Minutes of the 16th Governing Body Meeting held on 25-02-2017 at 11.00 AM in the Board Room of Sri Vasavi Engineering College.

Members Present:

1. Sri O.P. Goenka	--	Chairman
2. Sri G. Satyanarayana	--	Member
3. Sri Ch.S.N. Murthy	--	Member
4. Sri Ch.V.V.Subba Rao	--	Member
5. Sri P. Bala Kasaiah	--	Member
6. Sri P.Venkateswara Rao	-	Member
7. Dr. J. Srihari Rao	--	Member
8. Prof. T. Ramesh	--	Member
9. Sri M. Mahesh	--	Member
10. Dr. B. Prabhakara Rao	--	University Nominee
11. Smt. G. Loshma	--	Member
12. Dr. Ch. Rambabu	--	Invitee
13. Sri Ch. Apparao	-	Invitee
14. Dr.G.V.N.S.R. Ratnakara Rao	--	Invitee
15. Dr. B. Brahmaiah	--	Member Secretary

Members requested for absence:

1. Sri V.Rajanna	--	Member
2. Regional Officer, AICTE, SCRO Hyd.	--	AICTE Nominee
3. Sri J. Satyanarayana Murthy	--	Member
4. Dr. V.V.Hanumantha Rao	--	Member

BOG Meeting on 25/02/'17

Minutes of the Meeting

Item No 1: Welcome address

Principal extended a warm welcome to the Chairman and Members.

Item No 2: Approval of the minutes of the 15th meeting held on 12/07/2016.

The minutes of the previous meeting were circulated earlier and also placed on the table. As there were no comments Board approved the same.

Board was also informed about the action taken regarding the revision of Vision & Mission and also about the award of Best All rounder gold medal.

Item No 3: To present the report on the progress of the college since the last meeting.

Progress made on various fronts since the last meeting was presented.

Board appreciated the achievements made by students and faculty.

Progress report is enclosed as Annexure-I

Item No 4: To appraise the status of admission into various courses for the academic year 2016-17.

Student admission status into various courses during the year 2016-17 was presented.

Board noted the very poor admission into some of the M.Tech programs.

Board was informed of the proposal to close down the P.G program in

i) Power Electronics specialization and

ii) Digital Electronics and Communication system specialization.

In view of the continued poor admissions into these programs Board ratified the action of the college in requesting the AICTE to make the sanctioned intake to zero in the above two courses in the next academic year i.e., 2017-18.

Item No 5: Ratification of Faculty and staff appointments made since the last meeting.

Details of teaching & non-teaching staff resigned & relieved and new appointments made since the last meeting were presented.

Board ratified the same.

Item No 6: To discuss the Training & Placements activities.

Activities of the finishing school in providing training to improve the employability skills of the students by internal trainers and external agencies like 'IT Curve' were explained to the board.

On/Off Campus Placement details of 2015-16 batch and 2016-17 batch (till date) were presented branch wise and Company wise.

Board appreciated the placement of two students with Rs. 8.0 lakh package by Teja's Networks (2016-17).

Item No 7: To review the examination results.

Analysis of the results of the examinations held in April 2016 (II Sem of 2015-16) and November 2016 (I Sem of 2016-17) was presented.

Board noted the pass percentages.

Dr. Ramesh suggested that some remedial action like conducting a pre-semester exam and giving additional inputs to identified students may be tried to avoid single subject failures.

Item No 8: To appraise the details of re-admitted candidates and transferred candidates during the academic year 2016-17.

Details of students who were detained earlier and re-admitted during II Sem of 2016-17 in different years and branches were presented.

Board noted.

Item No 9: To appraise the attendance particulars of the students like Condonation and Detention.

Statistics on the number of students who were i)detained and ii) permitted under condonation category during the I Sem of 2016-17 academic year were presented.

Board noted.

Item No 10: To appraise the status of the ongoing construction activity and infra structure facilities.

Board was informed about the completion of the construction and occupation of i) the Class Room Complex to be used by SVEC and NIT-AP and ii) the apartments block to be used as NIT AP Girls Hostel (Temporarily).

Board was also informed about the creation of 2 seminar halls with audio video facilities & internet connectivity.

Board also noted the progress in the construction of Auditorium complex.

Item No 11: To appraise about the status of UGC autonomous application and NBA accreditation application:

Board was informed that the U.G.C had constituted the expert committee for inspection. The date for the visit is to be fixed by the Co-ordinator of the committee. The visit is expected to be in the month of March'17.

Regarding accreditation by NBA, the application process has been initiated. Pre-qualifier has to be uploaded after receiving response from NBA.

Item No 12: To approve the proposed names of experts to be nominated as members on the proposed Academic Council under Autonomy.

Board was apprised about the constitution of Academic Council, which is mandatory for any autonomous institution.

Since the college is likely to become autonomous very soon the proposed names of experts to be nominated as members from academia & industry have been presented.

1. Prof. B.V.S.S.S. Prasad Department of Mechanical Engineering, IITM, Chennai
2. Prof. P.V. Siva Pullaiah, Pro VC, (former Professor of CIVIL Engineering, IISc, Bangalore.) GITAM University Bangalore.
3. Prof. S.R.K. Reddy, Advisor, GEC, Gudlavalleru.
4. Dr. N.S.C. Babu Executive Director, C-DAC, Bangalore.
5. Sri B.V. Raghavaiah Retired Director, CPRI, Bhopal.
6. Sri Lokam Prasad, CEO/Chief Architect, Miracle Software Systems, Vizag

Board approved the above names.

Item No 13: To appraise about the proposals sent for external funding.

Details of the proposals sent by different departments for external funding under various schemes of D S T and AICTE were presented (Seminar/Symposia-3, MODROBS-3, FDP-3, RPS-3, Skill development centre for SC/ST-1 and an Adjunct Professor).

Approval for the two day workshop on "Nano Applications in Civil Engineering" has been received from DST, till now.

Item No 14: To approve the revision of Vision & Mission statements and Goals & Objectives of the College.

As suggested by the Board in the previous meeting, a workshop has been conducted with stake holders on 21-03-2017 to review and revise the Vision and Mission statements.
After thorough discussion, considering the changing scenario in the industry, shift of education system from teacher centric to student centric and the expected graduate attributes, the Vision & Mission statements and Goals and Objectives have been redrafted, so that they are SMART (Simple, Measurable, Achievable, Realistic & Time bound).

The redrafted statements were presented to the board.

Board deliberated upon the statements and suggested slight modifications.

The final version of the statements is given as Annexure – II

Item No 15: Any other item

i) A proposal made by Dr.J Srihari Rao to institute a cash award of Rs. 2000/- in the name of (late) Prof. B.N.Das of I.I.T , Kharagpur, has been presented to the Board.

The award may be called as Prof B.N.Das memorial cash award Rs.2000/- to be awarded to a student of B.Tech every year, who secures highest % of marks in aggregate considering all the common mathematics subjects in the curriculum (M-I, M-II & M-III). In the case of grading system, the person who gets the highest grade in all the three subjects will be eligible. If there is a tie between two or more students the CGPA upto II Semester may be used to decide the awardee.
Board approved the award.

ii) In continuation of the decision to award the Best All Rounder Gold Medal to the outgoing student taken in the previous meeting; the criteria for deciding the Best All Rounder have been presented.
The criteria are given in Annexure III
Meeting concluded with vote of thanks by Principal.

Chairman

BOG Meeting on 25/02/'17

Annexure I

Item No 16:

Progress Report

1. Three important MOUs were singed.
   a. Under an MOU signed with M/S thing Tronics Innovations Pvt. Ltd., Bangalore, an IoT (internet of things) lab is established in the college at a cost of Rs. 1 lakh. Students and the faculty are working on Industry oriented projects. A part of the work was sent for patenting.
   b. Under an MOU signed with IIT Madras and NIT Warangal, BOSSMOOL operating system and data base application software were provided. Students have to solve the assignments given by IIT on this platform. This training program enhances the capabilities of the students for web development using data bases. This MOU is valid for 3 years and the expenditure involved is Rs. 1.8 Lakh.
   c. Under an MOU signed with e-Yantra of IIT Bombay a Robotics & Embedded systems lab is established in the college at a cost of Rs.3 lakh. Under this MOU 4 faculty members were trained as resource persons for offering In-house training to the students and to carry out student projects in the area of Robotics.
2. Internal Quality Assurance Cell (IQAC) has been reconstituted as per the revised guidelines of NAAC.
3. In association with Electronics and ICT academy of NIT Warangal a 6 - day Faculty Development program on Data Science and Big Data Analytics was organized during 20-25 January 2017.
4. 28 guest lecturers were organized by the departments by inviting experts from Industry/Academic institutions for the benefit of the students.
5. Rs. 40 Lakh worth of equipment was added to different laboratories in the departments.
6. Department of Civil Engineering has carried out 23 nos. of testing works and generated a revenue of Rs. 66,695/-
7. A total of 70 faculty attended FDPs/Seminars etc. organized at different places.
8. 20 papers were presented by faculty in Seminars/Conferences and 26 papers were published in Journals.
9. Sri. V.S. Naresh of CSE and Sri. K. Rambabu of MBA were awarded Ph.D degrees by JNTUK and Amaravathi University respectively. Sri. Madhu sudhanaRao Librarian is awarded Ph.D in Library Science by S.V. University.
10. Department of Civil Engineering obtained a grant of Rs. 1 Lakh from SERB/DST for conducting a 2 - day National Workshop on "Nano Applications in Civil Engineering".
11. Institution of Engineers (I) student chapters in Mechanical and EEE Departments were inaugurated. IE(I), IETE & CSI student chapters organized a number of special lectures and other activities on Engineers Day etc.

12. 4 Innovative proposals, 3 from ECE and 1 from CSE prepared by students under the guidance of faculty were selected in the first round (scrutiny) for presentation at the contest "L&T Techgium-2017" organized by Larsen and Tubro Technology services limited at Bangalore. Out of these 4 proposals 1 proposal from ECE, and the 1 from CSE were selected for the final presentation in month of April 2017 (proof of concept - to present in the form of a working model). The winning teams shall be awarded a cash prize and shall be recognized as TECHgium Innovators and special recognition will be made at the grand finale for the mentors.
13. 86 students participated in paper/poster presentations.
14. A total of 400 students participated in various co-curricular/extracurricular activities and about 100 students' participated sports/games activities outside the college.
    55 students won I/II prize in different competitions.
15. 4 students of CSE got scores of 289,298,297and 290 out of 340 in GRE.
16. Mr. D. Srikanth of III year CSE and his team received silver coin for active participation in Miracle Digital Valley Summit at Visakhapatnam during 12-17 December 2016.
17. 9 students of II B.Tech (Mech.) have successfully completed the MOOCs course on "Electrical Vehicle Technology" conducted by I.I.T. Guwahati and passed the examination.

BOG Meeting On 25/02/'17

Annexure II

Item No 17:

Vision

To be a premier technological institute striving for excellence with global perspective and commitment to the Nation.

Mission

- To produce Engineering graduates of professional quality and global perspective through Learner Centric Education.
- To establish linkages with government, industry and Research laboratories to promote R&D activities and to disseminate innovations.
- To create an eco-system in the institute that leads to holistic development and ability for life-long learning.

Quality Policy

Sri Vasavi Engineering College works towards excellence in technical education by providing quality Engineering education with global standards and state of the art infrastructure to develop the institution as a trend – setter molding young minds into technocrats with national commitment.

Prospective Plan (Goals & objectives)

- To obtain U.G.C. Academic Autonomy and to admit 2017-18 batch in Autonomous curriculum.
- To develop laboratories like Robotics, IoT etc to promote research activity in the inter disciplinary areas.
- To attract and ensure retention of talented faculty and staff through the implementation of best practices.
- To be recognized as a research centre by the Affiliating University for pursuing Ph.D. work.
- To convert the premises in to a smart campus.
- To develop infrastructure required to organize national and international seminars and conferences.
- To get industrial accreditations for the college to enhance the on-campus recruitment of graduates by Multinational Companies. (MNCs).
- To obtain 6 year accreditation by N.B.A. before the academic year 2018-19, for all the eligible courses.
- To establish centers of excellence in specific areas in collaboration with Industry/R&D organization through MOUs.

- To generate revenue through enhanced testing & consultancy work/funded R&D projects/offering training programs etc.
- To transfer the benefits of technology to the society, through incubation/skill development centers.
- To get a brand image to the institute by obtaining patents.
- To slowly convert the premises into a residential campus, where majority of the faculty also can stay back to work during extended hours to enhance the R&D output.
- **To transform the college into a centre of excellence in technical education – a Deemed university of international reputation by 2025, the Silver Jubilee Year.**

BOG Meeting On 25/02/'17

Item No.18 **Annexure III**

Criteria for Selecting Best All Rounder

A. **Academic Activity – 65 Marks (max)**
   i. Performance in 7 Semesters -60 marks
   ii. Qualification in GATE/CAT/MAT/GRE/TOEFL etc - 5 marks
   Total - 65 Marks

B. **Co-Curricular Activity- 15 Marks (max)**

Journal publication	-	3 marks per paper
Paper/Poster presentation Outside college	-	2 marks per paper
Dept. Seminar outside the Curriculum	-	3 per seminar
Class representative	-	2 per Sem (Max 2 Semesters)
Professional body member	-	1 per membership

C. **Extra- Curricular Activity – 15 Marks (Max)**
   i. **Outside the College:**

Individual event		**Group/Team Event**
I prize –	4 Marks/event	3 marks/event
II prize-	2 Marks/event	2 marks/event
Participation-	1 Mark/event	1/event

   ii. **Within the College:**

Individual event		**Group event**
I Prize	3/event	2/event
II Prize	1/event	1/event

   iii. **Tech Fest Co-ordinator: 4marks**
   Any other co-ordinator: 2 marks
   Committee member : 1 mark

D. **Selection committee's Assessment: 5 Marks.**
   (Personality/general exposure/Communication skills etc)

Note: The candidate should get at least 5 marks each in B & C parts.

Regarding Academic performance in Part A; the distribution of marks for the academic performance is may be done as follows:

Normalized mark = (Student Marks/CGPA)/ (Department Topper Marks/CGPA) x 60

Board approved the criteria and authorized the Principal to make minor changes if necessary.

SRI VASAVI ENGINEERING COLLEGE
(AUTONOMOUS)
Pedatadepalli, Tadepalligudem – 534 101.

22nd Meeting of Board of Governors (BOG)
Held on 16th Dec, 2022 at 10.30 AM in Board Room

10:00 to 10:30 A.M Campus Visit

Agenda Notes

Item No.1: Welcoming the Chairman and Members of the Board.

Opening remarks by Chairman.

Item No.2: Approval of the minutes of the last meeting held on 11/03/’2020 and appraisal of the action taken.

Copy of the minutes of the 21st Board of Governors meeting held on 11/03/2020 is herewith attached and members are requested to please go through it and make comments/suggestions needed, if any.

The minutes of the meeting is enclosed as **Annexure-I** (Page Nos. 1-3)

Item No.3: To present the report on the progress of the college since the last meeting.

The progress of the college since last meeting is given in **Annexure II**. (Page Nos. 4-13)

Item No.4: To appraise the status of admissions into various programmes for the academic years 2021-22 & 2022-23.

Details admissions made during the years 2021-22 & 2022-23 are given in **Annexure – III** (Page Nos.14-15)

Item No.5: To review the utilization of the Budget for the year 2021-22

Details of budget utilization in the year 2021-22 are given in **Annexure – IV** (Page No.16)

Item No.6: To approve the proposed Budget for the year 2022-23

Details of proposed budget for the year 2022-23 are given in **Annexure – V** (Page No.17)

Item No.7: Approval of the minutes of the Academic Council meetings held on 30-08-2020 (IV Meeting), 07-01-2021 (V Meeting), 05-02-2022 (VI Meeting) and 10-11-2022 (VII Meeting)

Minutes of the Academic Council meetings held on 30the Aug, 2020, 7th Jan, 2021, 5th Feb, 2022 and 10th Nov, 2022 are given in **Annexure – VI**
(Annexure VI is given seperately)

Item No.8: Ratification of Teaching Staff Appointments made since last BoG Meeting

Details of staff appointment (Teaching & Non-Teaching) since last BoG meeting are given in **Annexure VII (Page Nos.18-26)**

Board is requested to approve the appointments of new Teaching and Non-Teaching staff.

Item No.9: Training & Placement statistics for the years 2020-21 and 2021-22

The college is giving best training to the students to make them ready for recruitment drives. The details of total placements in 2020-21 & 2021-22 are as follows

- **Total Number of Companies: 125**
- **Total number of Offers: 1999**
- **Total number of students Placed: =1068**
- **Total number of major training programs Conducted: 29**

Highest Package: 44 LPA – Amazon

S. No.	Roll Number	Name of the Student
1.	18A81A05K9	KOTHA DHANA LAKSHMI

Second Package: 25.22 LPA – SERVICENOW

S. No.	Roll Number	Name of the Student
1.	17A81A05G7	YELLAVULA SRI GANGA SWETHA SRI BHAVANI

Third Highest Package: 20LPA – VMWARE

S. No.	Roll Number	Name of the Student
1.	17A81A0530	NANDURINAGA VENKATA SRI LALITHA
2.	17A81A0549	VANKAYALAKAVYANJANA

Third Highest Package: 20LPA - Wells Fargo

S. No.	Roll Number	Name of the Student
1.	18A81A05C8	SOWMYA BADANA

<u>Next Highest Packages:</u>

- **Next Highest package:** 13 LPA -CAPILLARY TECHNOLOGIES
- **Next Highest package** : 12 LPA - AIRBUS GROUP INDIA PVT. LTD.
- **Next Highest package:** 09 LPA - Berkadia
- **Next Highest package:** 7.02 LPA - TCS DIGITAL
- **Next Highest package:** 7 LPA - WILEY MTHREE
- **Next Highest package:** 6.52 LPA - ZOHO
- **Next Highest package:** 6.5L - ACCENTURE
- **Average Package:** 4 LPA

Placements: (2017-21Batch)

S. No.	Branch	Total Students	Total Placed	No. of Offers
1	**CE**	67	8	9
2	**EEE**	188	59	85
3	**ME**	113	33	40
4	**ECE**	194	92	181
5	**CSE**	237	129	320
	Total	**799**	**321**	**635**

Placements: (2018-22 Batch)

S. No.	Branch	Total Students	Total Placed	No. of Offers
1	**CE**	60	35	47
2	**EEE**	118	94	197
3	**ME**	121	82	112
4	**ECE**	191	160	352
5	**CSE**	251	209	598
	Total	**741**	**580**	**1306**

Placements: (2019-23 Batch)

S. No.	Branch	Total Students	Total Placed	No. of Offers
1	**CE**	63	2	2
2	**EEE**	107	11	10
3	**ME**	115	3	3
4	**ECE**	204	72	58
5	**CSE**	57	17	16
6	**ECT**	273	123	100
7	**CST**	60	21	16
	Total	**879**	**249**	**205**

Item No.10: Examination results for the year 2020-21 & 221-22

Result analysis of the successful completion of B.Tech., MBA & M.Tech. end examinations and eligible no. of students for award of degree for the year 2021 & 2022 are given in **Annexure VIII**. (Page No.27-30)

Item No.11: Information on new courses/increase in intake/reduction in take etc. made in AICTE EoA application for the year 2021-22 & 2022-23

The following changes were made while submitting the application for EoA from AICTE for the year 2021-22.

New Courses:

i. Introduced two new emerging courses: B.Tech. in Artificial Intelligence and Machine Learning and B.Tech. in CSE (Artificial Intelligence) with an intake of 60 in each specialization from the academic year 2021-22

ii. Intake increased for PG Programme MBA from 90 to 120 in the year 2021-22

Change in the Name of the Course(s):

1. M.Tech. in Structural Engineering to M.Tech. Civil (Structural Engineering).
2. M.Tech. in Power Systems Control and Automation Engineering to M.Tech. in Power Electronics and Power Systems.
3. M.Tech. Machine Design to M.Tech. in Thermal Engineering.
4. M.Tech. in VLSI and Embedded Systems to M.Tech. in Embedded Systems and VLSI.
5. M.Tech. in Computer Science & Engineering to M.Tech in Computer Science.

The following changes were made during the year 2022-23.

i) Introduced a new course in Diploma level namely Diploma in Computer Engineering with an intake of 60 from the academic year 2022-23.

ii) Intake increased to 120 from 60 in two under graduate programmes B.Tech. in Artificial Intelligence and Machine Learning & B.Tech. in CSE (Artificial Intelligence) from the academic year 2022-23

Reduction of Intake was applied in the following programmes from 2022-23.

1. M.Tech. in Civil (Structural Engineering) – 18 to 6
2. M.Tech. in Power Electronics and Power Systems – 18 to 6
3. M.Tech. in Thermal Engineering – 18 to 6
4. M.Tech. in Embedded Systems and VLSI – 18 to 6
5. M.Tech. in Computer Science - 18 to 12
6. B.Tech. in Electrical & Electronics Engineering - 120 to 90
7. B.Tech. in Mechanical Engineering – 120 to 90
8. Diploma in Civil Engineering – 60 to 30
9. Diploma in Mechanical Engineering – 120 to 60
10. Diploma in Electrical & Electronics Engineering – 120 to 90

Item No.12: Proposal / Ratification of change of Member in Academic Council

Dr. Srinivas Pinisetty, Asst. Professor in CSE Department of IIT, Bhuvaneswar has been identified for the nomination as a member to College Academic Council in replacement of Late Dr. B.V.S.S.S. Prasad, Professor of Mechanical Engineering , IIT Madras.

Board is requested to approve his name for nomination to Academic Council.

Item No.13: Proposal for the change in HR Policy of the institution with respect to consultancy works

The following proposal was received from Head of the Depts. to change HR Policy rules in respect of honorarium in consultancy work being done by Departments.

Honorarium for Consultancy Work		
S.No.	Existing Policy	Proposed
1	College (60%)	College (50%)
2	Principal (2%)	Principal (2%)
3	HOD (3%)	HOD (6%)
4	Faculty Incharge (25%)	Faculty Incharge (25%)
5	Lab Technician (5%)	Lab Technician (10%)
6	DEO (1%)	DEO (2%)
7	Accounts (2%)	Accounts (2%)
8	Helper (2%)	Helper (3%)
Total	100%	100%

Item No.14: Any other Item with the permission of the chair.

SRI VASAVI ENGINEERING COLLEGE (Autonomous)

Pedatadepalli, Tadepalligudem – 534 101.

First Meeting of Academic Council held on 01/06/2018 at 10:30 A.M in the Conference Hall of Sri Vasavi Engineering College

Members Present:

1.	Dr.G.V..S.N.R.Ratnakar Rao	I/C Principal & Chairman
2.	Dr.P.V.Siva Pullaiah	Member
3.	Dr.S.R.K.Reddy	Member
4.	Dr.N.S.C.Babu	Member
5.	Dr.V.V.Subba Rao	Member
6.	Dr.P.Subba Rao	Member
7.	Dr.R.Sowmeyan, HOD, CE	Member
8.	Dr.Ch.Rambabu, HOD, EEE	Member
9.	Dr.M.V.Ramesh, HOD, ME	Member
10.	Dr.E.Kusuma Kumari, HOD, ECE	Member
11.	Dr.D.Jaya Kumari, HOD, CSE	Member
12.	Sri.N.Rajasekhar, HOD, BS&H	Member
13.	Dr.G.V.Subba Raju, HOD, MBA	Member
14.	Dr.J.Srihari Rao, Director	Member
15.	Dr.V.V.Hanumantha Rao, Section Head, English	Member
16.	Sri.K.N.H.Srinivas, Assoc.Prof., ECE	Member
17.	Dr.P.V.V.Rama Rao, Dean R&D	Member

Members absent

1.	Dr.B.V.S.S.Prasad, Professor, IIT, Madras	Member
2.	Dr.Ch.Satynarayana, Professor, DAP, JNTUK	Member
3.	Sri Prasad Lokam, CEO, Miracle Software Solutions	Member
4.	Sri B.V.Raghavaiah, Director (Retd.), CPRI, Bhopal	Member

1st Academic Council Meeting held on 01/06/'18

Minutes of the Meeting

Item No.1: Welcome address by Principal& Introduction of members.

As the Principal Dr.B.Brahmaiah was on leave, Prof.G.V.S.N.R Ratnakar Rao, Dean Academic & Member Secretary of the Council chaired the meeting in the capacity of In-charge Principal.

He welcomed all the members and introduced the members.

Item No.2: Approval of subject experts from outside parent University to be nominated as members of Boards of Studies in different departments

The constitution of different Boards of Studies along with external members as per the UGC guidelines was presented to the council.

The council approved the names of the subject experts from outside parent University nominated as members of Boards of Studies in different departments.

The approved names are given in Annexure-I

Item No.3: Academic Rules & Regulations for U.G & P.G programs

The rules & regulations for B.Tech/M.Tech & MBA programs were presented. After going through the rules & regulations members made some suggestions. Further, it was resolved to finalize the rules & regulations after taking the suggestions from the members in the Joint meeting of Boards of Studies also.

Item No.4: Any other item with the permission of the Chair

The tentative course structure for the UG, PG programs offered also was presented and it was tentatively approved and was resolved to finalize after further discussion in Boards of Studies.

Chairman

1st Academic Council Meeting on 01/06/2018
Agenda Item no: 02
Annexure-I

Approved List of Subject Experts for Nomination as Members on Boards of Studies

Department: Civil Engineering

S.No.	Name of the Member	Designation
1.	Dr. C.B. Kameswar Rao	Professor, Dept of Civil Engg., NIT Warangal
2.	Dr. M. Kumar	Professor, Dept of Civil Engg., Osmania University College of Engg, Hyderabad

Department: Electrical and Electronics Engineering

S.No.	Name of the Member	Designation
1.	Dr. M. Sydulu	Professor, Department of Electrical and Electronics Engineering, NIT Warangal
2.	Dr. Y. P. Obulesu	Professor, Department of Electrical and Electronics Engineering, VIT, Vellore.

Department: Mechanical Engineering

S.No.	Name of the Member	Designation
1.	Dr. R.V.Chalam	Professor, Department of Mechanical Engineering, NIT Warangal
2.	Dr. A. Krishnaiah	Professor, Department of Mechanical Engineering, Osmania University, Hyderabad

Department : Electronics & Communication Engineering

S.No.	Name of the Member	Designation
1.	Dr.N.V.S.N. Sarma	Professor, Department of Electronics and Communication Engineering, NIT Warangal
2.	Dr. M. Venugopala Rao	Professor, Department of Electronics and Communication Engineering, KL Deemed University, Vijayawada

Department : Computer Science & Engineering

S.No.	Name of the Member	Designation
1.	Dr. R.B.V. Subrahmanyam	Professor, Department of Computer Science and Engineering, NIT Warangal
2.	Dr. S. Pallam Setty	Professor, Department of Computer Science and Systems Engineering, AU College of Engineering, Visakhapatnam

Department: BSH (English)

S.No.	Name of the Member	Designation
1.	Dr. D. Kesava Rao	Professor of English, NIT Warangal
2.	Dr. K. Sree Ramesh	Special Officer, Adikavi Nannayya Univeristy PG Center, Tadepalligudem

Department: BSH (Physics)

S.No.	Name of the Member	Designation
1.	Dr. S.V.S.R. Reddy	Professor, Dept of Physics, NIT Warangal
2.	Dr.P.S.V.Subba Rao	Asst.Prof., Department of Physics Andhra University, Visakhapatnam

Department: BSH (Chemistry)

S.No.	Name of the Member	Designation
1.	Dr. P. Nageswara Rao,	Professor, Dept of Chemistry, NIT Warangal
2.	Dr. G. Rambabu	Asst. Prof., Sri Vidyaniketan Engg. College(A), Tirupathi

Department: BSH (Mathematics)

S.No.	Name of the Member	Designation
1.	Dr. Y.N.Reddy	Professor, Dept of Mathematics, NIT, Warangal
2.	Dr. K.K.M. Sarma	Professor of Mathematics, Andhra University, Visakhapatnam

Department: Management Studies

S.No.	Name of the Member	Address
1.	Dr. B. Amarnath	Professor & Registrar, Rayalaseema University, Kurnool
2.	Dr.J.N.V.Raghu Ram	Associate Professor, Department of Technology Management, VIT, Vellore

Minutes of the 2nd Academic Council meeting on 01/07/2018
Item No: 3
Annexure No: I

Academic Rules and Regulations for B.Tech Programme

(Applicable to the Batches Admitted in 2018 and onwards)

1.0 All the rules and regulations specified hereafter shall be read as a whole for the purpose of interpretation and when any doubt arises, the decision of the Chairman Academic Council of Sri Vasavi Engineering College is final.

As per the norms, the Principal of the college (Autonomous) shall be the Chairman of Academic Council.

2.0 ADMISSIONS:

ELIGIBILITY:

As per the norms of JAHAWARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA, Kakinada

B.TECH – REGULAR:

For Category – A seats (**Filled by the Convener, AP EAMCET),** a pass in Intermediate/10+2 with a rank in Common Entrance Test, AP EAMCET conducted by APSCHE.

For Category – B seats (**Filled by the College),** a pass (**50% Min aggregate**) in Intermediate/10+2 with or without a rank in AP EAMCET.

B.TECH -LATERAL ENTRY:

Admission under lateral entry is governed by the eligibility norms of JNTUK and Government of Andhra Pradesh.

2.1 ADMISSIONS UNDER SPECIAL CASES:

These may arise in the following situations.

1. When a student gets detained due to academic regulations and re-joins the college to complete the programme in a new regulation.
2. When a student discontinues for some time and re-joins the college to complete the programme in a new regulation.
3. When a student seeks transfer from other colleges to SVEC and intends to pursue B.Tech programme in the eligible branch of study.

These admissions may be permitted by the College Academic Council as per the norms stipulated by the statutory bodies and the Government of Andhra Pradesh from time-to-time.

In all such cases for admission if necessary permissions from the statutory bodies are to be obtained and the programme of study at the college will be governed by the transitory regulations stipulated in 9.10.

An undertaking from the students is to be taken at the time of admission stating that they would abide by the transitory regulations specified by the authorities if there is any change in the regulations.

3.0 DURATION OF THE PROGRAM AND MEDIUM OF INSTRUCTION:

The duration of the B.Tech program is four academic years comprising two semesters in each academic year. **The medium of instruction and examination is English**.

S.No	Activity	Description
1	Number of Semesters in an Academic year.	Two
2	Regular Semester duration in Weeks.	21 Weeks

3.1 Academic Activities Schedule:

1	Instruction	Starts from the date commencement of the semester as specified in the academic calendar.
2	Ist Mid Examinations	During the 9th week from the date of commencement of the semester.
3	2nd Mid Examinations	During the 17th week from the date of commencement of the semester
4	Comprehensive Test	During the 18th week from the date of commencement of the semester
5	Practical Examinations	1 Week
6	End Semester Examinations	2 Weeks

3.2 EVALUATION:

For Theory Courses:

Continuous Internal evaluation (CIE) for 40 marks and Semester End Examinations (SEE) for 60 marks of the student's performance.

For Laboratory course:

40 marks for Continuous Internal Evaluation (CIE) and 60 Marks for the Semester End Examinations (SEE).

4.0 PROGRAMS OF STUDY IN B.TECH:

4.1 The four year B.Tech programme is offered in the following branches of study at present:

S.No	Title of the UG Programme	Program Code
1.	Civil Engineering	CE
2.	Electrical and Electronics Engineering	EEE
3.	Mechanical Engineering	ME
4.	Electronics and Communication Engineering	ECE
5.	Computer Science & Engineering	CSE

4.2 Structure of the programme:

4.2.1 Each B.Tech programme of study shall consist of:

1. General courses in Basic Sciences, Basic Engineering Sciences, Social Sciences & Humanities.
2. Interdisciplinary courses in Engineering to impart the fundamentals of Engineering to the student.
3. Program core courses to impart broad based knowledge needed in the branch of study concerned.
4. Program elective courses from the discipline and open elective courses from interdisciplinary areas to be chosen by the student based on his/her interest and specialization preferred.

5. Laboratory courses
6. Projects, seminars and internships.
7. Every programme of study shall be designed to have 45-50 theory courses and 15-20 laboratory courses and the percentage distribution of the credits among different types of courses is as follows.

Humanities, Social Sciences, Basic Sciences and Engineering Science courses	35-40%
Professional core courses	30-40%
Professional and open elective courses	10-15%
Major project, Seminar, Employability skills and etc.,	10-15%

4.2.2 Contact hours:

Depending on the requirements of the programme, the number of contact hours per week is normally between 25 to 30.

4.2.3 Credits:

Credits are assigned to each course as per the norms as shown below:

Theory Course: 1 hour per week - 1 credit

Laboratory Course: 1 hour per week - 0.5 credit

4.3 Curriculum for programme of study:

1. The curriculum of B.Tech programme in any branch of Engineering is formulated based on the guidelines mentioned in **4.2,** (to be recommended by the Board of Studies concerned and approved by the Academic Council).

2. (After getting approval from the Academic Council, a copy of the curriculum along with rules and regulations for the programme shall be made available to all the students.) The following table shows a typical curriculum frame work for the B.Tech programme.

S.No	Course Area	Typical no of credits for a total of 160 credits

1.	Humanities & Social Sciences	10-15
2.	Basic Sciences	20-25
3.	Engineering Sciences	20-25
4.	Professional Core	45-60
5.	Professional Electives	12-18
6.	Major Project/Seminar, etc.,	10-15
7.	Open Electives	6-12
8.	Mandatory Courses	Non-credit

4.4 Maximum duration permitted to pursue the programme and cancellation of admission:

4.4.1 The maximum duration permitted to successfully complete the four year B.Tech. Programme of study shall be:

1. Eight academic years in sequence from the year of admission for a normal student admitted into the first year of the Programme.
2. Six academic years in sequence from the year of admission for a lateral entry student admitted into the second year of the Programme.

4.4.2 In case, any student fails to meet the applicable conditions for the eligibility of degree in the maximum stipulated period as mentioned in **4.4.1** his/her admission stands cancelled.

5.0 EXAMINATION SYSTEM AND EVALUATION:

5.1. The performance of the students in each semester shall be assessed course wise. All assessments will be done on absolute marks basis. However, for the purpose of reporting the performance of candidate, letter grades and grade points will be awarded. The performance of the student in each theory course is assessed through

1. Mid Semester Examinations
2. Comprehensive tests and
3. End Semester Examinations

For each theory/design and/or drawing course there shall be a Semester End Examination of three hours duration at the end of each semester, except where stated otherwise in the detailed scheme of instruction.

5.2. The distribution of marks between continuous internal evaluation (CIE) and semester end examination (SEE) will be as follows:

Nature of the course	CIE	SEE
Theory Courses	40	60
Drawing	40	60
Practical	40	60
Seminar Presentation/Comprehensive Viva	50	-
Project work Part-A	50	
Project work Part-B	50	150
Mandatory course	40	60

5.3. **Continuous Internal Evaluation (CIE) in Theory and Drawing Courses:**

For theory Courses the distribution for 40 marks under CIE will be as follows:

Two Mid semester examinations - 25 marks each

Comprehensive test - 10 marks

Assessment through

Alternate assessment tool (AAT)

2 times in a Semester - 05 marks each

CIE is computed as follows.

Two Mid Semester Examinations will be conducted, each for 25 marks. In order to encourage the students to appear for both examinations, weighted average of both exams will be taken as follows:

CIE= 0.8 X Best performance in MID exam +0.2 X Next best performance in MID exam $+\frac{(AAT1+AAT2)}{2}+$ Performance in comprehensive test

Comprehensive test in the total syllabus will be conducted at the end of the instruction.

The alternate assessment tool with detailed modality of evaluation for each course shall be specified by the teacher concerned at the beginning of the course with the permission of HOD concerned and the Principal.

The Mid Semester Examination is conducted in the regular mode according to a schedule which will be specified in the academic calendar.

The said examination consists of Part-A and Part-B, Part-A being objective type for 10 marks and Part-B being a written examination for 15 marks.

Engineering Graphics:

The internal evaluation for 40 marks will be done as follows:

1. Each student has to submit 6 drawing assignments - 6 x 5 = 30 marks
2. Two mid examinations each for 10 marks with weighted average as specified above =10 marks

Total- 40 marks

5.4. Semester End Examination Evaluation:

5.4.1 For each theory, design and/or the drawing course there shall be a semester end examination of three hours duration at the end of each semester for 60 marks unless stated otherwise in the detailed scheme of instructions.

The end semester examination is conducted for 60 marks covering the total syllabus.

There will be 6 questions with internal choice (One from each Unit). The student has to answer all the 6 questions which carry a weightage of 10 marks each.

5.4.2 For practical Courses there shall be continuous evaluation during the semester for 40 internal marks and semester end examination for 60 marks. The 40 marks under CIE shall be awarded as follows:

Day to day work -15 marks, Record-10 marks and internal laboratory test (to be conducted towards the end of the semester)-15 marks.

The Semester end examination in practical course shall be conducted by the teacher concerned and an external examiner.

5.4.3 For the seminar, the student shall collect the information on a specified topic and prepare a technical report and has to make an oral presentation showing his understanding over the topic to be evaluated by the Departmental committee consisting of **Head of the**

department, seminar supervisor and a senior faculty member. The seminar report shall be evaluated for 50 marks. There shall be no external examination for seminar.

Project Part-A: The student will make literature survey, identify a problem and prepare a plan for the execution of the proposed project work. Evaluation will be done by the departmental committee consisting of Head of the Department, Project In-charge and a senior faculty member. The evaluation will be done for 50 marks based on the report submitted and a seminar/viva-voce.

P**roject Part-B:** Out of a total of 200 marks for the project work-Part B, 50 marks shall be for Internal Evaluation and 150 marks for the Semester End Examination. The Semester End Examination (Viva – Voce) shall be conducted by a committee consisting of an external examiner, Head of the Department and Supervisor of the Project. The evaluation of project work shall be conducted at the end of VIII semester. The Internal Evaluation shall be on the basis of two seminars given by each student on the topic of his project and evaluated by an internal committee.

5.4.4 A minimum of 21 marks (35%) are to be secured exclusively in the semester end examination of theory/drawing course and a minimum total of 40 marks in SEE and CIE put together (40%) in a theory/drawing course is to be secured in order to be declared as passed in that course and for award of the grade in that course.

6.0 ATTENDANCE REQUIREMENTS:

A student is eligible to write the semester end examinations (SEE) if he/she acquires a minimum of 75% of attendance in aggregate of all the courses of that semester put together.

6.1 Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in a given semester may be granted by the College Academic Committee on medical grounds provided the student has submitted the application for medical leave along with medical certificate from a Registered medical practitioner within three days form reporting to the class work after the expiry of the medical leave.

6.2 A student representing the college in approved extracurricular activities such as sports, games, cultural meets, seminars, workshops and conferences shall be considered as on duty provided he/she has obtained prior written permission from the head of the department concerned and also submitted the certification of participation from the organizer of the event within three days after the completion of the event. However, this period of absence shall be counted as present for the purpose of computation of attendance only.

6.3 A stipulated fee shall be payable towards condonation of shortage of attendance.

6.4 Attendance below 65% in aggregate shall not be condoned under any circumstances.

6.5 Students whose shortage of attendance is not condoned in any semester are not eligible to write their semester end examinations.

6.6 A student who is short of attendance in a semester may seek re-admission into that semester when offered again, within 1 week from the date of the commencement of class work.

6.7 A student will be promoted to the next semester if he satisfies the attendance requirement of the present semester and the credit requirements specified under **7.0.**

6.8 If any candidate fulfills the attendance requirement in the present semester, he shall not be eligible for readmission into the same class.

6.9 A student is permitted to avail the condonation of shortage of attendance as mentioned above for a maximum of three times only during the total duration of the programme.

7.0 CONDITIONS FOR PROMOTION:

Minimum academic requirements:

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in **item no.6.0.**

7.1 A student is deemed to have satisfied the minimum academic requirements if he/she has earned the credits allotted to each theory/practical/design/drawing/laboratory course/project and secures not less than 35% of marks in the semester end examination and minimum 40% of marks in the sum total of the internal marks and semester end examination marks.

7.2 A student shall be promoted from first year to second year if he/she fulfills the minimum attendance requirement.

7.3 A student shall be promoted from II year to III year if he/she earns 50% of the total credits specified up to and including II year II semester.

7.4 A student shall be promoted from III year to IV year only if he earns 50 % of the credits specified up to and including III year I semester

8.0 GRADING SYSYTEM:

8.1 Based on the student performance during a given semester, a final letter grade will be awarded at the end of the semester for each course. The letter grades and the corresponding grade points are as given in the table.

TABLE: GRADES & GRADE POINTS

Grade	Grade Points	% of marks
S	10	≥ 90
A	9	≥ 80 – < 90
B	8	≥ 70 – < 80
C	7	≥ 60 – < 70
D	6	≥ 50 – < 60
E	5	≥ 40 – < 50
F	0 (Failed)	< 40
	0 (Absent)	—

8.2 A student who earns a minimum of 5 grade points (E grade) in a course is declared to have successfully completed the course, and is deemed to have earned the credits assigned to that course.

However, it should be noted that a pass in any course/term paper/project shall be governed by the rules mentioned in 5.0.

8.3 For Mandatory Courses: The evaluation will be done based on CIE and SEE with weightage as given in 5.2. These courses will not carry any credits. The performance will be graded as pass/fail. The grades obtained in these courses will not affect the grade point average; however, they will appear on the grade sheet.

8.4 Award of Degree

A student shall register and put up minimum attendance in all 160 credits and earn all 160 credits and also should secure a pass in all the mandatory courses to become eligible for the award of the degree.

A student who fails to satisfy the above criteria as indicated in the course structure within eight academic years from the year of his/her admission, shall forfeit his/her seat in B.Tech. programme and his/her admission stands cancelled.

9.0 GRADE POINT AVERAGE:

9.1 Computation of SGPA and CGPA:

The following procedure to compute the Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA):

i. The SGPA is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student, i.e

$$\textbf{SGPA}\ (Si) = \sum(Ci \times Gi) / \sum Ci$$

where Ci is the number of credits of the i^{th} course and Gi is the grade point scored by the student in the i^{th} course.

ii. The CGPA is also calculated in the same manner taking into account all the courses undergone by a student over all the semesters of a programme, i.e.

$$\textbf{CGPA} = \sum(Ci \times Si) / \sum Ci$$

where Si is the SGPA of the i^{th} semester and Ci is the total number of credits in that semester.

The SGPA and CGPA shall be rounded off to 2 decimal places and reported in the transcripts.

Illustration for Computation of SGPA and CGPA:

Computation of SGPA at the end of 1st Semester

Illustration No.1:

Course	Credit	Grade letter	Grade point	Credit Point (Credit x Grade)
Course 1	3	A	9	3 x 9 = 27

Course 2	3	C	7	3 x 7 = 21
Course 3	3	B	8	3 x 8 = 24
Course 4	3	S	10	3 x 10 = 30
Course 5	3	D	6	3 x 6 = 18
Course 6	3	C	7	3 x 7 = 21
Course 7	2	A	9	2 x 9 = 18
Course 8	2	C	7	2 x 7 = 14
Total	**22**			**173**

Thus, **SGPA at the end of 1st Semester= 173/22=7.86**

Illustration No.2 (with one failure)

Course	Credit	Grade letter	Grade point	Credit Point (Credit x Grade)
Course 1	3	A	9	3 x 9 = 27
Course 2	3	C	7	3 x 7 = 21
Course 3	3	B	8	3 x 8 = 24
Course 4	3	S	10	3 x 10 = 30
Course 5	3	F	0	3 x 0 = 00
Course 6	3	C	7	3 x 7 = 21
Course 7	2	A	9	2 x 9 = 18
Course 8	2	C	7	2 x 7 = 14
Total	**22**			**155**

Thus, **SGPA= 155/22=7.04**

Illustration No.2 (a)

Course	Credit	Grade letter	Grade point	Credit Point (Credit x Grade)
Course 5	3	D	6	3 x 6 =18
Total Credits of the	**22**			Ci (First Attempt)155 + Ci (subsequent attempt) 18= **173**

Thus, re-calculated **SGPA** after clearing the course**= 173/22=7.86**

Illustration No.3

Course	Credit	Grade letter	Grade point	Credit Point (Credit x Grade)

Course 1	3	A	9	3 x 9 = 27
Course 2	3	C	7	3 x 7 = 21
Course 3	3	B	8	3 x 8 = 24
Course 4	3	S	10	3 x 10 =30
Course 5	3	A	9	3 x 9 = 27
Course 6	3	C	7	3 x 7 =21
Course 7	2	A	9	2 x 9 =18
Course 8	2	C	7	2 x 7 =14
Total	**22**			**182**

Performance in Second semester

SGPA of 2nd Semester= 182/22=8.27

Thus, CGPA at the end of II semester: CGPA= $\frac{22*7.86+22*8.27}{44}$ = 8.06

CGPA calculation after Final Semester:

Sem-1	***Sem-2***	***Sem-3***	***Sem-4***	***Sem-5***	***Sem-6***	***Sem-7***	***Sem-8***
Credit : 16 SGPA: 7	Credit: 20 SGPA: 8.5	Credit : 22 SGPA: 9.2	Credit : 22 SGPA: 6.86	Credit : 20 SGPA: 8.18	Credit : 20 SGPA: 7.73	Credit : 20 SGPA: 8.68	Credit : 20 SGPA: 9.4

Thus, overall CGPA= $\mathbf{\frac{16*7+20*8.5+22*9.2+22*6.86+20*8.18+20*7.73+20*8.68+20*9.4}{160} = 8.21}$

9.2 Eligibility for Award of B.Tech. Degree:

A student shall be eligible for award of the B.Tech. degree if he/she fulfils all the following conditions:

1. Registered and successfully completed all the components prescribed in the Programme of study to which he/she is admitted.
2. Obtained CGPA greater than or equal to 5 (Minimum requirements for Pass), Has no dues to the Institute, hostels, Libraries etc., and
3. No disciplinary action is pending against him/her.

9.3 Award of Class:

A candidate who becomes eligible for the award of B.Tech degree shall be placed in one of the following classes based on CGPA.

TABLE: CGPA REQUIRED FOR AWARD OF DEGREE

Distinction	≥7.75*
First Class	≥6.75
Second Class	≥5.75
Pass	≥5.00

*In addition to the required CGPA of 7.75, the student must have necessarily passed all the courses of every semester **in the minimum stipulated period for the programme.**

9.4 Improvement of Class:

A candidate, after becoming eligible for the award of the degree, may reappear for the Semester End Examination in any two (maximum) of the theory courses as and when conducted, for the purpose of improving the aggregate and the class. But this reappearance shall be within a period of one academic year after becoming eligible for the award of the Degree.

However, this facility shall not be availed of by a candidate who has taken the Provisional Certificate. Such candidates shall not be permitted to reappear either for CIE in any course or for Semester End Examination (SEE) in laboratory courses (including project Viva-voce) for the purpose of improvement.

9.5 Supplementary Examination:

In addition to the Regular End Examinations held at the end of each semester, Supplementary End Examinations will be conducted during the Semester break. A Student can appear for any number of supplementary examinations till he clears all courses which he could not clear in the first attempt. However, the maximum stipulated period shall not be relaxed under any circumstances.

9.6 Malpractices:

The Principal shall refer the cases of malpractices in Continuous Internal Evaluation (CIE) and Semester End Examination (SEE) to an Enquiry Committee constituted by him. The committee will submit a report on the malpractice allegedly committed by the student to the Principal.

Rules pertaining to the punishments in the case of Malpractice are given in Annexure-I

9.7 Additional Academic Regulations:

i. Any Attempt to impress upon the teachers, examiners, faculty and staff of examinations, bribing for either marks or attendance will be treated as malpractice.

ii. When a student is absent for final examination, he is treated as to have appeared and obtained zero marks in that component and Grade is awarded accordingly.

iii. When a component of Continuous Internal Evaluation (CIE) or Semester End Examination (SEE) is cancelled as a penalty, he is awarded zero marks in that component.

iv. **Grade Sheet:** A grade sheet (memorandum) will be issued to each student indicating his/her performance in all courses taken in that semester and also indicating the grades and SGPA.

v. **Transcripts**: After successful completion of the total programme of study, a Transcript containing performance of all academic years will be issued as a final record. Candidates shall be permitted to apply for recounting/revaluation within the stipulated period with payment of prescribed fee.

vi. **The Academic Council has to approve and recommend to the JNTUK, Kakinada for the award of a degree to any student.**

9.8 Withholding of Results:

If the Student has not paid the dues, if any, or if any case of indiscipline is pending against him, the result of the student will be withheld and he will not be allowed into the next semester. His degree will be withheld in such cases.

9.9 Transitory Regulations:

For students admitted under special cases (mentioned in 2.1) these transitory regulations will provide the modus operandi.

At the time of such admission, based on the Programme pursued (case by case):

1. Equivalent courses completed by the student are established by the BOS concerned.
2. Marks/Credits are transferred for all such equivalent courses and treated as successfully cleared in the Programme of study prescribed by SVEC.

3. A Programme chart of residual courses not cleared will be derived and a Programme of study with duration specified will be prescribed for pursuit at SVEC.
4. Marks obtained in the previous system if the case be, are converted to grades and CGPA is calculated accordingly.

All other modalities and regulations governing shall be the same as those applicable to the stream of students with whom such a candidate is included into.

Regarding the students who were admitted under JNTU, Kakinada regulations for affiliated colleges:

If they happen to join and study along with their juniors at SVEC, the transitory regulations to be specified by JNTU, Kakinada for such students have to be followed.

10.0 GENERAL:

a) Wherever the words "he", "him", "his", occur in the regulations, they include "she", "her", "hers".
b) The Academic regulations should be read as a whole for the purpose of any interpretation.
c) In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Chairman of the Academic Council is final.
d) The Academic Council reserves the right to revise, amend, change or nullify the Regulations, Schemes of Examinations and/or Syllabi or any other matter depending on the needs of the students, society and industry.

11.0 B.Tech - LATERAL ENTRY SCHEME:

The B.Tech Degree of Sri Vasavi Engineering College (Autonomous), Pedatadepalli, Tadepalligudem under Jawaharlal Nehru Technological University Kakinada, Kakinada shall be conferred on candidates who are admitted into the second year of the programme and fulfill the requirements for the award of the Degree.

Applicable for the students admitted into II year B. Tech. (LES) from the Academic Year 2019-20 and onwards.

AWARD OF B. Tech. DEGREE – LES

A student will be declared eligible for the award of B. Tech. Degree (LES) if he/she fulfils the following academic regulations:

- Having admitted into the second year of the programme, a student shall be declared eligible for the award of the B. Tech Degree (LES), if he/she pursues a course of study in not less than three academic years and not more than six academic years.
- The candidate shall register for all the courses as specified for the program of study from second year to fourth year. (As per the present curriculum, the candidate shall register for 124 credits and secure all the 124 credits to become eligible for the award of the degree).
- All the other regulations as applicable to B. Tech. 4-year degree course (Regular) will hold good for B. Tech. (Lateral Entry Scheme).

Annexure-I

MALPRACTICES

S.No	Nature of Malpractices/Improper Conduct	Punishment
1 (a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only.
(b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled and sent to the University.

3.	Impersonates any other candidate in connection with the examination	The candidate who has impersonated shall be expelled From examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate who has been impersonated, shall be cancelled in all the subjects of the Examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.
4.	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in the subject.
6.	Refuses to obey the orders of the Chief Superintendent/Assistant – Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.

	of the examination.	
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat .
8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.
9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges In any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them.
10.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year.
11.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year examinations.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the University for further action to award suitable punishment	

COURSE STRUCTURE OF FIRST YEAR B.TECH (CE/EEE/ECE)
(For 2018 – 2019 Admitted Batch)

I SEMESTER

S.No	Course Code	Course Name	L	T	P	C
1	V18ENT01	English – I	2	-	-	MNC
2	V18MAT01	Engineering Mathematics – I	3	1	-	4
3	V18CHT01	Engineering Chemistry	3	1	-	4
4	V18CST01	Programming in C for problem solving	3	-	-	3
5	V18MET01	Engineering Graphics	1	-	3	2.5
6	V18ENL01	English Communication Skills Lab – I	-	-	2	MNC
7	V18CSL01	Programming lab in C for problem solving	-	-	3	1.5
8	V18CHL01	Engineering Chemistry Lab	-	-	3	1.5
		Total	12	2	11	16.5

Total Contact Hours: 25 Total Credits: 16.5

II SEMESTER

S.No	Course Code	Course Name	L	T	P	C
1	V18ENT02	English – II	2	-	-	2
2	V18MAT02	Engineering Mathematics – II	3	1	-	4
3	V18PHT01/ V18PHT02	Optics and Waves for CE/ Opto Electronics and Semi Conductors for EEE & ECE	3	1	-	4
4	VI8MET03 VI8MET02 VI8EET02	Engineering Mechanics for CE/ Introduction to Engineering Mechanics for EEE/ Basic Electrical Engineering for ECE	3	1	-	4
5	V18CHT02	Environmental Studies for EEE & ECE	3	-	-	MNC
6	V18ENL02	English Communication Skills Lab – II	-	-	2	1
7	VI8CEL01 V18EEL03 VI8EELO2	Computer aided Civil Engineering Drawing for CE Electrical Engg Workshop for EEE/ Basic Electrical Engineering Lab for ECE	-	-	3	1.5
8	V18PHL01/ V18PHL02	Optics and Waves Lab for CE/ Opto Electronics and Semi Conductors lab for EEE & ECE	-	-	3	1.5
9	VI8MELO1	Engineering and IT Workshop	-	-	3	1.5
		Total	14	3	11	19.5

Total Contact Hours: 28 (for EEE & ECE) Total Contact Hours: 25 (CE) Total Credits: 19.5

COURSE STRUCTURE OF FIRST YEAR B.TECH (CSE/ME)
(For 2018 – 2019 Admitted Batch)

I SEMESTER

S.No	Course Code	Course Name	L	T	P	C
1	V18ENT01	English – I	2	-	-	MNC
2	V18MAT01	Engineering Mathematics – I	3	1	-	4
3	V18PHT01/ V18PHT02	Optics and Waves for ME/ Opto Electronics and Semi Conductors for CSE	3	1	-	4
4	V18EET01	Basic Electrical and Electronics Engineering	3	1	-	4
5	V18CHT02	Environmental Studies	3	-	-	MNC
6	V18ENL01	English Communication Skills Lab – I	-	-	2	MNC
7	V18MEL01	Engineering and IT Workshop	-	-	3	1.5
8	V18EEL01	Basic Electrical and Electronics Engineering Lab	-	-	3	1.5
9	V18PHL01 V18PHL02	Optics and Waves Lab for ME/ Opto Electronics and Semi Conductors Lab for CSE	-	-	3	1.5
		Total	14	3	11	16.5

Total Contact Hours: 28 Total Credits: 16.5

II SEMESTER

S.No	Course Code	Course Name	L	T	P	C
1	V18ENT02	English – II	2	-	-	2
2	V18MAT02	Engineering Mathematics – II	3	1	-	4
3	V18CHT01	Engineering Chemistry	3	1	-	4
4	V18CST01	Programming in C for problem solving	3	-	-	3
5	V18MET01	Engineering Graphics	1	-	3	2.5
6	V18ENL02	English Communication Skills Lab – II	-	-	2	1
7	V18CSL01	Programming lab in C for problem solving	-	-	3	1.5
8	V18CHL01	Engineering Chemistry Lab	-	-	3	1.5
		Total	12	2	11	19.5

Total Contact Hours: 25 Total Credits: 19.5

I B.Tech I Semester English – I
(Common to all branches)

S.No	Course Code	Course Name	L	T	P	C
1	V18ENT01	English –I	2	-	-	MNC*

(*MNC : Mandatory Non Credit Course)

Course Outcomes

CO-1
Understand human resources and their contribution to the society, listen to and read a text to comprehend, interpret and answer questions, and use prepositions and tenses appropriately.
CO-2
Appraise the problems of transport and the solutions, write the gist of a short-story, know the etymological roots of words, use prefixes and exhibit basic skills in writing.
CO-3
View Solar Energy as a viable alternative source, and read for comprehension, analysis and interpretation and present narratives in writing.
CO-4
Evaluate various alternative sources of energy, spell words appropriately, pronounce them with proper stress, punctuate sentences correctly and narrate instances and stories.
CO-5
Realize the value of our living environment, describe animals, birds, objects, events, processes, etc., write paragraphs coherently and use connectors effectively.
CO-6
Grasp the vital role of training in industrial organizations, use prepositions, take notes, follow the office etiquette and write impressive narrations.

Syllabus

Unit-1
Human Resources: (From 'English for Engineers and Technologists')
Human resources and their contribution to the society
Word Stress, Simple Present Tense and Simple Past Tense
Using Present Continuous Tense
Role-play
Prepositions and Verb forms : Correct usage
Phrases and Clauses
Reading Skills development
Paragraph writing : Cohesion
An Ideal Family: A short story by **Catherine Mansfield**
(From 'Panorama: A Course on Reading')
Vocabulary
Unit-2
Transport : Problems and Solutions (From 'English for Engineers and Technologists')
Etymological roots
Prefixes
Pronunciation
Parts of Speech

Useful expressions
Writing Skills development
Writing Minutes of Meeting
War : A short story by **Luigi Pirandello** (From 'Panorama: A Course on Reading')
Vocabulary

Unit-3

Evaluating Technology (From 'English for Engineers and Technologists')
Writing
Reading Comprehension
The Verger : A short story by **Somerset Maugham**
(From 'Panorama: A Course on Reading')
Vocabulary
Antonyms and abbreviations

Unit-4

Energy: Alternative Sources (From 'English for Engineers and Technologists')
Word Stress
Antonyms
Suffixes
Comprehension
Spelling and Punctuation
Sentence structures
The Scarecrow : A short story by **Satyajit Ray**
(From 'Panorama: A Course on Reading')
Vocabulary

Unit-5

Our Living Environment (From 'English for Engineers and Technologists')
Connectors
Describing an animal/ a bird
Verb forms : practice
Reading Skills development
Writing Skills development
Making notes
A Village Lost to the Nation : A short story by **Krishna Chandra Pujari**
(From 'Panorama: A Course on Reading')
Vocabulary

Unit-6

Industry : Safety and Training (From 'English for Engineers and Technologists')
Taking notes
Prepositions
Reading Skills development
Word formation : Etymological Roots
Writing Skills development
Office Etiquette
Martin Luther King and the African: A short story by **Chinua Achebe**
(From 'Panorama: A Course on Reading') Vocabulary

Books Prescribed: **1. English for Engineers and Technologists**
Orient BlackSwan Pvt Ltd.
2. Panorama : A Course on Reading, Oxford University Press
(Prescribed for I B.Tech students of the JNTUK, Kakinada under R16 Regulation)

Suggested Readings from AICTE

1. Practical English Usage. Michael Swan, OUP. 1995
2. Remedial English Grammar, F.T. Wood. Macmillian, 2007

3. On Writing Well. William Zinsser.Harper Resource Book. 2001
4. Study Writing. Liz Hamp-Lyons and Ben Heasly. Cambridge University Press 2006
5. Communication Skills. Sanjay Kumar and PushpLata. Oxford University Press.2011
6. Exercises in Spoken English. Parts, I-III. CIEFL, Hyderabad Oxford University Press

Books for further reference

1. The Oxford guide to Writing & Speaking – John Seely
2. Technical Communication : Principles and practice – Meenakshi Raman & Sangeetha Sharma, Oxford University Press, New Delhi, 2014.
   (For Gujarat Technological University)
3. Business communication Concepts, Cases and Application – P.D. Chaturvedi and Mukhesh Chaturvedi, Pearson Education, Delhi, 2006.
4. The Students' Companion – Wilfred D. Best (New Edition) – Harper, Collins Publishers, 2012.

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I B.Tech II Semester

English – II
(Common to All Branches)

S.No	Course Code	Course Name	L	T	P	C
1	V18ENT02	English –II	2	-	-	2

Course Outcomes

CO-1
Understand the real import of education and work of noble men, use nouns, verbs and adjectives appropriately, identify and correct common errors in usage and write official letters.
CO-2
Derive inspiration from real life samples, interpret and speak on them, use synonyms and antonyms of words properly and do E-correspondence with required netiquette.
CO-3
Assimilate and adjust to new cultural environments, write on life-sketches, make the right use of tense and aspect and concord in sentences and plan and develop speech-writing.
CO-4
Imbibe ideas from the lives and works of successful men, use adverbs, develop view-points and topics and write different types of essays.
CO-5
Emulate personality-development inputs, elaborate on inspiring scientists use one-word substitutes, develop précis writing and write for the media.
CO-6
Learn from the paradigm of great contributors, use collocations and write professional and technical reports in standard formats.

Syllabus

Unit-1
The Greatest Resource – Education (From 'English Encounters')
Understanding the author's perspective
Making use of nouns
Vocabulary – deriving nouns from verbs and adjectives
Misplaced modifiers
Synonyms and Antonyms
Identifying common errors
Letter writing : Standard formats for official letters
A.P.J. Abdul Kalam (From 'The Great Indian Scientists')
Synonyms and Anonyms
Unit-2
Jadav Payeng : 'The Forest Man of India'
Vocabulary : deriving adjectives
Synonyms and Antonyms
Identifying common errors in the use of adjectives
E-correspondence with required Netiquette
Cliches
C.V. Raman (From 'The Great Indian Scientists')
Use of Synonyms and Antonyms of words in different contexts
Unit-3
Cultural Shock : Adjustment to New Cultural Environments
(From 'English Encounters')
Building Vocabulary – Verbs and nouns
Synonyms and Antonyms and appropriate usage

Making use of Tense and aspect and subject-verb agreement in sentences
Planning and developing speech-writing
Reading comprehensions
Homi Jahangir Bhabha (From 'The Great Indian Scientists')
Synonyms and Antonyms

Unit-4
Satya Nadella's First Letter to the Employees as CEO of Microsoft
Building Vocabulary – deriving adverbs
Identifying common errors in the use of adverbs
Essay writing : Developing ideas and topics into different types of essays
Redundancies
Jagadish Chandra Bose (From 'The Great Indian Scientists')
Using synonyms and antonyms of words in different contexts
Unit-5
Excerpts from Robin Sharma's 'Who Will Cry When You Die?'
One-word substitutes and usage
Prepositions
Required skills to write for the media
Précis writing
Prafulla Chandra Ray (From 'The Great Indian Scientists')
Using synonyms and antonyms of words in different contexts
Unit-6
The Chief Software Architect (From 'English Encounters')
Building Vocabulary : Collocations and Usage
Identifying common errors
Report writing – Standard formats and required skills
Srinivasa Ramanujan (From 'The Great Indian Scientists')
Using synonyms and antonyms of words in different contexts
Books Prescribed: **1. English Encounters**
A Text Book to Face Challenges in Communication
Maruthi Publications
(Prescribed for I B.Tech students of the JNTUK, Kakinada under R16 Regulation)

Lessons 2,4 and 5 in the above text book have been replaced by the following

1. **Jadav Payeng : The Forest Man of India** by **Shreya Pareek**, 2014
   Net Source: https://www.thebetterindia.com
2. **Satya Nadella's First Letter to the Employees as CEO of Microsoft**
   Net Source: https://news.microsoft.com
3. **Excerpts from Robin Sharma's 'Who Will Cry When You Die?'**
   JAICO Publishing House, Mumbai, 2009

2. The Great Indian Scientists, Cengage

Suggested Readings from AICTE

1. Practical English Usage. Michael Swan, OUP. 1995
2. Remedial English Grammar, F.T. Wood. Macmillian, 2007
3. On Writing Well. William Zinsser.Harper Resource Book. 2001
4. Study Writing. Liz Hamp-Lyons and Ben Heasly. Cambridge University Press 2006
5. Communication Skills. Sanjay Kumar and PushpLata. Oxford University Press.2011
6. Exercises in Spoken English. Parts, I-III. CIEFL, Hyderabad Oxford University Press

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1. The Oxford guide to Writing & Speaking – John Seely

2. Technical Communication : Principles and practice – Meenakshi Raman & Sangeetha Sharma, Oxford University Press, New Delhi, 2014.
(For Gujarat Technological University)
3. Business communication Concepts, Cases and Application – P.D. Chaturvedi and Mukhesh Chaturvedi, Pearson Education, Delhi, 2006.
4. The Students' Companion – Wilfred D. Best (New Edition) – Harper, Collins Publishers, 2012.

I B.Tech I Semester

English Communication Skills Laboratory – I (Common to all branches)

S.No	Course Code	Course Name	L	T	P	C
1	V18ENL01	ECS Lab –I	-	-	2	MNC

Course Outcomes

CO-1
Listen to and make inquiries on phone, thank and respond to thanks in appropriate spoken idiom.
CO-2
Make requests, give permissions and directions in fluent English.
CO-3
Articulate well in the contexts of clarifying, inviting, complaining, congratulating, apolozing, advising, agreeing and disagreeing in conversational mode.
CO-4
Distinguish and pronounce letters and sounds of English phonetically.
CO-5
Practise and pronounce consonants, vowels and diphthongs and consonant clusters.
CO-6
Listen to and understand different accents in English, and pronounce English words and speak sentences with right stress and intonation.

Unit-1
Why Study Spoken English
Making Inquiries on the Phone, Thanking and
Responding to Thanks
Practice Work
Unit-2
Requests, Permissions, and Directions
Practice Work
Unit-3
Clarifying, Inviting, Complaining, Congratulating and
Expressing Sympathy
Apologising, Advising, Suggesting, Agreeing and Disagreeing
Practice Work
Unit-4
Letters and Sounds
Practice Work
Unit-5
The Sounds of English
Practice Work
Unit-6
Pronunciation
Stress and Intonation
Practice Work

Book Prescribed:
Interact : English Lab Manual for Undergraduate Students
Orient BlackSwan
(Prescribed for I B.Tech students of the JNTUK, Kakinada under R16 Regulation)

Books for further reference

1. The Official Cambridge Guide to IELTS, For Academic & General Training, (With DVD-ROM), Student Book with Answers, 2015.
2. English Language Communication Skills, Lab Manuel cum Workbook (with CD), Cengage Learning.

I B.Tech II Semester

English Communication Skills Laboratory – II (Common to all branches)

S.No	Course Code	Course Name	L	T	P	C
1	V18ENL02	ECS Lab –II	-	-	2	1

Course Outcomes

CO-1
Listen to people critically and argue rationally to present a view-point confidently in formal debates.
CO-2
Exhibit team spirit and communicative skill and participate effectively in group discussions.
CO-3
Plan, structure and give presentations in professional manner.
CO-4
Face and perform well in interviews with required etiquette.
CO-5
Compose E-mails in standard formats to communicate clearly and write different types of CV in vogue that befit today's career needs.
CO-6
Make apt use of idiomatic expressions and recognize and correct typical errors that Indian speakers of English make in pronunciation, spelling, vocabulary and grammar.

Syllabus

Unit-1
Presentation Skills
Practice Work
Unit-2
Group Discussions
Practice Work
Unit-3
Debating
Practice Work
Unit-4
Interview Skills
Practice Work
Unit-5
E-mails
Practice Work
Unit-6
Idiomatic Expressions
Common Errors in English
Book Prescribed:
Interact : English Lab Manual for Undergraduate Students
Orient BlackSwan
(Prescribed for I B.Tech students of the JNTUK, Kakinada under R16 Regulation)
Books for further reference

1. The Official Cambridge Guide to IELTS, For Academic & General Training, (With DVD-ROM), Student Book with Answers, 2015.
2. English Language Communication Skills, Lab Manuel cum Workbook (with CD), Cengage Learning.

I B.Tech I & II Semesters **English**

(Common to all branches)

Assignment –I: Each Student is required to select a book (Short Story / Novel / Bio-graphy / Autobiography), read it and submit a report or an essay on it. He/She has to make an oral presentation of the gist of the book in the class before the completion of MID-I Examination. It is mandatory for all the students. It is for Internal Assessment.

Assignment-II : Each Student is required to present a report on a problem faced by individuals or the society with an analysis and possible solutions. He/She has to make an oral presentation of it in the class before the completion of MID-II Examination. It is mandatory for all the students. It is for Internal Assessment.

I B.Tech I Semester **MATHEMATICS-I**
(Common to All Branches)

S.No	Course Code	Course Name	L	T	P	C
1	VI8MAT01	**MATHEMATICS-I**	3	1	-	4

Course Outcomes: At the end of the course student will be able to:

CO1: Apply matrix technique to solve system of linear equation.
CO2: Find Eigenvalues and Eigen vectors
CO3: Solve the ordinary differential equations of first order & first degree
CO4: Solve the linear differential equations of higher order
CO5: Calculate maxima and minima of functions of two variables
CO6: Solve first order partial differential equations.

UNIT I: Linear system of equations:
Rank-Echelon form-Normal form – Solution of linear systems – Gauss elimination – Gauss Jordon- Gauss Jacobi and Gauss Seidal methods.
Applications: Finding the current in electrical Circuits.

UNIT II: Eigen values - Eigen vectors and Cayley-Hamilton theorem:
Eigenvalues - Eigen vectors– Properties – Cayley-Hamilton theorem (without proof) - Inverse and powers of a matrix by using Cayley-Hamilton theorem.

UNIT-III: Differential equations of first order and first degree:
Linear-Bernoulli-Exact-Reducible to exact differential equations.
Applications: Newton's Law of cooling-Law of natural growth and decay-Orthogonal Trajectories.

UNIT IV: Linear differential equations of higher order:
Linear non homogeneous differential equations of higher order with constant coefficients involving RHS term of the type e^{ax}, sin ax, cos ax, polynomials in x, e^{ax} V(x), xV(x)- method of variation of parameters.

UNIT V: Partial differentiation:
Introduction- Homogeneous function-Euler's theorem-total derivative-chain rule-generalized mean value theorem for single variable (without proof)-Taylor's and Maclaurin's series expansion of functions of two variables (without proof)– Functional dependence- Jacobian.
Applications: maxima and minima of functions of two variables without constraints and Lagrange's method (with constraints).

UNIT VI: First order Partial differential equations:
Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – solutions of first order linear (Lagrange) equation.

Text Books:
1. B.S.Grewal, Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.
2. N.P.Bali, Engineering Mathematics, Lakshmi Publications.

Reference Books:
1. Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, Wiley-India
2. Dean G. Duffy, Advanced engineering mathematics with MATLAB, CRC Press
3. Srimanta Pal, Subodh C.Bhunia, Engineering Mathematics, Oxford University Press.
4. Dass H.K., Rajnish Verma. Er., Higher Engineering Mathematics, S. Chand Co. Pvt. Ltd, Delhi.

I B.Tech II SEMESTER

MATHEMATICS-II
(Common to All Branches)

S.No	Course Code	Course Name	L	T	P	C
1	VI8MAT02	**MATHEMATICS-II**	3	1	-	4

Course Outcomes: At the end of the Course student will be able to:
CO1: Estimate approximate root of algebraic and transcendental equations
CO2: Compute interpolating polynomial for the given data
CO3: Solve ordinary differential equations using numerical methods
CO4: Evaluate multiple integrals and improper integrals
CO5: Calculate gradient of a scalar function, divergence and curl of a vector function.
CO6: Apply the knowledge of vector integral concepts to find characteristics of vector fields

UNIT I: Solution of Algebraic and Transcendental Equations:
Introduction- Bisection method – Method of false position – Iteration method – Newton-Raphson method (One variable).

UNIT II: Interpolation:
Introduction- finite differences- forward differences backward differences –central differences – symbolic relations and separation of symbols - differences of a polynomial-Newton's formulae for interpolation - Lagrange's interpolation formula.

UNIT III: Numerical Integration and solution of Ordinary Differential equations:
Trapezoidal rule- Simpson's 1/3rd and 3/8th rule-Solution of ordinary differential equations by Taylor's series- Euler's method - Runge-Kutta method (second and fourth order).

UNIT IV: Multiple Integrals:
Definition of Improper integrals - Double and triple integrals – Change of variables – Change of order of integration.
Applications: Finding areas and volumes.

UNIT V: Vector Differentiation:
Vector differential operator - Gradient- Divergence- Curl - Laplacian and second order operators - Vector identities.

UNIT VI: Vector Integration:
Line integral: Work done – Potential function – Surface and volume integrals - Vector integral theorems: Greens, Stokes and Gauss Divergence theorems (without proof) and related problems.

Text Books:
1. B.S.Grewal, Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.
2. N.P.Bali, Engineering Mathematics, Lakshmi Publications.

Reference Books:
1. Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, Wiley-
2. Dean G. Duffy, Advanced engineering mathematics with MATLAB, CRC Press
3. V.Ravindranath and P.Vijayalakshmi, Mathematical Methods, Himalaya Publishing House. India
4. Srimanta Pal, Subodh C.Bhunia, Engineering Mathematics, Oxford University Press.
5. Dass H.K., Rajnish Verma. Er., Higher Engineering Mathematics, S. Chand Co. Pvt. Ltd, Delhi.

OPTICS AND WAVES

(For Civil Engineering & Mechanical Engineering)

S.No	Course Code	Course Name	L	T	P	C
1	V18PHT01	**PHYSICS:** OPTICS AND WAVES	3	1	-	4

A student who successfully fulfills the course requirements will be able to:

1. Correlate the engineering concepts based on fundamental Physical Optics with Coherent source. Furthermore, students will be able to solve problems connected with the operation of optical instruments.
2. Study the sound waves & Use modern physics techniques and tools.
3. Illustrate the fundamental concepts of magnetism and dielectrics.

UNIT-I

INTERFERENCE: Introduction- Principle of Superposition – Coherent Sources – Interference in thin films (reflection geometry) – Newton's rings – construction and working principle of Michelson Interferometer

UNIT-II

DIFFRACTION: Introduction- Fraunhofer diffraction at single slit - double slit and N-slits (qualitative only)-Grating equation – Rayleigh's criterion for resolving power- Resolving power of a grating.

UNIT-III

POLARIZATION: Types of Polarization – Double refraction, Nicol Prism -Quarter wave plate and Half Wave plate.

LASERS: Characteristics– spontaneous emission and Stimulated emission of radiation – Einstein's Transition Probabilities- population inversion– pumping schemes-Ruby laser-He-Ne LASER –Applications of laser

UNIT-IV

ACOUSTICS: Introduction – Types of Acoustics – Sound Absorption – Absorption Coefficient - Reverberation time- Factors Effecting the Reverberation Time - Sabine's Formula- Eyring's Formula – Acoustics of Concert Hall.

UNIT-V

ULTRASONICS: Introduction**-** Ultrasonic Transducers - Piezoelectric and Magnetostriction Transducers – Production of Ultrasonic Waves Using Piezoelectric Effect And Magnetostriction Method- Non-Destructive Testing - Pulse Echo Technique – Scan A, Scan B & Scan C Techniques.

UNIT-VI

MAGNETIC PROPERTIES: Introduction- Origin of Magnetic Moment, Classification of Magnetic Materials – Ferromagnetism- Hysteresis – Soft and Hard Magnetic Materials

DIELECTRIC PROPERTIES: Introduction, types of polarizations- Electronic, Ionic and Orientation polarizations (qualitative only), – Internal field – Clausius- Mossoti Equation-Dielectric in alternative fields (Dielectric loss, Strength and Breakdown.)

Text Books:

1. M. Armugam, Engineering Physics
2. Dr.P.Sreenivasa Rao, Engineering Physics

Reference Books:

1. S. Mani Naidu, Engineering Physics.
2. S.O.Pillai, Solid State Physics.
3. DK Bhattacharya, Engineering Physics.
4. Ajoy Ghatak, Optics.
5. A.J. Dekker, Solid State Physics.

OPTO-ELECTRONICS AND SEMICONDUCTORS
(For CSE, ECE & EEE)

S.No	Course Code	Course Name	L	T	P	C
1	V18PHT02	OPTO-ELECTRONICS AND SEMI CONDUTORS	3	1	-	4

A student who successfully fulfills the course requirements will be able to
1. Expose the students to the basic concepts of Lasers, optical fibers and their properties.
2. Interpret wavelike behavior of matter and how this motivates the need to replace classical mechanics by a wave equation of motion for matter (the Schrödinger equations)
3. Distinguish fundamental physical laws for better understanding of materials and their properties for engineering applications.
4. Apply fundamental principles and processes to operational semiconductor devices and their uses.

UNIT-I LASERS: Introduction – Coherent Sources – Characteristics of Lasers – Spontaneous and Stimulated Emission of Radiation – Einstein's Coefficients – Population Inversion – pumping schemes-Ruby laser-He-Ne LASER –Applications of LASERs.

UNIT-II FIBER OPTICS: Introduction – Basic Principle of Optical Fiber-Advantages of fibres – Acceptance Angle and Acceptance Cone – Numerical Aperture **–** Transmission of Signal Through Step Index and Graded Index Fibers – Basic Optical Fiber Communication Link - Application of Optical Fibers.

UNIT-III INTRODUCTORY QUANTUM MECHANICS: Introduction - Matter Waves – Physical Significance of Wave Function – Schrödinger Time Independent Wave Equation – Application of Schrödinger Wave Equation in One Dimensional Potential Box.

ELECTRON THEORY OF METALS: Assumptions and Failures of Classical Free Electron Theory – Quantum Free Electron Theory - Fermi Level, Fermi Dirac Distribution Function and Sources of Electrical Resistance in Metals.

UNIT-IV BAND THEORY OF SOLIDS: Bloch's Theorem (Qualitative) – Kronig – Penney Model – Formation of Energy Bands in Crystalline Solids – Classification of Crystalline Solids Based on Band Theory - E-K Relation - Effective Mass of an Electron - Concept of Hole.

UNIT-V SEMICONDUCTOR PHYSICS: Introduction - Types of Semiconductors – Energy Band Diagrams, Carrier Concentration in Intrinsic Semiconductors – Expression for Conductivity-Extrinsic semiconductors-Carrier concentrations- Drift and Diffusion Currents – Relevance of Einstein's Equation- Hall Effect and its Applications- Direct and Indirect band gap semiconductors.

UNIT-VI SEMICONDUCTOR DEVICS: Introduction- p-n junction Diode, Zener Diode ,Photo detectors- Photo Diode , Pin Diode ,Construction Working Principle of Solar Cell and Light emitting diode .

Text Books:

1. MN Avadhanulu & PG Kshirsagar , A Text Book of Engineering Physics.
2. DK Bhattacharya, Engineering Physics.

Reference Books:

1. P.Battacharya, Semiconductor Optoelectronic Devices.
2. A Ghatak, Optics
3. S.O.Pillai , Solid State Physics
4. Dr.P. Sreenivasa Rao, Applied Physics
5. John M Senior, Optical Fiber Communications Principles and Practices
6. A.J.Dekkar , Solid State Physics.

Optics & Waves Lab

For ME & CE

S.No	Course Code	Course Name	L	T	P	C
1	V18PHL01	Optics & Waves Lab	-	-	3	1.5

List of Experiments:

(Any eight of the following to be done)

1. Determination of Rigidity modulus of a material – Torsional Pendulum
2. Determination of acceleration due to gravity – Compound Pendulum
3. Verification of laws of vibrations in stretched strings – Sonometer
4. Determination of velocity of sound – Volume Resonator
5. Magnetic field Induction along the axis of current carrying coil – Stewart and Gee's apparatus.
6. Determination of Planck's constant using photocell.
7. Determination of wave length of laser source using diffraction grating .
8. Melde's experiment – Transverse and longitudinal modes.
9. Coupled oscillator - Study two normal modes of coupled oscillator.
10. Determination of radius of curvature of Plano convex lens by forming Newton's rings.

Opto Electronics & Semiconductors Lab

For ECE, EEE & CSE

S.No	Course Code	Course Name	L	T	P	C
1	V18PHL02	Opto Electronics & Semiconductors Lab	-	-	3	1.5

List of Experiments:

(Any eight of the following to be done)

1. Newton's rings – Radius of curvature of Plano – Convex Lens.
2. Determination of wavelength of laser source using diffraction grating.
3. L-C-R Series Resonance Circuit.
4. Study of V/I Characteristics of Semiconductor diode.
5. Study of V/I Characteristics of zener diode.
6. Characteristics of Thermistor – Negative Temperature Coefficient of resistivity.
7. Energy band gap of a Semiconductor p-n junction.
8. Determination of Hall Coefficient and Carrier Concentration - Hall Effect
9. Determination of Planck's constant using photocell.
10. Study the Characteristics of a photo diode.

I Year – I/II Semester **ENGINEERING CHEMISTRY**

(Common to all branches)

S.No	Course Code	Course Name	L	T	P	C
1	V18CHT01	**ENGINEERING CHEMISTRY**	3	1	-	4

Course Outcomes:

At the end of the course, the student should be able to:

CO1: Apply different plastics and rubbers for various engineering applications.

CO2: Assess the quality of fuels and apply the knowledge of fuels for the preservation of natural fuels.

CO3: Understand relevant concepts of Electro Chemistry to apply them in designing electrochemical energy systems.

CO4: Analyse boiler troubles arising due to poor water quality and suggest suitable water treatment methods for different industrial applications.

CO5: Analyse the causes for practical corrosion problems and apply corrosion principles for protection of metallic structures from corrosion.

CO6: Identify the important applications of advanced engineering materials.

UNIT I: HIGH POLYMERS

Polymerisation: Introduction- Mechanism of Free radical addition polymerization – Plastics as engineering materials: advantages and limitations – Thermoplastics and Thermosetting plastics – Compounding and fabrication techniques (Compression, Injection, Transfer and Extrusion) - Preparation, properties and applications of Polythene (HDPE and LDPE), PVC, Bakelite, and Teflon.

Elastomers: Natural rubber – Vulcanization of rubber – Synthetic Rubbers: Preparation, properties and applications of Buna S, Buna N, and Thiokol.

UNIT II: FUEL TECHNOLOGY

Fuels – Characterstics of good fuel – Classification – Calorific value - HCV and LCV – Dulong's formula, Numerical problems – Bomb calorimeter – Numerical problems.

Solid fuels - Coal –– Proximate and ultimate analysis – Significance of the analyses, Numerical problems.

Liquid fuels –Petroleum- Refining – Cracking – Synthetic petrol (Fischer Tropsch and Bergius process) – Knocking - Octane and Cetane ratings – Anti-knocking agents.

Gaseous fuels – Natural gas, LPG and CNG – Biofuels.

UNIT III: ELECTROCHEMICAL CELLS

Single electrode potential – Electrochemical series and its significance - Standard electrodes (Hydrogen, Calomel and, Glass electrodes)– Conductometric titrations (Acid – Base).

Batteries: Primary battery (Dry Cell) – Secondary batteries (Lead acid cell, Ni-Cd cells).

Fuel cells: H_2-O_2 fuel cell, H_2-methanol fuel cell.

UNIT IV: WATER TECHNOLOGY

Hard water - Types of Hardness – Units of hardness - Determination of hardness and alkalinity - Boiler troubles: Priming and foaming, sludge and scale formation, Boiler corrosion, Caustic embrittlement - Softening of hard water: Zeolite process, Lime – Soda process, and Ion exchange process - Water for drinking purposes - Purification – Sterilization and disinfection: Chlorination, Break point chlorination – Desalination - Reverse Osmosis and Electrodialysis.

UNIT V: CORROSION

Definition – Theories of Corrosion (Chemical & Electrochemical) – Types of electrochemical corrosion (Galvanic corrosion, Concentration cell corrosion,Stress corrosion Pitting corrosionand Intergranular corrosion) -

Galvanic series - Factors which influence the rate of corrosion - Protection from corrosion:Metallic coatings (Cathodic and Anodic), Cathodic protection, Protective coatings –Methods of application of coatings on metals (Galvanizing, Tinning, &Electroplating) – Paints.

UNIT VI: CHEMISTRY OF ADVANCED MATERIALS

Nano materials: Introduction – Carbon nanotubes - Types, preparation (Arc discharge, Laser ablation and CVD Method) - Properties and applications of Nano materials.

Liquid crystals: Introduction – Types – Applications.

Biodegradable polymers – Conducting polymers.

Green Chemistry:Principles, Need for green Chemistry.

Text Books:

1. Engineering Chemistry by Jain and Jain; Dhanpat Rai Publications & Co.
2. A Text book of Engineering Chemistry by S. S. Dara; S. Chand & Co Ltd.

Reference Books:

1. Engineering Chemistry of Willey India Pvt. Ltd., Vajiram and others.
2. Engineering Chemistry by PrasanthRath, Cengage Learning.
3. Engineering Chemistry by Shikha Agarwal; Cambridge University Press.
4. B. Sivasankar, Engineering Chemistry, McGraw-Hill.

I Year – I/II Semester **ENGINEERING CHEMISTRY LABORATORY**
(Common to all branches)

S.No	Course Code	Course Name	L	T	P	C
1	V18CHL01	ENGINEERING CHEMISTRY LABORATORY	-	-	3	1.5

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Analyze quantitatively a variety of samples using volumetric methods and instrumental methods.

CO2: Applying volumetric and instrumental methods for the determination of water quality parameters namely Alkalinity, Hardness and pH.

CO3: Prepare polymeric materials and analyse the given coal samples.

List of Experiments:

1. Introduction to chemistry laboratory – Molarity, Normality, Primary, Secondary standard solutions, Volumetric titrations, Quantitative analysis, Qualitative analysis etc.,
2. Trial experiment – Estimation of HCl using standard Na_2CO_3 solution.
3. Estimation of $KMnO_4$ using standard oxalic acid solution.
4. Determination of alkalinity of a sample of water.
5. Determination of total hardness of water using standard EDTA solution.
6. Determination of rate of corrosion of mild steel in acidic environment in the absence and presence of an inhibitor.
7. Estimation of ferrous iron using standard $K_2Cr_2O_7$ solution.
8. Estimation of copper using standard EDTA solution.
9. Estimation of vitamin – C using standard Iodine solution.
10. Estimation of pH of the given sample solution using pH meter.
11. Conductometric titration between strong acid and strong base.
12. Potentiometric titration between strong acid and strong base.
13. Proximate analysis of coal.
14. Preparation of phenol – formaldehyde resin.

Reference Books:

1. Practical Engineering Chemistry by K. Mukkanti, B.S. Publications.
2. Vogel's Quantitative Chemical Analysis – V Edition – Longman.
3. A Text Book on experiments and Calculations Engineering by S.S.Dara, S.Chand& Co Ltd.
4. Chemistry Practical Manual, Lorven Publications.

I Year – I/II Semester **ENVIRONMENTAL STUDIES**
(Common to all branches)

S.No	Course Code	Course Name	L	T	P	C
1	V18CHT02	ENVIRONMENTAL STUDIES	3	0	0	0

Course Outcomes:

At the end of the course, the student should be able to:

CO1: Identify the global environmental challenges and the possible means to combat them.

CO2: Examine the natural resources, their availability for the sustenance of the life and conservation.

CO3: Assess the concepts of the ecosystem and the need for protecting various ecosystems.

CO4: Discuss the biodiversity, threats and conservation practices to protect the biodiversity

CO5: Explain various attributes of the pollution and waste management practices.

CO6: Outline the environmental management and environmental legislations in India.

UNIT I: FUNDAMENTALS OF ENVIRONMENTAL STUDIES

Definition and components of environment, Global Environmental Challenges: Global warming and climate change- Kyoto protocol, Acid rains, Ozone layer depletion -Population explosion and effects.

UNIT II: NATURAL RESOURCES AND ASSOCIATED PROBLEMS

Forest resources: Use and over exploitation - Deforestation: Timber extraction, Mining, dams and other effects on forest and tribal people. Water resources: Use and over utilization of surface and ground water – Floods, drought, conflicts over water - Dams: Benefits and problems. Mineral resources: Use and exploitation - Environmental effects of extracting and using mineral resources. Energy resources: Renewable and Non-renewable energy sources. Land resources: Land degradation, Wasteland reclamation.

UNIT III: ECOSYSTEMS

Concept of an ecosystem - Structure and function of an ecosystem: Producers, consumers and decomposers - Energy flow in the ecosystem – Food chains, food webs and Ecological pyramids. Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems -Introduction, types, characteristic features.

UNIT IV: BIODIVERSITY AND ITS CONSERVATION

Definition-Values of biodiversity: Consumptive use, Productive use, Social use. Hot-spots of biodiversity - Threats to biodiversity: Habitat loss, man-wildlife conflicts - Endangered and endemic species of India – Conservation of biodiversity.

UNIT V: ENVIRONMENTAL POLLUTION

Definition, Causes, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution and Nuclear Pollution. Solid Waste Management: Sources, classification, effects and control measures of municipal and industrial solid wastes.

UNIT VI: ENVIRONMENTAL LEGISLATION AND THE MANAGEMENT

Human Rights to a clean environment provided by Constitution. Environmental Protection Act, 1986 - Air (Prevention and Control of Pollution) Act, 1981 - Water(Prevention and Control of Pollution) Act, 1974 -Wildlife (Protection) Act, 1972 -Forest (Conservation) Act, 1980 -Issues involved in enforcement of environmental legislation –Eco-tourism.

Text books:

1. Environment Studies, Fourth Edition, Anubha Kaushik, C P Kaushik, New Age International Publishers.
2. A Textbook of Environmental Studies, Shaashi Chawla, TMH, New Delhi.
3. Fundamentals of Environment Studies, DD Mishra, S Chand & Co Ltd.
4. Textbook of Environmental Science, M. Anji Reddy, B S Publications, Hyderabad.

I YEAR II SEMESTER

COMPUTER AIDED CIVIL ENGINEERING DRAWING

S.No	Course Code	Course Name	L	T	P	C
1	V18CEL01	COMPUTER AIDED CIVIL ENGINEERING DRAWING	0	0	3	1.5

COURSE OUTCOMES:

After completion of the course the student should be able to

- Define AUTOCAD and list the applications
- Classify various AUTOCAD commands
- Explain orthographic projections and draw conventional signs as per IS standards
- Identify view points and view ports
- Utilize AUTOCAD commands to plan the buildings section and elevation
- Discover various 3D modeling concepts

UNIT 1 :- INTRODUCTION TO CAD

- Introduction to software; Definition of CAD; Applications of CAD; Advantages of CAD.
- Study of Basic Commands; generation of points, lines, curves, polygons, dimensioning.
- Edit Commands – edit, zoom, cross hatching, utility commands, construct, insert

UNIT 2:- COMPUTER AIDED MODELING

- Orthographic Projections.
- Draw conventional signs as per I.S Standards, symbols used in civil Engineering drawing

UNIT 3:- VIEW POINTS AND VIEW PORTS

- View Point Coordinates Options like save, restore, delete, joint, single option
- Layout management ; scale setting ; plotting, Import and export

UNIT 4 : - Plans 2-D

- Building Plans
- Section
- Elevation

UNIT 5 :- 3-D Modeling Concepts

- Introduction to 3-D Modeling
- 3-D Coordinate system
- U.C.S
- Wireframe modeling
- Import and export

REFERENCES

- Engineering drawing with AUTOCAD by B.V.R.Gupta, M.Raja Roy
- Engineering drawing with an introduction to AUTOCAD Dhanunjay, Jolhea (Tata Mcgraw- Hill)

Electrical Engineering Workshop
(For EEE)

S.No	Course Code	Course Name	L	T	P	C
1	V18EEL03	Electrical Engineering Workshop	0	0	2	1

Any 12 of the following modules are to be conducted

1. Wiring tools and Accessories
2. Electrical Wiring Joints
3. Lamp Circuits
4. Soldering Practice
5. AC and DC circuits
6. Resistance Measurement
7. Capacitance Measurement
8. Battery voltage measurement
9. Piping and Thread cutting skills
10. Special Lamp Connections
11. Wiring Practice for Power Loads
12. Motor Connections
13. Earthing
14. Testing and repair of Domestic appliances
15. Identification of terminals of DC motors
16. Overhauling of DC Machine
17. Overhauling of AC Machine
18. Practice on Motor winding

Basic Electrical Engineering
(For ECE)

S.No	Course Code	Course Name	L	T	P	C
1	V18EET02	Basic Electrical Engineering	3	1	0	4

Module 1 : DC Circuits

Electrical circuit elements (R, L and C), voltage and current sources, Kirchoff current and voltage laws, analysis of simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems. Time-domain analysis of first-order RL and RC circuits.

Module 2: AC Circuits

Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance. Threephase balanced circuits, voltage and current relations in star and delta connections.

Module 3: Magnetic Circuits

Basic definitions - Analogy between electric and magnetic circuits -Faradays laws of electromagnetic induction-Types of induced e.m.f.'s- series, parallel magnetic circuits –Concept of Self, Mutual inductances - concept of co-efficient of coupling -Simple problems.

Module 4: DC Machines

Construction and working principle of DC generator–Magnetization characteristics,

Classification of DC motor, applications, speed control of DC motor: field and armature control – three point starter.

Module 5: Transformers

Classifications of transformers, construction and working principle of transformer, EMF equation of transformer, Ideal and Practical transformer, equivalent circuit, losses in transformers, OC and SC test of transformers regulation and efficiency. Auto-transformer

Module 6: AC Machines

Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Loss components and efficiency, starting and speed control of induction motor. Construction and working of synchronous generators

Text Books

1. T. K. Nagsarkar, M. S. Sukhija, "Basic Electrical Engineering", Oxford University Press, 2005
2. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.
3. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.
4. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.

Reference Books

1. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
2. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
3. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.
4. S. K. Bhattacharya, "Basic Electrical and Electronics Engineering", Pearson Education India, 2011
5. S. K. Sahdev, "Fundamentals of Electrical Engineering & Electronics", DhanpatRai& Company, 2001

INTRODUCTION TO ENGINEERING MECHANICS
(For EEE)

V18MET02	INTRODUCTION TO ENGINEERING MECHANICS	L	T	P	C
		3	1	0	4

Course Outcomes:
After successful completion of the course, the student will be able to
CO1: Compute the resultant force of a given system of forces **(K3)**
CO2: Calculate Equilibrium of different force systems by using free body diagrams **(K3)**
CO3: Solve the 2D equilibrium problems by considering friction **(K3)**
CO4: Find the Centroid, Center of Gravity and Moment of Inertia for plane figures and bodies **(K3)**
CO5: Illustrate the different types of plane motions of a particle to compute its velocity, acceleration and force. **(K3)**
CO6: Illustrate the concept of Work and Energy (**K3)**

Unit I: Resultant and Equilibrium of 2 D force system: concept of resultant, equivalent force systems, resultant of 2D force systems. Concept of equilibrium, engineering applications like beams, trusses, frames and cables.

Unit II: Resultant and Equilibrium of 3 D force system: resultant of general force system, moment about a point, moment about a line. Equilibrium of 3D force system, applications to concurrent and parallel force system.

Unit III: 2D equilibrium problems considering friction: Applications to simple contact friction, wedges and belt friction. Principle of virtual work: applications to beams and mechanisms with single degree of freedom.

Unit IV: Centroid: Centroid of simple figures (from basic principles) – Centroid of Composite Figures Centre of Gravity: Centre of gravity of simple body (from basic principles), centre of gravity of composite bodies, Pappus theorems. Moment of inertia of plane figures.

Unit V: Kinematics: Rectilinear and Curvilinear motions – Velocity and Acceleration – Motion of Rigid Body – Types and their Analysis in Planar Motion. Kinetics: Analysis as a Particle and Analysis as a Rigid Body in Translation – Central Force Motion – Equations of Plane Motion – Fixed Axis Rotation – Rolling Bodies.

Unit VI: Work – Energy Method: Equations for Translation, Work-Energy Applications to Particle Motion, Connected System-Fixed Axis Rotation and Plane Motion. Impulse momentum method.

Text Books:

1. Engineering Mechanics, Fedinand . L. Singer, Harper – Collins.
2. Engg. Mechanics - S.Timoshenko & D.H.Young., 4th Edn - , Mc Graw Hill publications.
3. Engineering Mechanics by A.K.Tayal , Umesh Publications.

Reference Books:

1. Theory & Problems of engineering mechanics, statics & dynamics – E.W.Nelson, C.L.Best & W.G. McLean, 5th Edn – Schaum's outline series - Mc Graw Hill Publ.
2. Meriam J. L., Kraige L. G., "Engineering Mechanics – Dynamics", Wiley Student Edition,• (Sixth Edition) reprint 2011.
3. Beer F. P. , Johnston E. R., "Vector Mechanics for Engineers Statics and Dynamics", Tata• McGraw Hill Publishing company Ltd., New Delhi (Eighth Edition) reprint 2009
4. Shames Irving H., "Engineering Mechanics", Prentice Hall, New Delhi (Fourth edition)• reprint 2009.

ENGINEERING MECHANICS

(For ME, CE)

V18MET03	ENGINEERING MECHANICS	L	T	P	C
		3	1	0	4

Course Outcomes:

After successful completion of the course, the student will be able to

CO1: Compute the resultant force of a given system of forces **(K3)**

CO2: Calculate the forces in the different types of plane trusses **(K3)**

CO3: Find the Centroid, Center of Gravity and Moment of Inertia for plane figures and bodies **(K3)**

CO4: Illustrate the different types of plane motions of a particle to compute its velocity, acceleration and force. **(K3)**

CO5: Illustrate the concept of Work and Energy (**K3)**

CO6: Apply the principle of Virtual Work to stability of equilibrium of beams and trusses **(K3)**

Unit I: Introduction to Engg. Mechanics – Basic Concepts.

Systems of Forces: Coplanar Concurrent Forces – Resultant – Moment of Force and its Application – Couples and Resultant of Force Systems.

Equilibrium of Systems of Forces: Free Body Diagrams, Equations of Equilibrium of Coplanar Systems for concurrent forces. Lami's Theorem, Graphical method for the equilibrium of coplanar forces, Converse of the law of Triangle of forces, converse of the law of polygon of forces condition of equilibrium.

Unit II: Analysis of Trusses by Method of Joints: Types of Trusses - Assumptions for forces in members of a perfect truss, Force table, Cantilever Trusses, Structures with one end hinged and the other freely supported on rollers carrying horizontal or inclined loads.

Unit III: Centroid: Centroid of simple figures (from basic principles) – Centroid of composite Figures

Centre of Gravity: Centre of gravity of simple body (from basic principles), Pappus theorems.

Area moments of Inertia: Definition – Polar Moment of Inertia, Transfer Theorem, Moments of Inertia of Composite Figures.

Mass Moment of Inertia: Moment of Inertia of Masses, Transfer Formula for Mass Moments of Inertia.

Unit IV: Kinematics: Rectilinear and Curvilinear motions – Velocity and Acceleration – Motion of Rigid Body – Types and their Analysis in Planar Motion.

Kinetics: Analysis as a Particle and Analysis as a Rigid Body in Translation – Central Force Motion – Equations of Plane Motion – Fixed Axis Rotation – Rolling Bodies.

Unit V: Work – Energy Method: Equations for Translation, Work-Energy Applications to Particle Motion, Connected System-Fixed Axis Rotation and Plane Motion. Impulse momentum method.

Unit VI: Principle of Virtual Work: Principle of virtual work, advantages of principle of virtual work, principle of virtual applied to stability of equilibrium. Application of principle of virtual work limited to beams, ladder problems and trusses only.

Text Books:

1. Engg.Mechanics - S.Timoshenko&D.H.Young., 4th Edn - , McGraw Hill publications.
2. Engineering Mechanics by A.K.Tayal , Umesh Publications.
3. Engineering Mechanics, Fedinand . L. Singer, Harper – Collins.

Reference Books:

1. Theory & Problems of engineering mechanics, statics & dynamics – E.W.Nelson, C.L.Best& W.G. McLean, 5th Edn – Schaum's outline series - McGraw Hill Publ.
2. Meriam J. L., Kraige L. G., "Engineering Mechanics – Dynamics", Wiley Student Edition,• (Sixth Edition) reprint 2011.
3. Beer F. P. , Johnston E. R., "Vector Mechanics for Engineers Statics and Dynamics", Tata• McGraw Hill Publishing company Ltd., New Delhi (Eighth Edition) reprint 2009
4. Shames Irving H., "Engineering Mechanics", Prentice Hall, New Delhi (Fourth edition)• reprint 2009.

I B.Tech- I /II Semester **ENGINEERING GRAPHICS**
(Common to all branches)

V18MET01	ENGINEERING GRAPHICS	L	P	C
		1	3	2.5

Course Outcomes:

After successful completion of the course, the student will be able to

CO1: Demonstrate the usage of drawing instruments and sketch conic sections **(K3)**

CO2: Construct different types of scales and special curves **(K5)**

CO3: Draw the projections of the points, lines and planes with reference to the principal planes. **(K2)**

CO4: Develop the projections of solids and its surfaces. **K3)**

CO5: Draw the Isometric projections of solids. **(K2)**

CO6: Convert the isometric view to orthographic view and vice versa. **(K2)**

UNIT1: INTRODUCTION TO ENGINEERING GRAPHICS:

Introduction to Engineering Graphics and its significance, usage of Drawing instruments- Mini Drafter, Calipers, Set square etc..Lettering, Conic sections – Ellipse, Parabola, Hyperbola,

UNIT 2: SPECIAL CURVES & SCALES:

Special Curves – cycloid, epicycloids, hypocycloid, involutes; Scales – Plain, Diagonal and Vernier Scales.

UNIT 3: ORTHOGRAPHIC PROJECTIONS:

Introduction to Orthographic Projections- Projections of Points, Projection of lines inclined to both the planes; Projections of planes- inclined to both the Planes .

UNIT 4: PROJECTIONS OF REGULAR SOLIDS:

Projections of Solids – Prisms, Pyramids, Cones and Cylinders with the axis inclined to one of the planes. Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone.

UNIT 5: ISOMETRIC PROJECTIONS :

Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple solids and compound Solids;

UNIT 6:

Conversion of Isometric Views to Orthographic Views and Vice-versa**.**

Text Books:

1. Engineering Drawing by N.D. Butt, Chariot Publications
2. Engineering Drawing by Agarwal & Agarwal, Tata McGraw Hill Publishers

Reference Books:

1. Engineering Drawing by K.L.Narayana & P. Kannaiah, Scitech Publishers
2. Engineering Graphics for Degree by K.C. John, PHI Publishers
3. Engineering Graphics by PI Varghese, McGrawHill Publishers
4. Engineering Drawing + AutoCad – K Venugopal, V. Prabhu Raja, New Age

V18MEL01	ENGINEERING WORKSHOP & IT WORKSHOP PRACTICE LAB	L	P	C
		0	3	1.5

Engineering Workshop

Course Outcomes:

After successful completion of the course, the student will be able to

CO1: prepare different models in the carpentry trade such as Cross lap joint, Dove tail joint. **(K3)**

CO2: make various basic prototypes in the trade of Tin smithy such as rectangular tray, and open Cylinder **(K3)**

CO3:model various basic prototypes in the trade of fitting such as Straight fit, V- fit. **(K3)**

CO4: prepare different models in the Black smithy such as Round rod to Square, S-Hook.. **(K3)**

CO5: perform various basic House Wiring techniques such as connecting one lamp with one switch, connecting two lamps with one switch, connecting a fluorescent tube, Series wiring, Go down wiring. **(K3)**

CO6: prepare various basic prototypes in the trade of Welding such as Lap joint, Butt joint. **(K3)**

Engineering Workshop

Note: At least two exercises to be done from each trade.

Carpentry

1. T-Lap Joint
2. Cross Lap Joint
3. Dovetail Joint
4. Mortise and Tenon Joint

Tin Smithy

1. Taper Tray
2. Square Box without lid
3. Open Scoop
4. Funnel

Fitting shop

1. V- Fit
2. Square Fit
3. Half Round Fit
4. Dovetail Fit

Black smithy

1. Round rod to Square
2. S-Hook
3. Round Rod to Flat Ring
4. Round Rod to Square headed bolt

House wiring

1. Parallel / Series Connection of three bulbs
2. Stair Case wiring
3. Florescent Lamp Fitting
4. Measurement of Earth Resistance

Welding shop (Arc welding)

1. Butt Joint
2. Lap Joint

		L	P	C
V18MEL01	**IT WORKSHOP LAB**	**0**	**3**	**1.5**

Course Outcomes:

After successful completion of the course, the student will be able to

- Demonstrate Disassemble and Assemble a Personal Computer and its peripherals(K3)
- Practice installation of operating system.(K3)
- Connect peripherals and install required drivers(K4)
- Demonstrate internet connectivity and usage of internet as per his/her requirement.(K3)
- Prepare the Documents for their projects(K3)
- Prepare Slide shows for their presentations (K3)

PC Hardware:

Task 1: Identification of the peripherals of a computer: To prepare a report containing the block diagram of the CPU along with the configuration of each peripheral and its functions. Description of various I/O Devices.

Task 2(Optional) :A practice on disassembling the components of a PC and assembling them to back to working condition.

Task 3: Examples of Operating systems- DOS, Installation of MS windows on a PC

Task 4: Introduction to Memory, types of Storage Devices, I/O Port, Device Drivers, Assemblers, Compilers, Interpreters

Software Troubleshooting (Demonstration): Identification of a problem and fixing the PC for any software issues.

Task 5: Hardware Troubleshooting (Demonstration): Identification of a problem and fixing a defective PC (improper assembly or defective peripherals).

Internet & Networking Infrastructure

Task 6: Demonstrating Importance of Networking, Transmission Media, Networking Devices- Gateway, Routers, Hub, Bridge, NIC, Bluetooth Technology, Wireless Technology, Modem, DSL,ISP.

Task 7: Search Engines & Netiquette: Students are enabled to use search engines for simple search, academic search and any other context based search (Bing, Google etc). Students are acquainted to the principles of micro-blogging, wiki, collaboration using social networks, participating in online technology forums.

Word

Task 8: MS Word Orientation: Accessing, overview of toolbars, saving files, Using help and resources, rulers, formatting ,Drop Cap , Applying Text effects, Using Character Spacing, OLE in Word, using templates, Borders and Colors, Inserting Header and Footer, Using Date and Time option, security features in word, converting documents while saving, , mail merge.

Task 9: Creating project : Abstract Features to be covered:-Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check , Track Changes, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes and Paragraphs.

Excel

Task 10: Using spread sheet features of EXCEL including the macros, formulae, pivot tables, graphical representations. **Creating a Scheduler -** Features to be covered:- Gridlines, Format Cells, Summation, auto fill, Formatting Text, ,Charts,

Task 11: Performance Analysis - Features to be covered:- Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting.

Power Point

Task 12: Students will be working on basic power point utilities and tools which help them create basic power point presentation. Topic covered during this week includes :- PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows, Hyperlinks, Inserting – Images, Clip Art, Tables, animation and Charts in PowerPoint.

TEXT BOOK:

Faculty to consolidate the workshop manuals using the following references

1. Computer Fundamentals, Anita Goel, Pearson.

2. Scott Mueller's Upgrading and Repairing PCs, 18/e, Scott. Mueller, QUE, Pearson, 2008.

3. Information Technology Workshop,3e, G Praveen Babu, M V Narayana BS Publications.

4. Comdex Information Technology , Vikas Gupta, dreamtech.

REFERENCE BOOK:

1. Essential Computer and IT Fundamentals for Engineering and Science Students, Dr. N.B. Venkateswarlu.

2. PC Hardware trouble shooting made easy, TMH.

I B.Tech – I/II Semester **Programming in 'C' for problem Solving**

(Common to all branches)

V18CST01	Programming in 'C' for problem Solving	L	P	C
		3	0	3

Course Outcomes:

CO1: Describe various problem solving strategies such as Algorithms and Flowcharts **(K2)**

CO2: Develop various programming constructs using Control Structures. **(K3)**

CO3: Summarize the process of modular programming approach **(K5)**

CO4: Illustrate the usage of String handling functions and pointers **(K3)**

CO5: Construct Programs using Structures and Unions. **(K3)**

CO6: Distinguish between Sequential files and Random access files. **(K4)**

UNIT-I: Problem solving concepts: Problem solving strategies – Top down design, Bottom up design, Algorithms, Flow-charts, Types of Programming Languages, Compiler, Assembler and Linker, Testing and Debugging a program. **Introduction to C Programming:** Overview and importance of C, C Program Structure, Creation and Compilation of C Programs, Identifiers, Variables, Data types, Constants, Declarations.

UNIT-II: Operators: Arithmetic, relational and logical operators, increment and decrement operators, conditional operator, assignment operator, bitwise operators, special operators, expressions, Precedence, Associativity, Order of evaluation, Type conversion, Programming Examples.**Input and output statements:** Input and output functions.

Flow of Control: Conditional statements - If-else, Switch-case constructs, Loops - while, do-while, for.

UNIT-III: Arrays: Single-Dimensional Arrays, multi-Dimensional Arrays, initialization and accessing individual elements. **Functions:** Top down approach of problem solving, standard library functions, user defined functions, parameter passing - call by value, call by reference, return statement, passing arrays as parameters to functions, recursion, command line arguments.

UNIT-IV: Storage Classes: Scope and extent, Storage Classes in a single source file: auto, extern and static, register. **Strings in C**- Concepts, string handling functions. **Understanding pointers:** Accessing the address of a variable, declaring pointer variables, initialization of pointer variables, accessing a variable through its pointer, pointer arithmetic, pointer and arrays, pointers and character strings, array of pointers.

UNIT-V:Structures and Unions: Defining, declaring, initialization, accessing, comparing, operations on individual members, array of structures, structures within structures, self referential structure, structures and functions, pointers and structures, bit fields, Programming Examples.

Dynamic Memory Allocation: Definition, malloc, calloc, realloc, free, dynamic arrays.

UNIT-VI:File Processing: Defining and Opening a file, closing a file, input/output operations on files, error handling during I/O operations, random access to files, Programming Examples.

Preprocessor: Definition, Macro substitution, file inclusion, compiler control directives, Programming Examples.

Text Books:

1. Computer Programming: Ashok N Kamthane, Pearson Education
2. C: The Complete Reference: Herbert Schildt, Osborne/Mcgraw Hill, Inc.
3. Let Us C, Yashavant Kanetkar, BPB Publications, 15th Edition

Reference Books:

1. Programming with C, Second edition, Byron S Gottfried, Tata McGrawhill
2. Programming in C, Reema Thareja, Oxford.
3. Problem Solving and Programm design in C, Hanly J R & Koffman E.B, Pearson Education, 2009.
4. Foundations of Computer Science (C Edition) , Alfred V. Aho.
5. Programming and Problem Solving Using C, ISRD Group, Tata McGraw Hill, 2008.
6. Programming in C, Pradip Dey, Manas Ghosh, Oxford University Press, 2007.
7. Problem Solving Using C: Structured Programming Techniques, Yuksel Uckan.
8. C Programming, A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE.
9. Computer Programming in C – Kerninghan & Ritchie, PHI

I B.Tech – I/II Semester **Programming Lab in 'C' for problem Solving**

(Common to all branches)

V18CSL01	Programming Lab in 'C' for problem Solving	L	P	C
		0	3	1.5

Course Outcomes:

CO 1: Demonstrate problem solving techniques using Control Structures. **(K3)**

CO 2: Construct Programmes using the concepts of Arrays, Strings and Pointers. **(K3)**

CO3: Apply the concepts of Functions, Structures and Unions. **(K3)**

CO4: Use various file processing operations to develop real time applications. **(K4)**

LIST OF EXPERIMENTS:

Tutorial 1: Problem solving using computers.
Lab1: Familiarization with programming environment.
Tutorial 2: Variable types and type conversions.
Lab 2: Simple computational problems using arithmetic expressions.
Tutorial 3: Branching and logical expressions.
Lab 3: Problems involving if-then-else structures, switch – case.
Tutorial 4: Loops, while and for loops.
Lab 4: Iterative problems e.g. sum of series.
Tutorial 5: 1D Arrays: searching, sorting.
Lab 5: 1D Array manipulation.
Tutorial 6: 2D arrays.
Lab 6: Matrix problems.
Tutorial 7: Functions, call by value, call by reference, command line arguments.
Lab 7: Simple functions.
Tutorial 8: String handling.
Lab 8: String handling functions.
Tutorial 9: Pointers.
Lab 9: Programming with pointers.
Tutorial 10: Recursion, structure of recursive calls.
Lab 10: Recursive functions.
Tutorial 11: Structures, unions and dynamic memory allocation.
Lab 11: Structures & unions.
Tutorial 12: File handling.
Lab 12: File operations.

Reference Books:

1. Mastering C, K.R. Venugopal and S.R. Prasad, TMH Publishers.
2. Computer Programming in C, V. Rajaraman, PHI.
3. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
4. C- The Complete Reference, Herbert Schildt, Osborne/Mcgraw Hill, Inc.
5. Programming with C, Byron S Gottfried, Second edition, Tata McGrawhill.
6. Programming in C, Reema Thareja, Oxford.
7. Problem Solving and Program design in C, Hanly J R & Koffman E.B, Pearson Education, 2009.
8. Programming and Problem Solving Using C, ISRD Group, Tata McGraw Hill,2008.

Minutes of the 2nd Academic Council meeting on 01/07/2018
Item No: 7
Annexure No: IV

Academic Rules and Regulations for M.Tech Programme

The M.Tech Degree of Sri Vasavi Engineering College (Autonomous), Pedatadepalli, Tadepalligudem, under Jawaharlal Nehru Technological University Kakinada shall be conferred on candidates who are admitted to the programme and fulfill all the requirements for the award of the Degree.

1.0 ELIGIBILITY FOR ADMISSIONS:

Admission to the above programme shall be made subject to eligibility criteria, qualification and specialization as prescribed from time to time.

Admissions shall be made on the basis of merit/rank obtained by the candidates at the Qualifying Examination/Entrance Test conducted by the University/Government or on the basis of any other order of merit as approved by the University/ Government subject to reservations as laid down by the Govt. from time to time.

1.1 ADMISSIONS UNDER SPECIAL CASES:

These may arise in the following situations.

4. When a student gets detained due to academic regulations and re-joins the college to complete the programme in a new regulation.
5. When a student discontinues for some time and re-joins the college to complete the programme in a new regulation.
6. When a student seeks transfer from other colleges to SVEC and intends to pursue M.Tech programme in the eligible branch of study.

   These admissions may be permitted by the College Academic Council as per the norms stipulated by the statutory bodies and the Government of Andhra Pradesh from time-to-time.

   In all such cases for admission if necessary permissions from the statutory bodies are to be obtained and the programme of study at the college will be governed by the transitory regulations stipulated in **12.0.**

   An under taking from the students is to be taken at the time of admission stating that they would abide by the transitory regulations specified by the authorities if there is any change in the regulations.

2.0 AWARD OF M.Tech DEGREE:

i. A student shall be declared eligible for the award of the M. Tech Degree, if he pursues programme of study in not less than two and not more than four academic years.

ii. The student shall register for all 70 credits and secure all the 70 credits.

iii. The duration of each semester including examinations is 21 weeks.

3.0 SPECIALIZATION:

The following specializations are offered at present for the M. Tech programme

a) M.Tech- Structural Engineering
b) M.Tech- Power System Control & Automation
c) M.Tech- Machine Design
d) M.Tech- VLSI & Embedded Systems
e) M.Tech- Computer Science & Engineering

4.0 ATTENDANCE:

A student is eligible to write the semester end examinations (SEE) if he/she acquires a minimum of 75% of attendance in aggregate of all the courses of that semester put together.

4.1 Condonation of shortage of attendance in aggregate up to 10% (65% and above **but** below 75%) in a given semester may be granted by the College Academic Committee on medical grounds provided the student has submitted the application for medical leave along with medical certificate from a Registered medical practitioner within three days form reporting to the class work after the expiry of the medical leave. However, a student can avail this concession on medical grounds for not more than once during entire duration of the programme.

4.2 A student representing the college in approved extracurricular activities such as sports, games, cultural meets, seminars, workshops and conferences shall be considered as on duty provided he/she has obtained prior written permission from the head of the department concerned and also submitted the certification of participation from the organizer of the event within three days after the completion of the event. However, this period of absence shall be counted as present for the purpose of computation of attendance only.

4.3 A stipulated fee shall be payable towards condonation of shortage of attendance.

4.4 Attendance below 65% in aggregate shall not be condoned under any circumstances.

4.5 Students whose shortage of attendance is not condoned in any semester are not eligible to write their semester end examinations.

4.6 A student who is in short of attendance in a semester may seek re-admission into that semester when offered again, within 1 week from the date of the commencement of class work.

4.7 A student will be promoted to the next semester if he satisfies the attendance requirement of the present semester.

4.8 If any candidate fulfills the attendance requirement in the present semester, he shall not be eligible for readmission into the same class.

5.0 EVALUATION:

The performance of the candidate in each semester shall be evaluated course-wise, with a maximum of 100 marks for theory and 100 marks for practicals, on the basis of Internal Evaluation (IE) and End Semester Examination.

Theory Courses:

i. For the theory courses 60 marks shall be awarded based on the performance in the End Semester Examination and 40 marks shall be awarded based on the Internal Evaluation. The internal evaluation shall be made based on the average of the marks secured in the two Mid Term-Examinations conducted-one in the middle of the Semester and the other immediately after the completion of instruction.

ii. Each Mid-term examination shall be conducted for 30 marks and duration of 120 minutes with 3 questions (without choice), each question for 10 marks.
The balance 10 marks is earmarked for alternate assessment tool like assignments etc.,

Internal Evaluation= Average of two mid examinations (30)+AAT (10)

End Semester Examination shall be conducted for 60 marks.

There will be 5 questions with internal choice covering the entire syllabus. The student has to answer all the questions.

Practical Courses:

For practical course, 60 marks shall be awarded based on the performance in the End Semester Examination (Conducted by External Examiner and Internal Examiner) and

40 marks shall be awarded based on the day-to-day performance and an Internal Test as Internal Evaluation.

Seminar:

There shall be two seminar presentations one in I semester and another in II semester. For seminar, a student under the supervision of a faculty member, shall collect the literature on a topic and critically review the literature and submit it to the department in a report form and shall make an oral presentation before a Committee consisting of Head of the Department, Supervisor and two other senior faculty members of the department. For each Seminar there will be only internal evaluation for 50 marks. A candidate has to secure a minimum of 50% of marks to be declared successful.

MOOCS Courses:

Every student has to register for a MOOCs course in 1st semester itself as approved by the Departmental Committee and complete it on self study basis and submit the certificate of successful completion before the end of 3rd semester.

Comprehensive Viva:

Every Student has to appear for a comprehensive Viva-Voce at the end of III Semester. The performance will be assessed by a committee for 50 marks.

5.1 Minimum Academic requirement:

i. A candidate shall be deemed to have secured the minimum academic requirement in a course if he secures a minimum of 40% of marks in the End semester Examination and a minimum aggregate of 50% of the total marks in the End Semester Examination and Internal Evaluation taken together.

ii. In case the candidate does not secure the minimum academic requirement in any course (as specified in 5.1(i)) he has to reappear for the End Semester Examination in that course.

iii. A candidate shall be given one chance to re-register for each course provided the internal marks secured by a candidate are less than 50% and has failed in the end examination. In such a case, the candidate must re-register for the course(s) and secure the required minimum attendance. The candidate's attendance in the re-registered course(s) shall be calculated separately to decide upon his eligibility for writing the end examination in those course(s). In the event of the student taking another chance, his internal marks and end examination marks obtained in the previous attempt stands cancelled.

iv. For re-registration the candidates have to apply to the Dean Academics by paying the requisite fees and get approval from the College before the start of the Semester in which re-registration is required.

In case the candidate secures less than the required attendance in any re-registered course(s), he shall not be permitted to write the End Examination in that course. He shall again re-register the course when next offered.

6.0 EVALUATION OF PROJECT/DISSERTATION WORK:

The project duration is two semesters. Every candidate shall be required to submit a thesis or dissertation on a topic approved by the Project Review Committee.

i. A Project Review Committee (PRC) shall be constituted with Head of the Department and two other senior faculty members along with project supervisor.

ii. The total project work is evaluated at the end of 4^{th} semester for a total of 100 marks out of which 50 marks are awarded by an internal committee (PRC) and 50 marks are awarded by an external examiner.

6.1 Registration of Project Work:

The work on the project shall be initiated at the beginning of the II year and the duration of the project is two semesters.

A candidate is permitted to register for the project work after satisfying the attendance requirement of all the courses, both theory and practical.

The student has to submit, in consultation with his project supervisor, the title, expected outcomes and plan of action of his project work for approval. The student can initiate the Project work, only after obtaining the approval from the Project Review Committee (PRC).

At a later stage if a candidate wishes to change his supervisor or topic of the project, he can do so with the approval of the Project Review Committee (PRC). However, the Project Review Committee (PRC) shall examine whether or not the change of topic/supervisor leads to a major change of his initial plans of project proposal. If yes, his date of registration for the project work starts from the date of change of Supervisor or topic as the case may be.

6.2 Project Evaluation:

i. A candidate is permitted to submit Project Thesis only after successful completion of all theory and practical courses with the approval of PRC, not earlier than 40 weeks from the date of registration of the project work.

ii. Three copies of the Project Thesis certified by the supervisor shall be submitted to the department.

iii. The thesis shall be adjudicated by an External Examiner approved by the Principal from a panel of 4 Examiners, eminent in the field, submitted by the Department.

iv. If the report of the examiner is not favorable, the candidate shall revise and re-submit the Thesis in the time frame as decided by the PRC. If the report of the examiner is unfavorable again, the thesis shall be summarily rejected. The candidate has to re-register for the project and complete the project within the stipulated time after taking the approval from the competent authority.

v. If the report of the examiner is favorable, Viva-Voce examination shall be conducted by the external examiner who adjudicated the thesis. The Head of the Department shall coordinate and make arrangements for the conduct of Viva-Voce examination.

vi. The total project work is evaluated at the end of 4th semester for a total of 100 marks out of which 50 marks are awarded by the internal committee (PRC) and 50 marks are awarded by the external examiner and the performance is graded as per the grading system given in 7.0.

If the report of the Viva-Voce is unsatisfactory, the candidate shall retake the Viva-Voce examination only after three months. If he fails to get a satisfactory report at the second Viva-Voce examination, the candidate has to re-register for the project and complete the project within the stipulated time after taking the approval from the College.

7.0 GRADING SYSTEM:

Based on the students performance in different courses of a semester **letter grades** will be awarded at the end of the semester for each course. The letter grades and the corresponding **grade points** are as given in the following table.

Grade	Grade Points	% of marks
S	10	≥ 90
A	9	≥ 80 – < 90
B	8	≥ 70 – < 80
C	7	≥ 60 – < 70
D	6	≥ 50 – < 60
F	0 (Failed)	< 50

8.0 GRADE POINT AVERAGE:

Computation of SGPA and CGPA:

The following is the procedure to compute the Semester Grade Point Average (SGPA) for each semester and Cumulative Grade Point Average (CGPA) for all four semesters of the programme:

i. The SGPA is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student, i.e

$$\textbf{SGPA}\ (Si) = \sum(Ci \times Gi) / \sum Ci$$

where Ci is the number of credits of the i^{th} course and Gi is the grade point scored by the student in the i^{th} course.

ii. The CGPA is also calculated in the same manner taking into account all the courses undergone by a student over all the semesters of a programme, i.e.

$$\textbf{CGPA} = \sum(Ci \times Si) / \sum Ci$$

Where Si is the SGPA of the ith semester and Ci is the total number of credits in that semester.

The SGPA and CGPA shall be rounded off to 2 decimal places and reported in the transcripts.

Illustration for Computation of SGPA and CGPA:

Computation of SGPA at the end of 1st semester

Illustration No.1:

Course	Credit	Grade letter	Grade point	Credit Point (Credit x Grade)
Course 1	3	A	9	3 x 9 = 27
Course 2	3	C	7	3 x 7 = 21
Course 3	3	B	8	3 x 8 = 24
Course 4	3	S	10	3 x 10 = 30
Course 5	3	D	6	3 x 6 = 18
Course 6	3	C	7	3 x 7 = 21
Course 7	2	A	9	2 x 9 = 18
Total	**20**			**159**

Thus, **SGPA at the end of 1st Semester= 159/20=7.95**

Illustration No.2 (with one failure)

Course	Credit	Grade letter	Grade point	Credit Point (Credit x Grade)
Course 1	3	A	9	3 x 9 = 27
Course 2	3	C	7	3 x 7 = 21
Course 3	3	B	8	3 x 8 = 24
Course 4	3	S	10	3 x 10 = 30
Course 5	3	F	0	3 x 0 = 00
Course 6	3	C	7	3 x 7 = 21
Course 7	2	A	9	2 x 9 = 18
Total	**20**			**141**

Thus, **SGPA at the end of 1st Semester= 141/20=7.05**

Illustration No.2 (a)

Course	Credit	Grade letter	Grade point	Credit Point (Credit x Grade)
Course 5	3	D	6	3 x 6 =18
Total Credits of the Semester	**20**			Ci(First Attempt)141 +Ci (subsequent attempt) 18= **159**

Thus, **SGPA=159/20=7.95**

Illustration No.3

Second Semester performance:

Course	Credit	Grade letter	Grade point	Credit Point (Credit x Grade)
Course 1	3	A	9	3 x 9 = 27
Course 2	3	C	7	3 x 7 = 21
Course 3	3	B	8	3 x 8 = 24
Course 4	3	Ex	10	3 x 10 =30
Course 5	3	A	9	3 x 9 = 27
Course 6	3	C	7	3 x 7 =21
Course 7	2	A	9	2 x 9 =18
Total	**20**			**168**

Thus, **SGPA of 2nd Semester = 168/20=8.4**

CGPA at the end of 2nd Semester: CGPA= $\frac{20*7.95+20*8.4}{40} = 8.175$

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Sem-1	*Sem-2*	*Sem-3*	*Sem-4*
Credit : 20 SGPA: 7	Credit: 20 SGPA: 8.5	Credit : 10 SGPA: 9.2	Credit : 20 SGPA: 6.86

CGPA after Final Semester:

Thus, CGPA= $\frac{20*7+20*8.5+10*9.2+20*6.86}{70} = \mathbf{7.70}$

AWARD OF CLASS:

A candidate who becomes eligible for the award of M.Tech degree shall be placed in one of the following classes based on CGPA.

TABLE: CGPA Required for Award of Class

Distinction	**≥ 7.75***
First Class	**≥ 6.75**
Second Class	**≥ 6.0**

*In addition to the required CGPA of 7.75, the student must have necessarily passed all the courses of each semester in the first attempt.

9.0 MALPRACTICES:

The Principal shall refer the cases of malpractices in Continuous Internal Evaluation (CIE) and Semester End Examination (SEE) to an Enquiry Committee constituted by him. The committee will submit a report on the malpractice allegedly committed by the student to the Principal.

Rules pertaining to the punishments in the case of Malpractice are given in Annex-I

10.0 ADDITIONAL ACADEMIC REGULATIONS:

Grade Sheet: A grade sheet (memorandum) will be issued to each student indicating his performance in all courses taken in that semester and also indicating the grades and SGPA.

Transcripts: After successful completion of the total programme of study, a Transcript containing performance of all academic years will be issued as a final record. Candidates shall be permitted to apply for recounting/revaluation within the stipulated period with payment of prescribed fee. The Academic Council has to approve and recommend to the JNTUK, Kakinada for the award of a degree to any student.

11.0 WITHHOLDING OF RESULTS

If the student has not paid the dues, if any, to the **college** or if any case of indiscipline is pending against him, the result of the student will be withheld. His degree will be withheld in such cases.

12.0 TRANSITORY REGULATIONS:

For students admitted under special cases (mentioned in 1.1) these transitory regulations will provide the modus operandi.

At the time of such admission, based on the programme pursued (case by case):

5. Equivalent courses completed by the student are established by the BOS concerned.
6. Marks/Credits are transferred for all such equivalent courses and treated as successfully cleared in the Programme of study prescribed by SVEC.
7. A Programme chart of residual courses not cleared will be derived and a Programme of study with duration specified will be prescribed for pursuit at SVEC.
8. Marks obtained in the previous system if the case be, are converted to grades and CGPA is calculated accordingly.

All other modalities and regulations governing shall be the same as those applicable to the stream of students with whom such a candidate is included into.

Regarding the students who were admitted under JNTU, Kakinada regulations for affiliated colleges:

If they happen to join and study along with their juniors at SVEC, the transitory regulations to be specified by JNTU, Kakinada for such students have to be followed.

13.0 GENERAL:

i. Wherever the words "he", "him", "his", occur in the regulations, they include "she", "her", "hers".
ii. The academic regulation should be read as a whole for the purpose of any interpretation.
iii. In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Chairman of the Academic Council is final.
iv. The College may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the college.

Annexure-I

MALPRACTICES

S.No	Nature of Malpractices/Improper Conduct	Punishment
1 (a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in	Expulsion from the examination hall and cancellation of the performance in that subject only.

	which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	
(b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled and sent to the University.
3.	Impersonates any other candidate in connection with the examination	The candidate who has impersonated shall be expelled From examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate who has been impersonated, shall be cancelled in all the subjects of the Examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.
4.	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in

		connection with forfeiture of seat.
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in the subject.
6.	Refuses to obey the orders of the Chief Superintendent/Assistant – Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat .
8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.

9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges In any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them.
10.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year.
11.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year examinations.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the University for further action to award suitable punishment	

COURSE STRUCTURE OF M.TECH (STRUCTURAL ENGINEERING)

I SEMESTER

S.No	Code	Subject	L	T	P	C
1	V18MAT05	Advanced Mathematics	3	0	0	3
2	V18SET01	Theory of elasticity	3	0	0	3
3	V18SET02	Matrix analysis of structures	3	0	0	3
4	V18SET03	Structural dynamics	3	0	0	3
5	V18SET04 V18SET05 V18SET06	**Elective-I** Pre-stressed concrete Sub-structure design Structural optimization	3	0	0	3
6	V18SET07 V18SET08 V18SET09	**Elective-II** Repair and rehabilitation of structures Analysis and design of tall buildings Plastic analysis and design	3	0	0	3
7	V18SEL01	Advanced structural Engineering laboratory	0	0	4	2
8	V18SET41	Seminar-I	0	2	0	2
Total Contact Hours: 24			Total Credits: 22			

II SEMESTER

S.No	Code	Subject	L	T	P	C
1	V18SET10	Finite element method	3	0	0	3
2	V18SET11	Earth quake resistant design	3	0	0	3
3	V18SET12	Stability of structures	3	0	0	3
4	V18SET13	Theory of plates and shells	3	0	0	3
5	V18SET14 V18SET15 V18SET16	**Elective-III** Experimental stress analysis Reliability analysis and design Advanced concrete technology	3	0	0	3
6	V18SET17 V18SET18 V18SET19	**Elective-IV** Industrial structures Bridge Engineering Earth retaining structures	3	0	0	3
7	V18SEL02	CAD Laboratory	0	0	4	2
8	V18SET42	Seminar-II	0	2	0	2
Total Contact Hours: 24			Total Credits: 22			

III SEMESTER

S.No	Code	Subject	L	T	P	C
1.	V18SET43	MOOCs Course	0	0	0	MNC
2	V18SET44	Comprehensive Viva-Voce	0	0	0	2
3	V18SEL05	Project	0	0	0	0
Total Credits: 2						

MNC-Mandatory Non-credit

IV SEMESTER

S.No	Code	Subject	L	T	P	C
1	V18SEL05	Project Work (Continued)	0	0	0	24
Total Credits: 24						

COURSE STRUCTURE OF M.TECH (POWER SYSTEM CONTROLL & AUTOMATION)

I SEMESTER

S.No.	Course Code	Course Title	L	T	P	Credits
1	V18PST01	Power System Operation & Control	3	-	-	3
2	V18PST02	Advanced Computer Methods in Power Systems	3	-	-	3
3	V18PST03	Advanced Power System Protection	3	-	-	3
4	V18PST04	Micro Controllers and Application	3	-	-	3
5	V18PST05 V18PST06 V18PST07 V18PST08	Elective – I: 1. Power System Reliability 2. Application of AI Techniques in Power Systems 3. Electrical Distribution Systems 4. Power System Security	3	-	-	3
6	V18PST09 V18PST10 V18PST11 V18PST12	Elective – II: 1. Reactive Power Compensation & Management 2. Power Quality 3. Power System Transients 4. Voltage Stability	3	-	-	3
7	V18PSL01	Power Systems Lab-I	-	-	4	2
8	V18PST41	Seminar-I	-	2	-	2
Total Contact Hours: 24			Total Credits: 22			

II SEMESTER

S.No.	Course Code	Course Title	L	T	P	Credits
1	V18PST13	Modern Control Theory	3	-	-	3
2	V18PST14	Power System Dynamics & Stability	3	-	-	3
3	V18PST15	Solar & Wind Energy	3	-	-	3
4	V18PST16	Real Time Control of Power Systems	3	-	-	3
5	V18PST17 V18PST18 V18PST19 V18PST20	Elective – III: 1. Electrical and Hybrid Vehicles 2. Power System Deregulation 3. Smart Grid 4. High Voltage Engineering	3	-	-	3
6	V18PST21 V18PST22 V18PST23 V18PST24	Elective – IV: 1. Custom Power Devices 2. EHVAC Transmission 3. Demand Side Energy Management 4. HVDC & FACTS	3	-	-	3
7	V18PSL02	Power Systems Lab-II	-	-	4	2
8	V18PST42	Seminar-II	-	2	-	2
Total Contact Hours: 24			Total Credits: 22			

MNC- Mandatory Non-Credit

III SEMESTER

S.No.	Course Code	Course Title	L	T	P	Credits
1	V18PST43	MOOCs	-	-	-	MNC
2	V18PST44	Comprehensive Viva-Voce	-	-	-	2
3	V18PSL05	Project Work	-	-	-	-
Total Credits: 2						

IV SEMESTER

S.No.	Course Code	Course Title	L	T	P	Credits
1	V18PSL05	Project Work Part (Continued)	-	-	-	24
Total Credits: 24						

COURSE STRUCTURE OF M.TECH (MACHINE DESIGN)

I SEMESTER

S.No.	Course Code	Course	L	T	P	C
1	VI8MAT06	Computational Methods in Engineering	3	-	-	3
2	VI8MDT01	Advanced Mechanics of Solids	3	-	-	3
3	VI8MDT02	Advanced Mechanisms	3	-	-	3
4	VI8MDT03	Mechanical Vibrations	3	-	-	3
5	**Elective – I**	VI8MDT04 Design of Automobile Systems VI8MDT05Product Design VI8MDT06 Geometric Modeling VI8MDT07 Non Destructive Evaluation	3	-	-	3
6	**Elective – II**	VI8MDT08 Fracture Mechanics VI8MDT09 Gear Engineering VI8MDT10 Design for Manufacturing & Assembly VI8MDT11 Continuum Mechanics	3	-	-	3
7	VI8MDL01	Machine Dynamics Lab	-	-	4	2
8	VI8MDT41	Seminar – I	-	2	-	2
Total Contact Hours: 24			Total Credits: 22			

II SEMESTER

S.No.	Course Code	Course	L	T	P	C
1	VI8MDT12	Optimization and Reliability	3	-	-	3
2	VI8MDT13	Theory of Plasticity	3	-	-	3
3	VI8MDT14	Finite Element Method	3	-	-	3
4	VI8MDT15	Design with advanced Materials	3	-	-	3
5	**Elective – III**	VI8MDT16 Tribology VI8MDT17 Signal Analysis and Condition Monitoring VI8MDT18 Computational Fluid Dynamics VI8MDT19 Design Synthesis	3	-	-	3
6	**Elective-IV**	VI8MDT20 Pressure Vessel Design VI8MDT21 Mechanics of Composite Materials VI8MDT22 Mechatronics VI8MDT23 Experimental Stress Analysis	3	-	-	3
7	VI8MDL02	Design Practice Lab	-	-	4	2
8	VI8MDT42	Seminar – II	-	2	-	2
Total Contact Hours: 24			Total Credits: 22			

III SEMESTER

S.No.	Course Code	Course	L	T	P	C
1	V18MDT43	MOOCs Course	-	-	-	MNC
1	VI8MDT44	Comprehensive Viva-Voce	-	-	-	2
2	VI8MDL05	Project Work	-	-	-	-
Total Credits: 2						

MNC- Mandatory Non-credit

IV SMESTER

S.No.	Course Code	Course	L	T	P	C
1	VI8MDL05	Project Work (Continued)	-	-	-	24
Total Credits: 24						

COURSE STRUCTURE OF M.TECH (VLSI & EMBEDED SYSTEM)

I SEMESTER

S. No.	Course Code	Course Name	L	T	P	C
1.	V18VLT01	Digital System Design	3	-	-	3
2.	V18VLT02	VLSI Technology And Design	3	-	-	3
3.	V18VLT03	CMOS Analog IC Design	3	-	-	3
4.	V18VLT04	Embedded Systems Design-I	3	-	-	3
5.	 V18VLT05 V18VLT06 V18VLT07 V18VLT08	**ELECTIVE-1** Embedded C Digital Signal Processors &Architectures System On Chip Soft Computing Techniques	3	-	-	3
6.	 V18VLT09 V18VLT10 V18VLT11 V18VLT12	**ELECTIVE -2** Digital Design Through HDL CPLD & FPGA Architecures And Applications Algorithms For VLSI Design –Automation VLSI Signal Processing	3	-	-	3
7.	V18VLL01	VLSI LAB	-	-	4	2
8.	V18VLT41	SEMINAR-I		2	-	2
Total Contact Hours: 24			Total Credits: 22			

II SEMESTER

S. No.	Course Code	Course Name	L	T	P	C
1.	V18VLT13	Design For Testability	3	-	-	3
2.	V18VLT14	CMOS Digital IC Design	3	-	-	3
3.	V18VLT15	Embedded System Design - II	3	-	-	3
4.	V18VLT16	Embedded Real Time Systems	3	-	-	3
5.	 V18VLT17 V18VLT18 V18VLT19 V18VLT20	**ELECTIVE-III** Low Power VLSI CMOS Mixed Signal Circuit Design System Verilog Semiconductor Memory Design And Testing	3	-	-	3
6.	 V18VLT21 V18VLT22 V18VLT23 V18VLT24	**ELECTIVE-IV** Hardware Software Co-Design Embedded Computing Design For Internet Of Things Software for Embedded Systems.	3	-	-	3
7.	V18VLL02	Embedded System Design Lab	-	-	4	2
8.	V18VLT42	SEMINAR-II		2	-	2
Total Contact Hours: 24			Total Credits: 22			

III SEMESTER

S.No	Course Code	Course Name	L	P	C
1	V18VLT43	MOOCs	-	-	MNC
2	V18VLT44	Comprehensive VIVA	-	-	2
3	V18VLL05	Project work	-	-	-
Total Credits: 2					

MNC- Mandatory Non-Credit

IV SEMESTER

S.No	Course Code	Course Name	L	P	C
1	V18VLL05	Project work (Continued)	-	-	24
Total Credits: 24					

COURSE STRUCTURE OF M.TECH (COMPUTER SCIENCE AND ENGINEERING)

I SEMESTER

S.No.	Course Code	Course	L	T	P	C
1	V18CTT01	Object Oriented Software Engineering	3	-	-	3
2	V18CTT02	NOSQL Database	3	-	-	3
3	V18CTT03	Advanced Computer Architecture	3	-	-	3
4	V18CTT04	Advanced Operating Systems	3	-	-	3
5	V18CTT05	Advanced Data Structures and Algorithm Analysis	3	-	-	3
6	V18CTT06	Machine Leaning	3	-	-	3
7	V18CTL01	NOSQL Database Lab	-	-	2	1
8	V18CTL02	Advanced Data Structures and Algorithm Analysis Lab	-	-	2	1
9	V18CTT41	Seminar-I	-	2	-	2
Total Contact Hours: 24			Total Credits: 22			

Total Contact Hours=24

II SEMESTER

S.No.	Course Code	Course	L	T	P	C
1	V18CTT07	Data Science	3	-	-	3
2	V18CTT08	Advanced Web Technologies	3	-	-	3
3	V18CTT09	Cloud Computing	3	-	-	3
4	V18CTT10	Internet of Things	3	-	-	3
5	**Elective-I**		3	-	-	3
	V18CTT11	1) Cyber Security				
	V18CTT12	2) Artificial Intelligence				
	V18CTT13	3) Bioinformatics				
	V18CTT14	4) Wireless Sensor Networks				
6	**Elective-II**		3	-	-	3
	V18CTT15	1) Image Processing				
	V18CTT16	2) Parallel Algorithms				
	V18CTT17	3) Mobile Computing				
	V18CTT18	4) Grid Computing				
7	V18CTL03	Data Science Lab	-	-	2	1
8	V18CTL04	Advanced Web Technologies Lab	-	-	2	1
9	V18CTT42	Seminar-II	-	2	-	2
Total Contact Hours: 24			Total Credits: 22			

Total Contact Hours=24

III SEMESTER

S.No.	Course Code	Course	L	T	P	C
1	V18CTT43	MOOCs Course	-	-	-	MNC
2	V18CTT44	Comprehensive Viva Voce	-	-	-	2
3	V18CTL05	Project Work	-	-	-	-
Total Credits: 2						

MNC- Mandatory Non-Credit

IV SEMESTER

S.No.	Course Code	Course	L	T	P	C
1	V18CTL05	Project Work (Continued)	-	-	-	24
Total Credits: 24						

SYLLABUS FOR M.TECH (STRUCTURAL ENGINEERING)

I M.Tech- I Semester

Course Code: V18MAT05

L	P	C
3	0	3

ADVANCED MATHEMATICS

Unit – I

Numerical solutions of partial differential equations: Laplace and poisson equations – Representations as a difference equation – 5-point formula – Derivative boundary conditions – Irregular and non – rectangular grids – Matrix patterns, sparseness – ADI method.

Unit – II

Partial differential equations: Bender Schmidt – Crank-Nickelson method –Stability and convergence criteria. Solving wave equation by finite differences-stability of numerical method -wave equation in two space dimensions.

UNIT-III

Applied Statistics: Curve fitting by Method of Least squares (Straight lines, parabola, exponential and power curves). Simple correlation and regression - multiple correlation and regression.

UNIT-IV

Introduction to text of significance – Analysis of variance for one way classification and two way classification - Analysis of variance for regression – Multiple correlation coefficient.

UNIT-V

Linear Programming Problem Formation, Graphical Method, Simplex method, artificial variable method-Big-M method-Two Phase Method.

Non Linear Programming Problem Gradient method, Steepest Ascent Descent Methods.

TEXT BOOKS

1. Solutions of Partial Differential Equations" – Duffy, D.G. CBS Publishers, 1988
2. Introductory Methods of Numerical Analysis – Sastry, S.S. Prentice-Hall, 2nd Edition, 1992
3. Basic Statistics – Agarval, B.L., Wiley 1991, 2nd edition.
4. Operations Research – HamdyA, Taha.Optimization Techniques.-S.S.Rao.

I M.Tech- I Semester
Course Code: V18SET01

L	P	C
3	0	3

THEORY OF ELASTICITY

UNIT-I

Elasticity – Notation for forces and stresses – components of stresses and strains – Hooke's Law - Plane Stress – Plane strain – Differential Equations of equilibrium – Boundary conditions – Compatibility equations - Stress function – Boundary Conditions.

UNIT -II

Two dimensional problems in rectangular co-ordinates – Solution by polynomials – Saint Venant's principle – Determination of displacements – Bending of simple beams – Application of Fourier series for two dimensional problems for gravity loading

UNIT-III

Two dimensional problems in polar co-ordinates - General equations in polar co-ordinates – Stress distribution for problems having symmetrical about an axis - Strain components in polar co-ordinates – Displacements for symmetrical stress distributions - Stresses for plates with circular holes subjected to far field tension – stress concentration factor.

UNIT-IV

Analysis of stress and strain in three dimension - Principal stresses – Stress ellipsoid and stress director surface – Determination of principal stresses - Maximum shear stress – Homogeneous Deformation – General Theorems - Differential equations of equilibrium – Conditions of compatibility – Equations of equilibrium in terms of displacements – Principle of superposition – Uniqueness of solution –Reciprocal theorem.

UNIT-V

Torsion of prismatical bars – Bars with elliptical cross section – Other elementary solution – Membrane analogy – Torsion of rectangular bars – Solution of torsional problems by energy method.

TEXT BOOKS:

1. Theory of Elasticity by Timoshenko & Goodier J.N, published by Mc Graw-Hill, New York (1953), 2nd edition
2. Elasticity: Theory, Applications and Numeric- Martin H. Sadd, published by Elsevier(2004), 3rd edition

REFERENCE BOOKS:

1. Theory of Elasticity by sadhu singh, KHANNA publications (1978), 4th edition. Applied elasticity by C.T. Way, McGraw hill Publications (1963).

I M.Tech- I Semester

Course Code: V18SET02

L	P	C
3	0	3

MATRIX ANALYSIS OF STRUCTURES

UNIT-I

Introduction of matrix methods of analysis – Static and kinematic indeterminacy – Degree of freedom – Structure idealization-stiffness and flexibility methods – Suitability: Element stiffness matrix for truss element, beam element and Torsional element-Element force - displacement equations

UNIT-II

Stiffness method – Element and global stiffness equation – coordinate transformation and global assembly – structure stiffness matrix equation – analysis of simple pin jointed trusses – continuous beams– rigid jointed plane frames

UNIT-III

Stiffness method for Grid elements – development of stiffness matrix – coordinate transformation. Examples of grid problems – tapered and curved beams

UNIT-IV

Additional topics in stiffness methods – discussion of band width – semi band width – static condensation – sub structuring –Loads between joints-Support displacements-inertial and thermal stresses-Beams on elastic foundation by stiffness method.

UNIT-V

Space trusses and frames - Member stiffness for space truss and space frame–Transformation matrix from Local to Global – Analysis of simple trusses, beams and frames

TEXT BOOKS:

1. Matrix analysis of structures- Robert E Sennet- Prentice Hall-Englewood cliffs-New Jercy
2. Advanced structural analysis-Dr. P. Dayaratnam- Tata McGraw hill publishing company limited(2003)

REFERENCES:

1. Analysis of Indeterminate Structural analysis- C K Wang, Mc Graw Hill International Ltd, 5th edition
2. Analysis of tall buildings by force – displacement – Method M. Smolira– Mc. Graw Hill.Inc, (1975)
3. Foundation Analysis and design – J.E. Bowls. Mc. Graw Hill international, 5th edition.
4. Matrix analysis and framed structures by William Weaver, James M. Gere, D Van Nostrand Co, 1980

I M.Tech- I Semester

Course Code: V18SET03

L	P	C
3	0	3

STRUCTURAL DYNAMICS

UNIT-I

Introduction to Structural Dynamics: Fundamental objective of Dynamic analysis – Types of prescribed loadings – methods of Discretization – Formulation of the Equations of Motion.

UNIT-II

Theory of Vibrations: Introduction – Elements of a Vibratory system Degrees of Freedom of continuous systems - Oscillatory motion – Simple Harmonic Motion Free Vibrations of Single Degree of Freedom (SDOF) systems – Undamped and Damped – Critical damping – Logarithmic decrement – Forced vibrations of SDOF systems – Harmonic excitation – Dynamic magnification factor – Band width.

UNIT-III

Single Degree of Freedom System: Formulation and Solution of the equation of Motion – Free vibration response – Response to Harmonic, Periodic, Impulsive and general dynamic loadings – Duhamel integral.

UNIT-IV

Multi Degree of Freedom System: Selection of the Degrees of Freedom Evaluation of Structural Property Matrices – Formulation of the MDOF equations of motion - Undamped free vibrations – Solution of Eigen value problem for natural frequencies and mode shapes – Analysis of dynamic response - Normal coordinates.

UNIT-V

Continuous Systems: Introduction – Flexural vibrations of beams – Elementary case – Equation of motion – Analysis of undamped free vibration of beams in flexure – Natural frequencies and mode shapes of simple beams with different end conditions.

TEXT BOOKS:

1. Dynamics of Structures by R. W.Clough and J. Penzien, Mc Graw Hill Education(1993), 3rd edition
2. Structural Dynamics A K Chopra, Prrentice Hall International Series, 5th edition.

REFERENCES:

1. Structural Dynamics by John M. Bigges, Mc Graw Hill (1964) Structural Analysis by A. Ghali, A.M. Neville and T. G. Brown, newyork Taylor& Francis 2009, 6th edition

I M.Tech- I Semester

Course Code: V18SET04

L	P	C
3	0	3

PRESTRESSED CONCRETE (ELECTIVE-I)

UNIT-I: General principles of Pre-stressing- Pre-tensioning and Post tensioning - Pre tensioning and Post tensioning methods- Different systems of Pre-stressing- Analysis of prestress and Bending stresses– Resultant – stress at a section – pressure line – concept of load balancing – stresses in tendons.

UNIT-II: Losses of Pre-stressing- Loss of Pre-stress in pre-tensioned and post tensioned members due to various causes -Elastic shortening of concrete, shrinkage of concrete, creep of concrete, Relaxation of steel, slip in anchorage, differential shrinkage- bending of members and frictional losses- Long term losses

UNIT-III: Flexural, shear; torsional resistance and design of Prestressed concrete section. Types of flexural failure – code procedures-shear and principal stresses – Prestressed concrete members in torsion – Design of sections for flexure, Axial Tension, Compression and bending, shear, Bond

UNIT-IV: Analysis of continuous beams –Elastic theory- Linear transformation and Concordant tendons- Deflections of pre-stressed concrete beams: Importance of control of deflections- factors influencing deflections-short term deflections of un-cracked member – prediction of long term deflections

UNIT-V: Analysis of end blocks: By Guyon's method and Magnel's method, Anchorage zone stresses- Approximate method of design- anchorage zone reinforcement- transfer of pre stresses- pre tensioned members-Composite sections: Introduction-Analysis for stresses- differential shrinkage- general design considerations

TEXT BOOKS:

1. Prestressed Concrete by N. Krishna Raju, Mc Graw Higher Ed(2012), 5th edition.
2. Prestressed Concrete by S. Ramamrutham, published by Dhanpat Rai Sons, 2nd edition

REFERENCES:

1. Prestressed Concrete structures by P. Dayaratnam., P.sarah, MEDTECH publications, 7th edition.
2. Design of prestressed Concrete by T.Y.Lin and Ned H. Burns, Wiley (1981), 3rd edition,

IS 1343-1980, Indian Standard code for Prestressed concrete.

I M.Tech- I Semester

Course Code: V18SET05

L	P	C
3	0	3

SUB-STRUCTURE DESIGN
(ELECTIVE I)

UNIT-I: Soil Exploration – Importance, Terminology, planning - Geophysical methods. Borings, location, spacing and depth, methods of boring including drilling, stabilization of boreholes, boring records.

UNIT-II: Soil sampling – Methods of sampling -Types of samples and samplers-cleaning of bore holes, preservation, labeling and shipment of samples - Design considerations of open drive samplers.

UNIT-III: Shallow Foundations –Bearing capacity – General bearing capacity equation, Meyerhof's, Hansen's and Vesic's bearing capacity factors - Bearing capacity of stratified soils - Bearing capacity based on penetration resistance- safe bearing capacity and allowable bearing pressure. (Ref: IS -2131 & IS 6403)

UNIT-IV: Types and choice of type. Design considerations including location and depth, Proportioning of shallow foundations- isolated and combined footings and mats - Design procedure for mats. Floating foundation- Fundamentals of beams on Elastic foundations. (Ref: IS -456 & N.B.C. relevant volume).

UNIT-V: Pile foundations-Classification of piles-factors influencing choice-Load -carrying capacity of single piles in clays and sands using static pile formulae- á - â - and λ - methods – Dynamic pile formulae-limitations-Monotonic and cyclic pile load tests – Under reamed piles. Pile groups -Efficiency of pile groups- Different formulae-load carrying capacity of pile groups in clays and sands – settlement of pile groups in clays and sands – Computation of load on each pile in a group.

TEXT BOOKS:

1. Principles of Foundation Engineering by Braja M. Das, 4th edition.
2. Soil Mechanics in Engineering Practice by Terzagi and B.Peck, Willey publications, 3rd edition

REFERENCES:

1. Foundation Design by Wayne C. Teng, John Wiley & Co.,(1962)
2. Foundation Analysis and Design by J.E. Bowles McGraw Hill Pub Co.,3rd edition
3. Analysis and Design of sub structures by Swami Saran, Oxford IBH Pub Ltd, 2nd edition
4. Design Aids in Soil Mechanics and Foundation Engineering by Shanbaga R. Kaniraj,Tata Mc. Graw Hill.(2001), 1st edition.
5. Foundation Design and Construction by MJ Tomlinson and R. Boorman, NJ Prentice hall, 7th edition.
6. A short course in Foundation Engineering by Simmons and Menzes – ELBS (1975), 1st edition.

I M.Tech- I Semester

Course Code: V18SET06

L	P	C
3	0	3

STRUCTURAL OPTMIZATION (ELECTIVE-I)

UNIT-I;

Introduction: Need and scope for optimization – statements of optimization problems- Objective function and its surface design variables- constraints and constraint surface- Classification of optimization problems (various functions continuous, discontinuous and discrete) and function behavior (monotonic and unimodal)

UNIT-II

Classical optimization techniques: Differential calculus method, multi variable optimization by method of constrained variation and Lagrange multipliers (generalized problem) Khun-Tucker conditions of optimality -Fully stressed design and optimality criterion based algorithms- introduction, characteristics of fully stressed design theoretical basis-examples

UNIT-III

Non-Liner programming: Unconstrained minimization- Fibonacci, golden search, Quadratic and cubic interpolation methods for a one dimensional minimization and univariate method, Powel's method, Newton's method and Davidon Fletcher Powell's method for multivariable optimization- Constrained minimization- Cutting plane method- Zoutendjik's method- penalty function methods

UNIT-IV

Linear programming: Definitions and theorems- Simplex method-Duality in Linear programming- Plastic analysis and Minimum weight design and rigid frame

UNIT-V

Introduction to quadratic programming: Geometric programming- and dynamic programming- Design of beams and frames using dynamic programming technique

TEXT BOOKS:

1. Optimization Theory and Applications – S.S. Rao, Wiley Eastern Limited, New Delh
   Optimization Concepts and Application in Engineering- Belegundu A.D. and Chandrupatla T.R,1978.
2. Mathematical Foundations for Design of civil engineering systems by Robert, M. Starkand Robert, L. Nicholls, Mc Graw Hill book company, Newyork (1972)

REFERENCES:

1. Optimum design of structures by Majid. K.I, Newines, Butter Worths London(1974).
2. Optimization Concepts and Applications in engineering by A.D. belagnd and T.R. Chandrupatla, Cambridge University Press, 2nd edition

I M.Tech- I Semester

Course Code: V18SET07

L	P	C
3	0	3

REPAIR AND REHABILITATION OF STRUCTURES

(ELECTIVE-II)

UNIT-I

Materials for repair and rehabilitation -Admixtures- types of admixtures-purposes of using admixtures- chemical composition- Natural admixtures- Fibres- wraps- Glass and Carbon fibre wraps- Steel Plates-Non destructive evaluation: Importance- Concrete behavior under corrosion, disintegrated mechanisms- moisture effects and thermal effects – Visual investigation- Acoustical emission methods- Corrosion activity measurement- chloride content– Depth of carbonation- Impact echo methods- Ultrasound pulse velocity methods- Pull out tests.

UNIT-II

Strengthening and stabilization- Techniques- design considerations-Beam shear capacity strengthening- Shear Transfer strengthening-stress reduction techniques- Column strengthening-flexural strengthening- Connection stabilization and strengthening, Crack stabilization.

UNIT-III

Bonded installation techniques- Externally bonded FRP- Wet layup sheet, bolted plate, near surface mounted FRP, fundamental debonding mechanisms-intermediate crack debonding- CDC debonding- plate end debonding- strengthening of floor ofstructures.

UNIT-IV

Fibre reinforced concrete- Properties of constituent materials- Mix proportions, mixing and casting methods-Mechanical properties of fiber reinforced concrete- applications of fibre reinforced concretes-Light weight concrete- properties of light weight concrete- No fines concrete- design of light weight concrete- Flyash concrete-Introduction-classification of flyash- properties and reaction mechanism of flyash- Properties of flyash concrete in fresh state and hardened state- Durability of flyash concretes.

UNIT-V

High performance concretes- Introduction- Development of high performance concretes-Materials of high performance concretes- Properties of high performance concretes- Self Consolidating concrete-properties- qualifications.

TEXT BOOKS:

1. Concrete technology by Neville and J J Brooks, Pearson publications, 2nd edition
2. Special Structural concrete by Rafat Siddique, Galgotia publications (2000), Newdelhi.

REFERENCES:

1. Concrete repair and maintenance illustrated by Peter H Emmons, R. S. Means company. Inc(1994)
2. Concrete technology by M S Shetty, S. Chand publications (2006).

I M.Tech- I Semester

Course Code: V18SET08	**L**	**P**	**C**
	3	**0**	**3**

ANALYSIS AND DESIGN OF TALL BUILDINGS
(ELECTIVE-II)

UNIT-I

Design Criteria Philosophy, Materials – Modern concepts – High Performance Concrete, Fibre Reinforced Concrete, Light weight concrete, Self Compacting Concrete

UNIT-II

Gravity Loading – Dead load, Live load, Impact load, Construction load, Sequential loading. Wind Loading – Static and Dynamic Approach, Analytical method, Wind Tunnel Experimental methods. Earthquake Loading – Equivalent lateral Load analysis, Response Spectrum Method, Combination of Loads.

UNIT-III

Behavior of Structural Systems- Factors affecting the growth, height and structural form, Behaviour of Braced frames, Rigid Frames, In-filled frames, Shear walls, Coupled Shear walls, Wall–Frames, Tubular, Outrigger braced, Hybrid systems.

UNIT-IV

Analysis and Design- Modeling for approximate analysis, Accurate analysis and reduction techniques, Analysis of structures as an integral unit, Analysis for member forces, drift and twist. Computerized 3D analysis. Design for differential movement, Creep and Shrinkage effects, Temperature Effects and Fire Resistance.

UNIT-V

Stability Analysis- Overall buckling analysis of frames, wall–frames, Approximate methods, Second order effect of gravity loading, P–Delta Effects, Simultaneous first order and P-Delta analysis, Translational instability, Torsional Instability, Out of plumb effects, Effect of stiffness of members and foundation rotation in stability of structures.

TEXT BOOKS:

1. Bryan Stafford Smith and Alex Coull, "Tall Building Structures - Analysis and Design", John Wiley and Sons, Inc., 1991.

REFERENCES:

1. Taranath B.S, "Structural Analysis and Design of Tall Buildings", McGraw-Hill, 1988.
2. Outrigger design for high rise buildings by Hi Sunchoi and L. Joseph Mathias, Image publications, 2nd edition.

I M.Tech- I Semester

Course Code: V18SET09

L	P	C
3	0	3

PLASTIC ANALYSIS AND DESIGN
(ELECTIVE-II)

UNIT-I

Introduction and basic hypothesis: Concepts of stress and strain – relation of steel Moment curvature relation- basic difference between elastic and plastic analysis with examples- Yield condition, idealizations, collapse criteria- Virtual work in the elastic-plastic state-Evaluation of fully plastic moment and shape factors for the various practical sections.

UNIT-II

Method of Limit Analysis: Introduction to limit analysis of simply supported fixed beams and continuous beams, Effect of partial fixity and end, invariance of collapse loads, basic theorems of limit analysis, rectangular portal frames, gable frames, grids, superposition of mechanisms, drawing statistical bending moment diagrams for checks.

UNIT-III

Limit design Principles: Basic principles, limit design theorems, application of limit design theorems, trial and error method, method of combining mechanisms, plastic moment distribution method, load replacement method, continuous beams and simple frames designs using above principles.

UNIT-IV

Deflection in Plastic beams and frames: Load deflection relations for simply supported beams, deflection of simple pin based and fixed based portal frames, method of computing deflections.

UNIT-V

Minimum weight Design: Introduction to minimum Weight and linear Weight functions- Foulkes theorems and its geometrical analogue and absolute minimum weight design.

REFERENCES:

1. Plastic Methods of Structural analysis by B G Neal, Chapman and Rall publications, 1st edition.
2. Plastic analysis and Design by C E Messennet, M A Seve
3. Plastic analysis and Design of steel structures by M.B. wong , Published by Butter Worth – Heinemann(2008).
4. Limit State Design of steel structures by SK Duggal, Mc Graw Hill Education (2010).

I M.Tech- I Semester

Course Code: V18SEL01

L	P	C
0	4	2

ADVANCED STRUCTURAL ENGINEERING LABORATORY

1. Strain measurement - Electrical resistance strain gauges
2. Non destructive testing- Impact Hammer test, UPV test
3. Qualifications tests on Self compaction concrete- L Box test, J Box test, U box test, Slump test
4. Tests on Buckling of columns – Southwell plot
5. Repair and rehabilitation of concrete beams
6. Chemical Analysis of water for suitability in concreting with and without Reinforcement.
7. Chemical Analysis of sand and Aggregate for Suitability in Construction.

NOTE: A minimum of five experiments from the above set have to be conducted.

REFERENCES:

1. Specifications and Guidelines for Self Compacting Concrete by EFNARC.
2. Concrete repair and maintance illustrate by Peter H Emmons, R.S means Company Ltd (1994).
3. IS 456(2000): Plain and reinforced concrete – code of practice.

I M.Tech- II Semester

Course Code: V18SET10	**L**	**P**	**C**
	3	**0**	**3**

FINITE ELEMENT METHOD

UNIT-I

Introduction: Review of stiffness method- Principle of Stationary potential energy- Potential energy of an elastic body- Rayleigh-Ritz method of functional approximation - variational approaches -weighted residual methods

UNIT-II

Finite Element formulation of truss element: Stiffness matrix- properties of stiffness matrix – Selection of approximate displacement functions-solution of a plane truss- transformation matrix and stiffness matrix for a 3-D truss- Inclined and skewed supports- Galerkin's method for 1-D truss – Computation of stress in a truss element.

UNIT-III

Finite element formulation of Beam elements: Beam stiffness-assemblage of beam stiffness matrix- Examples of beam analysis for concentrated and distributed loading- Galerkin's method - 2-D Arbitrarily oriented beam element – inclined and skewed supports – rigid plane frame examples

UNIT-IV

Finite element formulation for plane stress, plane strain and axisymmetric problems- Derivation of CST and LST stiffness matrix and equations-treatment of body and surface forces-Finite Element solution for plane stress and axisymmetric problems- comparison of CST and LST elements –convergence of solution- interpretation of stresses

UNIT-V

Iso-parametric Formulation: An isoparametric bar element- plane bilinear isoparametric element – quadratic plane element - shape functions, evaluation of stiffness matrix, consistent nodal load vector - Gauss quadrature- appropriate order of quadrature – element and mesh instabilities – spurious zero energy modes, stress computation- patch test.

REFERENCES:

1. Concepts and applications of Finite Element Analysis – Robert D. Cook, Michael E Plesha, John Wiley & sons Publications, 4th edition.
2. A first course in the Finite Element Method – Daryl L. Logan, Thomson Publications, 5th edition.
3. Introduction to Finite Elements in Engineering- Tirupati R. Chandrupatla, Ashok D. Belgunda, PHI publications, 4th edition(2012).
4. Finite element method for Engineers by C.V.G. Vallabhan, Narosa book Distributors Ltd (2011).

I M.Tech- II Semester

Course Code: V18SET11

L	P	C
3	0	3

EARTHQUAKE RESISTANT DESIGN

UNIT-I

Engineering seismology – rebound theory – plate tectonics – seismic waves - earthquake size and various scales – local site effects – Indian seismicity – seismic zones of India – theory of vibrations – near ground and far ground rotation and their effects.

UNIT-II

Seismic design concepts – EQ load on simple building – load path – floor and roof diaphragms – seismic resistant building architecture – plan configuration – vertical configuration – pounding effects – mass and stiffness irregularities – torsion in structural system- Provision of seismic code (IS 1893 & 13920) – Building system – frames – shear wall – braced frames – layout design of Moment Resisting Frames(MRF) – ductility of MRF – Infill wall – Non- structural elements.

UNIT-III

Calculation of EQ load – 3D modeling of building systems and analysis (theory only) Design and ductile detailing of Beams and columns of frames Concept of strong column weak beams, Design and ductile detailing of shear walls

UNIT-IV

Cyclic loading behavior of RC, steel and pre- stressed concrete elements - modern concepts- Base isolation – Adaptive systems – case studies.

UNIT-V

Retrofitting and restoration of buildings subjected to damage due to earthquakes- effects of earthquakes – factors related to building damages due to earthquake- methods of seismic retrofitting- restoration of buildings

TEXT BOOKS:

1. Pankaj Agarwal and Manish ShriKhande, Earthquake Resistant Design of Structures, Prentice– Hall of India, 2007, New Delhi.
2. Introduction to the Theory of Seismology by Bullen K.E, Great Britain at the University Printing houses, Cambridge University Press 1996, 4th edition.

REFERENCES:

1. Earth quake resistant Design of structures by R. V. Singh , published by Vayu Education of india.
2. IS 1893(part I): 2002, Criteria for Earthquake Resistant Design of structures, 5th revision.

   IS 13920(2016): Ductile design and detailing of reinforced concrete structures subjected to seismic forces.

I M.Tech- II Semester

Course Code: V18SET12

L	P	C
3	0	3

STABILITY OF STRUCTURES

UNIT-I

Beam columns: Differential equation for beam columns – Beams column with concentrated loads – continuous lateral load – couples – Beam column with built in ends – continuous beams with axial load – application of Trigonometric series – Determination of allowable stresses.

UNIT-II

Elastic buckling of bars : Elastic buckling of straight columns – Effect of shear stress on buckling – Eccentrically and laterally loaded columns –Sway & Non Sway mode - Energy methods – Buckling of a bar on elastic foundation – Buckling of bar with intermediate compressive forces and distributed axial loads – Buckling of bars with change in cross section

– Effect of shear force on critical load – Built up columns

– Effect of Initial curvatue on bars – Buckling of frames – Sway & Non Sway mode.

UNIT-III

In-elastic buckling: Buckling of straight bars – Double modulus theory Tangent modulus theory. Experiments and design formulae:

Experiments on columns – Critical stress diagram – Empirical formulae of design – various end conditions – Design of columns based on buckling. Mathematical Treatment of stability problems: Buckling problem orthogonality relation – Ritz method –Stiffness method and formulation of Geometric stiffness matrix- Applications to simple frames

UNIT-IV

Torsional Buckling: Pure torsion of thin walled bars of open cross section – Non uniform torsion of thin walled bars of open cross section - Torsional buckling – Buckling of Torsion and Flexure.

UNIT-V

Lateral Buckling of simply supported Beams: Beams of rectangular cross section subjected for pure bending, Buckling of I Section subjected to pure bending.

TEXT BOOKS:

1. Theory of Elastic stability by Timshenko and J. Gere, Mc Graw Hill higher End(2010), 2nd edition.

REFERENCES:

1. Theory of Stability of Structures by Alexander ChaJes.
2. Stability of structures by Zdenek P B, Luigi Cedolin, Published by world Scientific (2000).

I M.Tech- II Semester

Course Code: V18SET13

L	P	C
3	0	3

THEORY OF PLATES AND SHELLS

UNIT-I

Derivation of governing differential equation for plate– in plane bending and transverse bending effects- Rectangular plates: Plates under various loading conditions like concentrated, uniformly distributed load and hydrostatic pressure. Navier and Levy's type of solutions for various boundary condition

UNIT-II

Circular plates: Symmetrically loaded, circular plates under various loading conditions, Annular plates.

UNIT-III

Introduction to Shells- Single and double curvature- Equations of Equilibrium of Shells: Derivation of stress resultants, Principles of membrane theory and bending theory.

UNIT-IV

Cylindrical Shells: Derivation of the governing DKJ equation for bending theory, details of Schorer's theory. Application to the analysis and design of short and long shells. Use of ASCE Manual coefficients for the design

UNIT-V

Beam theory of cylindrical shells: Beam and arch action. Design of diaphragms - Geometry analysis and design of elliptic Paraboloid, Conoidal and Hyperbolic Paraboloid shapes by membrane theory.

TEXT BOOKS:

1. Theory of Plates and Shells by S.Timoshenko and Krieger, McGraw-Hill book company, INC, New York, 2nd edition.
2. Analysis of thin concrete plates by K. Chandra Sekhara, New Age International Ltd.

REFERENCES:

1. A Text Book of Plate Analysis – Bairagi, K, Khanna Publisher, New Delhi(1986).
2. Design and Construction of Concrete Shell Roofs by Ramaswamy G.S, Mc Graw – Hill, New York(1968).

I M.Tech- II Semester

Course Code: V18SET14	**L**	**P**	**C**
	3	**0**	**3**

EXPERIMENTAL STRESS ANALYSIS
(ELECTIVE III)

UNIT-I

Introduction and Strain measurement methods – Model & Prototype Dimensional analysis-Factors influencing model design – Scale factors and Model material properties – Methods of model design. Definition of strain and its relation to experimental determinations - properties of strain gauge systems – Mechanical, Optical, Acoustic and Pneumatic types.

UNIT-II

Electrical resistance strain gages: Introduction – gauge construction - strain gauge adhesives - mounting methods – gauge sensitivities and gage factor – performance characteristics of wire and foil strain gauges – environmental effects. Analysis of strain gauge data – the three element rectangular rosette – the delta rosette – correction for transverse sensitivity.

UNIT-III

Non – destructive testing: Introduction – objectives of non destructive testing. Ultrasonic pulse velocity method – Rebound Hammer method (Concrete hammer) – Acoustic Emission- application to assessment of concrete quality.

UNIT-IV

Theory of photo elasticity: Introduction – temporary double refraction - Index ellipsoid and stress ellipsoid – the stress optic law – effects of stressed model in a polariscope for various arrangements - fringe sharpening.

UNIT-V

Two dimensional photo elasticity: Introduction – iso-chromatic fringe patterns – isoclinic fringe patterns – compensation techniques – calibration methods – separation methods – materials for photo- elasticity – properties of photo-elastic materials

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TEXT BOOKS:

1. Experimental Stress Analysis by Riley and Dally, McGraw-Hill Inc Newyork, 3rd edition.
2. Experimental Stress Analysis by L.S. Srinath, McGraw-Hill education (1984).

REFERENCES:

1. An introduction to experimental Stress Analysis by Lee G.H, John Wiley and sons(1950)
2. Experimental Stress Analysis by Sadhu Singh, Khanna publications

I M.Tech- II Semester

Course Code: V18SET15

L	P	C
3	0	3

RELIABILITY ANALYSIS AND DESIGN
(ELECTIVE-III)

UNIT-I

Concepts of Structural Safety: General, Design methods. Basic Statistics: Introduction, Data reduction, Histograms, Sample correlation.

UNIT-II

Probability Theory: Introduction, Random events, Random variables, Functions of random variables, Moments and expectation, Common probability distribution, Extremal distribution.

UNIT-III

Resistance Distributions and Parameters: Introduction, Statistics of properties of concrete, Statistics of properties of steel, Statistics of strength of bricks and mortar, Dimensional variations, Characterization of variables, Allowable stresses based on specified reliability.

UNIT-IV

Probabilistic Analysis of Loads: Gravity loads, Wind load. Basic Structural Reliability: Introduction, Computation of structural reliability. Monte Carlo Study of Structural Safety: General, Monte Carlo method, Applications. Level 2 Reliability Methods: Introduction, Basic variables and failure surface, First-order second-moment methods (FOSM).

UNIT-V

Reliability Based Design: Introduction, Determination of partial safety factors, Safety checking formats, Development of reliability based design criteria, Optimal safety factors, Summary of results of study for Indian standard – RCC design. Reliability of Structural Systems: Preliminary concepts as applied to simple structures.

TEXT BOOKS:

1. “Structural Reliability Analysis and Design” by Ranganatham R, Jaico publications(2005)
2. “Structural Reliability” by Melchers, R.E, published by Wiley (1987), 3rd edition.

REFERENCES:

1. Reliability of structures by Andrzej. S. nowak and Kevin R. Collins, Published by CRC press, 2nd edition.
2. Structural Reliability methods by O. Ditelevsen and H.D. Madsers , published by Wiley(1996),1st edition.

I M.Tech- II Semester

Course Code: V18SET16

L	P	C
3	0	3

ADVANCED CONCRETE TECHNOLOGY

(ELECTIVE-III)

UNIT-I

Durability of concrete and concrete construction: Durability concept, pore structure and transport processes, reinforcement corrosion, fire resistance, frost damage, sulphate attack, alkali silica reaction, delayed ettringite formation, methods of providing durable concrete, short-term tests to assess long-term behavior.

UNIT-II

Mix design: Review of methods and philosophies of IS, BS and ACI methods, mix design for special purposes. Acceptance criteria for compressive strength of concrete

UNIT-III

Special concretes: Lightweight concrete, autoclaved aerated concrete, no-fines concrete, lightweight aggregate concrete and foamed concrete, High strength concrete, refractory concrete, high density and radiation-shielding concrete, polymer concrete, fibre-reinforced concrete, mortars, renders, recycled concrete, Ferro Cement, Self Compacting Concrete.

UNIT-IV

Special processes and technology for particular types of structure: Sprayed concrete, underwater concrete, grouts, grouting and grouted concrete, mass concrete, slip form construction, pumped concrete, concrete for liquid retaining structures, vacuum process, concrete coatings and surface treatments.

UNIT-V

Test methods: Analysis of fresh concrete, Accelerated testing methods, Tests on hardened concrete, Core cutting and testing, partially destructive testing, Non-destructive testing of concrete structure

TEXT BOOKS::

1. Properties of Concrete by A.M.Neville, Longman (1995), 5th edition.
2. Concrete micro-structure, Properties and Materials, P.K.Mehta, J.M.Monteiro, Printice Hall INC & McGraw hill, USA, 4th edition.

REFERENCES:

1. Concrete Technology Theory and Practice, M.S.Shetty, S.Chand & Company Ltd, New Delhi.

I M.Tech- II Semester

Course Code: V18SET17

L	P	C
3	0	3

INDUSTRIAL STRUCTURES (ELECTIVE –IV)

UNIT-I

Planning and functional requirements- classification of industries and industrial structures- planning for layout- requirements regarding lighting ventilation and fire safety- protection against noise and vibrations.

UNIT-II

Industrial buildings- roofs for industrial buildings (Steel) - design of gantry girder- design of corbels and nibs- machine foundations.

UNIT-III

Design of Folded plates- Design considerations- analysis of folded plates- analysis of multibay folded plates- design of diaphragm beam

UNIT-IV

Power plant structures- Bunkers and silos- chimney and cooling towers-Nuclear containment structures

UNIT-V

Power transmission structures- transmission line towers- tower foundations- testing towers

TEXT BOOKS:

1. Advanced reinforced concrete design, N. Krishnam Raju, CBS publishers Pvt Ltd, 3rd edition.
2. Handbook on machine foundations- P. Srinivasulu and C.V. Vaidyanathan, McGraw-Hill (1976).

REFERENCES:

1. Tall Chimneys- Design and construction by S.N. Manohar, McGraw-Hill (19585)
2. Transmission Line Structures- A.R. Santakumar and S.S. Murthy, McGraw-Hill book company (1990) SP 32: 1986, Handbook on functional requirements of Industrial buildings

I M.Tech- II Semester

Course Code: V18SET18

L	P	C
3	0	3

BRIDGE ENGINEERING
(ELECTIVE –IV)

UNIT-I

Masonry arch Bridge design details- Rise, radius, and thickness of arch- Arch ring-Dimensioning of sub structures- Abutments pier and end connections.(Ref: IRC- SP-13)

UNIT-II

Super Structure: Slab bridge- Wheel load on slab- effective width method- slabs supported on two edges- cantilever slabs- dispersion length- Design of interior panel of slab- Pigeaud's method- design of longitudinal girders- Guyon-Messonet method- Hendry Jaegar method- Courbon's theory. (Ref: IRC-21), voided slabs, T-Beam bridges.

UNIT-III

Plate girder bridges- Elements of plate girder and their design-web-flange- intermediate stiffener- vertical stiffeners- bearing stiffener-design problem

UNIT-IV

Prestressed Concrete and Composite bridges- Preliminary dimensions-flexural and torsional parameters- Courbon's Theory – Distribution coefficients by exact analysis-design of girder section- maximum and minimum prestressing forces- eccentricity- live load and dead load shear forces- cable zone in girder- check for stresses at various sections- check for diagonal tension- diaphragms and end block design- short term and long term deflections- Composite action of composite brides- shear connectors-composite or transformed section- design problem. (Ref: IRC: Section-VI)

UNIT-V

Sub structure- Abutments- Stability analysis of abutments- piers- loads on piers – Analysis of piers- Design problem(Ref: IRC-13, IRC-21, IRC-78)- Pipe culvert- Flow pattern in pipe culvers- culvert alignment-culvert entrance structure- Hydraulic design and structural design of pipe culverts- reinforcements in pipes .(Ref: IRC: SP-13)

TEXT BOOKS:

1. Design of concrete bridges by Aswini, Vazirani and Ratwani, Khanna publishers (2017).
2. Essentials of bridge engineering- Jhonson Victor D, Oxford IBH publications Pvt Ltd (1980).

REFERENCES:

1. Design of bridges by Krishna Raju, Oxford IBH publications Pvt Ltd, 4th edition.
2. Design of bridge structures by T.R. Jagadeesh and M.A. Jayaram, 2nd edition.

I M.Tech- II Semester

Course Code: V18SET19

L	P	C
3	0	3

EARTH RETAINING STRUCTURES (ELECTIVE –IV)

UNIT-I

Earth pressures – Different types and their coefficients- Classical Theories of Earth pressure – Rankine's and Coulomb's Theories for Active and Passive earth pressure- Computation of Lateral Earth Pressure in Homogeneous and Layered soils- Graphical solutions for Coulomb's Theory in active and passive conditions.

UNIT-II

Retaining walls – different types - Type of Failures of Retaining Walls-Stability requirements – Drainage behind Retaining walls – Provision of Joints – Relief Shells

UNIT-III

Sheet Pile Structures – Types of Sheet piles – Cantilever sheet piles in sands and clays – Anchored sheet piles – Free earth and Fixed earth support methods – Row's moment reduction method – Location of anchors, Forces in anchors.

UNIT-IV

Soil reinforcement – Reinforced earth - Different components – their functions – Mechanics of reinforced earth – Failure modes-Failure theories – Design of Embakments on problematic soils.

UNIT-V

Braced cuts and Cofferdams: Lateral Pressure in Braced cuts – Design of Various Components of a Braced cut – Stability of Braced cuts – Bottom Heave in cuts. – types of cofferdam, suitability, merits and demerits – Design of single – wall cofferdams and their stability aspects

– TVA method and Cummins' methods.

TEXT BOOKS:

1. Principles of Foundation Engineering by Braja M. Das, 7th edition.
2. Foundation analysis and design by Bowles JE , McGraw Hill International publications, 5th edition.

REFERENCES:

1. Soil Mechanics in Engineering Practice by Terzaghi K and Rolph B peck , John Wiley & Co 2nd edition.
2. Analysis and Design of Foundations and Retaining Structures by Prakash S and Saritha Prakashan.

I M.Tech- II Semester

Course Code: V18SEL02

L	P	C
0	4	2

CAD LABORATORY

Analysis and Design using STADD, STRAP, STRUDS, ANSYS

1. Programming for beams subject to different loading (mandatory).
2. Analysis of reinforced concrete multistoried building
3. Analysis of steel transmission line tower
4. Analysis of plane and space truss
5. Analysis of plane and space frame
6. Determination of mode shapes and frequencies of tall buildings using lumped mass (stick model) approximation
7. Wind analysis on tall structure
8. Analysis of pre stressed concrete bridge girder
9. Analysis of Cylindrical shell
10. Modal Analysis of a Cantilever Beam

NOTE: A minimum of eight (including item 1) from the above set have to be conducted.

REFERENCE:

1.Computer aided design laboratory (Civil Engineering) by Shesha Prakash and Suresh.S

SYLLABUS FOR M.TECH (POWER SYSTEM CONTROL & AUTOMATION)

I M.TECH-I SEMESTER

Course Code : V18PST01

POWER SYSTEM OPERATION AND CONTROL

[L: 3; T: 0; P: 0 (3 credits)]

UNIT-I

Unit commitment: Introduction, Simple & numeration, Constraints in UCP, UC solutions. Methods-priority list method, Dynamic programming Approach.

UNIT-II

Single area Load Frequency Control: Necessity of keeping frequency constant. Definition of control area, single area control, Block diagram representation of an isolated Power System, Steady State analysis, Dynamic response-Uncontrolled case. Proportional plus Integral control of single area and its block diagram representation, steady state response, load frequency control, Role of AGC. State spare model of an isolated system, pole placement design, optimal control design.

UNIT-III

Two area Load Frequency Control, uncontrolled case and controlled case, tie-line bias control. Optimal two-area LF control-steady state representation, performance Index and optimal parameter adjustment. State space model for a two are system

UNIT-IV

Generation with limited Energy supply, Take-or-pay fuel supply contract, and composite generation production cost function. Solution by gradient search techniques, hard limits and slack variables, Fuel scheduling by linear programming.

UNIT-V

Interchange Evaluation and Power Pools Economy Interchange, Economy interchange Evaluation, Interchange Evaluation with unit commitment, Multiple Interchange contracts. After the-fact production costing, Transmission Losses in transaction Evaluation, other types of Interchange, power pools.

Text Books

1. I.J.Nagrath&D.P.Kothari, “Modern Power System Analysis” Tata McGraw-Hill Publishing Company ltd, 2nd edition.
2. PSR Murthy, “Power system operation and control”,B.S publication.
3. A.J.Wood&B.F.Wollenberg, “Power Generation, Operation and Control”, Johnwiley& sons Inc. 1984.

Reference Books

1. O.I.Elgerd, “Electrical Energy Systems Theory”, Tata McGraw-Hill Publishing Company Ltd, 2nd edition.
2. TJE Miller, “Reactive Power Control in Electric Systems”, John Wiley & sons.

I M.TECH-I SEMESTER

Course Code : V18PST02

ADVANCED COMPUTER METHODS IN POWER SYSTEMS

[L : 3; T: 0; P: 0 (3 credits)]

UNIT-I

Network modeling – Single phase and three phase modeling of alternators, transformers and transmission lines, Conditioning of Y Matrix –- Incidence matrix method, Method of successive elimination, Triangular factorization

UNIT-II

Load flow analysis - Newton Raphson method, Fast Decoupled method, AC-DC load flow – Single and three phase methods – Sequential solution techniques and extension to multiple and multi-terminal DC systems.

UNIT-III

Fault Studies -Analysis of balanced and unbalanced three phase faults – fault calculations – Short circuit faults – open circuit faults

UNIT-IV

System optimization - strategy for two generator systems – generalized strategies – effect of transmission losses - Sensitivity of the objective function - Formulation of optimal power flow-solution by Gradient method-Newton's method

UNIT-V

State Estimation – method of least squares – statistics – errors – estimates – test for bad data – structure and formation of Hessian matrix – power system state estimation

Test Books:

1. Grainger, J.J. and Stevenson, W.D. "Power System Analysis" Tata McGraw hill, New Delhi, 2003.
2. G W Stagg and A H El Abiad, "Computer Methods in Power System Analysis", McGraw Hill, 1968
3. Pai, M.A., "Computer Techniques in Power System Analysis", Tata McGraw Hill, New Delhi, 2006.

References:

1. HadiSaadat, "Power System Analysis", Tata McGraw hill, New Delhi, 2002.
2. Arrillaga, J and Arnold, C.P., "Computer analysis of power systems" John Wiley and Sons, New York, 1997.

I M.TECH-I SEMESTER
Course Code : V18PST03

ADVANCED POWER SYSTEM PROTECTION

[L: 3; T: 0; P : 0 (3 credits)]

UNIT-I

Static Relays: Advantages of static relays-Basic construction of static relays-Level detectors-Replica impedance –Mixing circuits-General equation for two input phase and amplitude comparators-Duality between amplitude and phase comparators.

Amplitude Comparators: Circulating current type and opposed voltage type- rectifier bridge comparators, Direct and Instantaneous comparators, Static Over Current Relays**,**Differential Relays

UNIT-II

Static Distance Relays: Static impedance-reactance–MHO and angle impedance relay-sampling comparator –realization of reactance and MHO relay using sampling comparator.

Phase Comparators: Coincidence circuit type- block spike phase comparator, techniques to measure the period of coincidence-Integrating type-Rectifier and Vector product type- Phase comparators.

UNIT-III

Multi-Input Comparators: Conic section characteristics-Three input amplitude comparator –Hybrid comparator-switched distance schemes –Poly phase distance schemes- phase fault scheme –three phase scheme – combined and ground fault scheme. POWER SWINGS: Effect of power swings on the performance of distance relays –Power swing analysis-Principle of out of step tripping and blocking relays-effect of line and length and source impedance on distance relays.

UNIT-IV

Microprocessor Based Protective Relays (Block diagram and flowchart approach only)

Over current relays–impedance relays-directional relay-reactance relay .Generalized mathematical expressions for distance relays-measurement of resistance and reactance –MHO and offset MHO relays-Realization of MHO characteristics-Realization of offset MHO characteristics -Basic principle of Digital computer relaying.

UNIT-V

Digital Protection: Application of wavelet protection to power system protection- transmission line protection, transformer protection, synchronous generator protection. Numerical differential protection of generator and transformers.

Text Books

1. Badri Ram and D.N.Vishwakarma, "Power system protection and Switch gear", TMH publication New Delhi 1995.
2. T.S. MadhavaRao, "Power system protection Static relays", TMH 2nd edition 1981

Reference Books

1. Mason, "The Art and Science of protective relaying", Wiley Eastern Ltd
2. C.L. Wadhwa, "Electrical power systems", New Age International (P) Limited
3. Sunil S. Rao, "Switchgear and protection", Khanna Publications

I M.TECH-I SEMESTER

Course Code : V18PST04

MICRO CONTROLLERS AND APPLICATIONS

[L: 3; T: 0; P: 0 (3 credits)]

UNIT-I

INTRODUCTION TO MICROCONTROLLERS

Overview of 8 bit and 16 bit Microcontrollers, CISC & RISC Processors, Harvard & Von-Neumann architectures, features of 8051 Micro Controller, PIN diagram, architecture, Memory organization, Different modes of operation of timer/counters.

UNIT II

PROGRAMMING OF 8051

Instruction set, Addressing modes, sample programs, introduction to embedded C, simple programs, development tools.

UNIT III

REAL TIME CONTROL: INTERRUPTS

Interrupt handling structure of an MCU – Interrupt Latency and Interrupt deadline – Multiple sources of the interrupts – Non-maskable interrupt sources – Enabling or Disabling of the sources – Polling to determine the Interrupt source and assignment of the priorities among them –Interrupt structure in Intel 8051.

UNIT IV

INTERFACING

LEDs & switches interfacing, keypad interfacing, Seven Segment Display interfacing, ADC & DAC interfacing, 2X16 LCD interfacing, stepper motor interfacing, serial port interfacing, high power devices, simple calculator development.

MICROCONTROLLER BASED INDUSTRIAL APPLICATIONS

Optical motor shaft encoders – Industrial control – Industrial process control system – Prototype MCU based Measuring instruments

UNIT V

PIC MICROCONTROLLERS

Overview and features, architecture of PIC 16C6X/7X, PIC memory organization, PIC 16C6X/7X instructions, addressing modes, I/O ports, Interrupts in PIC 16C61/71, PIC 16C61/71 timers.

UNIT VI

ARM 32 Bit MCUs:

Introduction to 16/32 Bit processors–ARMarchitecture and organization – ARM / Thumb programming model – ARM / Thumb instruction set.

Text Books

1. Kenneth J Ayala, "The 8051Microcontrollers: Architecture, Programming & Applications", Second Edition, Penram International Publishing (India).
2. A.V. Deshmukh, "Microcontrollers (Theory & Applications)", 6th Reprint, TMH, 2007.

Reference Books

1. Raj Kamal, "Microcontrollers Architecture, Programming, Interfacing and System Design", 2nd Edition, Pearson Education, 2005.
2. Mazidi and Mazidi, "The 8051 Microcontroller and Embedded Systems", 4th impression, PHI, 2000.

I M.TECH-I SEMESTER

Course Code : V18PST05

POWER SYSTEM RELIABILITY (ELECTIVE – I)

[L: 3; T: 0; P: 0 (3 credits)]

UNIT-I

Basic probability theory – rules for combining probabilities of events – Bernoulli's trials – probability density and distribution functions – binomial- distributions – expected value and standard deviation ofbinomial distribution.

UNIT -II

Network Modelling and Reliability Analysis of Series, Parallel, Series- Parallel networks – complex networks – decomposition method Reliability functions f(t), F(t), R(t), h(t) and their relationship – exponential distributions – Expected value and standard deviation of exponential distribution – Bath tub curve – reliability analysis of series parallel networks using exponential distribution – reliability measures MTTF, MTTR, MTBF.

UNIT –III

Markov chains – concept of stochastic transitional probability Matrix, Evaluation of limiting state Probabilities – Markov processes one component repairable system – time dependent probability evaluation using Laplace transform approach – evaluation of limiting state probabilities using STPM – two component repairable models – Frequency and duration concept – Evaluation of frequency of encountering state, mean cycletime, for one, two component repairable models – evaluation of cumulative probability and cumulative frequency of encountering merged states.

UNIT-IV

Generation system reliability analysis – reliability model of a generation system – recursive relation for unit addition and removal – load modelling – merging of generation load model – evaluation of transition rates for merged state model – cumulative Probability, cumulative frequency of failure evaluation – LOLP, LOLE.

UNIT-V

Composite system reliability analysis decomposition method – distribution system reliability analysis – radial networks – weather effects on transmission lines – Evaluation of load and energy indices.

Text Books

1. R.Billinton, R.N.Allan, "Reliability Evaluation of Engineering System", Plenum Press, New York.
2. R.Billinton, R.N.Allam, "Reliability Evaluation of Power System", Plenum Press, New York
3. Sharies E Ebeling, "An Introduction to Reliability and Maintainability Engineering", TATA McGraw Hill – Edition

Reference Books

1. J. Endrenyi, "Reliabilitymodelling in electric power system", John wiley and sons publications
2. Syed Ali, "Digital switching systems" system reliability and analysis", McGraw-Hill ,1997.

I M.TECH-I SEMESTER

Course Code : V18PST06

APPLICATION OF AI TECHNIQUES IN POWER SYSTEMS (ELECTIVE – I)

[L: 3; T: 0; P: 0 (3 credits)]

UNIT-I

Artificial Neural Networks:

Introduction Models of Neuron Network – Architectures – Knowledge representation – Artificial Intelligence and Neural networks–Learning process – Error correction learning – Hebbian learning – Competitive learning – Boltzman learning –Supervised learning – Unsupervised learning – Reinforcement learning – learning tasks.

UNIT-II

ANN Paradigms:

Multi – layer perceptron using Back propagation Algorithm (BPA) – Self – Organizing Map (SOM) – Radial Basis Function Network – Functional Link Network (FLN) – Hopfield Network.

UNIT-III

Fuzzy Logic:

Introduction – Fuzzy versus crisp – Fuzzy sets – Membership function – Basic Fuzzy set operations – Properties of Fuzzy sets – Fuzzy Cartesian Product – operations on Fuzzy relations – Fuzzy-logic – Fuzzy Quantifiers–Fuzzy Inference – Fuzzy Rule based system–Defuzzification methods.

UNIT-IV

Genetic Algorithms:

Introduction–Encoding – Fitness Function–Reproduction operators–Genetic Modeling – Genetic operators–Cross over – Single site cross over – Two point cross over – Multi point cross over – Uniform cross over – Matrix cross over–Cross over Rate –Inversion & Deletion – Mutation operator–Mutation – Mutation Rate–Bit–wise operators –Generational cycle – convergence of Genetic Algorithm.

UNIT-V

Applications of AI Techniques:

Load forecasting – Load flow studies – Economic load dispatch – Load frequency control – Single area system and two area system – Small Signal Stability (Dynamic stability) Reactive power control – speed control of DC and AC Motors.

Text books:

1. S.Rajasekaran and G.A.V.Pai,"Neural Networks, Fuzzy Logic & Genetic Algorithms", PHI, New Delhi, 2003.
2. Rober J. Schalkoff, "Artificial Neural Networks", Tata McGraw Hill Edition, 2011

Reference Books:

1. S. Rajasekaran and G.A.V. Pai"Neural Networks, Fuzzy Systems And Evolutionary Algorithms : Synthesis And Applications",PHI, New Delhi

I M.TECH-I SEMESTER

Course Code **:** V18PST07

ELECTRICAL DISTRIBUTION SYSTEMS (ELECTIVE – I)

[L: 3; T: 0; P: 0 (3 credits)]

UNIT- I

General : Introduction to Distribution systems, an overview of the role of computers in distribution system planning-Load modeling and characteristics: definition of basic terms like demand factor, utilization factor, load factor, plant factor, diversity factor, coincidence factor, contribution factor and loss factor-Relationship between the load factor and loss factor - Classification of loads (Residential, Commercial, Agricultural and Industrial) and their characteristics.

UNIT-II

Distribution Feeders and Substations

Design consideration of Distribution feeders: Radial and loop types of primary feeders, voltage levels, feeder-loading. Design practice of the secondary distribution system.

Location of Substations: Rating of a Distribution Substation, service area with primary feeders. Benefits derived through optimal location of substations. Distributed Generation placement and modelling.

UNIT -III

System Analysis: Voltage drop and power loss calculations - Derivation for volt-drop and power loss in lines, manual methods of solution for radial networks, three-phase balanced primary lines, non-three-phase primary lines.

UNIT- IV

Protective devices and coordination: Objectives of distribution system protection, types of common faults and procedure for fault calculation. Protective Devices: Principle of operation of fuses, circuit reclosers, line sectionalizer and circuit breakers. Coordination of protective devices General coordination procedure.

UNIT -V

Capacitive compensation for power factor control: Different types of power capacitors, shunt and series capacitors, effect of shunt capacitors (Fixed and Switched) power factor correction, capacitor location. Economic justification. Procedure to determine the best capacitor location. Voltage Control - Equipment for voltage control, effect of series capacitors, effect of AVB/AVR, line drop compensation.

Text Books:

1. TuranGonen, “Electric Power Distribution System Engineering”,Mc.Graw-Hill Book Company,1986.
2. A.S.Pabla “Electric Power Distribution”, Tata McGraw-Hill Publishing Company, 4th edition, 1997.

Reference Books:

1. V.Kamaraju, “Electrical Distribution”, McGraw Hill
2. Gorti Ramamurthy, “Handbook of Electrical Power Distribution”, Universities press.

I M.TECH-I SEMESTER
Course Code : V18PST08

POWER SYSTEM SECURITY (ELECTIVE – I)

[L: 3; T: 0; P: 0 (3 credits)]

UNIT-I

Short circuit analysis techniques in AC power Systems- Simulation of short circuit and open circuit faults using network theorems- fixed impedance short circuit analysis techniques-time domain short circuit analysis in large scale power systems- analysis of time variation of AC and DC short circuit components.

UNIT-II

Fixed impedance Short circuit analysis of large scale power systems general analysis of balanced, unbalanced and open circuit faults- 3- phase short circuit analysis in large scale power systems, Network equivalents and practical short circuit current assessments in large scale Ac power systems - uncertainties in short circuit current calculations.

UNIT-III

Risk assessment and safety considerations-control and limitation of high short circuit currents-limitation of short circuit currents in power system operation, Types of short circuit fault current limiters and their applications.

UNIT-IV

Power System Security analysis- concept of security- security analysis and monitoring- factors affecting power system security- detection of network problems, contingency analysis for generator and line outages by ILPF method – fast decoupled inverse Lemma-based approach, network sensitivity factors.

UNIT-V

Computer control power systems – need for real time and computer control of power systems-operating states of power system – SCADA implementation considerations – software requirements for implementing above functions.

Reference Books

1. Allen J. Wood and Bruce Woolenberg, "Power System Generation,Operation and Control", 1st edition, John Willey and sons,1996.
2. John J.Grainger and William D Stevenson Jr.,"Power System, analysis",McGraw Hill,ISE,1994.

Text Books

1. 1.NasserD.Tleis, "Power System Modelling and fault analysis", Elsevier, 2008.
2. P.Venkatesh, B.V.Manikandan, S.Charles Raja, A.Srinivasan, "Electrical Power Systems, Analysis, Security and Deregulation", kindle edition, PHI publication.

I M.TECH-I SEMESTER

Course Code : V18PST09

REACTIVE POWER COMPENSATION & MANAGEMENT (ELECTIVE – II)

[L: 3; T: 0; P: 0 (3 credits)]

UNIT-I

Load Compensation Objectives and specifications – reactive power characteristics – inductive and capacitive approximate biasing – Load compensator as a voltage regulator – phase balancing and power factor correction of unsymmetrical loads- examples.

UNIT- II

Reactive power compensation in transmission system: Steady state - Uncompensated line – types of compensation – Passive shunt and series and dynamic shunt compensation – examples Transient state - Characteristic time periods – passive shunt compensation – static compensations- series capacitor compensation –compensation using synchronous condensers – examples

UNIT-III

Reactive power coordination: Objective – Mathematical modelling – Operation planning – transmission benefits – Basic concepts of quality of power supply – disturbances- steady –state variations – effects of under voltages – frequency – Harmonics, radio frequency and

Electromagnetic interferences

UNIT-IV

Distribution side Reactive power Management: System losses –loss reduction methods – examples – Reactive power planning – objectives – Economics Planning capacitor placement – retrofitting of capacitor banks User side reactive power management: KVAR requirements for domestic appliances – Purpose of using capacitors – selection of capacitors – deciding factors – types of available capacitor, characteristics and Limitations

UNIT-V

Reactive power management in electric traction systems and are furnaces: Typical layout of traction systems – reactive power control requirements – distribution transformers- Electric arc furnaces – basic operations- furnaces transformer –filter requirements – remedialmeasures –power factor of an arc furnace

Text Books/ Reference Books

1. T.J.E.Miller, “Reactive power control in Electric power systems”, John Wiley and sons, 1982

2. D.M.Tagare, “Reactive power Management”, Tata McGraw Hill

3. W.Hofmann, J.Schlabbach, W. Just “Reactive power compensation, a practical guide”, John Wiley and sons

I M.TECH-I SEMESTER

Course Code : V18PST10

POWER QUALITY (ELECTIVE – II)

[L: 3; T:0; P: 0 (3 credits)]

UNIT-I: Introduction

Overview of Power Quality - Concern about the Power Quality - General Classes of PowerQuality Problems – Transients -Long-Duration Voltage Variations - Short-Duration VoltageVariations - Voltage Unbalance - Waveform Distortion - Voltage fluctuation - Power FrequencyVariations - Power Quality Terms - Voltage Sags and Interruptions - Sources of Sags andInterruptions – Nonlinear loads.

UNIT-II: Transient Over Voltages

Source of Transient over Voltages - Principles of Over Voltage Protection - Devices for OverVoltage Protection - Utility Capacitor Switching Transients - Utility Lightning Protection – LoadSwitching Transient Problems - Computer Tools for Transient Analysis

UNIT-III: Harmonic Distortion and solutions

Voltage vs. Current Distortion - Harmonics vs. Transients - Power System Quantities underNonsinusoidal Conditions - Harmonic Indices – Sources of harmonics - Locating Sources ofHarmonics – System Response Characteristics - Effects of Harmonic Distortion – Interharmonics-Harmonic Solutions Harmonic Distortion Evaluation - Devices for Controlling HarmonicDistortion - Harmonic Filter Design - Standards on Harmonics

UNIT- IV: Long Duration Voltage Variations

Principles of Regulating the Voltage - Device for Voltage Regulation - Utility Voltage RegulatorApplication - Capacitor for Voltage Regulation - End-user Capacitor Application – RegulatingUtility Voltage with Distributed Resources – Flicker

UNIT-V: Distributed Generation and Power Quality

Resurgence of Distributed Generation - DG Technologies - Interface to the Utility System -Power Quality Issues - Operating Conflicts - DG on Low Voltage Distribution Networks -Interconnection standards - Wiring and Grounding - Typical Wiring and Grounding Problems -Solution to Wiring and grounding Problems

Text Books:

1. Dugan R C, McGranaghan M F, Santoso S, and Beaty H W, “Electrical Power Systems Quality”, Second Edition, McGraw-Hill, 2002.
2. Kennedy B.W., “Power Quality Primer”, First Edition, McGraw-Hill, 2000.
3. W.E. Kazibwe and M.H. Sendula, “Electric power quality control techniques”, Springer.

Reference Books:

1. C. Shankaran, “Power Quality”, CRC Press, 2001
2. Francisco C.DE LA Rosa, “Harmonics and Power Systems”, CRC Press.
3. Ewald F. Fuchs, Mohammad A.S. Masoum, “Power Quality in Power Systems& Electrical Machines”, Academic Press.

I M.TECH-I SEMESTER
Course Code : V18PST11

POWER SYSTEM TRANSIENTS (ELECTIVE – II)

[L: 3; T: 0; P: 0 (3 credits)]

UNIT-I

Basic Concepts and Simple Switching Transients: Switching an RL,RC,RLC circuits

Transients Analysis of Three-Phase power Systems: Symmetrical components in Three-phase Systems, Sequence Components for Unbalanced Network Impedances, the Sequence Networks, analysis of Unsymmetrical Three-Phase Faults-single line-to-Ground Fault, Three phase-to-ground fault.

UNIT -II

Travelling Waves: Velocity of Travelling waves and Characteristic Impedance, Energy Contents of Travelling Waves, Attenuation and Distortion of Electromagnetic Waves, telegraph equations-lossless line, distortion less line, Reflection and Refraction of Travelling Waves, Reflection of Travelling Waves against Transformer-and-Generator windings, the Origin Transient Recovery voltages, bewley-lattice diagram. travelling waves and multi conductor system.

UNIT-III

Switching Transients: Arc interruption in circuit breaker, transient recovery voltage, arc-circuit interaction, interruption of capacitive currents, interruption of inverse currents, interruption of fault current in transmission line and transformers.

UNIT-IV

Power System Transient Recovery Voltages: Characteristics of the Transient Voltage- Short-circuit test duties based on IEC 60056 (1987),ANSI/IEEE Standards, the Harmonization between IEC and ANSI/ IEEE Standards with respect to Short-circuit Test duties, transient recovery voltage for Different types of faults.

UNIT-V

Lightning –Induced Transients: Mechanism of Lightning, wave shape of the lightning current, direct lighting Stroke to transmission line towers, direct lightening stroke to a line, lightning protection scheme. Numerical simulation of electrical transients, The Electromagnetic Transient Program, principles of numerical techniques used in transient simulation.

Text Books

1. Allen Greenwood, “Electrical Transients in Power System”, McGraw Hill 1990
2. A.P.SakisMeliopolous, “Power System Grounding and Transients: An Introduction”, Marcel Dekker, INC.
3. Lou Van Sluis, “Transients in power systems”, Wiley.

Reference Books

1. A.Ametani – “Power system transients theory and applications” CRC publications.
2. C.S. Indulkar, D.P. Kothari, K. Ramalingam, “Power system transients”, PHI publications.

I M.TECH-I SEMESTER

Course Code : V18PST12

VOLTAGE STABILITY (ELECTIVE – II)

[L: 3; T: 0; P: 0 (3 credits)]

UNIT-I

Reactive Power flow and voltage stability in power systems: Physical relationship indicating dependency of voltage on reactive power flow - reactive power, transient stability; Q-V curve; definition of voltage stability, voltage collapse and voltage security. Voltage collapse phenomenon, Factors of voltage collapse, effects of voltage collapse, voltage collapse analysis.

UNIT-II

Power system loads: Load characteristics that influence voltage stability such as – Discharge lighting, Induction motor, Air conditioning and heat pumps, Electronic power supplies, Over Headlines and cables.

UNIT-III

Reactive Power compensation: Generation and absorption of reactive power – Reactive power compensators & voltage controllers: - shunt capacitors, synchronous phase modifier – static VAR system – on load tap changing transformer, booster transformers.

UNIT-IV

Voltage stability static indices : Development of voltage collapse index – power flow studies – singular value decomposition – minimum singular value of voltage collapse – condition number as voltage collapse index.

UNIT-V

Voltage stability margins & Improvement of voltage stability: Stability margins, voltage stability margin of uncompensated and compensated power system. Dynamic voltage stability – voltage security, Methods of improving voltage stability and its practical aspects.

Text Books

1. Chakrabarti, D.P.Kothari, A.K. Mukhopadhyay, “Performance operation and control of EHV power transmission Systems”, A H Wheeler Publishing Co Ltd
2. C.W. Taylor, “Power System Voltage Stability”, Mc. Graw Hill, 1994

Reference Books

1. Francis T.S. Yu, “Electric power system dynamics”, Academic Press
2. PrabhaKundur, “Power system stability & control” , Mc. Graw Hill Education.
3. K.R. Padiyar“Power system Dynamics, stability & control”, BS publications.

I M.TECH-I SEMESTER

Course Code : V18PSL01

POWER SYSTEMS LAB-I

[L: 0; T: 0; P: 4 (2 credits)]

Any 10 of the following experiments are to be conducted

1. Formation of Y- Bus by Direct-Inspection Method.
2. Load Flow Solution Using Gauss-Siedel Method
3. Load Flow Solution Using Newton Raphson Method
4. Formation of Z-Bus by Z-bus building algorithm
5. Unsymmetrical Fault analysis using Z-bus
6. Economic Load Dispatch with transmission losses
7. Economic Load Dispatch without transmission losses
8. Transient Stability Analysis Using Point By Point Method
9. Load Frequency Control of Single Area Control& with andwithout controllers.
10. Load Frequency Control of Two AreaControlsystem with andwithout controllers
11. Load Flow Solution Using Fast De-coupled Method.
12. Symmetrical Fault analysis using Z-bus

I M.TECH-II SEMESTER

Course Code : V18PST13

MODERN CONTROL THEORY

[L: 3; T: 0; P: 0 (3 credits)]

UNIT –I

State Variable Analysis: The concept of state – State Equations for Dynamic systems – State diagram---- Linear Continuous time model for physical systems – Existence and Uniqueness of Solutions toContinuous – Time State Equations – Solutions – Linear Time Invariant Continuous – Time State Equations – State transition matrix and it's properties

UNIT – II

State Variable Techniques: General concept of Controllability – General concept of Observability Controllability tests for Continuous &Time Invariant systems - Observability tests for Continuous &Time Invariant systems - Controllability and Observability of state model in Jordan Canonical form - Controllability and Observability Canonical forms of State model – State feedback controller design through pole assignment.

UNIT – III

Non Linear Systems – 1: Introduction – Non Linear Systems – Types of Non – Linarites – Saturation – Dead – Zone – Backlash – Jump Phenomenon etc. - Singular Points – Introduction to Linearization ofnonlinear systems, properties of Non Linear Systems – Describing function – describing function analysis of nonlinear systems- Stability analysis of Non – Linear systems through describing functions.

UNIT – IV

Non Linear Systems – 11: Introduction to phase – plane analysis, Method of Isoclines for Constructing Trajectories, singular points, phase – plane analysis of nonlinear control systems.

UNIT – V

Stability Analysis Stability in the sense of Lyapunov, Lyapunov's stability and Lyapunov's instability theorems – Stability Analysis of the Linear Continuous time invariant systems by Lyapunovsecondmethod – Generation of Lyapunov functions – Variable gradient method – Krasooviski's method.

Text Books

1. M. Gopal, "Modern Control System Theory", New Age International – 1984

2. Ogata. K, "Modern Control Engineering", Prentice Hall – 1997

Reference Books

1. Hassan K. Klalil, "Nonlinear systems", Prentice Hall, 1996

2. Richard C. Dorf and Robert H. Bishop, "Modern control systems", 11th Edition, Pearson Edu, India, 2009

I M.TECH-II SEMESTER

Course Code : V18PST14

POWER SYSTEM DYNAMICS AND STABILITY

[L: 3; T: 0; P: 0 (3 credits)]

UNIT-I: System Dynamics

Synchronous machine model in state space: Synchronous Machine: Basic equations of a synchronous machine, dq0 Transformation and Park's transformation-

Computer representation for excitation and governor system – modeling of loads and induction machines.

UNIT-II: stability

Fundamental Concepts of Stability -Classification of Stability-

Steady state stability – steady state stability limit – Dynamics Stability limit – Dynamic stability analysis – State space representation of synchronous machine connected to infinite bus- time response – Stability by eign value approach.

UNIT-III:Simulation of Transient Stability

Equations of Motion: Swing Equation, calculation of inertia constant- Representation of loads – Alternate cycle solution method – Direct method of solution – Solution

Techniques: Modified Euler method – RungeKutta method – Concept of multi machine stability.

UNIT-IV: Excitation Systems

Excitation System Requirements, Elements of an Excitation System,

Types of Excitation System: Rotating Self-excited Exciter with direct acting Rheostatic type voltage regulator – Rotating main and Pilot Exciters with Indirect Acting Rheostatic Type Voltage Regulator – Rotating Main Exciter, Rotating Amplifier and Static Voltage Regulator – Static excitation scheme – Brushless excitation system - Effect of excitation on power system stability

UNIT-V: Speed Governing systems

Block diagram of speed governing system- Effect of governor action on power system stability- Effect of saturation, saliency & automatic voltage regulators on stability.

Text Books

1. K R Padiyar, "Power System Dynamics Stability and Control", B S Publications
2. P.Kundur, "Power System Stability & Control", Tata Mcgraw hill
3. Vijay Vittal, Bergen , "Power Systems Analysis", Pearson Education

Reference Books

1. P C CrauseViley, "Electric machinery and Drive Systems", IEEE Press .
2. P.M Anderson and A.A Fouad, "Power System Control and Stability", Iowa State University Press, Ames, Iowa, 1978.
3. R. Ramanujam, "Power System Dynamics, Analysis and Simulation", PHI Learning, New Delhi, January 2010.

I M.TECH-II SEMESTER

Course Code : V18PST15

SOLAR & WIND ENERGY

[L: 3; T: 0; P: 0 (3 credits)]

UNIT-I

SOLAR RESOURCES : Solar Energy - Availability - Solar radiation data and measurement - Estimation of average solar radiation - Solar water heater types – Heat balance – Flat plate collector efficiency – Efficiency of heat removal - Thermo siphon flow calculation - Forced circulation calculation - Evacuated collectors - Basics of solar concentrators- Solar Energy Applications - Solar air heaters – Solar Chimney - Crop driers – Passive solar system - Active solar systems - Water desalination – Principle of solar ponds.

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UNIT-II

SOLAR PHOTOVOLTAICS: The Photo Voltaic effect- p-n junction-different types of photovoltaic cells- PV cell characteristics- Effect of variation of temperature, insolation level & tilt angle on the characteristics- equivalent circuits- temperature effects on conversion efficiency- Fabrication and costs of PV cell.

PV SYSTEMS : Photovoltaic modules- module specifications- bypass diodes-PV arrays and PV systems- cabling, earthing and lightning protection- Battery storage: Lead and Nickel cadmium batteries- Charge regulators-LVD circuit-Voltage and current Source Inverters. Tracking Systems-Maximum power point tracking.

UNIT-III

WIND ENERGY-I: Nature of wind – Characteristics – Variation with height and time – Power in wind – Aerodynamics of Wind turbine – Momentum theory – Basics of aerodynamics – Aero foils and their characteristics– Wind turbine loads – Aerodynamic loads in steady operation – Yawed operation and tower shadow.

UNIT-IV

WIND ENERGY-II: Siting – Rotor selection –Annual energy output – Horizontal axis wind turbine (HAWT) – Vertical axis wind turbine (VAWT) – Rotor design considerations – Number of blades – Solidity - Blade profile – Upwind/Downwind – Yaw system – Tower – Braking system - Synchronous and asynchronous generators and loads – Integration of wind energy converters to electrical networks – Inverters – Control system – Requirement and strategies

UNIT-V

PV&WIND SYSTEM APPLICATIONS: Autonomous system; Grid Linked systems; Remote applications, System sizing; System Performance; Economics and future prospects.

Text Books

1. John Twidell and Tony Weir, “Renewable Energy Resources”, E &F.N.Spon
2. G.N.Tiwari and M.K.Ghosal, “Renewable Energy Resources Basic Principles and Applications”,Narosa

References Books

1. S.P.Sukhatme, “Solar Energy - Principles of thermal collection and storage”, TMH
2. Duffie& Beckman, “Solar Energy Thermal Processes”, Wiley
3. Tony Burton, David Sharpe, Nick Jenkins and Ervin Bossanyi / WileyWind Electrical Systems / S.N.Bhadra, D.Kastha and S.Banerjee , “Wind Energy Handbook”, Oxford

I M.TECH-II SEMESTER

Course Code : V18PST16

REAL TIME CONTROL OF POWER SYSTEMS

[L: 3; T: 0; P: 0 (3 credits)]

UNIT-I

State Estimation. Operating states of power systems. Different types of State Estimations, Theory of WLS state estimation, sequential and non-sequential methods to process measurements. Bad data observability, Bad data detection, identification and elimination.

UNIT-II

Security and Contingency Evaluation-Security concept, Security Analysis and monitoring, Contingency Analysis for Generator and line outages by iterative linear power flow method, and network sensitivity methods.

UNIT-III

Computer Control of Power Systems-Need for real time and computer control of power systems, SCADA - Supervisory control and Data Acquisition systems implementation considerations, energy control centres. Role of PMU in real time control.

UNIT-IV

Voltage Stability, voltage collapse, and voltage security, relation of voltage stability to rotor angle stability. Voltage stability analysis Introduction to voltage stability analysis `P-V'curves and `Q-V' curves, voltage stability in mature power systems, long-term voltage stability, power flow analysis for voltage stability, voltage stability static indices and Research Areas.

UNIT-V

Application of AI and ANN in Power System: Basic concepts and definitions, algorithms for load flow, short term load forecasting, fault diagnosis and state estimation.

Text Books

1. Allen J. Wood and Bruce F. Wollenberg "Power Generation, Operation & Control" 2nd edition, John Wiley and Sons.

2. I.J. Nagarath& D. P. Kothari , "Modern power system analysis" 4th Edition, TMH

Reference Books

1. John J.Grainger and William D.Stevenson, Jr.,"Power System Analysis", McGraw-Hill, 1994, International Edition

3. R.N.Dhar,"Computer Aided Power Systems Operation and Analysis", Tata McGraw Hill, 1982

4. L.P.Singh,"Advanced Power System Analysis and Dynamics", Wiley Eastern Ltd. 1986

5. PrabhaKundur, "Power System Stability and Control", McGraw Hill, 1994

6. P.D.Wasserman, "Neural Computing : Theory and Practice", Van Nostrand - Feinhold, New York.

I M.TECH-II SEMESTER

Course Code: V18PST17

ELECTRIC AND HYBRID VEHICLES (ELECTIVE-III)

[L: 3; T: 0; P: 0 (3 credits)]

Unit-I:

Introduction to Hybrid Electric Vehicles: History of hybrid and electric vehicles, social and environmental importance of hybrid and electric vehicles, impact of modern drive-trains on energy supplies.

Conventional Vehicles: Basics of vehicle performance, vehicle power source characterization & transmission characteristics.

Unit-II:

Hybrid Electric Drive-trains: Basic concept of hybrid traction, introduction to various hybrid drive-train topologies, power flow control in hybrid drive-train topologies, fuel efficiency analysis.

Electric Drive-trains: Basic concept of electric traction, introduction to various electric drive-train topologies, power flow control in electric drive-train topologies, fuel efficiency analysis.

Unit-III:

Electric Propulsion unit: Introduction to electric components used in hybrid and electric vehicles, Configuration and control of DC Motor drives, Configuration and control of Induction Motor drives

Unit-IV:

Energy Storage: Introduction to Energy Storage Requirements in Hybrid and Electric Vehicles, Battery based energy storage and its analysis, Fuel Cell based energy storage and its analysis, Hybridization of different energy storage devices

Unit-V:

Sizing the drive system: Matching the electric machine and the internal combustion engine (ICE), Sizing the propulsion motor, sizing the power electronics, selecting the energy storage technology, Communications, supporting subsystems.

Energy Management Strategies: Introduction to energy management strategies used in hybrid and electric vehicles, classification of different energy management strategies, comparison of different energy management strategies.

Text Books:

1. Iqbal Hussein, "Electric and Hybrid Vehicles, Design Fundamentals", CRC Press, 2003.
2. James Larminie, "Electric Vehicle Technology Explained", John Wiley & Sons, 2003.

Reference Books:

1. MehrdadEhsani, YimiGao, Sebastian E. Gay, Ali Emadi, "Modern Electric, Hybrid Electricand Fuel Cell Vehicles: Fundamentals, Theory and Design", CRC Press, 2004.
2. SandeepDhameja, "Electric Vehicle Battery Systems", Newnes, 2000.

I M.TECH-II SEMESTER
Course Code: V18PST18

POWER SYSTEM DEREGULATION (ELECTIVE – III)

[L: 3; T: 0; P: 0 (3 credits)]

UNIT-I

Need and conditions for deregulation. Introduction of Market structure, Market Architecture, Spot market, forward markets and settlements. Review of Concepts marginal cost of generation, least-cost operation, incremental cost of generation. Power System Operation ion deregulated environment and Indian Electricity act.

UNIT-II

Electricity sector structures and Ownership /management, the forms of Ownership and management. Different structure model like Monopoly model, Purchasing agency model, wholesale competition model, Retail competition model.

UNIT-III

FRAMEWORK and methods for the analysis of Bilateral and pool markets, LMP based markets, auction models and price formation, price based unit commitment, country practices.

UNIT-IV

Transmission network and market power. Power wheeling transactions and marginal costing, transmission costing. Congestion management methods- market splitting, counter-trading; Effect of congestion on LMPs- country practices

UNIT-V

Ancillary Services and System Security in Deregulation. Classifications and definitions, AS management in various markets- country practices. Technical, economic, & regulatory issues involved in the deregulation of the power industry.

Text Books

1. S. Stoft, "Power System Economics: Designing markets for electricity"
2. J. Wood and B. F. Wollenberg, "Power generation, operation and control",
3. K. Bhattacharya, M.H.J. Bollen and J.E. Daalder, "Operation of restructured power systems"
4. LoiLeiLai, "Power system restructuring & Deregulation", Wiley publications.

Reference Books

1. M. Shahidehpour, H. Yamin and Z. Li, "Market operations in electric power systems- Forecasting, Scheduling, and Risk Management" , A JOHN WILEY & SONS, INC., PUBLICATION
2. S. Kirschen and G. Strbac, "Fundamentals of power system economics", Wiely publications

I M.TECH-II SEMESTER

Course Code : V18PST19

SMART GRID (ELECTIVE – III)

[L: 3; T: 0; P: 0 (3 credits)]

UNIT-I

Introduction to Smart Grid: Evolution of Electric Grid, Concept of Smart Grid, Definitions, Need of Smart Grid, Functions of Smart Grid, Opportunities & Barriers of Smart Grid, Difference between conventional & smart grid, Concept of Resilient & Self-Healing Grid, Present development& International policies on Smart Grid. Case study of Smart Grid.

UNIT-II

Smart Grid Technologies: Part 1: Introduction to Smart Meters, Real Time Prizing, Smart Appliances, Automatic Meter Reading (AMR), Outage Management System (OMS), Plug in Hybrid Electric Vehicles (PHEV), Vehicle to Grid, Smart Sensors, Home & Building Automation, Phase Shifting Transformers.

UNIT-III

Smart Grid Technologies: Part 2: Smart Substations, Substation Automation, Feeder Automation. Geographic Information System (GIS), Intelligent Electronic Devices (IED) & their application for monitoring & protection, Smart storage like Battery, SMES, Pumped Hydro, Compressed Air Energy Storage, Wide Area Measurement System (WAMS), Phase Measurement Unit (PMU).

UNIT-IV

Microgrids and Distributed Energy Resources: Concept of micro grid, need & applications of micro grid, formation of microgrid, Issues of interconnection, protection & control of microgrid. Plastic & Organic solar cells, Thin film solar cells, Variable speed wind generators, fuelcells, microturbines, Captive power plants, Integration of renewable energy sources.

UNIT-V

Power Quality Management in Smart Grid: Power Quality & EMC in Smart Grid, Power Quality issues of Grid connected Renewable Energy Sources, Power Quality Conditioners for Smart Grid, Web based Power Quality monitoring, Power Quality Audit.

Information and Communication Technology for Smart Grid: Advanced Metering Infrastructure (AMI), Home Area Network (HAN), Neighborhood Area Network (NAN), Wide Area Network (WAN).

Text Books:

1. Ali Keyhani, Mohammad N. Marwali, Min Dai “Integration of Green and Renewable Energy in Electric Power Systems”, Wiley
2. Clark W. Gellings, “The Smart Grid: Enabling Energy Efficiency and Demand Response”,CRC Press
3. JanakaEkanayake, Nick Jenkins, KithsiriLiyanage, Jianzhong Wu, Akihiko Yokoyama,“Smart Grid: Technology and Applications”, Wiley
4. Jean Claude Sabonnadière, NouredineHadjsaïd, “Smart Grids”, Wiley Blackwell 19
5. Peter S. Fox Penner, “Smart Power: Climate Changes, the Smart Grid, and the Futureof Electric Utilities”, Island Press; 1 edition 8 Jun 2010
6. S. Chowdhury, S. P. Chowdhury, P. Crossley, “Microgrids and Active Distribution Networks.” Institution of Engineering and Technology, 30 Jun 2009

7. Stuart Borlase, “Smart Grids (Power Engineering)”, CRC Press

Reference Books:

1. Andres Carvallo, John Cooper, “The Advanced Smart Grid: Edge Power Driving Sustainability: 1”, Artech House Publishers July 2011
2. James Northcote, Green, Robert G. Wilson “Control and Automation of Electric Power Distribution Systems (Power Engineering)”, CRC Press
3. MladenKezunovic, Mark G. Adamiak, Alexander P. Apostolov, Jeffrey George Gilbert “Substation Automation (Power Electronics and Power Systems)”, Springer
4. R. C. Dugan, Mark F. McGranghan, Surya Santoso, H. Wayne Beaty, “Electrical Power System Quality”, 2nd Edition, McGraw Hill Publication
5. Yang Xiao, “Communication and Networking in Smart Grids”, CRC Press

I M.TECH-II SEMESTER
Course Code : V18PST20

HIGH VOLTAGE ENGINEERING (ELECTIVE – III)

[L: 3; T: 0; P: 0 (3 credits)]

UNIT-I

Generation of High AC & DC Voltages: Direct Voltages: AC to DC conversion methods electrostatic generators-Cascaded Voltage Multipliers.

Alternating Voltages: Testing transformers-Resonant circuits and their applications, Tesla coil.

UNIT-II

Generation of Impulse Voltages: Impulse voltage specifications-Impulse generations circuits-Operation, construction and design of Impulse generators-Generation of switching and long duration impulses.

Impulse Currents: Generation of High impulse currents and high current pulses.

UNIT-III

Measurement of High AC & DC Voltages: Measurement of High D.C. Voltages: Series resistance meters, voltage dividers and generating voltmeters.

Measurement of High A.C. Voltages: Series impedance meters electrostatic voltmeters potential transformers and CVTS-voltage dividers and their applications.

Measurement of Peak Voltages: Chubb-Fortesque methods.

Measurement of Impulse Voltages &Currents: Voltage dividers and impulse measuring systems Faraday generators

UNIT-IV

High Voltage Testing of Power Apparatus: Need for testing standards– Standards for porcelain/Glass insulators-Classification of porcelain/glass insulator tests – Tests for cap and pin porcelain/Glass insulators.

UNIT-V

High voltage AC testing methods-Power frequency tests-Over voltage tests on insulators, Isolators, Circuit Breakers and power cables

Impulse Testing: Impulse testing of transformers, insulators, Surge diverters, Bushings, cables, circuit breakers.

Text Books

1. E.Kuffel and W.S.Zaengl., "High Voltage Engineering" PergamanPress Oxford, 1984.
2. M.S.Naidu and V.Kamaraju, "High Voltage Engineering"Mc.Graw-Hill Books Co., New Delhi, 2nd edition, 1995.

Reference Books

1. M.S.Naidu and V.Kamaraju, "High Voltage Engineering" Tata McGraw Hill Publishing Company Limited, New Delhi – 2001.
2. KREUGER, F.H., "Discharge Detection in H.V. Equipment", Haywood London – 1964.

I M.TECH-II SEMESTER

Course Code : V18PST21

CUSTOM POWER DEVICES (ELECTIVE – IV)

[L: 3; T: 0; P: 0 (3 credits)]

UNIT- I

Introduction Custom Power and Custom Power Devices - power quality variations in distribution circuits –Voltage Sags, Swells, and Interruptions - System Faults – Over voltages and Under voltages - Voltage Flicker - Harmonic Distortion - Voltage Notching – Transient Disturbances - Characteristics of Voltage Sags.

UNIT-II

Overview of Custom Power Devices Reactive Power and Harmonic Compensation Devices Compensation Devices for Voltage Sags and Momentary Interruptions - Backup Energy Supply Devices – Battery UPS – Super Conducting Magnetic Energy Storage systems – Flywheel – Voltage Source Converter - Multi-level converters.

UNIT-III

Reactive Power and Harmonic Compensation Devices Var control devices - Static Var Compensator – Topologies - Direct Connected Static Var Compensation for Distribution Systems – Static Series Compensator - Static Shunt Compensator (DSTATCOM) – Interaction with Distribution Equipment and System - Installation Considerations.

UNIT- IV

High-Speed Source Transfer Switches, Solid State Limiting, And Breaking Devices: Source Transfer Switch - Static Source Transfer Switch (SSTS) - Hybrid source transfer switch – High-speed mechanical source transfer switch - Solid state current limiter - Solid state breaker.

UNIT-V

Application of Custom Power Devices in Power Systems P-Q theory – Control of P and Q – Dynamic Voltage Restorer (DVR) – Operation and control – Interline Power Flow Controller (IPFC) – Operation and control – Unified Power Quality Conditioner (UPQC) – Operation and control. Recent custom power devices.

Text Books

1. “Guidebook on Custom Power Devices, Technical Report”, Published by EPRI, Nov 2000

2. Gerard Ledwich, ArindamGhosh, “Power Quality Enhancement Using Custom Power Devices– Power Electronics and Power Systems”, Kluwer Academic Publishers, 2002.

Reference Books

1. C. Shankaran, “Power Quality”, CRC Press, 2001.

2. H. Akagiet.al., “Instantaneous power theory and application to power conditioning”, IEEE Press, 2007.

3. ArindamGhosh and Gerard Ledwich, “Custom Power Devices - An Introduction”, Springer, 2002.

4. Yash Pal et.al.,, “A Review of Compensating Type Custom Power Devices for Power Quality Improvement”, Joint International Conference on Power System Technology and IEEE Power India Conference, 2008.POWERCON 2008.

I M.TECH-II SEMESTER

Course Code : V18PST22

EHVAC TRANSMISSION (ELECTIVE – IV)

[L: 3; T: 0; P: 0 (3 credits)]

Unit-1: E.H.V.A.C. Transmission line trends and preliminary aspect standard transmission voltages – Estimation at line and ground parameters - Bundle conductor systems inductance and capacitance of E.H.V. lines – positive, negative and zero sequence impedance.

Unit-2: Electrostatic field and voltage gradients – calculations of electrostatic field of AC lines – effect high electrostatic field on biological organisms and human beings surface voltage gradients and maximum gradients of actual transmission lines

Unit-3: Electrostatic induction in unenergised lines – measurements of field and voltage gradients for three phase single and double circuit lines – unenegised lines. Power Frequency Voltage control and over voltages in EHV lines: No load voltage – charging currents at power frequency - voltage control

Unit 4: shunt and series compensation – static VAR compensation. Corona in E.H.V. lines – Corona loss formulae attention of traveling waves due to Corona – Audio noise due to Corona, its generation, characteristic and limits

Unit 5: Measurements of audio noise radio interference due to Corona RF properties of radio noise – frequency spectrum of RI fields. Design of EHV lines based on steady state and transient limits.

REFERENCES:

1. Rokosh Das Begamudre, "Extra High Voltage AC Transmission Engineering", Wiley EASTERN LTD., NEW DELHI – 1987.

2. "EHV Transmission line reference Books", Edison Electric Institution (GEC 1968).

Text Books:

1. Sanjay Sharma,"EHVAC, HVDC Transmission and distribution engineering", KHANNA PUBLISHERS
2. Schobhitgupta and Deepak Gupta, "EHV AC/DC Transmission", Genius Publications

I M.TECH-II SEMESTER

Course Code : V18PST23

DEMAND SIDE ENERGY MANAGEMENT (ELECTIVE – IV)

[L: 3; T: 0; P: 0 (3 credits)]

UNIT-I

Energy Audit and Energy management information systems: Energy audit: Definitions-Need-concepts-Types of energy audit;

Energy Economics: Introduction-Cost benefit risk analysis-Payback period-Straight line depreciation-Sinking fund depreciation—Reducing balance depreciation-Net present value method-Internal rate of return method.

UNIT-II

Energy Conservation in Electric utilities and Industry: Electrical load management: Energy and load management devices-Conservation strategies; conservation in electric utilities and industry: Introduction- Energy conservation in utilities by improving load factor-Utility voltage regulation-Energy conservation in Industries.

UNIT-III

Energy –efficient electric motors: Energy efficient motors-construction and technical features-performance characteristics; Economics of EEMs and system: life cycle-direct savings and payback analysis-efficiency factor.

UNIT-IV

Electric Lighting: Introduction-Need for an energy management program-Building analysis-Modification of existing systems- Replacement of existing systems-priorities

Illumination requirement: Task lighting requirements-lighting levels system modifications-non illumination modifications-lighting for non-task areas-reflectance-space geometry; System elements: light sources - characteristics of families of lamps-lamp substitution in an existing systems-selection of Higher efficiency lamps for a new system- Luminaries-ballasts-energy conservation in lighting.

UNIT-V

Space Heating, Ventilation, Air-Conditioning (HVAC) and Water Heating: Introduction-Heating of buildings-Transfer of Heat-Space heating methods-Ventilation and air-conditioning-Insulation-Cooling load- Electric water heating systems-Energy conservation methods.

Co-generation and storage: Combined cycle cogeneration-energy storage: pumped hydro schemes-compressed air energy storage (CAES)-storage batteries-superconducting magnetic energy storage (SMES)

Text Books

1. Wayne C.Turner, "Energy management Hand book",,John Wiley and sons publications
2. S C Tripathy, "Electric Energy Utilization and Conservation", Tata McGraw hill publishing company ltd. New Delhi
3. John C.Andreas, "Energy efficient electric motors selection and application".

Reference Books

1. Amit Kumar Tyagi, "Hand book on Energy Audit and Management", TERI (Tata energy research Institute)
2. Paul W.O' Callaghan, "Energy management", McGraw hill book company
3. Rakosh Das Begamudre, "Energy conversion systems", New age international publishers

I M.TECH-II SEMESTER

Course Code : V18PST22

H.V.D.C AND FACTS (ELECTIVE – IV)

[L: 3; T: 0; P: 0 (3 credits)]

UNIT-I:H.V.DC Transmission: General consideration, Power Handling Capabilities of HVDC lines, static converter configuration. Static Power Converters: 3 pulse, 6 pulse & 12 pulse converters, converter station and terminal equipment communication process, Rectifier and inverter operation

UNIT-II: Control of HVDC converter and systems: constant current, constant extinction angle and constant ignition angle control. Individual phase control and equidistant firing angle control. Harmonics in HVDC systems, Characteristic and uncharacteristic harmonics-troubles due to harmonics-harmonic filters.

UNIT-III: Converter faults and protection in HVDC systems: Converter faults, over current protection- valve group and DC line protection. Over voltage protection of converters.

UNIT-IV: FACTS concepts, importance of controllable parameters, basic types of FACTS controllers**,** Objectives of shunt compensation, midpoint voltage regulation, voltage instability prevention, improvement of transient stability, methods of controllable var generation, variable impedance type static var generators, switching converter type var generators.

UNIT-V: Concept of series capacitive compensation, improvement of transient stability, power oscillation damping, functional requirements. GTO thyristor controlled series capacitor (GSC), thyristor switched series capacitor (TSSC), and thyristor controlled series capacitor (TCSC), control schemes for GSC, TSSC and TCSC.

Text Books

1. E.W.Kimbark,“Direct current Transmission”, Wiely inter Science- New york.
2. J.Arillaga,“H.V.D.C.Tranmission”, peter peregrilnus ltd., London UK 1983
3. N.G.Hingorani and L.Guygi, “Understanding FACTS Devices”, IEEE Press. Indian Edition is available:— Standard Publications

References Books

1. “EHV Transmission line reference Books”, Edison Electric Institution (GEC 1968).
2. K.R.Padiyar,“High Voltage Direct current Transmission”, Wiely Eastern Ltd
3. E.Uhlman,“Power Transmission by Direct Current”, Springer Verlag, Berlin
4. Sang.Y.H and John.A.T, “Flexible AC Transmission systems”, IEEE Press (2006).
5. Vijay K.Sood, “HVDC & FACTS Controllers: applications of static converters in power systems”, Springer publishers

I M.TECH-II SEMESTER

Course Code : V18PSL02

POWER SYSTEMS LAB-II

[L: 0; T: 0; P: 4 (2 credits)]

Any 10 of the following experiments are to be conducted

1. Determination of Sequence Impedance of an Alternator by direct method.
2. Determination of break down strength of Transformer oil Testing.
3. Measurement of sequence impedance of a three phase transformer by application of sequence voltage.
4. Power angle characteristics of a salient pole Synchronous Machine.
5. Scott connection of transformer.
6. Determination of equivalent circuit of 3-winding Transformer.
7. Measurement of ABCD parameters on transmission line model.
8. Optimal power flow.
9. Reactive power compensation Br minimization of power loss using PSO
10. State estimation of power systems.

I M.TECH – I SEMESTER

VI8MAT06	COMPUTATIONAL METHODS IN ENGINEERING	L	P	C
		3	0	3

Unit – I

Introduction to numerical methods applied to engineering problems: Examples, solving sets of equations – Matrix notation – Determinants and inversion – Iterative methods – Relaxation methods – System of non-linear equations. Least square approximation fitting of non-linear curves by least squares –regression analysis- multiple linear regression, non linear regression -computer programs.

Unit – II

Boundry value problems and charecteristic value problems: Shooting method – Solution through a set of equations – Derivative boundary conditions – Rayleigh – Ritz method – Characteristic value problems.

Unit – III

Transformation Techniques: Continuous fourier series, frequency and time domains, laplace transform, fourier integral and transform, discrete fourier transform (DFT), Fast fourier transform (FFT).

Unit – IV

Numerical solutions of partial differential equations: Laplace's equations – Representations as a difference equation – Iterative methods for Laplace's equations – poisson equation – Examples – Derivative boundary conditions – Irregular and non – rectangular grids – Matrix patterns, sparseness – ADI method – Finite element method.

Unit – V

Partial differential equations: Explicit method – Crank-Nickelson method – Derivative boundary condition – Stability and convergence criteria. Solving wave equation by finite differences-stability of numerical method –method of characteristics-wave equation in two space dimensions-computer programs.

TEXT BOOKS:

1. Steven C.Chapra, Raymond P.Canale "Numerical Methods for Engineers" Tata Mc-Graw Hill, 7th edition
2. Curtis F.Gerald, Partick. O.Wheatly," Applied numerical analysis" Addison-Wesley, 1989, 7th edition
3. Douglas J.Faires, Riched Burden"Numerical methods", Brooks/Cole publishing Company, 1998, Second edition

References:

1. Ward Cheney and David Kincaid "Numerical mathematics and computing" Brooks/Cole publishing company1999, Fourth edition.
2. Riley K.F,. M.P.Hobson and Bence S.J,"Mathematical methods for physics and engineering", Cambridge University press, 1999.
3. Kreysis, Advanced Mathematics, 9th edition ,2006

I M.TECH – I SEMESTER

VI8MDT01	ADVANCED MECHANICS OF SOLIDS	L	P	C
		3	0	3

Unit I

Theories of stress and strain, Definition of stress at a point, stress notation, principal stresses, other properties, differential equations of motion of a deformable body, deformation of a deformable body, strain theory, principal strains, strain of a volume element, small displacement theory.

Stress –strain temperature relations: Elastic and non elastic response of a solid, first law of thermodynamics, Hooke's Law, Anisotropic elasticity, Hooke's Law, Isotropic elasticity, initiation of Yield, Yield criteria.

Unit II

Failure criteria: Modes of failure, Failure criteria, Excessive deflections, Yield initiation, fracture, Progressive fracture, (High Cycle fatigue for number of cycles $N > 10^6$, buckling. Application of energy methods: Elastic deflections and statically indeterminate members and structures: Principle of stationary potential energy, Castiglione's theorem on deflections, Castiglione's theorem on deflections for linear load deflection relations, deflections of statically determinate structures.

Unit III

Unsymmetrical bending: Bending stresses in Beams subjected to Nonsymmetrical bending; Deflection of straight beams due to nonsymmetrical bending.

Curved beam theory: Winkler Bach formula for circumferential stress – Limitations – Correction factors –Radial stress in curved beams – closed ring subjected to concentrated and uniform loads-stresses in chain links.

Unit IV

Torsion : Linear elastic solution; Prandtl elastic membrane (Soap-Film) Analogy; Narrow rectangular cross Section ;Hollow thin wall torsion members ,Multiply connected Cross Section.

Unit V

Contact stresses: Introduction; problem of determining contact stresses; Assumptions on which a solution for contact stresses is based; Expressions for principal stresses; Method of computing contact stresses; Deflection of bodies in point contact; Stresses for two bodies in contact over narrow rectangular area (Line contact), Loads normal to area; Stresses for two bodies in line contact, Normal and Tangent to contact area.

Textbooks:

1. Advanced Mechanics of materials by Boresi & Sidebottom-Wiely International, 6th edition.
2. Advanced Mechanics of Solids, L.S Srinath- Tata Mc-Graw Hill, 3rd edition

References:

1. Advanced strength of materials by Den Hortog J.P. , DOVER PUBLICATIONS.INC
2. Theory of plates & shells – Timoshenko, 2nd edition
3. Strength of materials & Theory of structures(Vol I&II)by B.C Punmia, laxmi publications, 9th edition
4. 4. Strength of materials by Sadhu singh, kanna publications , 11th edition, 2014

I M.TECH – I SEMESTER

VI8MDT02	ADVANCED MECHANISMS	L	P	C
		3	0	3

Unit – I: Introduction: Elements of Mechanisms; Mobility Criterion for Planar mechanisms and manipulators; Mobility Criterion for spatial mechanisms and manipulators. Spherical mechanisms-spherical trigonometry.

Unit – II: Advanced Kinematics of plane motion- I: The Inflection circle ; Euler – Savary Equation; Analytical and graphical determination of di ; Bobillier's Construction; Collineastion axis; Hartmann's Construction ;Inflection circle for the relative motion of two moving planes; Application of the Inflection circle to kinematic analysis.

Advanced Kinematics of plane motion - II: Polode curvature; Hall's Equation; Polode curvature in the four bar mechanism; coupler motion; relative motion of the output and input links; Determination of the output angular acceleration and its Rate of change; Freudenstein's collineation –axis theorem; Carter –Hall circle; The circling – point curve for the Coupler of of a four bar mechanism.

Unit – III: Introduction to Synthesis-Graphical Methods - I: The Four bar linkage ;Guiding a body through Two distinct positions; Guiding a body through Three distinct positions; The Rotocenter triangle ; Guiding a body through Four distinct positions; Burmester's curve.

Introduction to Synthesis-Graphical Methods - II: Function generation- General discussion; Function generation: Relative –rotocenter method, Overlay's method, Function generation-Velocity – pole method; Path generation: Hrones's and Nelson's motion Atlas, Roberts's theorem.

Unit – IV: Introduction to Synthesis-Analytical Methods: Function Generation: Freudenstien's equation, Precision point approximation, Precision – derivative approximation; Path Generation: Synthesis of Four-bar Mechanisms for specified instantaneous condition; Method of components; Synthesis of Four-bar Mechanisms for prescribed extreme values of the angular velocity of driven link; Method of components.

Unit – V: Manipulator kinematics : D-H transformation matrix ; Direct and Inverse kinematic analysis of Serial manipulators: Articulated, spherical & industrial robot manipulators- PUMA, SCARA,STANFORD ARM, MICROBOT.

Text Books:

1. Jeremy Hirschhorn, Kinematics and Dynamics of plane mechanisms,McGraw-Hill,1962.
2. L.Sciavicco and B.Siciliano, Modelling and control of Robot manipulators, Second edition , Springer -Verlag,London,2000.
3. Amitabh Ghosh and Ashok Kumar Mallik, Theory of Mechanisms and Machines. E.W.P.Publishers.

Reference Books:

1. Allen S.Hall Jr., Kinematics and Linkage Design, PHI,1964.
2. J.E Shigley and J.J . Uicker Jr., Theory of Machines and Mechanisms , McGraw-Hill, 1995.
3. Joseph Duffy, Analysis of mechanisms and Robot manipulators, Edward Arnold, 1980

I M.TECH – I SEMESTER

VI8MDT03	MECHANICAL VIBRATIONS	L	P	C
		3	0	3

Unit I

Single degree of Freedom systems: Undamped and damped free vibrations: forced vibrations ; coulomb damping; Response to harmonic excitation; rotating unbalance and support excitation, Vibration isolation and transmissibility, Vibrometers, velocity meters & accelerometers.

Unit II

Response to Non Periodic Excitations: unit Impulse, unit step and unit Ramp functions; response to arbitrary excitations, The Convolution Integral; shock spectrum; System response by the Laplace Transformation method.

Unit III

Multi degree freedom systems: Principal modes – undamped and damped free and forced vibrations ; undamped vibration absorbers, Matrix formulation, stiffness and flexibility influence coefficients; Eigen value problem; normal modes and their properties; Free and forced vibration by Modal analysis; Method of matrix inversion; Torsional vibrations of multi – rotor systems and geared systems; Discrete-Time systems.

Unit IV

Numerical Methods: Rayliegh's, stodola's, Matrix iteration, Rayleigh-Ritz Method and Holzer's methods

Unit V

Application of concepts: Free vibration of strings – longitudinal oscillations of bars-transverse vibrations of beams- Torsional vibrations of shafts. Critical speeds without and with damping, secondary critical speed.

Text books:

1. Elements of Vibration Analysis by Meirovitch. 2nd edition Tata Mc Graw Hill
2. Mechanical Vibrations by G.K. Groover. 2009 8th edition

References:

1. Vibrations by W.T. Thomson,1961
2. Mechanical Vibrations – Schaum series., Mc Graw Hill 1996
3. Vibration problems in Engineering by S.P. Timoshenko. 5th editon, 1990
4. Mechanical Vibrations–V.Ram Murthy. Alpha Science International, 2000

I M.TECH – I SEMESTER

VI8MDT04	DESIGN OF AUTOMOBILE SYSTEMS (ELECTIVE-I)	L	P	C
		3	0	3

UNIT I

Conceptual design of automobiles: body shape definition based on aerodynamic structure safety, sub - systems integration considerations, road load analysis, transmission of road loadsto structure.

UNTI II

Detail design of structural elements, load analysis for different vehicles, safety consideration, design for bending, torsion conditions, criteria for toppling, based on cornering loads.

UNIT III

Suspension system integration with vehicle for ride comfort, methods of mounting suspension and power train systems.

UNIT IV

Driver cabin/seat design, design of control systems based on ergonomics, anthropometry, human factors engineering considerations.

UNIT V

Safety aspects of automobiles, devices, energy absorbing systems, crash worthiness, legislation relating to safety, vehicle performance requirements, sub systems packaging and verification of vehicle performance through testing(lab, field testing).

TEXT BOOKS

1. 1 Donald E.Males, Fundamentals of automobile body structure design(R-394), 2011 SAE international
2. W.F.Milliker, D.L.Milliker,Maurice Olly, Chassis design: principles an analysis
3. (R-206) 2002 SAE international
4. 3. J.H Smith, Modern Vehicle System Design, 2001

I M.TECH – I SEMESTER

VI8MDT05	PRODUCT DESIGN (ELECTIVE-I)	L	P	C
		3	0	3

UNIT- I

Introduction -Need for IPPD – strategic importance of product development – integration of customer, designer, material supplier and process planner, Competitor and costumer – behavior analysis. Understanding customer – promoting customer understanding – involve customer in development and managing requirements – Organization – process management and improvement – Plan and establish product specification.

UNIT - II

CONCEPT GENERATION AND SELECTION: Task – Structured approaches – Clarification – Search – Externally and internally – explore systematically – reflect on the solutions and process – concept selection – methodology – benefits.

PRODUCT ARCHETECTURE: Implications – Product change – variety – component standardization – product performance – manufacturability.

UNIT - III

PRODUCT DEVELOPMENT MANAGEMENT: Establishing the architecture – creation – clustering – geometric layout development – fundamental and incidental interactions – related system level design issues – secondary systems – architecture of the chunks – creating detailed interface specifications.

INDUSTRIAL DESIGN: Integrate process design – Managing costs – Robust design – Integrating CAE, CAD, CAM tools – simulating product performance and manufacturing processing electronically – Need for industrial design – impact – design process.

UNIT - IV

Investigation of customer needs – conceptualization – refinement – management of the industrial design process – technology driven products – user – driven products – assessing the quality of industrial design.

UNIT - V

DESIGN FOR MANUFACTURING AND PRODUCTY DEVELOPMENT: Definition – Estimation of manufacturing cost – reducing the component costs and assembly costs – Minimize system complexity. Prototype basics – Principles of prototyping – planning for prototypes – Economics analysis – Understanding and representing tasks – baseline project planning – accelerating the project execution.

TEXT BOOKS:

1. Product Design and Development / Kari T. Ulrich and Steven D. Eppinger / McGraw Hill International Edns. 1999.5th edition
2. Concurrent Engg/integrated Product development / Kemnneth Crow / DRM Associates, 26/3, Via Olivera, Palos Verdes, CA 90274(310)377-569, Workshop Book.

REFERENCES:

1. Effective Product Design and Development / Stephen Rosenthal / Business One Orwin, Homewood, 1992, ISBN, 1-55623-603-4.
2. Tool Design–Integrated Methods for Successful Product Engineering / Staurt Pugh / Addsion Wesley Publishing, Neyourk, NY, 1991, ISBN 0-202-41369-5.
3. Production and Operations Management/Chase/TMH, 8th edition, 1997

I M.TECH – I SEMESTER

VI8MDT06	GEOMETRIC MODELING (ELECTIVE-I)	L	P	C
		3	0	3

Unit - I

Cubic spline –I Definition, Explicit and implicit equations, parametric equations, Algebraic and geometric form of cubic spline, Hermite cubic spline, tangent vectors, parametric space of a curve, blending functions.

Unit - II

Cubic Splines-II:

four point form, reparametrization, truncating and subdividing of curves. Graphic construction and interpretation, composite pc curves.

Bezier Curves: Bernstein basis, equations of Bezier curves, properties, derivatives.

Unit - III

B-Spline Curves: B-Spline basis, equations, knot vectors, properties, and derivatives.

Unit – IV

Surfaces: Bicubic surfaces, Coon's surfaces, Bezier surfaces, B-Spline surfaces, surfaces of revolutions, Sweep surfaces, ruled surfaces, tabulated cylinder, bilinear surfaces, Gaussian curvature.

Unit – V

Solids: Tricubic solid, Algebraic and geometric form.

Solid modeling concepts: Wire frames, Boundary representation, Half space modeling, spatial cell, cell decomposition, classification problem.

TEXT BOOKS:

1. Elements of Computer Graphics by Roger & Adams Tata McGraw Hill. 2nd edition
2. Geometric Modeling by Micheal E. Mortenson, McGraw Hill Publishers, 3rd edition

REFERENCES:

1. Computer Aided Design and Manufacturing, K.Lalit Narayan, K.Mallikarjuna Rao, MMM Sarcar, PHI Publishers

I M.TECH – I SEMESTER

VI8MDT07	NON-DESTRUCTIVE EVALUATION (ELECTIVE-I)	L	P	C
		3	0	3

UNIT – I

General Methods: Flaw Detection Using Dye Penetrants. Magnetic Particle Inspection introduction to electrical impedance, Principles of Eddy Current testing, Flaw detection using eddy currents

UNIT – II

X-Ray Radiography: The Radiographic process, X-Ray and Gamma-ray sources, Geometric Principles, Factors Governing Exposure, Radio graphic screens, Scattered radiation, Arithmetic of exposure, Radiographic image quality and detail visibility, Industrial X-Ray films, Fundamentals of processing techniques, Process control, The processing Room, Special Processing techniques, Paper Radiography, Sensitometric characteristics of x-ray films, Film graininess signal to noise ratio in radiographs, The photographic latent image, Radiation Protection,

UNIT – III

Generation of ultrasonic waves, Horizontal and shear waves, Near field and far field acoustic wave description, Ultrasonic probes- straight beam, direct contact type, Angle beam, Transmission/reflection type, and delay line transducers, acoustic coupling and media, Transmission and pulse echo methods, A-scan, B-scan, C-scan, F-scan and P-scan modes, Flaw sizing in ultrasonic inspection: AVG, Amplitude, Transmission, TOFD, Satellite pulse, Multi-modal transducer, Zonal method using focused beam. Flow location methods, Signal processing in Ultrasonic NDT; Mimics, spurious echos and noise. Ultrasonic flaw evaluation.

UNIT – IV

Holography: Principles and practices of Optical holography, acoustical, microwave, x-ray and electron beam holography techniques.

UNIT – V

Applications: NDT in flaw analysis of Pressure vessels, piping, NDT in Castings, Welded constructions, etc., Case studies.

TEXT BOOKS:

1. Ultrasonic testing by Krautkramer and Krautkramer, 4th edition Springer.
2. Ultrasonic inspection to Training for NDT : E. A. Gingel, Prometheus Press,2006.
3. Metals and alloys, ASTM Standards, Vol 3.01

I M.TECH – I SEMESTER

VI8MDT08	FRACTURE MECHANICS (ELECTIVE-II)	L	P	C
		3	0	3

UNIT-I

Introduction: Prediction of mechanical failure. Macroscopic failure modes; brittle and ductile behavior. Fracture in brittle and ductile materials – characteristics of fracture surfaces; inter-granular and intra-granular failure, cleavage and micro-ductility, growth of fatigue cracks, The ductile/brittle fracture transition temperature for notched and unnotched components. Fracture at elevated temperature.

UNIT-II

Griffiths analysis: Concept of energy release rate, G, and fracture energy, R. Modification for ductile materials, loading conditions. Concept of R curves.

Linear Elastic Fracture Mechanics, (LEFM). Three loading modes and the state of stress ahead of the crack tip, stress concentration factor, stress intensity factor and the material parameter the critical stress intensity factor, crack tip plasticity, effect of thickness on fracture toughness.

UNIT-III

Elastic-Plastic Fracture Mechanics; (EPFM). The definition of alternative

failure prediction parameters, Crack Tip Opening Displacement, and the J integral. Measurement of parameters and examples of use.

UNIT-IV

Fatigue: definition of terms used to describe fatigue cycles, High Cycle Fatigue, Low Cycle Fatigue, mean stress R ratio, strain and load control. S-N curves. Goodmans rule and Miners rule. Micromechanisms of fatigue damage, fatigue limits and initiation and propagation control, leading to a consideration of factors enhancing fatigue resistance. Total life and damage tolerant approaches to life prediction.

UNIT-V

Creep deformation: the evolution of creep damage, primary, secondary and tertiary creep. Micro-mechanisms of creep in materials and the role of diffusion. Ashby creep deformation maps. Stress dependence of creep – power law dependence. Comparison of creep performance under different conditions – extrapolation and the use of Larson-Miller parameters. Creep-fatigue interactions,Examples

TEXT BOOKS

1. T.L. Anderson, Fracture Mechanics Fundamentals and Applications, 2nd Ed. CRC press, (1995)
2. B. Lawn, Fracture of Brittle Solids, Cambridge Solid State Science Series 2nd ed1993. 3. J.F. Knott, Fundamentals of Fracture Mechanics, Butterworths (1973)
3. J.F. Knott, P Withey, Worked examples in Fracture Mechanics, Institute of Materials. 5. H.L.Ewald and R.J.H. Wanhill Fracture Mechanics, Edward Arnold, (1984).
4. S. Suresh, Fatigue of Materials, Cambridge University Press, (1998)
5. L.B. Freund and S. Suresh, Thin Film Materials Cambridge University Press,(2003). 8. G. E. Dieter, Mechanical Metallurgy, McGraw Hill, (1988)
6. D.C. Stouffer and L.T. Dame, Inelastic Deformation of Metals, Wiley (1996)
7. F.R.N. Nabarro, H.L. deVilliers, The Physics of Creep, Taylor and Francis, (1995)

I M.TECH – I SEMESTER

VI8MDT09	GEAR ENGINEERING (PSG Design data Book is allowed) (ELECTIVE-II)	L	P	C
		3	0	3

UNIT – I

Introduction: Principles of gear tooth action, Generation of Cycloid and Involute gears, Involutometry, gear manufacturing processes and inspection, gear tooth failure modes, stresses, selection of right kind of gears.

UNIT – II

Spur Gears, Helical gears, Bevel gears and worm gears, Tooth loads, Principles of Geometry, Design considerations and methodology, Complete design of spur gear teeth considering Lewis beam strength, Buckingham's dynamic load and wear load, Design of gear shaft and bearings.

UNIT –III

Gear trains: Simple, compound and epicyclic gear trains, Ray diagrams, Design of a gear box of an automobile, Design of gear trains from the propeller shafts of airplanes for auxiliary systems.

UNIT – IV

Gear failures

Analysis of gear tooth failures, Nomenclature of gear tooth wear and failure, tooth breakage, pitting, scoring, wear, overloading, gear-casing problems, lubrication failures

UNIT – V

Optimal Gear design: Optimization of gear design parameters, Weight minimization, Constraints in gear train design-space, interference, strength, dynamic considerations, rigidity etc. Compact design of gear trains, multi objective optimization of gear trains. Application of Traditional and non-traditional optimization techniques

TEXT BOOKS:

1. Maleev and Hartman, Machine Design, C.B.S. Publishers, India.6th edition 2015
2. Henry E.Merrit,Gear engineering ,Wheeler publishing,Allahabad,1992.
3. Practical Gear design by Darle W. Dudley,first edition McGraw-Hill book company

REFERENCES:

1. Earle Buckingham, Analytical mechanics of gears, Dover publications, New York, 1949.
2. G.M.Maitha, Hand book of gear design, Tata Mc.Graw Hill publishing company Ltd., New Delhi, 1994.

I M.TECH – I SEMESTER

VI8MDT10	DESIGN FOR MANUFACTURING AND ASSEMBLY (ELECTIVE-II)	L	P	C
		3	0	3

UNIT - I

Introduction to DFM, DFMA: How Does DFMA Work? Reasons for Not Implementing DFMA, What Are the Advantages of Applying DFMA During Product Design?, Typical DFMA Case Studies, Overall Impact of DFMA on Industry.

Design for Manual Assembly: General Design Guidelines for Manual Assembly, Development of the Systematic DFA Methodology, Assembly Efficiency, Effect of Part Symmetry, Thickness, Weight on Handling Time, Effects of Combinations of Factors, Application of the DFA Methodology.

UNIT - II

Machining processes: Overview of various machining processes-general design rules for machining-dimensional tolerance and surface roughness-Design for machining – ease – redesigning of components for machining ease with suitable examples. General design recommendations for machined parts.

UNIT - III

Metal casting: Appraisal of various casting processes, selection of casting process,-general design considerations for casting-casting tolerance-use of solidification, simulation in casting design-product design rules for sand casting.

Extrusion & Sheet metal work: Design guide lines extruded sections-design principles for punching, blanking, bending, deep drawing-Keeler Goodman forging line diagram – component design for blanking.

UNIT - IV

Metal joining: Appraisal of various welding processes, factors in design of weldments – general design guidelines-pre and post treatment of welds-effects of thermal stresses in weld joints-design of brazed joints. Forging: Design factors for forging – closed die forging design – parting lines of dies – drop forging die design – general design recommendations.

UNIT – V

Design for Assembly Automation: Fundamentals of automated assembly systems, System configurations, parts delivery system at workstations, various escapement and placement devices used in automated assembly systems, Quantitative analysis of Assembly systems, Multi station assembly systems, single station assembly lines.

TEXT BOOKS:

1. Design for manufacture, John cobert, Adisson Wesley. 1995
2. Design for Manufacture and assembly by Boothroyd,3rd edition CRC press
3. Design for manufacture, James Bralla, 2nd edition Mc Graw Hill

REFERENCE:

1. ASM Hand book Vol.20, Taylor & Francis 1997

I M.TECH – I SEMESTER

VI8MDT11	CONTINUUM MECHANICS (ELECTIVE-II)	L	P	C
		3	0	3

UNIT – I

Tensor calculus:

Tensor calculus, Multi linear forms, Definition of Tensor over including vector spaces, Alternating tensors, determinants, orientation, tensor products, kinematics of deformations and motion, strain analysis, rotation of tensors, calculations of tensors, internal calculations of tensors and integral identities.

UNIT – II

Eulerian and Lagrangian description of a continuous, discrete systems, continua, physical quantities and their derivatives. Rigid body motion, Relation between continuum models and real materials.

UNIT – III

Conservation laws in a continuum: Mass conservation in Lagrangen and Eulerian frames, Conservation of momentum in Lagrangen and Eulerian frames.

UNIT – IV

Conservation in angular momentum in lagrengian form. Conservation of energy in in Lagrangen and Eulerian frames.Strain and decomposition. Finite deformation, infinitesimal displacements

UNIT - V

Material frame indifference, Elastic Materials, Viscous fluids, linear visco-elasticity, case studies for metals and polymers.

TEXT BOOK

1. Continuous mechanics, George Backus, Samizdat Press, 1997

REFERENCES:

1. Mechanics of Continua, A.C. Eringan, 1962
2. Continuous Physics, Vol. 1, A.C. Eringan, 1967, Academic press
3. Introduction to Continuous Mechanics, B.L.N. Kennett, Cambridge, 1st edition 2001
4. Quick introduction to Tensor analysis, R.Sharipov, 2004, Samizdat Press.
5. Non-linear continuum mech-win, SEACAS theory manuals part II, T.A.Laursen, S.W.Attaway and R.I.Zadoks

I M.TECH – I SEMESTER

		L	P	C
VI8MDL01	**MACHINE DYNAMICS LABORATORY**	**0**	**4**	**2**

EXPERIMENTS:

1. Determination of damped natural frequency of vibration of the vibrating system with different viscous oils.
2. Determination of steady state amplitude of a forced vibratory system.
3. Static balancing using steel balls & Determination of the magnitude and orientation of the balancing mass in dynamic balancing.
4. Field balancing of the thin rotors using vibration pickups.
5. Determination of the magnitude of gyroscopic couple, angular velocity of precession, and representation of vectors.
6. Determination of natural frequency of given structure using FFT analyzer.
7. Diagnosis of a machine using FFT analyzer.
8. Direct kinematic analysis of a robot.
9. Inverse kinematic analysis of a robot.
10. An experiment on friction, wear, pin-on-disc.
11. An experiment on stress intensity factors/fatigue, fracture.
12. Modal analysis of beams and plates.

I M.TECH – II SEMESTER

VI8MDT12	OPTIMIZATION AND RELIABILITY	L	P	C
		3	0	3

UNIT - I

CLASSICAL OPTIMIZATION TECHNIQUES: Single variable optimization with and without constraints, multi – variable optimization without constraints, multi – variable optimization with constraints – method of Lagrange multipliers, Kuhn-Tucker conditions, merits and demerits of classical optimization techniques.

UNIT - II

NUMERICAL METHODS FOR OPTIMIZATION: Nelder Mead's Simplex search method, Gradient of a function, Steepest descent method, Newton's method, Pattern search methods, conjugate method, types of penalty methods for handling constraints, advantages of numerical methods.

UNIT - III

GENETIC ALGORITHM (GA) : Differences and similarities between conventional and evolutionary algorithms, working principle, reproduction, crossover, mutation, termination criteria, different reproduction and crossover operators, GA for constrained optimization, draw backs of GA,

GENETIC PROGRAMMING (GP): Principles of genetic programming, terminal sets, functional sets, differences between GA & GP, random population generation, solving differential equations using GP.

MULTI-OBJECTIVE GA: Pareto's analysis, Non-dominated front, multi – objective GA, Non-dominated sorted GA, convergence criterion, applications of multi-objective problems .

UNIT – IV

APPLICATIONS OF OPTIMIZATION IN DESIGN AND MANUFACTURING SYSTEMS: Some typical applications like optimization of path synthesis of a four-bar mechanism, minimization of weight of a cantilever beam, optimization of springs and gears, general optimization model of a machining process, optimization of arc welding parameters, and general procedure in optimizing machining operations sequence.

UNIT V

RELIABILITY: Concepts of Engineering Statistics, risk and reliability, probabilistic approach to design, reliability theory, design for reliability, numerical problems, hazard analysis.

TEXT BOOKS:

1. Optimization for Engineering Design – Kalyanmoy Deb, PHI Publishers, 2nd edition
2. Engineering Optimization – S.S.Rao, New Age Publishers, 3rd edition
3. Reliability Engineering by L.S.Srinath, 3rd edition.2005, East West publications
4. Multi objective genetic algorithm by Kalyanmoy Deb, 2nd edition PHI Publishers, 2012

REFERENCES:

1. Genetic algorithms in Search, Optimization, and Machine learning – D.E.Goldberg, Addison-Wesley Publishers
2. Optimal design – Jasbir Arora, Mc Graw Hill (International) Publishers, 4th edition 2017
3. An Introduction to Reliability and Maintainability Engineering by CE Ebeling, Waveland Printers Inc.,8th edition 2007
4. Reliability Theory and Practice by I Bazovsky, Dover Publications, 2013

I M.TECH – II SEMESTER

VI8MDT13	THEORY OF PLASTICITY (ELECTIVE-IV)	L	P	C
		3	0	3

UNIT-I

Introduction: Modeling Uniaxial behavior in Plasticity. Index notation, Cartesian tensors.

Yield and failure criteria Stress, stress deviator tensors. Invariants, principal, mean stresses. Elastic strain energy. Mohr's representation of stress in 2 & 3 dimensions. Haigh-Westergaard stress space. Equilibrium equations of a body. Yield criteria: Tresca's, von Mises rules, Drucker-Prager criterion, anisotropic yield criteria.

Strain at point: Cauchy's formulae for strains, principal strains, principal shear strains, derivative strain tensor. Strain-displacement relationships. Linear elastic stress strain relations, Generalized Hooke's law, nonlinear elastic stress strain relations

UNIT – II

Principle of virtual work and its rate forms: Drucker's stability postulate, normality, convexity and uniqueness for an elastic solid. Incremental stress strain relations.

Criteria for loading and unloading: Elastic and plastic strain increment tensors, Plastic potential and flow rule associated with different Yield criteria, Convexity, normality and uniqueness considerations for elastic–plastic materials. Expansion of a thick walled cylinder.

UNIT – III

Incremental stress strain relationships: Prandtl-Reuss material model. J_2 deformation theory, Drucker-Prager material, General Isotropic materials.

Deformation theory of plasticity: Loading surface, Hardening rules. Flow rule and Druckers stability postulate. Concept of effective stress and effective strain, mixed hardening material. Problems.

UNIT – IV

Finite element formulation for an elastic plastic matrix: Numerical algorithms for solving non linear equations, Convergence criteria, Numerical implementations of the elastic plastic incremental constitutive relations

UNIT – V

Bounding surface theory: Uniaxial and multiaxial loading anisotropic material behaviour Theroms of limit analysis: Statically admissible stress field and kinematically admissible velocity field. Upper and lower bound theorms, examples and problems.

TEXT BOOK:

1. Plasticity for structural engineering W.F.Chen s and D.J.Han, J. Ross Publishing, 2007

REFERENCES:

1. Mechanics of Materials –II, Victor E. Saouma.
2. Theory of plasticity, Sadhu Singh Khanna publications

I M.TECH – II SEMESTER

VI8MDT14	FINITE ELEMENT METHOD	L	P	C
		3	0	3

UNIT - I

Formulation Techniques: Methodology, Engineering problems and governing differential equations, finite elements. Variational methods-potential energy method, Raleigh Ritz method, strong and weak forms, Galerkin and weighted residual methods, calculus of variations, Essential and natural boundary conditions.

UNIT – II

One-dimensional elements: Bar, trusses, beams and frames, displacements, stresses and temperature effects.

UNIT – III

Two dimensional problems: CST, LST, four noded and eight nodded rectangular elements, Lagrange basis for triangles and rectangles, serendipity interpolation functions. Axisymmetric Problems: Axisymmetric formulations, Element matrices, boundary conditions. Heat Transfer problems: Conduction and convection, examples: - two-dimensional fin.

UNIT – IV

Isoparametric formulation: Concepts, sub parametric, super parametric elements, numerical integration, Requirements for convergence, h-refinement and p-refinement, complete and incomplete interpolation functions, pascal's triangle, Patch test.

UNIT – V

Finite elements in Structural Analysis: Static and dynamic analysis, eigen value problems, and their solution methods, case studies using commercial finite element packages.

TEXT BOOK:

1. Finite element methods by Chandrubatla & Belagondu.4th edition, 2011

REFERENCES:

1. J.N. Reddy, Finite element method in Heat transfer and fluid dynamics, CRC press, 1994
2. Zienckiwicz O.C. & R. L. Taylor, Finite Element Method, McGraw-Hill,1983.
3. 3. K. J. Bathe, Finite element procedures, Prentice-Hall, 1996

I M.TECH – II SEMESTER

VI8MDT15	DESIGN WITH ADVANCED MATERIALS	L	P	C
		3	0	3

Unit – I

Fundamentals of material science: Elasticity in metals, mechanism of plastic deformation, slip twinning, role of dislocations, yield stress, shear strength of perfect and real crystals, strengthening mechanism, work hardening, solid solution, grain boundary strengthening, Poly phase mixture, precipitation, particle, fiber and dispersion strengthening, effect of temperature, strain and strain rate on plastic behavior, super plasticity. Yield criteria: Von mises and Tresca criteria.

Unit – II

Motivation of selection, cost basis and service requirements, selection for mechanical properties, strength, toughness, fatigue, impact and creep, use of material property charts for material selection.

Unit – III

Modern metallic Materials: Dual phase steels, micro alloyed steels, high strength low alloy (HSLA) Steel, maraging steel, intermetalics, Ni and Ti aluminides, super alloys.

Unit – IV

Non metallic materials: Polymeric materials and their molecular structures, production techniques for fibers, foams, adhesives and coatings, structure, properties and applications of engineering polymers. composites; Introduction, reinforcement, types of composite materials, -properties, processing and application of composite materials.

Unit – V

Properties, structure and applications of Smart materials, shape memory alloys, metallic glass, quasi crystal and nano crystalline materials, ceramic materials, ceremets, high temperature materials, refractory materials.

TEXT BOOKS:

1. Mechanical behavior of materials/Thomas H. Courtney/2nd Edition, McGraw-Hill, 2000
2. Mechanical Metallurgy/George E.Dieter/McGraw Hill, 1998
3. Material selction in mechanical design by M.F Ashby. Bott

REFERENCES:

1. Selection and use of Engineering Materials 3rd edition /Charles J.A/Butterworth Heiremann.
2. Material science and metallurgy by VD Kodgire 2017

I M.TECH – II SEMESTER

VI8MDT16	TRIBOLOGY (ELECTIVE- III)	L	P	C
		3	0	3

UNIT – I

Introduction: Nature of surfaces and contact-Surface topography-friction and wear mechanisms, wear maps, effect of lubricants- methods of fluid film formation.

Lubrication: Choice of lubricants, types of oil, Grease and solid lubricants-additives-lubrication systems and their selection.

UNIT – II

Selection of rolling element bearings: Nominal life, static and dynamic capacity-Equivalent load, probabilities of survival- cubic mean load- bearing mounting details, pre loading of bearings, conditioning monitoring using shock pulse method.

UNIT – III

Hydrostatic Bearings: Thrust bearings – pad coefficients- restriction- optimum film thickness-journal bearings – design procedure –Aerostatic bearings; Thrust bearings and Journal bearings – design procedure.

UNIT – IV

Hydrodynamic bearings: Fundamentals of fluid formation – Reynold's equation; Hydrodynamic journal bearings – Sommerfield number- performance parameters – optimum bearing with maximum load capacity – Friction – Heat generated and Heat dissipated. Hydrodynamic thrust bearings; Raimondi and Boyd solution for hydrodynamic thrust bearings-fixed tilting pads, single and multiple pad bearings-optimum condition with largest minimum film thickness.

UNIT – V

Seals: different type-mechanical seals, lip seals, packed glands, soft piston seals, Mechanical piston rod packing, labyrinth seals and throttling bushes, oil flinger rings and drain grooves – selection of mechanical seals.

Failure of Tribological components: Failure analysis of plain bearings, rolling bearings, gears and seals, wear analysis using soap and Ferrography.

Dry rubbing Bearings: porous metal bearings and oscillatory journal bearings – qualitative approach only.

TEXT BOOKS:

1. Rowe WW& O' Dionoghue,"Hydrostatic and Hybrid bearing design" Butter worths & Co.Publishers Ltd,1983.
2. Collacott R.A," Mechanical Fault diagnosis and condition monitoring", Chapman and Hall, London 1977.
3. Bernard J.Hamrock, " Fundamentals of fluid film lubricant", Mc Graw-Hill Co.,1994.

REFERENCES:

1. Neale MJ, (Editor) " Tribology hand Book"Neumann Butterworths, 1975.
2. Connor and Boyd JJO (Editors) " Standard hand book of lubrication engineers " ASLE,Mc Graw Hill Book & Co.,1968
3. Shigley J, E Charles," Mechanical Engineering Design", McGraw Hill Co., 1989

I M.TECH – II SEMESTER

VI8MDT17	SIGNAL ANALYSIS AND CONDITION MONITORING (ELECTIVE- III)	L	P	C
		3	0	3

UNIT-I

Introduction, Basic concepts. Fourier analysis. Bandwidth. Signal types. Convolution.

Signal analysis: Filter response time. Detectors. Recorders. Analog analyzer types.

UNIT-II

PRACTICAL ANALYSIS OF STATIONARY SIGNALS: Stepped filter analysis. Swept filter analysis. High speed analysis. Real-time analysis.

UNIT-III

PRACTICAL ANALYSIS OF CONTINUOUS NON-STATIONARY SIGNALS: Choice of window type. Choice of window length. Choice of incremental step. Practical details. Scaling of the results.

UNIT-IV

PRACTICAL ANALYSIS OF TRANSIENTS: Analysis as a periodic signal. Analysis by repeated playback (constant bandwidth). Analysis by repeated playback (variable bandwidth).

UNIT-V

CONDITION MONITORING IN REAL SYSTEMS: Diagnostic tools. Condition monitoring of two stage compressor. Cement mill foundation. I.D. fan. Sugar centrifugal. Cooling tower fan. Air separator. Preheater fan. Field balancing of rotors. ISO standards on vibrations, active, passive hybrid methods of condition monitoring

TEXT BOOK:

1. Mechanical Fault diagnosis and condition monitoring by R. A .Collacott, Chapman and Hall, 1977

REFERENCES:

1. Frequency Analysis by R.B.Randall.3rd edition 2011
2. Mechanical Vibrations Practice with Basic Theory by V. Ramamurti, Narosa Publishing House.
3. Theory of Machines and Mechanisms by Amitabh Ghosh & AK Malik2nd edition, EWP

I M.TECH – II SEMESTER

VI8MDT18	COMPUTATIONAL FLUID DYNAMICS (ELECTIVE- III)	L	P	C
		3	0	3

UNIT – I

Introduction: Finite difference method, finite volume method, finite element method, governing equations and boundary conditions. Derivation of finite difference equations.

Solution methods: Solution methods of elliptical equations – finite difference formulations, interactive solution methods, direct method with Gaussian elimination.

Parabolic equations-explicit schemes and Von Neumann stability analysis, implicit schemes, alternating direction implicit schemes, approximate factorization, fractional step methods, direct method with tridiagonal matrix algorithm.

UNIT – II

Hyperbolic equations: explicit schemes and Von Neumann stability analysis, implicit schemes, multi step methods, nonlinear problems, second order one-dimensional wave equations.

Burgers equations: Explicit and implicit schemes, Runge-Kutta method.

UNIT – III

Formulations of incompressible viscous flows: Formulations of incompressible viscous flows by finite difference methods, pressure correction methods, vortex methods.

Treatment of compressible flows: potential equation, Eluer equations, Navier-stokes system of equations, flow field-dependent variation methods, boundary conditions, example problems.

UNIT – IV

Finite volume method: Finite volume method via finite difference method, formulations for two and three-dimensional problems.

UNIT – V

Standard variational methods: Linear fluid flow problems, steady state problems, Transient problems.

TEXT BOOK:

1. Computational fluid dynamics, T. J.Chung, Cambridge University press, 2nd edition 2002.

REFERENCE:

1. Text book of fluid dynamics, Frank Chorlton, CBS Publishers &distributors, 1985.

I M.TECH – II SEMESTER

		L	P	C
VI8MDT19	**DESIGN SYNTHESIS (ELECTIVE- III)**	**3**	**0**	**3**

UNIT – I

Design process and methodologies of systematic design conceptual design variants and evaluation; Standardization and its exploitation in design.

UNIT – II

Tolerance from process and function; interchangeability and selective assembly; selection of fits for different design situations, surface finish. Load transmission, load equalization lightweight and rigid constructions.

UNIT – III

Design of cast forged sheet metal parts and welded constructions Machining considerations.

UNIT – IV

Design for assembly and dismantling; Modular constructions erection, operation inspection and maintenance considerations; Ergonomics Design of accuracy; Location pins and registers, Machining in assembly, adjustment, Backlash and Clearance adjustment.

UNIT – V

Problems formulation for design optimization Example illustration the various principles available design variants for some of the common basic functional requirements.

TEXT BOOK:

1. Engineering Design a material and processing approach/ George Dieter/ McGraw Hill international book company 5th edition 2012

REFERENCES:

1. Engineering Design a systematic approach/ G. Phal W. Beitz/ Springer /3rd Edition
2. Mechanical Design Theory Methodology/ Manjula B. Waldron and Kenneth J. Waldron/ Springer Verlag New York 1996.

I M.TECH – II SEMESTER

VI8MDT20	PRESSURE VESSEL DESIGN (ELECTIVE-IV)	L	P	C
		3	0	3

UNIT – I

Introduction: Materials-shapes of Vessels-stresses in cylindrical, spherical and arbitrary, shaped shells. Cylindrical Vessels subjected to internal pressure, wind load, bending and torque for computation of pressure vessels-conical and tetrahedral vessels.

UNIT – II

Theory of thick cylinders: Shrink fit stresses in built up cylinders-auto frettage of thick cylinders. Thermal stresses in Pressure Vessels.

UNIT – III

Theory of rectangular plates: Pure bending-different edge conditions.

Theory circular plates: Simple supported and clamped ends subjected to concentrated and uniformly distributed loads-stresses from local loads. Design of dome bends, shell connections, flat heads and cone openings.

UNIT – IV

Discontinuity stresses in pressure vessels: Introduction, beam on an elastic foundation, infinitely long beam, semi infinite beam, cylindrical vessel under axially symmetrical loading, extent and significance of load deformations on pressure vessels, discontinuity stresses in vessels, stresses in a bimetallic joints, deformation and stresses in flanges.

UNIT – V

Pressure vessel materials and their environment: Introduction, ductile material tensile tests, structure and strength of steel, Leuder's lines, determination of stress patterns from plastic flow observations, behaviour of steel beyond the yield point, effect of cold work or strain hardening on the physical properties of pressure vessel steels, fracture types in tension, toughness of materials, effect of neutron irradiation of steels, fatigue of metals, fatigue crack growth, fatigue life prediction, cumulative fatigue damage, stress theory of failure of vessels subject to steady state and fatigue conditions.

TEXT BOOKS:

1. Theory and design of modern Pressure Vessels by John F.Harvey, Van nostrand Reihold Company, New York., 1980
2. Pressure Vessel Design and Analysis by Bickell, M.B.Ruizcs.,2009

REFERENCES:

1. Process Equipment design- Beowll & Yound Ett, WILEY 2009
2. Pressure Vessel Design Hand Book, Henry H.Bednar, P.E., C.B.S.Publishers, New Delhi. 1987
3. Theory of plates and shells- Timoshenko & Noinosky.Mc Graw Hill, 2nd edition, 2017

I M.TECH – II SEMESTER

VI8MDT21	MECHANICS OF COMPOSITE MATERIALS (ELECTIVE-IV)	L	P	C
		3	0	3

UNIT-I

Introduction to Composites: Introduction, Classification, matrix materials, reinforced matrix of composites

UNIT-II

Hooke's Law for a Two-Dimensional Angle Lamina, Engineering Constants of an Angle Lamina, Invariant Form of Stiffness and Compliance Matrices for an Angle Lamina Strength Failure Theories of an Angle Lamina : Maximum Stress Failure Theory Strength Ratio, Failure Envelopes,Maximum Strain Failure Theory ,Tsai–Hill Failure Theory, Tsai–Wu Failure Theory, Comparison of Experimental Results with Failure Theories. Hygrothermal Stresses and Strains in a Lamina: Hygrothermal Stress–Strain Relationships for a Unidirectional Lamina, Hygrothermal Stress–Strain Relationships for an Angle Lamina

UNIT-III

Macromechanical Analysis of a Lamina :Introduction ,Definitions: Stress, Strain ,Elastic Moduli, Strain Energy. Hooke's Law for Different Types of Materials, Hooke's Law for a Two-Dimensional Unidirectional Lamina, Plane Stress Assumption, Reduction of Hooke's Law in Three Dimensions to Two Dimensions, Relationship of Compliance and Stiffness Matrix to Engineering Elastic Constants of a Lamina,

UNIT-IV

Micromechanical Analysis of a Lamina :Introduction, Volume and Mass Fractions, Density, and Void Content, Evaluation of the Four Elastic Moduli, Strength of Materials Approach, Semi-Empirical Models ,Elasticity Approach, Elastic Moduli of Lamina with Transversely Isotropic Fibers, Ultimate Strengths of a Unidirectional Lamina, Coefficients of Thermal Expansion, Coefficients of Moisture Expansion

Macromechanical Analysis of Laminates: Introduction, Laminate Code , Stress–Strain Relations for a Laminate, In-Plane and Flexural Modulus of a Laminate, Hygrothermal Effects in a Laminate, Warpage of Laminates, hybrid laminates

UNIT-V

Design of Laminates: Introduction, thin plate theory, specially orthotropic plate, cross and angle ply laminated plates, problems using thin plate theory, Failure Criterion for a Laminate, Design of a Laminated Composites.

TEXT BOOKS:

1. Engineering Mechanics of Composite Materials by Isaac and M Daniel, Oxford University Press, 1994.
2. B. D. Agarwal and L. J. Broutman, Analysis and performance of fibre Composites, Wiley-Interscience, New York, 1980.
3. Mechanics of Composite Materials, Second Edition (Mechanical Engineering), By Autar K. Kaw Publisher, 2nd edition

REFERENCES:

1. R. M. Jones, Mechanics of Composite Materials, Mc Graw Hill Company, New York,1975.
2. L. R. Calcote, Analysis of Laminated Composite Structures, Van Nostrand Rainfold, New York, 1969.

I M.TECH – II SEMESTER

VI8MDT22	MECHATRONICS (ELECTIVE-IV)	L	P	C
		3	0	3

UNIT – I

Introduction: Definition of Mechatronics products, design considerations and trade offs. Overview of Mechtronic products. Intelligent machine Vs Automatic machine economic and social justification.

Actuators and drive systems: Mechanical, Electrical, hydraulic drive systems, Characteristics of mechanical, Electrical, Hydraulic and pneumatic actuators and their limitations.

UNIT – II

Motion Control: Control parameters and system objectives, Mechanical Configurations, Popular control system configurations. S-curve, motor/load inertia matching, design with linear slides.

Motion Control algorithms: Significance of feed forward control loops, shortfalls, fundamentals concepts of adaptive and fuzzy – control. Fuzzy logic compensatory control of transformation and deformation non- linearity's.

UNIT – III

Sensor interfacing: Analog and digital sensors for motion measurement, digital transducers, human-Machine and machine- Machine inter facing devices and strategy.

Architecture of intelligent machines: Introduction to Microprocessor and programmable logic controls and identification of systems. System design classification, motion control aspects in design.

UNIT – IV

Machine vision: Feature and pattern recognition methods, concepts of perception and cognition in decision-making, basics of image processing, binary and grey scale images, sharpening and smoothening of images.

UNIT – V

Micromechatronic Sytems: Micro sensors, micro actuators, smart instrumentation, micro-fabrication methods – lithography, etching, micro-joing.

TEXT BOOKS:

1. "Mechatronics and Measurement systems"by .Michel B.Histand and david G. Alciatore.4th edition
2. Introduction to Mechatronics and Measurement systems, Tata Mc Graw Hill. 3rd edition 2007
3. Control sensors and actuators C.W.desilva, Prentice Hall.CRC Press, 2007

I M.TECH – II SEMESTER

VI8MDT23	EXPERIMENTAL STRESS ANALYSIS	L	P	C
		3	0	3

UNIT – I

Introduction: Stress, strain, Plane stress and plane strain conditions, Compatibility conditions. Problems using plane stress and plane strain conditions, stress functions, mohrs circle for stress strain, Three-dimensional stress strain relations.

UNIT – II

Strain Measurement and Recordings: Various types of strain gauges, Electrical Resistance strain gauges, semiconductor strain gauges, strain gauge circuits. Introduction, static recording and data logging, dynamic recording at very low frequencies, dynamic recording at intermediate frequencies, dynamic recording at high frequencies, dynamic recording at very high frequencies, telemetry systems.

UNIT – III

Photo elasticity: Photo elasticity – Polariscope – Plane and circularly polarized light, Bright and dark field setups, Photo elastic materials – Isochromatic fringes – Isoclinics

Three dimensional Photo elasticity : Introduction, locking in model deformation, materials for three-dimensional photo elasticity, machining cementing and slicing three-dimensional models, slicing the model and interpretation of the resulting fringe patterns, effective stresses, the shear-difference method in three dimensions, applications of the Frozen-stress method, the scattered-light method.

UNIT – IV

Brittle coatings: Introduction, coating stresses, failure theories, brittle coating crack patterns, crack detection, ceramic based brittle coatings, resin based brittle coatings, test procedures for brittle coatings analysis, calibration procedures, analysis of brittle coating data.

Moire Methods: Introduction, mechanism of formation of Moire fringes, the geometrical approach to Moire-Fringe analysis, the displacement field approach to Moire-Fringe analysis, out of plane displacement measurements, out of plane slope measurements, sharpening and multiplication of Moire-Fringes, experimental procedure and techniques.

UNIT – V Birefringent coatings

Introduction, Coating stresses and strains, coating sensitivity, coating materials, application of coatings, effects of coating thickness, Fringe-order determinations in coatings, stress separation methods.

TEXT BOOKS :

1. Theory of Elasticity by Timoshenke and Goodier Jr, 3rd edition, 2010 Mc Graw-Hill
2. Experimental stress analysis by Dally and Riley, , 3rd edition, 1991, Mc Graw-Hill

REFERENCES:

1. A treatise on Mathematical theory of Elasticity by LOVE .A.H 4th edition 1927, Cambridge
2. Photo Elasticity by Frocht, Volume 1 Wiley Publications, 1941
3. Experimental stress analysis, Video course by K.Ramesh / NPTEL

I M.TECH – II SEMESTER

VI8MDL02	**DESIGN PRACTICE LABORATORY**	**L**	**P**	**C**
		-	**4**	**2**

I. Modeling

1. Surface modeling
2. Solid modeling
3. Drafting
4. Assembling

II. Structural Analysis using any FEA Package for different structures that can be discredited with 1-D, 2-D & 3-D elements

1. Static Analysis
2. Modal Analysis
3. Harmonic Analysis
4. Spectrum Analysis
5. Buckling Analysis
6. Analysis of Composites
7. Fracture mechanics

III. Thermal Analysis using any FEA Package for different structures that can be discretised with 1-D,2-D & 3-D elements

1. Steady state thermal analysis
2. Transient thermal analysis

IV. Transient analysis using any FEA Package for different structures that can be discretised with 1-D,2-D & 3-D elements

V. Prudent Design – a case study

REFERENCES:

User manuals of ANSYS package Version 9.0 I-DEAS Package Version 9.0

SYLLABUS FOR M.TECH (VLSI & EMBEDED SYSTEMS)

I M.TECH - I SEMESTER

Course Code	Course Name	L	T	P	C
V18VLT01	DIGITAL SYSTEM DESIGN	3	-	-	3

Course Outcome:
The student will be able to

1. Describe the algorithms for minimization of functions
2. Describe the algorithms for minimization of PLDs.
3. Design large scale digital systems.
4. Discuss the fault model and diagnosis in combinational and sequential circuits.

UNIT-I: Minimization Procedures and CAMP Algorithm

Review on minimization of switching functions using tabular methods, k-map, QM algorithm, CAMP-I algorithm, Phase-I: Determination of Adjacencies, DA, CSC, SSMs and EPCs, CAMPI algorithm, Phase-II: Passport checking, Determination of SPC, CAMP-II algorithm: Determination of solution cube, Cube based operations, determination of selected cubes are wholly within the given switching function or not, Introduction to cube based algorithms.

UNIT-II: PLA Design, PLA Minimization and Folding Algorithms

Introduction to PLDs, basic configurations and advantages of PLDs, PLA-Introduction, Block diagram of PLA, size of PLA, PLA design aspects, PLA minimization algorithm (IISc algorithm), PLA folding algorithm(COMPACT algorithm)-Illustration of algorithms with suitable examples.

UNIT -III: Design of Large Scale Digital Systems

Algorithmic state machine charts-Introduction, Derivation of SM Charts, Realization of SM Chart, control implementation, control unit design, data processor design, ROM design, PAL design aspects, digital system design approaches using CPLDs, FPGAs and ASICs.

UNIT-IV: Fault Diagnosis in Combinational Circuits

Faults classes and models, fault diagnosis and testing, fault detection test, test generation, testing process, obtaining a minimal complete test set, circuit under test methods- Path sensitization method, Boolean difference method, properties of Boolean differences, Kohavi algorithm, faults in PLAs, DFT schemes, built in self-test.

UNIT-V: Fault Diagnosis in Sequential Circuits

Fault detection and location in sequential circuits, circuit test approach, initial state identification, Haming experiments, synchronizing experiments, machine identification, distinguishing experiment, adaptive distinguishing experiments.

TEXT BOOKS:

1. Logic Design Theory-N. N. Biswas, PHI
2. Switching and Finite Automata Theory-Z. Kohavi , 2nd Edition, 2001, TMH
3. Digital system Design using PLDd-Lala

REFERENCE BOOKS:

1. Fundamentals of Logic Design – Charles H. Roth, 5th Ed., Cengage Learning.
2. Digital Systems Testing and Testable Design – MironAbramovici, Melvin A. Breuer and Arthur D. Friedman- John Wiley & Sons Inc.

I M.TECH - I SEMESTER

Course Code	Course Name	L	T	P	C
V18VLT02	VLSI TECHNOLOGY AND DESIGN	3	-	-	3

Course Outcome:
The student will be able to

1. Describe the Microelectronics and MOS Technologies
2. Describe various processes in IC Production.
3. Sketch the Layout Design.
4. Discuss the Floor Planning, Architecture Design.

UNIT-I: Review of Microelectronics and Introduction to MOS Technologies:

MOS, CMOS, Bi-CMOS Technology Trends and Projections Electronic design automation concept, ASIC and FPGA design flows, SOC designs, IC fabrication process.

UNIT-II: IC Production Process - I

Crystal Growth and Wafer Preparation: Introduction, Electronic-Grade Silicon, Czochralski Crystal Growing, Silicon Shaping, Process Considerations, Epitaxy: Introduction, Vapour-Phase Epitaxy, Molecular Beam Epitaxy, Silicon on Insulators, Epitaxial Evaluation.

UNIT-III: IC Production Process – II

Lithography: Introduction, Various Lithography techniques: Optical Lithography, Electron Lithography, X-ray Lithography, Ion Lithography. Etching Techniques, Deposition Processes, Ion Implantation, Metallization.

UNIT-IV: Layout Design and Tools:

Transistor Structures, Wires and Vias, Scalable Design Rules, Layout Design Tools.

Subsystem Design and Layout: Some architectural issues, switch logic, gate logic, examples of
structured design (combinational logic), some clocked sequential circuits, other system considerations.

UNIT-V:

Floor Planning: Introduction**,** Floor planning methods, off-chip connections.

Architecture Design: Introduction, Register-Transfer design, high-level synthesis, architectures
for low power, architecture testing.

Chip Design: Introduction and design methodologies.

TEXT BOOKS:

1. S. M. Sze, "VLSI Technology", McGraw-Hill, Second Edition.
2. Essentials of VLSI Circuits and Systems, K. Eshraghian, Douglas A. Pucknell, Sholeh Eshraghian, 2005, PHI Publications.
3. Modern VLSI Design-Wayne Wolf, 3rd Ed., 1997, Pearson Education.

REFERENCE BOOKS:

1. VLSI Design Technologies for Analog and Digital Circuits, Randall L. Geiger, PhillipE. Allen, Noel R. Strader, TMH Publications, 2010.
2. Introduction to VLSI Systems: A Logic, Circuit and System Perspective- Ming-BO Lin,CRC Press, 2011.
3. Principals of CMOS VLSI Design-N.H.E Weste, K. Eshraghian, 2nd Edition, AddisonWesley.

I M.TECH - I SEMESTER

Course Code	Course Name	L	T	P	C
V18VLT03	**CMOS ANALOG IC DESIGN**	**3**	**-**	**-**	**3**

Course Outcome:

The student will be able to

1. Describe the concept of MOS device and modeling of MOS drain current for large and small signal anaysis
2. Design and analyze Analog CMOS Sub-Circuits.
3. Distinguish Large signal and small signal analysis of CMOS Amplifiers
4. Describe the CMOS Op-Amps & Applications.

UNIT -I: MOS Devices and Modeling

The MOS Transistor, Passive Components- Capacitor & Resistor, Integrated circuit Layout, CMOS Device Modeling - Simple MOS Large-Signal Model, Other Model Parameters, Small-Signal Model for the MOS Transistor, Computer Simulation Models, Sub-threshold MOS Model.

UNIT -II: Analog CMOS Sub-Circuits

MOS Switch, MOS Diode, MOS Active Resistor, Current Sinks and Sources, Current Mirrors-Cascode current Mirror and Wilson Current Mirror, Current and Voltage References, Band gap Reference.

UNIT -III: CMOS Amplifiers-I

Inverters- Active load inverter, current source inverter, push-pull inverter, Differential Amplifiers- large signal analysis, small signal analysis, design of differential amplifier,

UNIT -IV: CMOS Amplifiers-II

Cascode Amplifiers- Large signal analysis, small signal analysis and frequency response, design of cascade amplifier, Current Amplifiers- single ended input current amplifier, differential input current amplifier, Output Amplifiers- class-a amplifier, source follower, push pull CS amplifier, High Gain Amplifiers Architectures.

UNIT -V: CMOS Op-Amps & Applications

Design of CMOS Op Amps, Compensation of Op Amps, Design of Two-Stage Op Amps,Power-Supply Rejection Ratio of Two-Stage Op Amps, Cascode Op Amps, Measurement Techniques of OP Amp, Characterization of Comparator, Two-Stage comparator design.

TEXT BOOKS:

1. CMOS Analog Circuit Design - Philip E. Allen and Douglas R. Holberg, OxfordUniversity Press, International Second Edition/Indian Edition, 2010.
2. Design of Analog CMOS Integrated Circuits- BehzadRazavi, TMH Edition.

REFERENCE BOOKS:

1. Analog Integrated Circuit Design- David A.Johns, Ken Martin, Wiley Student Edn, 2016.
2. Analysis and Design of Analog Integrated Circuits- Paul R. Gray, Paul J. Hurst, S. Lewisand R. G. Meyer, Wiley India, Fifth Edition, 2010.
3. CMOS: Circuit Design, Layout and Simulation- Baker, Li and Boyce, PHI.

I M.TECH - I SEMESTER

Course Code	Course Name	L	T	P	C
V18VLT04	EMBEDDED SYSTEMS DESIGN-I	3	-	-	3

Course Outcome:
The student will be able to

1. Describe the basic concepts of an embedded system and its design
2. Differentiate the hardware and software components required to develop an embedded system
3. Generalize the Embedded System design and development life cycle model and case studies

UNIT-I: Introduction

An Embedded System-Definition, Examples, Current Technologies, Integration in system Design, Embedded system design flow, hardware design concepts, software development, processor in an embedded system and other hardware units, introduction to processor based embedded system design concepts.

UNIT-II: Embedded Hardware

Embedded hardware building blocks, Embedded Processors – ISA architecture models, Internal processor design, processor performance, Board Memory – ROM, RAM, Auxiliary Memory, Memory Management of External Memory, Board Memory and performance. Embedded board Input / output – Serial versus Parallel I/O, interfacing the I/O components, I/O components and performance, Board buses – Bus arbitration and timing, Integrating the Bus with other board components, Bus performance.

UNIT-III: Embedded Software

Device drivers, Device Drivers for interrupt-Handling, Memory device drivers, On-board bus device drivers, Board I/O drivers, Explanation about above drivers with suitable examples, Board support packages, Middleware and Application Software – Middle ware, Middleware examples, Application layer software examples.

UNIT-IV: Embedded System Design, Development, Implementation and Testing

Embedded system design and development lifecycle model, creating an embedded systemarchitecture, introduction to embedded software development process and tools-Host and Targetmachines, linking and locating software, Getting embedded software into the target system,issues in Hardware-Software design and co-design, Implementing the design-The main software utility tool, CAD and the hardware, Translationtools, Debugging tools, testing on host machine, simulators, Laboratory tools, System Boot-Up.

UNIT-V: Embedded System Design-Case Studies

Case studies- Processor design approach of an embedded system, Micro Blaze Processor based Embedded system design on Xilinx platform-NiosII Processor based Embedded system design on Altera platform

TEXT BOOKS:

1. Tammy Noergaard "Embedded Systems Architecture: A Comprehensive Guide for Engineers and Programmers", Elsevier(Singapore) Pvt.Ltd.Publications, 2005.
2. Frank Vahid, Tony D. Givargis, "Embedded system Design: A Unified Hardware/Software Introduction", John Wily & Sons Inc.2002.

REFERENCE BOOKS:

1. Peter Marwedel, "Embedded System Design", Science Publishers, 2007.
2. Arnold S Burger, "Embedded System Design", CMP.
3. Rajkamal, "Embedded Systems: Architecture, Programming and Design", TMH Publications,
4. Second Edition, 2008.

I M.TECH - I SEMESTER

Course Code	Course Name	L	T	P	C
V18VLT05	EMBEDDED C (Elective-1)	3	-	-	3

Course Outcome:

The student will be able to

- Describe the basic concepts of programming in embedded system using C.
- Illustrate the 8051 Microcontroller Family
- Develop the methods of Reading Switches
- Develop the structure using Object-oriented programming with C
- Identify the Real-Time Constraints and case studies

UNIT-I: Programming Embedded Systems in C

Introduction, What is an embedded system, Which processor should you use, Which programming language should you use, Which operating system should you use, How do you develop embedded software, Conclusions

Introducing the 8051 Microcontroller Family

Introduction, What's in a name, The external interface of the Standard 8051, Reset requirements, Clock frequency and performance, Memory issues, I/O pins, Timers, Interrupts, Serial interface,
Power consumption, Conclusions

UNIT-II: Reading Switches

Introduction, Basic techniques for reading from port pins, Example: Reading and writing bytes, Example: Reading and writing bits (simple version), Example: Reading and writing bits (generic version), the need for pull-up resistors, Dealing with switch bounce, Example: Reading switch inputs (basic code), Example: Counting goats, Conclusions

UNIT-III: Adding Structure to the Code

Introduction, Object-oriented programming with C, The Project Header (MAIN.H), The Port Header (PORT.H), Example: Restructuring the 'Hello Embedded World' example, Example: Restructuring the goat-counting example, Further examples, Conclusions

UNIT-IV: Meeting Real-Time Constraints

Introduction, Creating 'hardware delays' using Timer 0 and Timer 1, Example: Generating a precise 50 ms delay, Example: Creating a portable hardware delay, Why not use Timer 2?, The need for 'timeout' mechanisms, Creating loop timeouts, Example: Testing loop timeouts, Example: A more reliable switch interface, Creating hardware timeouts, Example: Testing a hardware timeout, Conclusions

UNIT-V: Case Study-Intruder Alarm System

Introduction, The software architecture, Key software components used in this example, running the program, the software, Conclusions

TEXT BOOKS:

1. Embedded C - Michael J. Pont, 2nd Ed., Pearson Education, 2008.

REFERENCE BOOKS:

1. PIC MCU C-An introduction to programming, The Microchip PIC in CCS C – Nigel Gardner.

I M.TECH - I SEMESTER

Course Code	Course Name	L	T	P	C
V18VLT06	**DIGITAL SIGNAL PROCESSORS &ARCHITECTURES (Elective-1)**	**3**	**-**	**-**	**3**

Course Outcome:

The student will be able to

1. Apply the FFT algorithm for solving the DFT of a given signal.
2. Describe the computational accuracy.
3. Describe the features and Architectures for Programmable DSP Devices.

UNIT-I: Introduction to Digital Signal Processing: Introduction, a Digital signal processing system, the sampling process, discrete time sequences. Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT), Linear time-invariant systems, Digital filters, Decimation and interpolation.

Computational Accuracy in DSP Implementations: Number formats for signals and coefficients in DSP systems, Dynamic Range and Precision, Sources of error in DSP implementations, A/D Conversion errors, DSP Computational errors, D/A Conversion Errors, Compensating filter.

UNIT-II

Architectures for Programmable DSP Devices Basic Architectural features, DSP Computational Building Blocks, Bus Architecture and Memory, Data Addressing Capabilities, Address Generation UNIT, Programmability and Program Execution, Speed Issues, Features for External interfacing.

UNIT-III

Programmable Digital Signal Processors Commercial Digital signal processing Devices, Data Addressing modes of TMS320C54XX DSPs, Data Addressing modes of TMS320C54XX Processors, Memory space of TMS320C54XX Processors, Program Control, TMS320C54XX Instructions and Programming, On-Chip Peripherals, Interrupts of TMS320C54XX Processors, Pipeline Operation of TMS320C54XX Processors.

UNIT-IV

Analog Devices Family of DSP Devices Analog Devices Family of DSP Devices – ALU and MAC block diagram, Shifter Instruction, Base Architecture of ADSP 2100, ADSP-2181 high performance Processor.

Introduction to Black fin Processor - The Black fin Processor, Introduction to Micro Signal Architecture, Overview of Hardware Processing Units and Register files, Address Arithmetic Unit, Control Unit, Bus Architecture and Memory, Basic Peripherals.

UNIT-V

Interfacing Memory and I/O Peripherals to Programmable DSP Devices Memory space organization, External bus interfacing signals, Memory interface, Parallel I/O interface, Programmed I/O, Interrupts and I/O, Direct memory access (DMA).

TEXT BOOKS:

1. Digital Signal Processing – Avtar Singh and S. Srinivasan, Thomson Publications, 2004.
2. A Practical Approach To Digital Signal Processing-K Padmanabhan, R. Vijayarajeswaran, Ananthi. S, New Age International, 2006/2009
3. Digital Signal Processors, Architecture, Programming and Applications- B. Venkataramani and M. Bhaskar, 2002, TMH

REFERENCE BOOKS:

1. Embedded Signal Processing with the Micro Signal Architecture: Woon-SengGan, Sen M. Kuo, Wiley-IEEE Press, 2007.
2. DSP Processor Fundamentals, Architectures & Features – Lapsleyetal. 2000, S. Chand & Co.
3. Digital Signal Processing Applications Using the ADSP-2100 Family by The Applications Engineering Staff of Analog Devices, DSP Division, Edited by Amy Mar, PHI
4. The Scientist and Engineer’s Guide to Digital Signal Processing by Steven W. Smith, Ph.D., California Technical Publishing, ISBN 0-9660176-3-3, 1997

I M.TECH - I SEMESTER

Course Code	Course Name	L	T	P	C
V18VLT07	SYSTEM ON CHIP (Elective-1)	3	-	-	3

Course Outcome:
The student will be able to

1. Describe SOC System Approach, design and its Architecture.
2. Describe Memory Design for SOC
3. Explain the concepts of bus models and Interconnect Architectures
4. Describe Application Studies and Case Studies

UNIT-I:
Introduction to the System Approach System Architecture, Components of the system, Hardware & Software, Processor Architectures, Memory and Addressing. System level interconnection, An approach for SOC Design, System Architecture and Complexity.

UNIT-II:
Processors Introduction , Processor Selection for SOC, Basic concepts in Processor Architecture, Basic concepts in Processor Micro Architecture, Basic elements in Instruction handling. Buffers: minimizing Pipeline Delays, Branches, More Robust Processors, Vector Processors and Vector Instructions extensions, VLIW Processors, Superscalar Processors.

UNIT-III:
Memory Design for SOC Overview of SOC external memory, Internal Memory, Size, Scratchpads and Cache memory, Cache Organization, Cache data, Write Policies, Strategies for line replacement at miss time, Types of Cache, Split – I, and D – Caches, Multilevel Caches, Virtual to real translation , SOC Memory System, Models of Simple Processor – memory interaction.

UNIT-IV:
Interconnect Customization and Configuration Inter Connect Architectures, Bus: Basic Architectures, SOC Standard Buses, Analytic Bus Models, Using the Bus model, Effects of Bus transactions and contention time. SOC Customization: An overview, Customizing Instruction Processor, Reconfiguration Technologies, Mapping design onto Reconfigurable devices, Instance- Specific design, Customizable Soft Processor, Reconfiguration - overhead analysis and trade-off analysis on reconfigurable Parallelism.

UNIT-V:
Application Studies/Case Studies SOC Design approach, AES algorithms, Design and evaluation, Image compression – JPEG compression. Concepts of IP (Intellectual Property) cores and integration in SOC

TEXT BOOKS:

1. Computer System Design System-on-Chip - Michael J. Flynn and Wayne Luk, Wiely India Pvt. Ltd.
2. ARM System on Chip Architecture – Steve Furber –2nd Ed., 2000, Addison Wesley Professional.

REFERENCE BOOKS:

1. Design of System on a Chip: Devices and Components – Ricardo Reis, 1st Ed., 2004, Springer
2. Co-Verification of Hardware and Software for ARM System on Chip Design (Embedded Technology) – Jason Andrews – Newnes, BK and CDROM.
3. System on Chip Verification – Methodologies and Techniques – PrakashRashinkar, Peter Paterson and Leena Singh L, 2001, Kluwer Academic Publishers.

I M.TECH - I SEMESTER

Course Code	Course Name	L	T	P	C
V18VLT08	SOFT COMPUTING TECHNIQUES (Elective-1)	3	-	-	3

Course Outcome:

The student will be able to

1. Describe Artificial Neural Networks, Fuzzy Logic System modeling and control
2. Describe Genetic Algorithm
3. Apply Neural Networks in different areas using MATLAB

UNIT –I: Introduction:

Approaches to intelligent control, Architecture for intelligent control, Symbolic reasoning system, Rule-based systems, the AI approach, Knowledge representation - Expert systems.

UNIT –II: Artificial Neural Networks:

Concept of Artificial Neural Networks and its basic mathematical model, McCulloch-Pitts neuron model, simple perceptron, Adaline and Madaline, Feed-forward Multilayer Perceptron, Learning and Training the neural network, Data Processing: Scaling, Fourier transformation, principal-component analysis and wavelet transformations, Hopfield network, Self-organizing network and Recurrent network, Neural Network based controller.

UNIT –III: Fuzzy Logic System:

Introduction to crisp sets and fuzzy sets, basic fuzzy set operation and approximate reasoning, Introduction to fuzzy logic modeling and control, Fuzzification, inferencing and defuzzification, Fuzzy knowledge and rule bases, Fuzzy modeling and control schemes for nonlinear systems, Self-organizing fuzzy logic control, Fuzzy logic control for nonlinear time delay system.

UNIT –IV: Genetic Algorithm:

Basic concept of Genetic algorithm and detail algorithmic steps, Adjustment of free parameters, Solution of typical control problems using genetic algorithm, Concept on some other search techniques like Tabu search and anD-colony search techniques for solving optimization problems.

UNIT –V: Applications:

GA application to power system optimisation problem, Case studies: Identification and control of linear and nonlinear dynamic systems using MATLAB-Neural Network toolbox, Stability analysis of Neural-Network interconnection systems, Implementation of fuzzy logic controller using MATLAB fuzzy-logic toolbox, Stability analysis of fuzzy control systems.

TEXT BOOKS:

1. Introduction to Artificial Neural Systems - Jacek.M.Zurada, Jaico Publishing House, 1999.
2. Neural Networks and Fuzzy Systems - Kosko, B., Prentice-Hall of India Pvt. Ltd., 1994.

REFERENCE BOOKS:

1. Fuzzy Sets, Uncertainty and Information - Klir G.J. &Folger T.A., Prentice-Hall of India Pvt. Ltd., 1993.
2. Fuzzy Set Theory and Its Applications - Zimmerman H.J. Kluwer Academic Publishers, 1994.
3. Introduction to Fuzzy Control - Driankov, Hellendroon, Narosa Publishers.
4. Artificial Neural Networks - Dr. B. Yagananarayana, 1999, PHI, New Delhi.
5. Elements of Artificial Neural Networks - KishanMehrotra, Chelkuri K. Mohan, Sanjay Ranka, Penram International.
6. Artificial Neural Network –Simon Haykin, 2nd Ed., Pearson Education.
7. Introduction Neural Networks Using MATLAB 6.0 - S.N. Shivanandam, S. Sumati, S. N. Deepa,1/e, TMH, New Delhi.

I M.TECH - I SEMESTER

Course Code	Course Name	L	T	P	C
V18VLT09	DIGITAL DESIGN THROUGH HDL (Elective -2)	3	-	-	3

Course Outcome:

The student will be able to

1. Describe the basic concepts of Hardware Description Languages.
2. Develop programs for Combinational and Sequential Logic Circuits HDL
3. Construct the synthesis of Digital Logic Circuit Design
4. Describe Testing of Digital Logic Circuits and CAD Tools

UNIT-I: Digital Logic Design using VHDL

Introduction, designing with VHDL, design entry methods, logic synthesis, entities, architecture, packages and configurations, types of models: dataflow, behavioral, structural, signals vs. variables, generics, data types, concurrent vs. sequential statements, loops and program controls. Digital Logic Design using Verilog HDL Introduction, Verilog Data types and Operators, Binary data manipulation, Combinational and Sequential logic design, Structural Models of Combinational Logic, Logic Simulation, Design Verification and Test Methodology, Propagation Delay, Truth Table models using Verilog.

UNIT-II: Combinational Logic Circuit Design using VHDL

Combinational circuits building blocks: Multiplexers, Decoders, Encoders, Code converters, Arithmetic comparison circuits, VHDL for combinational circuits, Adders-Half Adder, Full Adder, Ripple-Carry Adder, Carry Look-Ahead Adder, Subtraction, Multiplication. Sequential Logic Circuit Design using VHDL Flip-flops, registers & counters, synchronous sequential circuits: Basic design steps, Mealy State model, Design of FSM using CAD tools, Serial Adder Example, State Minimization, Design of Counter using sequential Circuit approach.

UNIT-III: Digital Logic Circuit DesignExamples using Verilog HDL

Behavioral modeling, Data types, Boolean-Equation-Based behavioral models of combinational logics, Propagation delay and continuous assignments, latches and level-sensitive circuits in Verilog, Cyclic behavioral models of flip-flops and latches and Edge detection, comparison of styles for behavioral model; Behavioral model, Multiplexers, Encoders and Decoders, Counters, Shift Registers, Register files, Dataflow models of a linear feedback shift register, Machines with multi cycle operations, ASM and ASMD charts for behavioral modeling, Design examples, Keypad scanner and encoder.

UNIT-IV: Synthesis of Digital Logic Circuit Design:

Introduction to Synthesis, Synthesis of combinational logic, Synthesis of sequential logic with latches and flip-flops, Synthesis of Explicit and Implicit State Machines, Registers and counters.

UNIT-V: Testing of Digital Logic Circuits and CAD Tools :

Testing of logic circuits, fault model, complexity of a test set, path-sensitization, circuits with tree structure, random tests, testing of sequential circuits, built in self test, printed circuit boards, computer aided design tools, synthesis, physical design.

TEXT BOOKS:

1. Stephen Brown &ZvonkoVranesic, “Fundamentals of Digital logic design with VHDL”, Tata McGraw Hill, 2nd edition.
2. Michael D. Ciletti, “Advanced digital design with the Verilog HDL”, Eastern economy edition, PHI.

REFERENCE BOOKS:

1. Stephen Brown &ZvonkoVranesic, “Fundamentals of Digital logic with Verilog design”, Tata McGraw Hill,2nd edition.
2. Bhaskar, “VHDL Primer”,3rd Edition, PHI Publications.
3. Ian Grout, “Digital systems design with FPGAs and CPLDs”, Elsevier Publications.

I M.TECH - I SEMESTER

Course Code	Course Name	L	T	P	C
V18VLT10	CPLD & FPGA ARCHITECURES AND APPLICATIONS (Elective -2)	3	-	-	3

Course Outcome:
The student will be able to

1. Describe the Programmable Logic Devices
2. Distinguish the various types of Field Programmable Gate Arrays
3. Apply the typical applications on FPGAs

UNIT-I: Introduction to Programmable Logic Devices

Introduction, Simple Programmable Logic Devices – Read Only Memories, Programmable Logic Arrays, Programmable Array Logic, Programmable Logic Devices/Generic Array Logic; Complex Programmable Logic Devices –Architecture of Xilinx Cool Runner XCR3064XL Organization of FPGAs, FPGA Programming CPLD, CPLD Implementation of a Parallel Adder with Accumulation.

UNIT-II: Field Programmable Gate Arrays

Technologies, Programmable Logic Block Architectures, Programmable Interconnects, Programmable I/O blocks in FPGAs, Dedicated Specialized Components of FPGAs, Applications of FPGAs.

UNIT –III: SRAM Programmable FPGAs:

Introduction, Programming Technology, Device Architecture, The Xilinx XC2000, XC3000 and XC4000 Architectures.

UNIT –IV: Anti-Fuse Programmed FPGAs

Introduction, Programming Technology, Device Architecture, TheActel ACT1, ACT2 and ACT3 Architectures.

UNIT –V: Design Applications

General Design Issues, Counter Examples, A Fast Video Controller, A Fast DMA Controller, Designing Counters with ACT devices, Designing Adders and Accumulators with the ACT Architecture.

TEXT BOOKS:

1. Field Programmable Gate Array Technology - Stephen M. Trimberger, Springer International Edition.

2. Digital Systems Design - Charles H. Roth Jr, LizyKurian John, Cengage Learning.

REFERENCE BOOKS:

1. Field Programmable Gate Arrays - John V. Oldfield, Richard C. Dorf, Wiley India.

2. Digital Design Using Field Programmable Gate Arrays - Pak K. Chan/ SamihaMourad, Pearson Low Price Edition.

3. Digital Systems Design with FPGAs and CPLDs - Ian Grout, Elsevier, Newnes.

4. FPGA based System Design - Wayne Wolf, Prentice Hall Modern Semiconductor Design Series.

I M.TECH - I SEMESTER

Course Code	Course Name	L	T	P	C
V18VLT11	ALGORITHMS FOR VLSI DESIGN –AUTOMATION (Elective-2)	3	-	-	3

Course Outcome:

The student will be able to

- Describe Logic Synthesis
- Discuss VLSI Automation Algorithms
- Identify Placement, Floor Planning & Pin Assignment and Routing techniques

UNIT-I: Logic Synthesis & Verification:

Introduction to combinational logic synthesis, Binary Decision Diagram, Hardware models for High-level synthesis.

UNIT-II: VLSI Automation Algorithms:

Partitioning: Problem formulation, classification of partitioning algorithms, Group migration algorithms, simulated annealing & evolution, other partitioning algorithms.

UNIT-III: Placement, Floor Planning & Pin Assignment:

Problem formulation, simulation base placement algorithms, other placement algorithms, constraint based floor planning, floor planning algorithms for mixed block & cell design. General & channel pin assignment

UNIT-IV: Global Routing:

Problem formulation, classification of global routing algorithms, Maze routing algorithm, line probe algorithm, Steiner Tree based algorithms, ILP based approaches

UNIT-V: Detailed Routing:

problem formulation, classification of routing algorithms, single layer routing algorithms, two layer channel routing algorithms, three layer channel routing algorithms, and switchbox routing algorithms. Over The Cell Routing & Via Minimization: Two layers over the cell routers, constrained & unconstrained via minimization.

REFERENCE BOOKS:

1. NaveedShervani, "Algorithms for VLSI physical design Automation", Kluwer Academic Publisher, Second edition.

2. ChristophnMeinel& Thorsten Theobold, "Algorithm and Data Structures for VLSI Design", KAP, 2002.

3. Rolf Drechsheler : "Evolutionary Algorithm for VLSI", Second edition

4. Trimburger, "Introduction to CAD for VLSI", Kluwer Academic publisher, 2002 .

I M.TECH - I SEMESTER

COURSE CODE	COURSE NAME	L	T	P	C
V18VLT12	VLSI SIGNAL PROCESSING (Elective-2)	3	-	-	3

Course Outcome:

The student will be able to

1. Describe digital signal processing algorithms and processing.
2. Distinguish folding and unfolding algorithms.
3. Explain systolic architectures
4. Explain various convolution algorithms.
5. Describe applications of DSP processor in low power design.

UNIT-I:

Introduction to DSP: Typical DSP algorithms, DSP algorithms benefits, Representation of DSP algorithms.

Pipelining and Parallel Processing: Introduction, Pipelining of FIR Digital filters, Parallel Processing, Pipelining and Parallel Processing for Low Power.

Retiming: Introduction – Definitions and Properties – Solving System of Inequalities – Retiming Techniques.

UNIT-II:

Folding: Introduction -Folding Transform - Register minimization Techniques – Register minimization in folded architectures – folding of multirate systems

Unfolding: Introduction – An Algorithm for Unfolding – Properties of Unfolding – critical Path, Unfolding and Retiming – Applications of Unfolding

UNIT-III:

Systolic Architecture Design: Introduction – Systolic Array Design Methodology – FIR Systolic Arrays – Selection of Scheduling Vector – Matrix Multiplication and 2D Systolic Array Design – Systolic Design for Space Representations contain Delays

UNIT-IV:

Fast Convolution: Introduction – Cook-Toom Algorithm – Winogard algorithm – Iterated Convolution – Cyclic Convolution – Design of Fast Convolution algorithm by Inspection

UNIT-V:

Low Power Design: Scaling Vs Power Consumption –Power Analysis, Power Reduction techniques – Power Estimation Approaches Programmable DSP: Evaluation of Programmable Digital Signal Processors, DSP Processors for Mobile and Wireless Communications, Processors for Multimedia Signal Processing.

TEXT BOOKS:

1. VLSI Digital Signal Processing- System Design and Implementation – Keshab K. Parhi, 1998, Wiley Inter Science.

2. VLSI and Modern Signal Processing – Kung S. Y, H. J. While House, T. Kailath, 1985, Prentice Hall.

REFERENCE BOOKS:

1. Design of Analog – Digital VLSI Circuits for Telecommunications and Signal Processing – Jose E. France, YannisTsividis, 1994, Prentice Hall.

2. VLSI Digital Signal Processing – Medisetti V. K, 1995, IEEE Press (NY), USA

I M.TECH - I SEMESTER

Course Code	Course Name	L	T	P	C
V18VLL01	VLSI LAB	-	-	4	2

PART-A: VLSI Lab (Front-end Environment)

--The students are required to design the logic circuit to perform the followingexperiments using necessary simulator (Xilinx ISE Simulator/ Mentor GraphicsQuesta Simulator) to verify the logical /functional operation and to perform theanalysis with appropriate synthesizer (Xilinx ISE Synthesizer/Mentor GraphicsPrecision RTL) and then verify the implemented logic with different hardwaremodules/kits (CPLD/FPGA kits).

--The students are required to acquire the knowledge in both the Platforms (Xilinxand Mentor graphics) by perform at least Five experiments on each Platform.

List of Experiments:

1. Adder-Substractor.

2. Priority Encoder.

3. LFSR

4. Synchronous RAM.

5. ALU.

6. Up Counter/Down Counter.

7. Fire Detection and Control System using Combinational Logic circuits.

8. Traffic Light Controller using Sequential Logic circuits

9. Pattern Detection using Moore Machine.

10. Finite State Machine (FSM) based logic circuit.

PART-A: VLSI Lab (Back-end Environment)

--The students are required to design and implement the Layout of the following experiments of any Five using CMOS 130nm Technology with Mentor Graphics Tool.

List of Experiments:

1. Inverter Characteristics.

2. Full Adder.

3. RS-Latch, D-Latch and Clock Divider.

4. Synchronous Counter and Asynchronous Counter.

5. Static and Dynamic RAM.

6. ROM

7. Differential Amplifier.

8. Ring Oscillator

9. Digital-to-Analog-Converter.

10. Analog-to-Digital Converter.

Lab Requirements:

Software: Xilinx ISE Suite, Mentor Graphics-Questa Simulator, Mentor Graphics-Precision RTL, Mentor Graphics Back End/Tanner Software tool.

Hardware: Personal Computer with necessary peripherals, configuration and operating Systemand relevant VLSI (CPLD/FPGA) hardware Kits.

I M.TECH - II SEMESTER

COURSE CODE	COURSE NAME	L	T	P	C
V18VLT13	DESIGN FOR TESTABILITY	3	-	-	3

Course Outcome:
The students will be able to
1. Interpret the concepts of modeling digital circuits and simulation.
2. Describe modeling of faults and its testing for SSF.
3. Explain various techniques of testing.

UNIT-I: Modeling:
Modeling digital circuits at logic level, register level and structural level. Levels of modeling.

Logic Simulation: Types of simulation, delay models, element evaluation, hazard detection, gate level event driven simulation.

UNIT-II: Fault Modeling:

Logic fault models, fault detection and redundancy, fault equivalence and fault location. Single stuck and multiple stuck – fault models. Fault simulation applications, general techniques for combinational circuits.

UNIT-III: Testing for Single Stuck Faults (SSF):

Automated test pattern generation (ATPG/ATG) for SSFs in combinational and sequential circuits, functional testing with specific fault models. Vector simulation – ATPG vectors, formats, compaction and compression, selecting ATPG tool.

UNIT-IV: Design for Testability:

Testability trade-offs, techniques. Scan architectures and testing – controllability and observability, generic boundary scan, fully integrated scan, storage cells for scan design. Board level and system level DFT approaches. Boundary scan standards. Compression techniques – different techniques, syndrome test and signature analysis.

UNIT-V: Built-in-Self-Test (BIST):

BIST concepts and test pattern generation, specific BIST architectures – CSBL, BEST, RTS, LOCST, STUMPS, CBIST, RTD, SST, CATS, CSTP, BILBO. Brief ideas on some advanced BIST concepts and design for self-test at board level.

Reference Books

1. MironAbramovici, Melvin A.Breur, Arthur D.Friedman, Digital Systems Testing and Testable Design, Jaico Publishing House, 2001.
2. Michael L.Bushnell, VishwaniD.Agrawal, Essentials of Electronic Testing, Springer, 2000.
3. Michael D.Ciletti, Modeling, Synthesis, and Rapid Prototyping with the Verilog HDL., Prentice Hall, 1999.

I M.TECH - II SEMESTER

COURSE CODE	COURSE NAME	L	T	P	C
V18VLT14	CMOS DIGITAL IC DESIGN	3	-	-	3

Course Outcome:

The student will be able to

1. Describe the concepts of MOS design.
2. Demonstrate the combinational, sequential and dynamic CMOS logic circuits.
3. Explain various semiconductor memories.

UNIT-I: MOS Design

NMOS & Pseudo NMOS Logic – Inverter, Inverter threshold voltage, Output high voltage, Output Low Voltage, Gain at gate threshold voltage, Transient response, Rise time, Fall time; CMOS logic - Inverter, logic gates.

UNIT-II: Combinational MOS Logic Circuits:

MOS logic circuits with NMOS loads, Primitive CMOS logic gates – NOR & NAND gate, Complex Logic circuits design – Realizing Boolean expressions using NMOS gates and CMOS gates, AOI and OIA gates, CMOS full adder, CMOS transmission gates, Designing with Transmission gates.

UNIT-III: Sequential MOS Logic Circuits

Behaviour of bistable elements, Latch, Clocked latch and flip flop circuits, CMOS D latch and edge triggered flip-flop.

UNIT-IV: Dynamic Logic Circuits

Basic principle, Voltage Bootstrapping, Synchronous dynamic pass transistor circuits, Dynamic CMOS transmission gate logic, High performance Dynamic CMOS circuits – Domino logic, NORA logic.

UNIT-V: Semiconductor Memories

Types, RAM array organization, DRAM – Types, Operation, Leakage currents in DRAM cell and refresh operation, SRAM operation Leakage currents in SRAM cells, Flash Memory- NOR flash and NAND flash.

TEXT BOOKS:

1. Digital Integrated Circuit Design – Ken Martin, Oxford University Press, 2011.

2. CMOS Digital Integrated Circuits Analysis and Design – Sung-Mo Kang, Yusuf Leblebici,

TMH, 3rd Ed., 2011.

REFERENCE BOOKS:

1. Introduction to VLSI Systems: A Logic, Circuit and System Perspective – Ming-BO Lin,CRC Press, 2011

2.Digital Integrated Circuits– A Design Perspective, Jan M. Rabaey, AnanthaChandrakasan,BorivojeNikolic, 2nd Ed., PHI.

I M.TECH - II SEMESTER

COURSE CODE	COURSE NAME	L	T	P	C
V18VLT15	EMBEDDED SYSTEM DESIGN - II	3	-	-	3

Course Outcome:
The student will be able to

1. Describe the ARM architecture and its memory management.
2. Apply instruction set for Arm programming.
3. Develop basic ARM programs using C.
4. Describe the concepts of memory management.

UNIT-I:

ARM Architecture ARM Design Philosophy, Registers, PSR, Pipeline, Interrupts and Vector Table, Architecture Revision, ARM Processor Families. Introduction to ARM Cortex.

UNIT-II:

ARM Programming Model-I Instruction Set: Data Processing Instructions, Branch, Load, Store Instructions, PSR Instructions, Conditional Instructions.

UNIT-III:

ARM Programming Model-II Thumb Instruction Set: Register Usage, Other Branch Instructions, Data Processing Instructions, Single-Register and Multi Register Load-Store Instructions, Stack, Software Interrupt Instructions.

UNIT-IV:

ARM Programming: Simple C Programs using Function Calls, Pointers, Structures, Integer and Floating Point Arithmetic, Assembly Code using Instruction Scheduling, Register Allocation, Conditional Execution and Loops.

UNIT-V:

Memory Management Cache Architecture, Polices, Flushing and Caches, MMU, Page Tables, Translation, Access Permissions, Content Switch.

TEXT BOOKS:

1. ARM Systems Developer's Guides- Designing & Optimizing System Software – Andrew N. Sloss, Dominic Symes, Chris Wright, 2008, Elsevier.

2. ARM System-on-chip Architecture- Stephen Bo Furber - Addison-Wesley, 2000

REFERENCE BOOKS:

1. Embedded Microcomputer Systems, Real Time Interfacing – Jonathan W. Valvano – Brookes / Cole, 1999, Thomas Learning.

I M.TECH - II SEMESTER

Course Code	Course Name	L	T	P	C
V18VLT16	EMBEDDED REAL TIME SYSTEMS	3	-	-	3

Course Outcome:

The student will be able to

1. Describe the concepts of real time operating system.
2. Explain various RTOS and their programming concepts.
3. Express program modeling for case studies.
4. Construct an image for a target board.
5. Describe RT Linux

UNIT-I: Introduction

OS Services, Process Management, Timer Functions, Event Functions, Memory Management, Device, File and IO Systems Management, Interrupt Routines in RTOS Environment and Handling of Interrupt Source Calls, Inter Process communication Functions, Real-Time Operating Systems, Basic Design Using an RTOS, RTOS Task Scheduling Models, Interrupt Latency and Response of the Tasks as Performance Metrics, OS Security Issues.

UNIT-II: RTOS Programming

Basic Functions and Types of RTOS for Embedded Systems, RTOS mCOS-II, RTOS Vx Works,

Programming concepts of above RTOS with relevant Examples, Programming concepts of RTOS Windows CE, RTOS OSEK, RTOS Linux 2.6.x and RTOS RT Linux.

UNIT-III: Program Modeling – Case Studies

Case study of embedded system design and coding for an Automatic Chocolate Vending Machine (ACVM) Using Mucos RTOS, case study of digital camera hardware and software architecture, case study of coding for sending application layer byte streams on a TCP/IP Network Using RTOS Vx Works, Case Study of Embedded System for an Adaptive Cruise Control (ACC) System in Car, Case Study of Embedded System for a Smart Card, Case Study of Embedded System of Mobile Phone Software for Key Inputs.

UNIT-IV: Target Image Creation & Programming in Linux

Off-The-Shelf Operating Systems, Operating System Software, Target Image Creation for Window XP Embedded, Porting RTOS on a Micro Controller based Development Board. Overview and programming concepts of Unix/Linux Programming, Shell Programming, System Programming.

UNIT-V: Programming in RT Linux

Overview of RT Linux, Core RT Linux API, Program to display a message periodically, semaphore management, Mutex, Management, Case Study of Appliance Control by RT Linux System.

TEXT BOOKS:

1. Dr. K.V.K.K. Prasad: “Embedded/Real-Time Systems” Dream Tech Publications, Blackpad book.
2. Rajkamal: “Embedded Systems-Architecture, Programming and Design”, Tata McGraw Hill Publications, Second Edition, 2008.

REFERENCES:

1. Labrosse, “Embedding system building blocks “, CMP publishers.
2. Rob Williams,” Real time Systems Development”, Butterworth Heinemann Publications.

I M.TECH - II SEMESTER

COURSE CODE	COURSE NAME	L	T	P	C
V18VLT17	LOW POWER VLSI (ELECTIVE-III)	3	-	-	3

Course Outcome:
The students will be able to

1. Identify various sources of power consumption
2. Estimate the power consumption sing simulation and probabilistic approaches.
3. Discuss low power design at various levels of abstraction.
4. Discuss clock distribution for low power dissipation.

UNIT-I: Introduction
Need for low power VLSI chips, Sources of power dissipation. Emerging Low power approaches. Dynamic dissipation in CMOS, Transistor sizing & gate oxide thickness, Impact of technology Scaling, Technology & Device innovation.

UNIT-II: Power estimation Simulation Power analysis:
SPICE circuit simulators, gate level logic simulation, capacitive power estimation, static state power, gate level capacitance estimation, architecture level analysis, data correlation analysis in DSP systems. Monte Carlo simulation.

Probabilistic power analysis:
Random logic signals, probability & frequency, probabilistic power analysis techniques, signal entropy.

UNIT-III: Low Power Design Circuit level:
Power consumption in circuits. Flip Flops & Latches design, high capacitance nodes, low power digital cells library

Logic level:

Gate reorganization, signal gating, logic encoding, state machine encoding, pre-computation logic

UNIT-IV: Low power Architecture & Systems:

Power & performance management, switching activity reduction, parallel architecture with voltage reduction, flow graph transformation, low power arithmetic components, low power memory design.

UNIT-V: Low power Clock Distribution:

Power dissipation in clock distribution, single driver Vs distributed buffers, Zero skew Vs tolerable skew, chip & package co design of clock network

Algorithm &architectural level methodologies: Introduction, design flow, Algorithmic level analysis & optimization, Architectural level estimation & synthesis.

TEXTBOOKS:

1. Gary K. Yeap, "Practical Low Power Digital VLSI Design", KAP, 2002
2. Rabaey, Pedram, "Low power design methodologies" Kluwer Academic, 1997

REFERENCES BOOKS:

1. Kaushik Roy, Sharat Prasad, "Low-Power CMOS VLSI Circuit Design" Wiley, 2000

I M.TECH - II SEMESTER

COURSE CODE	COURSE NAME	L	T	P	C
V18VLT18	CMOS MIXED SIGNAL CIRCUIT DESIGN (ELECTIVE-III)	3	-	-	3

Course Outcome:
The students will be able to

1. Design Mixed signal based circuits starting from basics constraints to advanced constraints.
2. Analyze and design filter architectures using switched capacitor integrator circuits.
3. Design circuits like PLL,A/D and D/A converters.
4. Design over sampling circuits and higher order modulators.

UNIT-I: Switched Capacitor Circuits
Introduction to Switched Capacitor circuits- basic building blocks, Operation and Analysis, Non ideal effects in switched capacitor circuits, Switched capacitor integrators first order filters, Switch sharing, bi quad filters.

UNIT-II: Phased Lock Loop (PLL)
Basic PLL topology, Dynamics of simple PLL, Charge pump PLLs-Lock acquisition, Phase/Frequency detector and charge pump, Basic charge pump PLL, Non-ideal effects in PLLs- PFD/CP non-idealities, Dead zone, Jitter in PLLs; applications.

Unit III: Sampling Circuits
Basic sampling circuits for analog signal sampling, performance metrics of sampling circuits, different types of sampling switches. Sample-and-Hold Architectures- Open-loop & closed-loop architectures, open-loop architecture with miller capacitance, multiplexed-input architectures, recycling architecture, switched capacitor architecture, current-mode architecture.

UNIT-IV: D/A Converters
Nyquist rate D/A converters- Decoder based converters, Binary-Scaled converters, Thermometer-code converters, Hybrid converters.

UNIT-V: A/D Converters
Successive approximation converters, Flash converter, Two-step A/D converters, Interpolating A/D converters, Folding A/D converters, Pipelined A/D converters, Time-interleaved converters.

TEXT BOOKS:

1. Design of Analog CMOS Integrated Circuits- BehzadRazavi, TMH Edition, 2002

2. CMOS Analog Circuit Design - Philip E. Allen and Douglas R. Holberg, Oxford University Press, International Second Edition/Indian Edition, 2010.

3. Analog Integrated Circuit Design- David A. Johns,Ken Martin, Wiley Student Edition,

2016

REFERENCE BOOKS:

1. CMOS Integrated Analog-to- Digital and Digital-to-Analog converters-Rudy Van De Plassche, Kluwer Academic Publishers, 2003

2. Describeing Delta-Sigma Data converters-Richard Schreier, Wiley Interscience, 2005.

3. CMOS Mixed-Signal Circuit Design - R. Jacob Baker, Wiley Interscience, 2009.

I M.TECH - II SEMESTER

COURSE CODE	COURSE NAME	L	T	P	C
V18VLT19	SYSTEM VERILOG (ELECTIVE-III)	3	-	-	3

Course Outcome:
The students will be able to

1. Describe data types, RTL models and rules in SystemVerilog.
2. Demonstrate user defined, enumerated data types and structures in SystemVerilog.
3. Explain the procedural blocks, FSM and interfaces in SystemVerilog.

UNIT-I: Introduction to SystemVerilog:

SystemVerilog Declaration Spaces: Packages, unit compilation-unit declarations, Declarations in unnamed statement blocks, Simulation time units and precision

SystemVerilog Literal Values and Built-in Data Types

Enhanced literal value assignments, ‘define enhancements, SystemVerilog variables, Using 2-state types in RTL models, Relaxation of type rules, Signed and unsigned modifiers, Static and automatic variables, Deterministic variable initialization, Type casting

UNIT-II: SystemVerilog User-Defined and Enumerated Types

User-defined types, Enumerated types

SystemVerilog Arrays, Structures and Unions Structures, Unions, Arrays, The for each array looping construct, Array querying system functions, The bits “size of” system function, Dynamic arrays, associative arrays, sparse arrays and strings

UNIT-III: SystemVerilog Procedural Blocks, Tasks and Functions

Verilog general purpose always procedural block, SystemVerilog specialized procedural blocks, Enhancements to tasks and functions

UNIT-IV: SystemVerilog Procedural Statements

New operators, Operand enhancements, Enhanced for loops, Bottom testing do...while loop, The for each array looping construct, Enhanced block names, Statement labels, Enhanced case statements, Enhanced if...else decisions

Modeling Finite State Machines with SystemVerilog

Modeling state machines with enumerated types, Using 2-state types in FSM models

UNIT-V: SystemVerilog Interfaces

Interface concepts, Interface declarations, Using interfaces as module ports, Instantiating and connecting interfaces, Referencing signals within an interface, Interface mod ports, Using tasks and functions in interfaces, Using procedural blocks in interfaces, Reconfigurable interfaces, Verification with interfaces

TEXTBOOKS:

1. Sutherland, “Systemverilog for Design”, Springer publications

2. Christian B Spear, “SystemVerilog for Verification: A guide to learning the Testbench language features”, Springer publications, 3 rd edition.

3. VijayaRaghavan, “SystemVerilog Assertions”, Springer publications, 2005

COURSE CODE	COURSE NAME	L	T	P	C
V18VLT20	SEMICONDUCTOR MEMORY DESIGN AND TESTING (Elective-iii)	3	-	-	3

I M.TECH - II SEMESTER

Course Outcome:

The students will be able to

1. Describe concepts of volatile and non volatile memory technologies.
2. Discuss the fault modeling and testing memory devices.
3. Explain the reliability and radiation effects of memory devices.
4. Describe the advanced memory technologies.

UNIT-I: Random Access Memory Technologies

SRAM – SRAM Cell structures, MOS SRAM Architecture, MOS SRAM cell and peripheral circuit operation, Bipolar SRAM technologies, SOI technology, Advanced SRAM architectures and technologies, Application specific SRAMs, DRAM – DRAM technology development, CMOS DRAM, DRAM cell theory and advanced cell structures, BICMOS DRAM, soft error failure in DRAM, Advanced DRAM design and architecture, Application specific DRAM.

UNIT-II: Non-volatile Memories

Masked ROMs, High density ROM, PROM, Bipolar ROM, CMOS PROMS, EPROM, Floating gate EPROM cell, One time programmable EPROM, EEPROM, EEPROM technology and architecture, Non-volatile SRAM, Flash Memories (EPROM or EEPROM), advanced Flash memory architecture.

UNIT-III: Memory Fault Modeling Testing and Memory Design for Testability and Fault Tolerance

RAM fault modeling, Electrical testing, Pseudo Random testing, Megabit DRAM Testing, nonvolatile memory modeling and testing, IDDQ fault modeling and testing, Application specific memory testing, RAM fault modeling, BIST techniques for memory.

UNIT-IV: Semiconductor Memory Reliability and Radiation Effects

General reliability issues RAM failure modes and mechanism, Non-volatile memory reliability, reliability modeling and failure rate prediction, Design for Reliability, Reliability Test Structures, Reliability Screening and qualification, Radiation effects, Single Event Phenomenon (SEP), Radiation Hardening techniques, Radiation Hardening Process and Design Issues, Radiation Hardened Memory characteristics, Radiation Hardness Assurance and Testing, Radiation. Dosimetry, Water Level Radiation Testing and Test structures.

UNIT-V: Advanced Memory Technologies and High-density Memory Packing Technologies

Ferroelectric RAMs (FRAMs), GaAs FRAMs, Analog memories, magneto resistive RAMs (MRAMs), Experimental memory devices, Memory Hybrids and MCMs (2D), Memory Stacks and MCMs (3D), Memory MCM testing and reliability issues, Memory cards, High Density Memory Packaging Future Directions.

TEXT BOOKS:

1. Semiconductor Memories Technology – Ashok K. Sharma, 2002, Wiley.

2. Advanced Semiconductor Memories – Architecture, Design and Applications - Ashok K. Sharma- 2002, Wiley.

3. Modern Semiconductor Devices for Integrated Circuits – Chenming C Hu, 1st Ed., Prentice Hall.

I M.TECH - II SEMESTER

COURSE CODE	COURSE NAME	L	T	P	C
V18VLT21	HARDWARE SOFTWARE CO-DESIGN (Elective-iv)	3	-	-	3

Course Outcome:
The students will be able to

1. Describe co-design architectures, methods and algorithms.
2. Describe prototyping emulation and target architecture using embedded systems.
3. Explain the compilation techniques.
4. Distinguish the various design specifications and verifications.
5. Describe the system level specifications and design using languages.

UNIT-I: Co- Design Issues:
Co- Design Models, Architectures, Languages, A Generic Co-design Methodology.
Co- Synthesis Algorithms Hardware software synthesis algorithms: hardware – software partitioning distributed system co-synthesis.
UNIT-II:
Prototyping and Emulation Prototyping and emulation techniques, prototyping and emulation environments, future developments in emulation and prototyping architecture specialization techniques, system communication infrastructure
Target Architectures Architecture Specialization techniques, System Communication infrastructure, Target Architecture and Application System classes, Architecture for control dominated systems (8051-Architectures for High performance control), Architecture for Data dominated systems (ADSP21060, TMS320C60), Mixed Systems.
UNIT-III:
Compilation Techniques and Tools for Embedded Processor Architectures Modern embedded architectures, embedded software development needs, compilation technologies, practical consideration in a compiler development environment.
UNIT-IV:
Design Specification and Verification Design, co-design, the co-design computational model, concurrency coordinating con current computations, interfacing components, design verification, implementation verification, verification tools, interface verification.
UNIT-V:
Languages for System-Level Specification and Design-I System-level specification, design representation for system level synthesis, system level specification languages.
Languages for System-Level Specification and Design-II
Heterogeneous specifications and multi-language co-simulation, the cosyma system and lycos system.
TEXT BOOKS:
1. Hardware / Software Co- Design Principles and Practice – JorgenStaunstrup, Wayne Wolf – 2009, Springer.
2. Hardware / Software Co- Design - Giovanni De Micheli, MariagiovannaSami, 2002, Kluwer Academic Publishers.
REFERENCE BOOKS:
1. A Practical Introduction to Hardware/Software Co-design -Patrick R.Schaumont - 2010 – Springer Publications.

I M.TECH - II SEMESTER

COURSE CODE	COURSE NAME	L	T	P	C
V18VLT22	EMBEDDED COMPUTING (Elective-iv)	3	-	-	3

Course Outcome:
The students will be able to

1. Apply the concepts of Linux OS and programming
2. Describe the different software development tools and interfacing modules
3. Discuss the networking basics
4. Describe the IA32 instruction set

UNIT – I:
Programming on Linux Platform:
System Calls, Scheduling, Memory Allocation, Timers, Embedded Linux, Root File System, Busy Box. **Operating System Overview**: Processes, Tasks, Threads, Multi-Threading, Semaphore, Message Queue.
UNIT – II:
Introduction to Software Development Tools:
GNU GCC, make, gdb, static and dynamic linking, C libraries, compiler options, code optimization switches, lint, code profiling tools.
UNIT – III:
Interfacing Modules:
Sensor and actuator interface, data transfer and control, GPS, GSM module interfacing with data processing and display, OpenCV for machine vision, Audio signal processing.
UNIT – IV:
Networking Basics:
Sockets, ports, UDP, TCP/IP, client server model, socket programming, 802.11, Bluetooth, ZigBee, SSH, firewalls, network security.
UNIT – V:
IA32 Instruction Set: application binary interface, exception and interrupt handling, interruptlatency, assemblers, assembler directives, macros, simulation and debugging tools.

TEXT BOOKS:
1. Peter Barry and Patrick Crowley, “Modern Embedded Computing”,1st Edition. Elsevier/Morgan Kaufmann, 2012.
2. Linux Application Development - Michael K. Johnson, Erik W. Troan, Adission Wesley, 1998.
3. Assembly Language for x86 Processors by Kip R. Irvine
4. Intel® 64 and IA-32 Architectures Software Developer Manuals

REFERENCE BOOKS
1. Abraham Silberschatz, Peter B. Galvin and Greg Gagne, “Operating System Concepts”, Wiley
2. Maurice J. Bach, “The Design of the UNIX Operating System”, Prentice-Hall
3. W. Richard Stevens, “UNIX Network Programming”, Pearson

I M.TECH - II SEMESTER

COURSE CODE	COURSE NAME	L	T	P	C
V18VLT23	DESIGN FOR INTERNET OF THINGS (Elective-iv)	3	-	-	3

Course Outcome:
The student will be able to

1. Describe M2M and IOT technologies
2. Identify the layers and protocols in IOT
3. Describe various communication technologies used in IOT
4. Demonstrate various hardware components required for IOT applications

UNIT I – INTRODUCTION
Introduction from M2M to IoT, M2M and IoT Technology Fundamentals - Devices and gateways. IoT - An Architectural Overview – Building architecture, Main design principles and needed capabilities.
UNIT II – IOT PROTOCOLS
Functionality of Layers in IoT –Study of protocols - WirelessHART, Z-Wave, 6LoWPAN, RPL, CoAP, MQTT, oneM2M, ETSI M2M.
UNIT III COMMUNICATION TECHNOLOGIES IN IOT
IoT Connectivity – IEEE 802.15.4, WiFi, Bluetooth, Zigbee, Short Range Communications, LPWAN, Cellular Systems, Challenges and Solutions in 5G Era.
UNIT IV SYSTEM HARDWARE AND PROTOTYPING
Sensors, Actuators, Radio Frequency Identification, Wireless Sensor Networks and Participatory Sensing Technology, Prototyping the Embedded Devices for IoTs.
UNIT V – IOT APPLICATIONS
BUILDING IoT Application WITH RASPBERRY PI - Physical device – Raspberry Pi Interfaces – Programming – APIs / Packages – Web services, Real time applications of IoT- Connecting IoT to cloud – Cloud Storage for IoT.**Case Studies** - Smart and Connected Cities, Public Safety.
TEXTBOOKS:
1. Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, StamatisKarnouskos, David Boyle, "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1 st Edition, Academic Press, 2014.
2. IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things, David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry, Cisco Press 800 East 96th Street Indianapolis, Indiana 46240 USA
3. Daniel Minoli, "Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications", ISBN: 978-1-118- 47347-4, Willy Publications
4. IOT (Internet of Things) Programming: A Simple and Fast Way of Learning IOT by David Etter(Author)
5. Internet of Things **-** By Raj Kamal, McGraw-Hill Education. Copyright.
REFERENCE BOOKS:
1. From Internet of Things to Smart Cities: Enabling Technologies **-** edited by Hongjian Sun, Chao Wang, Bashar I. Ahmad, CRC Press -2018.
2. Peter Waher, "Learning Internet of Things", PACKT publishing, BIRMINGHAM
3. Bernd Scholz-Reiter, Florian Michahelles, "Architecting the Internet of Things", ISBN 978-3-642-19156-5 e-ISBN 978-3-642-19157-2, Springer
4. Vijay Madisetti and ArshdeepBahga, "Internet of Things (A Hands-on- Approach)", 1 st Edition, VPT, 2014.

I M.TECH - II SEMESTER

COURSE CODE	COURSE NAME	L	T	P	C
V18VLT24	SOFTWARE FOR EMBEDDED SYSTEMS (Elective-iv)	3	-	-	3

Course outcomes:

The student will be able to

1. Describe the fundamentals of embedded Programming.
2. Describe the GNU C Programming Tool Chain in Linux.
3. Explain time driven architecture, Serial Interface with a case study.
4. Illustrate the concepts of embedded Java for Web Enabling of systems.

UNIT I EMBEDDED PROGRAMMING

C and Assembly - Programming Style - Declarations and Expressions - Arrays, Qualifiers and Reading Numbers - Decision and Control Statements - Programming Process - More Control Statements - Variable Scope and Functions - C Preprocessor - Advanced Types – Simple Pointers - Debugging and Optimization – In-line Assembly.

UNIT II C PROGRAMMING TOOLCHAIN IN LINUX

C preprocessor - Stages of Compilation - Introduction to GCC - Debugging with GDB – The Make utility - GNU Configure and Build System - GNU Binary utilities - Profiling - using *gprof* - Memory Leak Detection with *valgrind* - Introduction to GNU C Library

UNIT III EMBEDDED C AND EMBEDDED OS

Adding Structure to 'C' Code: Object oriented programming with C, Header files for Project and Port, Examples. Meeting Real-time constraints: Creating hardware delays - Need for timeout mechanism - Creating loop timeouts - Creating hardware timeouts. Creating embedded operating system: Basis of a simple embedded OS, Introduction to sEOS, Using Timer 0 and Timer 1, Portability issue, Alternative system architecture, Important design considerations when using sEOS.

UNIT IV TIME-DRIVEN MULTI-STATE ARCHITECTURE AND HARDWARE

Multi-State systems and function sequences: Implementing multi-state (Timed) system - Implementing a Multi-state (Input/Timed) system. Using the Serial Interface: RS232 - The Basic RS-232 Protocol - Asynchronous data transmission and baud rates - Flow control – Software architecture - Using on-chip UART for RS-232 communication - Memory requirements – The serial menu architecture - Examples. Case study: Intruder alarm system.

UNIT V EMBEDDED JAVA

Introduction to Embedded Java and J2ME – Smart Card basics – Java card technology overview – Java card objects – Java card applets – working with APDUs – Web Technology for Embedded Systems.

TEXTBOOKS:

1. Steve Oualline, 'Practical C Programming 3rd Edition', O'Reilly Media, Inc, 2006.

2. Stephen Kochan, "Programming in C", 3rd Edition, Sams Publishing, 2009.

3. Michael J Pont, "Embedded C", Pearson Education, 2007.

4. Zhiqun Chen, 'Java Card Technology for Smart Cards: Architecture and Programmer's Guide', Addison-Wesley Professional, 2000.

I M.TECH - II SEMESTER

COURSE CODE	COURSE NAME	L	T	P	C
V18VLL02	EMBEDDED SYSTEM DESIGN LAB	-	-	4	2

1. The Students are required to write the programs using C-Language according to the Experiment requirements using RTOS Library Functions and macros ARM-926 developer kits and ARM-Cortex.
2. The following experiments are required to develop the algorithms, flow diagrams, source code and perform the compilation, execution and implement the same using necessary hardware kits for verification. The programs developed for the implementation should be at the level of an embedded system design.
3. The students are required to perform THREE experiments from Part-I and ALL experiments from Part-II and Part-III.

List of Experiments:

Part-I: Experiments using ARM-926 with PERFECT RTOS

1. Register a new command in CLI.

2. Create a new Task.

3. Interrupt handling.

4. Allocate resource using semaphores.

5. Share resource using MUTEX.

6. Reader's Writer's Problem for concurrent Tasks.

Part-II Experiments on ARM-CORTEX processor using any open source RTOS.

(Coo-Cox-Software-Platform)

1. Implement the interfacing of display with the ARM- CORTEX processor.

2. Interface ADC and DAC ports with the Input and Output sensitive devices.

3. Sensor interface with ARM-Cortex processor

Part-III Experiments on Raspberry PI (RPI) & ESP8266

1. RPI interfacing with sensor.

2. Sensor data upload to cloud using RPI.

3. ESP8266 interfacing with sensor.

4. Sensor data upload to cloud using ESP8266.

Lab Requirements:

Software:

1. Eclipse IDE for C and C++ (YAGARTO Eclipse IDE), Perfect RTOS Library, COO-COX Software Platform, YAGARTO TOOLS, and TFTP SERVER.

2. LINUX Environment for the compilation using Eclipse IDE & Java with latest version.

3. Arduino IDE
4. Python

Hardware:

1. The development kits of ARM-926 Developer Kits, ARM-Cortex Boards, Raspberry PI Board and ESP 8266 Board
2. Serial Cables, Network Cables and recommended power supply for the board.
3. Sensors for interfacing.

SYLLABUS FOR M.TECH (COMPUTER SCIENCE AND ENGINEERING)

I M.TECH – I SEMESTER

		L	T	P	C
V18CTT01	**OBJECT ORIENTED SOFTWARE ENGINEERING**	3	0	0	3

Course Outcomes:

After completion of this course the students will be able to:

1. Describe Software development life cycle for Object-Oriented solutions of Real-world problems.
2. Discuss Planning, Estimation and CASE tools.
3. Apply OO concepts along with their applicability contexts.
4. Demonstrate object oriented analysis and design.
5. Describe Implementation, Integration and Maintenance phases.

UNIT I: Introduction to Classical software Engineering: Historical, Economic and Maintenance aspects. Introduction to OO Paradigm. Different phases in structured paradigm and OO Paradigm. Software Process and different life cycle models and corresponding strengths and weaknesses.

UNIT II: Planning and Estimation: Estimation of Duration and Cost, COCOMO components of software. Project Management plan. Planning Object-Oriented Projects. **Tools for step wised refinement:** Cost - Benefit analysis, Introduction to software metrics and CASE tools. Taxonomy and scope of CASE tools.

UNIT III: Modules to objects: Cohesion and Coupling, Data Encapsulation and Information hiding aspects of Objects. Inheritance, Polymorphism and Dynamic Binding aspects. Cohesion and coupling of objects. Reusability, Portability and Interoperability aspects. Introduction to testing, with focus on Utility, Reliability, Robustness, Performance, Correctness.

UNIT IV: Requirement phase: Rapid Prototyping method, Specification phase, Specification Document, Formal methods of developing specification document, Examples of other semi - formal methods of using Finite-State- Machines, Petri nets and E- Language.

Analysis phase: Use case Modeling, Class Modeling, Dynamic Modeling, Testing during OO Analysis.

UNIT V: Design phase: Data oriented design, Object Oriented design, and Formal techniques for detailed design. Challenges in design phase.**IIM Phases:** Implementation, Integration and maintenance phases, OOSE aspects in these phases.

TEXT BOOKS:

1. Object oriented and Classical Software Engineering, **7/e**, Stephen R. Schach, TMH

2. Object oriented and classical software Engineering, Timothy Lethbridge, Robert Laganiere, TMH, **Second Edition**.

REFERENCE BOOKS:

1. Component-based software engineering: 7th international symposium, **CBSE 2004**, Ivica Crnkovic, Springer.

I M.TECH – I SEMESTER

V18CTT02	**NOSQL Database**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Outcomes:

1. After successful completion of the course students should be able to:
2. Define, compare and use the four types of NoSQL Databases (Document-oriented, KeyValue Pairs, Column oriented and Graph).
3. Demonstrate an understanding of the detailed architecture, define objects, load data, query data
4. Performance tune Column-oriented NoSQL databases.
5. Explain the detailed architecture, define objects, load data, query data and performance tune Document oriented NoSQL databases.

UNIT I: Introduction: Overview and History of NoSQL Databases Definition of the Four Types of NoSQL Database, The Value of Relational Databases, Getting at Persistent Data, Concurrency, Integration, Impedance Mismatch, Application and Integration Databases, Attack of the Clusters, The Emergence of NoSQL, Key Points, Comparison of relational databases to new NoSQL stores, MongoDB, Cassandra, HBASE, Neo4j use and deployment, Application, RDBMS approach, Challenges NoSQL approach, Key-Value and Document Data Models, Column-Family Stores, Aggregate-Oriented Databases.

UNIT II: Replication and sharding, MapReduce on databases. Distribution Models, Single Server, Sharding, Master-Slave Replication, Peer-to-Peer Replication, Combining Sharding and Replication.

UNIT III: NoSQL Key/Value databases using MongoDB, Document Databases, What Is a Document Database? Features, Consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases, Event Logging, Content Management Systems, Blogging Platforms, Web Analytics or Real-Time Analytics, E-Commerce Applications, When Not to Use, Complex Transactions Spanning Different Operations, Queries against Varying Aggregate Structure.

UNIT IV: Column- oriented NoSQL databases using Apache HBASE, Column-oriented NoSQL databases using Apache Cassandra, Architecture of HBASE, What Is a Column-Family Data Store? Features, Consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases, Event Logging, Content Management Systems, Blogging Platforms, Counters, Expiring Usage, When Not to Use

UNIT V: NoSQL Key/Value databases using Riak, Key-Value Databases, What Is a Key-Value Store, KeyValue Store Features, Consistency, Transactions, Query Features, Structure of Data, Scaling, Suitable Use Cases, Storing Session Information, User Profiles, Preferences, Shopping Cart Data, When Not to Use, Relationships among Data, Multi operation Transactions, Query by Data, Operations by Sets, Graph NoSQL databases using Neo4,NoSQL database development tools and programming languages, Graph Databases, What Is a Graph Database? Features, Consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases, Connected Data, Routing, Dispatch, and Location-Based Services, Recommendation Engines, When Not to Use

TEXT BOOKS:

1. NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence , **1st Edition, 2012.** Authors: Sadalage, P. & Fowler, Publication: Pearson Education.
2. The Definitive Guide to MongoDB: A complete guide to dealing with Big Data using MongoDB, 3rd Edition, December, 2015. Authors: Eelco Plegge, David Hows, Peter Membrey, Tim Hawkins, Apress Publishers

REFERENCE BOOKS:

1. Redmond, E. ,Wilson, Perkins: Seven Databases in Seven Weeks: A Guide to Modern Databases and the NoSQL Movement Edition**: 2nd Edition,2018**, O'Reilly Publishers.

I M.TECH – I SEMESTER

V18CTT03	ADVANCED COMPUTER ARCHITECTURE	L	T	P	C
		3	0	0	3

Course Outcomes

After completion of this course, student will be able to:

1. Identify different types of parallel computer models
2. Describe various processor and memory organizations.
3. Explain Pipelining, Multiprocessors and Multicomputers concepts.
4. Explain Multivector, SIMD Computers and Multithreaded, Dataflow Architectures.
5. Illustrate the parallel programming models and instruction level parallelism.

UNIT – I: Parallel computer models: The state of computing, Multiprocessors and Multicomputers, Multivector and SIMD computers. **Program and network properties:** Conditions of parallelism, Program partitioning and scheduling, Program flow mechanisms.

UNIT – II: Processors: Advanced Processor Technology, Superscalar Processors and Vector Processors. **Memory Hierarchy, Cache and Shared Memory:** Memory Hierarchy Technology, Virtual Memory Technology, Cache Memory Organizations, Shared-Memory Organizations.

UNIT – III: Pipelining: Linear Pipeline Processors, Nonlinear Pipeline Processors, Instruction Pipeline Design, Arithmetic Pipeline Design.**Multiprocessors and Multicomputers:** Multiprocessor System Interconnects, Cache Coherence and Synchronization Mechanisms, Message Passing Mechanisms.

UNIT – IV: Multivector and SIMD Computers: Vector Processing Principles, Compound Vector Processing.**Scalable, Multithreaded, Dataflow Architectures:** Latency-Hiding Techniques, Principles of Multithreading.

UNIT – V: Parallel Models, Languages: Parallel Programming Models, Parallel Languages and Compilers.**Instruction Level Parallelism:** Problem Definition, Model of a Typical Processor, Compiler- detected Instruction Level Parallelism, Operand Forwarding, Reorder Buffer, Register Renaming, Tomasulo's Algorithm, Branch Prediction.

TEXT BOOKS:

Advanced Computer Architecture: Parallelism, Scalability, Programmability, Kai Hwang, Naresh Jotwani, **Second Edition**, Tata McGraw Hill Education

REFERENCE BOOKS:

1. Computer Organization and Design, David A. Patterson and John. L. Hennessy, **Fifth Edition**, Morgan Kaufmann Series.
2. Computer Architecture and Organization, John P. Hayes, **Third Edition**, McGraw Hill Education.
3. Computer Architecture and Organization: Design Principles and Applications, B. Govindarajulu, **Second Edition**, McGraw Hill Education.

I M.TECH – I SEMESTER

V18CTT04	ADVANCED OPERATING SYSTEMS	L	T	P	C
		3	0	0	3

Course Outcomes:

After successful completion of this course, the student will be able to:

1. Define, Explain, and Apply Distributed Operating System Concepts: Architectures of Distributed Systems, Distributed Mutual Exclusion, Issues and its Inherent Limitations.
2. Describe the concepts of Distributed Resource Management, Dead lock Detection and Resolution
3. Explain the concepts of Distributed Shared Memory, Distributed Scheduling, Failure Recovery and Fault tolerance
4. Describe the concepts of Cryptography and Data Security in Distributed System
5. Describe Multiprocessor Operating System and Database Operating System: Concepts, Architecture and Design issues

UNIT - I:Architectures of Distributed Systems - System Architecture types - issues in distributed operating systems - communication networks - communication primitives. Theoretical Foundations – inherent limitations of a distributed system - lamp ports logical clocks - vector clocks - casual ordering of messages - global state - cuts of a distributed computation - termination detection. Distributed Mutual Exclusion - introduction - the classification of mutual exclusion and associated algorithms – a comparative performance analysis.

UNIT-II: Distributed Deadlock Detection -Introduction - deadlock handling strategies in distributed systems - issues in deadlock detection and resolution - control organizations for distributed deadlock detection - centralized and distributed deadlock detection algorithms - hierarchical deadlock detection algorithms. Agreement protocols - introduction-the system model, a classification of agreement problems, solutions to the Byzantine agreement problem, applications of agreement algorithms. Distributed resource management: introduction-architecture - mechanism for building distributed file systems - design issues - log structured file systems.

UNIT-III: Distributed shared memory-Architecture- algorithms for implementing DSM - memory coherence and protocols - design issues. Distributed Scheduling - introduction - issues in load distributing - components of a load distributing algorithm - stability - load distributing algorithm – performance comparison - selecting a suitable load sharing algorithm - requirements for load distributing –task migration and associated issues. Failure Recovery and Fault tolerance: introduction- basic concepts - classification of failures - backward and forward error recovery, backward error recovery- recovery in concurrent systems - consistent set of check points - synchronous and asynchronous check pointing and recovery - check pointing for distributed database systems- recovery in replicated distributed databases.

UNIT-IV: Protection and security -preliminaries, the access matrix model and its implementations.- safety in matrix model- advanced models of protection. Data security - cryptography: Model of cryptography, conventional cryptography- modern cryptography, private key cryptography, data encryption standard public key cryptography - multiple encryption - authentication in distributed systems.

UNIT-V: Multiprocessor Operating Systems - basic multiprocessor system architectures - inter connection networks for multiprocessor systems - caching - hypercube architecture. Multiprocessor Operating System - structures of multiprocessor operating system, operating system design issues- threads- process synchronization and scheduling. Database Operating systems :Introduction- requirements of a database operating system Concurrency control : theoretical aspects - introduction, database systems - a concurrency control model of database systems- the problem of concurrency control - serializability theory- distributed database systems, concurrency control algorithms - introduction, basic synchronization primitives, lock based algorithms-timestamp based algorithms, optimistic algorithms - concurrency control algorithms, data replication.

TEXT BOOKS:

1. Mukesh Singhal, Niranjan G.Shivaratri, "Advanced concepts in operating systems: Distributed, Database and multiprocessor operating systems", **TMH, 2001**

REFERENCE BOOKS:

1. Andrew S.Tanenbaum, "Modern operating system", **PHI, 2003**
2. Pradeep K.Sinha, "Distributed operating system-Concepts and design", PHI, 2003.
3. Andrew S.Tanenbaum, "Distributed operating system", Pearson education, 2003.

I M.TECH – I SEMESTER

		L	T	P	C
V18CTT05	**ADVANCED DATA STRUCTURES AND ALGORITHM ANALYSIS**	3	0	0	3

Course Outcomes:

After completion of this course, student will be able to:

1. Build Linear data structures using static and dynamic memory allocation.
2. Construct different types of trees.
3. Implement different types of graph algorithms.
4. Analyze algorithms and to determine correctness and time efficiency of algorithm.
5. Implement dynamic programming for different types of problems.

UNIT – I: Performance analysis, asymptotic notation, performance measurement. Linear Data Structures-Abstract Data Types, Linked list - Single, double and Circular linked list, Skip list. Stacks and Queues implement using Array representation and Linked list representation, Circular Queues, applications of stacks and queues.

UNIT – II: Trees – Introduction to trees, Binary tree, Threaded Binary tree, Binary Search Tree, AVL Trees, Red Black Trees, Splay tree. Multi way trees: B- Trees , B^* Tress, B^+ Trees , prefix B^+ Tress, 2-4 trees, tree traversal techniques, tries.

UNIT – III: Graphs – Introduction to Graphs, Graph representation(array and linked list), Graph traversing algorithms, complexity analysis of BFS and DFS, Spanning trees, Shortest path calculation, topological sort and graph applications.

UNIT – IV: Algorithm analysis – Introduction, Greedy Method and its applications (I/o Knapsack Problem and topological sort). Divide and conquer and its applications (Merge sort and quick sort).

UNIT – V: Dynamic programming and its applications (I/o Knapsack problem and all pairs shortest path), Back Tracking and its applications (I/o Knapsack problem, travelling sales person). Branch and bound and its applications (I/o Knapsack problem, travelling sales person).

TEXT BOOKS:

1. "Data Structures, Algorithms and Applications in C++ ", ,Sartaj Sahni, University Press **Second Edition**.
2. "Data Structures and algorithms in JAVA", Adam Drozdek, Thomson Course Technology, Indian edition, **second edition**.

REFERENCE BOOKS:

1. Data Structures, A Pseudocode Approach, Richard F Gilberg, Behrouz A Forouzan, Cengage **Second Edition**.
2. Data structures and Algorithm Analysis in C, 2nd edition, Mark Allen Weiss, Pearson
3. Classic Data Structures, **2/e**, Debasis, Samanta, PHI, **2009.**

I M.TECH – I SEMESTER

V18CTT06	MACHINE LEARNING	L	T	P	C
		3	0	0	3

Course Outcomes:

After successful completion of this course, the student will be able to:

1. Recognize the characteristics of machine learning that make it useful to real-world Problems.
2. Characterize machine learning algorithms as supervised, semi-supervised, and unsupervised.
3. Have heard of a few machine learning toolboxes.
4. Be able to use support vector machines.
5. Be able to use regularized regression algorithms.

UNIT - I: The ingredients of machine learning, Tasks: the problems that can be solved with machine learning, Models: the output of machine learning, Features, the workhorses of machine learning. Binary classification and related tasks: Classification, Scoring and ranking, Class probability estimation.

UNIT-II: Beyond binary Classification: Handling more than two classes, Regression, Unsupervised and descriptive learning. **Concept learning:** The hypothesis space, Paths through the hypothesis space, Beyond conjunctive concepts.

UNIT-III: Tree models: Decision trees, Ranking and probability estimation trees, Tree learning as variance reduction. **Rule models:** Learning ordered rule lists, Learning unordered rule sets, Descriptive rule learning, First-order rule learning

UNIT-IV: Linear models: The least-squares method, The perceptron: a heuristic learning algorithm for linear classifiers, Support vector machines, obtaining probabilities from linear classifiers, Going beyond linearity with kernel methods. **Distance Based Models:** Introduction, Neighbours and exemplars, Nearest Neighbours classification, Distance Based Clustering, Hierarchical Clustering.

UNIT-V: Probabilistic models: The normal distribution and its geometric interpretations, Probabilistic models for categorical data, Discriminative learning by optimising conditional likelihood Probabilistic models with hidden variables. **Features:** Kinds of feature, Feature transformations, Feature construction and selection. Model ensembles: Bagging and random forests, Boosting

TEXT BOOKS:

1. Machine Learning: The art and science of algorithms that make sense of data, Peter Flach, Cambridge,**2012**.
2. Machine Learning, Tom M. Mitchell, MGH,2017.

REFERENCE BOOKS:

1. UnderstandingMachine Learning: From Theory to Algorithms, Shai Shalev-Shwartz, ShaiBenDavid, Cambridge,**2014**.
2. Machine Learning in Action, Peter Harington, **2012**, Cengage.

I M.TECH – I SEMESTER

		L	T	P	C
V18CTL01	**NOSQL Database Laboratory**	**0**	**0**	**2**	**1**

Course Outcomes

After successful completion of the course students should be able to:

1. Install and run MongoDb
2. Identify differences between relational and NoSQL database systems
3. Execute various operations in Mongo DB
4. Apply Mapreduce for problem solving
5. Know Column oriented databases

LIST OF EXPERIMENTS

1. Introduction to MongoDB and its Installation on Windows & Linux
2. Description of mongo Shell, Create database and show database
3. Commands for MongoDB and To study operations in MongoDB – Insert, Query, Update, Delete and Projection
4. Where Clause equivalent in MongoDB
5. To study operations in MongoDB – AND in MongoDB, OR in MongoDB, Limit Records and Sort Records. To study operations in MongoDB – Indexing, Advanced Indexing, Aggregation and Map Reduce.
6. Practice with 'macdonalds' collection data for document oriented database. Import restaurants collection and apply some queries to get specified output.
7. Simple Querying using simple select(row and column) and Hive functions
8. Advanced querying using table joins, sampling in hive and subqueries
9. Define an external Hive table and review the results
10. Column oriented databases study, queries and practices

I M.TECH – I SEMESTER

V18CTL02	ADVANCED DATA STRUCTURES AND ALGORITHM ANALYSIS LAB	L	T	P	C
		0	0	2	1

Course Outcomes:
After completion of this course, student will be able to:

1. Design and analyze simple linear and non linear data structures
2. Implement ADT for Data Structures
3. Implement algorithms using different types of technique.
4. Strengthen the ability to identify and apply the suitable data structure for the given real world problem

List of Experiments

Implement the following list of experiments using C++:

1. Write a program to implement single linked list, double linked list and circular linked list using ADT.
2. Implement stack and queue using ADT.
3. Implementation of Multitask in a Single Array
4. Implement evolution of expression
5. Implement AVL Trees operations and display the tree elements using any one non recursive traversing technique.
6. Construct a graph and implement BFS and DFS graph traversal techniques.
7. Construct a graph and implement Prims and Krushkals minimum spanning trees.
8. Implement single source and all pair shortest path algorithms.
9. Implement Merge sort and quick sort using divide and conquer technique
10. Implement I/o Knapsack Problem using greedy technique
11. Implement travelling sales person problem using back tracking.
12. Implement any algorithm using Branch and Bound technique.

I M.TECH – II SEMESTER

V18CTT07	DATA SCIENCE	L	T	P	C
		3	0	0	3

Course Outcomes:

After completion of this course, student will be able to:

1. Understand the process of data validation and its role in decision making
2. Understand, create, and modify analytic and exploratory algorithms operating over data. Verify and quantify the validity of hypothesis using data analytics.
3. Know the privacy and data protection legislation and the data scientist professional code and ethics.

UNIT-1: Introduction: What is Data Science? What roles exist in Data Science? Current landscape of perspectives. Define the workflow, tools and approaches data scientists use to analyze data. Define a problem and identify appropriate data sets using the data science workflow. Walkthrough the data science workflow using a case study.

UNIT-II: Statistics Fundamentals: Exploratory Data Analysis and the Data Science Process-analyze datasets using basic summary statistics: mean, median, mode, max, min, quartile, inter-quartile, range, variance, standard deviation and correlation.

UNIT-III: Data Visualization – scatter plots, scatter matrix, line graph, box blots, and histograms. Identify a normal distribution within a dataset using summary statistics and visualization. Causation vs. Correlation. Test a hypothesis within a sample case study. Validate your findings using statistical analysis.

UNIT-IV: Foundations of Data Modeling: Introduction Regression – data modelling and linear regression. Categorical variables versus Continuous variables. Build the linear regression/logistic regression model using a dataset. Fit model – regularization, bias and error metrics. Evaluate model fit using loss functions – MSE (Mean Square Error), RMSE (Root MSE), Mean Absolute Error(MAE). Apply different regression models based on fit and complexity. Evaluate model using metrics such as accuracy/error, Confusion matrix, ROC curve and Cross Validation.

UNIT-V:Dimensionality Reduction – perform dimensionality reduction using topic models such as PCA and SVD. Refine and extract data/information from sample datasets. Introduction to Classification - define classification model, apply k-NN, Naïve Classifier and Decision trees. Build the classification model using a dataset and evaluate.

TEXT BOOKS:

1. The Art of Data Science: A Guide for Anyone Who Works with Data, Roger D. Peng, Elizabeth Matsui, Lean Pub, **2015**.
2. Doing Data Science, Straight Talk from The Frontline, Cathy O'Neil and Rachel Schutt. O'Reilly. **2014**.
3. Data Science for Business: What You Need to Know about Data Mining and Data-analytic Thinking, Foster Provost and Tom Fawcett**. 2013**
4. Elements of Statistical Learning, Trevor Hastie, Robert Tibshirani and Jerome Friedman, Springer, **2009**.

REFERENCE BOOKS:

1. Mining of Massive Datasets, JureLeskovek, AnandRajaraman and Jeffrey Ullman. Cambridge University Press. **2014**.
2. Machine Learning: A Probabilistic Perspective.Kevin P. Murphy, MIT Press, **2013**.
3. Data Mining and Analysis: Fundamental Concepts and Algorithms, Mohammed J. Zaki and Wagner Miera Jr., Cambridge University Press. **2014**.
4. R Programming for Data Science, Roger D. Peng, LeanPub, **2015**.
5. Python for Data Science for Dummies, Luca Massaron and John Paul Mueller, John Wiley and Sons, **2015.**

I M.TECH – II SEMESTER

V18CTT08	Advanced Web Technologies	L	T	P	C
		3	0	0	3

Course Outcomes:

After completion of the course, the student will be able to:

1. Understand the current technologies in Internet world
2. Design interactive web pages using HTML & Style Sheets and design Individual Graphical User Interfaces
3. Acquire knowledge of XML fundamentals and usage of XML technology in electronic data Interchange and creation of desktop applications using swings and beans.
4. Know the fundamentals of client side scripting such as JavaScript and apply it for data validation.
5. Design and develop web based enterprise systems for the enterprises using technologies like JSP with database.
6. Implement client side programming using java script, CSS
7. Learn and implement advanced and current technologies like AJAX, JQuery, PHP, Servlets and JSP
8. Learn to implement web services

UNIT-I

HTML & CSS: Introduction **-** Elements, Tags, Attributes, Heading, Paragraph. Formatting, Link, Image, Table, List, Block, Form, Frame Layout, DHTML, Basic Web Page Development, CSS- Create Class Styles, Create ID Styles ,Span, Colors.HTML5 in brief.

JavaScript : Introduction **-** JavaScript in Web Pages, The Advantages of JavaScript Writing JavaScript into HTML; Building Up JavaScript Syntax; Basic Programming Techniques; Operators and Expressions in JavaScript; JavaScript Programming Constructs; Conditional Checking Functions in JavaScript, Dialog Boxes, Statements, comments, variable, comparison, condition, switch, loop, break. Object – string, array. Function, Errors, Validation. The JavaScript Document Object Model-Introduction (Instance, Hierarchy); The JavaScript Assisted Style Sheets DOM; Understanding Objects in HTML (Properties of HTML objects, Methods of HTML objects); Browser Objects, Handling Events Using JavaScript

UNIT-II

Extensible Markup Language (XML):- Brief Over View of XML – XML Document structure, XML namespaces, Defining structure in XML documents, Reuse of XML schemes, Document navigation and transformation, Tree, Syntax, Elements, Attributes, Validation, and Viewing. XHTML in brief

Installing and Configuring MySQL:- Current and Future Versions of MySQl , How to Get MySQL, Installing MySQL on Windows, Trouble Shooting your Installation, Basic Security Guidelines

UNIT-III

Advanced Dynamic Web Client Side Programming: AJAX-xml Http Request object-AJAX applications-AJAX frame work -java script libraries - JQuery-basics – event handling, DOM,AJAX-effects- jQuery UI Web design Frameworks: Responsive web design-overview on Twitter bootstrap-DoJo- YahooUI-Google web toolkit libraries-Applets-overview on javaFX applets

UNIT-IV

Server Side Programming with PHP: The Building blocks of PHP, Variables, Data Types, Operators and Expressions, Constants. Flow Control Functions in PHP: Switching Flow, Loops, Code Blocks and Browser Output.

Functions: What is function? Calling functions, Defining Functions. Variable Scope, more about arguments working with Arrays and Some Array-Related Functions.

Working with Objects: Creating Objects, Object Instance Working with Strings, Dates and Time: Formatting strings with PHP, Investigating Strings with PHP, Manipulating Strings with PHP, Using Date and Time Functions in PHP

Working with Forms: Creating Forms, Accessing Form Input with User defined Arrays, Combining HTML and PHP code on a single Page, Using Hidden Fields to save state, Redirecting the user, Sending Mail on Form Submission, and Working with File Uploads.

Learning basic SQL Commands: Learning the MySQL Data types, Learning the Table Creation Syntax, Using Insert Command, Using SELECT Command, Using WHERE in your Queries, Selecting from Multiple Tables, Using the UPDATE command to modify records, Using the DELETE Command, Frequently used string functions in MySQL, Using Date and Time Functions in MySQL.

Interacting with MySQL using PHP: MySQL Versus MySQLi Functions, Connecting to MySQL with PHP, Working with MySQL Data.

UNIT-V

Server Side Programming With Servlets and JSP: Web Servers and Servlets: Tomcat web server, Introduction to Servelets: Lifecycle of a Serverlet, JSDK, The Servelet API, The javax.servelet Package, Reading Servelet parameters, Reading Initialization parameters. The javax.servelet HTTP package, Handling Http Request & Responses, Using Cookies-Session Tracking, Security Issues, Introduction to JSP: The Anatomy of a JSP Page. JSP Application Design with MVC , JSP Application Development: Generating Dynamic Content, Using Scripting Elements Implicit JSP Objects, Conditional Processing Sharing Session and Application Data Memory Usage Considerations

TEXT BOOKS:

1. "*Java server programming java JavaEE5 Black Book*", Kogent Solutions Dreamtech Press, Inc, ISBN-13 9788177228359 ISBN-10 8177228358, 2008.
2. "*AJAX black book*", new edition, Kogent Solutions Inc, Dreamtech Press, ISBN:10-81-7722-838-2 ISBN:13-978-81-7722-838-063. Jonathan Chaffer, Karl Swedberg, "*Learning jQuery*", 3rd Edition , , ISBN 13: 9781849516549, 2011
3. Chris Bates,*Web Programming- building internet applications*, 2nd edition, WILEY, Dreamtech, 2006
4. Patrick Naughton and Herbert Schildt, The *complete Reference Java seventhEdition*,TMH, 2007
5. Hans Bergsten, Java *Server Pages*, SPD O'Reilly, 2000
6. Robert W.Sebesta,*Programming world wide web*,Pearson Education,4th edition,2010
7. Marty Hall and Larry Brown,*Servlets And Java Server Pages Volume 1: CORE Technologies,*Pearson,2003.
8. Patrick Naughton and Herbert Schildt, The *complete Reference Java2fifth Edition*, TMH,1999.
9. "Internet and world wide web – How to Program", Deitel & Deitel, Goldberg, Pearson Education, **4th Edition,2008**.

REFERENCE BOOKS:

1. Professional Java Server Programming,S.Allamaraju and othersApress (dreamtech), J2EE 1.3ed, **2007**.
2. Java Server Programming ,Ivan Bayross and others,The X Team,SPD, 2nd Edition.
3. Web Warrior Guide to Web Programmming-Bai/Ekedaw-Thomas ,1st Edition.
4. Beginning Web Programming-Jon Duckett WROX, August 2004.
5. Java Server Pages, Pekowsky, Pearson, 2nd Edition.
6. Java Script,D.Flanagan,O'Reilly,6th Edition.

I M.TECH – II SEMESTER

V18CTT09	CLOUD COMPUTING	L	T	P	C
		3	0	0	3

Course Outcomes are:

After completion of the course the student will be able to

1. Able to understand about Cloud Computing Platforms and Technologies.
2. Students will be aware about Architecture and Open Challenges in Cloud Computing.
3. Students will be able to monitor and manage cloud computing applications.
4. Students will be able to describe the mechanisms needed to harness Cloud Computing in their own respective endeavors.
5. Students will be able to solve case studies related to Cloud Computing.

UNIT-I

Overview of Computing Paradigm: Recent trends in Computing Grid Computing, Cluster Computing, Distributed Computing, Utility Computing, Cloud Computing Evolution of cloud computing Business driver for adopting cloud computing

Introduction to Cloud Computing Cloud Computing (NIST Model) Introduction to Cloud Computing, History of Cloud Computing, Cloud service providers Properties, Characteristics &Disadvantages Pros and Cons of Cloud Computing, Benefits of Cloud Computing, Cloud computing vs. Cluster computing vs. Grid computing Role of Open Standards

UNIT-II

Cloud Computing Architecture Cloud computing stack Comparison with traditional computing architecture (client/server), Services provided at various levels, How Cloud Computing Works, Role of Networks in Cloud computing, protocols used, Role of Web services Service Models (XaaS) Infrastructure as a Service(IaaS) , Platform as a Service(PaaS), Software as a Service(SaaS) Deployment Models Public cloud, Private cloud, Hybrid cloud, Community cloud.

UNIT-III

Infrastructure as a Service(IaaS) Introduction to IaaS IaaS definition, Introduction to virtualization, Different approaches to virtualization, Hypervisors, Machine Image, Virtual Machine(VM) Resource Virtualization Server, Storage, Network Virtual Machine (resource) provisioning and manageability, storage as a service, Data storage in cloud computing(storage as a service) Examples Amazon EC2 Renting, EC2 Compute Unit, Platform and Storage, pricing, customers Eucalyptus

Platform as a Service(PaaS) Introduction to PaaS What is PaaS, Service Oriented Architecture (SOA) Cloud Platform and Management Computation Storage Examples Google App Engine Microsoft Azure

Software as a Service (PaaS) Introduction to SaaS, Web services, Web 2.0, Web OS, Case Study on SaaS

UNIT-IV

Service Management in Cloud Computing Service Level Agreements(SLAs), Billing & Accounting, Comparing Scaling Hardware: Traditional vs. Cloud, Economics of scaling: Benefitting enormously Managing Data Looking at Data, Scalability & Cloud Services Database & Data Stores in Cloud Large Scale Data Processing

UNIT-V

Cloud Security Infrastructure Security Network level security, Host level security, Application level security Data security and Storage Data privacy and security Issues, Jurisdictional issues raised by Data location Identity & Access Management, Access Control, Trust, Reputation, Risk, Authentication in cloud computing, Client access in cloud, Cloud contracting Model, Commercial and business considerations

TEXT BOOKS:

1. Cloud Computing Bible, Barrie Sosinsky, Wiley-India, **2010**
2. Cloud Computing: Principles and Paradigms, Editors: Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, Wile, **2011.**
3. Cloud Computing: Principles, Systems and Applications, Editors: Nikos Antonopoulos, Lee Gillam, Springer, **2012.**
4. Cloud Security: A Comprehensive Guide to Secure Cloud Computing, Ronald L. Krutz, Russell Dean Vines, Wiley-India**, 2010**.
5. Gautam Shroff, "*Enterprise Cloud Computing Technology Architecture Applications*", Cambridge University Press; 1 edition, [ISBN: 978-0521137355**], 2010**.
6. Toby Velte, Anthony Velte, Robert Elsenpeter, "*Cloud Computing, A Practical Approach"* McGraw-Hill Osborne Media; 1 edition [ISBN: 0071626948], **2009.**
7. Dimitris N. Chorafas, "*Cloud Computing Strategies"* CRC Press; 1 edition [ISBN: 1439834539],**2010**.
8. Cloud Computing for Dummies by Judith Hurwitz, R.Bloor, M.Kanfman, F.Halper (Wiley India Edition)

REFERENCE BOOKS:

1. Enterprise Cloud Computing by Gautam Shroff,Cambridge,**2010.**
2. Rajkumar Buyya, Christian Vecchiola and S. Thamarai Selvi, Mastering Cloud Computing, published by McGraw Hill Publication (India) Private Limited, 2013 (ISBN 978-1-25-902995-0).
3. John W. Rittinghouse, James F. Ransome, Cloud Computing implementation, management and security, CRC Press, Taylor & Francis group, 2010.
4. Anthony T.velte, Toby J.velte Robert Elsenpeter, Cloud computing a practical approach, Tata Mc Graw Hill edition, 2010.

I M.TECH – II SEMESTER

V18CTT10	INTERNET OF THINGS	L	T	P	C
		3	0	0	3

Course Outcomes:
After completion of this course, student will be able to:

1. Demonstrate knowledge and understanding of the security and ethical issues of the Internet of Things
2. Conceptually identify vulnerabilities, including recent attacks, involving the Internet of Things
3. Develop critical thinking skills
4. Compare and contrast the threat environment based on industry and/or device type

UNIT – I: The Internet of Things: An Overview of Internet of things,Internet of Things Technology, behind IoTs Sources of the IoTs, M2M Communication, Examples OF IoTs, Design Principles For Connected Devices

UNIT – II: Business Models for Business Processes in the Internet of Things ,IoT/M2M systems LAYERS AND designs standardizations ,Modified OSI Stack for the IoT/M2M Systems ,ETSI M2M domains and High-level capabilities ,Communication Technologies, Data Enrichment and Consolidation and Device Management Gateway Ease of designing and affordability

UNIT – III: Design Principles for the Web Connectivity for connected-Devices, Web Communication protocols for Connected Devices, Message Communication protocols for Connected Devices, Web Connectivity for connected-Devices.

UNIT – IV: Internet Connectivity Principles, Internet connectivity, Application Layer Protocols: HTTP, HTTPS, FTP, Telnet.

UNIT – V: Data Acquiring, Organizing and Analytics in IoT/M2M, Applications/Services/Business Processes, IOT/M2M Data Acquiring and Storage, Business Models for Business Processes in the Internet Of Things, Organizing Data, Transactions, Business Processes, Integration and Enterprise Systems.

TEXT BOOKS:

1. Internet of Things: Architecture, Design Principles And Applications, Rajkamal, McGraw Hill Higher Education,**2017**.
2. Internet of Things, A.Bahgya and V.Madisetti, Univesity Press, **2015.**

REFERENCES

1. Designing the Internet of Things, Adrian McEwen and Hakim Cassimally, Wiley,**2013.**
2. Getting Started with the Internet of Things CunoPfister , Oreilly,May 2011.

I M.TECH – II SEMESTER

V18CTT11	CYBER SECURITY (Elective-I)	L	T	P	C
		3	0	0	3

Course Outcomes:
After completion of this course, student will be able to:

1. Understand the broad set of technical, social & political aspects of Cyber Security.
2. Appreciate the vulnerabilities and threats posed by criminals, terrorist and nation states to national infrastructure.
3. Understand the nature of secure software development, operating systems and data base design.
4. Recognized the role security management plays in cyber security defense.
5. Understand the security management methods to maintain security protection.
6. Understand the legal and social issues at play in developing solutions

UNIT-I: Systems Vulnerability Scanning: Overview of vulnerability scanning, Open Port / Service Identification, Banner /Version Check, Traffic Probe, Vulnerability Probe, Vulnerability examples, OpenVAS, Metasploit. Networks Vulnerability Scanning - Netcat, Socat, understanding Port and Services tools - Datapipe, Fpipe, WinRelay, Network Reconnaissance Nmap, THC-Amap and System tools. Network Sniffers and Injection tools – Tcpdump and Windump, Wireshark, Ettercap, Hping Kismet

UNIT – II: Network Defense tools: Firewalls and Packet Filters: Firewall Basics, Packet Filter Vs Firewall, How a Firewall Protects a Network, Packet Characteristic to Filter, Stateless Vs Stateful Firewalls, Network Address Translation (NAT) and Port Forwarding, the basic of Virtual Private Networks, Linux Firewall, Windows Firewall, Snort: Introduction Detection System.

UNIT – III: Web Application Tools: Scanning for web vulnerabilities tools: Nikto, W3af, HTTP utilities - Curl, Open SSL and Stunnel, Application Inspection tools – Zed Attack Proxy, Sqlmap. DVWA, Webgoat, Password Cracking and Brute-Force Tools – John the Ripper, L0htcrack, Pwdump, HTC-Hydra

UNIT – IV:Introduction to Cyber Crime and law: Cyber Crimes, Types of Cybercrime, Hacking, Attack vectors, Cyberspace and Criminal Behavior, Clarification of Terms, Traditional Problems Associated with Computer Crime, Introduction to Incident Response, Digital Forensics, Computer Language, Network Language, Realms of the Cyber world, A Brief History of the Internet, Recognizing and Defining Computer Crime, Contemporary Crimes, Computers as Targets, Contaminants and Destruction of Data, Indian IT ACT 2000.

UNIT – V:Introduction to Cyber Crime Investigation: Firewalls and Packet Filters, password Cracking,Keyloggers and Spyware, Virus and Warms, Trojan and backdoors, Steganography, DOS and DDOS attack, SQL injection, Buffer Overflow, Attack on wireless Networks.

TEXT BOOKS:

1. Anti-Hacker Tool Kit (Indian Edition) by Mike Shema, Publication Mc Graw Hill, **Fourth Edition,2014.**
2. Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by Nina Godbole and Sunit Belpure, Publication Wiley, **First Edition, 2011.**

REFERENCE BOOKS:

1. The Official CHFI Study Guide for Computer Hacking Forensic Investigator by Dave Kleiman,**First Edition,2007.**
2. CISSP Study Guide**, 6th Edition** by James M. Stewart

I M.TECH – II SEMESTER

V18CTT12	ARTIFICIAL INTELLIGENCE (Elective-I)	L	T	P	C
		3	0	0	3

Course Outcomes:
After completion of the course, the student will be able to:

1. Describe Artificial Intelligence Techniques.
2. Illustrate Knowledge Representation in AI
3. Explain the concepts of planning and learning in AI

UNIT – I: Artificial Intelligence Introduction: The AI Problems, AI Technique, Defining the Problem as a State Space Search, Production Systems, Problem Characteristics, Production System Characteristics, Issues in the Design of Search Programs.

UNIT –II: Heuristic Search Techniques: Generate and Test, Hill Climbing, Best First Approach, Problem Reduction, Constraint Satisfaction, Means-Ends analysis.

UNIT –III: Knowledge Representation using Predicate Logic and Rules: Representing Simple Facts in Logic, Representing Instance and ISA Relationships, Computable Functions and Predicates, Resolution, Natural Deduction, Logic Programming, Forward Versus Backward Reasoning, Matching, Control Knowledge.

UNIT –IV: Planning: The Blocks World Example, Components of a Planning System, Goal Stack Planning, Nonlinear planning using constraint posting, Hierarchical Planning, Reactive Systems.

UNIT –V: Learning: Rote Learning, Learning by taking advice, Learning in problem solving, Learning from examples, Explanation Based Learning, Discovery, Analogy, Formal Learning Theory.

TEXTBOOK:

1. Artificial Intelligence, Elaine Rich, Kevin Knight, Shivashankar B Nair, Third Edition, Tata McGraw Hill Education Private Limited., **2009**

REFERENCES:

1. Artificial intelligence A modern Approach **, 3rd Edition**, Stuart Russel, Peter Norvig, Pearson Education.
2. Artificial Intelligence, A new Synthesis, Nils J Nilsson, Elsevier,**1st Edition, 1997**.

I M.TECH – II SEMESTER

V18CTT13	BIO INFORMATICS (Elective-I)	L	T	P	C
		3	0	0	3

Outcomes:

After completion of the course the student will be able to

1. **Broad Understanding of Biology**: Students will interpret relationships among living things and analyze and solve biological problems, from the molecular to ecosystem level using basic biological concepts, grounded in foundational theories."
2. **Computer Programming**: Students will create computer programs that facilitate bioinformatics.
3. The students will be able to describe the contents and properties of the most important bioinformatics databases, perform text- and sequence-based searches, and analyze and discuss the results in light of molecular biological knowledge
4. The students will be able to explain the major steps in pairwise and multiple sequence alignment, explain the principle for, and execute Pairwise sequence alignment by dynamic programming

UNIT-I: Basic Biology: What is life? The unity and the diversity of living things, Prokaryotes and Eukaryotes, Yeast and People, Evolutionary time and relatedness, Living parts: Tissues, cells, compartments and organelles, Central dogma of molecular biology, Concept of DNA, RNA, Protein and metabolic pathway.

Bio Informatics: Introduction, What is Bioinformatics? Recent challenges in Bioinformatics, Sequencing, Biological sequence/structure, Genome Projects, Pattern recognition an prediction

UNIT-II: Biological databases: Their needs and challenges. Example of different biological databases – sequence, structure, function, micro-array, pathway, etc, Primary sequence databases, Protein Sequence databases, Secondary databases, Protein pattern databases, and Structure classification databases, Genome Information Resources DNA sequence databases, specialized genomic resources

UNIT-III : Sequence Analysis: Importance of DNA analysis, Gene structure and DNA sequences, Features of DNA sequence analysis, EST (Expressed Sequence Tag) searches, Gene hunting, Profile of a cell, EST analysis, Effects of EST data on DNA databases.**Theory and Tools:** - Pairwise alignment – Different local and global search alignment, Heuristic searches (like BLAST) applicable to search against database, Multiple alignment algorithms, Whole genome comparison, Database searching, Alphabets and complexity, Algorithm and programs, Comparing two sequences, sub-sequences, Identity and similarity, The Dotplot, Local and global similarity, different alignment techniques, Dynamic Programming, Pair wise database searching.

UNIT-IV:Walk through the genome: Prediction of regulatory motifs, Operon, Gene, splices site, etc.

Markov models: Hidden Markov models – The evaluation, decoding and estimation problem and the algorithms. Application in sequence analysis

UNIT-V:Molecular phylogeny: maximum Parsimony, distance Matrix and maximum likelihood methods. Concepts of adaptive evolution.**Application of graph theory in Biology**: Biochemical Pathway, Protein-protein interaction network, Regulatory network and their analysis.

TEXT BOOKS:

1. Bioinformatics: Sequence, Structure and Databanks: A Practical Approach (The Practical Approach Series, 236), Des Higgins (Editor), Willie Taylor. **1st edition, October 2000, Oxford University Press. ISBN: 978-0199637904.**
2. Bioinformatics: Sequence and Genome Analysis, David W. Mount. **2nd edition, June2004**, Cold spring harbor laboratory press. ISBN: 978-0879697129
3. Biological Sequence Analysis: Probabilistic Models of Proteins and Nucleic acids, R. Durbin, S.R. Eddy, A. Krogh and G. Mitchison, **1st Edition**.
4. Introduction to Bioinformatics, by T K Attwood & D J Parry-Smith **A**ddison Wesley Longman ,**1999**.
5. Bioinformatics - A Beginner's Guide by Jean-Michel Claveriw, Cerdric Notredame, WILEY dreamlech India Pvt. Ltd, **2nd Edition,2006.**

REFERENCE BOOKS:

1. Introduction to Bioinformatics by Arthur.Lesk OXFORD publishers ,**2014.**
2. Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins, Second Edition, Andreas D. Baxevanis, B. F. Francis Ouellette. **3nd edition, October 2004**, A John Wiley & Sons, Inc., Publication. ISBN: 978-0471478782.

I M.TECH – II SEMESTER

V18CTT14	WIRELESS SENSOR NETWORKS (Elective-I)	L	T	P	C
		3	0	0	3

Course Outcomes:
After successful completion of this course, the student will be able to:

1. Identify the applications and challenges of MANETs
2. Explain Ad-hoc network routing protocols
3. Describe Broadcasting, Multicasting and Geocasting Routing Protocols
4. Describe and Discriminate Wireless LANs, Wireless PANs & Wireless Mesh Networks

UNIT-I: Introduction: Introduction to MANETs, Applications of MANETs, Challenges

UNIT-II: Routing in Ad hoc networks: Topology-Based versus Position Based Approaches, Topology-Based routing Protocols, Position-Based Routing, Other Routing Protocols

UNIT-III: Broadcasting, Multicasting and Geocasting: The Broadcasting Storm, Broadcasting in a MANET, Multicasting, Issues in providing Multicast in a MANET, Geocasting, Geocast Routing Protocols

UNIT-IV: Wireless LANs: Why Wireless LANs, Transmission Techniques, Medium Access Control Protocol Issues, The IEEE 802.11 Standard for Wireless LANs, Enhancement to IEEE 802.1 MAC

UNIT-V: Wireless PANs & Wireless Mesh Networks: Why Wireless PANs, The Bluetooth Technology, Enhancements to Bluetooth, Wireless Mesh Network Architecture, MR Deployment, IGW Deployment, Channel Assignment

TEXT BOOK:

1. Ad hoc and Sensor Networks Theory and Applications, Carlos de Morais Cordeiro, Dharma Prakash Agarwal, Second Edition, World Scientific, **2011**

REFERENCE BOOKS:

1. Adhoc Wireless Networks — Architectures and Protocols, C.Siva Ram Murthy, B.S.Murthy, Pearson Education, **2004**
2. Ad hoc Networking, Charles E.Perkins, Pearson Education, 2001

I M.TECH – II SEMESTER

V18CTT15	IMAGE PROCESSING (Elective-II)	L	T	P	C
		3	0	0	3

Course Outcomes:
After completion of this course, student will be able to:
1. Understand the basics of image processing.
2. Understand 2 D Transformations.
3. Learn the Digital image properties.
4. Acquire the knowledge of mathematical concepts for application on image morphing.
5. Be able to conduct independent study and analysis of image processing problems and techniques.

UNIT-I: Introduction: Applications of Computer Graphics and Image Processing, Fundamentals on Pixel concepts, effect of Aliasing and Jaggles, Advantages of high resolution systems DDA line algorithms: Bresenhams line and circle derivations and algorithms.

UNIT-II: 2-D Transformations: Translations, Scaling, rotation, reflection and shear transformations, Homogeneous coordinates, Composite Transformations- Reflection about an arbitrary line; Windowing and clipping, viewing transformations, Cohen- Sutherland clipping algorithm.

UNIT-III: Digital Image Properties: Metric and topological properties of Digital Images, Histogram, entropy, Visual Perception, Image Quality, Color perceived by humans, Color Spaces, Palette Images, color Constancy Color Images: Pixel brightness transformations, Local Preprocessing, image smoothing, Edge detectors, Robert Operators, Laplace, Prewitt, Sobel, Fri-chen, Canny Edge detection.

UNIT-IV: Mathematical Morphology: Basic Mathematical Concepts, Binary dilation and Erosion, Opening and closing, Gray Scale dilation and erosion, Skeleton, Thinning , Thickening Ultimate erosion, Geodesic transformations, Morphology and reconstruction, Morphological Segmentation.

UNIT-V: Segmentation: Threshold detection methods, Optimal Thresholding, Edge based SegmentationEdge image thresholding, Edge relaxation, Border tracing, Hough Transforms, Region based segmentation: Region Mergingm Region Splitting, Splitting and Merging, Watershed Segmentation. Image Data Compression: Image data Properties, Discrete Image Transformations in data compression, Discrete Cosine and Wavelet Transforms, Types of DWT and merits; Predicative Compression methods, Hierarchical and Progressive Compression methods, Comparison of Compression methods, JPEG- MPEG Image Compression methods.

TEXT BOOKS:

1. Computer Graphics C Version, Donald Hearn, M Paulli Baker, Pearson Education India, **1997, Second Edition** (Unit I and Unit II)
2. Image Processing, Analysis and Machine Vision, Millan Sonka, Vaclov Halvoc, Roger Boyle, Cengage Learning, 3ed, (Unit III, Unit IV, Unit V and Unit VI)

REFERENCE BOOKS:

1. Computer & Machine Vision, Theory, Algorithms, Practicles, E R Davies, Elsevier, **4ed**
2. Digital Image Processing with MATLAB and LABVIEW, Vipul Singh, Elsevier,2012.

I M.TECH – II SEMESTER

V18CTT16	**PARALLEL ALGORITHMS (Elective-II)**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Outcome:

At the end of this course the student be able to

1. Understand the various application areas.
2. Understand the Efficiency of parallel algorithms,
3. Understand parallel sorting network
4. Understand parallel searching algorithm,

UNIT-I: Introduction:

Computational demand in various application areas, advent of parallel processing, terminology-pipelining, Data parallelism and control parallelism-Amdahl's law.

UNIT-II: Scheduling:

Organizational features of Processor Arrays, Multi processors and multi-computers. Mapping and scheduling aspects of algorithms. Mapping into meshes and hyper cubes-Load balancing-List scheduling algorithm Coffman-graham scheduling algorithm for parallel processors.

UNIT-III: Algorithms:

Elementary Parallel algorithms on SIMD and MIMD machines, Analysis of these algorithms. Matrix Multiplication algorithms on SIMD and MIMD models. Fast Fourier Transform algorithms. Implementation on Hyper cube architectures. Solving linear file -system of equations, parallelizing aspects of sequential methods back substitution and Tri diagonal.

UNIT-IV: Sorting:

Parallel sorting methods, Odd-even transposition Sorting on processor arrays, Biotonic, merge sort on shuffle - exchange ID , Array processor,2D-Mesh processor and Hypercube Processor Array. Parallel Quick-sort on Multi processors. Hyper Quick sort on hypercube multi computers. Parallel search operations. Ellis algorithm and Manber and ladner's Algorithms for dictionary operations.

UNIT-V: Searching:

Parallel algorithms for Graph searching, All Pairs shortest paths and inimum cost spanning tree. Parallelization aspects of combinatorial search algorithms with Focus on Branch and Bound Methods and Alpha-beta Search methods.

TEXTBOOKS:

1. Parallel computing theory and practice, Michel J.Quinn,**2002,Second Edition.**

2. Programming Parallel Algorithms, Guy E. Blelloch, Communications of the ACM,**1996**.

I M.TECH – II SEMESTER

V18CTT17	**MOBILE COMPUTING (Elective-II)**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Outcomes:
After completion of this course, student will be able to:
1. Describe the basic concepts and principles in mobile computing.
2. Understand the concept of Wireless LANs, PAN, Mobile Networks, and Sensor Networks.
3. Understand positioning techniques and location based services and applications.
4. Describe the important issues and concerns on security and privacy.

UNIT–I: Introduction to Mobile Communications and Computing: Introduction to cellular concept, Frequency Reuse, Handoff, GSM: Mobile services, System architecture, Radio interface, Protocols, Localization and calling, Handover, Security, and New data services, Introduction to mobile computing, novel applications, limitations, and architecture.

UNIT - II: **Wireless LANs:** Introduction, Advantages and Disadvantages of WLANs, WLAN Topologies, Introduction to Wireless Local Area Network standard IEEE 802.11, Comparison of IEEE 802.11a, b, g and n standards, Wireless PANs, Hiper LAN, Wireless Local Loop

UNIT - III: **Wireless Networking:** Introduction, Various generations of wireless networks, Fixed network transmission hierarchy, Differences in wireless and fixed telephone networks, Traffic routing in wireless networks, WAN link connection technologies, X.25 protocol, Frame Relay, ATM, Virtual private networks, Wireless data services, Common channel signaling, Various networks for connecting to the internet.

UNIT - IV: **Database Issues:** Data management issues, data replication for mobile computers, adaptive clustering for mobile wireless networks, file system, disconnected operations.

UNIT - V: **Data Dissemination:** Communications asymmetry, classification of new data delivery mechanisms, push-based mechanisms, pull-based mechanisms, hybrid mechanisms, selective tuning (indexing) techniques.

TEXT BOOKS:

1. Gottapu Sasibhushana Rao, “Mobile Cellular Communication”, Pearson Education, **First Edition, 2013.**
2. Stojmenovic and Cacute, “Handbook of Wireless Networks and Mobile Computing”, **Wiley, 2002.**

REFERENCE BOOKS:

1. Reza Behravanfar, “Mobile Computing Principles: Designing and Developing Mobile Applications with UML and XML”, ISBN: 0521817331, Cambridge University Press, **October 2004.**
2. Adelstein, Frank, Gupta, Sandeep KS, Richard III, Golden , Schwiebert, Loren, “Fundamentals of Mobile and Pervasive Computing”, ISBN: 0071412379, McGraw-Hill Professional, **2005**.
3. Hansmann, Merk, Nicklous, Stober, “Principles of Mobile Computing”, Springer, second edition, **2003.**
4. Martyn Mallick, “Mobile and Wireless Design Essentials”, Wiley DreamTech, **2003.**

I M.TECH – II SEMESTER

V18CTT18	GRID COMPUTING (Elective-II)	L	T	P	C
		3	0	0	3

Course Outcomes:

After completion of this course, student will be able to:

1. Understand the need for and evolution of Grids in the context of processor- and data-intensive applications
2. Be familiar with the fundamental components of Grid environments, such as authentication, authorization, resource access, and resource discovery
3. Be able to design and implement Grid computing.
4. Be able to justify the applicability, or non-applicability, of Grid technologies for a specific application.

UNIT - I: **Introduction:** Introduction to Parallel, Distributed Computing, Cluster Computing and Grid Computing, Characterization of Grids, Organizations and their Roles, Grid Computing Road Maps.

UNIT - II: **Architecture:** Architecture of Grid and Grid Computing, Review of Web Services-OGSA-WSRF.

UNIT - III: **Grid Monitoring:** Grid Monitoring Architecture (GMA) - An Overview of Grid Monitoring Systems- GridICE - JAMM -MDS-Network Weather Service-R-GMA-Other Monitoring Systems- Ganglia and GridM **Grid Middleware:** List of globally available Middlewares - Case Studies-Recent version of Globus Toolkit and gLite - Architecture, Components and Features.

UNIT - IV: **Data Management And Grid Portals:** Data Management, Categories and Origins of Structured Data, Data Management Challenges, Architectural Approaches, Collective Data Management Services, Federation Services, Grid Portals, First-Generation Grid Portals, Second Generation Grid Portals.

UNIT - V: **Semantic Grid and Autonomic Computing:** Meta data and Ontology in the Semantic Web, Semantic Web services, Layered structure of the Semantic Grid, Semantic Grid activities, Autonomic Computing **Grid Security and Resource Management:** Grid Security, A Brief Security Primer, PKI-X509 Certificates, Grid Security, Scheduling and Resource Management, Scheduling Paradigms, Working principles of Scheduling, A Review of Condor, SGE, PBS and LSF - Grid Scheduling with QoS.

TEXT BOOKS:

1. Grid Computing, Joshy Joseph and Craig Fellenstein, Pearson Education **2004.**
2. The Grid Core Technologies, Maozhen Li, Mark Baker, John Wiley and Sons, **2005.**

REFERENCE BOOKS:

1. The Grid 2 - Blueprint for a New Computing Infrastructure, Ian Foster and Carl Kesselman, Morgan Kaufman - **2004.**
2. Grid Computing: Making the Global Infrastructure a reality, Fran Berman, Geoffrey Fox, Anthony J.G. Hey, John Wiley and sons, **2003**.

I M.TECH – II SEMESTER

V18CTL03	DATA SCIENCE LAB	L	T	P	C
		0	0	2	1

Course Outcomes:

At the end of the course, the student will be able to:

1. Understand the Concepts of R and Programming.
2. Understand the mathematics from a numerical point of view, including the application of these concepts root-finding, numerical integration and optimization
3. Understand the purpose for random variable and expectations required to understand simulations
4. Implement the Monte carlo and Stochastic Modelling
5. Work effectively in teams on data science projects using R

LIST OF EXPERIMENTS

1. R Environment Setup & R as calculating environment
2. R Basic programming, Input and output
3. Programming with functions & Sophisticated Data structures
4. Better Graphics using Graphics parameters
5. Frames and environments & Object –oriented Programming
6. Numerical Accuracy and program efficiency
7. Probability & Statistics: The law of Total probability
8. Simulation: Monte Carlo Integration – Hit and miss method
9. Data Modelling: Linear and Multiple Regression Models

Case Study

Consider the data set of Ozone levels in United States for the year 2014 and do the following analysis

1. Formulate your questions
2. Read in your data
3. Check the packaging
4. Look at the top and the bottom of your data
5. Check your "n" s
6. Validate with at least one external data source
7. Make a plot
8. Follow up

TEXT BOOKS:

1. Introduction to Scientific Programming and Simulation Using R, Owen Jones, Robert Maillardet and Andrew Robinson, Second Edition, CRC Press, 2014
2. The Art of Data Science: A Guide for Anyone Who Works with Data, Roger D. Peng, Elizabeth Matsui, LeanPub, 2015.
3. Data Science for Business: What You Need to Know about Data Mining and Data - analytic Thinking, Foster Provost and Tom Fawcett. 2013
4. Elements of Statistical Learning, Trevor Hastie, Robert Tibshirani and Jerome Friedman, Springer, 2009.

REFERENCE BOOKS:

1. Mining of Massive Datasets, JureLeskovek, Anand Rajaraman and Jeffrey Ullman, Cambridge University Press. 2014.
2. Machine Learning: A Probabilistic Perspective.Kevin P. Murphy, MIT Press, 2013.
3. Avrim Blum, John Hopcroft and Ravindran Kannan. Foundations of Data Science.
4. Data Mining and Analysis: Fundamental Concepts and Algorithms, Mohammed J. Zaki and Wagner Miera Jr., Cambridge University Press. 2014.
5. R Programming for Data Science, Roger D. Peng, LeanPub, 2015.
6. Python for Data Science for Dummies, Luca Massaron and John Paul Mueller, John Wiley and Sons, 2015.

I M.TECH – II SEMESTER

V18CTL04	ADVANCED WEB TECHNOLOGIES LAB	L	T	P	C
		0	0	2	1

List of Experiments

1. a) A Simple HTML home page provides links to move to other pages like hobbies, educational info, personal info etc.
   b) A HTML program to illustrate the use of frame and frameset tags of HTML.
   c) A HTML Program which use a HTML controls to create a student information form to collect student's information like name, address, phone, email, sex, birth date, hobbies etc.
2. a) Create a webpage which displays "Hello World" with font size 20 pixels, bold format, in "Times New Roman" font and green in colour using inline CSS, embedded CSS and external CSS.
   b) Create a webpage which displays the class time table and apply the following effects on the table:

➔ For the table header apply *blue* as the background colour and *white* for the colour of the text in the table header.
➔ Display *day names* (Mon, Tue etc...) in bold format with the first letter in the day name in uppercase.
➔ Display *lunch* slightly in bigger font other than the remaining text.

   c) Create a webpage to manage personal details like name, class, qualifications, photo, address etc., using tables and other suitable HTML tags. Apply the following style information:

➔ Display the heading of the page in *Times New Roman* font and with 24px size.
➔ Align all the field names like Name, Class, Photo etc to *right* in the table.
➔ Apply *light blue* as background colour for the left side cells in the table which contains field names like Name, Class etc...
➔ Also display your college logo as background image in the top right position of the web page.

   d) Create a web page containing two images, where one image overlaps another image by using the *z-index* CSS property.

1. a) A HTML Program which demonstrates loops like for loop, do while, while in java script.
   b) A HTML Program which demonstrates the use of functions in java script.
   c) A HTML Program which demonstrates various events like onclick, ondbclick, onfocus, onblur, onchange, onmouseover, onmouseover, window event, onload, onunload event.
   d) A HTML Program to create various functions and sub routines to validate the data entered by user in form.
2. a) Create a program to illustrate the concept of associative array in PHP.
   b) Create PHP program to implement the concept of Session management.
   c) Create a PHP program to display student information in webpage. Student's data is stored in My SQL database.
   d) Create a PHP program to insert student information from HTML form. Student's data is stored in My SQL database.

3. a) Create a well-formed XML document.
   b) Create a valid XML document using DTD.
   c) Create a valid XML document using XML Schema.
   d) Create a XML document which contains details of cars and display the same as a table using XSLT.
   e) Write a Java program to parse the XML document containing car details using SAXAPI.

4. a) Create a servlet to display "Hello World" in the browser.
   b) Create a servlet to store email-id as an initialization parameter and print the same email-id by reading the initialization parameter from the web.xml file.
   c) Create a servlet to retrieve name and branch details from a html page and print the same using the servlet.
   e) Create a HTML page which accepts book id, book name and book price and a submit button. When the user clicks the submit button, all the values assigned to the previous text fields must be stored in a session object and the control forwards to another servlet where the values stored in the session are retrieved and displayed.
5. a) Create a JSP page to display "Hello World" in the browser.
   b) Create a JSP page to store email-id as an initialization parameter and print the same email-id by reading the initialization parameter from the web.xml file.
   c) Create a JSP page to retrieve name and branch details from a html page and print the same using a servlet.
   d) Create a HTML page which accepts book id, book name and book price and a submit button. When the user clicks the submit button, all the values assigned to the previous text fields must be stored in a session object and the control forwards to a JSP page where the values stored in the session are retrieved and displayed.
6. Create a HTML page which accepts student regd.no. and prints the results of that student by retrieving the results from the database. Use AJAX to display the "please wait..." while the server is processing the request and print the result of the student when the server returns the result. Server resource can be either servlet or JSP or PHP

Reference Books:

1. "*Java server programming java JavaEE5 Black Book*", Kogent Solutions Dreamtech Press, Inc, ISBN-13 9788177228359 ISBN-10 8177228358, 2008.
2. "AJAX black book", new edition, Kogent Solutions Inc, Dreamtech Press, ISBN:10-81-7722- 838-2 ISBN:13-978-81-7722-838-06
3. Jonathan Chaffer, Karl Swedberg, "Learning jQuery", 3rd Edition, ISBN 13: 9781849516549, 2011
4. Chris Bates,Web Programming- building internet applications, 2nd edition, WILEY Dreamtech, 2006
5. Patrick Naughton and Herbert Schildt, The complete Reference Java seventhEdition,TMH, 2007
6. Hans Bergsten, Java Server Pages, SPD O'Reilly, 2000
7. Java Server Programming ,Ivan Bayross and others,The X Team,SPD
8. Web Warrior Guide to Web Programmming-Bai/Ekedaw-Thomas
9. Beginning Web Programming-Jon Duckett WROX.
10. Java Server Pages, Pekowsky, Pearson.
11. Java Script, D.Flanagan, O'Reilly, SPD.

Minutes of the 2nd Academic Council meeting on 01/07/2018
Item No: 9
Annexure No: VI

Academic Rules and Regulations for MBA Programme

(Effective for the students admitted into first year from the academic year 2018-2019)

The MBA Degree of Sri Vasavi Engineering College (Autonomous), Pedatadepalli, Tadepalligudem, under Jawaharlal Nehru Technological University Kakinada, Kakinada shall be conferred upon candidates who are admitted to the program and fulfill all the requirements for the award of the Degree.

1.0 ELIGIBILITY FOR ADMISSIONS:

Admission to the above program shall be made subject to eligibility criteria, qualification and specialization as prescribed from time to time. Admissions shall be made on the basis of merit/rank obtained by the candidates at the Qualifying Examination/Entrance Test conducted by the University or on the basis of any other order of merit as approved by the University, subject to reservations as laid down by the Govt. from time to time.

2.1 ADMISSIONS UNDER SPECIAL CASES:

These may arise in the following situations.

7. When a student gets detained due to academic regulations and re-joins the college to complete the programme in a new regulation.
8. When a student discontinues for some time and re-joins the college to complete the programme in a new regulation.
9. When a student seeks transfer from other colleges to SVEC and intends to pursue MBA programme.

   These admissions may be permitted by the College Academic Council as per the norms stipulated by the statutory bodies and the Government of Andhra Pradesh from time-to-time.

   In all such cases for admission if necessary permissions from the statutory bodies are to be obtained and the programme of study at the college will be governed by the transitory regulations stipulated in **11.0.**

   An under taking from the students is to be taken at the time of admission stating that they would abide by the transitory regulations specified by the authorities if there is any change in the regulations.

2.0 AWARD OF MBA DEGREE:

a) A Student shall be declared eligible for the award of MBA degree, if he pursues a course of study and completes it successfully in not less than two academic years and not more than four academic years.

b) A Student, who fails to fulfill all the academic requirements for the award of the degree within FOUR academic years from the year of their admission, shall forfeit his seat in MBA course.

c) The duration of each semester including examinations is 21 weeks.

3.0 ATTENDANCE :

A student is eligible to write the semester end examinations (SEE) if he/she acquires a minimum of 75% of attendance in aggregate of all the courses of that semester put together.

3.1 Condonation of shortage of attendance in aggregate up to 10% (65% and above and below

75%) in a given semester may be granted by the College Academic Committee on medical grounds provided the student has submitted the application for medical leave along with medical certificate from a Registered medical practitioner within three days form reporting to the class work after the expiry of the medical leave. However, a student can avail this concession on medical grounds for not more than once during entire duration of the program.

3.2 A student representing the college in approved extracurricular activities such as sports, games, cultural meets, seminars, workshops and conferences shall be considered as on duty provided he/she has obtained prior written permission from the head of the department concerned and also submitted the certification of participation from the organizer of the event within three days after the completion of the event. However, this period of absence shall be counted as present for the purpose of computation of attendance only.

3.3 A stipulated fee shall be payable towards condonation of shortage of attendance.

3.4 Attendance below 65% in aggregate shall not be condoned under any circumstances.

3.5 Students whose shortage of attendance is not condoned in any semester are not eligible to write their semester end examinations.

3.6 A student who is in short of attendance in a semester may seek re-admission into that semester when offered again, within 1 week from the date of the commencement of class work.

3.7 A student will be promoted to the next semester if he satisfies the attendance requirement of the present semester.

3.8 If any candidate fulfills the attendance requirement in the present semester, he shall not be eligible for readmission into the same class.

4.0 EVALUATION

The performance of the candidate in each semester shall be evaluated course-wise, with a maximum of 100 marks for theory and 100 marks for practicals, on the basis of Internal Evaluation (IE) and End Semester Examination.

4.1 Theory Courses:

iii. For the theory courses 60 marks shall be awarded based on the performance in the End Semester Examination and 40 marks shall be awarded based on the Internal Evaluation. The internal evaluation shall be made based on the average of the marks secured in the two Mid Term-Examinations conducted-one in the middle of the Semester and the other immediately after the completion of instruction.

iv. Each Mid-term examination shall be conducted for 20 marks and duration of 120 minutes with 4 questions (without choice), each question for 5 marks.
The balance 20 marks is earmarked for Mini report (10 marks for preparation of report and 10 marks for presentation in the class room in each course.

Internal Evaluation= Average of two mid examinations (20)+Mini report (20)

End Semester Examination shall be conducted for 60 marks.
There shall be 6 questions of 10 marks each and all questions shall be compulsory.
Each of these questions from 1 to 5 (with internal choice) shall cover each unit of the syllabus. The 6th question shall be a case study without internal choice.

4.2 Practical Courses:

For practical course, 60 marks shall be awarded based on the performance in the End Semester Examination (Conducted by External Examiner and Internal Examiner) and

40 marks shall be awarded based on the day-to-day performance and an Internal Test as Internal Evaluation.

4.3 Special instructions for Business Analytics Course

Related software tools like SPSS, R, MS- Excel etc., shall be used for Business Analytics. For the above course the relative weightage for internal evaluation and end semester examination shall be 40% and 60% respectively. For internal evaluation day to day work shall be evaluated for 20 marks by the course teacher concerned based on the reports/ submission prepared in the class. The remaining 20 marks shall be awarded on the basis of internal evaluation through a written test along with viva with equal weightage. The end semester examination pattern for this course is similar to that of other courses.

4.4 Minimum Academic Requirements:

i. A candidate shall be deemed to have secured the minimum academic requirements in a course if he secures a minimum of 40% of marks in the End Examination and a minimum aggregate of 50% of the total marks in the Semester End Examination and Internal Evaluation taken together.

ii. In case the candidate does not secure the minimum academic requirement in any course (as specified above in 4.4(i)) he has to re appear for the end semester examination in that course.

iii. A Candidate shall be given one chance to re-register for each course provided the internal marks secured by a candidate are less than 50% and he has failed in the end examination. In such a case, candidate must re-register for the course(s) and secure required minimum attendance.

iv. Attendance in the re-registered course(s) has to be calculated separately to become eligible to write the end examination in the re-registered course(s). The attendance in the re-registered course(s) shall be calculated separately to decide his eligibility for writing the end examination in those course(s). In the event of taking another chance, the internal marks and end examination marks obtained in the previous attempt are nullified. At a given time a candidate is permitted to re-register for a maximum of two course(s) in addition to

the subjects of a regular semester.

v. For re-registration the candidate have to apply to the Dean Academics by paying the requisite fees and get approval from the College before the start of the Semester in which re-

registration is required. In case the candidate secures less than the required attendance in any re-registered subject(s), he shall not be permitted to write the End examination in the subject. He shall again re-register the subject when next offered.

vi. A Candidate shall be allowed to submit the project report only after fulfilling the attendance requirement of all the semesters.

vii. Laboratory examination for MBA course must be conducted with two Examiners, one of them being Laboratory Class Teacher and second examiner shall be other than Class Teacher from other college.

viii. Every student has to register for a MOOCs course at the beginning of first semester as approved by the departmental committee and complete it before commencement of the third semester. A student shall submit the certificate of completion to the department. Students those who cannot complete MOOCs course in the stipulated period, they can do mini project during third semester as approved the departmental committee. A student shall submit a report and give a seminar on mini project before departmental committee. The Committee consists of the Head of the Department, the Supervisor of mini project and one senior faculty member from the department.

5.0 EVALUATION OF PROJECT WORK:

5.1 **A Project Review Committee** (PRC) will be constituted with Head of the Department, and two other senior faculty members of the department.

5.2 **Registration of Project work**: A Candidate is permitted to register for the project work after satisfying the attendance requirement up to II semester.

5.3 Every candidate shall work on projects approved by the PRC.

5.4 A student has to undergo practical training for a period of 5 weeks in a Corporate Enterprise (as a part of the project) after the Second Semester. In training period, the candidates should work on a specific problem related to the elective course.

At the end of practical training, the student should submit a certificate obtained from the organization.

The student should prepare a Project Report under the supervision of a guide from the faculty of management of the college. However, the students who prepare Project Report in the area of systems can also work under the guidance of a Faculty member from Computer Science Department.

5.5 The progress of the project work shall be periodically reviewed by PRC. The PRC shall authorize/approve change of guide/topic/title as deemed fit. A student shall submit status report in line with the recommended project calendar as approved by PRC. Three copies of Project dissertation certified by the Project Supervisor shall be submitted to the College.

5.6 The project is evaluated for 100 Marks at the end of IV Semester. A student shall engage a minimum of 2 hours per week in III and IV semester in consolidating the data, report writing, results & analysis, conclusions etc. Evaluation shall comprise of internal and external assessment.

Internal: 40 Marks

External: 60 Marks

Out of a total of 100 Marks for the dissertation 40 Marks shall be for internal evaluation and 60 Marks for the end semester project evaluation and viva voce. The internal evaluation shall be made by the departmental committee on the basis of the two seminars given by the student on the topic of his/her dissertation. The end semester project report evaluation and viva voce shall be adjudicated by one external examiner selected from a panel of 5 examiners outside the college. For this Head of the department shall submit a 5 member panel who are eminent in the field of study.

5.7 An internal departmental committee consisting of HOD, Supervisor and one senior faculty shall monitor the progress of the project work.

5.8 The project evaluation and viva voce examination shall be conducted by a board consisting of External examiner, HOD and Supervisor. A Candidate shall be allowed to take viva voce examination of the project, after fulfilling the attendance requirements.

5.9 The Candidate should secure minimum 40% marks in External assessment of Project Evaluation & viva-voce. If the candidate fails to secure minimum 50% of marks in project internal and End semester project Evaluation & viva-voce together, the candidate should retake the viva-voce examination after three months. If he fails to get minimum marks at the second viva-voce examination, he will not be eligible for the award of the degree, unless the candidate is asked to revise and resubmit. If the candidate fails to secure minimum marks again, the project shall be summarily rejected.

6.0 GRADING SYSTEM:

Based on the student performance during a given semester, a final letter grade will be awarded at the end of the semester for each subject. The letter grades and the corresponding grade points are as given in the Table.

Grade	Grade Points	% of marks
S	10	≥ 90
A	9	≥ 80 – < 90
B	8	≥ 70 – < 80
C	7	≥ 60 – < 70
D	6	≥ 50 – < 60
F	0 (Failed)	< 50

A student who earns a minimum of 6 grade points (D grade) in a course is declared to have successfully completed the course, and is deemed to have earned the credits assigned to that course.

7.0 GRADE POINT AVERAGE:

Computation of SGPA and CGPA:

The following procedure to compute the Semester Grade Point Average (SGPA)and Cumulative Grade Point Average (CGPA):

i. The SGPA is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student, i.e

$$\textbf{SGPA}\ (S_i) = \sum(C_i \times G_i) / \sum C_i$$

where Ci is the number of credits of the i^{th} course and Gi is the grade point scored by the student in the i^{th} course.

ii. The CGPA is also calculated in the same manner taking into account all the courses undergone by a student over all the semesters of a programme, i.e.

$$\textbf{CGPA} = \sum(C_i \times S_i) / \sum C_i$$

Where Si is the SGPA of the ith semester and Ci is the total number of credits in that semester.

The SGPA and CGPA shall be rounded off to 2 decimal places and reported in the transcripts.

Illustration for Computation of SGPA and CGPA:

Computation of SGPA at the end of 1st semester

Illustration No.1:

Course	Credit	Grade letter	Grade point	Credit Point (Credit x Grade)
Course 1	3	A	9	3 x 9 = 27
Course 2	3	C	7	3 x 7 = 21
Course 3	3	B	8	3 x 8 = 24
Course 4	3	S	10	3 x 10 = 30
Course 5	3	D	6	3 x 6 = 18
Course 6	3	C	7	3 x 7 = 21
Course 7	2	A	9	2 x 9 = 18
Total	**20**			**159**

Thus, **SGPA at the end of 1st semester= 159/20=7.95**

Illustration No.2 (with one failure)

Course	Credit	Grade letter	Grade point	Credit Point (Credit x Grade)
Course 1	3	A	9	3 x 9 = 27
Course 2	3	C	7	3 x 7 = 21
Course 3	3	B	8	3 x 8 = 24
Course 4	3	S	10	3 x 10 = 30
Course 5	3	F	0	3 x 0 = 00
Course 6	3	C	7	3 x 7 = 21
Course 7	2	A	9	2 x 9 = 18
Total				**141**

Thus, **SGPA= 141/20=7.05**

Illustration No.2 (a)

Course	Credit	Grade letter	Grade point	Credit Point (Credit x Grade)
Course 5	3	D	6	3 x 6 =18
Total Credits of the	**20**			Ci(First Attempt)141 +Ci (subsequent attempt) 18= **159**

Thus, recalculated **SGPA** after clearing the course **=159/20=7.95**

Illustration No.3

Second Semester Performance:

Course	Credit	Grade letter	Grade point	Credit Point (Credit x Grade)
Course 1	3	A	9	3 x 9 = 27
Course 2	3	C	7	3 x 7 = 21
Course 3	3	B	8	3 x 8 = 24
Course 4	3	Ex	10	3 x 10 =30
Course 5	3	A	9	3 x 9 = 27
Course 6	3	C	7	3 x 7 =21
Course 7	2	A	9	2 x 9 =18
Total	**20**			**168**

Thus, **SGPA of 2nd semester= 168/20=8.4**

Thus, CGPA at the end of 2nd semester= $\frac{20*x8+20x8.4}{40}$ =328/40=8.2

Sem-1	***Sem-2***	***Sem-3***	***Sem-4***
Credit : 20 SGPA: 7	Credit: 20 SGPA: 8.5	Credit : 20 SGPA: 9.2	Credit : 20 SGPA: 6.86

CGPA after Final Semester:

Thus, CGPA= $\frac{\mathbf{20*7+20*8.5+20*9.2+20*6.86}}{\mathbf{80}} = \mathbf{7.70}$

AWARD OF DEGREE & CLASS:

A candidate who becomes eligible for the award of M.B.A. Degree shall be placed in one of the following Classes based on CGPA.

TABLE: CGPA REQUIRED FOR AWARD OF DEGREE

Distinction with First Class	**≥ 7.75***
First Class	**≥ 6.75**
Second Class	**≥ 6.00**

*In addition to the required CGPA of 7.75, the student must have necessarily passed all the courses of each semester in the first attempt**.**

8.0 MALPRACTICES:

The Principal shall refer the cases of malpractices in Continuous Internal Evaluation (CIE) and/or Semester End Examination (SEE) to an Enquiry Committee constituted by him. The committee will submit a report on the malpractice allegedly committed by the student to the Principal.

Rules pertaining to the punishments in the case of Malpractice are given in Annexure-I

9.0 ADDITIONAL ACADEMIC REGULATIONS:

Grade Sheet: A grade sheet (memorandum) will be issued to each student indicating his performance in all courses taken in that semester and also indicating the grades and SGPA.

Transcripts: After successful completion of the total program of study, a Transcript containing performance of all academic years will be issued as a final record. Candidates shall be permitted to apply for recounting/revaluation within the stipulated period with payment of prescribed fee.

The Academic Council has to approve and recommend to the JNTUK, Kakinada for the award of a degree to any student.

10.0 WITHHOLDING OF RESULTS:

If the candidate has not paid any dues to the college or if any case of indiscipline is pending

against him, the result of the candidate will be withheld.

The issue of degree is liable to be withheld in such cases.

11.0 TRANSITORY REGULATIONS:

For students admitted under special cases (mentioned in 1.1) these transitory regulations will provide the modus operandi.

At the time of such admission, based on the Programme pursued (case by case):

1. Equivalent courses completed by the student are established by the BOS concerned.

2. Marks/Credits are transferred for all such equivalent courses and treated as successfully cleared in the Programme of study prescribed by SVEC.
3. A Programme chart of residual courses not cleared will be derived and a Programme of study with duration specified will be prescribed for pursuit at SVEC.
4. Marks obtained in the previous system if the case be, are converted to grades and CGPA is calculated accordingly.

All other modalities and regulations governing shall be the same as those applicable to the stream of students with whom such a candidate is included into.

Regarding the students who were admitted under JNTU, Kakinada regulations for affiliated colleges:

If they happen to join and study along with their juniors at SVEC, the transitory regulations to be specified by JNTU, Kakinada for such students have to be followed.

12.0 GENERAL :

1. Wherever the words "he", "him", "his", occur in the regulations, they include "she", "her", "hers".
2. The academic regulation should be read as a whole for the purpose of any interpretation.
3. In case of any doubt or ambiguity in the interpretation of the above rules the decision of the Chairman of the Academic Council is final.
4. The College may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the college.

Annexure-I

MALPRACTICES

S.No	Nature of Malpractices/Improper Conduct	Punishment
1 (a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is	Expulsion from the examination hall and cancellation of the performance in that subject only.

	appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	
(b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled and sent to the University.
3.	Impersonates any other candidate in connection with the examination	The candidate who has impersonated shall be expelled From examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate who has been impersonated, shall be cancelled in all the subjects of the Examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.
4.	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University

		examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in the subject.
6.	Refuses to obey the orders of the Chief Superintendent/Assistant – Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in- charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with

		forfeiture of seat .
8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.
9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges In any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them.
10.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year.
11.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year examinations.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the University for further action to award suitable punishment	

COURSE STRUCTURE OF MBA PROGRAMME

I SEMESTER

SNo	Course Code	Course	L	P	C	I	E	TM
1	V18MBT01	Management Theory & Organizational Behavior	4	--	4	40	60	100
2	V18MBT02	Managerial Economics	4	--	4	40	60	100
3	V18MBT03	Accounting for Managers	4	--	4	40	60	100
4	V18MBT04	Indian Economy & Policy	4	--	4	40	60	100
5	V18MBT05	Business Communication	4	--	4	40	60	100
6	V18MBT06	Quantitative Analysis for Business Decisions	4	--	4	40	60	100
7	V18MBL01	IT-LAB	---	6	3	40	60	100
8	V18ENT03	Employability Skills - I (English Communication Skills)	2	--	--	--	--	MNC
TOTAL			26	6	27	280	420	700

II SEMESTER

SNo	Course Code	Course	L	P	C	I	E	TM
1	V18MBT07	Financial Management	4	--	4	40	60	100
2	V18MBT08	Human Resource Management	4	--	4	40	60	100
3	V18MBT09	Marketing Management	4	--	4	40	60	100
4	V18MBT10	Production and Operations Management	4	--	4	40	60	100
5	V18MBT11	Business Research & Statistical Analysis	4	--	4	40	60	100
6	V18MBT12	Legal Environment for Business	4	--	4	40	60	100
7	V18MBT13	Business Ethics & Corporate Governance	4	--	4	40	60	100
8	V18ENT04	Employability Skills - II (Soft Skills)	2	--	--	--	--	MNC
TOTAL			30	--	28	280	420	700

III SEMESTER

SNo	Course Code	Course	L	P	C	I	E	TM
1	V18MBT14	Business Policy & Corporate Strategy	4	--	4	40	60	100
2	V18MBT15	Entrepreneurship Development	4	--	4	40	60	100
3	V18MBT16	E-Business	4	--	4	40	60	100
4		Elective-1	4	--	4	40	60	100
5		Elective-2	4	--	4	40	60	100
6		Elective-3	4	--	4	40	60	100
7		Elective-4	4	--	4	40	60	100
8	V18MBM01 V18MBP01	MOOCs/ Mini Project	--	--	--	--	--	MNC
9	V18ENT05	Employability Skills – III (Aptitude-1)	2	--	--	--	--	MNC
		TOTAL	30	--	28	280	420	700

IV SEMESTER

SNo	Course Code	Course	L	P	C	I	E	TM
1	V18MBT29	Logistics & Supply Chain Management	4	--	4	40	60	100
2	V18MBT30	Business Analytics	3	4	4	40	60	100
3		Elective-5	4	--	4	40	60	100
4		Elective-6	4	--	4	40	60	100
5		Elective-7	4	--	4	40	60	100
6		Elective-8	4	--	4	40	60	100
7	V18MBP02	Major Project & Viva voce	--	--	6	40	60	100
8	V18ENT06	Employability Skills – IV (Aptitude-2)	2	--	--	--	--	MNC
		TOTAL	25	04	30	280	420	700
		GRAND TOTAL	111	10	113	1120	1680	2800

L-LECTURE HOURS, P-PRACTICAL HOURS, C-CREDITS, I-INTERNAL MARKS, E-EXTERNAL MARKS, TM-TOTAL MARKS, MNC: Mandatory Non credit course

Single Specialization:

The Specialization papers will be offered in the areas of Marketing, Finance, and Human Resource Management (HRM). The students should choose any **one** of the listed Specialization areas in the beginning of the third semester of MBA. Specialization will be offered subject to a minimum of 20 students.

Semester-III

Specialization I: Marketing

S.No.	Course Code	Course
1.	V18MBT17	Consumer Behavior
2.	V18MBT18	Retail Management
3.	V18MBT19	Integrated Marketing Communication
4.	V18MBT20	Product & Brand Management

Specialization II: Finance

S.No.	Course Code	Course
1.	V18MBT21	Security Analysis & Portfolio Management
2.	V18MBT22	Advance Management Accounting
3.	V18MBT23	Financial Markets & Services
4.	V18MBT24	Banking & Insurance Management

Specialization III: HRM

S.No.	Course Code	Course
1.	V18MBT25	Human Resource Planning & Development
2.	V18MBT26	Compensation and Reward Management
3.	V18MBT27	Performance Management
4.	V18MBT28	Strategic Human Resource Management

Semester-IV

Specialization I: Marketing

S.No.	Course Code	Course
1.	V18MBT31	Services Marketing
2.	V18MBT32	Sales and Distribution Management
3.	V18MBT33	Digital & Social media Marketing
4.	V18MBT34	International Marketing Management

Specialization II: Finance

S.No.	Course Code	Course
1.	V18MBT35	Financial Derivatives
2.	V18MBT36	Project Appraisal and Finance
3.	V18MBT37	Business Taxation & Planning
4.	V18MBT38	International Financial Management

Specialization III: HRM

S.No.	Course Code	Course
1.	V18MBT39	Organizational Change & Development
2.	V18MBT40	Management of Industrial Relations
3.	V18MBT41	Labour Welfare & Legislations
4.	V18MBT42	International HRM

SYLLABUS FOR MBA PROGRAMME

I MBA- I SEMESTER
Course Code: V18MBT01

MANAGEMENT PROCESS & ORGANIZATIONAL BEHAVIOR

L	T	P	C
4	0	0	4

Course Outcomes:

1. Understand the fundamentals of management and develop holistic perspective towards an organization.
2. Use the models of decision making and controlling in an organizational context.
3. Understand various dimensions of individual behavior.
4. Identify the dynamics of group and also emerge as a good team member.
5. Emerge as a leader who can understand the culture of an organization.

Unit-I:
Role of Management – Concept – Significance – Functions – Principles of Management - Patterns of Management: Scientific – Behavioral – Systems – Contingency

Unit-II:
Decision Making and Controlling – Process – Techniques. Planning – Process – Problems- Making it Effective. Controlling - System of Controlling – Controlling Techniques – Making Controlling Effective.

Unit-III:
Organizational Behavior – Introduction to OB – Organizing Process – Departmentation Types – Making Organizing Effective - Understanding Individual Behavior – Perception – Learning – Personality Types – Johor window- Transactional Analysis

Unit-IV:
Group Dynamics and Motivation – Benefits of Groups – Types of Groups – Group Formation and Development, Motivation – Concept of Motivation - Motivational Theories of Maslow, Herzberg, David Mc Clelland, and Porter and Lawler

Unit-V:
Leadership and Organizational Culture and Climate: Leadership – Traits Theory – Managerial Grid – Transactional vs. Transformational Leadership – Qualities of good Leader, Change Management – Conflict Management.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. Essentials of Management- An International Perspective, 8th Edition, Koontz & Werich, TMH
2. Management: Text & Cases, 2nd Edition, Satya Raju & Parthasarthy ,PHI
3. Business Organization and Principles of Management, A. Roy, TMH
4. Management, Text & Cases, V.S. P. Rao &Harikrishna, Excel Books,2009
5. Mgmt. Concept & Strategies, Chandan, Vikas Publications
6. Management Science, Rao, Scitech
7. Principal & Practice of Management. Ghanekar, EPH,2005
8. Principal & Practice of Management, Amrita Singh, EPH
9. Organizational Behavior, Stephen P. Robbins,16th Edition, Pearson Education.
10. Organizational Behaviour,4th Edition, S.S.Khanka, S.Chand,2002
11. Organizational Behavior 1st Edition, Mishra .M.N ,Vikas Publishing
12. Organizational behavior, Pierce Gardner, Cengage, Weihrich&Aryasri, TMH,2009.
13. Organizational Behaviour, Subbarao P, Third Revised Edition, Himalaya Publishing House,2017.
14. Organizational Behaviour, Sarma, Jaico Publications,2009.

I MBA- I SEMESTER
Course Code: V18MBT02

MANAGERIAL ECONOMICS

L	T	P	C
4	0	0	4

Course Outcomes:

1. Apply the concepts of Managerial economics in managerial decision making.
2. Understand the relationship between Price, demand & supply and determine changes in market equilibrium.
3. Explain the relationship between inputs and productivity using various production functions and their applicability in real world business.
4. Develop various cost structures and determine the relationship between costs and output in short and long run.
5. Determine the profit maximizing price and output in various competitive markets in short and long run.

UNIT 1:

Introduction to Managerial Economics: Definition, Nature and Scope, Relationship with other areas in Economics, The role of managerial economist. Concept of opportunity cost, Incremental concept, time perspective, Risk & uncertainty.

UNIT 2:

Demand Analysis: Elasticity of demand, types and significance of Elasticity of Demand - Measurement of price Elasticity of Demand – law of Supply, Elasticity of Supply -Need for Demand forecasting, forecasting techniques.

UNIT 3:

Production Analysis: Production function, Marginal Rate of Technical Substitution, Production function with one/two variables, Cobb-Douglas Production Function, Returns to Scale and Laws of returns.

UNIT 4:

Cost and Revenue Analysis: Cost concepts, determinants of cost, cost – output relationship in the short run and long run – Modern development in cost theory –Envelop shaped long run curve- Total, Average and Marginal cost and revenue curves– Cost - Volume – Profit analysis

UNIT 5:

Market Structure and Pricing practices: Features and Types of different Markets – Price- Output determination in Perfect competition, Monopoly, Monopolistic competition and Oligopoly both in the long run and short run. Pricing methods in practice –- Managerial Theories of a firm. .

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References

1. Paul, Koushil: "**Managerial Economics**", Cengage Learning, New Delhi,
2. Siddiqui S A,Siddiqui A S: "**Managerial Economics**", and Financial Analysis", New Age International Publishers, New Delhi, 2008.
3. Vanita Agarwal: "**Managerial Economics**", Pearson, New Delhi, 2013.
4. Dominick Salvatore: "**Managerial Economics**", Oxford University Press, New Delhi,2010.
5. D.L. Ahuja: "**Managerial Economics**", S. Chand & Company ltd,New Delhi-55.
6. O'Sullivan, Sheffrin, Perez "Micro Economics: Principles, Applications and Tools", Pearson Education.
7. Mithani D M: ''**Managerial Economics**", Himalaya Publishing House, Mumbai, 2008.
8. Atmanand: "**Managerial Economics**", Excel Publications. New Delhi, 2012.
9. Varshney, R.L and Maheswari, K L: ''**Managerial Economics**", Sultan Chand and Sons, New Delhi, 2002.
10. Narayanan Nadar E, Vijayan S: ''**Managerial Economics**", PHI Private Limited, New Delhi,2009.

I MBA- I SEMESTER
Course Code: V18MBT03

ACCOUNTING FOR MANAGERS

L	T	P	C
4	0	0	4

Course Outcomes:

1. Understand Nature, objectives and principles of financial accounting,
2. Able to prepare the financial statements of organization.
3. Apply various tools to analysis the financial position of the organization.
4. Understood the fundamental concepts of cost accounting which help the organization in decision making.
5. Aware of contemporary practices in the area of financial accounting.

Unit-I:
Introduction to Financial Accounting: Definition – Scope – Nature – Objectives – Users of Accounting Information – Accounting Principles: Concepts and Conventions – Accounting Standards. **Branches of Accounting:** Financial Accounting – Cost Accounting – Management Accounting.

Unit-II:
Accounting Cycle & Preparation of Financial Statements: Book keeping, **Double Entry System, Classification of Accounts – Journal – ledger and Trial Balance preparation**. Capital and Revenue Expenditure. **Preparation** of Final Accounts: Trading, profit and loss account and Balance Sheet – Methods of Depreciation.

Unit-III:
Financial Statement Analysis: Comparative - Common size, Trend Analysis, Ratio Analysis – Funds Flow Analysis (simple problems) – Cash Flow Statements (simple problems)

Unit-IV:
Cost Accounting for Managerial Decisions: Meaning of Cost, Costing, cost accounting, Classification of Costs, Elements of Cost and Preparation of Cost Sheet. Marginal Costing: Break Even Analysis

Unit–V:
Contemporary Developments in Accounting: Window Dressing, Methods of Window dressing, **Ethical issues in preparation of accounts.** Human Resource Accounting – Social Accounting - Responsibility Accounting – Reporting to Management (Theory)- Forensic Accounting and Audit.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. G .Prasad& V. Chandra Sekhara Rao, Accounting for managers, jai Bharat publications.
2. Jelsy Joseph Kuppapally – Accounting for Managers – PHI (2008).
3. I.M. Pandey: Management Accounting, Third Revised Edition, Vikas Publishing House. New Delhi.
4. Jawaharlal, Accounting for Management, Himalaya, Mumbai,2012
5. Khan and Jain, Management Accounting, 5th Edition, Tata Mc Graw Hill, Delhi.
6. Gupta R.L. and Radhaswamy M: Advanced Accountancy, Sultan Chand Publications-2014.
7. Maheswari S.N: Advanced Accountancy, 5th Edition, Vikas Publishing House. New Delhi.
8. Grewal T.S. Introduction to Accountancy, 2009, S Chand Publishers

I MBA- I SEMESTER
Course Code: V18MBT04

INDIAN ECONOMY & POLICY

L	T	P	C
4	0	0	4

Course Outcomes:

1. Understand the composition of Indian economy.
2. Able to analyze the internal and external factors which impact the functionality of a business unit.
3. Understand the industrial environment prevails in India towards industrial development.
4. Know the functioning of various financial organs in Indian economic system.
5. Understand how Indian economy integrated to the global business.

Unit-I:
Demographic Environment: India's mixed Economic system - Occupational Structure; population trends; growth trends in basic sectors- National income and distribution of wealth- Poverty and unemployment- Recent trends and government policy.

Unit-II:
Economic & Business Environment - Appraisal of Fiscal and monitory policies; Industrial Policy, 1991; Liberalisation, Privatisation and Globalisation- Foreign Trade policy – FEMA; Consumer Protection Act; Consumer Rights and redressal Mechanism; Environmental degradation and protection

Unit-III:
Industrial Environment: Industrial Growth; structure and performance; Public sector in India; Role and growth; Disinvestment and privatization of PSUs; Industrial sickness in India- incidence, nature and causes; Government's remedial policy measures

Unit-IV:
Financial Environment- Money market; Capital market; structure, Role and problems of growth- impact of Global Financial crisis – Reforms in Indian Capital markets- Commercial Banking - Recent trends; Reforms; problem of NPAs; Govt. Measures.

Unit-V:
International Environment- Foreign Investments and Multinational Corporations; Implications of FDI and Portfolio Investments; Social and economic implications of MNCs in India- Indian economy under WTO regime; Impact of WTO policies on Agriculture, small business and employment- Impact of World Bank and IMF policies on Indian Economy.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. Dutt, Ruddar& KPM Sundaram, Indian Economy, S. Chand & Co. New Delhi,2016
2. Misra&Puri, Indian Economy, Himalaya Publishing House, Delhi,2015
3. Ahuja, H. L., Economic Environment of Business,7th Edition, S. Chand & Co, New Delhi
4. Adhikari,M., Economic Environment of Business, Sultan Chand & Sons, Delhi,2012
5. Fernando, A. C., Business Environment, Pearson, Delhi,2016
6. Ashwathappa, K, Essentials of Business Environment, Himalaya, Delhi,2018.
7. The Economic Times, Financial Express, Business Standard, Dailies

I MBA- I SEMESTER
Course Code: V18MBT05

BUSINESS COMMUNICATION

L	T	P	C
4	0	0	4

Course Outcomes:

1. Understand the communication process, importance and classification.
2. Familiar with managing organizational communication
3. Understand influencing factors of interpersonal communication.
4. Learn various business writing skills
5. Preparations of reports for different occasions.

UNIT 1:
Role of Communication in Business: Objective of Communication – The Process of Human Communication – Media of Communication - Written Communication - Oral Communication – Visual Communication - Audio Visual Communication – Silence - Developing Listening Skills – Improving Non-verbal communication skills – Cross Cultural Communication – problems and challenges.
UNIT 2:
Managing Organization Communication: Formal and Informal Communication–intrapersonal Communication – Models for Inter Personal Communication - Exchange Theory, Johari Window and Transactional Analysis.
UNIT 3:
Motivational factors to influence Interpersonal Communication: Inter-Personal communication – Role of Emotion in Inter Personal Communication – Communication Styles – Barriers to Communication – gateways to Effective Interpersonal Communication.
UNIT 4:
Business Writing Skills: Significance of Business Correspondence – Preparing agenda for meetings, recording minutes of meeting, Letter Writing (Employment related correspondence, Correspondence with Govt./Authorities, Office Orders, Enquiries and Replies), Press release, Writing CV - Telephone Communication – email and SMS etiquette.
UNIT 5:
Report Writing – Meaning and Significance-Structure of Reports - Negative, Persuasive and Special Reporting: Informal Report – Proposals, Formal Reports. Techniques of Presentation – Types of Presentation.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.
References:

1) C.S.G. Krishnamacharyulu and Lalitha Rama Krishnan, Business Communication, Himalaya Publishing House, Mumbai,2016.
2) Urmila Rani and S. M. Roy, Business Communication, Himalaya Publishing House.
3) Nirmala Sing, Business Communication, Deep and Deep Publications Pvt. Ltd..
4) R. K. Madhukar, Business Communication, VIKAS Publications,2018.
5) Business and Professional Communication, Texas Aandm. Sage Publications ,2017
6) The Basics of Communication, Steve Duck, Sage Publications,2012
7) Professional Speaking Skills, Aruna koneru, Oxford University Press,2015
8) English Grammar, RajeevanKaral, Oxford University Press
9) Spoken English, Sabina Pillai, Oxford University Press,2016.

I MBA- I SEMESTER
Course Code: V18MBT06

QUANTITATIVE TECHNIQUES FOR BUSINESS DECISIONS

	L	T	P	C
Course Outcomes:	4	0	0	4

1. Obtain basic knowledge of statistics, probability and probability distributions.
2. Understand decisions making process and familiar with various supporting tools for decision making.
3. Able to formulate Linear Programming models for various managerial problems.
4. Can optimally utilize resources using Transportation, Assignment models. Formulate strategies using Game theory.
5. Understand project management techniques using PERT and CPM.

UNIT 1:
Basic Measures of Central Tendency – Measures of Dispersion –Simple Correlation and Regression analysis - Concept of Probability- Probability Rules – Joint and Marginal Probability – Baye'sTheorem- Probability Distributions- Binomial, Poisson, Normal and Probability Distributions.

UNIT 2:
Introduction to Operations Research. Decision Theory: Steps involved in Decision Making, different environments in which decisions are made, Criteria for Decision Making, Decision making under uncertainty, Decision making under conditions of Risk-Utility as a decision criterion, Decision trees, Graphic displays of the decision making process.

UNIT 3:
Linear Programming: Formation of mathematical modeling, Graphical method, the Simplex Method; Justification, interpretation of Significance of All Elements in the Simplex Tableau, Artificial variable techniques.

UNIT 4:
Transportation, Assignment Models & Game theory: Definition and application of the transportation model, solution of the transportation problem, the Assignment Model, Traveling Salesman Problem. Game Theory: Introduction – Two Person Zero-Sum Games, Pure Strategies, Games with Saddle Point, Mixed strategies, Rules of Dominance, Solution Methods of Games without Saddle point – Algebraic, matrix and arithmetic methods.

UNIT 5:
Network Analysis: PERT & CPM.- Drawing networks – identifying critical path – probability of completing the project within given time- project crashing –optimum cost and optimum duration..

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References

1. N.D.Vohra: "***Quantitative Techniques in Management***", Tata-McGraw Hill Private Limited, New Delhi, 2011.
2. J. K. Sharma, "***Operations Research: Theory and Applications***", Macmillan Gupta S.P:"***Statistical Methods***", S. Chand and Sons, New Delhi,
3. Anand Sharma: "**Quantitative Techniques for Business decision Making**", HimalayaPublishers, New Delhi,2012;
4. D P Apte: "***Operation Research and Quantitative Techniques***", Excel Publication, New Delhi,2013
5. Hamdy, A.Taha: "***Operations Research: An Introduction***", Prentice-Hall of India, New Delhi2003.
6. Anderson: "**Quantitative Methods for Business**", Cengage Learning, New Delhi 2013
7. Sancheti, Dc & VK Kapoor, "**Business Mathematics**", S Chand and Sons, New Delhi

I MBA- I SEMESTER
Course Code: V18MBL01

INFORMATION TECHNOLOGY LAB (100% LAB)

L	T	P	C
4	0	6	3

Course Outcomes:

1. Able to prepare various office reports using MS-Office, run queries using SQL.
2. Compute various financial calculations using MS-Excel.
3. Calculate and apply statistical functions using MS-Excel.
4. Understand the concept flow diagrams, TQM methodologies.

UNIT 1:

Introduction of various software used for business: Significance in the current business environments - Introduction of software MS Office, SQL.

UNIT 2:

Financial modeling: Present value of cash flows, Valuations, Financial ratio analysis, Forecasting, Trend analysis of data, Random input generations

UNIT 3:

Statistics for Management - correlation and regression analysis data presentation techniques. Spread sheet showing the monthly payments with changing interest rate over a period of loan. (Using excel)

UNIT 4:

Data Collection and analyzing techniques: Charts, Flow diagrams TQM methodologies

References:

1. Shelly, Cashman: “Microsoft copies 2007”, Cengage Learning, New Delhi. 2012

I MBA- II SEMESTER
Course Code: V18MBT07

FINANCIAL MANAGEMENT

L	T	P	C
4	0	0	4

Course Outcomes:

1. Understood the fundamental concepts of financial Management
2. Able to construct optimal capital structure by identification of financial sources and evaluating cost of capital.
3. Evaluating long term investment projects by applying capital budgeting techniques.
4. Get through knowledge of working capital, cash, inventory and receivables management
5. Aware of various forms of corporate restructuring and Merger & Acquisition trends.

UNIT 1:
Financial Management: Concept - Nature and Scope - Evolution of financial Management objectives of financial Management - Profit maximization- Wealth maximization and EPS maximization – Major decisions of financial manager Challenges of Financial manager in contemporary scenario, Agency problem, - Risk-Return - trade off.

UNIT 2:
Financing Decision: Sources of finance - financial instruments - Concept and financial effects of leverage – Preparation Capital Structure decision - EBIT – EPS analysis. Cost of Capital: The concept – Average vs. Marginal Cost of Capital. Measurement of Cost of Capital – Component Costs and weighted Average Cost.

UNIT 3:
Investment and Dividend Decision: Investment decision process- Concept and Techniques of Time Value of money - Capital budgeting decisions: Developing Cash Flow Data - Evaluation Techniques-Traditional and DCF methods - NPV vs. IRR, PI- Risk Analysis in capital budgeting: Measurement of Risk. Risk Adjusted Discount Rate – Sensitivity analysis - Decision Tree Approach. Dividend Decision: Major forms of dividends - The theoretical backdrop– relevant, irrelevant theories of dividend. .

UNIT-4:
Working Capital Management: Concepts and characteristics of working capital. Factors determining the working capital - Estimating working capital requirements - Working capital policy - Management of current assets like Cash, Receivables and Inventory.

UNIT-5:
Corporate Restructuring: Mergers and Acquisitions, Types of Mergers, Evaluation of Merger Proposal, Take-over, Amalgamation, Leverage buy-out, Management buy-out, Merger and Acquisition trends in India.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. P.Vijaya Kumar, P.S. Ravindra, Kiran Kumar, “Financial Management”, Himalaya Publishing House PVT Ltd, 2014.
2. Rajiv Srivastava, Anil Misra: “**Financial Management**”, Oxford University Press, New Delhi,2012
3. Brigham,E.F: “**Financial Management Theory and Practice**”, Cengae Learning, New Delhi, 2013
4. Prasanna Chandra: “**Financial Management Theory and Practice**”, Tata McGrawHill 2011.
5. I.M. Pandey: “**Financial Management”,** Vikas Publishers, New Delhi, 2013.
6. RM Srivastava, Financial Management, Himalaya Publishing house, 4th edition.
7. Khan and Jain: Financial Management, Tata McGraw Hill, New Delhi,
8. Pradip Kumar Sinha: “**Financial Management**”, Excel Books, New Delhi, 2009.
9. Vyuptakesh Sharan: “**Fundamentals Financial Management**”, Pearson, New Delhi, 2012.

I MBA- II SEMESTER
Course Code: V18MBT08

HUMAN RESOURCE MANAGEMENT

L	T	P	C
4	0	0	4

Course Outcomes:

1. Understand the fundamentals of HRM with a global perspective.
2. Calculate the type and number of personnel required to the organization in future by considering the demand and supply of manpower.
3. Learn various methods to assess the performance of employees.
4. Design compensation system that conforms to the legal framework.
5. Learn the functionality of trade unions and also have ability to balance between work and life.

UNIT 1:
HRM: Significance - Definition and Functions – evolution of HRM- Principles - Ethical Aspects of HRM- - HR policies, Strategies to increase firm performance - Role and position of HR department – aligning HR strategy with organizational strategy - HRM at global perspective challenges – cross-cultural problems – emerging trends in HRM.

UNIT 2:
Investment perspectives of HRM: HR Planning – Demand and Supply forecasting- Recruitment and Selection- Sources of recruitment - Tests and Interview Techniques – Training and Development – Methods and techniques – Training evaluation - retention - Job Analysis –job description and specifications - Management development - HRD concepts.

UNIT 3:
Performance Evaluation: Importance – Methods – Traditional and Modern methods – Latest trends in performance appraisal - Career Development and Counseling- Compensation, Concepts and Principles- Influencing Factors- Current Trends in Compensation- Methods of Payments - compensation mechanisms at international level.

UNIT 4:
Wage and Salary Administration: Concept- Wage Structure- Wage and Salary Policies- Legal Frame Work- Determinants of Payment of Wages- Wage Differentials - Job design and Evaluation- - Incentive Payment Systems. Welfare management: Nature and concepts – statutory and non-statutory welfare measures – incentive mechanisms-Fringe Benefits-ESOPs

UNIT 5:
Managing Industrial Relations: Trade Unions - Employee Participation Schemes-Collective Bargaining– Grievances and disputes resolution mechanisms – Safety at work – nature and importance – work hazards – safety mechanisms- Quality of Work Life (QWL).

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References

1. K Aswathappa: "***Human Resource and Personnel Management***", Tata McGraw Hill, New Delhi, 2013
2. N.Sambasiva Rao and Dr. Nirmal Kumar: "**Human Resource Management and Industrial Relations**", Himalaya Publishing House, Mumbai
3. Mathis, Jackson,Tripathy:"***Human Resource Management:Asouth-Asin Perspective***", Cengage Learning, New Delhi, 2013
4. Subba Rao P: "***Personnel and Human Resource Management-Text and Cases***", Himalaya Publications, Mumbai, 2013.
5. Madhurima Lall, Sakina Qasim Zasidi: "**Human Resource Management**", Excel Books, New Delhi, 2010

I MBA- II SEMESTER
Course Code: V18MBT09

MARKETING MANAGEMENT

	L	T	P	C
Course Outcomes:	4	0	0	4

1. Know the concepts and constituents of Market and Marketing.
2. Understand marketing mix elements
3. Understand the process of develop pricing strategies.
4. Learn various marketing communication tools and techniques
5. Obtain the information on changing paradigm of marketing.

UNIT 1:
Introduction to Marketing: Concept of Market and Marketing – Philosophies of Marketing – Marketing Planning Process-Creation of Customer Value and Satisfaction.

UNIT 2:
Marketing MIX : Elements of marketing Mix - Product: Classification of Products - New Product Development - Product Life Cycle- BCG Matrix - Market Segmentation, Targeting and positioning strategies.

UNIT 3:
Pricing Strategy: Objectives of Pricing - Methods of Pricing - Selecting the Final price - Adopting price - Initiating the price cuts - Imitating price increases - Responding to Competitor's price changes.

UNIT 4:
Marketing Communication: Communication Process – Communication Mix – Managing Advertising Sales Promotion - Public relations and Direct Marketing - Sales force - Objectives of Sales force - Structure and Size - Sales force Compensation.

UNIT 5:
Branding and New Horizons of Marketing: Brand and Branding – Creation of Brand - Brand Identity – Brand positioning and equity. Online Marketing – Green Marketing – Neuro Marketing – Guerilla Marketing – Experiential Marketing – Internal Marketing.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References
1. Lamb, Hair, Sharma: "**MKTG**" Cengage Learning , New Delhi, 2013
2. Phillip Kotler: "**Marketing Management** ", Pearson Publishers, New Delhi, 2013.
3. Rajan Sexena: "**Marketing Management**", Tata McGraw Hill, New Delhi, 2012.
4. R.Srinivasan: "**Case Studies in Marketing**", PHI Learning, New Delhi, 2012
5. Tapan K Pand: "**Marketing Management**", Excel Books, New Delhi, 2012
6. Paul Baines, Chris Fill, Kelly Page Adapted by Sinha K: "**Marketing**", Oxford University Press, Chenni, 2013.

I MBA- II SEMESTER
Course Code: V18MBT10

PRODUCTION & OPERATIONS MANAGEMENT

L	T	P	C
4	0	0	4

Course Outcomes:

1) Understand the evolution and fundamental concepts of production and operations management
2) Familiar with production planning and control strategies.
3) Learn concepts of Waste Management, Quality Assurance, Quality Circles and application of various Statistical Quality Control techniques.
4) Understand basic concepts of Quality Improvement tools like six sigma, ISO 9000-2000 clauses and coverage and factors effecting Productivity.
5) Gain knowledge on stores management and Inventory Control techniques.

UNIT 1:
Introduction: Overview & Definition of Production and Operations Management- Nature and Scope of Production and Operations Management-Historical Evolution –Role & responsibilities of the production manager - Types of Manufacturing Processes.
UNIT 2:
Production Planning and Control: Stages in PPC – Gantt – PPC in Mass, Batch, and Job Order Manufacturing- Aggregate planning and Master Scheduling, MRP, CRP. Maintenance management & Industrial Safety. Plant Location & Layout Planning- Factors influencing location - types of layouts. Capacity Planning – Optimal Production Strategies: Scheduling and Sequencing of Operations. Work Design: Method Study and Work Measurement – Work Sampling.
UNIT 3:
Managing of Work Environment: –Automation --Technology Management – Waste Management. Quality Assurance and Quality Circles – Statistical Quality Control –Control Charts for Variables- Average, Range and Control charts for Attributes. Acceptance Sampling Plans.
UNIT 4:
Quality Improvement: Basic concepts of quality, dimensions of quality, Juran's quality trilogy, Deming's 14 principles, Quality improvement and cost reduction, ISO 9000-2000 clauses & coverage. Six Sigma, Productivity –factors affecting productivity, measurement & improvements in productivity - new product development and design - stages & techniques. Total Productive Maintenance (TPM).
UNIT 5:
Stores Management: Purchase functions and Procedure - Objectives of Stores Management – Requirements for efficient-Management of Stores – safety stock- Different Systems of Inventory Control -Inventory control techniques- EOQ, ABC, VED and FNSD analysis- JIT, VMI
Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References
1. Panner Selvem: "**Production and Operation Management**", Prentice Hall of India, NewDelhi, 2012.
2. K.Aswathappa, K. Shridhara: "**Production & Operation Management**", Himalaya Publishing House, New Delhi, 2012
3. Ajay K Garg: "**Production and Operation Management**", TMH, New Delhi,2012
4. Deepak Kumar Battacharya: "**Production & Operation Management**", University Press, New Delhi, 2012
5. AlanMuhlemann, JohnOakland,jasti Katyayani: "**Production and Operation Management**", Pearson, New Delhi,2013
6. O.P.Khanna, " Industrial Engineering and Management" Dhanpad Rai Publications

I MBA- II SEMESTER

Course Code: V18MBT11

BUSINESS RESEARCH & STATSTICAL ANALYSIS

L	T	P	C
4	0	0	4

Course Outcomes:

1. Understand the concept of research, research process in detail
2. Understand various scaling techniques and research report preparation process.
3. Apply various statistical tools to test hypothesis.
4. Familiar with Bivariate and Multivariate analysis concepts.
5. Use SPSS for Hypothesis testing.

UNIT 1:

Introduction : Nature and Importance of research, The role of business research, Research process, types of research, Defining Research Problem. Research Design –Types of Research design-Sampling and Sampling Design – Sampling Methods –Probability and Non probability sampling. Discussion on primary data and secondary data, tools and techniques of collecting data. Methods of collecting data- Designing of Questionnaire.

UNIT 2:

Measurement and Scaling – Nominal Scale – Ordinal Scale –Interval Scale – Ratio Scale – Guttman Scale – Likert Scale – Schematic Differential Scale. Editing – Coding – Classification of Data – Tables and Graphic Presentation – Preparation and Presentation of Research Report

UNIT 3:

Data Analysis: Formulation of hypothesis-types of hypothesis- Type I and Type II errors, Hypothesis testing procedure, parametric tests -t distribution, Z test,

UNIT 4:

F test and ANOVA - one way and two ways test- Chi Square test- Goodness of fit- Independence- Bivariate and Multivariate analysis concepts.

UNIT 5:

Automated Data Analysis: SPSS Applications – Tabulation and Cross Tabulation of Data: Univariate, Bivariate Data Analysis and Tests of Hypothesis.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References

1. Navdeep and Guptha : “**Statistical Techniques & Research Methodology**”, Kalyani Publishers
2. Willam G.Zikmund, Adhkari: “***Business Research Methods***”, Cengage Learning, New Delhi, 2013.
3. S.Shajahan: “***Research Methods for management***”, JAICO Publishing House, New Delhi, 2009.
4. UWE FLICK: “**Introducing *Research Methodology***”, SAGE, New Delhi,2012.
5. Cooper R.Donald and Schindler S. Pamela: “***Business Research Methods***”, 9/e, Tata MCGraw Hill, New Delhi.
6. M.V.Kulkarni: “**Research Methodology**” , Everest Publishing House, New Delhi, 2010.
7. Sachdeva: “***Business Research Methods***”, Himalaya Publishing House, Mumbai, 2011.
8. Ranjit Kumar: “**Research Methodology”,** Pearson,New Delhi,2012.
9. Deepak Chawla , Neena Sondhi: “**Research Methodology, Concepts and Cases**” Vikas Publishing House, New Delhi, 2011.
10. Alan Bryman, Emma Bell: “**Business Research Methods**”, Oxford University Press, New Delhi, 2011.

I MBA- II SEMESTER
Course Code: V18MBT12

LEGAL ENVIRONMENT FOR BUSINESS

L	T	P	C
4	0	0	4

Course Outcomes:

1. Understand the classification and essentials of valid contract under the Indian contract act-1872
2. Student will get awareness about the sale and agreement to sale and also on the rights of a consumer to protect himself in the unfair trade practice
3. Understand contract of agency in detail and also the issue of various negotiable instruments and their consequences.
4. Understand the concepts of partnership according to the Indian Partnership Act 1932(types, registration, partnership deed, dissolution of partnership)
5. Aware the legal aspect at various stages of functioning of a company complying with Companies Act 2013.

UNIT 1:
Importance of Commercial Law: The Indian Contracts Act, 1872 – Nature of the Act and Classification of Contracts – Essentials of a Valid Contract – Offer and Acceptance – Capacity – Consideration –Free Consent – Legality of Object –Performance of a Contract – Discharge of a Contract – Breach of a Contract and Remedies.
UNIT 2
Sales of Goods Act: Distinction between Sales and Agreement to Sell – Conditions and Warranties – Performance of Contract of Sale –Transfer of Ownership – Rights of an Unpaid Seller. Consumer Protection Act, 1986: Consumer Right –Machinery for Redressal of Consumer Grievances.- Information Technology Act 2000.
UNIT 3:
Contract of Agency: Kinds of Agents –Creation of Agency- Duties and Rights of Principal and Agents- Principal's Liability for the Acts of the Agent-Liability of Agent –Termination of Agency. Negotiable Instruments Act, 1881- Kinds of a Negotiable Instruments and endorsement- Presentation and discharge of Negotiable Instrument.
UNIT 4:
Indian Partnership Act, 1932: Meaning and Essentials of Partnership- Registration – Types of Partnership- Duties and Rights of Partners – Dissolution of Partnership.
UNIT 5
Company Act 2013: Nature and Types of Companies – Formation – Memorandum of Association-Articles of Association –Kinds of Shares –Duties of Directors-Winding up.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.
References:

1. Kuchhal M. C. – Business Law (Vikas Publication, 4th Edition)
2. Gulshan S. S. – Business Law Including Company Law (Excel Books)
3. Avtar Singh – Principles of Mercantile Law (Eastern Book Company, 7th Edition).
4. N.D. Kapoor & Rajni Abbi-General Laws & Procedures (Sultan Chand & Sons)
5. Kumar, Ravinder (2016), Legal aspects of Business – 4th edition, Cengage Publishers, New Delhi.
6. Relevant Acts

I MBA- II SEMESTER
Course Code: V18MBT13

BUSINESS ETHICS & CORPORATE GOVERNANCE

L	T	P	C
4	0	0	4

COURSE OUTCOMES:

1. Understand the importance of ethics and ethical practices at work place
2. Know various factors influencing Business ethics in India. Also get understanding of various scams.
3. Understand the ethical practices in functional areas such as Marketing, Hrm & Finance.
4. Understand the overview of corporate governance in India.
5. Gain knowledge in various governance issues related to Directors and Auditors.

UNIT 1:
Importance of Business Ethics: Values and Ethics- Business Ethics and Law – Ethics in Work Place – Ethical Decision Making- Theories of Business Ethics – Management and Ethics- Indian Ethical Traditions.
UNIT 2:
Impact of Globalization on Indian Business Ethics: Reasons for Unethical Practices among Indian companies – Development of Indian Capital Markets – Various studies on Ethical Attitudes of Managers Major Indian Scams.
UNIT 3:
Ethics in Marketing, HRM and Finance: Product safety and Pricing-Ethical responsibility in Product-Advertising and Target Marketing Ethics of sales, advertising and product placement and Consumer Autonomy. Ethics in HRM & Finance – HR related ethical issues - Institutional Culture – Frauds in Banks - Measures against Bank Frauds – Frauds in Insurance sector.
UNIT 4:
Corporate Governance: An overview – Theory and Practice of Governance- Indian model of Governance-Good Corporate Governance – Land marks in emergence of Governance OECD Principles – Sarbanes-Oxley Act 2002- SEBI Initiatives.
UNIT 5:
Corporate Governance Indian Scenario: Role of Government in Ensuring Corporate Governance – Governance issues relating to Board of Directors – Duties and responsibilities of Auditors – Governance under limited competition – Role of Media – Corporate Governance in Developing and Transiting Economies.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. S.K.Mandal: “Ethics in Business and Corporate Governance”, TMH, New Delhi, 2012.
2. Marianne M Jennings: “Cases in Business Ethics”, Cengage Learning, New Delhi,2012.
3. S.Prabhakaran: “Business Ethics and Corporate Governance”, Excel Books, New Delhi, 2011.
4. N.Balasubramanyam: “A Case Book on Corporate Governance and Stewardship”,TMH., New Delhi, 2011.
5. A.C.Fernando: “Business Ethics and Corporate Governance”, Pearson Publishers, New Delhi, 2013.

Minutes of the 2nd Academic Council meeting on 01/07/2018
Item No: 11
Annexure No: VIII

Academic Calendar (Autonomous)

Each Semester duration: 21 weeks (total)		
	Instruction	- 16 weeks
	MID Semester exams	-1 week
	Comprehensive Test	- 1 week
	Practical exams	-1 week
	End semester exams	-2 weeks

I Year (2018-19)

I Semester

S.No	Form	To	Activity	No. of Weeks
1	09/7/2018	21/7/2018	Induction Programme	2 weeks
2	23/7/2018	15/9/2018	Instruction	8 weeks
3	17/09/2018	19/9/2018	Mid-I	3 days
4	20/09/2018	14/11/2018	Instruction	8 weeks
5	15/11/2018	17/11/2018	Mid-II	3 days
6	19/11/2018	24/11/2018	Comprehensive test	1 week
7	26/11/2018	1/12/2018	Practical Exams	1 week
8	03/12/2018	15/12/2018	End Semester Exams	2 weeks
Total				**2+21=23**
1 Week Winter Break				

II SEMSTER

1	24/12/2018	16/2/2019	Instruction	8 weeks
2	18/2/2019	20/2/2019	Mid-I	3 days
3	21/2/2019	24/4/2019	Instruction	8 weeks
4	25/4/2019	27/4/2019	Mid-II	3 days
5	29/4/2019	4/5/2019	Comprehensive test	1 week
6	06/5/2019	11/5/2019	Practical exams	1 week
7	13/05/2019	25/5/2019	End Semester Exams	2 weeks
Total				21
5 weeks Summer Break				
Commencement of II Year- 01/07/2019				

SRI VASAVI ENGINEERING COLLEGE (Autonomous)

Pedatadepalli, Tadepalligudem – 534 101.

Third Meeting of the Academic Council was held on **02/06/2019 at 10:30 A.M**. in the Conference Hall of Sri Vasavi Engineering College.

Members Present:

1.	Dr.Guduru VNSR Ratnakara Rao	Principal & Chairman
2.	Prof. R. Srinivasa Rao,DE, JNTUK	Member
3.	Prof.P.Siva Pullaiah, Pro-Vice Chancellor, GITAM	Member
4.	Prof.B.V.S.S.S. Prasad, IIT Madras	Member
5.	Prof.S.R.K.Reddy, Gudlavelleru Engg.College	Member
6.	Sri B.V.Raghavaiah, Director (Retd.), CPRI, Bhopal	Member
7.	Dr. N.S.C. Babu, Executive Director, SETS	Member
8.	Dr.D.Sudha Rani, HOD, EEE	Member
9.	Dr.M.V.Ramesh, HOD, ME	Member
10.	Dr.E.Kusuma Kumari, HOD, ECE	Member
11.	Dr.D.Jaya Kumari, HOD, CSE	Member
12.	Dr.G.V.Subba Raju, HOD, MBA	Member
13.	Sri.N.Rajasekhar, HOD, BS&H	Member
14.	Dr.J.Srihari Rao, Director	Member
15.	Dr.V.V.Hanumantha Rao, Section Head, English	Member
16.	Sri P.Sita Rama Raju, Section Head, Physics	Member
17.	Sri J.Chandra Rao, Section Head, Chemistry	Member
18.	Sri.K.N.H.Srinivas, Assoc.Prof., ECE	Member
19.	Dr.Rama Rao P.V.V., Dean R&D	Member
20.	Sri.G.Radha Krishnan, HOD I/c, CE	Invited Member
21.	Sri V. Kiran Kumar, COE	Invited Member
22.	Dr. T. Sujani, Head Training	Invited Member
23.	Dr.Ch.Rambabu, Dean (SA)	Member Secretary

Members absent

1.	Dr. V.V. Subba Rao, Registrar JNTUK	Member
2.	Dr. A. Mallikarjuna Prasad, DAP JNTUK	Member
3.	Sri Lokam Prasad, CEO, Miracle Software Systems	Member

Minutes of the Third Academic Council Meeting held on 02/06/2019

Venue: Conference Hall

Item No.1: Welcome address by Principal& Introduction of members.

Principal Prof. Guduru VNSR Ratnakara Rao welcomed the members and chaired the meeting.

Item No.2: To approve Action taken report on the minutes of the previous meeting held on 01.07.2018.

The Council approved and the same is given in Annexure-I **(Page No.3)**

Item No.3: To approve of the minutes of the meeting of BOS of various departments:

a. Minutes of the 2nd meeting of the BOS of Mathematics (dated: 13.04.2019). [Details are given in Annexure-II **(Page No.9)]**
b. Minutes of the 2nd meeting of the BOS of **E**lectronics & **C**ommunication **E**ngineering **(ECE)** (dated: 13.04.2019). [Details are given in Annexure-III **(Page No.12)]**
c. Minutes of the 2nd meeting of the BOS of MBA (dated: 16.04.2019). [Details are given in Annexure-IV **(Page No.44)]**
d. Minutes of the 2nd meeting of the BOS of English (dated: 19.04.2019). [Details are given in Annexure-V **(Page No.106)]**
e. Minutes of the 2nd meeting of the BOS of **C**ivil **E**ngineering (**CE**) (dated: 20.04.2019). [Details are given in Annexure-VI **(Page No.116)]**
f. Minutes of the 2nd meeting of the BOS of **E**lectrical & **E**lectronics **E**ngineering (**EEE**) (dated: 20.04.2019). [Details are given in Annexure-VII **(Page No.149)]**
g. Minutes of the 2nd meeting of the BOS of **C**omputer **S**cience & **E**ngineering (**CSE**) (dated: 20.04.2019). [Details are given in Annexure-VIII **(Page No.172)]**
h. Minutes of the 2nd meeting of the BOS of **M**echanical **E**ngineering (**ME**) (dated: 21.04.2019). [Details are given in Annexure-IX **(Page No.219)]**

The Council approved minutes of the meeting of BOS of various departments.

Item No.4: Any other item with the permission of the Chair

i) The proposed B.Tech, MBA III & IV Semester Academic Calendar was also presented and it was approved by the council. [Details are given in Annexure-X **(Page No.250)]**

ii) Conditions for Promotion of Lateral Entry Students [Details are given in Annexure-XI **(Page No.253)]**

Annexure-I

Minutes of the Second Academic Council Meeting held on 01/07/2018

Item No.1: Welcome address by Principal& Introduction of members.

Principal Dr.Guduru.V.N.S.R Ratnakara Rao welcomed the members and chaired the meeting.

Item No.2: Approval of the minutes of the previous meeting

Minutes of the 1st meeting which were already circulated to members are approved.

Item No.3: To approve the Rules & Regulations to the award of degree

Detailed rules and regulations for the award of B.Tech degrees offered by Sri Vasavi Engineering College (Autonomous) were presented. After deliberations with minor changes the rules and regulations are approved. These are applicable for the batch of students admitted in Academic Year 2018-19 and onwards.

Item No.4: To approve the common course structure for different branches of B.Tech program.

The common course structures for different branches during the I and II semesters of the B.Tech programme are presented.

Item No.5: To approve the syllabi for different courses offered in I and II semester of B.Tech Programme.

Syllabus for different courses along with course outcomes, number of contact hours, number of credits and the prescribed textbooks as recommended by BOS concerned are presented.

Item No.6: To approve the course structures of II, III & IV years of different B.Tech programmes.

Tentative course structures for II, III & IV years of B.Tech programmes are presented.

These will be approved after further discussion in the next meeting.

Item No.7: To approve the rules and regulations pertaining to the award of M.Tech degrees offered by the college

The regulations pertaining to the M.Tech programme are presented.

Item No.8: To approve the course structure and syllabi for M.Tech programme offered by the college

Detailed course structures along with syllabi as recommended by BOS concerned for the different M.Tech programmes offered by the college namely

i. M.Tech (Structural Engineering)
ii. M.Tech (Power System Control and Automation)
iii. M.Tech (Machine Design)
iv. M.Tech (VLSI & Embedded Systems)
v. M.Tech (Computer Science &Engineering)

are presented.

Item No.9: To approve the Rules and Regulations pertaining to the award of MBA programme offered by the college

Council resolved that the regulations will be at far with those for M.Tech programme except for minor difference in arriving at the internal marks for the theory courses and in project evaluation.

Item No.10: To approve the course structure and syllabi for the MBA programme

Detailed course structure along with syllabi as recommended by BOS concerned is presented.

Item No.11: Any other item

The tentative academic schedule for the 1st year of B.Tech programme under autonomy is presented.

Meeting concluded with vote of thanks by the Member Secretary.

The Academic Rules & Regulations approved by the council were followed for the academic Year 2018-19.

- **Details of Academic Calendar:**

S.No	Content	B.Tech	M.Tech	MBA
1.	Commencement of Class work for I Sem	03/08/2018	13/08/2018	13/08/2018
2.	End of Class work for I Sem	29/11/2018	18/12/2018	06/12/2018
3.	Commencement of Class work for II Sem	02/01/2019	21/01/2019	07/01/2019
4.	End of Class work for II Sem	02/05/2019	18/05/2019	08/05/2019

- **Details of student attendance for I & II Sem of U.G & P.G:**

S.No	Content	B.Tech		M.Tech		MBA	
		I Sem	II Sem	I Sem	II Sem	I Sem	II Sem
1.	<65% (Detained)	12	5	1	Nil	3	1
2.	65-74.99%	18	28	2	Nil	3	7
3.	>75%	565	550	23	25	55	50

- **Details of Student attendance for II, III, IV B.Tech I & II Semester for the A.Y. 2018-19:**

S.No	Content	II B.Tech		III B.Tech		IV B.Tech	
		I Sem	II Sem	I Sem	II Sem	I Sem	II Sem
1.	<65% (Detained)	16	8	10	8	4	1
2.	65-74.99%	70	92	45	54	57	76
3.	>75%	668	637	715	698	704	684

- **Details of Placements for the A.Y 2018-19:**

  No. of Companies: **45**

  No. of Students Placed: **450**

- **Details of Internships for the A.Y. 2018-19:**

  No. of Students gone for Internships: **114**

Results

B.Tech I Semester Result:

S. No.	Branch & Section	Appeared	Passed	Failed	Pass %
1.	CE	42	28	14	66.67
2.	EEE	46	38	8	82.61
3.	ME-A	42	17	25	40.48
4.	ME-B	38	32	6	84.21
5.	ECE-A	59	32	27	54.24
6.	ECE-B	59	50	9	84.75
7.	ECE-C	60	55	5	91.67
8.	CSE-A	58	27	31	46.55
9.	CSE-B	60	59	1	98.33
10.	CSE-C	59	55	4	93.22
11.	CSE-D	60	57	3	95.00
Overall		**583**	**450**	**133**	**77.18**

MBA I Semester Result:

S.No	Programme	Appeared	Passed	Failed	Pass %
1	MBA	58	43	15	**74.14%**

M.Tech I Semester Result:

S.No	Specialization	Appeared	Passed	Failed	Pass %
1.	STE	7	6	1	85.71
2.	PSCA	3	3	0	100
3.	MD	9	7	2	77.77
4.	VLSI&ES	1	1	0	100
5.	CSE	5	5	0	100
6.	**Overall**	**25**	**22**	**3**	**88.00%**

II B.Tech I Semester Result:

S. No.	Branch & Section	Appeared	Passed	Failed	Pass %
1.	CE	70	27	43	38.57
2.	EEE-A	35	13	22	37.14
3.	EEE-B	38	15	23	39.47
4.	EEE-C	58	29	29	50.00
5.	ME-A	64	22	42	34.38
6.	ME-B	61	29	32	47.54
7.	ECE-A	68	28	40	41.18
8.	ECE-B	66	30	36	45.45
9.	ECE-C	65	33	32	50.77
10	CSE-A	55	33	22	60.00
11	CSE-B	54	31	23	57.41
12	CSE-C	55	28	27	50.91
13	CSE-D	50	25	25	50.00
Overall		**739**	**343**	**396**	**46.41%**

III B.Tech I Semester Result:

S. No.	Branch & Section	Appeared	Passed	Failed	Pass%
1.	CE	65	28	37	43.08
2.	EEE-A	61	30	31	49.18
3.	EEE-B	59	28	31	47.46
4.	ME-A	69	26	43	37.68
5.	ME-B	71	20	51	28.17
6.	ECE-A	72	42	30	58.33
7.	ECE-B	66	35	31	53.03
8.	ECE-C	61	30	31	49.18
9.	CSE-A	62	53	9	85.48
10.	CSE-B	60	47	13	78.33
11.	CSE-C	52	40	12	76.92
12.	CSE-D	61	48	13	78.69
Overall		**759**	**427**	**332**	**56.25%**

IV B.Tech I Semester Result:

S. No.	Branch & Section	Appeared	Passed	Failed	Pass %
1.	CE	70	61	9	87.14
2.	EEE-A	59	47	12	79.66
3.	EEE-B	61	54	7	88.52
4.	ME-A	67	39	28	58.21
5.	ME-B	59	41	18	69.49
6.	ECE-A	67	37	30	55.22
7.	ECE-B	71	49	22	69.01
8.	ECE-C	64	43	21	67.19
9.	CSE-A	63	45	18	71.43
10.	CSE-B	59	50	9	84.75
11.	CSE-C	58	48	10	82.76
12.	CSE-D	63	52	11	82.54
Overall		**761**	**566**	**195**	**74.37%**

Annexure-II

Minutes of the meeting, BOS Mathematics (Held on 13.04.2019)

Item No-1: Introducing the members of BOS by Chairman.

The chairman of BOS extended a formal welcome and introduced the members.

Item No.2: Syllabi for the courses offered in MBA III and IV Semesters.

The detailed syllabi for the courses Employability Skills-III (Aptitude) & Employability Skills-IV (Aptitude) along with prescribed text books have been presented. With minor changes, the syllabi for the courses mentioned above have been approved. The approved syllabi for the courses are given in Appendix-BSH(M)-01.

Item No.3: Review of the Syllabi for the A.Y. 2018-19, I & II Semester of B.Tech & M.Tech Programme

No changes were suggested.

Proposed Syllabus

Year/Sem	**MBA III Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation Year	2019-2020	2	-	-	MNC*	**V18MAT07**
Name of the Course	Employability Skills – III (Aptitude-1)					

(*MNC : Mandatory Non Credit Course)

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

1. Investigate different types of logics. (K4)
2. Classify Ages and solve problems on Averages. (K2)
3. Identify accurate direction, find out angles between hands of the clock and find a day in a particular Calendar. (K3)
4. Improve problem solving skills through the concepts of Percentages, Profit &loss, and Partnership. (K3)
5. Summarize appropriate methods of logical thinking on "Ratio and Proportion"(K4)

Unit-1 SET THEORY & ANALYTICAL REASONING. Definition and concept of Venn Diagram – its applications. statements – Affirmations,

Unit-2 AVERAGES &PROBLEMS ON AGES Problems on ages with different logics. Averages and its various Interpretations, Definition and Properties, Applications of average in different cases such as Allegations – Methods of solving equations.

Unit-3 CLOCK, CALENDER & DIRECTIONS Deriving the formula to find the angle between hands for the given time, finding the time if the angle is known. History of calendar-Define year, leap year, Finding the day for the given date, Formula and method to find the day for the given date in easy way. Usage of directions north, south, east, west, Problems related to directions north, south, east, west.

Unit-4 PERCENTAGES, PROFIT AND LOSS, PARTNERSHIP Problems on percentages-Converting fractions into percentages and vice versa, Understanding of cost price, selling price, marked price, discount, percentage of profit, percentage of loss, percentage of discount, Introduction of partnership, Sleeping partner concept and problems

Unit-5 RATIO & PROPORTION Introducing the concept of ratio in three different methods, a method to compute and compare two ratios – The effect of increase or decrease of a quantity on the ratio – The meaning of proportion and Problems related to Ratio and Proportion.

TEXT BOOK:

Work book -1 on Aptitude Prepared by Training & Placement cell, Sri Vasavi Engineering College.

References: Quantitative Aptitude by

R.S. Agarwal – Sultan Chand Publications

Proposed Syllabus

Year/Sem	**MBA IV Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation Year	2019-2020	2	-	-	MNC*	**V18MAT08**
Name of the Course	Employability Skills – IV (Aptitude-2)					

(*MNC : Mandatory Non Credit Course)

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

1. Determine various methods of Simple and compound Interest. (K5)
2. Improve problem solving skills through the concepts of "Time & Work"(K3)
3. Find the relationship among Time, Speed and Distance. (K3)
4. RelateNumbers and Letters and solvedifferent problems on Number system. (K1)
5. Analyze and solve the problems on Data Analysis. (K4)

Unit-1 SIMPLE AND COMPOUND INTEREST Definition of Simple and Compound Interest. Formulas of Applications – Difference between Simple and Compound interest – Rate of Increase or Decrease Population

Unit-2 TIME AND WORK Men Days Relation for completion of work – Capability Ratio among Men, Women and Children – Application of time in Pipes and Cistern. Work Progress in positive and negative effects.

Unit-3 TIME & DISTENCE Relation among Time Speed and Distance – Concepts of Relative speed and Average Speed – Ideas about Boats and Streams.

Unit-4 NUMBER SYSTEM AND RANKING Problems of how to find the next number in the series, Finding the missing number and related sums, , Sums related to Classification, Sums related to letter series, Relation between number series and letter series and find the Ranking.

Unit-5 DATA ANALYSIS & INTERPRETATION. Mastering the art of analyzing the data of different forms – Understanding qualitative and quantitative research.

TEXT BOOK:

Work book -II on Aptitude Prepared by T & P cell, Sri Vasavi Engineering College.

References: Quantitative Aptitude by

R.S. Agarwal – Sultan Chand Publications

Annexure-III

Minutes of the meeting, BOS of Electronics & Communication Engineering

(Held on 13.04.2019)

The ECE Department Board of Studies (BOS) meeting was conducted on 13.4.2019 at 10.30 A.M. at ECE Seminar hall. The following external members attended the meeting along with internal faculty members.. The ECE HOD, Dr E. Kusuma Kumari, BOS Chairman headed the meeting.

Details of members attended:

S.No	Name of the BOS Member	Nominee	Address
1.	Dr.E.Kusuma Kumari	Chair person	Professor & Head, ECE, SVEC
2.	Prof.I.Santhi Prabha	University Nominee	Prof.in ECE Dept., University College of Engg.,JNTUK, Kakinada
3.	Prof. M. Venugopala Rao	Subject Expert	Prof., ECE Dept., K.L.University, Vijayawada.
4.	Sri. Sunkavalli Siva Kumar	Alumni Nominee	Sr.Engineer,Qualcomm,Bangalore.
5.	Dr. P. Kishore Kumar	Invited Member	Asst.Professor, HOD, ECE,NIT, A.P
6.	All Faculty Members in Dept.	Members	ECE Dept., SVEC

The following are the key points discussed in the meeting.

Key Discussions:

- **Item No.1: Review of the B. Tech ECE Course Structure**

- The Chairman and BOS members reviewed the course structure of B. Tech ECE and suggested modifications in the structure.
- Members suggested to combine Analog Communication(V18ECT07) in IV sem and Digital communication(V18ECT11) in V Sem courses as a single course as Analog & Digital Communication Course (V18ECT07)
- Members suggested to include Advanced communication course (V18ECT16) in the VI Semester.
- Members suggested to combine the lab courses Analog Comm. Lab (V18ECL05) & Digital Communications Lab (V18ECL07) as a Communications Lab (V18ECL05) and to be included in IV Semester.
- In 5th Semester theory course Digital Communication (V18ECT11) & Digital Comm. Lab Course (V18ECL07) are replaced with Digital Signal Processing

(V18ECT11) & Lab Courses (V18ECL07)

- Members suggested to include lab Course Mini Project using IOT(V18ECL12) and Theory Course Artificial Intelligence (V18ECT24) as program Elective Course in the course structure
- English BOS has renamed the titles of mandatory Courses Employability Skills I (V18ENT03) & Employability Skills II (V18ENT04) to Professional Communication Skills I (V18ENT03) & Professional Communication Skills II (V18ENT04) respectively in the III & IV Semesters of Course structure.
- It was decided that the mandatory Course Constitution of India (V18ENT11) to be included instead of Indian Traditional Knowledge (V18ENT07) in the III Semester of Course structure.
- The approved course structure for the Academic Year 2019-20 was given in **Appendix-ECE-01**

➢ **Item No.2: Suggest syllabi for proposed III and IV Semester course structure for the Academic year 2019- 2020**

- The approved syllabi for courses offered in III &IV Semesters are given in **Appendix-ECE-02**
  - For EEE & CSE Programmes, the following courses and Syllabus are approved and it was given in **Appendix-ECE-03**

S.No.	Programme	SEM	Course Code	Course Name
1	EEE	III	V18ECT05	Analog Electronics
2	EEE	III	V18ECL03	Analog Electronics Lab
3	CSE	III	V18ECT06	Digital Electronics
4	CSE	III	V18ECL04	Digital Electronics Lab

➢ **Item No 3: Approval for Course Structure For New Programme Electronics & Communication Technology**

- The Institution has filed an application with approved authorities for grant of New Programme Electronics & Communication Technology (ECT) for the academic year 2019-20.
- In this connection it is decided to follow the prescribed course structure of ECE I Semester & II Semester for the academic year 2019-20 for the new Programme ECT. Details are given in **Appendix-ECE-04.** Finally, the chairman thanked to all the BOS members and faculty. The meeting ended at 4.30 P.M

Appendix-ECE-01

III Semester

S. No	Course Code	Course Name	L	T	P	Credits
1	V18ECT01	Electronic Devices & Circuits	3	1	-	4
2	V18ECT02	Digital System Design	3	-	-	3
3	V18ECT03	Signals & Systems	3	1	-	4
4	V18ECT 04	Network Theory	3	-	-	3
5	V18MBT51	Managerial Economics & Financial Analysis	3	-	-	3
6	V18ECL01	Electronic Devices & Circuits LAB	-	-	2	1
7	V18ECL02	Digital System Design LAB	-	-	2	1
8	V18ENT03	Professional Comm. Skills- I	3	-	-	MNC
9	V18ENT11	Constitution of India	2	-	-	MNC
		TOTAL	**20**	**2**	**4**	**19**

Total Contact Hours: 26 **Total Credits : 19**

IV Semester

S. No	Course Code	Course Name	L	T	P	Credits
1	V18ECT07	Analog & Digital Communications	3	1	-	4
2	V18ECT08	Analog Circuits	3	1	-	4
3	V18ECT09	Probability Theory & Stochastic Process	3	1	-	4
4	V18ECT10	Electromagnetic Waves & Transmission Lines	3	1	-	4
5	V18MAT03	Mathematics-III	3	-	-	3
6	V18ECL 05	Communications Lab	-	-	2	1
7	V18CSL32	Object Oriented Programming Through Java Lab	-	-	2	1
8	V18ECL06	Analog Circuits Lab	-	-	2	1
9	V18ENT04	Professional Comm Skills- II	3	-	-	MNC
		TOTAL	**18**	**4**	**6**	**22**

Total Contact Hours: 28 **Total Credits: 22**

III - SEMESTER

Course : Electronic Devices And Circuits

Code : V18ECT01

L	T	P	C
3	1	-	4

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

1. Explain the basic concepts of semiconductor physics and explain the formation of p-n Junction. **[K2]**
2. Discuss special semiconductor diodes. **[K2]**
3. Construct and working principle of rectifiers with and without filters with relevant expressions and necessary comparisons **[K3]**
4. Describe the construction, principle of operation of transistors, BJT and FET with their V-I characteristics in different configurations. **[K2]**
5. Explain the need of transistor biasing, various biasing techniques for BJT and FET and stabilization concepts with necessary expressions. **[K2]**
6. Analyze small signal low frequency transistor amplifier circuits using BJT and FET in different configurations. **[K4]**

Syllabus:

UNIT-I:Semi Conductor Physics & Junction diode characteristics: Review of semiconductor physics, continuity equation, law of junction, p-n junction diode, current components in PN junction Diode, derivation of diode equation, V-I Characteristics, Diode resistance, Diode capacitance, energy band diagram of PN junction Diode.

UNIT- II: Special Semiconductor Diodes: Zener Diode, Breakdown mechanisms, Zener diode applications, LED, LCD, LDR, Photo diode, Photo transistor, Varactor diode, Tunnel Diode, DIAC, TRIAC, SCR, UJT, Construction, operation and characteristics of all the diodes are required to be considered.

UNIT- III: Rectifiers and Filters: Basic Rectifier setup**,** half wave rectifier, full wave rectifier, bridge rectifier, derivations of characteristics of rectifiers, rectifier circuits-operation, input and output waveforms, Filters, Inductor filter, Capacitor filter, L-section filter, π-section filter multiple L section and π-section filter, derivation for ripple factor in each case.

UNIT- IV: Transistor Characteristics: BJT: Junction transistor, transistor current components, transistor equation, transistor configurations, transistor as an amplifier, characteristics of transistor in Common Base, Common Emitter and Common Collector configurations, punch through/ reach through, typical transistor junction voltage values.

FET: FET types, construction, operation, characteristics, parameters, MOSFET-types, construction, operation, characteristics, comparison between JFET and MOSFET.

UNIT- V: Transistor Biasing and Thermal Stabilization: Need for biasing, operating point, load line analysis, BJT biasing- methods, basic stability, fixed bias, collector to base bias, self bias, Stabilization against variations in VBE, Ic, and β, Stability factors, (S, S', S''), Bias compensation, Thermal runaway, Thermal stability. FET Biasing.

UNIT- VI: Small Signal Low Frequency Transistor Amplifier Models:

BJT: Two port network, Transistor hybrid model, determination of h-parameters, conversion of h-parameters, Generalized analysis of transistor amplifier model using h-parameters, Analysis of CB, CE and CC amplifiers using exact and approximate analysis, Comparison of transistor amplifiers. Generalized analysis of FET amplifier small signal model, analysis of CS amplifier.

Text Books:

1. Electronic Devices and Circuits- J. Millman, C. Halkias, Tata Mc-Graw Hill, Second Edition.

2. Integrated Electronics- Jacob Millman, C. Halkies, C.D.Parikh, Tata Mc-Graw Hill, 2009.

3. Electronic Devices and Circuits – R.L Boylestad and Louis Nashelsky, Pearson publications

References:

1. Electronic Devices and Circuits-K. Satya Prasad, VGS Book Links.

2. Electronic Devices and Circuits-Salivahanan, Kumar, Vallavaraj, Tata Mc-Graw Hill, Second Edition

3. Electronic Devices and Circuits – Bell, Oxford

4. Electronic Devices and Circuits-A.P Godse,U.A.Bakshi , Technical publications

Course: Digital System Design
Code:V18ECT02

L	T	P	C
3	-	-	3

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

1. Explain the various types of number systems and their conversions, codes and logic Gates.(K_2)
2. Apply the minimization techniques to simplify the hardware requirements of digital circuits. (K_3)
3. Develop basic digital circuits with combinational logic using IEEE Standard 1076 Hardware Description Language (VHDL). (K_3)
4. Develop basic digital circuits with sequential logic using IEEE Standard 1076 Hardware Description Language (VHDL). (K_3)
5. Apply the knowledge of flip flops to construct different finite state machines (K_3)
6. Explain the concepts of different programmable logic devices. (K_2)

UNIT – I: NUMBER SYSTEMS & CODES

i) Representation of numbers of different radix, conversion from one radix to another radix, r-1's and r's complements of signed members, problem solving.
ii) 4 bit codes, BCD, Excess-3, 2421, 84-2-1 code etc.,
iii) Basic logic operations -NOT, OR, AND, Universal building blocks, EX-OR, EX-NOR - Gates, Standard SOP and POS forms, Gray code, error detection and correction codes, NAND-NAND and NOR-NOR realizations.

UNIT – II: MINIMIZATION TECHNIQUES

Boolean theorems, principle of complementation & duality, De-Morgan theorems, minimization of logic functions using Boolean theorems, minimization of switching functions using K-Map up to 4 variables, tabular minimization, problem solving (code-converters using K-Map etc..).

COMBINATIONAL LOGIC CIRCUITS DESIGN - I

Design of half adder, full adder, half subtractor, full subtractor, 4-bit adder-subtractor circuit, BCD adder circuit, Look-a-head adder circuit.

UNIT – III: COMBINATIONAL LOGIC CIRCUITS DESIGN -II

Design of decoder, encoder, priority encoder, multiplexer and demultiplexer, 4-bit digital comparator, Higher order multiplexing and demultiplexing, Realization of Boolean functions using decoders and multiplexers, Modeling of combinational logic circuits using VHDL.

UNIT – IV: SEQUENTIAL CIRCUITS-I

Classification of sequential circuits, basic flip-flops, truth tables and excitation tables, Conversion from one flip-flop to another flip-flop.
Design of registers: shift register, bi-directional shift register and universal shift register. Design of ripple counters, design of synchronous counters, Johnson counter, ring counter. Modeling of sequential circuits using VHDL

UNIT – V: SEQUENTIAL CIRCUITS-II

Finite state machine, Analysis of clocked sequential circuits, state diagrams, state tables, reduction of state tables and state assignment, design procedures. Realization of circuits using various flip-flops. Mealy to Moore conversion and vice-versa.

UNIT-VI: INTRODUCTION TO PLDs

PROM, PAL, PLA-Basics structures, merits & demerits, comparison, realization of Boolean functions and programming tables using PROM, PAL, PLA.

TEXT BOOKS:

1. Switching and finite automata theory-Zvi Kohavi,TMH, 2nd edition, 2008
2. Switching Theory and Logic Design - A. Anand Kumar, PHI Learning Pvt. Ltd, 3rd edition, 2016.
3. Digital Design Principles & Practices – John F. Wakerly, PHI/ Pearson Education Asia, 3rd edition, 2005.
4. Digital Design - M.Morris Mano, Michael D Ciletti, Pearson Education Asia, 4th edition.
5. VHDL Primer – J. Bhasker, Pearson Education/ PHI, 3rd Edition.

REFERENCES:

1. Modern Digital Electronics - RP Jain, TMH Education Pvt., Ltd.,, 4th edition, 2010.
2. Fundamentals of Logic Design - Charles H. Roth Jr, Jaico Publishers.
3. Fundamentals of Digital Logic with VHDL Design- Stephen Brown, ZvonkoVranesic, McGraw-Hill, 3rd Edition.

Course : Signals & Systems
Code : V18ECT03

L	T	P	C
3	1	-	4

Prerequisite: Fundamentals of Electrical Circuits, Linear Algebra and Differential Equations, Ordinary Differential Equations.

<u>COURSE OUTCOMES:</u>

After successful completion of the course, the student will be able to:

CO1: Apply the knowledge of linear algebra to vector space& analogy, orthogonality and basic signals.K3

CO2: Classify systems based on their properties and determine the response of LTI system using convolution K2

CO3: Analyze the spectral characteristics of continuous-time signals and systems using Fourier analysis K4

CO4: Apply sampling theorem concept to convert continuous time signals to discrete time signal and reconstruct.K3

CO5: Apply Laplace transform and inverse Laplace transform to analyze continuous time signals and systems with respect to ROC.K3

CO6: Apply Z transform to analyze discrete time signals and systems with respect to ROC.K3

UNIT-I

BASIC SIGNALS: Introduction to signal and system, Classification of Signals, Elementary signals, Signal properties and operations, Orthogonal signal space, Signal approximation using orthogonal functions.

UNIT-II

LINEAR-TIME INVARIANT SYSTEMS: Properties of Systems, Continuous-Time LTI Systems: The Convolution Integral; Properties of Linear Time-Invariant Systems; Causal LTI Systems Described by Differential and Difference Equations.

UNIT III

FOURIER SERIES REPRESENTATION OF PERIODIC SIGNALS: Trigonometric and Exponential fourier series, Fourier Series Representation of Continuous-Time Periodic Signals(Sinusoidal, triangular and square); Convergence of the Fourier Series.

Fourier Transforms: Representation of Aperiodic Signals; The Continuous-Time Fourier Transform; The Fourier Transform for Periodic Signals; Properties of Continuous-Time Fourier Transform.

UNIT-IV

Representation of a Continuous-Time Signal by its Samples; The Sampling Theorem; Reconstruction of a Signal From its Samples; The Effect of Under Sampling; Aliasing; Discrete-Time Processing of ContinuousTime Signals; Sampling of Discrete-Time Signals.

UNIT-V

Laplace Transforms: The Laplace transform; The Region of Convergence for Laplace Transforms; The Inverse Laplace Transform; Properties of the Laplace Transform; Laplace Transform Pairs; Analysis and Characterization of LTI Systems Using the Laplace Transform.

UNIT-VI

Z-Transforms: The Region of Convergence for the Z-Transform; Properties of the Z-Transform; Z-Transform Pairs; Analysis and Characterization of LTI Systems using Z-Transforms.

TEXT BOOKS:

1. Signals and Systems, A.V. Oppenheim and A.S. Willsky with S. H. Nawab, Second Edition, PHI Private limited.
2. Signals and Systems, Second Edition, S. Haykin and B. Van Veen, John Wiley & Sons.
3. B. P. Lathi, "Principles of Linear Systems and Signals", Second Edition, Oxford, 2009.

REFERENCES:

1. R.E.Zeimer, W.H.Tranter and R.D.Fannin, "Signals & Systems - Continuous and Discrete", Pearson, 2007.
2. John Alan Stuller, "An Introduction to Signals and Systems", Thomson, 2007. 40
3. M.J.Roberts, "Signals & Systems Analysis using Transform Methods & MATLAB", Tata McGraw Hill, 2007.
4. ocw.mit.edu › Supplemental Resources › Signals and Systems
5. www.satishkashyap.com/2012/04/iit-video-lectures-on-signals-and.html
6. nptel.ac.in/courses/117104074/1
7. www.cdeep.iitb.ac.in/nptel/.../Signals%20and%20System/TOC-M1.htm
8. freevideolectures.com/Subject/Signals-Systems

Course : Network Theory
Code : V18ECT04

L	T	P	C
3	-	-	3

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

1. Solve the electrical network using mesh and nodal analysis (K3)
2. Apply network theorems to analyze the Electric circuits.(K3)
3. Explain RLC transient circuits and Filters (K2)
4. Describe the steady state analysis of RLC circuits (K2)
5. Analyze the resonance circuits (K4)
6. Solve the two port network parameters (K3)

UNIT – I

Introduction to Electrical Circuits : Network elements classification, Electric charge and current, Electric energy and potential, Resistance parameter – series and parallel combination, Inductance parameter – series and parallel combination, Capacitance parameter – series and parallel combination. Energy sources: Ideal, Non-ideal, Independent and dependent sources, Source transformation, Kirchoff's laws, Mesh analysis and Nodal analysis problem solving with resistances only including dependent sources.

Unit-II

Network theorems: Thevinin's, Norton's, Milliman's, Reciprocity, Compensation, Substitution, Superposition, Max Power Transfer, - problem solving using dependent sources also.

UNIT – III

Transients: Definition of time constants, R-L circuit, R-C circuit with DC excitation, Evaluating initial conditions procedure, problem solving using R-L-C elements with DC excitation. Solutions using Laplace transform method.

UNIT – IV

Steady State Analysis of A.C Circuits: Response to sinusoidal excitation - pure resistance, pure inductance, pure capacitance, impedance concept, phase angle, series R-L, R-C, R-L-C circuits problem solving. Complex impedance and phasor notation for R-L, R-C, R-L-C problem solving using mesh and nodal analysis, problem solving.

UNIT – V

Resonance: Introduction, Definition of Q, Series resonance, Bandwidth of series resonance, Parallel resonance, Condition for maximum impedance, current in anti resonance, Bandwidth of parallel resonance, anti resonance at all frequencies.

UNIT – VI

Two-port networks: Relationship of two port networks, Z-parameters, Y-parameters, Transmission parameters, h-parameters, Relationship between parameter sets, Parallel connection of two port networks, Cascade connection of two port networks, series connection of two port networks, problem solving.

TEXT BOOKS:

1. Electric Circuit Analysis by Hayt and Kimmarle, TMH Eigth Edition ,2012.
2. Network Analysis by Van-Valkenberg.

REFERENCES:

1. Circuit Theory (Analysis and Synthesis) By ABHIJIT Chakrabarti 7th Revised Edition,Dhanpat Rai &Co.
2. Basic Circuit Analysis by DR Cunninghan, Jaico Publishers.
3. Network Analysis and Filter Design by Chadha, Umesh Publications.
4. Circuits & Network Analysis & Synthesis - A.Sudhakar & Shyam Mohan S.Pillai Tata McGraw Hill, 2nd Edition, 1994.

Course : Managerial Economics and Financial Analysis
Code : V18MBT51

L	T	P	C
3	-	-	3

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO1: Understand the basic concepts of managerial economics, demand, and elasticity of demand and methods of demand forecasting. **[K2]**

CO2: Estimate the production function with one, two and infinite variables. Understand various cost concepts and calculating breakeven point **[K2]**

CO3: Understand and showing a price output determination in different types of market structures and knowing various pricing methods **[K2]**

CO4: Understand various forms of business organizations **[K2]**

CO5: Prepare financial statements and its analysis. **[K3]**

CO6: Appraise the projects by using various capital budgeting methods **[K4]**

UNIT-I Introduction to Managerial Economics and demand Analysis: Definition of Managerial Economics –Scope of Managerial Economics and its relationship with other subjects – Concept of Demand, Types of Demand, Determinants of Demand- Demand schedule, Demand curve, Law of Demand and its limitations- Elasticity of Demand, Types of Elasticity of Demand and Measurement- Demand forecasting and Methods of forecasting..

UNIT – II Production and Cost Analyses: Concept of Production function- Cobb-Douglas Production function- Law of Variable proportions-Isoquants and Isocosts and choice of least cost factor combination-Concepts of Returns to scale and Economies of scale-Different cost concepts: opportunity costs, explicit and implicit costs- Fixed costs, Variable Costs and Total cost –Cost–Volume-Profit analysis-Determination of Breakeven point(simple problems)Managerial significance and limitations of Breakeven point.

UNIT – III Introduction to Markets, & Pricing Policies: Market Structures: Perfect Competition, Monopoly, Monopolistic competition and Oligopoly – Features – Price and Output Determination – Methods of Pricing: Average cost pricing, Limit Pricing, Market Skimming Pricing, Internet Pricing, Flat Rate Pricing, Usage sensitive pricing and Priority Pricing.

UNIT – IV Types of Business Organization and Business Cycles: Features and Evaluation of Sole Trader, Partnership, Joint Stock Company – State/Public Enterprises and their forms – Business Cycles : Meaning and Features – Phases of Business Cycle.

UNIT – V Introduction to Accounting & Financing Analysis: Introduction to Double Entry Systems – Preparation of Financial Statements-Analysis and Interpretation of Financial Statements-Ratio Analysis

UNIT – VI Capital and Capital Budgeting: Capital Budgeting: Meaning of Capital-Capitalization-Meaning of Capital Budgeting-Time value of money- Methods of appraising Project profitability: Traditional Methods and modern methods (simple problems)

TEXT BOOKS

1. Dr. N. AppaRao, Dr. P. Vijay Kumar: 'Managerial Economics and Financial Analysis',Cengage Publications, New Delhi – 2011
2. Dr. A. R. Aryasri – Managerial Economics and Financial Analysis, TMH 2011
3. Prof. J.V.Prabhakararao, Prof. P. Venkatarao. 'Managerial Economics and Financial Analysis', Ravindra Publication.

REFERENCES:

1. Shailaja Gajjala and Usha Munipalle, Univerties press, 201 Dr. B. Kuberudu and Dr. T. V. Ramana: Managerial Economics & Financial Analysis, Himalaya Publishing House, 2014.
2. V. Maheswari: Managerial Economics, Sultan Chand.2014
3. Suma Damodaran: Managerial Economics, Oxford 2011.
4. VanithaAgarwal: Managerial Economics, Pearson Publications 2011.
5. Sanjay Dhameja: Financial Accounting for Managers, Pearson
6. Maheswari: Financial Accounting, Vikas Publications.
7. S. A. Siddiqui&A. S. Siddiqui: Managerial Economics and Financial Analysis, New Age International Publishers, 2012
8. Ramesh Singh, Indian Economy, 7th Edn., TMH2015
9. Pankaj Tandon A Text Book of Microeconomic Theory, Sage Publishers, 2015

Course: Electronic Devices and Circuits Lab
Code : V18ECL01

L	T	P	C
-	-	2	1

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO-1 : Identify, Test and describe the specifications of various components. **[K2]**
CO-2: Find the unknown Frequency using Cathode Ray Oscilloscope. **[K1]**
CO-3: Interpret the Characteristics of various semiconductor devices. **[K2]**
CO-4: Sketch the Regulation Characteristics of Zener Diode. **[K3]**
CO-5: Examine the Performance of Rectifiers with and without Filters. **[K3]**
CO-6 : Sketch the Frequency Response of Amplifiers and Compute Bandwidth. **[K3]**

Electronic Workshop Practice:

1. Identification, Specifications, and Testing of R, L, C Components (Colour Codes), Potentiometers, Coils, Gang Condensers, Relays, Bread Boards.
2. Identification, Specifications and Testing of active devices like Diodes, BJTs, JFETs, LEDs, UJT.
3. Study and operation of Ammeters, Voltmeters, Transformers, Analog and Digital Multimeter, Function Generator, Regulated Power Supply and CRO..

List of Experiments:

1. P-N Junction Diode Characteristics
   Part A: Germanium Diode (Forward bias only)
   Part B: Silicon Diode (Forward & Reverse bias)
2. Rectifiers (without and with c-filter)
   Part A: Half-wave Rectifier
   Part B: Full-wave Rectifier
3. Zener Diode Characteristics
   Part A: V-I Characteristics
   Part B: Zener Diode as Voltage Regulator
4. BJT Characteristics (CB Configuration)
   Part A: Input Characteristics
   Part B: Output Characteristics
5. BJT Characteristics (CE Configuration)
   Part A: Input Characteristics
   Part B: Output Characteristics
6. FET Characteristics (CS Configuration)
   Part A: Drain Characteristics
   Part B: Transfer Characteristics
7. UJT Characteristics
8. BJT-CE Amplifier
9. Emitter Follower-CC Amplifier
10. FET-CS Amplifier

Course : Digital System Design Lab
Code : V18ECL02

L	T	P	C
-	-	2	1

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

1. Examine the logic behavior of various IC gates.(K_3)
2. Construct and test combination logic circuits. (K_3)
3. Construct and test synchronous Asynchronous sequential circuits. (K_3)
4. Develop and Simulate Combinational logic circuit and validate its functionality using VHDL on Xilinx Software Package. (K_3)
5. Develop and Simulate Sequential logic circuit and validate its functionality using VHDL on Xilinx Software Package. (K_3)

LIST OF EXPERIMENTS

Part A: USING HARDWARE (Minimum of 5 Experiments to be done)

1. Verification of Basic Logic Gates and implementing all individual gates with Universal Gates.
2. Construct Half Adder and Full Adder using Half Adder and verify the truth table.
3. Design a Combinational Logic circuit for 3X8 Decoder and verify the truth table.
4. Design a Combinational Logic circuit for 4x1 MUX, 1X4 De-MUX and verify the truth table.
5. Verification of truth tables of the basic Flip- Flops with Synchronous and Asynchronous modes.
6. Design a Decade Counter and verify the truth table.

Part B: USING XILINX Tool (Minimum of 5 Experiments to be done)

Note: The students are required to design and draw the internal logical structure of the following Digital Circuits and to develop VHDL/Verilog HDL Source code, perform simulation using relevant simulator and analyze the obtained simulation results using necessary synthesizer.

1. Design of Full Adder using 3 modeling systems.
2. 8 to 3 Encoder (with and without parity).
3. 4- Bit comparator-IC 7485.
4. Flip-Flops (D/SR/JK Flip-Flops).
5. 4 bit binary up/down counter-IC74193.
6. Shift registers-IC 7495.

IV SEMESTER

Course : Analog & Digital Communications

Code : V18ECT07

L	T	P	C
3	1	-	4

Pre requisites: Signals and systems, Mathematics.

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

1. Explain the spectral characteristics, generation and detection techniques of Amplitude modulation techniques (K2)
2. Explain the spectral characteristics, generation and detection techniques of angle modulation techniques (K2)
3. Illustrate different types of noise and predict its effect on analog communication Systems.(K3)
4. Describe the generation and detection methods of various digital modulation schemes.(K2)
5. Analyze Optimal Reception of Digital Signal and explain various multiple access techniques.(K4)
6. Describe the concepts of error control coding (K2).

UNITI

Analog Modulation: Need for modulation, Frequency Division Multiplexing, **Linear Modulation Techniques** - AM, DSB-SC, SSB, VSB - Time domain and frequency domain description, single tone modulation, power relations - Generation & Detection.Applications, AMTransmitters, AM Receivers - Super-heterodyne receiver, IF, AGC.

UNIT II

Angle Modulation: Phase and Frequency Modulation, Narrow band and Wide band FM, Carsons rule, Indirect and direct method of FM generation, Detection of FM, Applications, Phase locked loop, Comparison of FM and AM. FMTransmitters, FM Receivers.

UNIT III

Noise in Analog Communication system: Noise in DSB &SSB system, Noise in AM system, Noise in Angle Modulation system,Pre-emphasis and de-emphasis.

Pulse Modulation: Time Division Multiplexing,PAM, PWM, PPM-Generation and Detection.

UNIT IV

Digital Modulation Systems: Pulse Modulation: Baseband signals. Sampling process; Quantization Process; Quantization Noise; Pulse-Code Modulation; Noise Considerations in PCM Systems; Differential Pulse-Code Modulation, Delta modulation, adaptive delta modulation, Amplitude, phase and frequency shift keying schemes (ASK, PSK, FSK), M-array modulation schemes.

UNIT V

Optimal Reception of Digital Signal: Matched filter receivers, optimum receiver - bandwidth consideration and probability of error calculations for these schemes.

Multiple Access Techniques: TDMA, FDMA and CDMA

UNIT VI

Information theory and Error control Coding: Measure of information – Entropy, Information rate– Source coding theorem – Channel capacity – Shannon-Hartley law – Shannon's limit-Error, control Codes – Linear codes, Cyclic codes, Convolution Coding.

TEXT BOOKS:

1. Simon Haykin and Michael Moher, "An Introduction to Analog & Digital Communications", 2nd Ed., Wiley, (2007).
2. H Taub& D. Schilling, GautamSahe, "Principles of Communication Systems", TMH, 3rd Edition, (2007).
3. Tomasi, Wayne, "Electronics Communication Systems- Fundamentals through advanced", 5th Edition, Pearson Education, 2009
4. Lathi, "Modern Digital & Analog Communications Systems", 2e, Oxford University Press

REFERENCE BOOKS:

1. Loen W. Couch, "Modern Communication Systems: Principles & Applications", Prentice Hall, (P621.382/84), (1995)
2. Bruce Carlson, Paul B. Crilly and Janet C. Rutledge, "Communication Systems: An Introduction to Signals and Noise in Electrical Communications", 4th Edition, McGraw-Hill, (2002).
3. Simon Haykin, "Communication Systems", 4th Edition, John Wiley & Sons, (2001).
4. NevioBenvenuto, Roberto Corvaja, Tomaso Erseghe, and Nicola Laurenti, "Communication Systems: Fundamentals and Design Methods", John Wiley & Sons, (2006).
5. Andrew J. Viterbi & Jim K. O, "Principles of Digital Communication and Coding", McGraw-Hill Book Company.
6. Bernard Sklar, "Digital Communications - Fundamentals and Applications", 2E, Prentice Hall.
7. Sam Shanmugam, K, "Digital and Analog Communication Systems", Wiley publisher (2006).

Course: Analog Circuits
Code: V18ECT08

L	T	P	C
3	1	-	4

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

1. Construct wave shaping circuits for various applications
2. Analyze transistor amplifier circuits at low and high frequencies.
3. Explain the operation of Feedback and Power amplifiers
4. Explain the operation of sinusoidal and non sinusoidal oscillators
5. Construct circuits for different applications using ICs.
6. Explain the operation of Active filters and Data Converters

Unit I

Wave shaping circuits: Response of high pass and low pass RC circuits to step, pulse inputs. High pass RC circuit as differentiator, low pass RC circuit as integrator. Series and shunt clippers, clipping at two independent levels, Positive and Negative Clampers.

Unit II

Transistor at High frequencies: Hybrid π CE transistor model, CE short circuit current gain, Current gain with resistive load, Gain bandwidth product.

Multistage amplifiers: Low frequency analysis of cascade and cascode amplifiers.

Unit III

Feedback and Power amplifiers: Voltage series, current series, voltage shunt, current shunt feedback amplifiers, effect of negative feedback. Various classes of operation (Class A, B, AB, C), power efficiency calculations.

Unit IV

Oscillators: Oscillators: Basic concept, Barkhausen criterion, RC oscillators (phase shift, Wien bridge), LC oscillators (Hartley, Colpitts) Non-sinusoidal oscillators: Bistable, Monostable and Astable Multivibrators.

Unit V

Integrated Circuits and applications: Op-amp Block Diagram, Ideal Op-amp, Equivalent Circuit, Power supplies, Ideal voltage transfer curve, open loop op-amp configurations. Inverting and non-inverting amplifiers, summing, scaling, averaging amplifier, integrator and differentiator, 555 timer functional block diagram, Astable and Monostable multivibrators.

Unit VI

Active filters and Data Converters: First order Low pass, high pass, band pass and band stop filters, All pass filter design guidelines. Weighted resistor DAC, R-2R ladder DAC. Dual slope ADC, Successive approximation ADC, flash ADC.

Text Books:

1. Integrated Electronics- J. Millman and C.C. Halkias, TMH
2. Electronic Devices and Circuits- Salivahanan, N.Suresh Kumar, A. Vallavaraj, TMH
3. Pulse, Digital and Switching Waveforms - J. Millman and H. Taub, TMH
4. Pulse and Digital Circuits – A. Anand Kumar, PHI
5. Linear Integrated Circuits – D. Roy Choudhury, 4th edition, New Age International (p) Ltd.

6. Op-Amps & Linear Integrated Circuits - Ramakanth A. Gayakwad,3rd edition, PHI.

References :

1. Electronic Devices and Circuits Theory – Robert L. Boylestad and Louis Nashelsky, Pearson/Prentice Hall.
2. Electronic Circuit Analysis - B.V.Rao, K.R.Rajeswari, P.C.R.Pantulu, K.B.R.Murthy, Pearson Publications.
3. Pulse & Digital Circuits-BN Yoga Narasimhan, 2000,Sri Maruthi Publishers, Bangalore.
4. Operational Amplifiers & Linear Integrated Circuits –Sanjay Sharma ;SK Kataria &Sons;2nd Edition,2010

Course: Probability Theory & Stochastic Processes
Code : V18ECT09

L	T	P	C
3	1	-	4

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

1. Explain basic concepts of probability theory through Sets and Relative Frequency **[K2]**
2. Explain the concept of a random variable, functions based on random variable like distribution and density functions **[K2]**
3. Compute the expected value, moments on one random variable **[K3]**
4. Illustrate the concepts of joint distribution & density functions on multiple random variables and their transformations with examples **[K3]**
5. Compute the statistical characteristics of stochastic processes like auto correlation & cross correlation functions. **[K3]**
6. Calculate the power density spectrum and cross power- density spectrum of signals **[K3]**

UNIT I: PROBABILITY : Probability introduced through Sets and Relative Frequency: Experiments and Sample Spaces, Discrete and Continuous Sample Spaces, Events, Probability Definitions and Axioms, Mathematical Model of Experiments, Probability as a Relative Frequency, Joint Probability, Conditional Probability, Total Probability, Bayes' Theorem, Independent Events

UNIT II: **THE RANDOM VARIABLE**: Definition of a random variable, Discrete, continuous and mixed random Variables. Distribution & density functions and its properties of a random variable. Binomial, Poisson, Uniform, Gaussian, Exponential and Rayleigh random variables. Conditional distribution and density functions and its properties.

UNIT III: OPERATION ON ONE RANDOM VARIABLE – EXPECTATIONS : Introduction, expected value of a random variable, function of a random variable, moments about the origin, central moments, variance, characteristic function, moment generating function, transformations of a random variable: Monotonic transformations for a continuous random variable

UNIT IV: MULTIPLE RANDOM VARIABLES : Vector random variables, joint distribution function, properties of joint distribution, marginal distribution functions, conditional distribution and density, statistical independence, sum of two random variables, sum of several random variables, central limit theorem: unequal distribution, equal distributions.

OPERATIONS ON MULTIPLE RANDOM VARIABLES: Joint moments about the origin, joint central moments, joint characteristic functions, jointly Gaussian random variables: two random variables case, N-random variables case

UNIT V: RANDOM PROCESSES – TEMPORAL CHARACTERISTICS: The random process concept, classification of processes, deterministic and nondeterministic processes, distribution and density functions, concept of Stationarity and statistical independence. First-order stationary processes, second-order and wide-sense Stationarity, nth-order and strict-sense Stationarity, time averages and Ergodicity, autocorrelation function and its properties, cross-correlation function and its properties, covariance functions

UNIT VI: RANDOM PROCESSES – SPECTRAL CHARACTERISTICS: The power density spectrum: properties, relationship between power density spectrum and autocorrelation function, the cross-power density spectrum, properties, relationship between cross-power density spectrum and cross-correlation function.

TEXT BOOKS:

1. Probability, Random Variables & Random Signal Principles, Peyton Z. Peebles, TMH, 4th Edition, 2001.
2. Probability, Random Variables and Stochastic Processes, Athanasios Papoulis and S.Unnikrishna Pillai, PHI, 4th Edition, 2002.
3. Probability Theory and Stochastic Processes, Y. Mallikarjuna Reddy, 4th Edition, Universities Press,

REFERENCE BOOKS:

1. Probability Theory and Stochastic Processes – B. Prabhakara Rao, BS Publications
2. Probability and Random Processes with Applications to Signal Processing, Henry Stark and John W. Woods, Pearson Education, 3rd Edition.
3. Schaum's Outline of Probability, Random Variables, and Random Processes.
4. An Introduction to Random Signals and Communication Theory, B.P. Lathi, International Textbook, 1968.
5. Random Process – Ludeman , John Wiley
6. Probability Theory and Random Processes, P. Ramesh Babu, McGrawHill, 2015.

L	T	P	C
3	1	-	4

Course: Electro Magnetic Waves & Transmission Lines
Code : V18ECT10
COURSE OUTCOMES:
After successful completion of the course, the student will be able to:
1. Use Various laws of static electric field to determine E. (K3)
2. Use Various laws of magneto static field to determine H and Apply Maxwell's equations to analyze the time varying behavior of EM waves (K3)
3. Compute the Propagation Characteristics of the EM Waves in different mediums. (K3)
4. Calculate Brewster angle, critical angle and total internal reflection. (K3)
5. Compute Primary and Secondary constants for a given transmission line(K3)
6. Calculate reflection coefficient, VSWR etc. using smith chart(K3)

UNIT I: Review of Co-ordinate Systems, **Electrostatics:** Coulomb's Law, Electric Field Intensity Electric Flux Density, Gauss Law and Applications, Electric Potential, Maxwell's Two Equations for Electrostatic Fields, Energy Density, Illustrative Problems. Convection and Conduction Currents, Dielectric Constant, Continuity Equation, Relaxation Time, Poisson's and Laplace's Equations; Types of Capacitance Illustrative Problems.

UNIT II: Magneto Statics : Biot-Savart Law, Ampere's Circuital Law and Applications, Magnetic Flux Density, Maxwell's Two Equations for Magneto static Fields, Magnetic Scalar and Vector Potentials, Ampere's Force Law, Inductances and Magnetic Energy. Illustrative Problems.

Maxwell's Equations (Time Varying Fields): Faraday's Law and Transformer emf, Inconsistency of Ampere's Law and Displacement Current Density, Maxwell's Equations in Different Final Forms and Word Statements. Introduction to Boundary conditions. Illustrative Problems.

UNIT III: EM Wave Characteristics - I: Wave Equations for Conducting and Perfect Dielectric Media, Uniform Plane Waves – Definition, All Relations between E & H. Sinusoidal Variations. Wave Propagation in Lossless and Conducting Media. Wave Propagation in Good Conductors and Good Dielectrics. Polarization. Illustrative Problems.

UNIT IV: EM Wave Characteristics – II: Reflection and Refraction of Plane Waves – Normal and Oblique Incidences, for Perfect Dielectrics, Brewster Angle, Critical Angle and Total Internal Reflection, Surface Impedance. Poynting Theorem – Applications, Illustrative Problems.

UNIT V: Transmission Lines - I : Types, Parameters, Transmission Line Equations, Primary & Secondary Constants, Expressions for Characteristic Impedance, Propagation Constant, Phase and Group Velocities, Infinite Line Concepts, Lossless line. Condition for Distortionless Line. Illustrative Problems.

UNIT VI: Transmission Lines – II : Input Impedance Relations, SC and OC Lines, Reflection Coefficient, VSWR. UHF Lines as Circuit Elements; $\lambda/4$, $\lambda/2$, $\lambda/8$ Lines – Impedance Transformations. Smith Chart – Configuration and Applications, Single Stub Matching. Illustrative Problems.

TEXT BOOKS:

1. Elements of Electromagnetic – Matthew N.O. Sadiku, Oxford Univ. Press, 3rd ed., 2001.
2. Electromagnetic Waves and Radiating Systems – E.C. Jordan and K.G. Balmain, PHI, 2nd Edition, 2000.
3. Electromagnetic field theory and Transmission Lines – G.SasibhusanaRao,Wiley India Pvt.L

REFERENCES:

1. Electromagnetic Fields and Wave Theory –GSN Raju, Pearson Education 2006
2. Engineering Electromagnetics – William H. Hayt Jr. and John A. Buck, TMH, 7th ed., 2006.
3. Transmission Lines and Networks – Umesh Sinha, Satya Prakashan (Tech. India Publications), New Delhi, 2001.
4. Electromagnetic waves & Radiating Systems, Prentice Hall, India 3. Narayana Rao, N: Engineering Electromagnetics, 3rd ed., Prentice Hall, 1997.
5. Engineering Electromagnetics – William H. Hayt Jr. and John A. Buck, TMH, 7th ed., 2006

Course: Analog Circuits Lab
Code: V18ECL06

L	T	P	C
-	-	2	1

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO 1- Construct circuit for linear wave shaping circuits. **[K3]**

CO 2- Construct feedback amplifiers and obtain their characteristics **[K3]**

CO 3- Construct different RC and LC oscillators using BJT based on the frequency range. **[K3]**

CO 4- Construct circuit and analyze different multivibrator circuits. [**K4]**

CO 5- Construct circuits for verifying linear and nonlinear applications using IC 741 op-amp and IC 555 timer [**K3]**

CO 6- Sketch the Frequency Response Characteristics of Active filters **[K3]**

Minimum Ten Experiments to be conducted:

1. Linear wave shaping
2. Non Linear wave shaping
3. Voltage-Series Feedback Amplifier
4. Class B Push-Pull Power Amplifier
5. RC Phase Shift/Wien Bridge Oscillator
6. Hartley/Colpitt's Oscillator
7. B istable Multi vibrator.
8. Summing, Scaling, Averaging amplifiers using IC 741.
9. Integrator and Differentiator Circuits using IC 741.
10. A stable Multi vibrator using IC 555.
11. Active Filters – LPF, HPF (first order)
12. 4 bit Digital to Analog Converter

Course: Communications Lab
Code : V18ECL05

L	T	P	C
-	-	2	1

COURSE OUTCOMES:
After successful completion of the course, the student will be able to:

CO-1- Demonstrate the operation of various pulse modulation and demodulation techniques. **[K3]**

CO-2 -Construct the pre-emphasis and de-emphasis circuits and verify its frequency response. **[K3]**

CO-3 -Demonstrate the spectrum analysis of modulated signal using spectrum analyzer, operation of AGC and PLL **[K3]**

CO-4- Understand the Time division multiplexing and Demultiplexing, Pulse digital modulation techniques, such as PCM, DPCM, and DM, Companding theorem **[K2]**

CO-5- Understand generation and detection of digital modulation techniques, such as ASK, PSK, FSK and DPSK. **[K2]**

CO-6- Verify the Source encoding and decoding (Huffman Coding) technique and channel encoding and decoding techniques. **[K3]**

List of Experiments (Twelve experiments to be done)

A. Analog Communications
   1. Amplitude Modulation - Mod. & Demod.
   2. AM - DSB SC - Mod. & Demod.
   3. Spectrum Analysis of Modulated signal using Spectrum Analyser
   4. Pre-emphasis & De-emphasis
   5. Frequency Modulation - Mod. & Demod, PLL.
   6. Sampling Theorem - Pulse Amplitude Modulation - Mod. & Demod.
   7. PWM , PPM - Mod. & Demod.

B. Digital Communications
   1. Pulse code modulation, Differential pulse code modulation.
   2. Delta modulation, Companding.
   3. ASK, FSK, PSK.
   4. Differential phase shift keying.
   5. Source Encoder and Decoder
   6. Channel coding-
      i. Linear Block Code-Encoder and Decoder
      ii. Binary Cyclic Code – Encoder and Decoder
      iii. Convolution Code – Encoder and Decoder

III SEMESTER
Course : Digital Electronics
Code : V18ECT06
Branch: III Semester CSE

L	T	P	C
3	-	-	3

COURSE OUTCOMES:
After successful completion of the course, the student will be able to:

1. Illustrate the conversion of a number from one number system to another. **[K3]**
2. Classify Boolean theorems & simplify the Boolean functions using the Boolean properties. **[K2]**
3. Use K-map as a tool to simplify and design logic circuits **[K3]**
4. Construct different combinational Logic circuits like MUX, Decoders, Encoders etc. **[K3]**
5. Demonstrate the basic flip-flops in terms of truth table & excitation table **[K2]**
6. Apply the concepts of flip-flops in the designing of different sequential circuits like registers, counters, etc. **[K3]**

UNIT1: Number systems& Binary codes:
Number systems: Number Systems, Radix conversions, complement of numbers. Binary codes: Binary codes, Weighted and non-Weighted codes, BCD code, gray code, excess 3 codes.

UNIT -II: Concept of Boolean algebra:
Basic Theorems and Properties of Boolean algebra, Boolean Functions, Canonical and Standard Forms, Minterms and Maxterms, Logic gates: NOT, OR, AND, NOR, NAND, XOR, XNOR - Universal gates.

UNIT- III: Gate level Minimization:
Map Method, Two-Variable K-Map, Three-Variable K-Map, Four Variable K-Maps. Products of Sum Simplification, Sum of Products Simplification, Don't – Care Conditions, NAND and NOR Implementation.

UNIT- IV:Combinational Logic:
Introduction, Analysis Procedure, Design Procedure, Binary Adder–Subtractor, Decimal Adder, Decoders, Encoders, Multiplexers.

UNIT V: **Sequential Logic Circuits**:
Introduction –Latches and Flip flops: Basic Flip flop circuit, RS, D, JK and T Flip-flops – Triggering of Flip flops: Master Slave Flip flop, edge triggered flip flop – Conversion of one type of Flip flop to another.

UNIT -VI: Registers and Counters:

Registers and Counters: Shift Register, Universal Shift Register, Applications of Registers, Asynchronous counter, Synchronous counter, Mod-N Counter, binary up/down counter, Ring counter, Johnson counter.

Memories: Introduction to ROM, PROM, EPROM.

TEXT BOOKS:

1. Digital Design, 5/e, M.Morris Mano, Michael D Ciletti, PEA.
2. Fundamentals of Logic Design, 5/e, Roth, Cengage.

REFERENCE BOOKS:

1. Digital Logic and Computer Design, M.Morris Mano, PEA.
2. Digital Logic Design, Leach, Malvino, Saha, TMH.
3. Modern Digital Electronics, R.P. Jain, TMH

L	T	P	C
-	-	2	1

Course : Digital Electronics Lab
Code : V18ECL04
Branch: III Semester CSE

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO1: Apply the Boolean algebra to design digital logic circuits. **[K3]**

CO2: Analyse the behaviour of different combinational logic circuits. **[K4]**

CO3: Analyse the behaviour of different sequential logic circuits **[K4]**

CO4: Construct and troubleshoot simple combinational and sequential circuits **[K3]**

List of Experiments

Minimum Ten Experiments to be conducted:

Study of Integrated Circuits, Bread board& Power supplies.

1) Verification of Basic LogicGates
2) Verification of Universal Gates, Special Gates.
3) Verify the De-Morganlaws using CMOS IC's
4) Design a Gray code encoder & Decoder using IC 7486
5) Construct a Half Adder using IC's and verify the truth table.
6) Construct a Half Subtractor using IC's and verify the truth table.
7) Verify the truthtableof IC 74138(3x8 Decoder)
8) Verify the truthtable of IC 74153(4x1 MUX).
9) Verify the D Flip- Flop Using IC7474 with PRESET, CLEAR asynchronous Inputs.
10) Verify JK Flip- Flop & T Flip-Flop Using IC7476 with PRESET, CLEAR asynchronous Inputs.
11) Verify Decade counter using IC7490.
12) Design 4-bit right Shift Register using D-Flip-Flop and verify the truthtable.

Course : Analog Electronics
Code : V18ECT05
Branch: III Semester EEE

L	T	P	C
3	-	-	3

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO 1: Explain the working principle of diode and Construct Diode rectifier circuits with and without filters. **[K2]**

CO 2: Sketch V-I characteristics of BJT and FET in different configurations. **[K3]**

CO 3: Explain the operation of Feedback Amplifiers and oscillators. **[K2]**

CO 4: Construct wave shaping circuits for various applications **[K3]**

CO 5: Construct circuits for different applications using ICs. **[K3]**

CO 6: Explain the operation of Data Converters using IC 741 OP-AMP. **[K2]**

UNIT-I: Junction diode characteristics and diode Applications: p-n junction diode, current components in PN junction Diode, derivation of diode equation, V-I Characteristics, Diode resistance, Diode capacitance. Zener Diode, Breakdown mechanisms Basic Rectifier setup**,** half wave rectifier, full wave rectifier, bridge rectifier, derivations of characteristics of rectifiers, rectifier circuits-operation, input and output waveforms, Filters, Inductor filter, Capacitor filter, L-section filter, π-section filter-, derivation for ripple factor in each case.

UNIT- II: Transistor Characteristics: BJT: Junction transistor, transistor current components, transistor equation, transistor configurations, transistor as an amplifier, and characteristics of transistor in Common Base, Common Emitter and Common Collector configurations, punch through/ reach through, typical transistor junction voltage values.

FET: FET types, construction, operation, characteristics, parameters, MOSFET-types, construction, operation, characteristics, comparison between JFET and MOSFET.

UNIT- III Feedback amplifiers and Oscillators: Voltage series, current series, voltage shunt, current shunt feedback amplifiers, effect of negative feedback. Oscillators: Basic concept, Barkhausen criterion, RC oscillators (phase shift, Wien bridge), LC oscillators (Hartley, Colpitts)

UNIT- IV Wave shaping circuits: Response of high pass and low pass RC circuits to step, pulse inputs. High pass RC circuit as differentiator, low pass RC circuit as integrator. Series and shunt clippers, clipping at two independent levels, Positive and Negative Clampers. Introduction to multivibrators: Bistable, Monostable and Astable Multivibrators.

UNIT- V Integrated Circuits and applications: Op-amp Block Diagram, Ideal Op-amp, Equivalent Circuit, Power supplies, Ideal voltage transfer curve, open loop op-amp configurations. Inverting and non-inverting amplifiers, summing, scaling, averaging amplifier, integrator and differentiator, 555 timer functional block diagram, Astable and Monostable multivibrators.

UNIT- VI Data Converters: Weighted resistor DAC, R-2R ladder DAC. Flash Type ADC, Counter type ADC, Successive approximation ADC, Dual slope ADC,. Specifications of DAC&ADC.

Text Books:

1. Integrated Electronics- J. Millman and C.C. Halkias, TMH
2. Electronic Devices and Circuits- Salivahanan, N.Suresh Kumar, A. Vallavaraj, TMH
3. Pulse, Digital and Switching Waveforms - J. Millman and H. Taub, TMH
4. Linear Integrated Circuits – D. Roy Choudhury, 4th edition, New Age International (p) Ltd.
5. Op-Amps & Linear Integrated Circuits - Ramakanth A. Gayakwad,3rd edition, PHI.

References :

1. Electronic Devices and Circuits Theory – Robert L. Boylestad and Louis Nashelsky, Pearson/Prentice Hall.
2. Electronic Circuit Analysis - B.V.Rao, K.R.Rajeswari, P.C.R.Pantulu, K.B.R.Murthy, Pearson Publications.
3. Pulse & Digital Circuits-BN Yoga Narasimhan, 2000,Sri Maruthi Publishers, Bangalore.
4. Operational Amplifiers & Linear Integrated Circuits –Sanjay Sharma ;SK Kataria &Sons;2nd Edition,2010

L	T	P	C
-	-	2	1

Course: Analog Electronics Lab
Code : V18ECL03
Branch: III Semester EEE

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO-1: Interpret the Characteristics of various semiconductor devices. **[K2]**

CO-2: Examine the Performance of Rectifiers with and without Filters. **[K3]**

CO 3: Construct circuit for linear wave shaping circuits. **[K3]**

CO 4**:** Construct different RC and LC oscillators using BJT based on the frequency
range. **[K3]**

CO 5**-** Construct circuits for verifying linear and nonlinear applications using IC 741op-amp and IC 555 timer [**K3]**

CO 6**-** Verify the Characteristics of 4 bit Digital to Analog Converter **[K3]**

List of Experiments:

1. P-N Junction Diode Characteristics
   Part A: Germanium Diode (Forward bias only)
   Part B: Silicon Diode (Forward & Reverse bias)
2. Rectifiers (without and with c-filter)
   Part A: Half-wave Rectifier
   Part B: Full-wave Rectifier
3. Zener Diode Characteristics
   Part A: V-I Characteristics
   Part B: Zener Diode as Voltage Regulator

4 BJT Characteristics (CE Configuration)
   Part A: Input Characteristics
   Part B: Output Characteristics

5 FET Characteristics (CS Configuration)
   Part A: Drain Characteristics
   Part B: Transfer Characteristics.

6 Linear wave shaping

7 Non Linear wave shaping

8 RC Phase Shift/Wien Bridge Oscillator

9 Hartley/Colpitt's Oscillator

10 Integrator and Differentiator Circuits using IC 741

11 A stable Multi vibrator using IC 555

12 4 bit Digital to Analog Converter

Appendix-ECE-04

Course Structure for Electronics and Communication Technology (ECT) Programme

I SEMESTER

S.No	Course Code	Course Name	L	T	P	C
1	V18ENT01	English – I	2	-	-	MNC
2	V18MAT01	Engineering Mathematics – I	3	1	-	4
3	V18CHT01	Engineering Chemistry	3	1	-	4
4	V18CST01	Programming in C for problem solving	3	-	-	3
5	V18MET01	Engineering Graphics	1	-	3	2.5
6	V18ENL01	English Communication Skills Lab – I	-	-	2	MNC
7	V18CSL01	Programming lab in C for problem solving	-	-	3	1.5
8	V18CHL01	Engineering Chemistry Lab	-	-	3	1.5
Total			12	2	11	16.5

Total Contact Hours: 25 Total Credits: 16.5

II SEMESTER

S.No	Course Code	Course Name	L	T	P	C
1	V18ENT02	English – II	2	-	-	2
2	V18MAT02	Engineering Mathematics – II	3	1	-	4
3	V18PHT02	Opto Electronics and Semi Conductors for EEE & ECE	3	1	-	4
4	VI8EET02	Basic Electrical Engineering for ECE	3	1	-	4
5	V18CHT02	Environmental Studies for ECE	3	-	-	MNC
6	V18ENL02	English Communication Skills Lab – II	-	-	2	1
7	VI8EELO2	Basic Electrical Engineering Lab for ECE	-	-	3	1.5
8	V18PHL02	Opto Electronics and Semi Conductors lab for ECE	-	-	3	1.5
9	VI8MELO1	Engineering and IT Workshop				
Total			12	2	11	19.5

Total Contact Hours: 25

Annexure-IV

Minutes of the meeting, BOS of MBA (Held on 16.04.2019)

The chairman of the BOS extended a formal welcome and introduced the members.

The following are the members of BOS of Management Studies (MBA)

S.No	Name of the member	Designation	
1	Dr.G.V.Subba Raju	Professor & HOD; DMS Sri Vasavi Engg.College	Chairman BOS
2	Prof. B. Amarnath	Professor & Registrar, Rayalaseema University, Kurnool	Council Nominee
3	Dr.J.N.V.Raghu Ram	Associate Professor, Department of Technology Management, VIT, Vellore	Council Nominee
4	Sri. P.S. Varma	D G M, Coromandel International Limited, Kakinada	Industry expert
5	Prof. D. Surya Chandra Rao	Professor Department of Management Studies, Krishna University, Director, RGVKT, Nuzvid. Machilipatnam	University Nominee
Department of Management Studies, Sri Vasavi Engineering College members			
6	V.Kiran Kumar	Associate Professor	Member
7	Dr. S. Krishna Murthy Naidu	Associate Professor	Member
8	Dr.RSRK Kiran Kumar	Associate Professor	Member
9	D.Satyanarayana	Sr. Asst.Professor	Member
10	D. Naveen Kumar	Asst. Professor	Member
11	R.V.Rajasekhar	Asst. Professor	Member
12	V. Saranya	Asst. Professor	Member

13	U. Bhargava	Asst. Professor	Member
14	Dr.R.S.V.Rama Swathi	Asst. Professor	Member
15	E. Suresh	Asst. Professor	Member
16	Dr. K.Rambabu	Asst. Professor	Member
17	K.V.Malleswari	Asst. Professor	Member

Item 1: Syllabi approval for MBA 3rd and 4th Semester Courses for the academic year 2019-20.

The Chairman of BOS proposed the syllabi for MBA 3rd and 4th Semester for the academic year 2019-20. After considering the suggestion made by all BOS members, the courses syllabi for MBA (Autonomous) programme has been approved. The approved syllabi copies are enclosed as **Appendix-MBA-01**

Item 2: Syllabi approval for Managerial Economics and Financial Analysis for the Academic year 2019-20.

The syllabus for Managerial Economics and Financial Analysis for the academic year 2019-20 has been approved by BOS members. The approved syllabi copy is enclosed as **Appendix-MBA-02**

Item 3: Review of MBA 1st Semester (2018-19 (Autonomous)) Admitted batch results.

MBA 1st Semester results of 2018-19 (Autonomous) admitted batch are presented by the Chairman.

End Semester examination results

No. Students registered	No. of students passed	Pass percentage
58	43	74.14%

All BOS members have expressed their satisfaction on the pass percentage and performance of students in examinations.

Item 4: Any other academic item

The course codes of Employability Skills III (Aptitude-1), Employability Skills IV (Aptitude-2) changed as V18MAT07 and V18MAT08 respectively. This courses syllabus is approved by BOS in Mathematics.

Appendix-MBA-01

Semester-I

SNo	Course Code	Course	L	P	C	I	E	TM
1	V18MBT01	Management Theory & Organizational Behaviour	4	--	4	40	60	100
2	V18MBT02	Managerial Economics	4	--	4	40	60	100
3	V18MBT03	Accounting for Managers	4	--	4	40	60	100
4	V18MBT04	Indian Economy & Policy	4	--	4	40	60	100
5	V18MBT05	Business Communication	4	--	4	40	60	100
6	V18MBT06	Quantitative Analysis for Business Decisions	4	--	4	40	60	100
7	V18MBL01	IT-LAB	---	6	3	40	60	100
8	V18ENT13	Employability Skills I (English Communication Skills)	2	--	--	--	--	MNC
		TOTAL	26	6	27	280	420	700

Semester-II

SNo	Course Code	Course	L	P	C	I	E	TM
1	V18MBT07	Financial Management	4	--	4	40	60	100
2	V18MBT08	Human Resource Management	4	--	4	40	60	100
3	V18MBT09	Marketing Management	4	--	4	40	60	100
4	V18MBT10	Production and Operations Management	4	--	4	40	60	100
5	V18MBT11	Business Research & Statistical Analysis	4	--	4	40	60	100
6	V18MBT12	Legal Environment for Business	4	--	4	40	60	100
7	V18MBT13	Business Ethics & Corporate Governance	4	--	4	40	60	100
8	V18ENT14	Employability Skills II (Soft Skills)	2	--	--	--	--	MNC
		TOTAL	30	--	28	280	420	700

Semester-III

SNo	Course Code	Course	L	P	C	I	E	TM
1	V18MBT14	Business Policy & Corporate Strategy	4	--	4	40	60	100
2	V18MBT15	Entrepreneurship Development	4	--	4	40	60	100
3	V18MBT16	E-Business	4	--	4	40	60	100
4		Elective-1	4	--	4	40	60	100
5		Elective-2	4	--	4	40	60	100
6		Elective-3	4	--	4	40	60	100
7		Elective-4	4	--	4	40	60	100
8	V18MBM01 / V18MBP01	MOOCs/ Mini Project	--	--	--	--	--	MNC
9	V18MAT07	Employability Skills III (Aptitude -1)	2	--	--	--	--	MNC
		TOTAL	30	--	28	280	420	700

Semester-IV

SNo	Course Code	Course	L	P	C	I	E	TM
1	V18MBT29	Logistics & Supply Chain Management	4	--	4	40	60	100
2	V18MBT30	Business Analytics	3	4	4	40	60	100
3		Elective-5	4	--	4	40	60	100
4		Elective-6	4	--	4	40	60	100
5		Elective-7	4	--	4	40	60	100
6		Elective-8	4	--	4	40	60	100
7	V18MBP02	Major Project & Viva voce	--	--	6	40	60	100
8	V18MAT08	Employability Skills IV (Aptitude-2)	2	--	--	--	--	MNC
		TOTAL	25	04	30	280	420	700
		GRAND TOTAL	111	10	113	1120	1680	2800

L-LECTURE HOURS, P-PRACTICAL HOURS, C-CREDITS, I-INTERNAL MARKS, E-EXTERNAL MARKS, TM-TOTAL MARKS,MNC-

MNC: Mandatory Non credit course

Single Specialization:

The Specialization papers will be offered in the areas of Marketing, Finance, and Human Resource Management (HRM). The students should choose any **one** of the listed Specialization areas in the beginning of the third semester of MBA. Specialization will be offered subject to a minimum of 20 students.

Semester-III

Specialization I: Marketing

S.No.	*Course Code*	*Course*
1	V18MBT17	Consumer Behavior
2	V18MBT18	Retail Management
3	V18MBT19	Integrated Marketing Communication
4	V18MBT20	Product & Brand Management

Specialization II: Finance

S.No.	*Course Code*	*Course*
1	V18MBT21	Security Analysis & Portfolio Management
2	V18MBT22	Advance Management Accounting
3	V18MBT23	Financial Markets & Services
4	V18MBT24	Banking & Insurance Management

Specialization III: HRM

S.No.	*Course Code*	*Course*
1	V18MBT25	Human Resource Planning & Development
2	V18MBT26	Compensation and Reward Management
3	V18MBT27	Performance Management
4	V18MBT28	Strategic Human Resource Management

Semester-IV

Specialization I: Marketing

S.No.	*Course Code*	*Course*
5	V18MBT31	Services Marketing
6	V18MBT32	Sales and Distribution Management
7	V18MBT33	Digital & Social media Marketing
8	V18MBT34	International Marketing Management

Specialization II: Finance

S.No.	*Course Code*	*Course*
5	V18MBT35	Financial Derivatives
6	V18MBT36	Project Appraisal and Finance
7	V18MBT37	Business Taxation & Planning
8	V18MBT38	International Financial Management

Specialization III: HRM

S.No.	*Course Code*	*Course*
5	V18MBT39	Organizational Change & Development
6	V18MBT40	Management of Industrial Relations
7	V18MBT41	Labour Welfare & Legislations
8	V18MBT42	International HRM

V18MBT14: BUSINESS POLICY & CORPORATE STRATEGY

L	T	P	C
4	0	0	4

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO1: Understand the concept of business policy and strategic management in detail

CO2: To get familiarity with various tools for appraising an organization's external environment.

CO3: Analyze various strategies formulated at corporate, business and functional levels.

CO4: To understand strategy implementation procedure in detail.

CO5: Evaluate the performance of strategies designed and applied at various levels of a business.

UNIT 1

Introduction: The concept and evolution of Business Policy- Vision, Misssion and Objectives- Difference between business policy and strategic management. Corporate governance- concept, issues, models, evolution and significance. Introduction to Strategic Management-Concept importance of strategic Management, Strategy & Competitive Advantage, Strategy Planning & Decisions, strategic Management Process.

UNIT 2

Environmental Scanning and leadership: External Environment Appraisal using PESTEL, Competitor Analysis using Porter's 5-Forces model, Environmental Threat and Opportunity Profile (ETOP), Porter Value chain Analysis, Scanning Functional Resources and Capabilities for building Organization Capability Profile (OCP), SWOT Analysis. Key strategic leadership actions.

UNIT 3

Strategy Formulation: Strategic alternatives at corporate level: concept of grand strategies, Strategic choice models - Strickland's Grand Strategy Selection Matrix, Model of Grand Strategy Clusters, BCG, GE Nine Cell Matrix Strategic alternatives at business level: Michael Porter's Generic competitive strategies, Formulation of strategy at corporate, business and functional levels. Red Ocean and Blue Ocean Strategies

UNIT 4

Strategy Implementation: Developing short-term objectives and policies, functional tactics, and rewards, Structural Implementation: an overview of Structural Considerations Behavioral Implementation: an overview of: Leadership and Corporate Culture Mc Kinsey 7-S Framework.

UNIT 5

Strategy Evaluation and control – Establishing strategic controls - Measuring performance – appropriate measures- Role of the strategist – using qualitative and quantitative benchmarking to evaluate performance - strategic information systems – problems in measuring performance – Strategic surveillance -strategic audit Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References

1. Vijaya Kumar P,.Hitt A: **Strategic Management**, Cengage learning, NewDelhi,2010
2. John A PearceII, AmitaMital: "**Strategic Management**", TMH, New Delhi,2012.Mohapatra: "**Cases Studies in Strategic Management**", Pearson, NewDelhi,2012
3. Adrian Haberberg&Alison: **Strategic Management**, Oxford University Press, NewDelhi, 2010
4. P.SubbaRao: "**Business Policy and Strategic Management**" Text and Cases,Himalaya Publishing House, New Delhi,2011
5. AppaRao, ParvatheshwarRao, Shiva Rama Krishna: "**Strategic Management and Business Policy"**, Excel Books, New Delhi,2012

V18MBT15: ENTREPRENEURSHIP DEVELOPMENT

L	T	P	C
4	0	0	4

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO1: Understand the foundations of Entrepreneurship and its importance.

CO2: Develop viable business ideas and understand entrepreneurial eco system.

CO3: Develop new projects and preparation of detailed project report.

CO4: Understand the importance of MSME's in the economic development of a nation.

CO5: Identify various sources of Entrepreneurial support organizations.

UNIT 1

Entrepreneurship: Importance and growth - Characteristics and Qualities of Entrepreneur- Role of Entrepreneurship, Ethics and Social Responsibilities. Women Entrepreneurship: Role & Importance, Problems of Women Entrepreneurs, Opportunities for women entrepreneurs – corporate entrepreneurship – mobility of entrepreneur – entrepreneurial motivation.

UNIT2

Innovation: Sources of business idea-Idea generation- Ideal validation- idea screening process- market sizing techniques- innovation and creativity for aspiring entrepreneurs- incubation- startup eco system

UNIT 3

Planning and Evaluation of Projects: Growth of Firm – Project identification and selection - Factors inducing growth- - Project Feasibility Study – Elements of a project report- preparation of DPR. Post Planning of Project-Project Planning and Control.

UNIT 4

Small and Micro Enterprises: Importance, definitions – policies and their support to MSMEs - growth and growth strategies – registration process of MSME- MSMED Act 2006.

UNIT 5

Institutional Support to Entrepreneur and MSMEs: Role of Government - Role of SIDBI, NIESBUD, SISI, DIC,NSIC, TCOs, role of DST in technology entrepreneurship- Financial Institutions-Commercial Banks, Entrepreneurial Development Institutes.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References

1. Arya Kumar: "Entrepreneurship", Pearson, Publishing House, New Delhi,2012.
2. VSP Rao, Kuratko: "Entrepreneurship', Cengage Learning, NewDelhi,
3. K.Ramachandran: "Entrepreneurship Development", TMH, New Delhi, 2012
4. 4.B.Janakiram, M Rizwana: "Entrepreneurship Development" Excel Books, New Delhi,2011 Rajeev Roy: "Entrepreneurship", Oxford University Press, NewDelhi,2012

5. 5.P.C.Shejwalkar: “Entrepreneurship Development”, Everest Publishing House, NewDelhi, 2011

V18MBT16: E-BUSINESS

L	T	P	C
4	0	0	4

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO1: Understand the foundations and importance of E-commerce.

CO2: Analyze the impact of e-commerce on business models and strategy.

CO3: Apply the systems used in e-business in real life situations.

CO4: Discriminate the impact of e-Commerce on Business to Consumer, Business-to-Business and Intra-organizational levels.

CO5: Create a new online business with profound knowledge on launching process.

Unit 1:

Introduction to e-Business and e-Commerce: Define the e-Commerce and e-Business, Define e- Commerce- Types of transactions. Define e-Business Models. Internet Marketing and e-Tailing.Elements of e-Business Models. Explain the benefits and limitations of e-Commerce.

Unit 2:

E-Marketplaces: Structures, Mechanisms, Economics, and Impacts: Define e-Marketplace and Describe their Functions. E-Business models of companies like amazon, flipkart, alibaba, foodpanda, etc. e-Marketplace types and their features. Describe the various types of e-auctions and list their characteristics.

Unit 3:

E-Business Applications, e-Procurement and e-Payment Systems: Integration and e-Business suits, ERP, e-SCM, CRM, e-Procurement definition, processes, methods and benefits, e-Payment, Discuss the categories and users of smart cards, Describe payment methods in B2B EC.

Unit 4:

The Impact of e-Business on Different Fields and Industries: e-Tourism, Employment and Job Market Online, Online Real Estate, Online Publishing and e-Books, e-Banking and Personal Finance Online, On-Demand Delivery Systems and E-Grocers, Online Delivery of Digital Products, Entertainment, and Media

Unit 5:

Launching a Successful Online Business and EC Projects- Requirements for starting an online business from different perspectives- Funding options available to start up businesses. -Processes associated with managing Web site development -Techniques of search engine optimization. Evaluate Web sites on design criteria.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. Electronic Commerc**e:** A Managerial Perspective, Turban, E. et al., Prentice Hall

2. Electronic Business and Electronic Commerce Management, 2nd edition, Dave Chaffey, Prentice Hall,
3. e-Learning Tools and Technologies, Horton and Horton, Wiley Publishing.

V18MBT17: CONSUMER BEHAVIOR

L	T	P	C
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COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

1. Analyze and determine the behavior of consumer.
2. Describe consumer perception and attitude.
3. Understand the factors influencing consumer behavior.
4. Know the importance of communication on consumer behavior
5. Able to identify the roots of consumerism.

UNIT-1

Introduction to Consumer Behavior:

Understanding consumers and market segments. Evolution of concept of consumer behavior, consumer analysis and business strategy. Models of Buyer Behavior, Howard Model, Howard- Sheth Model, EKB Model, Webster and Wind Model and Sheth Industrial Buyer Behavior Model

UNIT-2

Psychological Foundations of Consumer Behavior:

Consumer Motivation, Perception, Personality and Behavior, Learning and Behavior Modification, Information Processing, Memory Organization and Function, Attitude Formation and Attitude Change.

UNIT-3

Consumer Behavioral **Influences:**

Social and Cultural Environment Economic, Demographic, Cross Cultural and Socio–Cultural Influences, Social Stratification, Reference Groups and Family, Personal influence

UNIT-4

Communication and Consumer Behavior:

Components of communications process, designing persuasive communication and Diffusion of Innovations. Consumer Decision Processes High and Low Involvement, Pre-purchase Processes, Post Purchase processes, Consumption and evaluation, Brand Loyalty and Repeat Purchase Behavior

UNIT-5

Consumerism:

The roots of consumerism, consumer safety, consumer information, Environmental concerns, consumer privacy, legislative responses to consumerism and marketer responses to consumer issues

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References

1. Ramneek Kapoor, Nnamdi O Madichie: “Consumer Behavior” Text and Cases”, TMH, New Delhi, 2012.
2. Ramanuj Majumdar: “Consumer Behavior insight from Indian Market”, PHI Learning,
3. New Delhi, 2011
4. M.S.Raju: “Consumer Behavior Concepts, applications and Cases”, Vikas Publishing
5. House, New Delhi, 2013.

6. David L Loudon and Albert J Della Bitta, “Consumer Behavior” 4/e, TMH, New Delhi,
7. 2002.
8. Schiffman, L.G and Kanuk L.L “Consumer Behavior”, 8/e, Pearson Education, New Delhi, 2003.

V18MBT18: RETAIL MANAGEMENT

L	T	P	C
4	0	0	4

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

1. Understand the basic structure of Retail business in India.
2. Gain Knowledge in designing Retail strategies.
3. Interpret the importance of location in making a retail business successful.
4. Apply basic operations in retail business in real life environment.
5. Examine the technical and financial aspects of retail business besides report preparation.

UNIT 1

Basics of Retailing: Retail and Retailing, Functions of Retailers, Types of Retailers, Benefits of a self service store, Evolution of Modern Retail, Understanding Barcoding, Multi-channel Retailing, Product assortment.

UNIT 2

Retail Strategies : Building sustainable competitive advantage, Strategic Retail planning process, Merchandising principles, Smart Pricing, Purchasing staples and branded FMCG items, Manpower planning and scheduling, Circle of Retail life

UNIT 3

Retail Location: Types, Location advantages, Finding the right place, core catchment area, Getting the right layout, Strategic profit model.

UNIT 4

Store operations : Inventory Management, Plan-O-Gram, Store manager routine and checklist, The cashier process, Cash management at Till, Billing process, Managing pilferage, Customer relationship management, periodic stock taking, Day-to-day security and loss prevention.

UNIT 5

Retail Monetary actions: Costs of running a supermarket, Key performance Indicators, Category Management, Retail automation, MIS and business reports, Licenses and permissions required.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. A.J.Lamba (2011): “The Art of Retailing”, Tata McGraw Hill Education Pvt Ltd, New Delhi
2. Sivakumar A (2007): “Retail Marketing”, Excel Books, New Delhi.
3. Sheikh and Kaneez Fatima (2012): “Retail Management” Himalaya publishing house, Mumbai.
4. Swapna Pradhan (2012): “Retail Management”, Tata McGraw Hill, New Delhi.

V18MBT19: INTEGRATED MARKETING COMMUNICATION

L	T	P	C
4	0	0	4

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

1. To familiarize the students with concepts and practices in marketing communication.
2. To learn various communication tools and its effectiveness in contemporary times.
3. Draw a lesson from that knowledge for better integration of various marketing communication tools.
4. Understand the procedure for designing an integrated marketing communication programme.
5. Bring out creative ideas for effective marketing communication

Unit I:

An Introduction to Integrated Marketing Communication (IMC): Meaning and role of IMC in Marketing process, one voice communication V/s IMC. Introduction to IMC tools – Advertising, sales promotion, publicity, public relations, and event sponsorship; The role of advertising agencies and other marketing organizations providing marketing services and perspective on consumer behaviour.

Unit II:

Understanding communication process: Source, Message and channel factors, Communication response hierarchy- AIDA model, Hierarchy of effect model, Innovation adoption model, information processing model, The standard learning Hierarchy, Attribution Hierarchy, and low involvement hierarchy Consumer involvement- The Elaboration Likelihood (ELM) model, The Foote, Cone and Belding (FCB) Model.

Unit III:

Planning for Marketing Communication (Marcom): Establishing marcom Objectives and Budgeting for Promotional Programmes-Setting communication objectives, Sales as marcom objective, DAGMAR approach for setting ad objectives. Budgeting for marcom-Factors influencing budget, Theoritical approach to budgeting viz. Marginal analysis and Sales response curve, Method to determine marcom budget.

Unit IV:

Developing the Integrated Marketing Communication Programme: Planning and development of creative marcom. Creative strategies in advertising, sales promotion, publicity, event sponsorships etc. Creative strategy in implementation and evaluation of marcom- Types of appeals and execution styles. Media planning and selection decisions- steps involved and information needed for media planning.

Unit V:

Measuring Effectiveness and control of Promotional Programmes: Meaning and importance of measuring communication effectiveness, The testing process, measuring the effectiveness of other promotional tools and IMC. The ethical, social, and legal aspects of advertising and promotion-, Social Communication Different legislative and self regulatory codes controlling advertising and promotions in India viz. advertising councils code, print media codes, broadcasting media codes and regulations governing sales promotion, packaging, direct marketing and internet marketing

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. Integrated Marketing Communications – Kenneth Clown& Donald Bach
2. Advertising and Promotions – Belch & Belch, Tata McGraw Hill
3. Advertising Management – Rajeev Batra, John G.Myers& David A Aaker-PHI
4. Otto Kleepner's advertising Procedure – PH
5. International Edition – Contemporary Advertising Irwin/McGraw -Hill
6. Integrated Marketing Communications – Duncon- TMH
7. Foundations of Advertising Theory & Practice

V18MBT20: PRODUCT & BRAND MANAGEMENT

L	T	P	C
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COURSE OUTCOMES

At the end of the course students would be able to:

1: Understand the basic product structure and its components for market place.

2: Match the needs of the consumers in developing a new product.

3: Rephrase the concept of Brand and its applicability in the current market conditions.

4: Apply the concept of branding in real life market situations.

5: Understand core brand mantras for successful launch of a product.

UNIT 1

Introduction to Product: Product, Levels of a Product, Classification of products, Major Product decisions, Product Life Cycle, Product mix decisions, Consumer Adoption process.

UNIT 2

Product Development: New Product Development Process, Ideation, Concept development, Concept testing, Commercialization, Standard Test markets, controlled test markets and Simulated test markets, Managing New product development.

UNIT 3

Introduction to Branding: Concept of Brand and Branding, Brand Equity, Brand equity models, Building strong brands, Brand positioning, Brand Sponsorships.

UNIT 4

Brand Development: Functions of Brand to Consumer, Role of Brand in the product success, Brand development strategies, Brand Management Process, Brand Associations.

UNIT 5

Brand Value: Definition, Core Brand values, Branding and Ethics, Brand Mantras, Internal Branding, Brand Value chain model, Brand Imitations.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. Tapan K Panda (2016): “Product and Brand Management”, Oxford University Press.
2. Chitale A K (2013): “Product policy and Brand Management”, PHI Publications, New Delhi.
3. U C Mathur (2012): “Product and Brand Management” Excel Books, New Delhi.
4. Kirti Dutta (2012): “Brand Management: Principles and Practices”, Oxford University Press.
5. Harsh V Verma(2012): “Brand Management:Text and Cases” Excel Books, New Delhi.

V18MBT21: SECURITY ANALYSIS & PORTFOLIO MANAGEMENT

L	T	P	C
4	0	0	4

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

1. Understand the environment of share markets and trading system is stock exchanges.
2. Find the relationship between risk and return. Value the equities and bonds
3. Learn about fundamental, technical and efficient market approaches.
4. Identify portfolio selection through different portfolio theories.
5. Apply various tools to analyse the performance of mutual funds.

Unit-I: Concept of Investment Education: Investment Vs Speculation, Investment alternatives - Investment Process – Trading System in Stock Exchanges –Market Indices. Calculation of SENSEX and NIFTY - Return and Risk – Meaning and Measurement of Security Returns. Meaning and Types of Security Risks: Systematic Vs Non-systematic Risk - Measurement of Risk. (Problems)

Unit-II: Equity and Bond Valuation Models: – Equity Shares valuation-Cash flow valuation-Asset Valuation-Dividend-discount model; concept of Bond. Zero coupon bond, YTM, YTC. Bond valuation (Simple Problems)

Unit-III: Investment Analysis: Fundamental Analysis – Economy, Industry and Company Analysis, Technical Analysis – Dow Theory – Elliot Wave Theory – Trends and Trend Reversals - Efficient Market Theory –Hypothesis- Forms of Market Efficiency.

Unit-IV: Portfolio Analysis and Selection: Elements of Portfolio Management, Portfolio Models – Markowitz Model, Efficient Frontier and Selection of Optimal Portfolio. Sharpe Single Index Model (SIM) and Capital Asset Pricing Model (CAPM).

Unit-V: Portfolio Evaluation of Mutual funds: Concept and Objectives, Functions and Classification of Mutual Funds- SEBI- Guidelines for Mutual Funds, Performance Evaluation of Portfolios; Sharpe- Jenson – Fama Models for Evaluation of Mutual funds (Problems).

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. S.Kevin: “Security Analysis and Portfolio Management”, PHI Learning, New Delhi, 2009
2. Punithavathy Pandian: “Security Analysis and Portfolio Management”, Vikas Publishing House, N
3. Sudhendra Bhat: “Security Analysis and Portfolio Management”, Excel Books, New Delhi, 2009.
4. Shashi K Gupta: “Security Analysis and Portfolio Management”, Kalyani Publishers, New Delhi,2010
5. Prasanna Chandra, “Investment Analysis and Portfolio Management”, 3/e Tata McGrawHill Publishing Co. Ltd. New Delhi, 2003.

6. Ranganatham : “Investment Analysis and Portfolio Management” Pearson Education. New Delhi, 2009.

V18MBT22: ADVANCED MANAGEMENT ACCOUNTING

L	T	P	C
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COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

1. Understand the nature, objectives and importance of advanced management accounting
2. Find optimum pricing, product-mix make or buy decisions through marginal costing.
3. Learn about standard costing and variance analysis
4. Prepare different types of budgets
5. Aware of contemporary practices in the area of advanced management accounting

Unit – 1: Introduction: Scope, objectives, importance and limitations of Employment of Management Accounting — Role, duties and responsibilities of Management Accountant. Essentials of reporting of management accounting.

Unit - 2: Marginal Costing: Significance of marginal costing. Cost volume profit-BEP analysis – Decision Situations-Sales Volume Decisions – Pricing and Special Order Pricing – Make / Buy Decisions – Product Mix Decisions-– Plant Shutdown Decision Profit Planning – planning of level of activity – Key factor – Foreign market offers.

Unit - 3: Standard Costing: Standard Costing and Absorption costing – Establishment of cost standards. Variance analysis: Material Variances – Labour Variances – Overhead Variances - Sales Variances

Unit- 4: Budgetary Control: – Objectives and advantages of Budgetary control. Types of various budgets. Preparation of Budgets – Purchase, Production, Sales and Cash Budget- Flexible Budget – Master Budget – Zero Based Budgeting.

Unit – 5: Contemporary issues in Management Accounting: Value analysis-Activity based costing-Social cost benefit analysis-Kaizen costing-Throughput costing-Target costing-Learning curve.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. Charles T. Horn Gaxy L. Sundem.: “Introduction to Management Accounting” Konrk Publishers PVT Ltd, New Delhi.

2. S.P. Gupta: “Management Accounting” Sahitya Bhawan Publications, Agra 2002.

3. Manmohan and Goyal: “Management Accounting” Pearson Education.

4. V. Krishna Kumar: “Management Accounting” Mittal Publications, New Delhi.

5. Dr. Kulsreshtha and Gupta: “Practical Problem in Management Accounting” Tata Mc Graw Hill, New Delhi.

6. S.P. Jain and K.L. Narang: “Advanced Cost and Management Accounting” Kalyani Publishers, New Delhi.

V18MBT23: FINANCIAL MARKETS & SERVICES

L	T	P	C
4	0	0	4

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

1. Understand the structure of Indian financial system
2. Get awareness on the financial services and function of merchant banker.
3. Understand the function of Venture capital and lease financing
4. Describe the functions of various NBFCs
5. Understand the functions of security deposits and stock broking houses

Unit I: Indian Financial System , Financial Markets: Structure of Financial System – role of Financial System in Economic Development – Financial Markets :Capital Markets – Money Markets – Primary Market and Secondary Market – Role of SEBI – Secondary Market Operations – Regulation – Functions of Stock Exchanges – Listing – Formalities – Financial Services Sector- Problems and Reforms.

Unit –II: Financial Services: Concept , Scope of Financial Services – Regulatory Frame Work of Financial Services – Growth of Financial Services in India – Merchant Banking – Meaning-Types – Responsibilities of Merchant Bankers – Role of Merchant Bankers in Issue Management – Regulation of Merchant Banking in India.

Unit III: Venture Capital and Leasing: – Growth of Venture Capital in India – Financing Pattern under Venture Capital – Legal Aspects and Guidelines for Venture Capital, Leasing – types of Leases – Evaluation of Leasing Option Vs. Borrowing.

Unit IV: NBFCs: Credit Rating – Meaning, Functions – Debt Rating System of CRISIL, ICRA and CARE. Factoring, Forfeiting and Bill Discounting – Types of Factoring Arrangements – Factoring in the Indian Context;

Unit V: Stock Broking and Security Depository: Concept of Stock Broking, Evolution of stock broking business, functions of stock broking firm- Regulatory guidelines of SEBI on stock broking business- Debt Securitization – Concept and Application – De-mat Services-need and Operations-role of NSDL and CSDL.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References

1. Bhole & Mahakud, Financial Institutions and Market, TMH, New Delhi
2. V.A.Avadhani, Marketing of Financial Services, Himalayas Publishers, Mumbai
3. DK Murthy, and Venugopal, Indian Financial System, IK Int Pub House
4. Anthony Saunders and MM Cornett, Fin Markets & Institutions,TMH, ND
5. Edminister R.D., Financial Institution, Markets and Management:
6. Punithavathy Pandian, Financial Markets and Services, Vikas, New Delhi

7. Vasanth Desai, Financial Markets & Financial Services, Himalaya, Mumbai
8. Meir Khan – Financial Institutions and Markets, Oxford Press.
9. Madura, Financial Markets & Institutions, Cengage, ND

V18MBT24: BANKING & INSURANCE MANAGEMENT

L	T	P	C
4	0	0	4

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

1. Interpret the basic institutional and practical knowledge of Banking and Insurance
2. Apply the practical knowledge of bank credit system and non-performing assets in real scenario.
3. Ability to recognize the new innovations and regulations in the banking sector
4. Ability to interpret the types of insurance and its importance.
5. Understand the concept of general insurance and its practical applicability.

UNIT 1

Introduction to Banking: Meaning of a Bank and Customer- Bank and customer Relationship - Role of commercial banks in Economic Development - Evolution of Banking in India – origin, nationalization, reforms and Financial Inclusion in India - Financial statement analysis of banks: CAMEL Approach, Key Performance indicators- Sources of Bank Funds.

UNIT 2

Uses of Bank Funds: Features of Bank Credit - types of lending - assessment of credit worthiness of a prospective borrower - management of credit process - different types of loans and their features - Non Performing Assets: - gross and net concept of NPAs, causes, implications & recovery of NPAs.

UNIT 3

Regulation and Innovations in Banking System: Regulation of Bank Capital: The need to regulate Bank Capital - Concept of Regulatory Capital, Basel Accords I,II and III. - Banking Innovations - Core Banking Solution - Retail Banking - Products & Services: Plastic Money - National Electronic Funds Transfer - ATM - Mobile Phone Banking - Net Banking- Banc-assurance.

UNIT 4

Introduction to Insurance: Evolution of insurance business in India-Insurance as a Risk Management Tool- Principles of Insurance - Characteristics of Insurance contract - Functions of Insurers - Concept of Reinsurance, uses and advantages - Marketing channels: Agents & brokers –professionalism, remuneration, responsibilities, classification - an overview of IRDA.

UNIT 5

Life Insurance and General Insurance: The concept of Life Insurance - types of Life Insurance contracts - Tax treatment of Life Insurance- Life Insurance Products- Classification of Life Insurance - The Actuarial Science- Provisions of Life Insurance contracts - Special Life Insurance forms – General Insurance: **Health Insurance, Travel Insurance, Motor Insurance – Marine Insurance-** Micro Insurance in India.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. Peter.S.Rose & Sylvia. C. Hudgins: "**Bank Management & Financial Services**", Tata McGraw Hill New Delhi, 2010,
2. James S. Trieschmann, Robert E. Hoyt & David. W. Sommer B:"**Risk Management & Insurance**", Cengage Learning, New Delhi
3. Reddy K S and Rao R N: "Banking & Insurance", Paramount Publishing House 2013.
4. Vasant Desai: "Banks & Institutional Management", Himalaya Publishing House 2010.
5. Harold. D. Skipper & W. Jean Kwon: "Risk Management & Insurance, Perspectives in a Global Economy", Blackwell Publishing New Delhi.
6. NIA: "Life Insurance Principles and Practices", Cengage Learning, New Delhi,2013.
7. Neelam C.Gulati: "Banking and Insurance: Principles and Practice", Excel Books, New Delhi 2011.

V18MBT25: HUMAN RESOURCE PLANNING AND DEVELOPMENT

L	T	P	C
4	0	0	4

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO1: Understand the concept of HR Planning

CO2: Explain various factors influence demand and supply of manpower

CO3: Describe various models of learning

CO4: Assess training needs of employees

CO5: Evaluate various training methods

UNIT-I

Concept of HRP: Definition, need and importance of HRP-Process-Objectives of HRP- skill inventory-Macro Level manpower Planning and Labour market Analysis - Organisational Human Resource Planning; Work Force Flow mapping - Age and Grade Distribution mapping.

UNIT-II

Demand and supply forecasting: Human Resource demand and supply forecasting- Qualitative and Quantitative techniques of HR Demand forecasting; Redeployment and Exit Strategies. Succession planning- meaning and process-competency mapping.

UNIT-III

Instructional Technology for HRD: Learning and HRD; Models and Curriculum; Principles of Learning; Group and Individual Learning; Transactional Analysis; Assessment Centre; Behaviour Modelling and Self Directed Learning; Evaluating the HRD.

UNIT – 4

Human Resource Training and Development: Concept and Importance; Assessing Training Needs; Designing and Evaluating T&D Programmes; Role, Responsibilities and challenges to Training Managers.

UNIT – 5

Training Methods: Training with in Industry (TWI): On the Job & Off the Job Training; Management Development: Lecture Method; Role Play; In-basket Exercise; Simulation; Vestibule Training; Management Games; Case Study; Programmed Instruction; Team Development; Sensitivity Training; Globalization challenges and Strategies of Training Program, Review on T&D Programmes in India.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

Reference Books:

1. Nadler, Leonard :Corporat Human Resource Development, Van Nostrand Reinhold, ASTD, New York .
2. Rao, T.V and Pareek, Udai: Designing and Managing Human Resource Systems, Oxford IBH Pub. Pvt.Ltd., New Delhi , 2005.
3. Rao, T.V: Readings in HRD, Oxford IBH Pub. Pvt. Ltd., New Delhi , 2004

4. Viramani, B.R and Seth, Parmila: Evaluating Management Development, Vision Books, New Delhi .
5. Rao, T.V.(et.al): HRD in the New Economic Environment, Tata McGraw-Hill Pub.Pvt, Ltd., New Delhi , 2003.
6. Rao, T.V: HRD Audit, Sage Publications, New Delhi .
7. ILO, Teaching and Training Methods for Management Development Hand Book, McGraw-Hill , New York .
8. Rao, T.V: Human Resource Development, Sage Publications, New Delhi .
9. Kapur, Sashi: Human Resource Development and Training in Practice, Beacon Books, New Delhi
10. Strategic HRM by Mabey and Salama.

V18MBT26: COMPENSATION AND REWARD MANAGEMENT

L	T	P	C
4	0	0	4

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO1: Describe the meaning and concept of wage and salary administration

CO2: Explain various methods of calculating worth of a job

CO3: State the various theories of wage and salary

CO4: Analyze the role of a compensation in controlling the labour cost

CO5: Evaluate compensation structure and design efficient compensation package

UNIT 1

Compensation: concept and definition – objectives of compensation program – factors influencing compensation –Role of compensation and Reward in Modern organizations- Compensation as a Retention strategy- aligning compensation strategy with business strategy – concept of reward - non-financial compensation system-Reward management process - Managing Compensation: Designing a compensation system – internal and external equity– pay determinants

UNIT 2

Job evaluation and Compensation Structure: Introduction to Principles and Procedures of job evaluation programs-Introduction to basic job evaluation methods-Types of compensation system, compensation surveys- Incentive payments and its objectives.

UNIT 3

Wage and Salary administration: Nature and Purpose, Wage surveys-Administration of wage and salary-Principles-Components of wages-Theory of wages-Wage differentials-Importance- Wage differentials in India-Executive compensation plans-Legal frame work for wage and salary administration.

UNIT 4

Control systems for labour costs: Introduction-Direct and Indirect labour, Role of various departments-The personnel department-Industrial engineering department-Types of worker- Payroll department-Process and steps for preparation of payroll-Compensation surveys-Profit sharing.

UNIT 5

Pay Structure and Tax Planning: Introduction- Compensation Structures-Performance based and Pay based structures-Designing pay structures-comparison in evaluation of different types of pay structures-Significance of factors affecting-Tax Planning –Concept of Tax planning-Role of tax planning in compensation benefits-Tax efficient compensation package-Fixation of tax liability salary restructuring.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References

1. Dr. Kanchan Bhatia “Compensation Management”, Himalaya Publishing House, New Delhi 2012.
2. A.M.Sarma, N.SambasivaRao: “Compensation and Performance management”, Himalaya Publishing House, Mumbai
3. DewakarGoel:“Performance Appraisal and Compensation Management”, PHI Learning, New Delhi, 2012
4. ER SoniShyan Singh ‘Compensation Management’ – Excel Books, New Delhi – 2008.
5. 5.Mousumi S Bhattacharya NilanjanSengupta , “Compensation Management” – Excel Books, New Delhi – 2009
6. 6.Tapomoy Deb “Compensation Management” – Excel Books, New Delhi – 2009

V18MBT27: PERFORMANCE MANAGEMENT

L	T	P	C
4	0	0	4

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO1: Describe the relationship between performance management and other disciplines

of HRM

CO2: Explain various approaches of performance management planning

CO3: Discuss various methods of design and implementation of performance management Systems.

CO4: Analyze the role of a compensation in controlling the labor cost

CO5: Evaluate compensation structure and design efficient compensation package

Unit-1

Introduction: Definition–concerns-scope-Historical developments in performance management-Over view of performance management-Process for managing performance- Importance –Linkage of PM to other HR processes-Performance Audit.

Unit-2

Performance Management Planning: Introduction-Need-Importance-Approaches-The Planning Process—Planning Individual Performance- Strategic Planning –Linkages to strategic planning-Barriers to performance planning-Competency Mapping-steps-Methods.

Unit-3

Management System: objectives – Functions- Phases of Performance Management System- Competency based Performance Management Systems- Reward based Performance Management Systems- HR Challenges- Appraisal for recognition and reward-Methods of Appraising- Appraisal system design-Implementing the Appraisal System

Unit-4

Performance Monitoring and Counselling: Supervision- Objectives and Principles of Monitoring- Monitoring Process- Periodic reviews- Problem solving-engendering trust- Role efficiency- Coaching- Counselling and Monitoring-Concepts and Skills

Unit-5

Performance management skills – Operational change through performance management. High Performing Teams: Building and leading High performing teams – team oriented organizations – developing and leading high performing teams- Role of Leadership

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. PremChadha: “Performance Management”, Macmillan India, New Delhi, 2008.
2. Michael Armstrong & Angela Baron, “Performance Management”: The New Realities, Jaico Publishing House, New Delhi, 2010.

3. T.V.Rao, "Appraising and Developing Managerial Performance", Excel Books, 2003.
4. David Wade and RonadRecardo, "Corporate Performance Management", Butter Heinemann, New Delhi, 2002.
5. DewakarGoel: "Performance Appraisal and Compensation Management", PHI Leaarning, New Delhi, 2009
6. A.M. Sarma "Performance Management Systems" Himalaya Publishing House, New Delhi, 2010.

V18MBT28: STRATEGIC HUMAN RESOURCE MANAGEMENT

L	T	P	C
4	0	0	4

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO1: Understand the theoretical perspectives and various approaches to Strategic HRM

CO2: Describe various strategic HR Planning process

CO3: Explain strategic HR implementation process

CO4: Explain strategic HR Development

CO5: Evaluate various strategic HR strategies

UNIT-1

Human Resource Strategy: Introduction to Strategic Human Resource Management - Evaluation objectives and Importance of Human Resources Strategy- Strategic fit – A conceptual framework -Human Resources contribution to strategy - Theoretical Perspectives on SHRM approaches - Linking business strategies to HR strategies.

UNIT-2

Strategic Human Resource Planning: Objectives, benefits, levels of strategic planning- Activities related to strategic HR Planning-Basic overview of various strategicplanning models-Strategic HR Planning model-Components of the strategic plan.

UNIT-3

Strategy Implementation: Strategy implementation as a social issue-The role of Human Resource-Work force utilization and employment practices-Resourcing and Retention strategies-Reward and Performance management strategies.

UNIT-4

Strategic Human Resource Development: Concept of Strategic Planning for HRD- Levels in Strategic HRD planning-Training and Development Strategies-HRD effectiveness- employee engagement- Green HRM

UNIT-5

Human Resource Evaluation: Approaches to evaluation, Evaluation Strategic contributions of Traditional Areas - Evaluating Strategic Contribution of Emerging Areas-HR as a Profit centre and HR outsourcing strategy.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. Charles R. Greer: “Strategic Human Resource Management” - A General Manager Approach - Pearson Education, Asia
2. Fombrum Charles &Tichy: “Strategic Human Resource Management” - John Wiley Sons, 1984
3. Dr. Anjali Ghanekar “Strategic Human Resource Management” Everest Publishing House, Pune 2009
4. TanujaAgarwala “Strategic Human Resource Management” Oxford University Press, New Delhi 2014
5. Srinivas R Kandula “Strategic Human Resource Development” PHI Learning PVT Limited, New Delhi 2009

6. Dreher, Dougherty “Human Resource Strategy” Tata McGraw Hill Publishing Company Limited, New Delhi 2008

V18MBT29: LOGISTICS & SUPPLY CHAIN MANAGEMENT

L	T	P	C
4	0	0	4

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO1: Understand the importance of logistics management.

CO2: Get familiarity with various cost concepts in measuring logistics performance.

CO3: Understand the relationship between logistics and supply chain management.

CO4: Identify the need for coordination in LSCM.

CO5: Understand global logistics management.

UNIT-I:

Logistics and Competitive strategy: Competitive advantage – Gaining Competitive advantage through logistics-Integrated supply chains– Competitive performance - Models in Logistics Management - Logistics to Supply Chain Management – Focus areas in Supply Chain Management.- Customer service and retention- Basic service capability Value added services

UNIT 2:

Measuring logistics costs and performance: The concept of Total Cost analysis – Principles of logistics costing – Logistics and the bottom-line – Impact of Logistics on shareholder value - customer profitability analysis –direct product profitability – cost drivers and activity-based costing.

UNIT 3:

Logistics and Supply chain relationships: Benchmarking the logistics process and SCM operations –Mapping the supply chain processes – Supplier and distributor benchmarking – setting benchmarking priorities –identifying logistics performance indicators –Channel structure
– Economics of distribution –channel relationships –logistics service alliances.

UNIT 4:

Sourcing, Transporting and Pricing Products: sourcing decisions and transportation in supply chain – infrastructure suppliers of transport services – transportation economics and pricing – documentation - pricing and revenue management Lack of coordination and Bullwhip Effect - Impact of lack of coordination. - CRM –Internal supply chain management - .

UNIT 5:

Managing global Logistic: Logistics in a global economy – views of global logistics- global operating levels – interlinked global economy – Global strategy – Global purchasing – Global logistics – Channels in Global logistics –Global alliances.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References

1. Donald J.Bowersox and David J.Closs: "Logistical Management" The Integrated Supply Chain Process, TMH, 2011.
2. Edward J Bradi, John J Coyle: " A Logistics Approch to Supply Chain Management, Cengage Learning, New Delhi, 2012.
3. D.K.Agrawal: "Distribution and Logistics Management", MacMillan Publishers, 2011
4. Sunil Chopra and Peter Meindl: "Supply chain Management: Strategy, Planning and Operation", Pearson Education, New Delhi 2013
5. Rahul V Altekar: Supply Chain Management, PHI Learning Ltd, New Delhi, 2009

V18MBT30: BUSINESS ANALYTICS

L	T	P	C
3	0	4	4

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

1. Demonstrate the need of Business Analytics in today's business world.
2. Illustrate the phases of business analytics life cycle.
3. Demonstrate various Big Data technologies for business analytics.
4. Illustrating the use of R programming for business analytics.
5. Creating data sets using R programming and analyzing business data for decision making..

Unit– I: Introduction to Business Analytics –Competing on Analytics – The New Science of Winning Business Analytics – The Paradigm Shift from Data to Insight and from Business Intelligence to Business Analytics – Descriptive - Predictive and Prescriptive.

Unit–II: The Business Analytics Cycle Information summary about Books – Tools –Blogs- Resources –Groups – communities –Videos –Useful links- Sources of Data –Database Architecture and Data Gathering Process-Types of Data- Overview of an online survey/research project**.**

Unit-III: Introduction to Big Data – Structuring of Big Data –Elements of Big Data- Business Applications of Big Data –Handling Big Data Technologies –Data Mining and Text Mining.

Unit–IV: Creating R data sets – Reading raw data files (Column input/formatted input)- Assigning variable attributes – Changing variable attributes – Reading MS spread sheets in R**.** **(Including Practical)**

Unit–V: Reading R data sets and creating variables –Reading Delimited Raw Data Files –Using Excel for Data Management –Purpose of the Database- Relational Databases Entities – Relationships and Attributes –Specify Keys – Primary and Foreign –Create Relationships among Tables –Refinement and Normalization – Microsoft Access and R. **(Including Practical)**

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. Big Data for Dummies – Authors: Judith Hurwitz, Alan Nugent, Fern Halper, and Marcia Kaufman
2. BIG DATA using SMART Big Data Analytics to make better decisions and improve performance – Author: BERNARD MARR
3. Analytics in a Big Data World, the essential guide to data science and its applications – Author: BART BAESENS
4. Data Science for Business, what you need to know about Data Mining and Data-Analytic Thinking – Author: FOSTER PROVOST & TOM FAWCETT

5. Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data – Author: EMC Education Services
6. R For Dummies – Authors: Andrie de Vries, and JorisMeys

V18MBT31: SERVICES MARKETING

L	T	P	C
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COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

1. Understand the nature and importance of services in an economy.
2. Understand the need for CRM in services.
3. To get familiarity on service product and strategy.
4. To understand distribution mechanism for services
5. To analyze the importance of service quality.

Unit I: Importance of services marketing; Service characteristics and Marketing challenges; Reasons for growth of services sector; Services sector in the Indian economy.

Unit II: Customer Relationship Marketing: Relationship Marketing, the nature of services consumption, understanding customer needs and expectations, strategic response to the intangibility of service performance.

Unit III: Services product management (Basic service package, CVH, service flower, new service development, service life cycle); Services branding and positioning; physical evidence; Pricing of services.

Unit IV: Service Distribution strategies; internal marketing; External marketing; Interactive marketing (Service encounter, Management of moments of truth, Interaction process design and efficiency).

Unit V: Service quality management (Gap model, SERVQUAL); Total quality services marketing; Services failures and recovery strategies (Case Studies are Compulsory)

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

Suggested Books:

1. K.Rama Mohana Rao: Services Marketing, Pearson, 2 Ed. New Delhi.
2. Valeri Zeithmal, Mary Jo Binter,Dwayne D Gremler and Ajay Pandit: Services Marketing, Tata McGraw Hill, New Delhi.
3. Christopher Lovelock, Jochen Wirtz and Jayanta Chatterjee: Services Marketing: People, Technology, Strategy, Pearson, New Delhi.
4. Christian Gronroos: Services Management and Marketing, Maxwell Macmillan.
5. Harsh V. Verma, Services Marketing, Pearson, New Delhi.

V18MBT32: SALES AND DISTRIBUTION MANAGEMENT

L	T	P	C
4	0	0	4

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

1. Understand the basic concept of Sales and distribution management.
2. Apply personal selling techniques to promote a product.
3. Apply various concepts of sales force management.
4. Understand various issues related to distribution channels.
5. Understand the functionality of logistics and supply chain concepts.

UNIT1:

Definition of Sales Management-nature and scope of sales Management –Modern trends in Sales Management -Role and responsibilities of Sales Managers -Organization of Sales Department-Different types of Sales Organizations

UNIT2:

Personal Selling –Objectives – Approaches to Personal Selling –Process of Personal Selling- Organization Design and Staffing, Sales Planning, Time and Territory Management

UNIT3:

Managing sales Force - Recruitment –Selection and Training of salesmen-Salesmen's Compensation Plans - Evaluation of Salesmen's performance –Sales Control Research

UNIT4:

Marketing Channels- Structure and Functions-Channel Design –Selecting Channel Members –Motivating Channel Members –Selection and Recruitment of Channel Partners- Channel Conflicts –Reasons –Managing Channel Conflicts

UNIT5:

Distribution Management -–Retailing –Wholesaling - Supply Chain Management-Managing Logistics-Physical Distribution Management –Transportation and Traffic Management –Warehousing and Storage

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. Sales Management: Decisions, Strategies & Cases, Richard R. Still, Edward W. Cundiff, Norman A.P. Govoni, Pearson Education, Latest Edition
2. Sales Management: Concepts Practice, and Cases, Johnson F.M., Kurtz D.L., Scheuing E.E., Tata McGraw- Hill, Latest Edition

3. Selling & Sales Management, David Jobber, Geoffrey Lancaster, Pearson Education, Latest Edition
4. Sales Management, Tanner, Honeycutt, Erffmeyer, Pearson Education, Latest Edition
5. Sales Force Management, Mark W. Johnston, Greg W. Marshall, Tata McGraw-Hill, Latest Edition
6. Sales Management, William L. Cron, Thomas E. DeCarlo, Wiley, Latest Edition
7. Sales & Distribution Management, Dr. S. L. Gupta, Excel, Latest Edition

V18MBT33: DIGITAL AND SOCIAL MEDIA MARKETING

L	T	P	C
4	0	0	4

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO1 : Recall the basic and advanced concepts of Marketing learned.

CO2 : Understand and gain Knowledge in Fundamental aspects of Digital Marketing.

CO3 : Apply SEM in managing promotional activities.

CO4 : Apply SMM techniques in planning a promotional campaign.

CO5 : Manage the promotional activities using SMO.

UNIT 1

Overview of Traditional Marketing: Marketing process, Marketing Mix, Promotion Strategies, Importance of Distribution Networks, Green Marketing, Guerrilla Marketing, Double Loop Marketing-From Mind share to wallet share.

UNIT 2

Fundamentals of Digital Marketing : Difference between Marketing and Sales, Inbound Vs Outbound Marketing, 7P's of Marketing, Concept of Digital Marketing, evolution of Digital marketing, various tools available in Digital Marketing landscape, advantages to marketers going digital, Understanding the concepts of Traffic and Leads.

UNIT 3

Search Engine Marketing: Understanding Ad words, Ad words Account structure, Ad types, Keyword Match types, Ad rank, Quality score calculation, Keyword planning and control, Bidding Strategies, Creating Ad campaigns (Search and Display only)

UNIT 4

Social Media Marketing: Importance of Social Media, Social Media-Disruption of Traditional Media, Benefits of Social Media Marketing, Social media jargon-Structure of SMM, Developing SMM strategy, Benefits of Blogs and Webinars - Planning a SMM Campaign and latest trends in social media marketing.

UNIT 5

Social Media Optimization: Meaning of Social Media optimization, Techniques of SMO, Edge rank algorithm, Practical Sessions on Social blogging sites. Add on Topics in Digital Marketing - Basic concepts of Search Engine optimization, Affiliate Marketing, E-Mail Marketing, Drip Marketing and Google Analytics. Cyber crime and ethical aspects of social media marketing.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. Puneet Singh Bhatia (2017). ‘Fundamentals of Digital Marketing’.Pearson Education.
2. Seema Gupta (2017). ‘Digital Marketing.’Tata McGraw Hill.
3. Philip Kotler (2017). ‘Marketing 4.0 : Moving from Traditional to Digital’.
4. VandanaAhuja (2015). ‘Digital Marketing’.Oxford University Press.
5. AnkitSrivastava (2018) ‘Social Media Marketing and Branding’.Pbp publishers.

V18MBT34: INTERNATIONAL MARKETING MANAGEMENT

L	T	P	C
4	0	0	4

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO1: Illustrate the marketing principles that together constitute the field of study known as international marketing;

CO2: Evaluate and design sustainable strategies for International markets.

CO3: Understand and assess the challenges of managing product and price decisions in International markets.

CO4: Evaluate various marketing channels in International arena.

CO5: Practice export related documentation by following authenticated procedures.

UNIT 1:

Introduction to International Marketing: Scope and Significance of international Marketing, - Difference between International and domestic marketing – The growing attractiveness of developing country market – International orientations, Stages of internationalization, Driving and restraining forces of International markets, Participants in international marketing.

UNIT 2:

International marketing strategy: Entry strategies in International markets – modes of entries in International markets – International market segmentation – international targeting – criteria for targeting, selecting a International target market – International product positioning strategy. Business Customs in International Market – strategies for FDI and FIIs - Entry Strategies of Indian Firms

UNIT 3:

International Product & Price management: International product mix – Managing International Research and Development for product management– Product diffusion and adoption in International markets – Product and culture – International brand leadership – : Environmental influences on Pricing Decisions – Grey Market goods – Transfer pricing – International Pricing – Policy Alternatives – Constraints on International pricing

UNIT 4:

International Marketing Channels and Promotion for International markets: channels – Innovations in International channels – Channel strategy for new market entry – Distribution Structures – International Distribution Patterns - Challenges in Managing An International Distribution Strategy – Selecting Foreign Country Market intermediaries - International Advertising and branding - Export Policy Decisions of a firm - Export costing and pricing – EXIM policy of India.

UNIT 5:

Export procedures and documents: Preliminaries: inquiry and offer – confirmation of offer – export license – finance – production /procurement of goods – shipping space – packing and marketing – quality control and pre – shipment inspection – excise clearance – customs formalities – negotiation and documents – standardization and aligned pre-shipment documents – documents related to goods – documents related to shipments.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References

1. Francis Cherunilam: International marketing, 11th Edition, Himalaya Publication
2. House,2010
3. Warren J Keegan: Global Marketing Management, 5th Edition, Prentice Hall of India
4. Private Limited.
5. Philip R. Cateora, John L. Graham: International Marketing 11/e, Tata McGraw-Hill Co. Ltd.,
6. 2002.
7. R.Srinivasan: International Marketing, Prentice-Hall of India Pvt. Ltd., 2010
8. U.C Mathur: International Marketing Management, Sage Publications, New Delhi 2008
9. Kotabe, Peloso: International Marketing, Wiley India, New Delhi, 2020

V18MBT35: FINANCIAL DERIVATIVES

L	T	P	C
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COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

1. Understand the nature of derivatives and derivative markets
2. Know the trading of futures on BSE &NSE
3. To get fundamental knowledge of options market
4. Apply pricing mechanism on various derivative options.
5. To get the ability of understanding swaps and economic functions of swap transactions.

Unit– I: Introduction to Financial Derivatives – Meaning and Need – Growth of Financial Derivatives in India – Derivative Markets – Participants – Functions – Types of Derivatives – Forwards – Futures – Options – Swaps – The Regulatory Framework of Derivatives Trading in India.

Unit – II: Features of Futures – Differences Between Forwards and Futures – Financial Futures – Trading – Currency Future – Interest Rate Futures – Pricing of Future Contracts – Value At Risk (VAR) – Hedging Strategies – Hedging with Stock Index Futures –Futures Trading on BSE & NSE.

Unit – III: Options Market – Meaning & Need – Options Vs futures – Types of Options Contracts – Call Options – Put Options – Trading Strategies Involving Options – Basic Option Positions – Margins – Options on stock Indices – Option Markets in India on NSE and BSE.

Unit – IV: Option Pricing – Intrinsic Value and Time Value - Pricing at Expiration – Factors Affecting Options pricing – Put-Call Parity Pricing Relationship – Pricing Models – Introduction to Binominal Option Pricing Model.

Unit – V: Swaps – Meaning – Overview – The Structure of Swaps – Interest Rate Swaps – Currency Swaps – Commodity Swaps – Swap Variant – Swap Dealer Role – Equity Swaps – Economic Functions of Swap Transactions – FRAs and Swaps.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

Suggested Books:

1. Rene M Stulz, Risk Management and Derivatives, Cengage, New Delhi
2. David Thomas. W & Dubofsky Miller. Jr., Derivatives Valuation and Risk Management, Oxford University, Indian Edition.

3. N.D.Vohra & B.R.Baghi, Futures and Options, Tata McGraw-Hill Publishing Company Ltd.
4. Red Head: Financial Derivatives: An Introduction to Futures, Forward, Options" Prentice Hall of India.
5. David A. Dubofsky, Thomas W.Miller, Jr.: Derivatives: Valuation and Risk Management, Oxford University Press.
6. Sunil K.Parameswaran, "Futures Markets: Theory and Practice" Tata-McGraw-Hill Publishing Company Ltd.
7. D.C.Parwari, Financial Futures and Options, Jaico Publishing House
8. T.V.Somanathan, Derivatives, Tata McGraw-Hill Publishing Company Ltd.
9. NSE manual of Indian Futures & Options & www.Sebi.com

V18MBT36: PROJECT APPRAISAL AND FINANCE

L	T	P	C
4	0	0	4

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

1. Understand the nature, importance, various types of projects and project life cycle.
2. Know the different kinds of feasibility studies like market, technical, managerial etc.
3. Evaluating project appraisals by applying capital budgeting techniques.
4. Estimation of project scheduling using PERT and CPM
5. Identify the project related risks and remedial measures.

Unit I: Basics of Project Management –Concept–need-objectives-Characteristics of project - Project environment – Types of Projects – Project life cycle-phases – Project selection – Causes of delay in Project commissioning– Remedies to avoid overruns.

Unit II–Feasibility study: Project analysis-Feasibility studies and reports – Stages of Project feasibility study – Components for project feasibility studies. Market feasibility -Market survey – Technical feasibility-Managerial Feasibility-Legal Aspects of Project Management.

Unit III: Financial Appraisal – Criteria and Investment strategies – Capital Investment - Risk analysis – Cost and financial feasibility – Cost of project and means of financing –Estimation of cash flows – Appraisal Techniques (Non DCF and DCF)-Cost-Benefit Ratio-Financial evaluation under Uncertainty – Tax benefits.(Problems)

Unit IV: Project Scheduling: Network analysis- Development of Programme Evaluation & Review Technique (PERT) – Benefits of PERT – Assumptions in PERT modelling Construction of PERT (Project duration and valuation, slack and critical activities, critical path interpretation) – Critical Path –Method (CPM) (Problems)

Unit V:–Project Risk Management*:* Introduction to Risk, Risk Management, Role of Risk Management in Overall Project Management, Process of Risk Management in project management, Reducing Risks. Abandonment analysis - Social Cost Benefit Analysis (SCBA) National and International importance of projects.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

Suggested Books:

1. Gido: Effective Project Management, 2e, Thomson, 2007.

2. Prasanna Chandra, “Projects, Planning, Analysis, Selection, Financing, Implementation and Review”, TataMcGraw Hill Company Pvt. Ltd., New Delhi 1998.
3. Damodaran, “Corporate Finance”, Johy Wiley Publications.
4. Erhardt & Brigham, “Principles of Corporate Finance”, Thomson, 2006.
5. Singh M.K, “Project Evaluation and Management”
6. Prasad N.K, “Principles and Practice of Cost Accounting”, 8. Pahwa, HPS, Project Financing.
7. Clifford F. Gray, Erik W. Larson, “Project Management, the Managerial Emphasis”, McGraw Hill, 2000.

V18MBT37: BUSINESS TAXATION & PLANNING

L	T	P	C
4	0	0	4

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

1) To Know about various types of Direct taxes
2) Understand the computation of various types of indirect taxes
3) To get familiarity with tax planning.
4) To understand basis of tax management decisions
5) Able to understand International tax system.

UNIT 1

Direct Taxes: Income Tax Act 1961 – Basic concepts – Income – Agricultural Income – Residential Status – Income exemption from tax – Income from House Property – Computation of Salary Income – Income from Business and Profession – Capital Gain from other sources – computation of Total Income.

UNIT 2

In Direct Taxes: Historical Evolution of GST and VAT in India. – Issues of GST – Components of GST. Excise Duty – Introduction – Nature – Basic Concepts. Customs Duty – Introduction – Basic Concepts – Scope and Converge of Customs Duty – Nature of Customs Duty – Classification for Customs – Types of Custom Duties – Exemptions from Customs Duty.

UNIT 3

Introduction to Tax Planning: Nature of Tax – Essential components in levy of tax – Legal Principles of taxation laws – Five basic Rules of interpretation of statues – Law Lexicon and Legal Maxims – Concepts of Tax Avoidance, Tax Evasion – Tax Planning and Tax Management.

UNIT 4

Tax Management Decisions: Tax considerations - Management Decisions, such as make / buy- own/lease - export/local sale - Guidelines to Tax planning – Relief's – Concessions – Rebates – Deductions – Incentives (Payment of Advance Tax) – Filing of Returns – Refunds – Penalties for non-compliance.

UNIT 5

Multi National Taxation: Bilateral Tax Treaties- Transfer Pricing for Tax Planning – Uses of Inter Company Loans- Tax Intensives Organizational Setup of MNCs- Tax Reliefs and Rebates in India- Tax Credits- Tax Havens- Investment Decision on Tax Planning- Global Investment and Tax Incentives- Transfer Pricing Methods- Measures to Plug Tax Loopholes.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. Vinod K.Singhania and Mounica singhnia, Corporate Tax Planning and business Management, Taxmann Publications.
2. Vinod K.Singhania and Kapil Singhania, Direct Taxes – Law and Practice, Taxmann Publications
3. R.N.Lakhotia, Corporate Tax Planning, vision publications.
4. V.A. Avadhani, "International Financial Managment" Himalaya Publishing House, 2009
5. PG Apte, "International Financial Management" Tata Mc Graw Hill, 2009.
6. Arun kumar "Ground Scorching Tax" Penguin Portfolio

V18MBT38: INTERNATIONAL FINANCIAL MANAGEMENT

L	T	P	C
4	0	0	4

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

- Understand the Evolution of international monetary system,
- Get the knowledge to apply the various measures to face the foreign Exchange risk
- Awareness about the international financial markets and financial instruments used in financial market
- Gained knowledge about the Corporate Strategies that MNC's will apply for FDI and Valuation of international acquisitions.
- Able to read and analyse the financial reports of MNC's

Unit I: International Monetary and Financial System: Introduction to international financial Management, Nature and Scope, International Monetary System: Breton Woods Conference and Other Exchange Rate Regimes; European Monetary System, South East Asia Crisis and Current Trends.

Unit II: Foreign Exchange Markets: Foreign Exchange market Structures, Quotations and speculation, Arbitrage in Forex Market , Forex Exposure , Transaction Exposure; Accounting Exposure and Operating Exposure – Management of Exposures – Internal Techniques, Management of Risk in Foreign Exchange Markets: FOREX Derivatives – Swaps, futures and Options and Forward Contracts (Cases).

Unit-III: Features of Different International Markets: Euro Loans, CPs, Floating Rate Instruments, Loan Syndication, Euro Deposits, International Bonds, Euro Bonds and Process of Issue of GDRs and ADRs.

Unit-IV: Foreign Investment Decisions: Corporate Strategy and Foreign Direct Investment; Multinational Capital Budgeting; International Acquisition and Valuation, Adjusting for Risk in Foreign Investment.

Unit V: International Accounting and Practices; Accounting Practices of MNCs, Accounting For Foreign Currency Translation, Consolidation of Financial Statement. Accounting For Inflationary Trends. Transfer Pricing, Arm's-length price, Benefits and Costs of Transfer Pricing. Transfer pricing and Indian tax Provisions.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

1. Buckley Adrin, Multinational Finance, 3rd Edition, Engle Wood Cliffs, Prentice Hall of India.
2. S.P.Srinivasan, B.Janakiram, International Financial Management, Wiley India, New Delhi.
3. Clark, International Financial Management, Cengage, ND

4. V.Sharan, International Financial Management, 3rd Edition, Prentice Hall of India.
5. A.K.Seth, International Financial Management, Galgothia Publishing Company.
6. P.G.Apte, International Financial Management, Tata McGrw Hill, 3rd Edition
7. .Bhalla, V.K., International Financial Management, 2nd Edition, New Delhi, Anmol, 2001. V.A.Avadhani, International Financial Management, Himalaya Publishing House.
8. Bhalla, V.K., Managing International Investment and Finance, New Delhi, Anmol, 1997.

V18MBT39: ORGANIZATIONAL CHANGE & DEVELOPMENT

L	T	P	C
4	0	0	4

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO1: Recall the nature and importance of change in organizations

CO2: Represent various changes through mapping and diagramming

CO3: Describe nature, importance and interventions of OD

CO4: State the changes in labour management in India

CO5: analyse the need for teams and harness team work in organizations

UNIT 1

Basics of Change Management: Meaning, nature and Types of Change – change programmes – change levers – change as transformation – change as turnaround – value based change.

UNIT 2

Mapping change: The role of diagramming in system investigation – A review of basic flow diagramming techniques –systems relationships – systems diagramming and mapping, influence charts, multiple cause diagrams- a multidisciplinary approach - Learning organization: The relevance of a learning organization - strategies to build a learning organization.

UNIT 3

Organization Development (OD): Meaning, Nature and scope of OD - Dynamics of planned change – Person-focused and role-focused OD interventions –Planning OD Strategy – OD interventions in Indian Organizations – Challenges to OD Practitioners.

UNIT 4

Negotiated Change: Change in the labour - management relations in the post-liberalized India – collective bargaining strategy to the challenges of Globalization and the restructuring of enterprises in India - Changes in the legal frame work of collective bargaining -social security.

UNIT 5

Team Building: Nature and Importance of Teams – Team Vs Groups – Types of teams – Characteristics of Virtual teams – Team building life cycle – Team building skills – Virtual team - High performance teams – self managing teams – Building team relationships – empowered teams – leadership on teams – Managing cross –cultural diversity in teams – Group think as a decision making process – effective decision making techniques for teams and groups.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References

1. Cummings: “Theory of Organisation Development and Change”, Cengage Learning, New Delhi, 2013.
2. Robert A Paton: Change Management, Sage Publications, New Delhi, 2011.
3. NilanjanSengupta: Managing Changing Organisations, PHI Learning, New Delhi, 2009
4. Adrian Thornhill: Managing Change, Pearson Education, New Delhi, 2012.
5. Radha R Sharma: Change Management, TMH, New Delhi, 2012

V18MBT40: MANAGEMENT OF INDUSTRIAL RELATIONS

L	T	P	C
4	0	0	4

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO1: Explain the factors influence IR

CO2: Describe the growth and functioning of trade unions

CO3: Describe nature, importance and various forms of Workers' Participation in management.

CO4: Recall the Salient features of Workmen Compensation Act.

CO5: Analyse the Causes of Grievances and Design redressal mechanism.

UNIT 1

Industrial Relations Management: Concept- meaning- evaluation –Background of industrial Relations in India- Influencing factors of IR in enterprise and the consequences. Economic, Social and Political environments-Employment Structure –Social Partnership-Wider approaches to industrial relations- Labour Market.

UNIT 2

Trade Unions: Introduction-Definition and objectives-growth of Trade Unions in India-trade Unions Act , 1926, recent amendments. Legal framework-Union recognition-Union Problems-Employees Association-introduction ,Objective Membership, Financial Status.

UNIT 3

Workers' Participation in Management: Workers' Participation in Management - Worker's Participation in India, shop floor, Plant Level, Board Level- Workers' Welfare in Indian scenario- Collective bargaining concepts & Characteristics – Promoting peace.

UNIT 4

Social Security: Introduction and types –Social Security in India, Health and Occupational safety programs- Salient features of Workmen Compensation Act and Employees' State Insurance Act relating to social security – Workers' education objectives -Rewarding.

UNIT 5

Employee Grievances: Causes of Grievances –Conciliation, Arbitration and Adjudication procedural aspects for Settlement of Grievances –Standing Orders-Code Discipline. Industrial Disputes: Meaning, nature and scope of industrial disputes - Cases and Consequences of Industrial Disputes –Prevention and Settlement of industrial disputes in India.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References

1. C.S Venkataratnam: “Industrial Relations”, Oxford University Press, New Delhi, 2011
2. Sinha: “Industrial Relations, Trade Unions and Labour Legislation”, Pearson
3. Education, New Delhi, 2013
4. Mamoria: “**Dynamics of Industrial Relations**”, Himalaya Publishing House, New Delhi,
5. 2010
6. B.D.Singh: “**Industrial Relations**” Excel Books, New Delhi, 2010
7. Arun Monappa: “**Industrial Relations**”, TMH, New Delhi. 2012
8. Prof. N.Sambasiva Rao and Dr. Nirmal Kumar: “**Human Resource Management and**
9. **Industrial Relations**”, Himalaya Publishing House, Mumbai
10. Ratna Sen: “**Industrial Relations**”, MacMillon Publishers, New Delhi, 2011

V18MBT41: LABOUR WELFARE & LEGISLATION

L	T	P	C
4	0	0	4

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO1: Describe various problems in labour welfare

CO2: Reproduce various labour welfare programs

CO3: Recall the provisions of various acts related to labour welfare

CO4: Recall the provisions of various acts related to payment of bonus and wages

CO5: Explain the functioning of trade unions in India

UNIT 1

Labour Welfare: Concept, scope and philosophy, principles of labour welfare, Indian constitution on labour, Agencies of labour welfare and their role. Impact of ILO on labour welfare in India-Labour problems – Indebtedness, Absenteeism, Alcoholism, Personal and Family Counselling.

UNIT 2

Labour welfare programmes: Statutory and non-statutory, extra mural and intra mural, Central Board of Workers' Education; Workers' Cooperatives; Welfare Centers, Welfare Officers' Role, Status and Functions. Role of social work in industry, Labour welfare fund.

UNIT 3

Welfare Legislation: Factories Act 1948, Mines Act 1952, Plantation Labour Act 1951, Contract Labour (Regulation and Abolition) Act 1970 and A.P. Shops and Establishments Act.

UNIT 4

Wage and Social Security Legislation: Payment of wages Act 1936 - Minimum wages Act 1948 - Payment of Bonus Act 1966 -. Payment of Gratuity Act 1972 - Workmen's Compensation Act 1923 - Employees State Insurance Act 1948 - Maternity Benefit Act 1961 and Employees Provident Fund and Miscellaneous Provisions Act 1952.

UNIT 5

Industrial Relations Legislation: Industrial Disputes Act 1947; Industrial Employment (standing orders) Act 1946 and Trade Unions Act 1926.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. Govt. of India (Ministry of Labour, 1969). Report of the Commission on Labour Welfare, New Delhi: Author.
2. Govt. of India (Ministry of Labour, 1983). Report on Royal Commission on Labour in India, New Delhi: Author.
3. Malik, P.L: "Industrial Law", Eastern Book Company. Laknow,1977
4. Moorthy, M.V: "Principles of Labour Welfare", Oxford University Press, New Delhi.

5. Pant, S.C: “Indian Labour Problems”, Chaitanya Pub. House. Allahabad.

V18MBT42: INTERNATIONAL HRM

L	T	P	C
4	0	0	4

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO1: Describe global HR perspective

CO2: Explain problems involved in international assignments

CO3: Discuss the relevance of Cross Culture Communication in global context

CO4: Evaluate the worth of a overseas assignment

CO5: Evaluate Global Strategic Advantages through HRD

UNIT 1

Introduction: A Global HR Perspective in New Economy-Challenges of Globalization -Implications of Managing People and Leveraging Human Resource-- Conflicts - Strategic Role of International HRM – Global HR Planning – Staffing policy – Training and development – performance appraisal –International Labour relations – Industrial democracy.

UNIT 2

Managing International Assignments: Significance – Selection methods - Positioning Expatriate – Repatriate – factors of consideration - Strategies - International assignments for Women – gender issues.

UNIT 3

Cross Culture Management: Importance – Concepts and issues – theories-considerations - Problems – Skill building methods – Cross Culture Communication and Negotiation – Cross Culture Teams.

UNIT 4

Compensation Management: Importance – Concepts- Trends - Issues – Methods – Factors of Consideration – Models – incentive methods – global compensation implications on Indian systems - Performance Management.

UNIT 5

Global Strategic Advantages through HRD: Measures for creating global HRD Climate – Strategic Frame Work of HRD and Challenges - Globalization and Quality of Working Life and Productivity – Challenges in Creation of New Jobs through Globalization- New Corporate Culture

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. Subba Rao P: “International Human Resource Management”, Himalaya Publishing House, Hyderabad, 2011
2. NilanjanSen Gupta: “International Human Resource Management Text and cases” Excel Books, New Delhi.
3. Tony Edwards :“International Human Resource Management”, Pearson Education, New Delhi, 2012

4. Aswathappa K, Sadhana Dash: “International Human Resource Management, TMH, New Delhi,
5. Monir H Tayeb: “International Human Resource Management”, Oxford Universities Press, Hyderabad, 2012.

Appendix-MBA-02

Course: MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS
Code : V18MBT51

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO1: Understand the basic concepts of managerial economics, demand, and elasticity of demand and methods of demand forecasting.

CO2: Interpret the production function with one, two and infinite variables. Understanding various cost concepts and calculating breakeven point

CO3: Identify price output determination in different types of market structures and knowing various pricing methods

CO4: Understand various forms of business organizations

CO5: Prepare financial statements and its analysis.

CO6: Appraise the projects by using various capital budgeting methods

UNIT-I

Introduction to Managerial Economics and demand Analysis: Definition of Managerial Economics –Scope of Managerial Economics and its relationship with other subjects – Concept of Demand, Types of Demand, Determinants of Demand- Demand schedule, Demand curve, Law of Demand and its limitations- Elasticity of Demand, Types of Elasticity of Demand and Measurement- Demand forecasting and Methods of forecasting..

UNIT – II

Production and Cost Analyses: Concept of Production function- Cobb-Douglas Production function- Law of Variable proportions-Isoquants and Isocosts and choice of least cost factor combination-Concepts of Returns to scale and Economies of scale-Different cost concepts: opportunity costs, explicit and implicit costs- Fixed costs, Variable Costs and Total cost –Cost–Volume-Profit analysis-Determination of Breakeven point(simple problems)Managerial significance and limitations of Breakeven point.

UNIT – III

Introduction to Markets, & Pricing Policies: Market Structures: Perfect Competition, Monopoly, Monopolistic competition and Oligopoly – Features – Price and Output Determination – Methods of Pricing: Average cost pricing, Limit Pricing, Market Skimming Pricing, Internet Pricing, Flat Rate Pricing, Usage sensitive pricing and Priority Pricing.

UNIT – IV

Types of Business Organization and Business Cycles: Features and Evaluation of Sole Trader, Partnership, Joint Stock Company – State/Public Enterprises and their forms – Business Cycles : Meaning and Features – Phases of Business Cycle.

UNIT – V

Introduction to Accounting & Financing Analysis: Introduction to Double Entry Systems – Preparation of Financial Statements-Analysis and Interpretation of Financial Statements-Ratio Analysis

UNIT – VI

Capital and Capital Budgeting: Capital Budgeting: Meaning of Capital-Capitalization-Meaning of Capital Budgeting-Time value of money- Methods of appraising Project profitability: Traditional Methods and modern methods (simple problems)

TEXT BOOKS

1. Dr. N. AppaRao, Dr. P. Vijay Kumar: 'Managerial Economics and Financial Analysis',Cengage Publications, New Delhi – 2011
2. Dr. A. R. Aryasri – Managerial Economics and Financial Analysis, TMH 2011
3. Prof. J.V.Prabhakararao, Prof. P. Venkatarao. 'Managerial Economics and Financial Analysis', Ravindra Publication.

REFERENCES:

1. Shailaja Gajjala and Usha Munipalle, Univerties press, 201 Dr. B. Kuberudu and Dr. T. V. Ramana: Managerial Economics & Financial Analysis, Himalaya Publishing House, 2014.
2. V. Maheswari: Managerial Economics, Sultan Chand.2014
3. Suma Damodaran: Managerial Economics, Oxford 2011.
4. VanithaAgarwal: Managerial Economics, Pearson Publications 2011.
5. Sanjay Dhameja: Financial Accounting for Managers, Pearson
6. Maheswari: Financial Accounting, Vikas Publications.
7. S. A. Siddiqui&A. S. Siddiqui: Managerial Economics and Financial Analysis, New Age International Publishers, 2012
8. Ramesh Singh, Indian Economy, 7th Edn., TMH2015
9. Pankaj Tandon A Text Book of Microeconomic Theory, Sage Publishers, 2015

Annexure-V

Minutes of the meeting, BOS of English (Held on 19.04.2019)

Minutes of the Second Meeting of Board of Studies of English held on 19/04/2019 at Srinivasa Ramanujan Hall of Learning (E-block) in the Department of BS&H.

Agenda Item No: 1

To discuss and review the continuation of the syllabi of English-I, English-II, ECS Lab-I & ECS Lab-II for I & II Semesters of B.Tech for the Academic Year 2019-2020.

Resolution: No changes were recommended.

Agenda Item No: 2

To discuss and finalize the syllabi of Professional Communication Skills-I & Professional Communication Skills-II for III & IV Semesters of B.Tech for the Academic Year 2019-2020.

Resolution: The Mandatory Non-credit Courses (MNCs), viz., Employability Skills-I (V18ENT03) & Employability Skills-II (V18ENT04) have been replaced by **Professional Communication Skills-I (V18ENT03)** and **Professional Communication Skills–II (V18ENT04)** respectively and the syllabi have been approved and is given in Appendix-BSH-English-01.

Agenda Item No: 3

To discuss and finalize the syllabus of 'Constitution of India' for the III Semester of B.Tech in the department of ECE & the IV Semester of the departments of CSE & ME for the Academic Year 2019-2020.

Resolution: The syllabus of the Mandatory Non-credit Course (MNC) **Constitution of India (V18ENT11)** has been discussed and approved and is given in Appendix-BSH-English-02.

Agenda Item No: 4

To discuss and finalize the syllabus of 'Professional Ethics and Human Values' for the III Semester of B.Tech in the department of EEE for the Academic Year 2019-2020

Resolution: The syllabus of the Mandatory Non-credit Course (MNC) **Professional Ethics and Human Values (V18ENT12)** has been discussed and approved and is given in Appendix-BSH-English-03.

B.Tech III Semester

S.No	Course Code	Course Name	L	T	P	C
1	V18ENT03	**Professional Communication Skills - I**	3	-	-	MNC

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO1: Summarize one's introduction in an appropriate manner, exhibit grammatical competence through correction of sentences, analyze noun and pronoun dispositions and develop pre-reading strategies to improve comprehension skills.[K5]

CO2: Distinguish singular and plural in different contexts and display knowledge through accurate usage of sentences, build conversations which befit the situations, comprehend the passages well and use different kinds of idioms. [K4]

CO3: Classify various kinds of adjectives and adverbs, learn natural occurrence of paired words of native speakers, infer the referential and inferential aspects of the passages and make use of idioms while narrating personal experiences. [K4]

CO4: Judge and assess the behavior of people in day to day life using kinesics and proxemics that disclose their disposition and be aware of their personal traits that promote good relations. (K2)

CO5: Articulate their goals and have a constructive plan of executing them properly and become adept in oral presentations as well as poster presentations that enhance their professional skills. (K3)

CO6: Evaluate various happenings by thinking out of the box and display their latent talent; and reduce the stress levels by applying various stress management techniques. (K4)

UNIT – I

SELF-INTRODUCTION: Basic information - Academic and personal - interests– strengths and weaknesses – goal.

ERROR ANALYSIS: Nouns & Pronouns – Singular & Plural – Kinds of Nouns & Pronouns- Collective Nouns - Personal and Reflexive Pronouns.

READING COMPREHENSION: Reading as a skill – quick reading - analyzing – answering **IDIOMS & PHRASES**: Colloquial expressions– formal and informal expressions.

UNIT – II

ERROR ANALYSIS: Concord – Subject – Verb agreement.

ROLE PLAY: Day to day situations - practical approach – real life experiences.

READING COMPREHENSION: Skimming – scanning - summarizing – problem solving.

IDIOMS & PHRASES: Enriching written and spoken English – use and usage.

UNIT – III

ERROR ANALYSIS: Adjectives – Adverbs – role of modifiers – place of Adjectives– Adverbs of frequency.

COLLOCATIONS: Natural combination of words – closely affiliated with each other.

READING COMPREHENSION: At a glance – close reading – understanding – answering

IDIOMS & PHRASES: Communicative - expressive – competent.

UNIT –IV

INTER AND INTRA PERSONAL SKILLS: Leading, Coaching, Interviewing, Managing, Persuading - Self awareness, Self confidence, Good Attitude.

BODY LANGUAGE: Basics of proxemics and kinesics.

UNIT -V

PRESENTATION SKILLS: Importance of Presentation skills, Structuring our presentations, Ways to improve our presentation skills, Tips for effective presentations.– oral – Power point – poster.

GOAL SETTING: Short-term – long-term – aim – target – vision – How to set SMART goals.

UNIT - VI

LATERAL THINKING: What is creativity, Fundamental approaches to smart thinking, Characteristics of a creative person, Convergent and Divergent thinking.

STRESS MANAGEMENT: Meaning of Stress, Types of Stress, Symptoms of stress, Short term and long term stress, how can people manage stress.

Reference:

1. Essential English Grammar : Raymond Murphy
2. Advanced English Grammar : D.S. Paul
3. Word Power Made Easy : Norman Lewis
4. English collocations in use : Michael McCarthy
5. Word Power Made Handy : ShaliniVarma
6. Barron’s GRE : Barron’s
7. Current English Grammar & Usage : R.P Sinha
8. Think & Grow Rich : NapoleaonHill
9. Soft Skills for Everyone : Butterfield, Jeff,
10. Soft Skills : Chauhan,G.S.& Sangeeta Sharma
11. Theories of Personality : Hall, Calvin S
12. Corporate Conversations : Holtz, Shel
13. Communication Skills : Kumar, Sanajy and PushpLata

14. Winning at Interviews : Thorpe, Edgar and Showick Thorpe
15. Swami Vivekananda and "Personality Development" published by RK Math.

B.Tech IV Semester

S.No	Course Code	Course Name	L	T	P	C
1	V18ENT04	**Professional Communication Skills - II**	3	-	-	MNC

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO1: Correlate individual words in a sentence, use new vocabulary and focus on the error analysis of prepositions and conjunctions. [K4]

CO2: Distinguish and acquire knowledge of using words of same category in a sentence and learn new words that promote communicative finesse. [K5]

CO3: Find errors in sentences where the modifiers are misplaced and put them at the appropriate place, use hit pair words and send an email that is concise and lucid[K5]

CO 4: Interpret the importance of Attire and Etiquette in societal context and manage their time. (K2)

CO5: Discover the team-working abilities among themselves and display their leadership qualities. (K3)

CO6: Identify various elements of emotional balance that have positive impact on work-life-balance. (K2)

UNIT – I

ERROR ANALYSIS: Prepositions - kinds of prepositions –appropriate use – conjunctions: sub-ordinating & co-ordinating.

VOCABULARY: Etymology **–** roots – suffixes – prefixes and one word substitutes.

SENTENCE IMPROVEMENT: Better choice – error-free sentences – effective – syntax**.**

UNIT – II

ERROR ANALYSIS: Parallel grammatical forms – same grammatical structures.

VOCABULARY: Words that describe personalities – faiths – professions – medical specialistsand Word Clusters.

EXPANSION OF PROVERBS: Meaning – interpretation – explanation**.**

UNIT – III

ERROR ANALYSIS: Dangling modifiers – misplacement of modifiers – arrangement.

VOCABULARY: Antonyms and Synonymsand Foreign expressions.

EMAIL WRITING: Format – method of exchanging – technicalities.

UNIT- IV

ATTIRE & ETIQUETTE: Formal – informal- professional – social Attires, Meaning of Etiquette, Need for etiquette, Types of Etiquette.

TIME - MANAGEMENT: Value of time – Setting priorities – effective use of time – ABCD analysis, Pareto Principle, Eisenhower Method.

UNIT -V

TEAM WORK – Benefits of working with a team – Team Dynamics **.**

LEADERSHIP QUALITIES: Leadership Styles, Characteristics of a Good Leader, Big 5 Personality traits, Myths about leadership qualities.

UNIT -VI

EMOTIONAL INTELLIGENCE: What is EI – Daniel Goleman model of EI, Qualities of an Emotionally Intelligent Person - Emotional balance – feelings – thoughts – motivation.

WORK – LIFE - BALANCE: Personal life – professional life – cause of work-life imbalances, consequences of work-life imbalance, Role of gender and family – improving work life balance.

Reference:

1. Essential English Grammar : Raymond Murphy
2. Advanced English Grammar : D.S. Paul
3. Word Power Made Easy : Norman Lewis
4. English collocations in use : Michael McCarthy
5. Word Power Made Handy : ShaliniVarma
6. Barron's GRE : Barron's
7. Current English Grammar & Usage : R.P Sinha
8. Think & Grow Rich : NapoleaonHill
9. Soft Skills for Everyone : Butterfield, Jeff,
10. Soft Skills : Chauhan,G.S.& Sangeeta Sharma
11. Theories of Personality : Hall, Calvin S
12. Corporate Conversations : Holtz, Shel
13. Communication Skills : Kumar, Sanajy and PushpLata
14. Winning at Interviews : Thorpe, Edgar and Showick Thorpe
15. Swami Vivekananda and "Personality Development" published by RK Math.

B.Tech ECE (III Sem), CSE & ME (IV Sem)

S.No	Course Code	Course Name	L	T	P	C
1	V18ENT11	**Constitution of India**	2	-	-	MNC

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO1: Summarize the evolution and historical importance of the Indian Constitution from 1858 to 1947. [K2]

CO2: Explain various stages in the composition of the Indian Constitution. [K2]

CO3: Develop awareness about their primary rights and duties & build up their civic sense. [K3]

CO4: Comprehend the distribution of powers between the center and states. (K4)

CO5: Summarize and sketch the specific roles of heads of Nation and the functioning of legislative bodies. (K2)

CO6: Explain the role of local self-government in strengthening democracy. (K1)

Syllabus

Unit-I

Historical Perspective of the Indian Constitution – A brief discussion of various Acts i.e from 1858 to 1947 passed by the British Government.

Unit–II

Constitution of India

a) Preparation of Indian constitution by Constituent Assembly of India.
b) Preamble or Philosophy of the Indian Constitution.
c) Salient features of the Indian constitution.

Unit-III

a) Fundamental Rights - their importance & Limitations
b) Fundamental Duties and their importance
c) Directive principles of the state policy and their implementation

Unit-IV

Indian Federalism

a) Distribution of powers between Union and State Governments
b) Legislative, Executive and Financial relations between Union and State Governments

Unit-V

Parliamentary form of Government in India

1. Union Executive

a) President of India- Powers and functions
b) Vice-President - Powers and functions
c) Prime Minister and Council of Minister - Powers and functions

2. Union Legislature

a) Rajya Sabha – Powers and Functions
b) Lok Sabha- Powers and Functions

c) Amending Procedure- Important Constitutional Amendments – 42^{nd}, 44 Constitutional Amendment Acts.

d) **Judiciary** – Supreme court of India - Powers and Functions

Unit-VI

Local Self–government in India 73^{rd} & 74^{th} Constitutional Amendment Acts

Reference Books:

1. D D Basu-Introduction to the Constitution of India – 18^{th} Edition. Prentice – Hall of India Private Ltd-New Delhi-1998
2. Granville Austin (1972) the Indian Constitution, Cornerstone of a Nation, Oxford university Press, New Delhi
3. Madhavkhosla (2012) the Indian Constitution, Oxford University Press, New Delhi
1. 4.Granville Austin (1999) Working a Democratic Constitution; A History of the Indian Experience, Oxford University Press, New Delhi
4. Zoya Hasan, Sridharan E and Sudharshan R (Eds) 2002 India's living Constitution, Permanent black, New Delhi
5. BaxiUpendra (1980) the Indian Supreme Court and Politics, Eastern Book Co, Lucknow.

B.Tech (EEE) III Semester

S.No	Course Code	Course Name	L	T	P	C
1	V18ENT12	Professional Ethics & Human Values	4	-	-	MNC

COURSE OUTCOMES:
After successful completion of the course, the student will be able to:

CO No.	Course Outcome	Knowledge Level
C212.1	Understand and assimilate human values to grow as responsible human beings with proper personality.	K2
C212.2	Understand different ethical theories	K2
C212.3	Interpret engineering as social experiment	K2
C212.4	Explain Engineers' responsibilities towards Safety and Risk	K2
C212.5	Understand ethical conduct and discharge their professional duties	K2
C212.6	Understand ethics in view of globalization	K2

Module 1: Human Values
Morals, Values and Ethics, Integrity, Trustworthiness, Work Ethics, Service Learning, Civic Virtue, Respect for others, Living Peacefully, Caring, Sharing, Honesty, Courage, Value Time, Co-operation, Commitment, Empathy, Self-confidence, Spirituality, Character, Discrimination.
Module 2: Engineering Ethics
Need of Engineering Ethics, Senses of Engineering Ethics, Variety of moral issues, Types of Inquiry, Moral dilemma, Moral Autonomy, Moral development (theories), Kohlberg's Theory, Gilligan's Theory, Profession and Professionalism, Self Interest, Theories about right action (Ethical theories), Uses of Ethical Theories, Utilitarian theory, Learning from the Past, Self-interest, Customs, Religion, Self-respect.
Module 3: Engineering as Social Experiment
Experimental Nature of Engineering, Comparison with Standard Experiments, Engineer as responsible experimenters, Codes of ethics industrial standards.
Module 4: Engineers' Responsibilities towards Safety and Risk
Definitions of Safety and Risk, Types of Risks, Risk analysis, Scenario Analysis, Failure mode and effect analysis, Fault-tree Analysis, Assessment of Risk , Assessment of safety, Safe Exit, Risk-Benefit Analysis.
Module 5: Engineers' Duties and Rights
Confidentiality, Types of Confidential Information, Conflict of Interests, Occupational Crimes, Industrial Espionage, Price Fixing, Whistle Blowing,

Collegiality, Loyalty, Collective Bargaining,Concept of Duty, Professional Duties, Human Rights, Employee Rights.

Module 6: Global Issues

Globalization, MNCs, Environmental Ethics, Computer Ethics, Weapon development, Business Ethics, Media Ethics, Research Ethics, Intellectual Property Rights.

Text Books

1. Professional Ethics by R. Subramaniam – Oxford Publications, New Delhi
2. Professional Ethics and Human Values by Prof. R.Naagarazan

Reference Books

1. Professional Ethics and Human Values by Prof.D.R.Kiran-Tata McGraw-Hill - 2013
2. Engineering Ethics & Human Values by M.Govindarajan, S.Natarajan and V.S.SenthilKumar-PHI Learning Pvt. Ltd – 2009.

Annexure-VI

Minutes of the meeting, BOS of Civil Engineering (Held on 20.04.2019)

1. **Introducing members of Board of Studies**

   The Chairman, BOS has extended a formal welcome and introduced the members.

2. **Review of the minutes of the previous meeting.**

   Reviewed the minutes of the previous meeting and suggested the following

Modifications in III Semester Course Structure

1. V18CET02, Building Planning and Construction Management is removed from III Semester.
2. V18MAT04 Probability and Statistics is taken in place of V18CET03 Transform & Discrete Mathematics.
3. V18CET04 is renamed as Strength of Materials-I instead of Introduction to Solid Mechanics.
4. V18CET36 Building Materials Planning and Construction is included in place of V18CET05 Effective Technical Communication.
5. V18CET10 Introduction to Fluid Mechanics is placed in III Semester instead of IV Semester and credits also enhanced from 3 to 4.
6. V18MBT51 Managerial Economics & Financial Analysis is included in IV Sem instead of III Sem.

Modifications in IV Semester

1. V18CET13 Strength of Materials-II is taken in place of V18CET07 Energy Science & Engineering.
2. V18CET14 Hydraulic Engineering is included in place of V18CET10 Introduction to Fluid Mechanics.
3. V18MBT51 Managerial Economics & Financial Analysis is included in place of V18MBT12 Organizational Behavior.
4. V18CET14 Hydraulic Engineering is included in IV sem instead of V sem.

Modifications in VI Semester

1. V18CET37 Building Estimation and construction management is included in place of V18CET20 “Engineering Economics, Estimation and costing.
2. The Revised course structure for the academic year 2019-20 is enclosed in **Appendix-CE-01**
3. **Review of the syllabi approved for the Academic Year 2018-19.**
   Reviewed the syllabi of the Academic Year 2018-19 It is suggested that in Mathematics Transform & Discrete Mathematics may also be included. However it will be taken up in the next Academic year.
4. **Suggest modifications for the existing course structure**
   All ready mentioned in item 2

5. **Approval of syllabi for proposed courses for the academic year 2019-2020.**
6. Approved the syllabi for proposed courses for the academic year 2019-20 and enclosed in **Appendix-CE-02**

Appendix-CE-01

COURSE STRUCTURE OF SECOND YEAR B.TECH (CIVIL)
(For 2018 – 2019 Admitted Batch)

III SEMESTER

S.No	Course Code	Course Title	Hours per week			Credits
			L	T	P	C
1	V18CET04	Strength of Materials-I	3	1	0	4
2	V18CET36	Building Materials Planning & Construction	3	1	0	4
3	V18CET10	Introduction to Fluid Mechanics	3	1	0	4
4	V18CET35	Principles of Environmental Science & Engineering	2	0	0	2
5	V18MAT04	Probability & Statistics	3	1	0	4
6	VI8EET01	Basic Electrical and Electronics Engineering	3	1	0	4
7	V18CEL02	Material Testing Lab	0	0	3	1.5
8	VI8EEL01	Basic Electrical and Electronics Engineering Lab	0	0	2	1
9	V18ENT03	Professional Communication Skills -I	3	0	0	MNC
Total			**20**	**3**	**6**	**24.5**

IV SEMESTER

S.No	Course Code	Course Title	Hours per week			Credits
			L	T	P	C
1	V18CET13	Strength of Materials-II	3	0	0	3
2	V18CET08	Engineering Geology	2	0	0	2
3	V18CET09	Concrete Technology	3	1	0	4
4	V18CET14	Hydraulic Engineering	3	1	0	4
5	V18CET11	Surveying and Geometrics	2	1	0	3
6	V18MBT51	Managerial Economics & Financial Analysis	3	0	0	3
7	V18CEL03	Concrete Technology Lab	0	0	3	1.5
8	V18CEL04	Surveying Lab	0	0	3	1.5
9	V18CEL05	Fluid Mechanics And Hydraulic Machinery Lab	0	0	3	1.5
10	V18CEL06	Engineering Geology Lab	0	0	2	1
11	V18ENT04	Professional Communication Skills -II	3	0	0	MNC
Total			**17**	**4**	**11**	**24.5**

Appendix-CE-02

III SEMESTER- SYLLABUS

Year/Sem	III Sem	L	T	P	C	COURSE CODE
Regulation Year	2018-2019	3	1	0	4	V18CET04
Name of the Course	STRENGTH OF MATERIALS-I					
Branch	CIVIL ENGINEERING					

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

- Understand the basic materials behavior under the influence of different external loading conditions and the support conditions
- Draw the diagrams indicating the variation of the key performance features like bending moment and shear forces
- Understand bending concepts and calculation of section modulus and for determination of stresses developed in the beams and torsion.
- Assess stresses across section of the thin and thick cylinders to arrive at optimum sections to withstand the internal pressure using Lame's equation.

SYLLABUS:

UNIT – I:

Simple Stresses ,Strains and Strain Energy: Elasticity and plasticity –Types of stresses and strains – Hooke's law – stress – strain diagram for mild steel – Workingstress – Factor of safety – Lateral strain, Poisson's ratio and volumetric strain – Elasticmoduli and the relationship between them – Bars of varying section – composite bars –Temperature stresses.

Strain Energy – Resilience – Gradual, sudden, impact and shock loadings – simple applications.

UNIT – II:

Shear Force and Bending Moment: Definition of beam – Types of beams –Concept of shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, uniformly distributed loads, uniformly varying loads and combination of these loads – Point of contra flexure – Relation between S.F., B.M and rate of loading at a section of a beam

UNIT – III:

Flexural Stresses: Theory of simple bending – Assumptions – Derivation of bending equation: $M/I = f/y = E/R$, Neutral axis – Determination bending stresses – section modulus of rectangular and circular sections (Solid and Hollow), I, T, Angle and Channel sections – Design of simple beam sections.

UNIT –IV:

Shear Stresses: Derivation of formula – Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T angle sections, built up beams, shear centre.

UNIT – V:

Torsion- Derivation of torsion equation and its assumptions. Applications of the equation of the hollow and solid circular shafts, torsional rigidity, combined torsion and bending of circular shafts, principal stress and maximum shear stresses under combined loading of bending and torsion. Analysis of closed-coiled –helical springs

UNIT – VI:

Thin and Thick Cylinders: Thin cylindrical shells – Derivation of formula for longitudinal and circumferential stresses – hoop, longitudinal and Volumetric strains – changes in diameter, and volume of thin cylinders – Thin spherical shells.

Thick Cylinders: Introduction Lame's theory for thick cylinders – Derivation of Lame's formulae – distribution of hoop and radial stresses across thickness – design of thick cylinders – compound cylinders – Necessary difference of radii for shrinkage – Thick spherical shells.

TEXT BOOKS:

1. Mechanics of Materials- R. C. Hibbler, Pearson; 10 edition (January 15, 2016)
2. Strength of materials -S. S. Bhavakatti, Vikas Publishing House; Fourth edition (2013)
3. Strength of Materials -R. K. Rajput, S. Chand Publishing (6th Edition) (2015)
4. Strength of Materials -R.K Bansal,Laxmi Publications; Sixth edition (2018)

REFERENCES:

1. Fundamentals of Solid Mechanics M.L. Gambhir, PHI Learning Pvt. Ltd., New Delhi. (1 December 2009)
2. Introduction to Strength of Material by U.C. Jindal,Pearson Education; Second edition (28 September 2017)
3. Strength of materials by R. Subramanian, Oxford university press, New Delhi, third edition (15 June 2016)

Year/Sem	III Sem	L	T	P	C	COURSE CODE
Regulation Year	2018-2019	3	1	0	4	V18CET36
Name of the Course	BUILDING MATERIALS, PLANNING AND CONSTRUCTION					
Branch	CIVIL ENGINEERING					

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

- Identify different building materials and their importance in building construction.
- Differentiate brick masonry, stone masonry construction
- Use of lime and cement in various constructions.
- Describe the importance of building components and finishing's.
- Understand building by-laws, ventilation and lightening requirements

UNIT – I:

Stones, Bricks and Tiles: Building stones – classifications and quarrying – properties –structural requirements and dressing. Bricks – Composition of Brick earth – manufacture and structural requirements, Fly ash, Ceramics, Timber, Aluminum, Glass, Paints and Plastics: Wood - structure – types and properties– seasoning – defects; alternate materials for Timber–GI/ fibre – reinforced glass bricks, steel & aluminum, Plastics.

UNIT – II:

Cement & Admixtures: Ingredients of cement – manufacture – Chemical composition – Hydration - field & lab tests. Admixtures – mineral & chemical admixtures – uses.

Lime: Various ingredients of lime – Constituents of lime stone – classification of lime – various methods of manufacture of lime

UNIT – III:

Mortars: Lime and Cement Mortars.

Masonry: Brick masonry – types – bonds; Stone masonry – types; Composite masonry – Brick- stone composite; Concrete, Reinforced brick. Cavity and partition walls.

Finishing's: Plastering, Pointing, Painting, Claddings – Types – Tiles – ACP.

UNIT-IV:

Aggregates: Classification of aggregate – Coarse and fine aggregates- particle shape and texture – Bond and Strength of aggregate – Specific gravity – Bulk Density, porosity and absorption – Moisture content of Aggregate- Bulking of sand – Sieve analysis.

Miscellaneous materials: Bitumen and asphaltic materials, structural steel and other metals, geo textiles, carbon composites including properties and uses.

UNIT V:

Building Byelaws and Regulations: Introduction- terminology- objectives of building byelaws- floor area ratio- floor space index- principles under laying building bye laws- classification of buildings- open space requirements – built up area limitations- height of buildings– lightening and ventilation requirements.

Residential buildings: Minimum standards for various parts of buildings requirements of different rooms and their grouping- characteristics of various types of residential buildings, relationship between plan, elevation, Climate influence on Orientation of Buildings.

UNIT – VI:

Building Components: Lintels, Arches, walls, vaults – stair cases – types of floors, types of roofs – flat, curved, trussed. Foundations – types; Damp Proof Course; Joinery – doors – windows – materials – types.

Form work: Types: Requirements – Standards – Scaffolding – Design;
Shoring, Underpinning.

TEXT BOOKS:

1. Building Materials and Construction – Arora & Bindra, Dhanpat Roy Publications. 2010,5th edition.
2. Building Materials, M. L. Gambhir, Tata McGraw Hill Publishing Co. Ltd. New Delhi. 2014,
   5th edition,.
3. Building Construction by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) ltd., New Delhi. 2016,11th edition.
4. Building Materials, S. S. Bhavikatti, Vikas publications House private ltd. 2012, 1st edition.
5. Building Construction, S. S. Bhavikatti, Vikas publications House private ltd. 2012, 1st edition.
6. Building planning and drawing,Dr.N.Kumara swamy,A.kameswara Rao, 2012, 6th edition.

REFERENCES:

1. Building Materials and Construction by G C Sahu, Joygopal Jena McGraw hill Pvt Ltd 2017,
   1st edition.
2. Building Materials by Duggal, New Age International. 2012 ,4th edition.
3. Building Materials by P. C. Varghese, PHI. 2015, 2nd edition.
4. Building Construction by PC Varghese PHI. 2007, 1st edition.
5. Construction Technology – Vol – I & II by R. Chubby, Longman UK.1987, 2nd edition.
6. Alternate Building Materials and Technology, Jagadish, Venkatarama Reddy and others; New Age Publications.2017 ,2nd edition.

Year/Sem	III Sem	L	T	P	C	COURSE CODE
Regulation Year	2018-2019	3	1	0	4	V18CET10
Name of the Course	INTRODUCTION TO FLUID MECHANICS					
Branch	CIVIL ENGINEERING					

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

- Understand the physical properties of fluids and their influences on fluid motion
- Calculate the forces acting on plane and curved surfaces and solve fluid flow problems in kinematics.
- Solve a variety of problems in fluid dynamics
- Solve various pipe flow problems
- Solve various laminar flow problems
- Assess fluid flow through pipes using different devices

UNIT I:

INTRODUCTION : Dimensions and units – Physical properties of fluid specific gravity, viscosity, surface tension, vapor pressure and their influences on fluid motion, pressure at a point, Pascal's law, hydrostatic law, atmospheric, gauge and vacuum pressure, measurement of pressure. Pressure gauges, Manometers: Differential and Micro Manometers.

UNIT – II:

`HYDROSTATICS: Hydrostatic forces on submerged plane, Horizontal, Vertical, inclined and curved surfaces – Center of pressure, derivations and problems.

UNIT – III:

FLUID KINEMATICS: Description of fluid flow, Stream line, path line and streak lines and stream tube. Classification of flows: Steady, unsteady, uniform, non-uniform, laminar, turbulent, rotational and irrotational flows, Equation of continuity for one, two, three dimensional flows, stream and velocity potential functions.

UNIT – IV:

FLUID DYNAMICS: Surface and body forces – Euler's and Bernoulli's equations for flow along a stream line for 3-D flow, Momentum principle, Momentum equation and its application – forces on pipe bend.

UNIT – V:

CLOSED CONDUIT FLOW: Laws of Fluid friction – Darcy's equation, Minor losses – pipes in series – pipes in parallel, Total energy line and hydraulic gradient line, Pipe network problems, Variation of friction factor with Reynold's number, Moody's Chart.

UNIT – VI:

MEASUREMENT OF FLOW: Pitot tube, Venturi meter and Orifice meter, classification of orifices, small orifice and large orifice, flow over rectangular, triangular and trapezoidal and Stepped notches, Broad crested weirs.

TEXT BOOKS:

1. Hydraulics and Fluid Mechanics including Hydraulic Machines by Dr. P.N. Modi and Dr. S.N. Seth, Standard Book house, Rajsons Pvt. Ltd., 21st Edition, 2017

2. A textbookof Fluid Mechanics and Hydraulic Machines by Dr. R.K. Bansal, Laxmi Publications (P) Ltd., New Delhi, 10th Edition, 2018

REFERENCES:

1. Introduction to Fluid Mechanics and Fluid Machines by S.K. Som, G. Biswas, Suman Chakraborthy, Mc Graw Hill Education, 3rd Edition, 2017.
2. Fluid Mechanics by A.K. Mohanty, Prentice Hall of India Pvt. Ltd., New Delhi, 2nd Edition, 1994.
3. Fluid Mechanics and Hydraulic Machines by K. Subramanya, Mc Graw Hill Education, 1st Edition, 2010.

Year/Sem	III Sem	L	T	P	C	COURSE CODE
Regulation Year	2018-2019	2	0	0	2	V18CET35
Name of the Course	PRINCIPLES OF ENVIRONMENTAL SCIENCE & ENGINEERING					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of the course, the student will be able to

- Outline the global environmental challenges and environmental legislations.
- Interpret various natural resources and associated problems.
- Discuss various attributes of environmental pollution.
- Interpret quality of water.
- Operate sewage water treatment plants.
- Illustrate various solid waste management practices.

UNIT I: FUNDAMENTALS OF ENVIRONMENTAL STUDIES AND ACTS

Definition and components of environment, Global Environmental Challenges: Global warming and climate change, Acid rains, Ozone layer depletion - Population explosion and effects.

Environmental Protection Act, 1986 - Air (Prevention and Control of Pollution) Act, 1981 – Water (Prevention and Control of Pollution) Act, 1974 -Wildlife (Protection) Act, 1972 - Forest (Conservation) Act.

UNIT II: NATURAL RESOURCES AND ASSOCIATED PROBLEMS

Forest resources: Use and over exploitation - Deforestation: Timber extraction, Mining, dams and other effects on forest and tribal people. Water resources: Use and over utilization of surface and ground water – Floods, drought, conflicts over water - Dams: Benefits and problems. Effects of extracting and using mineral resources. Energy resources: Renewable and Non-renewable energy sources. Land resources: Land degradation, Wasteland reclamation.

UNIT III: ENVIRONMENTAL POLLUTION

Definition, Causes, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution and Nuclear Pollution.

UNIT IV: WATER QUALITY AND DESIGN OF WATER TREATMENT UNITS

Impurities in water -Water borne diseases – Protected water supply – Water quality and testing – Drinking water standards- Layout and general outline of water treatment units – Sedimentation – principles – Design factors – Coagulation, flocculation, clarifier design – Coagulants – Feeding arrangements.

Filtration – Theory – Working of slow and rapid gravity filters – Multimedia filters – Design of filters – Troubles in operation, comparison of filters – Disinfection – Theory of chlorination, chlorine demand, other disinfection practices- Desalination processes.

UNIT V: SEWAGE QUALITY AND DESIGN OF SEWAGE TREATMENT UNITS

Conservancy and water carriage systems– Characteristics of sewage– BOD – COD equations. Dilution –Self purification of rivers - Layout and general outline of various units in a waste water treatment plant.

Primary treatment - Design of screens – Grit chambers – Skimming tanks – Sedimentation tanks – Principles of design – Biological treatment – Trickling filters – Standard and high rate.

UNIT –VI: SOLID WASTE MANAGEMENT

Municipal Solid Wastes: Characteristics-Generation- collection- Methods of collection-Equipment types of vehicles-Man power requirement-Collection routes.

Need for Transfer operations-Transfer Stations-Selection of location of transfer station-Transport means and methods - Engineered systems for solid waste management - Recycle energy recovery treatment and disposal.

TEXT BOOKS:

1. Principles of environmental science and engineering by P. Venugopala Rao by Prentice Hall India Learning Private Limited, 1St Edition edition (2006), new Delhi.
2. Principles of environmental sciences by Jan J. Boersea and Lucas reijnders , Springer; 2010 edition (May 27, 2010).
3. Environment Studies by Anubha Kaushik, C P Kaushik, New Age International Private Limited; Five edition (1 August 2018).
4. A Textbook of Environmental Studies, Shaashi Chawla, Tata McGraw Hill Education Private Limited (26 April 2012), New Delhi.
5. Fundamentals of Environment Studies, DD Mishra S Chand & Company (1 December 2010).
6. Water supply engineering byS.K.Garg Khanna publishers(2017),33 rd edition.
7. Sewage disposal and air pollution by S.K.Garg, Khanna publishers(2017),39th edition
8. Water supply engineering by B.C .punmia,Ashok Kumar jain and Arun K jain, Laxmi Publications (December 1, 2005) ,2nd edition.
9. Management of municipal solid waste by T.N.Ramachandra, The Energy and Resources Institute, TERI (1 December 2009).
10. Solid waste management by K. Sasi kumar,S.G. Krishna, Prentice Hall India Learning Private Limited (2009)

Year/Sem	III & IV Sem	L	T	P	C	COURSE CODE
Regulation Year	2018-2019	3	1	-	4	V18MAT04
Name of the Course	PROBABILITY AND STATISTICS					
Branches	CIVIL, EEE, ME & CSE					

Pre requisites: Probability, Conditional Probability, Baye's theorem on probability

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO1: Find measures of central tendency and dispersion for real data sets.

CO2: Find parameters of given function

CO3: Apply probability distribution to real time problems

CO4: Plot a best fit curve to an experimental data and find the correlation and regression

CO5: Create good estimators to various parameters

CO6: Apply the principles of Statistical Inference to practical problems

Unit-I: Basic Statistics

Measures of Central Tendency: Mean, Median, Mode

Measures of Dispersion: Variance, Standard deviation, Skewness and Kurtosis

Unit-II: Basic Probability

Random Variables: Discrete and continuous - Probability function – density and distribution function, Expectation of a Random Variable, Moments, Chebychev's Inequality (Without proof).

Unit-III: Probability Distributions

Probability distributions: Binomial, Poisson and Normal - Evaluation of statistical parameters: Mean, Variance and their properties, Introduction to Exponential, Gamma and Weibull distributions.

Unit-IV: Bivariate Distributions

Curve fitting by the method of Least squares- Fitting of straight line, parabola and exponential curves, Simple Correlation and Regression – Rank correlation.

Unit-V: Sampling Distributionand Estimation

Introduction –Sampling distribution of means with known and unknown standard deviation

Estimation: Criteria of a good estimator, point and interval estimators for means and proportions

Unit-VI: Tests of Hypothesis

Introduction-Type-I, Type-II Errors, Maximum Error, one–tail, two-tail tests,Test of significance: Large sample test for single proportion, difference of proportions, single mean, difference of means.

Test of significance: Small sample test for single mean, difference of means and test of ratio of variances (F-Test) - Chi-square test for goodness of fit and independence of attributes.

Text Books:

1. V. Ramana, A text Book of Engineering Mathematics, Tata Mc Graw Hill.
2. Miller & Freund's, Probability & Statistics for Engineers – Eighth Edition, Richard. A. Johnson

References Books:

1. S. Ross, "A First Course in Probability", Pearson Education India, 2002.
2. Dr.T.S.R.Murthy, Probability and Statistics for Engineers, BS Publications.
3. T. Veerarajan, "Engineering Mathematics", Tata McGraw-Hill, New Delhi, 2010.

Year/Sem	III Sem	L	T	P	C	COURSE CODE
Regulation Year	2018-2019	3	1	0	4	V18EET01
Name of the Course	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING					
Branches	CIVIL, CSE&ME					

Module 1 : DC Circuits

Electrical circuit elements (R, L and C), Kirchoff's current and voltage laws, analysis of simple circuits with dc excitation. Superposition, Maximum Power Transfer, Thevenin and Norton Theorems.

Module 2: AC Circuits

Representation of sinusoidal waveforms, peak and RMS values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance.

Module 3: DC Machines

Introduction-Working principle of DC generator–Magnetization characteristics of D.C. Shunt generator –Types of DC motors– applications – three point starter.

Transformers-Classification, working principle of ideal and practical transformer, losses in transformers, regulation and efficiency, OC& SC test on single phase transformer.

Module 4: AC Machines

Construction and working of a three-phase induction motor, torque-slip characteristics. Loss components and efficiency, starting and speed control of induction motor.Construction and Principle of operation of synchronous generators.

Module 5: Semiconductor Devices and Rectifiers

Introduction– Classification – PN junction diode characteristics a) Forward bias b) Reverse bias - Diode acts as a switch - Half-wave and Full-wave rectifiers – Concepts of ripple factor, voltage regulation and efficiency - Simple problems.

Module 6: Transistors

Types of Transistors - Transistor acts as an amplifier - CB, CE and CC configurations and characteristics- feedback amplifier.

Text Books

1. T. K. Nagsarkar, M. S. Sukhija, "Basic Electrical Engineering", Oxford University Press, 2005
2. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.
3. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.
4. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.

Reference Books

1. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
2. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.

3. V. D. Toro, “Electrical Engineering Fundamentals”, Prentice Hall India, 1989.
4. S. K. Bhattacharya, “Basic Electrical and Electronics Engineering”, Pearson Education India, 2011
5. S. K. Sahdev, “Fundamentals of Electrical Engineering & Electronics”, DhanpatRai& Company, 2001

Year/Sem	III Sem	L	T	P	C	COURSE CODE
Regulation Year	2018-2019	0	0	3	1.5	V18CEL02
Name of the Course	MATERIAL TESTING LAB					
Branch	CIVIL					

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

- Identify the engineering properties of materials in the laboratory
- Assess torsion test to determine elastic constants
- Assess spring test to determine elastic constants
- Assess flexural test to determine elastic constants
- Determine hardness of metals
- Determine Impact strength of metals

List of Experiments

1. Tension test on Steel bar
2. Bending test on (Steel / Wood) Cantilever beam.
3. Bending test on simple support beam.
4. Torsion test
5. Hardness test
6. Spring test
7. Compression test on wood or concrete
8. Impact test
9. Shear test
10. Verification of Maxwell's Reciprocal theorem on beams.
11. Continuous beam – deflection test.

List of Major Equipment:

1. UTM for conducting tension test on rods
2. Steel beam for flexure test
3. Wooden beam for flexure test
4. Torsion testing machine
5. Brinnell's / Rock well's hardness testing machine
6. Setup for spring tests
7. Compression testing machine
8. Izod Impact machine
9. Shear testing machine
10. Beam setup for Maxwell's theorem verification.
11. Continuous beam setup

Year/Sem	III Sem	L	T	P	C	COURSE CODE
Regulation Year	2018-2019	0	0	2	1	V18EEL01
Name of the Course	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB					
Branches	CIVIL, CSE & ME					

Any 10 of the following experiments are to be conducted

1. Verification of Superposition Theorem.
2. Experimental determination of Thevenin's and Norton's equivalent circuits and verification by direct test.
3. Verification of maximum power transfer theorem.
4. Series and Parallel Resonance – Timing, Resonant frequency, Bandwidth and Q-factor determination for RLC network.
5. Magnetization characteristics of D.C. Shunt generator. Determination of critical field resistance and speed.
6. Speed control of D.C. Shunt motor by Armature & flux control methods
7. Brake test on DC shunt motor. Determination of performance characteristics.
8. OC & SC tests on Single-phase transformer (Predetermination of efficiency and regulation at given power factors and determination of equivalent circuit).
9. Brake test on 3-phase Induction motor (performance characteristics).
10. PN junction diode characteristics a) Forward bias b) Reverse bias (Cut in voltage and resistance calculations)
11. Transistor CE characteristics (Input and output)
12. Half wave rectifier with and without filters.
13. Full wave rectifier with and without filters.
14. CE amplifiers.

IV SEMESTER- SYLLABUS

Year/Sem	IV Sem	L	T	P	C	COURSE CODE
Regulation Year	2018-2019	3	0	0	3	V18CET13
Name of the Course	STRENGTH OF MATERIALS – II					
Branch	CIVIL ENGINEERING					

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

- Understand the basic concepts of Principal stresses developed in a member when it is subjected to stresses along different axes and design the sections.
- Asses stresses in different engineering applications like shafts, springs, columns and struts subjected to different loading conditions
- Assess forces in different types of trusses used in Construction.

UNIT I

Principal stresses and strains: Introduction – Stresses on an inclined section of a bar under axial loading – compound stresses – Normal and tangential stresses on an inclined plane for biaxial stresses – Two perpendicular normal stresses accompanied by a state of simple shear – mohr'scircle of stresses – Principal stresses and strains – Analytical and graphical solutions.

Theories of failures: Various Theories of failures such as Maximum Principal stress theory –Maximum Principal strain theory – Maximum shear stress theory – Maximum strain energy theory –Maximum shear strain energy theory.

UNIT II

Deflection of Beams: Bending into a circular arc – slope, deflection and radius of curvature – Differential equation for the elastic line of a beam – Double integration and Macaulay's methods – Determination of slope and deflection for cantilever and simply supported beams subjected to point loads, - U.D.L. Uniformly varying load. Mohr's theorems – Moment area method – application to simple cases including overhanging beams.

UNIT III

Columns and Struts: Introduction – Types of columns – Short, medium and long columns –Axially loaded compression members – Crushing load – Euler‟s theorem for long columns –assumptions – derivation of Euler‟s critical load formulae for various end conditions – Equivalent length of a column – Slenderness ratio –Euler‟s critical stress – Limitations of Euler‟s theory – Rankine– Gordon formula – Long columns subjected to effentric loading – Secant formula –Empirical formulae – Straight line formula – Prof. Perry‟s formula.

UNIT – IV

Direct and Bending stresses: Stresses under the combined action of directloading and B.M. Core of a section – determination of stresses in the case of chimneys,retaining walls and dams – conditions for stability – stresses due to direct loading and B.M.about both axis.

UNIT V

Unsymetrical bending: Introduction – Centroidal principal axes of section – Graphical method for locating principal axes – Moments of inertia referred to any set of rectangular axes – Stresses in beams subjected to unsymmetrical bending – Principal axes – Resolution of bending moment into two rectangular axes through the centroid - Location of neutral axis – Deflection of beams under unsymmetrical bending.

UNIT – VI

Analysis of pin-jointed plane frames: Determination of Forces in members ofplane pin-jointed perfect trusses by (i) tension co efficient method (ii) method of sections. Analysisof various types of cantilever and simply supported trusses by tension co efficient method, method of sections.

TEXT BOOKS:

1. Mechanics of Materials- R. C. Hibbler, Pearson; 10 edition (January 15, 2016)
2. Strength of materials -S. S. Bhavakatti, Vikas Publishing House; Fourth edition (2013)
3. Strength of Materials -R. K. Rajput, S. Chand Publishing (6th Edition) (2015)
4. Strength of Materials - R.K Bansal,Laxmi Publications; Sixth edition (2018)

REFERENCES:

1. Fundamentals of Solid Mechanics M.L. Gambhir, PHI Learning Pvt. Ltd., New Delhi. (1 December 2009)
2. Introduction to Strength of Material by U.C. Jindal, Pearson Education; Second edition (28 September 2017)
3. Strength of materials by R. Subramanian, Oxford university press, New Delhi, third edition (15 June 2016)

Year/Sem	IV Sem	L	T	P	C	COURSE CODE
Regulation Year	2018-2019	2	0	0	2	V18CET08
Name of the Course	ENGINEERING GEOLOGY					
Branch	CIVIL ENGINEERING					

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

- Relate the features of geological agents.
- Review the types of minerals and rocks
- Interpret hazard zonation with reference to secondary structures
- Review the landslides and their resulting subsidence.
- Assess the ground conditions using geophysical explorations
- Examine the engineering geological conditions of the strata and its suitability to major projects like Dams, Tunnels and Reservoirs etc.

UNIT-I

Introduction: Branches of geology, Importance of geology in Civil engineering with case studies.

Physical Geology: Geological processes, Weathering, Erosion and Civil engineering importance of weathering and Erosion

UNIT- II

Mineralogy: Definition of mineral, Importance of study of minerals, Significance of different physical properties in mineral identification, Study of physical properties, Structure and chemical composition of common rock forming and economic minerals viz. Feldspar, Quartz, Olivine, Augite, Hornblende, Muscovite, Biotite, Asbestos, Apatite , Kyanite, Garnet, Beryl, Talc, Calcite, Dolomite, Pyrite, Hematite, Magnetite, Galena, Graphite, Magnesite, Bauxite and Clay minerals

Petrology: Introduction, Civil Engineering importance of petrology, Definition of Rock, Rock cycle, Geological Classification of rocks Igneous Rocks: Forms, Structures and textures of igneous rocks, Megascopic description and civil engineering uses of Granite, Basalt, Dolerite, Pegmatite and Charnockite

Sedimentary Rocks: Formation, Structures and textures of sedimentary rocks, Megascopic description and civil engineering uses of Laterite, Conglomerate, Sand stone, Lime stone and Shale

Metamorphic Rocks: Types of metamorphism, Structures and textures of metamorphic rocks, Megascopic Description and Civil engineering uses of Gneiss, Schist, Quartzite, Marble and Slate

UNIT-III

Structural Geology: Introduction, Out crop, Strike and dip, Causes for development of secondary structures, Classification of Structures associated with Folds, Faults, Joints, Unconformities and their Civil engineering importance

UNIT- IV

Earthquakes: Classification and causes, Intensity and magnitude and their measuring scales, Effects of earthquakes, Seismic belts, Civil Engineering considerations in seismic areas, Seismic zones of India

Land Slides: Classification, Causes and effects, Preventive measures of landslides

Ground water: Introduction, Classification of rocks based on porosity and permeability, Types of aquifers, Effects of groundwater over draft

UNIT- V

Geophysics: Importance of Geophysical methods, Classification, Principles of Geophysical study by Gravity method, Magnetic method, Electrical methods, Seismic methods, Radiometric method and Electrical resistivity, Seismic refraction methods

UNIT- VI

Dams: Types of Dams, Geological considerations for the selection of dam sites, Stages of investigation, Case histories of few dam failures, Geology of few Indian dam sites

Tunnels: Purpose of Tunneling, Geological considerations for tunneling, Effects of tunneling, Over break, Geology of some tunnel sites

TEXTBOOKS:

1. A text Book of Engineering Geology by N. Chenna Kesavulu, Macmillan India Ltd., Delhi, second edition, 2009.
2. Principles of Engineering Geology by K M Bangar, Standard Publishers and Distributers, 2009.
3. Principles of Engineering Geology- K Gokhale, B. S. Publication, Revised Edition, 2010.

REFERENCE BOOKS:

1. Fundamentals of Engineering Geology, F.G.Bell, published by Butterworth-Heinemann, 1983.
2. Principles of Engineering Geology and Geotechnics by D P Krynine and W R Judd, CBS Publishers & Distribution, first edition, 2005.
3. Engineering Geology for Civil Engineers by D. Venkata Reddy, Oxford & IBM Publishing Company Pvt. Ltd., New Delhi, second edition, 2017.
4. Engineering and General Geology by Parbin Singh, Published by S. K. Kataria & Sons, New Delhi, 2013.
5. Engineering Geology and Rock Mechanics by Dr B.P.Varma, Khanna Publishers, Delhi, 1998.

Year/Sem	IV Sem	L	T	P	C	COURSE CODE
Regulation Year	2018-2019	3	1	0	4	V18CET09
Name of the Course	CONCRETE TECHNOLOGY					
Branch	CIVIL ENGINEERING					

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

- Understand the basic concepts of concrete.
- Realize the importance of quality of concrete.
- Familiarize the basic ingredients of concrete and their role in the production of concrete and its behavior in the field.
- Test the fresh concrete properties and the hardened concrete properties.
- Evaluate the ingredients of concrete through lab test results and design the concrete mix by BIS method.
- Familiarize the basic concepts of special concrete and their production and applications and understand the behavior of concrete in various environments.

UNIT I:

Introduction of Concrete, Cements and Admixtures: Portland cement – Chemical composition – Hydration, Setting of cement, Fineness of cement, Structure of hydrated cement–Test for physical properties – Different grades of cements (opc-33,opc-43,opc-53) – Admixtures – Mineral and chemical admixtures – accelerators, retarders, air entrainers, plasticizers, super plasticizers, fly ash and silica fume.

Aggregates: Classification of aggregate – Particle shape & texture – Bond, strength & other mechanical properties of aggregates – Specific gravity, Bulk density, porosity, adsorption & moisture content of aggregate – Bulking of sand –Soundness of aggregate – Alkali aggregate reaction – Thermal properties – Sieve analysis –Fineness modulus – Grading curves – Grading of fine & coarse Aggregates – Gap graded and well graded aggregate as per relevant IS code – Maximum aggregate size - Quality of mixing water.

UNIT – II:

Fresh Concrete: Steps in Manufacture of Concrete–proportion, mixing, placing, compaction, finishing, curing – including various types in each stage. Properties of fresh concrete-Workability – Factors affecting workability – Measurement of workability by different tests, Setting times of concrete, Effect of time and temperature on workability – Segregation & bleeding – Mixing and vibration of concrete.

UNIT – III:

Hardened Concrete: Water / Cement ratio – Abram's Law – Gel space ratio – Nature of strength of concrete –Maturity concept – Strength in tension & compression – Factors affecting strength – Relation between compression &

tensile strength – Curing, Testing of Hardened Concrete: Compression tests – Tension tests – Flexure tests –Split tension tests – Non-destructive testing methods – codal provisions for NDT.

UNIT – IV:

Elasticity, Creep & Shrinkage, Modulus of elasticity, Dynamic modulus of elasticity, Poisson's ratio, Creep of concrete, Factors influencing creep, Relation between creep & time, Nature of creep, Effects of creep – Shrinkage – types of shrinkage, Factors affecting shrinkage.

UNIT – V:

Mix Design: Factors in the choice of mix proportions – Durability of concrete – Quality Control of concrete – Statistical methods – Acceptance criteria – Concepts proportioning of concrete mixes by BIS method of mix design.

UNIT – VI:

Special Concretes: Ready mixed concrete, Shotcrete, Light weight aggregate concrete, Cellular concrete, No-fines concrete, High density concrete, Fibre reinforced concrete, Different types of fibres, Factors affecting properties of Fibre reinforced concrete, Polymer concrete, Types of Polymer concrete, Properties of polymer concrete, High performance concrete –Self consolidating concrete, SIFCON, self healing concrete.

Text Books:

1. Concrete Technology, M. S. Shetty. – S. Chand & Company
2. Concrete Technology, A. R. Santha Kumar, Oxford University Press, New Delhi

References:

1. Properties of Concrete, A. M. Neville – PEARSON – 4th edition
2. Concrete Technology, M.L. Gambhir. – Tata Mc. Graw Hill Publishers, New Delhi

Codal Provisions:

1. IS 269:1989 – Ordinary Portland Cement, grade 33
2. IS 4031:1988 – methods of physical tests for hydraulic cement.
3. IS 383:1970 – Specification for coarse and fine aggregate from natural sources for concrete.
4. IS 456:2000 Code of practice for plain and reinforced concrete.
5. IS 10262:2009 – Guideline for concrete mix proportioning.
6. SP 16:1980 Design aids for reinforced concrete to IS 456:1978

Year/Sem	IV Sem	L	T	P	C	COURSE CODE
Regulation Year	2018-2019	3	1	0	4	V18CET14
Name of the Course	HYDRAULIC ENGINEERING					
Branch	CIVIL ENGINEERING					

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

- Solve uniform open channel flow problems
- Solve Non-uniform open channel flow problems
- Apply the principles of dimensional analysis and similitude in hydraulic model Testing
- Estimate the impact of jet on plane and curved surfaces using momentum Principle.
- Develop performance characteristics of turbines using velocity triangles
- Calculate work done and efficiency of centrifugal and reciprocating pumps

UNIT – I:

OPEN CHANNEL FLOW: Types of flows, Type of channels, Velocity distribution, energy and momentum correction factors, Chezy's, Manning's and Bazin formulae for uniform flow, Most Economical sections.

Critical flow: Specific energy-critical depth – computation of critical depth – critical, sub-critical and super critical flows.

UNIT II:

NON UNIFORM FLOW: Dynamic equation for G.V.F., Mild, Critical, Steep, horizontal and adverse slopes, surface profiles, direct step method, Rapidly varied flow, hydraulic jump, energy dissipation.

UNIT – III:

HYDRAULIC SIMILITUDE: Dimensional analysis - Rayleigh's method and Buckingham's pi theorem, study of Hydraulic models – Geometric, kinematic and dynamic similarities, dimensionless numbers, model laws, scale effect.

UNIT – IV:

MOMENTUM PRINCIPLES: Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes, jet striking centrally and at tip, velocity triangles at inlet and outlet, expressions for work done and efficiency, Angular momentum principle.

UNIT – V:

BASICS OF HYDRAULIC MACHINERY: Layout of hydropower installation, Heads and efficiencies, classification of turbines.

HYDRAULIC TURBINES: Pelton wheel, Francis turbine, Kaplan turbine - working, proportions, velocity diagram, work done and efficiency, hydraulic design, draft tube – theory and function efficiency, Governing of turbines, surge tanks, unit and specific turbines, unit speed, unit quantity, unit power, specific speed, performance characteristics, geometric similarity, cavitation.

UNIT – VI:

CENTRIFUGAL PUMPS: Pump installation details, classification, work done, manometric head, minimum starting speed, losses and efficiencies, specific speed, multistage pumps, pumps in parallel, performance of pumps, characteristic curves, NPSH, Cavitation.

RECIPROCATING PUMPS: Introduction, classification of reciprocating pumps, main components of reciprocating pumps, working of a reciprocating pumps, discharge through pumps, indicator diagram, work done by reciprocating pumps, slip of reciprocating pumps.

TEXT BOOKS:

1. A textbook of Fluid Mechanics and Hydraulic Machines by Dr. R.K. Bansal, Laxmi Publications (P) Ltd., New Delhi, 10th Edition, 2018
2. Hydraulics and Fluid Mechanics including Hydraulic Machines by Dr. P.N. Modi and Dr. S.N. Seth, Standard Book house, Rajsons Pvt. Ltd., 21st Edition, 2017
3. A text book of Fluid mechanics and Hydraulic machines by Er. R. K. Rajput, S. Chand & company, 6th Edition, 2016

REFERENCES:

1. Flow in Open Channels by K. Subramanya, Mc Graw Hill Education, 4th Edition, 2015.
2. Fluid Mechanics and Hydraulic Machines by K. Subramanya, Mc Graw Hill Education, 1st Edition, 2010.

Year/Sem	IV Sem	L	T	P	C	COURSE CODE
Regulation Year	2018-2019	2	1	0	3	V18CET11
Name of the Course	SURVEYING AND GEOMATICS					
Branch	CIVIL ENGINEERING					

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

- Demonstrate the basic surveying skills
- Use various surveying instruments.
- Perform different methods of surveying
- Compute various data required for various methods of surveying.
- Integrate the knowledge on surveying to the new frontiers of science like Global positioning System, Remote sensing

UNIT– I:

Introduction: Definition-Uses of surveying- overview of plane surveying (chain, Compass and plane table), Objectives, Principles and classifications – Errors in survey Measurements

UNIT – II:

Compass survey and traversing: Electronic distance measurements (EDM)-principles of electro optical EDM-Errors and corrections to linear measurements-Compass survey-Meridians, Azimuths and Bearings, declination, computation of angle. Traversing-Purpose-types of traverse-traverse computation-traverse adjustments-Introduction omitted measurements

UNIT–III:

Leveling, Contouring and Curves::Concept and Terminology, Leveling Instrument and their Temporary and permanent adjustments- method of leveling. Characteristics and Uses of contours- methods of conducting contour surveys.Types of curves, design and setting out – simple and compound curves

UNIT – IV:

Theodolite, Description, principles-uses and adjustments – temporary and permanent, measurement of horizontal and vertical angles. Principles of Electronic Theodolite – Introduction to Trigonometrically leveling,.

Tachometric Surveying: Stadia and tangential methods of Tacheometry. Distance and-Elevation formulae for Staff vertical position

UNIT–V:

Computation of Areas and Volumes: Area from field notes, computation ofareas along irregular boundaries and area consisting of regular boundaries. Embankments and cutting for a level section and two level sections with and without transverse slopes, determination of the capacity of reservoir, volume of barrow pits.

UNIT–VI: Introduction to Geo matic, Total Station and Global positioning system, Electromagnetic spectrum, Visual image interpretation, Digital image processing.

Text Books:

1. Surveying, Vol No.1, 2 &3, B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain –
2. Laxmi Publications Ltd, New Delhi,seventeenth edition (2016)
3. 2 Text book of Surveying, S.K. Duggal (Vol No. 1&2), Tata McGraw Hill Publishing
4. Co. Ltd. New Delhi.Fourth edition (1 July 2017)
5. Text book of Surveying, Arora (Vol No. 1&2), STANDARD BOOK HOUSE SINCE 1960; Edition: Year-2015 edition (2015)
6. Anji Reddy, M., Remote sensing and geographical information system,BS Publications/BSP Books (2012)

Reference Books:

1. Text book of Surveying, C. Venkataramaiah, universities Press (India) Pvt. Ltd. (12 January 2011)
2. Surveying and levelling, R. Subramanian, Oxford University Press; 2 edition (30 June 2012)

Year/Sem	IV Sem	L	T	P	C	COURSE CODE
Regulation Year	2018-2019	0	0	3	1.5	V18CEL03
Name of the Course	CONCRETE TECHNOLOGY LAB					
Branch	CIVIL ENGINEERING					

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

- Find some properties of cement by consistency, fineness, setting times, specific gravity, soundness and compressive strength.
- Determine the workability of cement concrete by compaction factor, slump and Vee – Bee tests.
- Determine properties of self-compacting concrete by Slump cone, V funnel, L Box
- Determine the specific gravity of coarse aggregate and fine aggregate by Sieve analysis.
- Determine the flakiness and elongation index of coarse aggregates.
- Determine the bulking of sand.
- Understand the non-destructive testing procedures on concrete

I. Tests on Cement

1. Normal Consistency and fineness of cement.
2. Initial setting time and final setting time of cement.
3. Specific gravity of cement
4. Soundness of cement.
5. Compressive strength of cement.

II. Tests on Aggregate

1. Sieve Analysis and gradation chairs
2. Bulking of sand.
3. Bulk and compact densities of fine and coarse aggregates

III. Tests on Fresh Concrete

1. Slump test
2. Compact factor test
3. Vee-bee Test
4. Flow Table Test

Tests on Self Compacting Concrete

1. Slump cone
2. V funnel
3. L Box

IV. Tests on hardened concrete

1. Compression test on cubes & Cylinders
2. Flexure test
3. Splitting Tensile Test
4. Modulus of Elasticity

V. Non Destructive tests of concrete

1. Rebound hammer
2. Ultrasound pulse Velocity (UPV)

Text Books:

1. Concrete Technology, M. S. Shetty. – S. Chand & Company

References:

1. Concrete Technology, M.L. Gambhir. – Tata Mc. Graw Hill Publishers, **New Delhi.**

Codes for reference:

1. IS: 4031 – chemical analysis and tests on cement.
2. IS 650:1991 –Standards and testing
3. IS 383:1970- Specification for coarse & fine aggregate
4. IS 2386 (Part III) 1963- Methods of test for aggregate for specific gravity, density, voids, absorption & bulking
5. IS 516:1959- Specification for compressive strength, Flexural strength
6. IS 5816:1999-Method of test for splitting tensile strength of concrete.
7. IS 13311(Part 1):1992 Methods of non-destructive testing of concrete: Part 1 Ultrasonic pulse velocity.
8. IS 13311(Part 2):1992 Methods of non-destructive testing of concrete: Part 2 Rebound hammer.
9. IS 6461(Part 7):1973 Glossary of terms relating to cement concrete: Part 7 Mixing, laying, compaction, curing and other construction aspects.

Year/Sem	IV Sem	L	T	P	C	COURSE CODE
Regulation Year	2018-2019	0	0	3	1.5	V18CEL04
Name of the Course	SURVEYING LAB					
Branch	CIVIL ENGINEERING					

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

- Use different Survey instruments to collect filed data
- Calculate distances, levels and angles from collected data
- Transfer points on ground to drawing sheet
- Interpret survey data to compute areas and volumes by using different methods
- Prepare profile of land from the collected survey data

List of experiments

1. Survey by chain survey of road profile with offsets in case of road widening.
2. Finding the area of the given boundary using compass (Closed Traverse)
3. Plane table survey; finding the area of a given boundary by the method of Radiation
4. Plane table survey; finding the area of a given boundary by the method of intersection.
5. Fly leveling : Height of the instrument method (differential leveling)
6. Fly leveling: Rise and Fall method.
7. Theodolite Survey: Determining the Horizontal and Vertical Angles by the method of repetition method.
8. Theodolite Survey: Finding the distance between two inaccessible points.
9. One Exercise on Curve setting.
10. One Exercise on contours.
11. Determination of area using total station
12. Determination distance between two inaccessible points.
13. Introduction to GPS.

Text/ References Books:

1. Surveying Vol No.1, 2 &3 by Dr.B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain –LaxmiPublications, seventeenth edition (2016), New Delhi.
2. Text book of Surveying by S.K. Duggal (Vol No. 1&2), McGraw Hill Education; Fourth edition (1 July 2017), New Delhi.
3. Text book of Surveying,Dr.K.R.Arora (Vol No. 1&2), STANDARD BOOK HOUSE SINCE 1960; Edition: Year-2015 edition (2015), Delhi.

Year/Sem	IV Sem	L	T	P	C	COURSE CODE
Regulation Year	2018-2019	0	0	3	1.5	V18CEL05
Name of the Course	FLUID MECHANICS AND HYDRAULIC MACHINERY LAB					
Branch	CIVIL ENGINEERING					

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

- Show the verification of Bernoulli's equation
- Find the discharge through an orifice and mouth piece by using constant head and variable head methods.
- Calculate coefficient of discharge for Venturimeter and Orificemeter
- Find loss of head due to friction and minor losses in pipes
- Calculate the force exerted by the jet on the vanes.
- Calculate efficiency and sketch performance curves for turbines and pumps.

List of Experiments

1. Verification of Bernoulli's equation.
2. Calibration of Venturimeter and Orifice meter
3. Determination of Coefficient of discharge for a small orifice by a constant head method.
4. Determination of Coefficient of discharge for an external mouth piece by variable head method.
5. Characterization of laminar and turbulent flows by Reynold's apparatus.
6. Calibration of contracted Rectangular Notch and /or Triangular Notch
7. Determination of Coefficient of loss of head in a sudden contraction and friction factor.
8. Impact of jet on vanes
9. Study of Hydraulic jump.
10. Performance studies on Pelton wheel turbine
11. Performance studies on Francis turbine/Kaplan turbine.
12. Performance studies on single stage centrifugal pump.
13. Performance studies on reciprocating pump.

List of Equipment:

1. Venturimeter setup.
2. Orifice meter setup.
3. Small orifice setup.
4. External mouthpiece setup.
5. Reynold's apparatus
6. Rectangular and Triangular notch setups.
7. Friction factor test setup.
8. Bernoulli's theorem setup.
9. Impact of jets.
10. Hydraulic jump test setup.
11. Pelton wheel and Francis turbines.
12. Centrifugal and Reciprocating pumps.

TEXT BOOKS:

1. A textbook of Fluid Mechanics and Hydraulic Machines by Dr. R.K. Bansal, Laxmi Publications (P) Ltd., New Delhi, 10th Edition, 2018
2. Hydraulics and Fluid Mechanics including Hydraulic Machines by Dr. P.N. Modi and Dr. S.N. Seth, Standard Book house, Rajsons Pvt. Ltd., 21st Edition, 2017

Year/Sem	IV Sem	L	T	P	C	COURSE CODE
Regulation Year	2018-2019	0	0	2	1	V18CEL06
Name of the Course	ENGINEERING GEOLOGY LAB					
Branch	CIVIL ENGINEERING					

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

- Understand the importance of geology in civil engineering
- Identify the geological process of any region to carry civil engineering works
- Evaluate the formation and properties of minerals, rocks and soil
- Develop the ability to prepare geological maps and sections to interpret site conditions

LIST OF EXPERIMENTS

1. Physical properties of minerals and their megascopic identification
2. Rock forming minerals: Quartz group, Feldspar group, Garnet group, Mica group, Talc, Chlorite, Olivine, Kyanite, Asbestos, Tourmelene, Calcite, Gypsum etc.
3. Ore forming minerals: Magnetite, Hematite, Pyrite, Pyralusite, Graphite, Chromite etc.
4. Megascopic description and identification of rocks
5. Igneous rocks: Granite, Pegmatite, Gabbro, Dolerite, Syenite, Granite Poryphery, Basalt, etc.
6. Sedimentary rocks: Sand stone, Ferrugineous sand stone, Lime stone, Shale, Laterite, Conglamorate, etc.
7. Metamorphic rocks: Biotite, Granite Gneiss, Slate, Muscovite & Biotiteschist, Marble, Khondalite, etc.
8. Interpretation and drawing of sections for geological maps showing tilted beds, faults, unconformities etc.
9. Simple Structural Geology problems
10. Bore hole data
11. Strength of the rock using laboratory tests
12. Field work to identify Minerals and Rocks, Geomorphology and Structural Geology

REFERENCES

1. Applied Engineering Geology Practicals by M T Maruthesha Reddy, New Age International Publishers, Second Edition, 2007.
2. Foundations of Engineering Geology by F G Bell, B S Publications, first edition, 2005.

Annexure-VII

Minutes of the meeting, BOS of Electrical and Electronics Engineering
(Held on 20.04.2019)

Item No. 1: Chairperson welcomed all the BOS members.

Item No. 2: Review of course structure of III & IV semesters for UG (B.Tech-EEE) Programme of Academic Year 2019-20.

- Reviewed the course structure of III & IV semesters for UG (B.Tech-EEE) Programme for the Academic Year 2019-20 and following modifications havebeen done.

  III Semester

  1. Thermal and Hydro Prime Movers (THPM) Theory (Course Code:V18MET12) and Laboratory (Course Code:V18MEL06) courses are replaced with **Data Structures & Algorithms Lab (**Course Code:**V18CSL31)**.
  2. Professional Ethics course (Course Code:V18ENT07) is renamed as **Professional Ethics and Human Values (**Course Code: **V18ENT12)**.
  3. English BOS has renamed the titles of mandatory Courses Employability Skills-I (Course Code: V18ENT03) to Professional Communication Skills-I (Course Code:**V18ENT03**)

  IV Semester

  1. Power Systems – I Course (Course Code: V18EET08)**and** Power Systems – II (Course Code: V18EET10) are merged and titled as **Electrical Power Generation and Transmission (**Course Code: **V18EET10).**
  2. Electrical Circuits Laboratory course (Course Code: V18EEL02) and Electrical Measurements Laboratory (Course Code: V18EEL04) are merged and titled as **Electrical Circuits & Measurements Laboratory (**Course Code: **V18EEL04).**
  3. **Python Programming Laboratory (**Course Code: **V18CSL33)** is introduced.
  4. Electrical Safety Awareness course(Course Code: V18EET56) title is modified as **Electrical Safety & IE Rules (**Course Code: **V18EET11).**
  5. English BOS has renamed the titles of mandatory Courses Employability Skills-II (Course Code: V18ENT04) to Professional Communication Skills-II (Course Code: **V18ENT04**)

  The details of the course structure for UG (B.Tech) Programme (EEE) are given in Appendix-EEE-01

Item No. 3: Propose syllabi for the courses offered in III and IV semesters of B.Tech programme of Academic Year 2019-20.

The approved syllabi for the courses offered in III and IV semesters of B.Tech programme of Academic Year 2019-20 is attached in Appendix-EEE-02

Item No. 4: Result Analysis of the courses offered in I semester.

Reviewed and apprised the results of the courses offered by EEE Department in I semester.

Results are given in Appendix-EEE-03

Appendix-EEE-01

PROPOSED COURSE STRUCTURE FOR UG-B.TECH PROGRAMME (EEE)
III & IV SEMESTERS UNDER AUTONOMY

III Semester						
S.No	**Course Code**	**Course Name**	**L**	**T**	**P**	**Credits**
1.	V18EET03	Electrical Circuit Analysis - I	3	1	-	4
2.	V18ECT05	Analog Electronics	3	-	-	3
3.	V18EET04	Electrical Machines – I	3	1	-	4
4.	V18EET05	Electro Magnetic Fields	3	1	-	4
5.	V18EET06	Electrical and Electronic Measurements	3	-	-	3
6.	V18CSL31	Data Structures & Algorithms Lab	-	-	6	3
7.	V18ECL03	Analog Electronics Laboratory	-	-	2	1
8.	V18ENT12	Professional Ethics & Human Values	2	-	-	MNC
9.	V18ENT03	Professional Communication Skills– I	3	-	-	MNC
		Total Contact Hours	**29**			**22**
IV Semester						
S.No.	**Course Code**	**Course Name**	**L**	**T**	**P**	**Credits**
1.	V18EET07	Electrical Circuit Analysis -II	3	1	-	4
2.	V18EET08	Digital Electronics	3	-	-	3
3.	V18EET09	Electrical Machines – II	3	1	-	4
4.	V18MAT04	Probability &Statistics	3	1	-	4
5.	V18EET10	Electrical Power Generation and Transmission	3	-	-	3
6.	V18EEL04	Electrical Circuits & Measurements Laboratory	-	-	2	1
7.	V18EEL05	Electrical Machines Laboratory - I	-	-	2	1
8.	V18CSL33	Python Programming Lab	-	-	2	1
9.	V18EET11	Electrical Safety & IE Rules	2	-	-	MNC
10.	V18ENT04	Professional Communication Skills– II	3	-	-	MNC
		Total Contact Hours	**29**			**21**

Internship/Industrial Training – Enrolment of Internship/Industrial Training will be initiated at the end of IV Semester.

Appendix-EEE-02

SYLLABI FOR THE COURSES OFFERED FOR UG B.TECH (EEE) PROGRAMME IN III & IV SEMESTERS

Programme: B. Tech - Electrical & Electronics Engineering **Semester: III**

Course Code: V18EET03

Course Name: Electrical Circuit Analysis – I **[L : 3; T:1; P : 0 (4 credits)]**

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO No.	Course Outcome	Knowledge Level
C201.1	Apply various network reduction techniques for solving electrical circuits.	K3
C201.2	Apply the principles of magnetism for solving different kind of magnetic circuits with and without dot conventions.	K3
C201.3	Calculate different parameters of single phase alternating quantities.	K3
C201.4	Determine various parameters in series and parallel resonant circuits.	K3
C201.5	Apply the network theorems for solving electrical circuits.	K3
C201.6	Calculate two-port network parameters for any type of electrical networks	K3

Unit-I: Introduction to Electrical Circuits

Classification of network elements, electric charge and current, electric energy and potential, Resistance parameter – Ohm's Law - series and parallel combination; Inductance parameter – series and parallel combination; Capacitance parameter – series and parallel combination; Energy Sources - Ideal, Non-Ideal, Independent and Dependent sources; Kirchhoff's laws; Source transformation; Y-Δ and Δ-Y transformation; Mesh analysis and Nodal analysis - problem solving for the network consisting of independent and dependent sources.

Unit-II: Magnetic Circuits

Basic definitions of MMF, Flux and Reluctance; Analogy between electrical and magnetic circuits; Analysis of series, parallel and composite magnetic circuits; Faraday's laws of electromagnetic induction; Concepts of self-inductance, mutual inductance and coefficient of coupling; Concept of Dot Convention and coupled coils.

Unit-III: Single Phase A.C Systems

Definitions of basic terms associated with periodic functions: Time period, Angular velocity and frequency, RMS value, Average value, Form factor and peak factor - numerical problems**;** Concept of phase angle and phase difference – Waveforms and phasor diagrams for lagging, leading networks; complex and polar forms of representations, steady state analysis of series and parallel combinations of R, L and C circuits; Power Factor and its significance; Concepts of Real, Reactive, Apparent and Complex Powers; Waveforms of instantaneous voltage, current and power; Power triangle.

Unit-IV: Analysis of AC Networks & Resonance

Extension of node and mesh analysis to AC networks; Numerical problems on sinusoidal steady state analysis; Concept of Resonance **-** Series and parallel resonance, Bandwidth of series and parallel resonance, Quasi factor, Selectivity; Numerical problems; Introduction to locus diagrams.

Unit-V: Network Theorems (DC & AC Excitations)

Superposition, Thevenin’s, Norton’s, Milliman’s, Reciprocity, Compensation, Maximum Power Transfer, Tellegen’s theorems; problem solving for the network consisting of independent and dependent sources.Concept of Duality and Dual networks.

Unit-VI: Two-Port networks

Basic Definitions; Z-parameters; Y-parameters; Transmission line (ABCD) parameters; h-parameters; Relationship between parameter sets; Series, Parallel and Cascade connections of two port networks; problem solving for the network consisting of independent and dependent sources.

Text Books:

1. Engineering Circuit Analysis by William Hayt and Jack E.Kemmerley, McGraw Hill Company,6 th edition
2. Network Analysis by Van Valkenburg, Prentice-Hall of India Private Ltd
3. Circuit Theory (Analysis and Synthesis) by A.Chakrabarthi, DhanpatRai& Co.

Reference Books:

1. Fundamentals of Electrical Circuits by Charles K.Alexander and Mathew N.O.Sadiku, McGraw Hill Education (India)
2. Network Analysis by C.L.Wadhwa, New Age International Publishers.
3. Electric Circuits– (Schaum’s outlines) by MahmoodNahvi& Joseph Edminister, Adapted byKumaRao,5th Edition – McGraw Hill.
4. Electrical Circuit Analysis by Sudhakar A. &ShyammohanS.Palli, McGraw Hill Publication
5. Introductory Circuit Analysis by Robert L Boylestad, Pearson Publications

Programme: B. Tech - Electrical & Electronics Engineering **Semester: III**
Course Code: V18EET04
Course Name: Electrical Machines – I **[L: 3; T:1; P : 0 (4 credits)]**

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO No.	Course Outcome	Knowledge Level
C203.1	Understand the basic fundamentals of electromechanical energy conversion and various DC machines	K2
C203.2	Predict and mitigate the ill-effects of armature reaction and improve commutation in dc machines	K3
C203.3	Understand the torque production mechanism and control the speed of dc motors	K2
C203.4	Analyze the performance of single phase transformers	K4
C203.5	Calculate the regulation, losses and efficiency of single phase transformers	K3
C203.6	Understand the parallel transforms, control voltages with tap changing methods and achieve three phase to two phase transformation	K2

Unit-I: Introduction to DC machines

Principles of electromechanical energy conversion; Construction and principle of operation of DC machine; EMF equation of DC generator; Classification of DC machines based on excitation; Magnetization Characteristics of DC shunt generator.

Unit-II: Performance of D.C. Machines

Torque and back-emf equations of dc motor; Armature Reaction and Commutation; Characteristics of separately-excited, shunt, series and compound motors; losses and efficiency of a DC machine; Applications of DC motors

Unit-III: Starting, Speed Control and Testing of D.C. Machines

Necessity of Starter - Working of 3-Point and 4-Point Starters; Speed Control of DC shunt motor by armature voltage and field flux control; Testing of DC machines - Brake Test, Swinburne’s method, Hopkinson’s Test, Retardation Test; Simple Numerical Problems.

Unit-IV: Single-phase Transformers

Types, Constructional details, Principle of operation, EMF Equation of a 1-Φ Transformer; Transformer operation on No-Load and On-Load for lagging, leading and unity power factors loads and their phasor diagrams; Transformer equivalent circuit; Transformer Regulation, Losses and efficiency; effect of variation of supply frequency and voltage on losses; All day efficiency.

Unit-V: Testing of Single-phase Transformers

O.C. and S.C. tests; Sumpner’s test; Separation of losses of a 1-Φ transformer; Parallel operation with equal voltage ratios; Auto Transformer - equivalent circuit, comparison with two winding transformers.

Unit-VI:-III-Phase Transformers

Poly-phase connections, Y/Y, Y/Δ, Δ/Y, Δ/Δ and open-Δ; Scott Connection; Three winding Transformer: Determination of Z_p, Z_s and Z_t; Off-load and On-load tap changers.

Text Books

1. Electrical Machines by P.S. Bhimbra, Khanna Publishers.
2. Theory & Performance of Electrical Machines by J.B.Guptha. S.K.Kataria& Sons.

Reference Books

1. Electrical Machines by D. P.Kothari, I .J .Nagarth, McGrawHill Publications, 4th edition
2. Electrical Machines by R.K.Rajput, Lakshmi publications, 5th edition.
3. Electrical Machinery by AbijithChakrabarthi and SudhiptaDebnath, McGraw Hill Education2015
4. Electrical Machinery Fundamentals by Stephen J Chapman, McGraw Hill education 2010
5. Electric Machines by MulukutlaS.Sarma & Mukeshk.Pathak, CENGAGE Learning.
6. Electric Machinery by A.E.Fitzgerald, Charles kingsley,StephenD.Umans, TMH

Programme: B. Tech - Electrical & Electronics Engineering Semester: III
Course Code : V18EET05
Course Name : Electro Magnetic Fields [L : 3; T:1; P : 0 (4 credits)]

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO No.	Course Outcome	Knowledge Level
C204.1	Compute the electric field and potential due to different configurations of static charges and electric dipole.	K3
C204.2	Calculate the capacitance of various configurations and understand the concept of conduction and convection current densities.	K3
C204.3	Apply the Biot-Savart's law for finding MFI for different cables and develop the Maxwell's second equation.	K3
C204.4	Compute MFI for different cables by applying Ampere's circuital law and develop the Maxwell's third equation.	K3
C204.5	Determine the magnetic forces, torque produced by currents in magnetic fields, self-inductance of solenoid and toroid.	K3
C204.6	Calculate the induced E.M.F's and understand the concept of fileds varying with time.	K3

Unit-I: Electrostatics

Electrostatic Fields; Coulomb's Law; Electric Field Intensity (EFI) - EFI due to a line and a surface charges; Work done in moving a point charge in an electrostatic field; Electric Potential - Properties of potential function, Potential gradient; Guass's law; Maxwell's first law, div(D)=ρ_v; Laplace's and Poison's equations; Electric dipole - Potential and EFI due to an electric dipole, Torque on an Electric dipole placed in an electric field.

Unit-II: Conductors, Dielectrics and Capacitance

Conductors & Dielectrics: Conductors - Behavior of conductors in an electric field; Insulators - Polarization; Electric boundary conditions;

Capacitance: Capacitance of parallel plates, spherical and coaxial cables with composite dielectrics; Energy density in a static electric field; Current density - Conduction and Convection current densities; Ohm's law in point form, Equation of continuity.

Unit-III: Magneto Statics-I

Introduction to static magnetic fields; Biot-Savart's law; Magnetic Field Intensity (MFI) - MFI due to a straight current carrying filament, circular, square and solenoidal current carrying wires; Maxwell's second Equation, div(B)=0.

Unit-IV: Magneto Statics-II

Ampere's circuital law - MFI due to an infinite sheet of current, long filament current carrying conductor, circular, rectangular and square loops; Point form of Ampere's circuital law; Maxwell's third equation, Curl (H)=J.

Unit-V: Forces in Magnetic fields and Inductance

Magnetic force; Behavior of charges moving in magnetic field; Lorentz force equation; Force on a current carrying element placed in a magnetic field; Force on a straight and a long current carrying conductor placed in a magnetic field; Force between two straight long and parallel current carrying conductors; Magnetic dipole - a differential current loop as a magnetic dipole, Torque on a current loop placed in a magnetic field; Inductance: Basic expressions for self and mutual inductances, self-inductance of a solenoid and toroid.

Unit-VI: Time Varying Fields

Introduction; Integral and point forms of faraday's laws of electromagnetic induction; statically and dynamically induced EMFs; Maxwell's fourth equation, Curl (E) = $-\partial B/\partial t$; Modification of Maxwell's equations for time varying fields; Simple problems.

Text Books

1. Engineering Electromagnetics by William H. Hayt& John. A. Buck Mc. Graw-Hill Companies, 7th Editon.2006.
2. Electromagnetic Fields by R MeenaKumari, R Subhasri, New Age International, 2008.
3. Elements of Electromagnetics by Matthew N.O. Sadiku, Oxford University Press, 4th edition.

Reference Books

1. Introduction to Electro Dynamics by D J Griffiths, Prentice-Hall of India Pvt. Ltd, 2nd edition
2. Electromagnetic Field Theory by Yaduvir Singh, Pearson.
3. Fundamentals of Engineering Electromagnetics by Sunil Bhooshan, Oxford higher education.

Programme: B. Tech - Electrical & Electronics Engineering Semester: III
Course Code: V18EET06
Course Name: Electrical and Electronic Measurements

[L : 3; T:1; P : 0 (4 credits)]

COURSE OUTCOMES:
After successful completion of the course, the student will be able to:

CO No.	Course Outcome	Knowledge Level
C205.1	Identify the proper instrument for measurement of AC or DC voltage and current	K2
C205.2	Choose thesuitable instrument for the measurement of power and energy.	K3
C205.3	Understand the operation of potentiometer.	K2
C205.4	Compute the electrical parameters by using appropriate bridge.	K3
C205.5	Calculate different magnetic parameters by using magnetic instruments and illustrate the instrument transformers.	K3
C205.6	Understand the operation of various digital instruments.	K2

Unit-I: Electromechanical Indicating Instruments

Classification of measuring instruments; Construction and principle of operation of PMMC Galvanometer, MI instruments; Extension of instrument ranges using shunts, multipliers; Numerical Problems.

Unit-II: Power and Energy Measurement

Single phase dynamometer wattmeter (LPF and UPF), expression for deflecting and control torques; Type of P.F. Meters; Single phase induction type energy meter, Driving and braking torques, errors and compensations, testing by phantom loading using R.S.S. meter; Numerical Problems.

Unit-III: Potentiometers

Principle and operation of D.C. Crompton's potentiometer and their applications; Types of AC Potentiometers and their Applications.

Unit-IV: Measurement of Parameters

I. Measurement of Resistance: wheat stone's bridge and its Sensitivity; Ohm meter; Kelvin's double bridge; Loss of charge method; Earth resistance measurement by fall of potential method and megger.
II. Measurement of inductance & Q-Factor: Maxwell's bridge; Hay's bridge; Anderson's bridge.
III. Measurement of capacitance and loss angle: Desauty's Bridge; Schering Bridge.

Unit-V: Magnetic Measurements & Instrument Transformers

Magnetic Measurements: Constructional details of Flux meter; Determination of B–H Loop: Methods of reversals and Step-by-Step method; Core loss measurements by Maxwell's and Campbell's Bridges.

Instrument Transformers: Ratio and Phase angle errors (Derivation & Phasor Diagram) and their applications in the extension of instrument ranges.

Unit-VI: Electronic Instruments

Introduction; Digital Voltmeters (DVM); Ramp type DVM; Integrating type DVM; Successive-approximation DVM; Digital frequency meter, Digital Tachometer; Measurement of phase difference & Frequency by using lissajous patterns in CRO; Electronic Multi meter.

Text Books:

1. A course in Electrical& Electronic Measurement and Instrumentation by A.K.Sawhney, DhapatRai& Co.
2. Electronic Instruments by H.S. Kalsi, Tata Mc-Graw hill.

Reference Books:

1. Electrical and Electronic Measurements and instrumentation by R.K.Rajput, S.Chand.
2. Digital Instrumentation by A.J. Bouwens, Tata Mc-Graw hill.
3. Modern Electronic instrumentation & Measuring instruments by A.D. Heltric& W.C. Copper, Wheeler Publication.
4. Instrument transducers by H.K.P. Neubert, Oxford University press.
5. Electrical Measurements by Forest K. Harris, John Wiley and Sons.

Programme: B. Tech - Electrical & Electronics Engineering   Semester: IV

Course Code: V18EET07

Course Name: Electrical Circuit Analysis –II   **[L : 3; T:1; P : 0 (4 credits)]**

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO No.	Course Outcome	Knowledge Level
C210.1	Compute electrical parameters for 3-phase balanced systems	K3
C210.2	Determine electrical parameters for 3-phase unbalanced systems	K3
C210.3	Analyse circuit parameters under transient conditions	K3
C210.4	Apply Foster and Cauer methods for Network Synthesis	K3
C210.5	Apply Fourier Series and Transforms for analysing electrical circuits	K3
C210.6	Understand the concept of filters	K3

Unit-I: Balanced Three phase circuits

Advantages of three phase over single phase system; Generation of three phase voltages; Inter connection of three phase windings: Star and delta connection, Phase sequence, Relation between line and phase voltages and currents in balanced systems; Balanced Star connected load supplied from: Balanced 3-phase 4-wire system, balanced 3-phase 3-wire system; Balanced delta connected load supplied from: Balanced 3-phase 3-wire system, measurement of active and reactive power in balanced 3-phase systems.

Unit-II: Unbalanced Three phase circuits

Unbalanced Star connected load supplied from: Balanced 3-phase 4-wire system, balanced 3-phase 3-wire system; Unbalanced delta connected load supplied from: Balanced 3-phase 3-wire system; Analysis of 3-phase unbalanced circuits: Loop method, Star-Delta transformation technique; Measurement of three phase power using two wattmeter method.

Unit-III: Transient analysis in DC and AC Circuits

Initial Conditions; Analysis of R-L, R-C and R-L-C circuits with DC and AC excitations using differential equations and Laplace transforms; Numerical Problems.

Unit-IV: Network Synthesis

Concept of Stability; Hurwitz Polynomials: Properties, Procedure of Testing; Positive real function; Basic synthesis procedure; LC immittance functions; RC impedance and RL admittance functions; RL impedance and RC admittance functions by using Foster and Cauer methods.

Unit-V: Fourier Analysis and Transforms

Fourier Theorem; Trigonometric form and exponential form of Fourier series; Conditions of symmetry; Line spectra and phase angle spectra; Analysis of electrical circuits to non- sinusoidal periodic waveforms.

Fourier integrals and Fourier transforms: Properties of Fourier transforms and application to electrical circuits.

Unit-VI: Passive Filters and Attenuators

Classification and general relations in filters, Constant K low pass, high pass and band pass filters, m-derived low pass, high pass and band pass filters, Attenuators symmetrical and asymmetrical.

Text Books:

1. Engineering Circuit Analysis by William Hayt and Jack E.Kemmerley, McGraw Hill Company,6th edition
2. Network Analysis byVan Valkenburg, Prentice-Hall of India Private Ltd
3. Circuit Theory (Analysis and Synthesis) by A.Chakrabarthi, DhanpatRai& Co.

Reference Books:

1. Network Theory by N.C. Jagan, C. Lakshminarayana, Anshan Publications
2. Network Theory-Analysis and Synthesis by SmarajitGhosh, PHI Publishers
3. Fundamentals of Electrical Circuits by Charles K.Alexander and Mathew N.O.Sadiku, McGraw Hill Education (India)
4. Network Analysis by C.L.Wadhwa, New Age International Publishers.
5. Electric Circuits– (Schaum's outlines) by MahmoodNahvi& Joseph Edminister, Adapted byKumaRao, 5th Edition – McGraw Hill.
6. Electrical Circuit Analysis by Sudhakar A. &ShyammohanS.Palli, McGraw Hill Publication
7. Introductory Circuit Analysis by Robert L Boylestad, Pearson Publications

Programme: B. Tech - Electrical & Electronics Engineering **Semester: IV**

Course Code: V18EET08

Course Name: Digital Electronics **[L : 3; T:1; P : 0 (4 credits)]**

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO No.	Course Outcome	Knowledge Level
C211.1	Understand various number systems, conversation from one radix to another radix.	K2
C211.2	Solve the boolean functions using K-map and tabular minimization	K3
C211.3	Construct the combinational logic circuits	K3
C211.4	Apply PLD's for realization of Boolean	K3
C211.5	Develop the sequential logic circuits such as flip flops, counters and registers.	K3
C211.6	Analyse clocked sequential circuits, finite state machines, Meelay to Moore conversion and vice-versa.	K4

Unit-I: Review of Number Systems & Codes:

i) Representation of numbers of different radix, conversation from one radix to another radix, r-1's compliments and r's compliments of signed members, problem solving.

ii) 4 bit codes, BCD, Excess-3, 2421, 84-2-1 9's compliment code etc.,

iii) Logic operations and error detection & correction codes; Basic logic operations - NOT, OR, AND, Universal building blocks, EX-OR, EX-NOR - Gates, Standard SOP and POS, Forms, Gray code, error detection, error correction codes (parity checking, even parity, odd parity, Hamming code) NAND-NAND and NOR-NOR realizations.

Unit-II: Minimization Techniques:

Boolean theorems, principle of complementation & duality, De-morgan theorems, minimization of logic functions using Boolean theorems, minimization of switching functions using K-Map up to 6 variables, tabular minimization, problem solving (code converters using K-Map etc..).

Unit-III: Combinational Logic Circuits Design:

Design of Half adder, full adder, half subtractor, full subtractor, applications of full adders, 4-bit binary subtractor, adder-subtractor circuit, BCD adder circuit, Excess 3 adder circuit, look-a-head adder circuit, Design of decoder, demultiplexer, 7 segment decoder, higher order demultiplexing, encoder, multiplexer, higher order multiplexing, realization of Boolean functions using decoders and multiplexers, priority encoder, 4-bit digital comparator.

Unit-IV: Introduction of PLD'S:

PROM, PAL, PLA-Basics structures, realization of Boolean function with PLDs, merits & demerits of PROM, PAL, PLA comparison, realization of Boolean functions using PROM, PAL, PLA, programming tables of PROM, PAL, PLA.

Unit-V: Sequential Circuits I:

Classification of sequential circuits (synchronous and asynchronous); basic flip-flops, truth tables and excitation tables (nand RS latch, nor RS latch, RS flip-flop, JK flip-flop, T flip-flop, D flip-flop with reset and clear terminals). Conversion from one flip-flop to flip-flop. Design of ripple counters, design of synchronous counters, Johnson counter, ring counter. Design of registers - Buffer register, control buffer register, shift register, bi-directional shift register, universal shift register.

Unit-VI: Sequential Circuits II:

Finite state machine; Analysis of clocked sequential circuits, state diagrams, state tables, reduction of state tables and state assignment, design procedures.Realization of circuits using various flip-flops.Meelay to Moore conversion and vice-versa.

Text Books:

1. Digital Design – Morris Mano, PHI, 4th Edition, 2008.
2. Switching & Finite Automata theory – ZviKohavi, TMH, 3rd Edition, 2011.

Reference Books:

1. Introduction to Switching Theory and Logic Design by Frederick J. Hill , Gerald R., PetersonMc-Graw Hill TMH edition.
2. Switching Theory and Logic Design by A. Anand Kumar, PHI, 3rd Edition.
3. Fundamentals of Logic Design by Charles H. Roth Jr, Jaico Publishers.
4. Microelectronics by Milliman, MH edition.

Programme: B. Tech - Electrical & Electronics Engineering Semester: IV
Course Code: V18EET09
Course Name: Electrical Machines – II **[L : 3; T:1; P : 0 (4 credits)]**

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO No.	Course Outcome	Knowledge Level
C212.1	Explain the operation and performance of three phase induction motor	K3
C212.2	Analyze the torque-speed relation, performance of induction motor andinduction generator	K4
C212.3	Explain the torque production mechanism and starting of single phase induction motors	K3
C212.4	Analyze the performance of synchronous generators by determining its voltage regulation.	K4
C212.5	Examinethe parallel operation and control of real and reactive powers for synchronousgenerators.	K3
C212.6	Understand the operation, performance, starting and power factor corrections of synchronousmotors and Mathematical Analysis of power developed, hunting and its suppression	K4

Unit-I: 3-phase Induction Motors

Construction details of cage and wound rotor machines; Production of rotating magnetic field; Principle of operation; Rotor EMF, Rotor frequency, Rotor Current and p.f. at standstill and during running conditions; Rotor power input; rotor copper losses; Mechanical power developed and their interrelationship; Equivalent circuit; Phasor diagram.

Unit-II: Characteristics, starting and testing methods of Induction Motors

Torque equation; expressions for maximum torque and starting torque; torque-slip characteristics; double cage and deep bar rotors construction; crawling and cogging; speed control of induction motor with V/f method; no-load and blocked rotor tests (construction of circle diagram for predetermination of performance parameters); methods of starting, soft starters; induction generator operation (Qualitative treatment only).

Unit-III: Single Phase Motors

Constructional features and its equivalent circuit; Problem of starting – Double revolving field theory; Starting methods; shaded pole motors; AC Series motor.

Unit-IV: Alternators

Constructional features of non–salient and salient pole type alternator; Armature windings – Distributed and concentrated windings; Distribution, Pitch and Winding factors; E.M.F equation; Improvements of waveform and armature reaction; Voltage regulation by synchronous impedance method, MMF method and Potier triangle method; Phasor diagrams; Two reaction analysis of salient pole machine and phasor diagram.

Unit-V: Parallel Operation of Alternators

Parallel operation with infinite bus and other alternators; Synchronizing power; Load sharing; Control of real and reactive powers; Numerical problems.

Unit-VI: Synchronous Motors

Principle and theory of operation of Synchronous Motor;Phasor diagram; Starting torque; Variation of current and power factor with excitation; Synchronous condenser; Mathematical Analysis for power developed; Hunting and its suppression; Methods of starting.

Text Books

1. Electrical Machines by P.S. Bhimbra, Khanna Publishers
2. Theory & Performance of Electrical Machines by J.B.Guptha. S.K.Kataria& Sons

Reference Books

1. Electrical Machines by D. P.Kothari, I .J .Nagarth,McGrawHill Publications, 4th edition
2. Electrical Machines by R.K.Rajput, Lakshmi publications, 5th edition.
3. Electrical Machinery by AbijithChakrabarthi and SudhiptaDebnath,McGraw Hill education 2015
4. Electrical Machinery Fundamentals by Stephen J Chapman McGraw Hill education 2010
5. Electric Machines by MulukutlaS.Sarma&Mukeshk.Pathak, CENGAGE Learning.
6. Electric Machinery by A.E.Fitzgerald, Charleskingsley,StephenD.Umans, TMH

Programme: B. Tech - Electrical & Electronics Engineering Semester: IV

Course Code: V18EET10

Course Name: Electrical Power Generation & Transmission

[L:3; T:1; P:0 (4 credits)]

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO No.	Course Outcome	Knowledge Level
C214.1	Understand the working of conventional power generating stations	K2
C214.2	Choose the proper turbine for a particular power generating station	K3
C214.3	Calculate the performances parameters of various load and insulation resistance and power factor of the cables.	K3
C214.4	Compute the resistance, inductance and capacitance of transmission lines	K3
C214.5	Determine the various transmission line parameters	K3
C214.6	Understand different effects occurred and calculate the corona loss, sag and tension in transmission lines	K3

Unit-I: Conventional Power generating Stations

General layout of a thermal power plant and its Components-General layout of Nuclear power plant -Nuclear fission and Chain Reaction –General Lay out of Hydel power plant and Description of its main components

Unit-II: Turbines

Steam Turbines: Schematic layout of steam power plant, Classification of Steam Turbines-Impulse Turbine and Reaction Turbine- Compounding in Turbines-Velocity Diagrams for simple Impulse and Reaction Turbines- Work done & efficiency

Unit-III: Economic Aspects of Power Generation, Tariffs and Cables

Load curve, load duration and integrated load duration curves, discussion on economic aspects: connected load, maximum demand, and demand factor. Different Tariff methods.

Construction of cables, Types of Cables, Calculation of insulation resistance and power factor of the cable.

Unit-IV: Transmission Line Parameters

Conductor materials: Types of conductors – Calculation of resistance for solid conductors – Calculation of inductance for single phase– Single and double circuit lines–Concept of GMR and GMD–Symmetrical and asymmetrical conductor configuration with and without transposition–Bundled conductors-Numerical Problems–Calculation of capacitance for 2 wire– Effect of ground on capacitance – Capacitance calculations for symmetrical and asymmetrical for single phase–Numerical Problems

Unit-V: Modeling of Transmission Lines

Classification of Transmission Lines: Short, medium and their model representations –Nominal-T–Nominal-Pie and A, B, C, D Constants for symmetrical and Asymmetrical Networks— Evaluation of A,B,C,D Constants–, regulation and efficiency-Numerical problems-Surge Impedance –Surge Impedance loading-Wavelengths and Velocity of Propagation.

Unit-VI: Sag and Tension Calculations and Overhead Line Insulators

Skin and Proximity effects – Ferranti effect – Charging Current –Shunt Compensation –Corona – Description of the phenomenon–Factors affecting corona- Sag and Tension calculations with equal and unequal heights of towers–Effect of Wind and Ice on weight of Conductor–Numerical Problems

Text Books

1. Generation, Distribution and Utilization of Electric Energy by C.L.Wadhawa, New age International (P) Limited, Publishers
2. Thermal Engineering by Rajput, Lakshmi publications
3. Electrical Power Systems by C.L.Wadhwa, 6th Edition, New Age International Publishers.

Reference Books

1. Text Book on Power System Engineering by M.L.Soni, P.V.Gupta, U.S.Bhatnagar and Chakrabarti, DhanpatRai& Co. Pvt. Ltd
2. A Course in Power Systems by J. B. Gupta, S K Kataria& Sons Publishers.
3. Principles of Power Systems by V.K Mehta and Rohit Mehta, S. Chand Publishers.
4. Electrical Power Systems by P.S.R. Murthy, B.S.Publications.

Programme:B. Tech - Electrical & Electronics Engineering **Semester: IV**
Course Code:V18EEL04
Course Name: Electrical Circuits & Measurements Laboratory

[L:0;T:0;P:2(1credits)]

COURSE OUTCOMES:
After successful completion of the course, the student will be able to:

CO No.	Course Outcome	Knowledge Level
C215.1	Compute response in the electrical circuits using various Network theorems and determine two port network parameters	K3
C215.2	Sketch Locus Diagrams of RL and RC Series Circuits	K3
C215.3	Find parameters of the circuit under resonance conditions	K3
C215.4	Analyse the measuring parameters of Anderson & Schering bridge.	K3
C215.5	Calibrate voltmeters, ammeters, single phase energy meters	K3
C215.6	Apply various methods to calculate 3phase power and choke coil parameters	K3

Any 5 experiments from each cycle are to be conducted

Cycle I:
1. Verification of Thevenin's and Norton's Theorems
2. Verification of Superposition and Reciprocity Theorem
3. Verification of Compensation and Millmann's Theorems.
4. Verification of Maximum Power Transfer Theorem.
5. Locus Diagrams of RL and RC Series Circuits.
6. Time Response of first order RC and second order RLC Networks.
7. Series and Parallel Resonance
8. Determination of Z, Y, Transmission and hybrid parameters.

Cycle II:
1. Calibration and Testing of single phase energy Meter
2. Calibration of PMMC ammeter and voltmeter using Crompton D.C. Potentiometer
3. Calibration of AC voltmeter and measurement of choke parameters using AC Potentiometer in polar form.
4. Calibration of dynamometer and LPF wattmeter by using phantom and direct loading.
5. Capacitance and Inductance Measurement using Schering Bridge and Anderson bridge.
6. Measurement of 3 phase power with single watt meter and using two C.Ts
7. Measurement of choke coil Parameters by using 3 Voltmeter and 3 Ammeter method.

Programme: B. Tech - Electrical & Electronics Engineering Semester: IV
Course Code: V18EEL05
Course Name: Electrical Machines Laboratory – I

[L :0; T:0; P : 2 (1 credits)]

COURSE OUTCOMES:
After successful completion of the course, the student will be able to:

CO No.	Course Outcome	Knowledge Level
C216.1	Apply and Deduce the principles of Electrical Machines through laboratory experimental work	K3
C216.2	Connect the circuit to perform experiments and measure the required parameters	K3
C216.3	Analyse the observed data & come to a conclusion	
C216.4	Organize reports based on performed experiments with effective demonstration of diagrams and characteristics /graph	K4
C216.5	Demonstrate the performance of Electrical Machines.	K4
C216.6	Troubleshoot the operation of Electrical machines.	K3

Any 10 of the following experiments are to be conducted

1. Magnetization characteristics of DC shunt generator: Determination of critical field resistance and critical speed.
2. Brake test on DC shunt motor. Determination of performance curves.
3. Hopkinson's test on DC shunt machines. Predetermination of efficiency.
4. Swinburne's test and Predetermination of efficiencies as Generator and Motor.
5. Speed control of DC shunt motor by Field and armature Control.
6. Retardation test on DC shunt motor. Determination of losses at rated speed.
7. Separation of losses in DC shunts motor.
8. OC & SC test on single phase transformer.
9. Sumner's test on single phase transformers.
10. Scott connection of transformers.
11. Parallel operation of Single phase Transformers.
12. Separation of core losses of a single phase transformer.
13. Heat run test on a bank of 3 Nos. of single phase Delta connected transformers.

Programme B. Tech - Electrical & Electronics Engineering Semester: IV
Course Code: V18EET56
Course Name: Electrical Safety & IE Rules **[L : 2; T:0; P : 0 (MNC)]**

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO No.	Course Outcome	Knowledge Level
C218.1	Understand the types of electrical hazards and its impact on human body	K2
C218.2	Identify various electrical safety equipment required in power industries.	K2
C218.3	Explain different types of safety methods needed for safe operation of power system	K2
C218.4	Demonstrate the electrical accident rescue techniques and required first aid	K3
C218.5	Understand the departmental procedure for obtaining service connection	K2
C218.6	Describe various IE rules in Indian Electricity Act	K2

Unit-I: Hazards of Electricity

Introduction**,** Hazard Analysis**,** Shock**,** Arc**,** Blast**,** Affected Body Parts**,** Summary Of Causes—Injury And Death**,** Protective Strategies**.**

Unit-II: Electrical Safety Equipment

Introduction**,** General Inspection and Testing Requirements for Electrical Safety Equipment**,** Flash And Thermal Protection**,** Head and Eye Protection**,** Rubber Insulating Equipment**,** Hot Sticks**,** Insulated Tools**,** Barriers And SignsSafety Tags, Locks, and Locking Devices , The Electrician's Safety Kit

Unit-III: Safety Procedures and Methods

Introduction**,** The Six-Step Safety Method**,** Job Briefings**,** Energized Or De-Energized?**,** Safe Switching Of Power Systems**,** Energy Control Programs**,** Lockout-Tagout**,** Placement Of Safety Grounds**,** Barriers And Warning Signs**,** Tools And Test Equipment**,** The One-Minute Safety Audit.

Unit-IV: Accident Prevention, Rescue, and First Aid

Accident Prevention, Individual Responsibility, Installation Safety, First Aid ,Resuscitation (Artificial Respiration), Heart-Lung Resuscitation, Rescue Techniques, General Rescue Procedures, Accident Investigation

Unit-V: Departmental Procedures and Tests

Departmental procedure for obtaining service connection, Insulation resistance and Earth resistance, testing of electrical installation, Insulation resistance between conductor and earth, load survey.

Unit-VI: REC and Indian Electricity Act

Introduction, Rural Electrification, Indian Electricity Rules, National Electrical Code.

Textbooks:

1. Electrical Saftey hand book byJohn Cadick, Mary Capelli-Schellpfeffer, Dennis K. Neitzel, 3rd edition, McGraw-Hill Publications.

References:

1. Indian Electricity Act 2003
2. The Indian Electricity Rules, 1956

3. A Study Guide on Electrical SafetyHazards Awareness by EFCOG Electrical Safety Improvement Project.

Appendix-EEE-03

Course Name: Basic Electrical and Electronics Engineering
Course Code: V18EET01

Branch	Name of the Faculty	No. of Students			Pass %	No. of Students Secured						failed only in this Course	Pass %(If single Course failures Could be avoided	Grade Point		
		Appeared	Passed	Failed		Grade	‘A’ Grade >=80 to <90	Grade >=70 to	‘C’ Grade >=60 to <70	‘D’ Grade >=50 to <60	‘E’ Grade >=40 to <50			MIN	MAX	AVG
ME-A	K.Suresh	42	24	18	57.14	0	1	5	5	3	10	3	64.29	5	9	6.33
ME-B		38	32	6	84.21	0	4	7	6	10	5	4	94.74	5	9	6.84
CSE-A	G.MadhuSagarBabu	58	29	29	50	0	2	2	3	11	11	10	67.24	5	9	6.07
CSE-B		60	60	0	100	0	8	17	19	10	6	0	100	5	9	7.18
CSE-C	A. U. S. Naga Prasad	59	55	4	93.22	2	13	7	24	8	1	2	96.61	5	10	7.53
CSE-D		60	60	0	100	5	11	19	13	8	4	0	100	5	10	7.67

Annexure-VIII

Minutes of the meeting, BOS of Computer Science Engineering (Held on 20.04.2019)

Item No. 1: Introducing members of BOS by Chairperson.

The Chairperson BOS extended a formal welcome and introduced the members.

Item No. 2: Review of the syllabus approved for the Academic Year 2018-19(B.Tech)

(i) As per the discussions by the BOS members, no changes were suggested in the Syllabus.

Item No: 3: Suggest modification for the existing Course Structure (B.Tech).

i) The courses namely **Employability Skills-I (V18ENT03) and Employability Skills-II (V18ENT04)** were renamed by BOS of English as **Professional Communication Skills – I (V18ENT03) and Professional Communication Skills –II (V18ENT04)**.

ii) A new **MNC course** by name **Technical Skills-I (**V18CST60**) & Technical Skills-II (**V18CST61**)** were suggested by the committee to be offered in the III Sem & IV Sem respectively.

iii) The Course Structure & Syllabus for these four courses are placed in **Appendix-CSE-01.**

Item No: 4: Change of course (II SEM) in the Approved course structure (M.Tech)

To provide advanced courses the committee recommended **Deep Learning (V18CTT19)** Course in place of **Artificial Intelligence (V18CTT12)** in Elective-I. The revised Course Structure is proposed in **Appendix-CSE-02**.

Item No.5: Syllabi for the proposed courses offered in III and IV semesters of B.Tech Programme for the Academic Year 2019-20 & M.Tech(CSE) II Sem.

(i) The proposed Syllabi is given in **Appendix-CSE-03**.

(ii) Syllabus is approved for the courses offered to EEE & ECE Programmes, is given in **Appendix-CSE-04.**

S.No.	Programme	SEM	Course Code	Course Name
1	EEE	III	V18CSL31	Data Structures & Algorithms Lab
2	EEE	IV	V18CSL33	Python Programming Lab
3	ECE	IV	V18CSL32	Object-OrientedProgrammingThrough Java Lab

iii) **M.Tech , Deep Learning (V18CTT19)** Course Syllabus is proposed in **Appendix-CSE-05.**

Item No.6: Any other item with the permission of chair

We are awaiting for the approval of new Programme Computer Science & Technology (CST) for the A.Y 2019-20. As suggested by the BOS, it has been decided to adopt the same Syllabi & Course Structure of I & II SEM CSE for CST also. Details are given in **Appendix CSE-06**

Appendix-CSE-01

B.Tech Course Structure

S.No	**III – Semester**						
	Course Code		**Course**	**L**	**T**	**P**	**C**
1	V18MAT04	BSC	Probability & Statistics	3	1	0	4
2	V18ECT06	ESC	Digital Electronics	3	0	0	3
3	V18CST02	PCC	Data Structures and Algorithms	3	0	0	3
4	V18CST03	ESC	Discrete Mathematics	3	0	0	3
5	V18CST04	ESC	Object Oriented Programming for problem Solving	3	0	0	3
6	V18ECL04	ESC	Digital Electronics Lab	0	0	2	1
7	V18CSL02	PCC	Data Structures and Algorithms Lab	0	0	3	1.5
8	V18CSL03	ESC	Object Oriented Programming for problem Solving Lab	0	0	3	1.5
9	V18ENT03		Professional Communication Skills – I	3	0	0	MNC
10	V18CST60		**Technical Skills-I**	0	0	4	MNC
Total				**18**	**1**	**12**	**20**

Total Contact Hours: 31

IV – Semester							
S.No	**Course Code**		**Course**	**L**	**T**	**P**	**C**
1	V18CST05	PCC	Computer Organization	3	0	0	3
2	V18CST06	PCC	Software Engineering	3	0	0	3
3	V18CST07	PCC	Formal Languages and Automata Theory	3	0	0	3
4	V18CST08	PCC	Java Programming	3	0	0	3
	V18CST09	PCC	Python Programming	3	0	0	3
5	V18MBET51	HSS	Managerial Economics and Financial Analysis	3	0	0	3
6	V18CSL04	PCC	Java Programming Lab	0	0	3	1.5
7	V18CSL05	PCC	Python Programming Lab	0	0	3	1.5
8	V18ENT11		Constitution of India	2	0	0	MNC
9	V18ENT04		Professional Communication Skills – II	3	0	0	MNC
10	V18CST61		**Technical Skills -II**	0	0	4	MNC
Total				**23**	**0**	**10**	**21**

Total Contact Hours: 33

Appendix-CSE-02

M.Tech (CSE) Course Structure

I-SEMESTER

S.No.	Course Code	Course	L	T	P	C
1	V18CTT01	Object Oriented Software Engineering	3	-	-	3
2	V18CTT02	NOSQL Database	3	-	-	3
3	V18CTT03	Advanced Computer Architecture	3	-	-	3
4	V18CTT04	Advanced Operating Systems	3	-	-	3
5	V18CTT05	Advanced Data Structures and Algorithm Analysis	3	-	-	3
6	V18CTT06	Machine Leaning	3	-	-	3
7	V18CTL01	NOSQL Database Lab	-	-	2	1
8	V18CTL02	Advanced Data Structures and Algorithm Analysis Lab	-	-	2	1
9	V18CTT41	Seminar-I	-	2	-	2
Total Credits			**18**	**2**	**4**	**22**

L = Lecture, T = Tutorial, P = Practical & C = Credits

Total Contact Hours: 24

II-SEMESTER

S.No.	Course Code	Course	L	T	P	C
1	V18CTT07	Data Science	3	-	-	3
2	V18CTT08	Advanced Web Technologies	3	-	-	3
3	V18CTT09	Cloud Computing	3	-	-	3
4	V18CTT10	Internet of Things	3	-	-	3
5	**Elective-I**		3	-	-	3
	V18CTT11	1) Cyber Security				
	V18CTT19	2) Deep Learning				
	V18CTT13	3) Bioinformatics				
	V18CTT14	4) Wireless Sensor Networks				
6	**Elective-II**		3	-	-	3
	V18CTT15	1) Image Processing				
	V18CTT16	2) Parallel Algorithms				
	V18CTT17	3) Mobile Computing				
	V18CTT18	4) Grid Computing				
7	V18CTL03	Data Science Lab	-	-	2	1
8	V18CTL04	Advanced Web Technologies Lab	-	-	2	1
9	V18CTT42	Seminar-II	-	2	-	2
Total Credits			**18**	**2**	**4**	**22**

L = Lecture, T = Tutorial, P = Practical & C = Credits

Total Contact Hours: 24

III Sem	PROBABILITY AND STATISTICS	Course Code: VI8MAT04	L	T	P
			3	1	0

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO1: Find measures of central tendency and dispersion for real data sets.

CO2: Find parameters of given function

CO3: Apply probability distribution to real time problems

CO4: Plot a best fit curve to an experimental data and find the correlation and regression

CO5: Create good estimators to various parameters

CO6: Apply the principles of Statistical Inference to practical problems

Unit-I: Basic Statistics

Measures of Central Tendency: Mean, Median, Mode

Measures of Dispersion: Variance, Standard deviation, Skewness and Kurtosis

Unit-II: Basic Probability

Random Variables: Discrete and continuous - Probability function – density and distribution function, Expectation of a Random Variable, Moments, Chebychev's Inequality (Without proof).

Unit-III: Probability Distributions

Probability distributions: Binomial, Poisson and Normal - Evaluation of statistical parameters: Mean, Variance and their properties, Introduction to Exponential, Gamma and Weibull distributions.

Unit-IV: Bivariate Distributions

Curve fitting by the method of Least squares- Fitting of straight line, parabola and exponential curves, Simple Correlation and Regression – Rank correlation.

Unit-V: Sampling Distribution and Estimation

Introduction **–**Sampling distribution of means with known and unknown standard deviation

Estimation: Criteria of a good estimator, point and interval estimators for means and proportions

Unit-VI: Tests of Hypothesis

Introduction-Type-I, Type-II Errors, Maximum Error, one–tail, two-tail tests,Test of significance: Large sample test for single proportion, difference of proportions, single mean, difference of means.

Test of significance: Small sample test for single mean, difference of means and test of ratio of variances (F-Test) - Chi-square test for goodness of fit and independence of attributes.

Text Books:

1. **B. V. Ramana**, A text Book of Engineering Mathematics, Tata McGraw Hill.

2. **Miller & Freund's**, Probability & Statistics for Engineers – Eighth Edition,Richard. A. Johnson

References Books:

1. **S. Ross,** “A First Course in Probability”, Pearson Education India, 2002.
2. **Dr.T.S.R.Murthy**, Probability and Statistics for Engineers, BS Publications.
3. **T. Veerarajan**, “Engineering Mathematics”, Tata McGraw-Hill, New Delhi, 2010.

III Sem	DIGITAL ELECTRONICS	Course Code: VI8ECT06	L	T	P
			3	0	0

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO1: Illustrate the conversion of a number from one number system to another .

CO2: Classify Boolean theorems & simplify the Boolean functions using the Boolean properties.

CO3: Use K-map as a tool to simplify and design logic circuits

CO4: Construct different combinational Logic circuits like MUX, Decoders, Encoders etc.

CO5: Demonstrate the basic flip-flops in terms of truth table & excitation table

CO6: Apply the concepts of flip-flops in the designing of different sequential circuits like registers, counters, etc.

UNIT I: Number systems & Binary codes:

Number systems: Number Systems, Radix conversions, complement of numbers. Binary codes: Binary codes, Weighted and non-Weighted codes, BCD code, gray code, excess 3 codes.

UNIT -II: Concept of Boolean algebra:

Basic Theorems and Properties of Boolean algebra, Boolean Functions, Canonical and Standard Forms, Minterms and Maxterms, Logic gates: NOT, OR, AND, NOR, NAND, XOR, XNOR - Universal gates.

UNIT- III: Gate level Minimization:

Map Method, Two-Variable K-Map, Three-Variable K-Map, Four Variable K-Maps. Products of Sum Simplification, Sum of Products Simplification, Don't – Care Conditions, NAND and NOR Implementation.

UNIT- IV: Combinational Logic:

Introduction, Analysis Procedure, Design Procedure, Binary Adder–Subtractor, Decimal Adder, Decoders, Encoders, Multiplexers.

UNIT V: **Sequential Logic Circuits**:

Introduction –Latches and Flip flops: Basic Flip flop circuit, RS, D, JK and T Flip-flops – Triggering of Flip flops: Master Slave Flip flop, edge triggered flip flop – Conversion of one type of Flip flop to another.

UNIT -VI: Registers and Counters:

Registers and Counters: Shift Register, Universal Shift Register, Applications of Registers, Asynchronous counter, Synchronous counter, Mod-N Counter, binary up/down counter, Ring counter, Johnson counter.

Memories: Introduction to ROM, PROM, EPROM.

TEXT BOOKS:

1. Digital Design, 5/e, M.Morris Mano, Michael D Ciletti, PEA.
2. Fundamentals of Logic Design, 5/e, Roth, Cengage.

REFERENCE BOOKS:

1. Digital Logic and Computer Design, M.Morris Mano, PEA.
2. Digital Logic Design, Leach, Malvino, Saha, TMH.
3. Modern Digital Electronics, R.P. Jain, TMH.

III Sem	DATA STRUCTURES AND ALGORITHMS	Course Code: **V18CST02**	L	T	P
			3	0	0

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO1: Explain Sorting and Searching techniques. [K2]
CO2: Demonstrate Singly Linked List and Double Linked List. [K3]
CO3: Interpret the basic operations on Stacks and Queues. [K3]
CO4: Demonstrate Binary Tree and Binary Search Tree [K3]
CO5: Compare Binary trees and Self-Balanced trees with appropriate examples. [K4]
CO6: Illustrate various graph algorithms.. [K3]

UNIT I: Algorithm Notations - performance analysis: Space complexity, time complexity – Asymptotic notation: Big O, Omega and Theta.

Sorting: Bubble Sort, Insertion Sort, Selection Sort, Quick Sort, Merge Sort, Radix Sort. **Searching**: Linear Search, Binary Search. Introduction to Hashing.

UNIT II: Types of Data Structures – Linear data structures and non-linear data structures. Representation of arrays - polynomial representation, addition of two polynomials, sparse representation, transpose of sparse matrix.

Single linked list: Representation of node, operations on single linked list, reverses the linked list,

Double linked list: operations like insert delete and display. Circular linked List.

UNIT III: Stacks Definition, array representation, linked list representation, Towers of hanoi, infix to postfix conversion, expression evolution, Multistack.

Queues definition, Array representation, linked list representation, operations on queues, Applications of Queues, Circular Queue.

UNIT IV: Trees: Introduction, Terminology, Representation of Trees.

Binary Trees: Properties of Binary Tress, Binary Tree Representation, operations, Tree Traversals – recursive, non-recursive.Binary Search Tree and its operations.

UNIT – V: Self-Balanced Trees - **AVL trees:** Definition, Representation of an AVL Tree, Height of AVL tree, AVL element searching, insert and delete element from AVL tree.

Priority Queues: Heaps Definition, types of heaps, properties and its operations.

UNIT – VI: Graphs: Graph Definition, properties, Graph Representation, Elementary Graph Operations. Graph Traversal techniques: Depth First Search, Breadth First Search.Spanning Trees: Kruskal's Algorithm, Prims Algorithm. Single source shortest Paths and all pair shortest path algorithm.

Text Books:

1. Data Structures, algorithms and applications in C++, SartajSahni, Universities press, Second Edition.

2. Fundamentals of Data Structures in C++, Ellis Horowitz, SartajSahni and Dinesh Mehta, 2nd Edition, Universities Press (India) Pvt. Ltd.

Reference Books:

1. An Introduction to Data Structures with Application, Jean-Paul Tremblay , Paul Sorenson, Second Edition.
2. Fundamentals of Data Structures and algorithms by C V Sastry, Rakesh Nayak, Ch. Raja Ramesh, IK Publications, new Delhi.
3. Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.
4. Problem solving with C++, The OOP, Fourth edition, W.Savitch, Pearson education.

III Sem	DISCRETE MATHEMATICS	Course Code: V18CST03	L	T	P
			3	0	0

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO1: Demonstrate the concepts associated with propositions and mathematical logic. **[K3]**

CO2: Demonstrate the basic concepts associated with relations, functions and their applications. **[K3]**

CO3: Illustrate algebraic structures and their applications in computer science. **[K3]**

CO4: Apply techniques of graphs for real-time problems **[K3]**

CO5: Demonstrate the concepts of trees in various real time problems. **[K3]**

CO6: Solve recurrence relations using various methods and problems based on combinatory. **[K3]**

UNIT-I Mathematical Logic: Statements and Notation , Connectives, Truth tables, Tautologies, Equivalence of formulas, Tautological Implications, Normal forms, Theory of inference for Statement Calculus, Indirect Method of Proof. Predicate calculus- Predicates, quantifiers, universe of discourse.

UNIT-II Set Theory and Relations: Basic concepts, Operations on Sets, Principle of Inclusion and Exclusion, Relations, Properties of Binary Relations in a set, Relation Matrix and Digraph, Equivalence, Partial Ordering Relations, Hasse Diagrams, Lattice and its Properties , Functions, Bijective Functions, Composition of Functions.

UNIT-III Algebraic Structures: Algebraic Systems and examples, Properties of Binary operations, Semi Groups, Monoids, Homomorphism of Semi groups and Monoids, Groups, Abelian Group, Subgroups.

UNIT-IV Graph Theory-I: Basic Concepts of graph, Representing graphs, Sub graphs, Isomorphic graphs, Paths and Circuits,Eulerian and Hamiltonian Graphs,Planar graphs, Graph Colouring , Chromatic Number.

UNIT-V Number Theory: Properties of integers, Division Theorem, The Greatest Common Divisor, Euclidean Algorithm, Least Common Multiple, Testing for Prime Numbers, The Fundamental Theorem of Arithmetic, Modular Arithmetic (Fermat's Theorem and Euler 's Theorem)

UNIT-VI Combinatorics and Recurrence Relations:

Combinatories: Basics of counting, permutations, combinations, inclusion-exclusion, pigeonhole principle.

Recurrence relations: Solving homogeneous and non-homogeneous recurrence relation by method of substituation, characteristic roots and generating function.

Text Books:

1. 1. Discrete Mathematical Structures with Applications to Computer Science, J. P. Tremblay and P. Manohar, 1st Edition, Tata McGraw Hill.
2. Discrete Mathematics and its Applications with Combinatorics and Graph Theory, K. H.Rosen, 7th Edition, Tata McGraw Hill..
3. Discrete Mathematics for Computer Scientists and Mathematicians, J. L. Mott, A. Kandel, T.P. Baker, 2nd Edition, Prentice Hall of India.

Reference Books:

1. Elements of Discrete Mathematics -A Computer Oriented Approach, C. L. Liu and D. P. Mohapatra,
2. 3rdEdition, Tata McGraw Hill.
3. 2.Discrete Mathematics with Combinatorics and Graph Theory, Santha, 1st Edition Cengage Learning.

III Sem	OBJECT ORIENTED PROGRAMMING FOR PROBLEM SOLVING	Course Code: V18CST04	L	T	P
			3	0	0

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO1: Differentiate Procedural Oriented Programming and Object Oriented Programming. **[K2]**

CO2: Develop object oriented programs onclasses and objects. **[K3]**

CO3: Demonstrate various object-oriented concepts like Constructors, Destructors & Operator-Overloading. **[K3]**

CO4: Apply various Object Oriented features like Inheritance and Polymorphism to solve various computing Problems. **[K3]**

CO5: Develop programs to handle Exceptions & Files. **[K3]**

CO6: Describe Generic Programming. **[K3]**

UNIT I: Introduction to Object-Oriented Programming: Introduction to Object-Oriented Programming – Programming Paradigms, Features of Object Oriented Programming,Data Types, Variables, Constants, Operators ,Decision Statements &Control Structures, Arrays, Namespace, Default Arguments, Constant Arguments, Inputting Default Arguments, Reference Arguments.

UNIT II: Classes and Objects: Introduction to Classes and Objects: Defining Classes & Objects, Access specifiers, Scope Resolution Operator, Static Member variables, Static Member Functions, Array of Objects**.** Inline Functions, Overloading Member Functions, Objects as Function Arguments, Friend Functions, Friend Class, Local Class, Empty Class, Nested Classes, Return by Reference.

UNIT III: Object Initialization, Cleanup and Operator Overloading: Introduction to Constructors, Characteristics, Constructor with Default Arguments, Parameterized Constructors, Overloading Constructors, Copy Constructor, Dynamic Constructors and Destructors, Anonymous Objects .Introduction to operator Overloading, Rules for Overloading Operators, Overloading Unary & Binary Operators, this keyword, Constraint on Increment and Decrement Operators, Overloading with Friend Functions, Type Conversions.

UNIT IV: Inheritance and Polymorphism: Base class and Derived class, Single Inheritance, Multiple Inheritance, Multilevel Inheritance, Hierarchical Inheritance, Hybrid Inheritance, Virtual Base Classes, and Constructor in Derived Classes. qualifier classes and inheritance, Significance of Virtual Functions, Early Vs Late Binding, Pure Virtual Functions, Virtual Destructor.

UNIT V: Exception Handling and File Handling: Principles of Exception Handling, Keywords, Exception Handling Mechanism, Multiple Catch Statements, Catching Multiple Exceptions, Re-throwing Exception.File Opening Modes, File Stream Classes, I/O manipulators, Classes for File Handling, Sequential Access Files, Random Access Files, Error Handling Functions.

UNIT-VI: Generic Programming with Templates: Need for Templates,Class Templates, Function Templates,overloading Template Functions. Introduction to Standard Template Library, Sequential Containers & Associative Containers.

Text Books

1. Programming in C++, Ashok N Kamthane, 2nd Edition, Pearson.
2. C++ How to Program, Paul J. Deitel, Harvey Deitel, 6th edition, PHI publication.

References Books

1. Object Oriented Programming C++, Joyce Farrell, Cengage.
2. Mastering C++, Venugopal, Raj Kumar, Ravi Kumar, TMH.
3. The Complete Reference C++, HerbertSchildt, 4th Edition, Mcgraw Hill.
4. 4.Object Oriented Programming With C++, R. Subburaj, Vikas Publishing House.

III Sem	DIGITAL ELECTRONICS LAB	Course Code:V18ECL04	L	T	P
			0	0	2

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO1: Apply the Boolean algebra to design digital logic circuits.

CO2: Analyse the behaviour of different combinational logic circuits.

CO3: Analyse the behaviour of different sequential logic circuits

CO4: Construct and troubleshoot simple combinational and sequential circuits

List of Experiments: *Conduct any TEN experiments*

Study of Integrated Circuits, Bread board& Power supplies

1) Verification of Basic Logic Gates
2) Verification of Universal Gates, Special Gates.
3) Verify the De-Morgan laws using CMOS IC's
4) Design a Gray code encoder & Decoder using IC 7486
5) Construct a Half Adder using IC's and verify the truth table.
6) Construct a Half Subtract or using IC's and verify the truth table.
7) Verify the truth tableof IC 74138(3x8 Decoder)
8) Verify the truth table of IC 74153(4x1 MUX).
9) Verify the D Flip- Flop Using IC7474 with PRESET, CLEAR asynchronous Inputs.
10) Verify JK Flip- Flop & T Flip-Flop Using IC7476 with PRESET, CLEAR asynchronous Inputs.
11) Verify Decade counter using IC7490.
12) Design 4-bit right Shift Register using D-Flip-Flop and verify the truth table.

Add-on Experiments

1) Verify the read and write operations for the IC74189.
2) Design the Mod-6 counter usingIC74XX

Equipment Required:

1. IC TrainerKits
2. Electronic chips of allgates
3. PowerSupplies
4. Bread boards

III Sem	DATA STRUCTURES AND ALGORITHMS LAB	Course Code: V18CSL02	L	T	P
			0	0	3

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO1: Construct programs on Sorting and searching Techniques. **[K3]**

CO2: Illustrate various operations on Singly Linked List. **[K3]**

CO3: Construct programs on Double Linked List. **[K3]**

CO4: Develop programs on Stacks, Queues and their Applications. **[K3]**

CO5: Implement various operations on Binary Search Tree. **[K3]**

CO6: Implement various shortest path algorithms. **[K3]**

List of Experiments

1. Programs to implement the following sorting techniques
   (a) Selection sort (b) Quick sort (c) Merge sort
2. Programs to implement the following searching methods
   (a) Linear search (b) Binary search.
3. A Program to Implement hash table and its operations.(Note: Use at least one collision resolution technique)
4. A Program to implement addition of two polynomials. (using arrays).
5. A Program to implement single linked list and its operations. (create, insert, delete, display)
6. A Program to implement double linked list and its operations.
7. A Program to implement stack operations using arrays.
8. A Program to convert infix expression to postfix expression.
9. A Program to implement queue operations using single linked list.
10. A Program to implement circular queue using arrays.
11. A Program to implement Binary search Tree and its operations.
12. A Program to implement AVL trees and its operations.
13. A Program to implement Heap sort.
14. A Program to implement graph traversal algorithms (BFS & DFS).
15. A Program to implement minimum spanning tree algorithms (Prims &Krushkal)
16. A Program to implement single source shortest path algorithm.

Text books:

1. Data Structures, algorithms and applications in C++, SartajSahni, Universities press, Second Edition.
2. Fundamentals of Data Structures in C++, Ellis Horowitz, SartajSahni and Dinesh Mehta, 2nd Edition, Universities Press (India) Pvt. Ltd.

Reference Books:

1. An Introduction to Data Structures with Application, Jean-Paul Tremblay , Paul Sorenson, Second Edition.
2. Fundamentals of Data Structures and algorithms by C V Sastry, Rakesh Nayak, Ch. Raja Ramesh, IK Publications, new Delhi.
3. Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.
4. Problem solving with C++, The OOP, Fourth edition, W.Savitch, Pearson education.

III Sem	OBJECT ORIENTED PROGRAMMING FOR PROBLEM SOLVING LAB	Course Code: V18CSL03	L	T	P
			0	0	3

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO1: Develop Programs on Classes and Objects. **[K3]**
CO2: Demonstrate Constructors and destructors. **[K3]**
CO3: Demonstrate Operator-Overloading. **[K3]**
CO4: Implement Inheritance and Polymorphism. **[K3]**
CO5: Develop programs to handle Exceptions & Files. **[K3]**
CO6: Illustrate Generic Programming. **[K3]**

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List of experiments:

1. Programs illustrating Various Control Structures.
2. Programs illustrating the use of following concepts.
   (a) Default Arguments b) Constant Arguments c) Reference Arguments
3. Programs illustrating the use of following concepts:
   a) Classes & Objects b) Inline functions
   c) Static Member functions d) Overloading of Member Functions
4. Programs illustrating the use of following concepts.
   a) Objects as Function Arguments b)Friend Functions , Friend class
   c) Local class d) Empty Class& Nested Classes
5. Programs illustrating the use of following concepts.
   a) Default constructor b) Constructor with arguments c) Copy constructor
6. Programs to illustrate the Overloading of various operators.
   a) Binary b) Unary c) new d) delete
7. Programs illustrating the various forms of Inheritance.
   a) Single b) Multilevel c) Hierarchical d) Hybrid
8. Program illustrating the use of Virtual Functions &Virtual Base class.
9. Programs illustrating how Exceptions are handled.
   a) Division-by-zero b) Overflow in an array
10. Programs illustrating file handling operations:
    a) Copying text files b) Displaying the contents of the file
11. Programs illustrating Class template and Overloading Function Template.
12. Programs illustrating Sequential Containers & Associative Containers.

Text Books

1. Programming in C++, Ashok N Kamthane, 2nd Edition, Pearson.
2. C++ How to Program, Paul J. Deitel, Harvey Deitel, 6th edition, PHI publication.

			L	T	P
III Sem	**Professional Communication Skills - I**	Course Code: **V18ENT03**	3	0	0

Syllabus Details

1. *Course Outcomes: After successful completion of the Course, the student will be able to:*

CO1: Summarize one's introduction in an appropriate manner, exhibit grammatical competence through correction of sentences, analyze noun and pronoun dispositions and develop pre-reading strategies to improve comprehension skills.[K5]

CO2: Distinguish singular and plural in different contexts and display knowledge through accurate usage of sentences, build conversations which befit the situations, comprehendthe passages well and, use different kinds of idioms. [K4]

CO3: Classify various kinds of adjectives and adverbs, learn natural occurrence of paired words of native speakers, infer the referential and inferential aspects of the passages and make use of idioms while narrating personal experiences. [K4]

CO4: Judge and assess the behaviour of people in day to day life using kinesics and proxemics that disclose their disposition and be aware of their personal traits that promote good relations. (K2)

CO5: Articulate their goals and have a constructive plan of executing them properly and become adept in oral presentations as well as poster presentations that enhance their professional skills. (K3)

CO6: Evaluate various happenings by thinking out of the box and display their latent talent. They can also reduce the stress levels by applying various stress management techniques. (K4)

2. Syllabus

UNIT – I

SELF-INTRODUCTION: Basic information - Academic and personal - interests– strengths and weaknesses – goal.

ERROR ANALYSIS: Nouns & Pronouns – Singular & Plural – Kinds of Nouns & Pronouns- Collective Nouns - Personal and Reflexive Pronouns.

READING COMPREHENSION: Reading as a skill – quick reading - analyzing – answering **IDIOMS& PHRASES**: Colloquial expressions– formal and informal expressions.

UNIT – II

ERROR ANALYSIS: Concord – Subject – Verb agreement.

ROLE PLAY: Day to day situations - practical approach – real life experiences. **READING COMPREHENSION:** Skimming – scanning - summarizing – problem solving.

IDIOMS & PHRASES: Enriching written and spoken English – use and usage.

UNIT – III

ERROR ANALYSIS: Adjectives – Adverbs – role of modifiers – place of Adjectives– Adverbs of frequency.

COLLOCATIONS: Natural combination of words – closely affiliated with each other.

READING COMPREHENSION: At a glance – close reading – understanding – answering

IDIOMS & PHRASES: Communicative - expressive – competent.

UNIT -IV

INTER AND INTRA PERSONAL SKILLS: Leading, Coaching, Interviewing, Managing, Persuading - Self awareness, Self confidence, Good Attitude.

BODY LANGUAGE: Basics of proxemics and kinesics.

UNIT -V

PRESENTATION SKILLS: Importance of Presentation skills, Structuring our presentations, Ways to improve our presentation skills, Tips for effective presentations.– oral – Power point – poster.

GOAL SETTING: Short-term – long-term – aim – target – vision – How to set SMART goals.

UNIT - VI

LATERAL THINKING: What is creativity, Fundamental approaches to smart thinking, Characteristics of a creative person, Convergent and Divergent thinking.

STRESS MANAGEMENT: Meaning of Stress, Types of Stress, Symptoms of stress, Short term and long term stress, how can people manage stress.

3. Reference:

1.Essential English Grammar - Raymond Murphy

2. Advanced English Grammar – D.S. Paul

3.Word Power Made Easy – Norman Lewis

4.English collocations in use - Michael McCarthy

5. Word Power Made Handy - ShaliniVarma

6.Barron's GRE - Barron's

7. Current English Grammar & Usage – R.P Sinha

8.Think & Grow Rich - NapoleaonHill

9.Soft Skills for Everyone - Butterfield, Jeff,

10. Soft Skills - Chauhan, G.S. and Sangeeta Sharma

11. Theories of Personality - Hall, Calvin S

12. Corporate Conversations - Holtz, Shel

13. Communication Skills - Kumar, Sanajy and PushpLata

14. Winning at Interviews - Thorpe, Edgar and Showick Thorpe

15. Swami Vivekananda and "Personality Development" published by RK Math.

III Sem	**Technical Skills - I**	Course Code:	L	T	P
		V18CST60	0	0	4

Syllabus Details

Module-1: Problem Solving using C-I

Course Outcomes: After successful completion of the Course, the student will be able to:

CO1 : Build programs using Variables and Operators.(K3)

CO2 : Identify and resolve compilation errors for conditional statements.(K3)

CO3 : Develop problems using looping constructs.(K3)

CO4 : Model the problems using functions.(K3).

CO5 : Develop problems using Arrays (K3).

CO6 : Make use of Strings to solve the given problem(K3)

Syllabus

1. **I/O Statements, Operators and Expressions**
2. **Problem Solving Using Conditional Statements**
3. **Looping Constructs**
4. **Functions**
5. **2-D Arrays**
6. **Strings**

Text Books:

1. Let us C: Yesvanth Kanetkar, BPB Publications, 16th Edition
2. Working With C, Yashavant P. Kanetkar, BPB Publications
3. Test Your C Skills, Yashavant P. Kanetkar, BPB Publications

IV Sem	COMPUTER ORGANIZATION	Course Code: V18CST05	L	T	P
			3	0	0

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

- **CO1:** Illustrate Basic structure of Computers, Instruction types and their addressing modes. **[K2]**
- **CO2:** Describe the different modes of Input / Output transfer. **[K2]**
- **CO3:** Illustrate different types of Memory. **[K2]**
- **CO4:** Describe the different types of Control Unit techniques. **[K2]**
- **CO5:** Illustrate the Fixed point and Floating point arithmetic operations of ALU. **[K2]**
- **CO6:** Explain the concept of Pipelining. **[K2]**

UNIT-I: Introduction:

Functional Units, Basic Operational Concepts, Bus Structures.

Instruction Sequencing and Addressing Modes: Instructions and Instruction Sequencing, Addressing modes, Basic Input/Output Operations.

UNIT-II: Input/Output Organization:

Accessing Input/Output devices, Interrupts- Interrupt Hardware, Enabling and Disabling Interrupts, Handling Multiple Devices, Direct Memory Access, Buses-Synchronous and Asynchronous.

UNIT-III: Memory Organization:

Memory Hierarchy, Main Memory, Auxiliary Memory, Associative memory, Cache Memory. **(Morris Mano)**

UNIT-IV: Processing Unit:

Fundamental Concepts, Execution of a Complete Instruction, Multiple-Bus Organization, Hardwired Control, Micro programmed Control-Microinstructions, Micro program Sequencing.

UNIT-V: Arithmetic Logic Unit:

Introduction, Addition and Subtraction, Multiplication Algorithms, Division Algorithms, Floating-Point Arithmetic Operations. **(Morris Mano)**

UNIT-VI: Pipelining:

Basic Concepts, Data Hazards, Instruction Hazards, Datapath and Control Considerations.

Text Books:

1. Computer Organization, Carl Hamacher, ZvonkoVranesic, SafwatZaky, 5th Edition, McGraw Hill Education.
2. Computer System Architecture, M. Morris Mano, 3rd Edition, Pearson Education.

Reference Books:

1. Computer Organization and Architecture, William Stallings, 10th Edition, Pearson Education.

2. Computer Architecture and Organization, John P. Hayes, 3rd Edition, McGraw Hill Education.

IV Sem	SOFTWARE ENGINEERING	Course Code: **V18CST06**	L	T	P
			3	0	0

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO1: Demonstrate Software Process Models. **[K3]**

CO2: Illustrate Requirement Engineering Process. **[K3]**

CO3: Discuss Software architecture and Design. **[K2]**

CO4: Apply Coding principles and Testing techniques **[K3]**

CO5: Discuss Software Estimation and Maintenance. **[K2]**

CO6: Describe Quality Management and Metrics. **[K2]**

UNIT-I: The nature of Software: Defining Software, Software application Domains, Legacy software. Software engineering, the software process, software Myths.

Software development process models: Waterfall model, Prototyping, Iterative development, Unified process, Extreme programming and agile process. Merits and Demerits of Software Process Models.

UNIT-II: Software Requirements: Functional and non-functional requirements, User requirements, System requirements, Interface specification, the Software requirements document

Requirements engineering process: Feasibility studies, Requirements elicitation and analysis, Requirements validation, Requirements management.

UNIT-III: Software Architecture: Role of software architecture, Architecture views, components and connector view, architecture styles for C & C view, documenting architecture design, evaluating architectures.

Design: Design concepts, Function-oriented design, Object oriented design, Detailed design.

UNIT-IV: Coding and Testing: Programming principles and guidelines, incrementally developing code, managing evolving code. Testing concepts, testing process, Black-box testing, White-box testing.

Risk management: Reactive vs. Proactive Risk strategies, Software risks, Risk identification, Risk projection, Risk refinement, RMMM Plan.

UNIT-V: Software Project estimation: Decomposition techniques, Empirical Estimation Models.

Software Maintenance: Maintenance Process, Reverse Engineering, Reengineering, Configuration Management

UNIT-VI: Metrics for Process and Products: Software Measurement, Metrics for software quality.

Quality Management: Quality concepts, Software quality assurance, Software Reviews, Formal technical reviews, Statistical Software quality Assurance, Software reliability, SEI-CMM Model, Six Sigma and ISO 9000 quality standards.

Text Books:

1. Software Engineering, A practitioner's Approach- Roger S.Pressman, 7th Edition, McGrawHill International Edition.
2. Software Engineering- Ian Sommerville, 9th Edition, Pearson education.
3. Software Engineering, A Precise approach, PankajJalote, Wiley

Reference Books:

1. CMMI and Six Sigma: Partners in Process Improvement , Jeannine M. Siviy, M. Lynn Penn, Robert W. Stoddard, 1st edition, Addison Wesley;
2. Software Engineering principles and practice, W S Jawadekar, 3rdEdition,TMH

IV Sem	FORMAL LANGUAGES AND AUTOMATA THEORY	Course Code: **V18CST07**	L	T	P
			3	0	0

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO1: Construct DFA, NFA and Є-NFA. [**K3**]
CO2: Produce Regular expressions, Regular Grammars. [**K3**]
CO3: Construct Context Free Grammars, Context Free Languages.[**K3**]
CO4: Construct Pushdown Automata and its equivalence with CFG.[**K3**]
CO5: Construct Turing machine. [**K3**]
CO6: Discuss Decidability Theory. [**K2**]

UNIT-I: Alphabet, Strings, Language, Finite Automaton Definition, Transition Systems, Acceptance of Strings by Finite Automata, DFA, Design of DFA, NFA, Design of NFA, Equivalence between NFA and DFA, Finite Automata with ϵ-Transition, Equivalence between NFA and ϵ-NFA, Minimization of Finite Automata, Equivalence between two Finite Automata, Moore and Mealy machines and their equivalences, Applications of Finite Automata.

UNIT-II: REGULAR EXPRESSIONS: Regular expressions, Identity rules, Equivalence between two Regular Expressions, Equivalence between Regular Expressions and Finite Automata, Pumping lemma, Closure properties of regular sets(proofs not required),Regular Sets and Regular grammars, Equivalence between Regular grammar and FA, Regular Expressions and Regular Grammar.

UNIT-III: CONTEXT FREE GRAMMARS: Formal Languages, Grammars, Classification of Grammars, Chomsky Hierarchy, Context free Grammars, Derivation of string, Left Most Derivations, Right Most Derivations, parse trees, Ambiguity in Context-Free Grammars, Simplification of Context Free Grammars, Normal Forms-Chomsky Normal Form (CNF), Greibach Normal Form (GNF),Pumping Lemma, Closure Properties, Applications of Context Free Languages.

UNIT-IV: PUSHDOWN AUTOMATA: Definitions, Instantaneous descriptions, Languages of a PDA, Equivalence of Pushdown automata and CFG's, Deterministic pushdown automata: Definition DPDA, Regular Languages and DPDA , DPDA and context free languages.

UNIT-V: TURING MACHINE: Definition, Model, Representation of Turing Machines: Instantaneous Description, Transition Tables and Transition Diagrams, Language Acceptance of a Turing Machine, Design of Turing Machine (TM) , Types of TM's (Proofs not required).

UNIT-VI: Recursive languages, Recursive Enumerable Language, Closure Properties of Recursive languages & Recursive Enumerable, Universal Turing Machine. Decidable and Un-decidable Languages, Halting Problem of Turing Machines, Post Correspondence Problem, Modified Post's Correspondence Problem.

Text Books:

1. Introduction to Automata Theory, Languages and Computation, J.E.Hopcroft, R.MotwaniandJ.D.Ullman, 3rdEdition, Pearson, 2008.
2. Theory of Computer Science-Automata ,Languages and Computation, K.L.P.Mishra and N.Chandrasekharan, 3rdEdition,PHI, 2007.
3. Peter Linz, “An Introduction to Formal Language and Automata”, ThirdEdition, Narosa Publishers, New Delhi, 2002

Reference Books:

1. 1.Introduction to Automata Theory, Formal Languages and Computation, ShyamalenduKandar, Pearson, 2013.
2. Theory of Computation, V.Kulkarni, Oxford UniversityPress, 2013.
3. Theory of Automata, Languages and Computation, RajendraKumar, McGraw Hill, 2014.
4. Formal Language and Automata Theory, K.V.N.Sunitha and N.Kalyani, Pearson, 2015.
5. John C Martin, “Introduction to Languages and the Theory of Computation”, Third Edition, Tata McGraw Hill Publishing Company, New
6. Delhi, 2007
7. Kamala Krithivasan and Rama. R, “Introduction to Formal Languages, Automata Theory and Computation”, Pearson Education 2009.

IV Sem	JAVA PROGRAMMING	Course Code: **V18CST08**	L	T	P
			3	0	0

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO1: Describe Java Virtual Machine and Type casting. [**K2**]

CO2: Demonstrate Concepts like Constructors, Arrays, Nested Classes and Command Line Arguments. [**K3**]

CO3: Implement Concepts of Inheritance and Exception Handling [**K3**]

CO4: Develop programs on Multi-Threading and Files [**K3**]

CO5: Demonstrate Applet Programming and AWT Components. [**K3**]

CO6: Describe Event Handling and Swings. [**K3**]

UNIT-I: Introduction to Java: Introduction to Object Oriented Paradigm, Concepts of OOP, Applications of OOP, History of Java, Java Features, JVM, Program Structure. Variables, Primitive Data Types, Constants, Operators, Expressions, Precedence rules and Associativity, Primitive type conversion and Casting, Control Structures.

UNIT-II: Classes and Objects: Classes and objects, Class declaration, Creating objects, Methods, Constructors and Constructor Overloading, Importance of Static Keyword and Examples, this Keyword, Arrays, Command Line Arguments, Nested Classes.

UNIT-III: Inheritance and Exception Handling: Inheritance, super Keyword, final Keyword, Method Overriding and Abstract Class. Interfaces, Creating Packages, Using Packages, Importance of Class path. Exception Handling, Importance of try, catch, throw, throws and finally Block.

UNIT-IV: Multithreading and Files: Introduction, Thread Lifecycle, Creation of Threads, Thread Priorities, Thread Synchronization, Communication between Threads. Reading Data from Files and Writing Data to Files, Random Access Files.

UNIT-V: Applet Programming and AWT: Applet Class, Applet Lifecycle, Applet Programs. Introduction to AWT, Components and Containers, Button, Label, Checkbox, Radio Buttons, List Boxes, Layouts, Menu and Scrollbar.

UNIT-VI: Event Handling and Swings: Event Handling : Event Delegation Model, Sources of Events, Event Listeners, Adapter Classes, InnerClasses. Introduction to Swings.

Text Books:

1. Java Proramming, E.Balagurusamy, 4thEdition , TMH.
2. The complete Reference Java, 8thEdition, Herbert Schildt, TMH.
3. Introduction to java programming ,Y Daniel Liang, 7thEdition, Pearson.

Reference books:

1. Core Java: An Integrated Approach , R Nageswara Rao, 7th Edition, Dream Tech
2. Head First Java , Kathy Sierra and Bert Bates, 2nd Edition O’reilly

IV Sem	PYTHON PROGRAMMING	Course Code: **V18CST09**	L	T	P
			3	0	0

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO1: Illustrate basic concepts of Python Programming. **[K2]**
CO2: Describe control structures in python. **[K2]**
CO3: Demonstrate functions and packages. **[K3]**
CO4: Construct python programs using structured data types. **[K3]**
CO5: Compare TextFiles and Binary Files. **[K4]**
CO6: Apply OOPs concepts to Develop Test cases. **[K3]**

UNIT-I: Introduction to Python, Data Types & Operators: Basics of python programming: Features of python – History of Python - The Future of Python installation and execution - Data types – Identifiers - variables – type conversions- Literal Constants – Numbers – Strings. I/O statements. Operators and expressions, operator precedence – expression evaluation.

UNIT-II: Control Structures: Decision Control statements: conditional (if), alternative (if-else), chained conditional (if-elif-else);

Iteration: while loop, for loop, nested for loop, range function, break, continue and pass statements.

UNIT-III: Functions :Functions & modules : Introduction - Function Declaration &Definition - Function Call – Variable Scope and Lifetime - The return statement- More on Defining Functions - Lambda Functions or Anonymous Functions - Documentation Strings- Modules – Packages.

UNIT-IV: Structured Data Types: Lists: list operations, list slices, list methods, cloning lists, list parameters. **Tuples**: tuple assignment, tuple as return value. **Set:** Set Creation, Set Operations. **Dictionaries**: Creation, operations; comprehension, operations on strings.

UNIT-V: Files & Exception Handling: Introduction - Types of files - Text files - reading and writing files; Errors and exceptions handling.

UNIT-VI: OOPS concepts and Testing Basics: Classes, Methods, Constructor, Inheritance, Overriding Methods, Data hiding, GUI programming with TKINTER.

Text Books:

1. "Python Programming using problem solving Approach" ReemaThareja, Oxford University Press – 2017.
2. Python with Machine Learning by A.Krishna Mohan, Karunakar & T.Murali Mohan by S. Chand Publisher-2018.

Reference Books:

1. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2nd edition, Updated for Python 3, Shroff /O'Reilly Publishers, 2016 .

2. Guido van Rossum and Fred L. Drake Jr, ―An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.
3. John V Guttag, ―Introduction to Computation and Programming Using Python", Revised and expanded Edition, MIT Press , 2013
4. Robert Sedgewick, Kevin Wayne, Robert Dondero, ―Introduction to Programming in Python:

IV Sem	Managerial Economics and Financial Analysis	Course Code: V18MBET51	L	T	P
			3	0	0

Syllabus Details

Course Outcomes: After successful completion of the Course, the student will be able to:

CO1: Understand the basic concepts of managerial economics, demand, and elasticity of demand and methods of demand forecasting. **[K2]**

CO2: Estimate the production function with one, two and infinite variables. Understanding various cost concepts and calculating breakeven point **[K2]**

CO3: Understand and showing a price output determination in different types of market structures and knowing various pricing methods **[K2]**

CO4: Understanding various forms of business organizations **[K2].**
CO5: Prepare the financial statements and its analysis **[K3].**

CO6: Appraise the projects by using various capital budgeting methods **[K4].**

UNIT-I: Introduction to Managerial Economics and demand Analysis: Definition of Managerial Economics –Scope of Managerial Economics and its relationship with other subjects – Concept of Demand, Types of Demand, Determinants of Demand- Demand schedule, Demand curve, Law of Demand and its limitations- Elasticity of Demand, Types of Elasticity of Demand and Measurement- Demand forecasting and Methods of forecasting..

UNIT–II: Production and Cost Analyses: Concept of Production function- Cobb-Douglas Production function- Law of Variable proportions-Isoquants and Isocosts and choice of least cost factor combination-Concepts of Returns to scale and Economies of scale- Different cost concepts: opportunity costs, explicit and implicit costs- Fixed costs, Variable Costs and Total cost –Cost–Volume-Profit analysis- Determination of Breakeven point(simple problems)Managerial significance and limitations of Breakeven point.

UNIT–III: Introduction to Markets, & Pricing Policies: Market Structures: Perfect Competition, Monopoly, Monopolistic competition and Oligopoly – Features – Price and Output Determination – Methods of Pricing: Average cost pricing, Limit Pricing, Market Skimming Pricing, Internet Pricing, Flat Rate Pricing, Usage sensitive pricing and Priority Pricing.

UNIT–IV: Types of Business Organization and Business Cycles:

Features and Evaluation of Sole Trader, Partnership, Joint Stock Company

– State/Public Enterprises and their forms – Business Cycles : Meaning and Features – Phases of Business Cycle.

UNIT–V: Introduction to Accounting & Financing Analysis: Introduction to Double Entry Systems – Preparation of Financial Statements-Analysis and Interpretation of Financial Statements-Ratio Analysis

UNIT–VI: Capital and Capital Budgeting: Capital Budgeting: Meaning of Capital-Capitalization-Meaning of Capital Budgeting-Time value of money- Methods of appraising Project profitability: Traditional Methods and modern methods (simple problems)

TEXT BOOKS

Dr. N. AppaRao, Dr. P. Vijay Kumar: 'Managerial Economics and Financial Analysis', Cengage Publications, New Delhi – 2011

Dr. A. R. Aryasri – Managerial Economics and Financial Analysis, TMH 2011

Prof. J.V.Prabhakararao, Prof. P. Venkatarao. 'Managerial Economics and Financial Analysis', Ravindra Publication.

REFERENCES:

1. *ShailajaGajjala and UshaMunipalle, Univerties press, 2012.*
2. Dr. B. Kuberudu and Dr. T. V. Ramana: Managerial Economics & Financial Analysis, Himalaya Publishing House, 2014.
3. V. Maheswari: Managerial Economics, Sultan Chand.2014
4. Suma Damodaran: Managerial Economics, Oxford 2011.
5. VanithaAgarwal: Managerial Economics, Pearson Publications 2011.
6. Sanjay Dhameja: Financial Accounting for Managers, Pearson
7. Maheswari: Financial Accounting, Vikas Publications.
8. S. A. Siddiqui& A. S. Siddiqui: Managerial Economics and Financial Analysis, New Age International Publishers, 2012
9. Ramesh Singh, Indian Economy, 7th Edn., TMH2015
10. PankajTandonA Text Book of Microeconomic Theory, Sage Publishers, 2015

IV Sem	JAVA PROGRAMMING LAB	Course Code: **V18CSL04**	L	T	P
			0	0	3

COURSE OUTCOMES:
After successful completion of the course, the student will be able to:

CO1: Develop Programs to handle on Classes and Objects **[K3]**
CO2: Demonstrate Constructors and Arrays. **[K3]**
CO3: Demonstrate Inheritance and Exception Handling. **[K3]**
CO4: Implement programs on Multi-Threading. **[K3]**
CO5: Illustrate File Handling Mechanisms. **[K3]**
CO6: Demonstrate GUI Programming using Applets and Swings. **[K3]**

List of Experiment

1. Programs illustrating Control Structures and Type Conversions in java.
2. Programs illustrating the use of following concepts:
   a) Classes & Objects b) Usage of static c) Constructors
3. Programs illustrating the use of following concepts.
   a) Arrays b) Nested Classes c) Command Line Arguments
4. Programs illustrating the use of following concepts.
   a) Inheritance b) Usage of super c)Method Overriding
5. Programs to illustrate the Overloading of various operators.
   a) Usage of final b) Abstract class c) Interfaces
6. Programs illustrating the various concepts like.
   a) Packages b) Exception Handling
7. Programs illustrating how Multi-Threading implemented.
   a) Multiple Threads on Single Object b) Thread Deadlock
8. Programs illustrating Thread Communication.
9. Programs illustrating reading from and writing to files.
   a) Sequential Files b) Random Access Files
10. Programs illustrating GUI using Applets & AWT Components.
11. Programs to illustrate Event Handling using Listener Interfaces.
12. Programs illustrating GUI using Swings.

Text books:

1. The complete Reference Java, 8^{th} Edition, Herbert Schildt, TMH.
2. Introduction to java programming, Y Daniel Liang, 7^{th} Edition, Pearson.

IV Sem	PYTHON PROGRAMMING LAB	Course Code: **V18CSL05**	L	T	P
			0	0	3

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO1: Demonstrate Basic Python Programs **[K3]**
CO2: Construct control structures in python **[K3]**
CO3: Demonstrate functions and packages. **[K3]**
CO4: Construct python programs using structured data types. **[K3]**
CO5: Demonstrate Text Files and exception handling. **[K3]**
CO6: Test Rock – paper – Scissors game. **[K4]**

Exercise 1 - Basics

a) A sample Python Script using command prompt, Python Command Line andIDLE
b) A program to purposefully raise an Indentation Error and correct it

Exercise 2 - Operations

a) A program to compute distance between two points taking input from the user (Pythagorean Theorem)
b) A program on add.py that takes 2 numbers as command line arguments and prints its sum.

Exercise - 3 Control Flow

a) A Program to implement for checking whether the given number is a even number or not.
b) A program to construct reverse the digits of a given number and add it to the original, If the sum is not a palindrome repeat this procedure.
c) A program using a while loop that asks the user for a number, and prints a countdown from that number to zero.

Exercise 4 - Control Flow – Continued

a) A program to construct the following pattern, using a nested for loop.

```
*
* *
* * *
* * * *
* * * * *
* * * *
* * *
* *
*
```

b) By considering the terms in the Fibonacci sequence whose values do not exceed four million,find the sum of the even-valued terms.

Exercise - 5 – Problem Solving using Functions

a) Find mean, median, mode for the given set of numbers passed as arguments to a function
b) Develop a function nearly_equal to test whether two strings are nearly equal. Two strings a and b are nearly equal when a can be generated by a single mutation on b.
c) Develop a Recursive Function to find the Factorial of a given number.
d) Develop function to compute gcd, lcm of two numbers. Each function shouldn't exceed one line.

Exercise - 6 Structured Data types

a) a program to count the number of strings where the string length is 2 or more and the first and last character are same from a given list of strings.
b) a program to develop unzip a list of tuples into individual lists and convert them into dictionary.

Exercise – 7 Structured Data types Continued

a) A program to count the numbers of characters in the string and store them in a dictionary data structure
b) A program to use split and join methods in the string and trace a birthday with a dictionary data structure.

Exercise - 8– Modules

a) Install packages requests, flask and explore themusing (pip)
b) A program to implement a script that imports requests and fetch content from the page. Eg. (Wiki)
c) Develop a simple script that serves a simple HTTPResponse and a simple HTML Page

Exercise - 9 Files

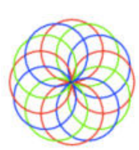
a) A program to count frequency of characters in a given file. Can you use character frequency to tell whether the given file is a Python program file, C program file or a text file?
b) A program to compute the number of characters, words and lines in a file.

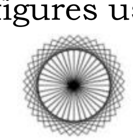
Exercise - 10 OOP

a) Class variables and instance variable and illustration of self variable
i) Robot
ii) ATM Machine

Exercise - 11 GUI, Graphics

1. Develop a GUI for an Expression
2. A program to implement the following figures using turtle





Case Study: Implement Rock – paper – Scissors game using TKINTER.

Text Books:

1. "Python Programming using problem solving Approach" ReemaThareja, Oxford University Press – 2017.

2. Python with Machine Learning by A.Krishna Mohan, Karunakar & T.Murali Mohan by S. Chand Publisher-2018.

IV Sem	**Constitution of India**	Course Code: **V18ENT11**	L	T	P
			2	0	0

Syllabus Details

1. **Course Outcomes: At the end of the Course student will be able to:**

CO1: Summarize the evolution and historical importance of Indian constitution from 1858 to 1947. [K2]

CO2: Explain various stages in the composition of Indian Constitution. [K2]

CO3: Develop awareness about their primary rights and duties & build up their civic sense. [K3]

CO4: Comprehend the distribution of powers between the center and states. (K4)

CO5: Summarize and sketch the specific roles of heads of Nation and the functioning of legislative bodies. (K2)

CO6: Explain the role of local self-government in strengthening democracy. (K1)

Constitution of India – Basic features and fundamental principles

The Constitution of India is the supreme law of India. Parliament of India cannot make any law which violates the Fundamental Rights enumerated under the Part III of the Constitution. The Parliament of India has been empowered to amend the Constitution under Article 368, however, it cannot use this power to change the "basic structure" of the constitution, which has been ruled and explained by the Supreme Court of India in its historical judgments. The Constitution of India reflects the idea of "Constitutionalism" – a modern and progressive concept historically developed by the thinkers of "liberalism" – an ideology which has been recognized as one of the most popular political ideology and result of historical struggles against arbitrary use of sovereign power by state. The historic revolutions in France, England, America and particularly European Renaissance and Reformation movement have resulted into progressive legal reforms in the form of "constitutionalism" in many countries. The Constitution of India was made by borrowing models and principles from many countries including United Kingdom and America.

The Constitution of India is not only a legal document but it also reflects social, political and economic perspectives of the Indian Society. It reflects India's legacy of "diversity". It has been said that Indian constitution reflects ideals of its freedom movement, however, few critics have argued that it does not truly incorporate ourown ancient legal heritage and cultural values. No law can be "static" and therefore the Constitution of India has also been amended more than one hundred times. These amendments reflect political, social and economic developments since the year 1950. The Indian judiciary and particularly the Supreme Court of India has played an historic role as the guardian of people. It has been protecting not only basic ideals of the Constitution but also strengthened the same through progressive interpretations of the text of the Constitution. The judicial activism of the Supreme Court of India and its historic contributions has been recognized throughout the world and it gradually made it "as one of the strongest court in the world".

Course content

1. Meaning of the constitution law and constitutionalism
2. Historical perspective of the Constitution of India
3. Salient features and characteristics of the Constitution ofIndia
4. Scheme of the fundamental rights
5. The scheme of the Fundamental Duties and its legalstatus
6. The Directive Principles of State Policy – Its importance andimplementation
7. Federal structure and distribution of legislative and financial powers between the Union and the States
8. Parliamentary Form of Government in India – The constitution powers and

status of the President of India

9. Amendment of the Constitutional Powers and Procedure

10. The historical perspectives of the constitutional amendments inIndia

11. Emergency Provisions : National Emergency, President Rule, Financial Emergency

12. Local Self Government – Constitutional Scheme in India

13. Scheme of the Fundamental Right to Equality

14. Scheme of the Fundamental Right to certain Freedom under Article19

15. Scope of the Right to Life and Personal Liberty under Article21

Unit-I: Historical Perspective of the Indian Constitution – A brief discussion of various Acts i.e from 1858 to 1947 passed by the British Government.

Unit–II: Constitution of India

a) Preparation of Indian constitution by Constituent Assembly of India.

b) Preamble or Philosophy of the Indian Constitution.

c) Salient features of the Indian constitution.

Unit-III:

a) Fundamental Rights - their importance& Limitations

b) Fundamental Duties and their importance

c) Directive principles of the state policy and their implementation

Unit-IV: Indian Federalism

a) Distribution of powers between Union and State Governments

b) Legislative, Executive and Financial relations between Union and State Governments

Unit-V: Parliamentary form of Government in India

1.Union Executive

a) President of India- Powers and functions

b) Vice-President - Powers and functions

c) Prime Minister and Council of Minister - Powers and functions

2. Union Legislature

a) RajyaSabha – Powers and Functions

b) LokSabha- Powers and Functions

c) Amending Procedure- Important Constitutional Amendments – 42nd, 44 Constitutional Amendment Acts.

3. **Judiciary** – Supreme court of India - Powers and Functions

Unit-VI: Local Self–government in India 73rd & 74th Constitutional Amendments Acts

Reference Books:

1. D DBasu-Introduction to the constitution of India – 18th Edition. Prentice – Hall of India Private Ltd-New Delhi-1998

2. Granville Austin (1972) the Indian Constitution, Cornerstone of a Nation Oxford university Press, New Delhi

3. Madhavkhosla (2012) the Indian Constitution, oxford university press, New Delhi

4.Granville Austin (1999) Working a Democratic Constitution; A History of the Indian Experience, Oxford University Press, New Delhi

5.ZoyaHasan, Sridharan E and Sudharshan R (Eds) 2002 India's living Constitution, Permanent black, New Delhi

6.BaxiUpendra (1980) the Indian Supreme Court and Politics Eastern book co, Lucknow

			L	T	P
IV Sem	**Professional Communication Skills - II**	Course Code: V18ENT04	3	0	0

Syllabus Details

1. Course Outcomes: At the end of the Course student will be able to:

CO1: Correlate individual words into one whole sentence using new vocabulary and focus on the error analysis of prepositions and conjunctions. ***[K4]***

CO2: Distinguish and acquire knowledge of using words of same category in a sentence and learn new words that promote communicative finesse. **[K5]**

CO3: Find errors in sentences where the modifiers are misplaced and put them at the appropriate place, use hit pair words and send an email that is concise and lucid **[K5]**

CO4: Interpret the importance of Attire and Etiquette in societal context and manage their time. [**K2]**

CO5: Discover the team working abilities among themselves and display their leadership qualities. **[K3]**

CO6: Identify various elements of emotional balance that have positive impact on work-life-balance. **[K2]**

2. Syllabus

UNIT – I

ERROR ANALYSIS: Prepositions - kinds of prepositions –appropriate use - conjunctions –sub- ordinating– co-ordinating.

VOCABULARY: Etymology **–** roots – suffixes – prefixesand one word substitutes.

SENTENCE IMPROVEMENT: Better choice – error-free sentences – effective – syntax.

UNIT – II

ERROR ANALYSIS: Parallel grammatical forms – same grammatical structures.

VOCABULARY: Words that describe personalities – faiths – professions – medical specialists and Word Clusters.

EXPANSION OF PROVERBS: Meaning – interpretation – explanation.

UNIT – III

ERROR ANALYSIS: Dangling modifiers – misplacement of modifiers – arrangement.

VOCABULARY: Antonyms and Synonymsand Foreign expressions.

EMAIL WRITING: Format – method of exchanging – technicalities.

UNIT- IV

ATTIRE & ETIQUETTE: Formal – informal- professional – social Attires, Meaning of Etiquette, Need for etiquette, Types of Etiquette.

TIME - MANAGEMENT: Value of time – Setting priorities – effective use of time – ABCD analysis, Pareto Principle, Eisenhower Method.

UNIT -V

TEAM WORK – Benefits of working with a team – Team Dynamics . LEADERSHIP QUALITIES: Leadership Styles, Characteristics of a Good Leader, Big 5 Personality traits, Myths about leadership qualities.

UNIT -VI

EMOTIONAL INTELLIGENCE: What is EI – Daniel Goleman model of EI, Qualities of an Emotionally Intelligent Person - Emotional balance – feelings – thoughts – motivation.

WORK – LIFE - BALANCE: Personal life – professional life – cause of work-life imbalances, consequences of work-life imbalance, Role of gender and family – improving work life balance.

3.Reference:

1. Essential English Grammar - Raymond Murphy
2. Advanced English Grammar – D.S. Paul
3. Word Power Made Easy – Norman Lewis
4. English collocations in use - Michael McCarthy
5. Word Power Made Handy - ShaliniVarma
6. Barron's GRE - Barron's
7. Current English Grammar & Usage – R.P Sinha
8. Think & Grow Rich - Napoleaon Hill
9. Soft Skills for Everyone - Butterfield, Jeff,
10. Soft Skills - Chauhan, G.S. and

Sangeeta Sharma

11. Theories of Personality - Hall, Calvin S

12. Corporate Conversations - Holtz, Shel

13. . Communication Skills - Kumar, Sanajy and PushpLata

14. Winning at Interviews - Thorpe, Edgar and Showick Thorpe

15. Swami Vivekananda and "Personality Development" published by RK Math.

IV Sem	**Technical Skills-II**	Course Code: **V18CST61**	L	T	P
			0	0	4

Syllabus Details

Module-II: Problem Solving using C-II

1. Course Outcomes: After successful completion of the course, the student will be able to:

CO1 : Develop programs using Pointers. **[K3]**

CO2 : Develop problems using functions. **[K3]**

CO3 : Solve problems using recursions. **[K3]**

CO4 : Construct programs using File Handling. **[K3].**

CO5 : Develop programs using Structures and Unions **[K3].**

CO6 : Make use of command line arguments and preprocessors to solve the given problems(K3)

Syllabus

1. Pointers
2. **Functions and Pointers**
3. **Recursion**
4. **File Handling**
5. **Structures and Union**
6. **Enum, Preprocessors, Command Line Arguments**

Text Books:

1. Let us C: Yesvanth Kanetkar, BPB Publications, 16th Edition
2. Working With C, Yashavant P. Kanetkar, BPB Publications
3. Test Your C Skills, Yashavant P. Kanetkar, BPB Publications
4. Understanding Pointers in C, Yashavant P. Kanetkar, BPB Publications.

Appendix-CSE-05

II Sem	**Deep Learning**	Course Code: V18CTT19	L	T	P
			3	0	0

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO1: Explain the concept of Neural Networks [**K2]**

CO2: Explain about Feed forward Networks [**K2]**

CO3: Explain the fundamentals of Deep Neural Networks [**K2]**

CO4: Explain about Recurrent Neural Networks [**K2]**

CO5: Explain Convolution Neural Networks [**K2]**

Unit I-Basics: Biological Neuron, Idea of computational units, McCulloch–Pitts unit and Thresholding logic, Linear Perceptron, Perceptron Learning Algorithm, Linear separability. Convergence theorem for Perceptron Learning Algorithm.

Unit-II Feed for ward Networks: Multilayer Perceptron, Gradient Descent, Back propagation, Empirical Risk Minimization, regularization, auto encoders.

Unit-III Deep Neural Networks: Difficulty of training deep neural networks, Greedy layer wise training. **Better Training of Neural Networks:** Newer optimization methods for neural networks : Ad grad, ad a delta, rms prop, adam, NAG.

Unit-IV Recurrent Neural Networks: Back propagation through time, Long Short Term Memory, Gated Recurrent Units, Bidirectional LSTMs, Bidirectional RNNs

Unit-V Convolution Neural Networks: LeNet, AlexNet. **Generative models:** Restrictive Boltzmann Machines (RBMs),

Textbooks

1. Deep Learning, Ian Goodfellow and YoshuaBengio and Aaron Courville, MIT Press, 2016. Available online at https://www.deeplearningbook.org/

References:

1. Neural Networks: A Systematic Introduction, Raúl Rojas, 1996
2. Pattern Recognition and Machine Learning, Christopher Bishop, 2007

COURSE STRUCTURE OF FIRST YEAR B.TECH (CST)
(For 2019 – 2020 Admitted Batch)

I SEMESTER

S.No	Course Code		Course Name	L	T	P	C
1	V18ENT01		English – I	2	-	-	MNC
2	V18MAT01	BSC	Engineering Mathematics – I	3	1	-	4
3	V18PHT02	BSC	Semiconductor Physics And Opto-Electronic Devices	3	1	-	4
4	V18EET01	ESC	Basic Electrical and Electronics Engineering	3	1	-	4
5	V18CHT02		Environmental Studies	3	-	-	MNC
6	V18ENL01		English Communication Skills Lab – I	-	-	2	MNC
7	V18MEL01	ESC	Engineering& IT Workshop	-	-	3	1.5
8	V18EEL01	ESC	Basic Electrical and Electronics Engineering Lab	-	-	3	1.5
9	V18PHL02	BSC	Semiconductor Physics And Opto-Electronic Devices Lab	-	-	3	1.5
Total				14	3	11	16.5

Total Contact Hours: 28

II SEMESTER

S. No	Course Code		Course Name	L	T	P	C
1	V18ENT02	HSS	English – II	2	-	-	2
2	V18MAT02	BSC	Engineering Mathematics – II	3	1	-	4
3	V18CHT01	BSC	Engineering Chemistry	3	1	-	4
4	V18CST01	ESC	Programming in ‘C’ for problem Solving	3	-	-	3
5	V18MET01	ESC	Engineering Graphics	1	-	3	2.5
6	V18ENL02	HSS	English Communication Skills Lab – II	-	-	2	1
7	V18CSL01	ESC	Programming Lab in ‘C’ for problem Solving	-	-	3	1.5
8	V18CHL01	BSC	Engineering Chemistry Lab	-	-	3	1.5
Total				12	2	11	19.5

Total Contact Hours: 25

Annexure-IX

Minutes of the meeting, BOS of Mechanical Engineering (Held on 21.04.2019)

Item No.1: Chairman welcomed all the BOS members and introduced to all the BOS-internal members.

Item No.2: Suggest modifications for the existing course structure.

- Course named Computer aided Engineering Drawing Practice (CAEDP) (course code. V18MEL04) is removed.
- Condition monitoring & Machine Learning (course code.V18MET44) and Entrepreneurship (Course code.V18MET45) are included under the group of Open Elective –III in VII semester.
- Few courses suggested during previous meeting are rearranged as mentioned follows:

S.No.	Code	Name of the Course	Planned	Revised plan
1	V18MET06	Theory of Machines-1	III Sem	IV Sem
2	V18MET09	Materials Engineering	IV Sem	III Sem
3	V18MET10	Metrology	IV Sem	VI Sem
4	V18MEL06	Metrology &Instrumentation & Control Systems lab	IV Sem	VI Sem
5	V18MET14	Manufacturing Processes	V Sem	IV Sem
6	V18MEL09	Heat Transfer lab	V Sem	VI Sem
7	V18MET17	Metal Cutting & Machine Tools	VI Sem	V Sem
8	V18MEL10	Thermal Engineering lab	VI Sem	V Sem
9	V18MEL11	Manufacturing Processes lab	VI Sem	IV Sem

- The revised course structure offered is attached in **Appendix-ME-01**.
- The courses Employability skills-I (course code.V18ENT03) & Employability skills - II (course code.V18ENT04) offered by BOS of English have been renamed as Professional Communication Skills-I (course code.V18ENT03) & Professional Communication Skills – II (course code.V18ENT04) in III and IV semesters respectively.
- The course code of Constitution of India V18ENT07 offered by BOS of English has been changed to V18ENT11 in IV semester.
- The approved courses syllabi for Professional Communication Skills – I (course code.V18ENT03) & Professional Communication Skills – II (course code.V18ENT04) is attached in **Appendix-ME-02**.

Item No. 2: Propose syllabi for the courses offered in III and IV semesters of B.Tech programme of Academic Year 2019-20.

- The approved syllabi for the courses is attached in **Appendix-ME-03**

Item No. 3: Review of the syllabi approved for the Academic Year 2018-19, I & II semester for B.Tech & M.Tech programme.

- No changes were suggested.

Appendix-ME-01

COURSE STRUCTURE OF FIRST YEAR B.TECH (ME)

III Semester						
S.No.	**Course Code**	**Course**	**L**	**T**	**P**	**Credits**
1	**V18MAT04**	Probability & Statistics	3	1	0	4
2	**V18MET03**	Engineering Mechanics	3	1	0	4
3	**V18MET04**	Thermodynamics	3	1	0	4
4	**V18MET05**	Fluid Mechanics & Fluid Machines	3	0	0	3
5	**V18MET09**	Materials Engineering	3	0	0	3
6	**V18MEL02**	Machine Drawing	0	0	3	1.5
7	**V18MEL03**	Fluid Mechanics & Fluid Machines Lab	0	0	3	1.5
8	**V18ENT03**	Professional Communication Skills-I	3	0	0	MNC
			18	**3**	**6**	**21**

Contact hours: 27

IV Semester						
S.No.	**Course Code**	**Course**	**L**	**T**	**P**	**Credits**
1	**V18MET07**	Applied Thermodynamics	3	0	0	3
2	**V18MET08**	Mechanics of Solids	3	1	0	4
3	**V18MET06**	Theory of Machines - I	3	0	0	3
4	**V18MET14**	Manufacturing Processes	3	0	0	3
5	**V18MET11**	Instrumentation & Control Systems	3	0	0	3
6	**V18MEL05**	Mechanics of Solids & Materials Engineering Lab	0	0	3	1.5
7	**V18MEL11**	Manufacturing Process Lab	0	0	3	1.5
8	**V18ENT11**	Constitution of India	2	0	0	MNC
9	**V18ENT04**	Professional Communication Skills-II	3	0	0	MNC
			20	**1**	**6**	**19**

Contact hours: 27

Professional Communication Skills - I

B.Tech III Semester

(Common to all Branches)

S.No	Course Code	Course Name	L	T	P	C
1	**V18ENT03**	**Professional Communication Skills - I**	3	-	-	MNC

Professional Communication Skills – II

B.Tech IV Semester

(Common to all Branches)

S.No	Course Code	Course Name	L	T	P	C
1	**V18ENT04**	**Professional Communication Skills - II**	3	-	-	MNC

Constitution of India

Year/Sem	ECE (III Sem) , CSE & ME (IV Sem)	**L**	**T**	**P**	**C**	**Course Code**
Regulation Year	2019-2020	2	-	-	MNC*	**V18ENT11**
Name of the Course	**Constitution of India**					
Branches	ECE, CSE & ME					

Syllabus for the Regulation Year 2019-2020 (Common to all Branches)

Professional Communication Skills - I

B.Tech III Semester

S.No	Course Code	Course Name	L	T	P	C
1	V18ENT03	**Professional Communication Skills - I**	3	-	-	MNC

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO1: Summarize one's introduction in an appropriate manner, exhibit grammatical competence through correction of sentences, analyze noun and pronoun dispositions and develop pre-reading strategies to improve comprehension skills.[K5]

CO2: Distinguish singular and plural in different contexts and display knowledge through accurate usage of sentences, build conversations which befit the situations, comprehendthe passages well and, use different kinds of idioms. [K4]

CO3: Classify various kinds of adjectives and adverbs, learn natural occurrence of paired words of native speakers, infer the referential and inferential aspects of the passages and make use of idioms while narrating personal experiences. [K4]

CO4: Judge and assess the behaviour of people in day to day life using kinesics and proxemics that disclose their disposition and be aware of their personal traits that promote good relations. (K2)

CO5: Articulate their goals and have a constructive plan of executing them properly and become adept in oral presentations as well as poster presentations that enhance their professional skills. (K3)

CO6: Evaluate various happenings by thinking out of the box and display their latent talent. They can also reduce the stress levels by applying various stress management techniques. (K4)

UNIT – I

SELF-INTRODUCTION: Basic information- Academic and personal - interests– strengths and weaknesses – goal.

ERROR ANALYSIS: Nouns & Pronouns – Singular & Plural – Kinds of Nouns & Pronouns- Collective Nouns - Personal and Reflexive Pronouns.

READING COMPREHENSION: Reading as a skill – quick reading - analyzing – answering **IDIOMS& PHRASES**: Colloquial expressions– formal and informal expressions.

UNIT – II

ERROR ANALYSIS: Concord – Subject – Verb agreement.

ROLE PLAY: Day to day situations - practical approach – real life experiences.

READING COMPREHENSION: Skimming – scanning - summarizing – problem solving.

IDIOMS & PHRASES: Enriching written and spoken English – use and usage.

UNIT – III

ERROR ANALYSIS: Adjectives – Adverbs – role of modifiers – place of Adjectives– Adverbs of frequency.

COLLOCATIONS: Natural combination of words – closely affiliated with each other.

READING COMPREHENSION: At a glance – close reading – understanding – answering

IDIOMS & PHRASES: Communicative - expressive – competent.

UNIT -IV

INTER AND INTRA PERSONAL SKILLS: Leading, Coaching, Interviewing, Managing, Persuading - Self awareness, Self confidence, Good Attitude.

BODY LANGUAGE: Basics of proxemics and kinesics.

UNIT -V

PRESENTATION SKILLS: Importance of Presentation skills, Structuring our presentations, Ways to improve our presentation skills, Tips for effective presentations.– oral – Power point – poster.

GOAL SETTING: Short-term – long-term – aim – target – vision – How to set SMART goals.

UNIT - VI

LATERAL THINKING: What is creativity, Fundamental approaches to smart thinking, Characteristics of a creative person, Convergent and Divergent thinking.

STRESS MANAGEMENT: Meaning of Stress, Types of Stress, Symptoms of stress, Short term and long term stress, how can people manage stress.

References:

1. Essential English Grammar : Raymond Murphy
2. Advanced English Grammar : D.S. Paul
3. Word Power Made Easy : Norman Lewis
4. English collocations in use : Michael McCarthy
5. Word Power Made Handy : ShaliniVarma
6. Barron’s GRE : Barron’s
7. Current English Grammar & Usage : R.P Sinha
8. Think & Grow Rich : NapoleaonHill
9. Soft Skills for Everyone : Butterfield, Jeff,
10. Soft Skills : Chauhan,G.S.&Sangeeta Sharma
11. Theories of Personality : Hall, Calvin S
12. Corporate Conversations : Holtz, Shel
13. Communication Skills : Kumar, Sanajy and PushpLata
14. Winning at Interviews : Thorpe, Edgar and Showick Thorpe
15. Swami Vivekananda and “Personality Development” published by RK Math.

S.No	Course Code	Course Name	L	T	P	C
1	V18ENT04	**Professional Communication Skills - II**	3	-	-	MNC

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO1: Correlate individual words into one whole sentence using new vocabulary and focus on the error analysis of prepositions and conjunctions. **[K4]**

CO2: Distinguish and acquire knowledge of using words of same category in a sentence and learn new words that promote communicative finesse.**[K5]**

CO3: Find errors in sentences where the modifiers are misplaced and put them at the appropriate place, use hit pair words and send an email that is concise and lucid **[K5]**

CO 4: Interpret the importance of Attire and Etiquette in societal context and manage their time. [**K2]**

CO5: Discover the team working abilities among themselves and display their leadership qualities. **[K3]**

CO6: Identify various elements of emotional balance that have positive impact on work-life-balance. **[K2]**

UNIT – I

ERROR ANALYSIS: Prepositions - kinds of prepositions –appropriate use - conjunctions –sub- ordinating– co-ordinating.

VOCABULARY: Etymology **–** roots – suffixes – prefixesand one word substitutes.

SENTENCE IMPROVEMENT: Better choice – error-free sentences – effective – syntax**.**

UNIT – II

ERROR ANALYSIS: Parallel grammatical forms – same grammatical structures.

VOCABULARY: Words that describe personalities – faiths – professions – medical specialistsand Word Clusters.

EXPANSION OF PROVERBS: Meaning – interpretation – explanation**.**

UNIT – III

ERROR ANALYSIS: Dangling modifiers – misplacement of modifiers – arrangement.

VOCABULARY: Antonyms and Synonymsand Foreign expressions.

EMAIL WRITING: Format – method of exchanging – technicalities.

UNIT- IV

ATTIRE & ETIQUETTE: Formal – informal- professional – social Attires, Meaning of Etiquette, Need for etiquette, Types of Etiquette.

TIME - MANAGEMENT: Value of time – Setting priorities – effective use of time – ABCD analysis, Pareto Principle, Eisenhower Method.

UNIT -V

TEAM WORK – Benefits of working with a team – Team Dynamics **.**

LEADERSHIP QUALITIES: Leadership Styles, Characteristics of a Good Leader, Big 5 Personality traits, Myths about leadership qualities.

UNIT -VI

EMOTIONAL INTELLIGENCE: What is EI – Daniel Goleman model of EI, Qualities of an Emotionally Intelligent Person - Emotional balance – feelings – thoughts – motivation.

WORK – LIFE - BALANCE: Personal life – professional life – cause of work-life imbalances, consequences of work-life imbalance, Role of gender and family – improving work life balance

References:

1. Essential English Grammar : Raymond Murphy
2. Advanced English Grammar : D.S. Paul
3. Word Power Made Easy : Norman Lewis
4. English collocations in use : Michael McCarthy
5. Word Power Made Handy : ShaliniVarma
6. Barron's GRE : Barron's
7. Current English Grammar & Usage : R.P Sinha
8. Think & Grow Rich : NapoleaonHill
9. Soft Skills for Everyone : Butterfield, Jeff,
10. Soft Skills : Chauhan,G.S.&Sangeeta Sharma
11. Theories of Personality : Hall, Calvin S
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13. Communication Skills : Kumar, Sanajy and PushpLata
14. Winning at Interviews : Thorpe, Edgar and Showick Thorpe
15. Swami Vivekananda and "Personality Development" published by RK Math.

Syllabus for the Regulation Year 2019-2020
Constitution of India
B.Tech ECE (III Sem), CSE & ME (IV Sem)

S.No	Course Code	Course Name	L	T	P	C
1	V18ENT11	**Constitution of India**	2	-	-	MNC

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO1: Summarize the evolution and historical importance of Indian constitution from 1858 to 1947. **[K2]**

CO2: Explain various stages in the composition of Indian Constitution. **[K2]**

CO3: Develop awareness about their primary rights and duties & build up their civic sense. **[K3]**

CO4: Comprehend the distribution of powers between the center and states. **[K4]**

CO5: Summarize and sketch the specific roles of heads of Nation and the functioning of legislative bodies. **[K2]**

CO6: Explain the role of local self-government in strengthening democracy. **[K1]**

Unit-I

Historical Perspective of the Indian Constitution – A brief discussion of various Acts i.e from 1858 to 1947 passed by the British Government.

Unit–II

Constitution of India

d) Preparation of Indian constitution by Constituent Assembly of India.
e) Preamble or Philosophy of the Indian Constitution.
f) Salient features of the Indian constitution.

Unit-III

d) Fundamental Rights - their importance& Limitations
e) Fundamental Duties and their importance
f) Directive principles of the state policy and their implementation

Unit-IV

Indian Federalism

c) Distribution of powers between Union and State Governments
d) Legislative, Executive and Financial relations between Union and State Governments

Unit-V

Parliamentary form of Government in India

1. **Union Executive**
   d) President of India- Powers and functions
   e) Vice-President - Powers and functions
   f) Prime Minister and Council of Minister - Powers and functions
2. **Union Legislature**
   e) Rajya Sabha – Powers and Functions
   f) Lok Sabha- Powers and Functions

g) Amending Procedure- Important Constitutional Amendments – 42nd, 44 Constitutional Amendment Acts.

3. Judiciary – Supreme court of India - Powers and Functions

Unit-VI

Local Self–government in India 73rd & 74th Constitutional Amendments Acts

Reference Books:

1. D D Basu-Introduction to the constitution of India – 18th Edition. Prentice – Hall of India Private Ltd-New Delhi-1998
2. Granville Austin (1972) the Indian Constitution, Cornerstone of a Nation Oxford university Press, New Delhi
3. Madhavkhosla (2012) the Indian Constitution, oxford university press, New Delhi
4. 4.Granville Austin (1999) Working a Democratic Constitution; A History of the Indian Experience, Oxford University Press, New Delhi
5. Zoya Hasan, Sridharan E and Sudharshan R (Eds) 2002 India's living Constitution, Permanent black, New Delhi
6. BaxiUpendra (1980) the Indian Supreme Court and Politics Eastern book co, Lucknow

V18MET04	THERMODYNAMICS	L	T	P	C
		3	1	0	4

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

		Knowledge Level
CO1	Describe the basic terms related to work and heat	K2
CO2	Explain first law of thermodynamics and internal energy.	K2
CO3	Apply the second law of thermodynamics to basic thermal systems.	K3
CO4	Explain the concept of entropy.	K2
CO5	Illustrate various thermodynamic cycles.	K2
CO6	Discuss about pure substance.	K2

UNIT – I

Thermodynamic System, boundary, Surrounding, control volume, Universe, Concept of Continuum, Thermodynamic Equilibrium, State, Property, Process, Cycle – Reversibility – Quasi – static Process, Irreversible Process, Causes of Irreversibility – Energy in State Work and Heat, Point and Path function. Zeroth law of thermodynamics.

UNIT – II

First law of thermodynamics: Joule's experiments-First law of thermodynamics-systems and steady flow systems- Specific heats at constant volume and pressure -Enthalpy- First law applied to flow systems- Systems undergoing a cycle and change of state- First law applied to steady flow processes-various non-flow processes-Properties of end states- Heat transfer and work transfer- Change in internal energy-throttling and free expansion.

UNIT – III

Second law of thermodynamics-Limitations of the First Law – Thermal Reservoir, Heat Engine, Heat pump, Parameters of performance, Second Law of Thermodynamics, Kelvin-Planck and Clausius Statements and their Equivalence / Corollaries, PMM of Second kind, Carnot's principle, Carnot cycle and its specialties, Clasius theorem Clausius Inequality.

UNIT – IV

Entropy, Principle of Entropy Increase, availability and irreversibility–Third Law of Thermodynamics

T-ds relations, Helmholtz and Gibbs functions, Gibbs relations, Maxwell relations

UNIT – V

Thermodynamic Cycles: Carnot vapor cycle, ideal Rankine cycle, Rankine reheat cycle, air-standard Otto cycle, air-standard Diesel cycle, air-standard Brayton cycle, vapor-compression refrigeration cycle.

UNIT – VI

Pure Substances: P-V-T- surfaces, T-S and h-s diagrams, Mollier Charts, Phase Transformations, Triple point at critical state properties during change of phase, Dryness Fraction.

Text Books:

1. Engineering Thermodynamics, PK Nag 5th Edn, TMH,2014
2. Thermodynamics. An engineering Approach with student resources DVD Y.A. Cengel & M.A. Boles, 7th Edn-McGrawHill,2014
3. Internal Combustion Engine –V Ganeshan.4th edition, TMH, 2016

References:

1. Engineering Thermodynamics by Y.V.C. Rao, 1st edition, Universities, 2005.
2. A text book of Engineering thermodynamics, R.K Rajput, 4th edition, Lakshmi Publishers,2010

V18MET05	FLUID MECHANICS AND FLUID MACHINES	L	T	P	C
		3	0	0	3

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

		Knowledge Level
CO1	Understand the basic concepts of fluid properties and to determine hydrodynamic forces on submerged bodies.	K3
CO2	Apply the flow field phenomena and the basic governing equations in solving fluid flow problems.	K3
CO3	Calculate the various losses occurring when the fluid flowing in closed conduit and measure the discharge by different apparatus.	K3
CO4	Understand the concept of boundary layer theory and to find out major and minor losses.	K3
CO5	Determine the forces in the operation of jets and turbines and to determine efficiencies of turbines.	K3
CO6	Interpret the operation of pumps and hydraulic systems and to find efficiencies of pumps.	K3

UNIT 1

Fluid Statics :Dimensions and units-Physical properties of fluids-Density, Specific gravity, Viscosity, Surface tension, Vapour pressure, Capillarity, Bulk modulus. Pressure types-Atmospheric, absolute, gauge and vacuum pressure. Measurement of pressure - Piezometer, different types of manometers.

UNIT 2

Fluid Kinematics: stream line, path line and steak line. Classification of flows-steady &un steady, uniform & non uniform, laminar & turbulent, rotational & irrotational flows-equation of continuity for one dimensional flow and three dimensional flow. Equation of continuity in differential form.

UNIT 3

Fluid Dynamics: Bernoulli's equation along a stream line, Momentum equation, application of momentum equation on pipe bend. Measurement of flow- Pitot tube, Venturimeter, Orifice meter, Turbine flow meter.

UNIT 4

Closed Conduit Flow: Reynolds experiments, Darcy-Weisbatch equation, Major and minor losses, Hydraulic gradient line, Total energy line, Pipes in series and parallel.

Boundary layer concepts: Definition, Development along a thin flat plate, Thicknesses (Momentum, Energy, Displacement-No derivations), separation, methods of controlling separation, stream lined and bluff bodies.

UNIT 5

Basics of turbomachinery: Determination of hydrodynamic force of jet on stationary and moving flat, inclined, curved vanes (jet striking at tip and centre), velocity diagrams, work done and efficiency, flow over radial vanes, series of vanes.

Turbines:

Classification of turbines, Pelton wheel, Francis turbine, Kaplan turbine- Working principles, working proportions, work done, efficiencies. Draft tube-types, functions and efficiency.

Unit and specific quantities, governing, Cavitation, Water hammer, Surge tank.

UNIT 6:

Pumps :

Centrifugal pumps: Classification, working, work done, heads, efficiencies, losses. Specific speed, pumps in series and parallel.

Reciprocating pumps: Classification, working, work done, slip, indicator diagrams, Effect of acceleration and friction on work done.

TEXT BOOKS:

1. Hydraulics And Fluid Mechanics Including Hydraulics Machines (In Si Units)– Modi & Seth,20th edition, Standard publishers, 2015.
2. Fluid mechanics and Hydraulic machines – R.K. Bansal,1st edition, Lakshmi Publications,2011

REFERENCES:

1. Fluid Mechanics And Fluid Power Engineering, D.S Kumar, 9th edition, , S.K Kataria publishers, 2016
2. Fluid Mechanics and Hydraulics by Jack.B. Evett –,3rd edition, TMH, 2004
3. Fluid Mechanics – Yunus A.Cengel & John.M.Cimbala,2nd edition, TMH publications, 2013

V18MET09	MATERIALS ENGINEERING	L	T	P	C
		3	0	0	3

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

		Knowledge Level
CO1	Explain the types of bonds in solids and crystallization of metals.	K2
CO2	Construct phase diagrams for the study of alloys and phase transformation reactions.	K2
CO3	Distinguish Cast Irons and Steels.	K2
CO4	Identify suitable heat treatment process to achieve desired properties of metals and alloys.	K2
CO5	Discriminate different non ferrous metals and their alloys	K2
CO6	Illustrate the properties and applications of composites and ceramic materials and understand the concepts of powder metallurgy.	K2

Unit 1

Structure of Metals: Properties of metals, Types of Bonds in Solids, Crystal geometry - Space Lattices, Unit cells, Crystal Structure, Miller indices. Imperfections in crystals- Line defects, Point defects, Surface defects. Crystallization of metals, grain, grain boundaries and their properties.

Constitution of alloys: Necessity of alloying, types of solid solutions, Hume Rotherys rules.

Unit 2

Equilibrium Diagrams: Experimental methods of construction of equilibrium diagrams, phase rule, Isomorphous alloy systems, Lever rule, eutectic systems, peritectic reaction. Transformations in the solid state – allotropy, eutectoid, peritectoid reactions, relationship between equilibrium diagrams and properties of alloys. Study of important binary phase diagrams of Cu-Ni, Al-si, and Fe-Fe3C.

Unit 3

Production of Iron & Steels: Working principle of Blast Furnace, Cupola furnace, Open hearth furnace , Electric arc furnace and Induction furnace.

Cast irons and alloy steels: Types of Cast irons- White, Grey, Malleable and Nodular Cast Irons, Properties and application of cast irons, Effect of alloying elements on structure and properties of steels , Properties and uses of Silicon and Hadfield Manganese steels, High speed steels and Stainless steel.

Unit 4

Heat treatment of Ferrous and Non Ferrous alloys: Types of heat treatment processes, Annealing, normalizing, hardening, TTT diagrams, tempering, hardenability, surface - hardening methods, Age hardening treatment.

Unit 5

Non-ferrous metals and alloys: Properties and uses of important non-ferrous metals like Cu, Al, Pb, Sn, Zn. Study of important non-ferrous alloys: Brass & Bronzes, Bearing alloys, Al alloys & Ti alloys.

Unit 6

Composite materials and Ceramics: Classification of composites, methods of manufacturing of composites – stir casting method, hand layup process, filament winding process.

Properties and applications of crystalline ceramics, glasses, cermets, abrasive materials and nano-materials

Powder metallurgy: Introduction, steps in powder metallurgy.

TEXT BOOKS:

1. Introduction to Physical Metallurgy/ Sidney H. Avner/ 2nd edition ,McGraw Hill Education (India) Private Limited/2016
2. Materials Science and Engineering/ William D Callister (Adapted by R. Balasubramaniam) /Wiley Inida (P) Ltd/ 2007
3. Material Science and Metallurgy/ Dr. V.D.Kodgire/40th edition, Everest Publishing House/2017

REFERENCE BOOKS

1. Materials Science and Engineering/ V. Raghavan /(5th Edition) Prentice-Hall of India Pvt. Ltd/2004.
2. Essential of Materials science and engineering /Donald R.Askeland/ 2nd edition Thomson/2014
3. Engineering mechanics of Composite Materials/Isaac M.Daniel, Ori Ishai/ 5th edition/Oxford Publications/2015.

V18MEL02	MACHINE DRAWING	L	T	P	C
		0	0	3	1.5

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

		Knowledge Level
CO1	Describe the drawing and develop ability to represent any matter/symbol with the help of picture in CAD.	K2
CO2	Develop primary knowledge on machine drawings and the representation of tolerance on dimensions.	K3
CO3	Show the hidden objects by sectional views of different machine parts and their geometry representation.	K3
CO4	Identify the different joining methods to assemble the machine parts .	K3
CO5	Develop skill to produce assembly drawings from detailed drawings of machines parts.	K3
CO6	Construct press tools and their assemblies in 3-D.	K3

PART-A

Sectional views : Orthographic projection of different types of composite bodies. Sectional views, Full sectional, half sectional views of simple machine parts, Screwed fastenings – nomenclature of threads, conventional representation of threads, Hexagonal and square headed bolts and nuts, Various types of machine screws and set screws, Foundation bolts.

Keys, Shaft couplings, Riveted joints, Bearings Sunk key, saddle key, feather key, sleeve coupling, flanged coupling, lap and but riveted joints and plummer block,Lock nuts, Cotter joints

PART-B

AutoCAD Mechanical Desktop, draw, modify, dimension tool bars, annotations, Layers,ISI conventions in drawing, representation of Materials, machine parts, welded joints, riveted joints, methods of indicating notes on drawings. Sketcher, part modeling, assembly, drafting commands in CATIA.

Assembly drawings in 2D using AUTOCAD: Stuffing box, steam engine connecting rod, Eccentric, single tool post, Lathe tail stock, machine vice, knuckle joint and Screw jack.

Assembly drawings in 3D Using CATIA: Foot step bearing, square tool post, piercing and blanking tool, V-bending tool and box jig.

TEXT BOOKS:

1. Machine drawing _ K.L. Narayana, P. Kannaiah& K.Venkata reddy, 1st edition, Radiant, 2016
2. Tool Engineering & Design _ G.R. Nagpal/Khanna publishers, 1st edition, Khanna Publishers,2009
3. Machine Drawing with Auto CAD- Pohit and Ghosh, 1st edition, Pearso, 2017

REFERENCES:

1. Machine Drawing by Nagpal,1st edition, khanna publishers, 2009
2. Machine drawing, Ajeet Singh, 2nd edition, TMH, 2016
3. Machine drawing with autocad, Pohit; Goutam, 1st edition, Pearson, 2017.

V18MEL03	FLUID MECHANICS AND FLUID MACHINES LAB	L	T	P	C
		0	0	3	1.5

COURSE OUTCOMES:
After successful completion of the course, the student will be able to:

		Knowledge Level
CO1	Employ the basic principles of Fluid mechanics to assess discharge with different devices and different losses in a pipe line.	K3
CO2	Calculate the performance parameters of Reciprocating and Centrifugal pumps.	K3
CO3	Calculate the performance parameters of different types of turbines.	K3

1. Determination of friction factor for the given pipe line.
2. Determination of loss of head due to sudden contraction.
3. Determination of force exerted by a jet on a vane.
4. Calibration of Venturimeter.
5. Calibration of Orificemeter.
6. Calibration of Turbine flow meter.
7. Determination of performance parameters of Reciprocating pump.
8. Determination of performance parameters of Single stage Centrifugal pump.
9. Determination of performance parameters of Multi stage Centrifugal pump.
10. Determination of performance parameters of Pelton wheel.
11. Determination of performance parameters of Francis Turbine.
12. Determination of performance parameters of Kaplan Turbine.

ADD ON EXPERIMENTS:

1. Determination of loss of head due to sudden expansion.
2. Verification of Bernoulli’s theorem.

REFERENCES:

1. Fluid Mechanics and Fluid Machines lab – College lab manual.
2. Hydraulics And Fluid Mechanics Including Hydraulics Machines (In Si Units) – Modi & Seth,20th edition, Standard publishers, 2015.

V18MET07	APPLIED THERMODYNAMICS	L	T	P	C
		3	0	0	3

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

		Knowledge Level
CO1	Illustrate the working of various IC engines.	K2
CO2	Classify the working of various steam boilers, mountings, accessories and draught systems.	K2
CO3	Demonstrate about steam nozzles	K2
CO4	Calculate the performance of steam turbines	K3
CO5	compute the performance of steam condensers	K3
CO6	Illustrate the performance parameters of gas turbines	K3

UNIT – I

I. C. ENGINES : Classification, Working principles, Valve and Port Timing Diagrams, Engine systems, Fuel, Carburettor, Fuel Injection System, Ignition, Cooling and Lubrication, principle of wankle engine.

UNIT – II

Steam boilers

Classification, working principles of L.P & H.P boilers with sketches & applications, mountings and accessories, working principles, boiler horse power, Process Steam, equivalent evaporation, efficiency and heat balance, draught, classification- natural and artificial draught.

UNIT – III

Steam Nozzles:

Type of nozzles- Applications - Flow through nozzles- Condition for maximum discharge- Nozzle Efficiency- Super saturated flow in nozzles, Wilson's line.

UNIT – IV

Steam Turbines: Classification, Applications, impulse turbine, mechanical details, velocity diagram, effect of friction, power developed, axial thrust, blade or diagram efficiency, condition for maximum efficiency, velocity compounding, pressure compounding and velocity & pressure Compounding, combined velocity diagram for a velocity compounded impulse turbine.

Reaction Turbine: Applications , Mechanical details, principle of operation, thermodynamic analysis of a stage, degree of reaction, velocity diagram, Parson's reaction turbine, condition for maximum efficiency.

UNIT – V

Steam Condensers:

Classification of condensers- Jet, Evaporative and surface condensers-Applications - Vacuum and its Measurement- Vacuum efficiency- Sources of air leakage in condensers- Condenser Efficiency- Daltons law of partial pressures- Determination of mass of cooling water.

UNIT – VI

Gas Turbines: Applications, Simple gas turbine plant, ideal cycle, essential components, parameters of performance, actual cycle, regeneration, inter cooling and reheating, closed and open cycles, merits and demerits.

Text Books:

1. Engineering Thermodynamics, PK Nag 4th Edn, TMH.
2. Thermodynamics. An engineering Approach with student resources/ DVD. Y.A. Cengel & M.A. Boles/ 8th Edn-McGrawHill/2016
3. Gas Turbines / V Ganesan/3rd edition, TMH/2016

References:

1. Thermal Engineering/ R.K.Rajput/4th edition/ Laxmi Publications/2010
2. Applied Thermodynamics-II / R. Yadav./6th edition, Central Publishing House/2016
3. Gas turbines and Propulsive Systems/1st edition, Dhanpat Rai/2014
4. Tables of the properties of steam and other vapours and temperature-Entropy table by Cecil H Peabody by Forgotten books
5. Steam tables by C.P Kodandaraman – New age International

V18MET08	MECHANICS OF SOLIDS	L	T	P	C
		3	1	0	4

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

		Knowledge Level
CO1	Explain concept of stress and strain of composite bars.	K2
CO2	Find the shear force and bending moment in a beams.	K3
CO3	Calculate flexural and shear stresses in a beam and understand applications of various springs.	K3
CO4	Estimate the principal stresses in structural members.	K3
CO5	Determine the torsional rigidity of shaft and buckling load capacity of columns.	K3
CO6	Estimate the hoop and longitudinal stress and strains in thin and thick cylinders.	K3

UNIT-I Simple stresses & Strains:

Definitions of stress and strain – types of stresses and strains – Elasticity – Hooke's law – Stress – Strain diagram for Mild steel – working stress- factor of safety- Lateral strain – Poisson's ratio and volumetric strain – Elastic Modulii and the relationship between elastic constants – Bars of varying section – composite bars – temperature stresses.

Strain Energy

Definition – Resilience – Strain Energy due to gradually applied; suddenly applied and impact loads – simple applications.

UNIT-II Shear Force & Bending Moment Diagrams:

Definition of beam – Types of beams – concept of SF and BM – SF &BM diagrams for cantilever, Simple support and overhanging beams subjected point loads, Uniform distributed load(UDL), Uniformly varying loads– point of contra flexure – Relationship between S.F, BM and rate of loading.

UNIT-III Flexural Stresses:

Theory of simple Bending – Assumptions–Derivation of Bending equation - Neutral axis – Determination of bending stresses – section modulus of rectangular, Circular sections (Solid and Hollow), I and T channel sections.

Mechanical Springs: Introduction , classification , Applications **,** Stresses and deflections of helical springs – extension -compression springs .

UNIT-IV Principal Stresses and Strains:

Introduction-stresses on an inclined section of a bar under axial loading- compound stresses-Normal and tangential stresses on an inclined plane for biaxial stresses-Two perpendicular normal stresses –representation of stress on Mohrs circle diagram, Introduction to theories of Failure.

UNIT-V

TORSION: Introduction**-** Derivation of torsion equation and its assumptions. Applications of the equation of the hollow and solid circular shafts, torsional rigidity. Combined torsion and bending of circular shafts.

COLUMNS: Buckling and Stability, Columns with Pinned ends, Columns with other support Conditions, Limitations of Euler's Formula, Rankine'sFormula.

UNIT-VI

THIN CYLINDERS: Thin seamless cylindrical shells – Derivation of formula for longitudinal and circumferential stresses – hoop, longitudinal and Volumetric strains – changes in dia, and volume of thin cylinders – Riveted boiler shells – Thin spherical shells.

THICK CYLINDERS: –lame's equation – cylinders subjected to inside & outside pressures –compound cylinders.

Text Books:

1. Solid Mechanics, by Popov/PHI publications 2nd edition /2017
2. Mechanics of Materials/Gere and Timoshenko,/ TMH 4th edition /2010
3. Strength of materials/ S.Ramamrutham/Dhanpat rai publishers 1st edition /2016

Reference Books:

1. Strength of materials/ R.K.Bansal/ Laxmi Publications 5th edition /2017
2. Introduction to Solid Mechanics / Irving H Shames/ 4th edition PEARSON /2014
3. Strength of materials /Young,D.H. Timoshenko, Stephen/CBS publishers /2002

V18MET06	THEORY OF MACHINES-I	L	T	P	C
		3	0	0	3

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

		Knowledge Level
CO1	Explain the inversion of the four bar, slider crank and double slider chains.	K2
CO2	Determine the velocities and accelerations in mechanisms by graphical method.	K3
CO3	Explain the working of copying mechanism, straight line motion mechanisms, steering gears and Hooke's joint.	K2
CO4	Draw the cam profiles for given follower motions.	K3
CO5	Compare tooth profiles for gears and compute performance characteristics.	K2
CO6	Describe gear trains and compute the velocity ratio and torque in gear trains and calculate various parameters related to belts.	K3

UNIT-I

Mechanisms :

Introduction, terminology, definitions and assumptions, planar, spherical and spatial mechanisms, mobility, classification of mechanisms, kinematic inversion, inversions of four bar chain, slider crank chain and double slider chain, Grashoff's law, mechanical advantage.

UNIT-II

Velocity Analysis :

Introduction, Absolute and relative motions, Vectors, Addition and subtraction of vectors, Motion of a link, Four-link mechanism, Velocity diagrams, Angular velocity of links, Velocity of rubbing, Slider-crank mechanism, crank and slotted lever mechanism. Instantaneous center, Kennedy's theorem, Locating I-centers, Angular velocity ratio theorem.

Acceleration Analysis:

Introduction -Acceleration, four-link mechanism, Acceleration of intermediate and offset points, Slider-crank mechanism, Coriolis component, Crank and slotted lever mechanism using graphical method, Klein's Construction.

UNIT-III

Lower Pairs: Pantograph, Exact straight line mechanism condition, Peaucellier, Hart Scott-

Russel mechanisms. Approximate straight line mechanisms, Grasshopper, Watt, Chebyshev, Robert mechanisms. Steering gears-condition for correct steering, Davis, Ackerman steering gears, Hooke's joint-velocity ratio, angular acceleration of driven shaft, double Hooke's joint.

UNIT-IV

Cams: Types of cams and followers, types of follower motion, velocity and acceleration diagrams, profile of cams.

UNIT-V

Gears: Classification of gears, spur gears- terminology, fundamental law of toothed gearing, involute and cycloidal profile, Path of contact ,arc of contact, contact ratio, minimum number of teeth, interference and methods of avoiding interference, rubbing velocity.

UNIT-VI

Gear Trains: Introduction – Types – Simple – compound and reverted gear trains – Epicyclic gear train.

Belt drives: Belt and rope drives, open and crossed belt drives, velocity ratio, slip, material for belts and ropes, crowning of pulleys, ratio of friction tensions, power transmitted, centrifugal effect on belts, maximum power transmitted by a belt, initial tension.

Text Books:

1. Theory of Machines' Rattan SS, Tata McGraw Hill Education Publishers, 4th Edition 2015.
2. Theory of Machines / Beven Thomos / CBS publication, 3rd edition /2005

References:

1. Theory of Machines / R.K.Bansal/ Laxmi Publications 5th edition /2016
2. Mechanisms of Machines, V Ramamurthy, Narosa publishing House, Reprint ,2019
3. Theory of Machines by R S KHURMI, S CHAND Publications, 1st Edition, 2011.
4. Theory of Machines and Mechanisms, Ballaney P, Khanna publications,1st Edition,2011.

V18MET14	MANUFACTURING PROCESSES	L	T	P	C
		3	0	0	3

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

		Knowledge Level
CO1	Understand fundamentals of casting-patterns and its materials, Gating System	K3
CO2	Choose the elements of casting and introduce other casting processes	K3
CO3	Distinguish various arc and solid state welding processes and select a suitable process based on the application and requirements	K3
CO4	Understand the principles of advanced welding processes and their applications, welding defects and its testing methods	K3
CO5	Establish the knowledge on Hot working and Cold Working Process	K3
CO6	Understanding of various bulk forming processes, sheet metal forming and processing of plastics.	K3

Unit I:

Casting - Steps involved in making a casting – Advantage of casting and its applications.

Patterns and Pattern making – Types of patterns – Materials used for patterns, pattern allowances and their construction

Principles of Gating_ Gating ratio and design of Gating systems

Unit II:

Melting and solidification:

Methods of melting -- Crucible melting and cupola operation, steel making processes.

Solidification of casting – Concept – Solidification of pure metal and alloys, short & long freezing range alloys.

Risers – Types function and design, casting design considerations,

Special casting processes -- 1) Centrifugal 2) Die 3) Investment.

Unit III:

Welding: Classification of welding process types of welds and welded joints and their characteristics, design of welded joints --Gas welding, ARC welding, Forge welding, resistance welding, Thermit welding and Plasma (Air and water) welding.

Unit IV:

Special welding processes

Inert Gas welding - TIG & MIG, welding, Friction welding, Induction welding, Explosive welding, Laser welding, Soldering & Brazing. Heat affected zones in welding; welding defects – causes and remedies – destructive non-destructive testing of welds.

Cutting of metals: Oxy – Acetylene Gas cutting, water plasma. Cutting of ferrous, non-ferrous metals.

Unit V:

Hot & cold working: strain hardening, recovery, recrystallization and grain growth, Comparison of properties of Cold and Hot worked parts

Rolling fundamentals – Theory of rolling, types of Rolling mills and products.

Extrusion of metals: Basic extrusion process and its characteristics. Hot extrusion and cold extrusion - Forward extrusion and backward extrusion – Impact extrusion Hydrostatic extrusion.

Drawing – Wire drawing and Tube drawing

Unit VI:

Bulk forming processes: Principles of forging – Tools and dies – Types Forging – Smith forging, Drop Forging – Roll forging – Forging hammers: Rotary forging – forging defects.

Sheet metal forming: Stretch Forming, Deep Drawing, Coining, Spinning, Blanking And Piercing – Bending And Forming, Stamping Spring Back And Remedies - Types Of Presses And Press Tools

Processing of plastics: Types of Plastics, Properties, applications and their Processing methods & Equipment (blow &injection moulding)

Text Books:

1. Manufacturing Engineering and Technology/ Kalpakjian, Serope;Steven, Schmid R./Pearson, 1st Edition 2013.
2. Manufacturing Technology / P.N. Rao/ Tata McGraw Hill, 4th Edition 2016.

References:

1. Production Technology / R.K. Jain /Khanna publishers,17th edition 2004.
2. Principles of Metal Castings / Richard W Heine and Roenthal. McGraw Hill Education, 2nd Edition 2017.
3. Welding Process and technology /Dr. Paramar / Khanna Publishers,3rd Edition.
4. Production Technology /Sarma P C / S.Chand Publications,4th Edition 2014.

V18MET11	INSTRUCTIONMENTATION AND CONTROL SYSTEMS	L	T	P	C
		3	0	0	3

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

		Knowledge Level
CO1	Discuss about the basic concepts of Linear measuring Instruments	K2
CO2	Explain various types of Temperature and Pressure measuring Instruments	K2
CO3	Understand the working of flow, Speed, Acceleration and Vibration measuring devices	K2
CO4	Illustrate various types of Strain measuring Instruments	K2
CO5	Explain the Humidity, Force, Torque, and Power measuring Instruments	K2
CO6	Describe various types of control system and its Elements	K2

UNIT – I

Basic principles of measurement – Generalized configuration, Dynamic performance characteristics – sources of error and elimination methods.

Displacement Measurement: Principle and construction of various transducers – piezo electric, inductive, capacitance, resistance, ionization and photo electric transducers, calibration procedures.

UNIT – II

Temperature Measurement : Thermometry , scales of temperature, electrical resistance – thermister – thermocouple – pyrometers.

Pressure Measurement : Working of Various instruments - dead weight pressure gauge , bourdon pressure gauges, bellows – diaphragm gauges.

Low pressure measurement – Thermal conductivity gauges – Ionization pressure gauges, Mcleod pressure gauge.

UNIT – III

Level Measurement : Working of Various instruments – Capacitative, Ultrasonic, Magnetic, Cryogenic fuel level indicators – bubler level indicators.

Flow Measurement- Rotameter, Magnetic, Ultrasonic, hot – wire anemometer, Laser Doppler Anemometer (LDA).

Speed Measurement : Types of Mechanical tachometers, electrical tachometers, stroboscope and noncontact type of tachometer

UNIT – IV

Acceleration And Vibration Measurement: Principles of seismic instruments – Vibrometer and Accelerometer

Strain Measurements: Various types of strain measuring instruments – electrical strain gauge – gauge factor – use of resistance strain gauge for measuring bending compressive and tensile strains , strain gauge rosettes.

UNIT – V

Introduction to Elements Of Control Systems : classification, Elements of control systems, concept of open loop and closed loop systems, Examples and application of open loop and closed loop systems, Feed-Back Characteristics.

UNIT – VI

Control Systems Components: Servomechanisms- Transfer Function of DC Servo motor and AC Servo motor,working principle of stepper motor, applications (position, temperature and speed control systems with block diagrams).

Microprocessor and Microcontrollers : Introcution,basic concepts and various types controllers

Text Books:

1. Measurement Systems: Applications & design / D.S Kumar/ Metropolitan/1st/2015
2. Mechanical Measurements / BeckWith, Marangoni,Linehard/ Pearson/6th/2018

References:

1. Measurement systems: Application and design/Doeblin Earnest. O. Adaptation/ TMH/6th edition,
   2018
2. A course in mechanical measurements and Instrumentation and control/
3. Sawhney, A.K.;Sawhney, Puneet/ Dhanpat Rai/1st edition/2016
4. Experimental Methods for Engineers / J.P.Holman/McGraw Hill /8th edition.
5. Mechanical and Industrial Measurements / R.K. Jain/ Khanna Publishers/2008

V18MEL05	Mechanics of Solids & Materials Engineering Lab	L	T	P	C
		0	0	3	1.5

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

		Knowledge Level
CO1	Assess the Mechanical properties of different metals.	K3
CO2	Examine the microstructures of different ferrous and non ferrous metals.	K3
CO3	Identify the effect of heat treatment and cooling rates on the properties of steels.	K4

NOTE: Any 6 experiments from each section A and B.

(A) MECHNICS OF SOLIDS LAB:

1. Direct tension test
2. Bending test on
a) Simply supported beam
b) Cantilever beam
3. Torsion test
4. Hardness test
a) Brinells hardness test
b) Rockwell hardness test
5. Test on springs
6. Compression test on cube
7. Impact test
8. Punch shear test

(B) METALLURGY LAB:

1. Preparation and study of the Micro Structure of pure metals like Iron, Cu and Al.
2. Preparation and study of the Microstructure of Mild steels, Medium carbon steels, high – C steels.
3. Study of the Micro Structures of Cast Irons.
4. Study of the Micro Structures of Non-Ferrous alloys – Brass and Bronze.
5. Study of the Micro structures of Heat treated steels.
6. Hardenability of steels by Jominy End Quench Test.
7. To find out the hardness of various treated and untreated steels.

References:

1. Strength of materials, S.S.Bhavikatti Vikas Publications, 4th edition, 2013.
2. Material Science and Metallurgy, Dr. V.D.Kodagire, Everest Publishing House, 40 th Edition, 2017.

V18MEL11	MANUFACTURING PROCESSES LAB	L	T	P	C
		0	0	3	1.5

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

		Knowledge Level
CO1	Design and Make a pattern.	3
CO2	Test the properties of sand and prepare a casting.	3
CO3	Perform Arc welding, Spot welding, TIG, MIG welding and Plasma Arc Cutting operations	3
CO4	Perform blanking, piercing, Drawing and bending operations.	3
CO5	Operate injection and blow moulding machines to manufacture plastic components	3

METAL CASTING:

Pattern Design and pattern making using wood turning lathe
Sand properties testing for Compression strength and permeability.
Mould preparation, melting and casting.

WELDING:

ARC Welding Lap, Butt & T- Joint
Spot Welding –Lap &Butt Joint
TIG Welding -Butt Joint
MIG Welding- Butt Joint
Plasma Arc Cutting

METAL FORMING:

Blanking & Piercing operation by using Progressive Die
Bending and Drawing operation

PROCESSING OF PLASTICS

Injection Molding
Blow Molding

REFERENCES:

1. Production technology lab – college manual.
2. Manufacturing Engineering and Technology/ Kalpakjian, Serope; Steven, Schmid R. / Pearson, 1st Edition, 2013
3. Manufacturing Technology / P.N. Rao/TMH, 4th Edition, 2016.

Annexure-X

Academic Calendars for B.Tech, MBA & M.Tech (for the A.Y.2018-19)

B.Tech

I Semester			
Description	**From**	**To**	**Weeks**
Commencement of Class Work	03-08-2018		
I Unit of Instructions	03-08-2018	28-09-2018	8 Weeks
I Mid Examinations	29-09-2018	03-10-2018	5 Days
II Unit of Instructions	04-10-2018	29-11-2018	8 Weeks
II Mid Examinations	30-11-2018	03-12-2018	4 Days
Comprehensive Test	04-12-2018	10-12-2018	1 Week
Preparation & Practical's	11-12-2018	15-12-2018	5 Days
End Examinations	17-12-2018	22-12-2018	1 Week
II Semester			
I Unit of Instructions	02-01-2019	27-02-2019	8 Weeks
I Mid Examination	28-02-2019	05-03-2019	5 Days
II Unit of Instructions	06-03-2019	01-05-2019	8 Weeks
II Mid Examinations	02-05-2019	07-05-2019	5 Days
Comprehensive Test	08-05-2019	13-05-2019	5 Days
Lab Examinations	14-05-2019	18-05-2019	5 Days
End Examinations	20-05-2019	31-05-2019	2 Weeks

MBA

I Semester			
Description	**From**	**To**	**Weeks**
Commencement of Class Work	13-08-2018		
I Unit of Instructions	13-08-2018	06-10-2018	8 Weeks
I Mid Examinations	08-10-2018	11-10-2018	4 Days
II Unit of Instructions	12-10-2018	06-12-2018	8 Weeks
II Mid Examinations	07-12-2018	11-12-2018	5 Days
Preparation & Practical's	12-12-2018	15-12-2018	4 Days
End Examinations	17-12-2018	22-12-2018	1 Week
II Semester			
I Unit of Instructions	07-01-2019	02-03-2019	8 Weeks
I Mid Examinations	05-03-2019	13-03-2019	8 Days
II Unit of Instructions	14-03-2019	08-05-2019	8 Weeks
II Mid Examinations	09-05-2019	17-05-2019	8 Days
End Examinations	20-05-2019	05-06-2019	2 Weeks
Project period	10-06-2019	13-07-2019	5 Weeks

M.Tech

I Semester			
Description	**From**	**To**	**Weeks**
Commencement of Class Work	28-08-2018		
I Unit of Instructions	28-08-2018	23-10-2018	8 Weeks
I Mid Examinations	24-10-2018	26-10-2018	3 Days
II Unit of Instructions	27-10-2018	22-12-2018	8 Weeks
II Mid Examinations	24-12-2018	27-12-2018	3 Days
Preparation & Practical's	28-12-2018	01-01-2019	4 Days
End Examinations	02-01-2019	08-01-2019	1 Week
II Semester			
I Unit of Instructions	21-01-2019	16-03-2019	8 Weeks
I Mid Examinations	18-03-2019	23-03-2019	1 Week
II Unit of Instructions	25-03-2019	18-05-2019	8 Weeks
II Mid Examinations	20-05-2019	25-05-2019	1 Week
Preparation & Practical	27-05-2019	01-06-2019	1 Week
End Examinations	03-06-2019	15-06-2019	2 Weeks

Proposed B.Tech III & IV Sem Academic Calendar (for the A.Y.2019-20)

B.TECH III SEM			
Description	**From**	**To**	**Weeks**
Commencement of Class Work	10.06.2019		
I Unit of Instructions	10.06.2019	03.08.2019	8 Weeks
I Mid Examination	05.08.2019	10.08.2019	1 Week
II Unit of Instructions	12.08.2019	05.10.2019	8 Weeks
II Mid Examination	07.10.2019	12.10.2019	1 Week
Comprehensive Test	14.10.2019	19.10.2019	1 Week
Preparation and Practical’s	21.10.2019	25.10.2019	5 Days
End Examinations	28.10.2019	09.11.2019	2 Weeks
B.TECH IV SEM			
Commencement of Class Work	11.11.2019		
I Unit of Instructions	11.11.2019	04.01.2020	8 Weeks
I Mid Examination	06.01.2020	11.01.2020	1 Week
II Unit of Instructions	13.01.2020	07.03.2020	8 Weeks
II Mid Examination	09.03.2020	14.03.2020	1 Week
Comprehensive Test	16.03.2020	21.03.2020	1 Week
Preparation and Practical’s	23.03.2020	27.03.2020	5 Days
End Examinations	30.03.2020	11.04.2020	2 Weeks

Proposed MBA III & IV Sem Academic Calendar (for the A.Y.2019-20)

MBA III SEM			
Description	**From**	**To**	**Weeks**
Commencement of Class Work	22-07-2019		
I Unit of Instructions	22-07-2019	14-09-2019	8 Weeks
I Mid Examination	16-09-2019	25-09-2019	9 Days
II Unit of Instructions	26-09-2019	23-11-2019	8 Weeks
II Mid Examination	25-11-2019	04-12-2019	9 Days
End Examinations	09-12-2019	26-12-2019	2 Weeks
MBA IV SEM			
Commencement of Class Work	30-12-2019		
I Unit of Instructions	30-12-2019	22-02-2020	8 Weeks
I Mid Examination	24-02-2020	03-03-2020	8 Days
II Unit of Instructions	04-03-2020	28-04-2020	8 Weeks
II Mid Examination	29-04-2020	09-05-2020	11 Days
End Examinations	11-05-2020	26-05-2020	2 Weeks

Annexure-XI

CONDITIONS FOR PROMOTION OF LATERAL ENTRY STUDENTS:

Minimum academic requirements:

The following academic requirements have to be satisfied.

- A Student shall be promoted from II Year to III Year if he/she fulfills the minimum attendance requirement.
- A Student shall be promoted from III Year to IV Year only if he/she earns 50% of the Credits specified up to and including III year I semester.

SRI VASAVI ENGINEERING COLLEGE (AUTONOMOUS)
(Sponsored by Sri Vasavi Educational Society)
(Approved by AICTE, New Delhi & Permanently affiliated to JNTUK, Kakinada)
(Accredited by NAAC with 'A' Grade ,Recognized by UGC under section 2(f) & 12(B))
(**NBA** Accreditation to B.Tech., EEE,CSE, ME and ECE Branches for 3 Years)
Pedatadepalli, **TADEPALLIGUDEM – 534 101.** W.G.Dist**. (A.P)**

Minutes of the Fourth Academic Council Meeting held on 30/08/2020 at 03:00 P.M. through online mode.

SRI VASAVI ENGINEERING COLLEGE (AUTONOMOUS)

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Pedatadepalli, **TADEPALLIGUDEM – 534 101.** W.G.Dist**. (A.P)**

Fourth Meeting of the Academic Council was held on **30/08/2020 at 03:00 P.M**. through online mode

Meeting Link:
https://zoom.us/j/96967150691?pwd=cHdMU05VaVZCdXhqZTN3M2liZWZMQT09
Password :svec@2020

Members Present:

1.	Dr. Guduru VNSR Ratnakara Rao	Principal & Chairman
2.	Prof. R. Srinivasa Rao, DAP, JNTUK	Member
3.	Prof L Sumalatha, DE,JNTUK	Member
4.	Prof V.V. Subba Rao, Principal, UCE, JNTUK Narasaraopeta	Member
5.	Prof.P.Siva Pullaiah, Pro-Vice Chancellor, GITAM	Member
6.	Prof.B.V.S.S.S. Prasad, IIT Madras	Member
7.	Prof.S.R.K.Reddy, Gudlavelleru Engg.College	Member
8.	Sri B.V.Raghavaiah, Director (Retd.), CPRI, Bhopal	Member
9.	Dr. N.S.C. Babu, Executive Director, SETS	Member
10.	Dr.D.Sudha Rani, HOD, EEE	Member
11.	Dr.M.V.Ramesh, HOD, ME	Member
12.	Dr.E.Kusuma Kumari, HOD, ECE	Member
13.	Dr.D.Jaya Kumari, HOD, CSE	Member
14.	Dr.G.V.Subba Raju, HOD, MBA	Member
15.	Sri.N.Rajasekhar, HOD, BS&H	Member
16.	Dr. T. Sujani, Head Training	Member
17.	Sri P.Sita Rama Raju, Section Head, Physics	Member
18.	Sri A Vamsi Subbarayan Section Head, Chemistry	Member
19.	Sri.K.N.H.Srinivas, Assoc.Prof., ECE	Member
20.	Dr. G.Radha Krishnan, HOD I/c, CE	Member
21.	Sri S Amjed Ali, Section Head, Mathematics	Invited Member
22.	Sri P N V GopalaKrishna, Head Placements	Invited Member

23.	Sri Ch V S R GopalaKrishna , DCE	Invited Member
24.	Sri Ch Apparao, Director Technical	Invited Member
25.	Dr.Ch.Rambabu, Dean (SA)	Member Secretary

Members Absent

1.	Dr.J.Srihari Rao, Director	Member
2.	Sri Lokam Prasad, CEO,Miracle Software Systems	Member

SRI VASAVI ENGINEERING COLLEGE (Autonomous)

Pedatadepalli, **TADEPALLIGUDEM – 534 101.** W.G.Dist.**(A.P)**

Fourth Meeting of Academic Council

Minutes of the Fourth Academic Council Meeting held on 30/08/2020.

Item No.1: Welcome address by Principal& Introduction of members.

Principal **Prof. Guduru VNSR Ratnakara Rao** welcomed the members and chaired the meeting.

Item No.2: Review of institute progress for the Academic Year 2019-2020.[Details aregiven in Annexure-I **(Page No. 06**)]

The council reviewed the progress of the institute for the academic year 2019-2020 and appreciated.

Item No.3: Action taken report on the minutes of the previous meeting (held on02.06.2019).

The council approved the action taken report presented in Annexure-II **(Page No. 08)**

Item No.4: Approval of the minutes of the meeting of BOS ofVariousdepartments:

a. Minutes of the 3rdmeeting of the BOS of Electrical and Electronics Engineering (dated: 30.05.2020). [Details are given in Annexure-III **(Page No.13)**]
b. Minutes of the 3rd meeting of the BOS of Computer Science & Engineering (CSE) (dated: 31.05.2020). [Details are given in Annexure-IV **(Page No. 60)**]
c. Minutes of the 3rd meeting of the BOS of Mechanical Engineering (ME) (dated: 03.06.2020). [Details are given in Annexure-V **(Page No.113)**]
d. Minutes of the 3rd meeting of the BOS of MBA (dated: 04.06.2020). [Details are given in Annexure-VI **(Page No152)**]
e. Minutes of the 3rd meeting of the BOS of Electronics & Communication Engineering (ECE) (dated: 10.06.2020). [Details are given in Annexure-VII **(Page No. 158)**]
f. Minutes of the 3rd meeting of the BOS of Civil Engineering (CE) (dated: 29.06.2020). [Details are given in Annexure-VIII **(Page No.204)**]
g. Minutes of the 3rd meeting of the BOS of Combined Mathematics &English (dated: 01.08.2020). [Details are given in Annexure-IX **(Page No. 246)**]

The council approved the minutes of the meeting of BOS of Various Departments.

Item No.5: Amendments to **UG V18** Academic Regulations

The proposed amendments are approved by the council. Given in **Annexure-X** **(Page No. 254)**

Item No.6: Approval of Honor's/ Minor degree in Data Science

The proposed Academic regulations for Honor's/ Minor degree in Data Science are approved by the council. Given in **Annexure-XI** **(Page No 255)**

Item No.7: Amendments to **MBA V18** Academic Regulations

The proposed amendments are approved by the council. Given **Annexure-XII** **(Page No. 258)**

Item No.8: Any other item with the permission of the Chair

a. Presented Result Analysis for the Academic Year 2019-2020given in **Annexure XIII (Page No. 259)**
b. Proposed Academic Calendar B.Tech V Sem (A.Y 2020-2021) 2018 Admitted batch given in **Annexure XIV (Page No. 264)**
c. Proposed Academic Calendar B.Tech III Sem (A.Y 2020-2021) 2019 Admitted batch given in **Annexure XV (Page No. 265)**
d. Proposed Academic Calendar MBA III Sem (A.Y 2020-2021) 2020 Admitted batch given in **Annexure XVI (Page No. 266)**
e. Proposed Internal Evaluation for A.Y 2019-2020 given in **Annexure-XVII (Page No.267)**

The council

1) Reviewed result analysis
2) Approved the academic calendars for 2020-21 academic year and modifications in Internal Evaluation for A.Y 2019-2020

The meeting concluded with vote of thanks by the Member Secretary.

Annexure-I

Progress Report for the Academic Year 2019-2020

1. One of our student Mahalakshmi Vardineedi bearing roll number 16A81A05N5 got placed in Amazon with Rs. 18.00 LPA package.
2. Two Major Research Projects worth Rs.01.08 Crores were sanctioned by Department of Science & Technology, Govt. of India, New Delhi under SEED Scheme. One Project worth Rs.76.00 lakhs to EEE Dept. and 2nd Project worth Rs.32.00 lakhs to ECE Department.
3. Ministry of MSME, Govt. of India approved our institution as MSME Host Institute/Business Incubator in the month of November 2019 and a total of 19 business ideas were submitted to MSME by our students in the first phase and 5 business Ideas in the second phase. Outside Entrepreneurs submitted 5 Ideas.
4. JNTUK, Kakinada recognized the Departments of CSE & ME as Research centre for 2 years from 2019-20.
5. Mrs. G. Loshma, Department of CSE was awarded Ph.D by JNTUH, Hyderabad, Mr. G. Radhakrishnan, Department of Civil Engineering was awarded Ph.D by JNTUK, Kakinada. Mr O Sri Nagesh was awarded Ph.D by Lingayya's University.
6. A total of 42 faculty members have registered with NPTEL for 37 various courses and successfully certified.
7. A total of 105 faculty from various departments attended FDPs, Workshops upto march 2020.
8. 13 Guest Lectures were arranged for the benefit of students.
9. 25 FDPs were conducted by all the departments upto March 2020.
10. Students from various departments visited nine different industries as a part of Industrial Visit.
11. 120 students from various departments have undergone internship program offered by industries.
12. 24 Training programs (CRT & Company Specific) were conducted for students.
13. About 71 students participated in various co-curricular & extra-curricular activities conducted at different places outside the college.
14. 4 Patent publications and two chapters are published by faculty members.
15. Under the aegis of SPDP Centre (Sponsored by AICTE), a 15 hour (One hour per day) certification program on "Basic Interactive Skills", Internet of Things and AI & ML were conducted for SC, ST students of our College.
16. 247 students are placed in 30 Companies so far.
17. Submitted AICTE online application for the Extension of Approval with reduction in intake in MBA from 120 to 90 and Diploma in Civil Engineering from 120 to 60 w.e.f. from the academic year 2020-21.

18. Our college NSS UNIT organized a blood donation camp on 12/02/2020 in association with Red Cross Organization and donated 30 units of blood. Sahaya (Social Service)in the department of CSE has done 5 social service activities.
19. A total of 26 Social Service Activities were organized by our NSS UNIT.
20. University Innovation Fellowship was awarded to 4 students in 2020 by Stanford University.
21. An MOU is signed with SRKR, Bhimavaram to associate with their AICTE Magadarshan Scheme.
22. Submitted 12 proposals to AICTE under AQIS Scheme in Dec’ 2019/ Jan’ 2020.Recently got the approval for 2 week Faculty Deveropment Programme (FDP) under AQIS 2019-20 during the financial Year 202O-2021 to ECE Department and Approval for MODROPS to CSE Department.
23. Submitted 3 proposals DST-SEED-TIDE Scheme
24. Physical Education Department has conducted Intra Hostel Sports & Games meet in which more than 450 students have actively participated. 12 students are now the members of the JNTUK University Teams in various games & sports.
25. One day workshop on ‘Gender Sensitization – Equal Opportunities’ was conducted on the occasion of International Women’s Day on 8th March, 2020 with students & staff.
26. Institute ranked 54th in ARIIA-2020 announced on 18th August 2020.

Annexure-II

Minutes of the Third Academic Council Meeting held on 02/06/2019

Item No.1: Welcome address by Principal& Introduction of members.

Principal, Prof. Guduru VNSR Ratnakara Rao welcomed the members and chaired the meeting.

Item No.2: To approve Action taken report on the minutes of the previous meeting held on 01.07.2018.

The Council approved.

Item No.3: To approve of the minutes of the meeting of BOS of various departments.

The council approved minutes of BOS of various departments.

Item No.4: Any other item with the permission of the Chair

i) The proposed B.Tech, MBA III & IV Semester Academic Calendar was also presented and it was approved by the council.

Few modifications are done in the approved academic calendars of B Tech for the academic year 2019-2020 are given as follows

Approved Academic Calendars (2019-2020):

B.TECH III SEM			
Description	**From**	**To**	**Weeks**
Commencement of Class Work	10.06.2019		
I Unit of Instructions	10.06.2019	03.08.2019	8 Weeks
I Mid Examination	05.08.2019	10.08.2019	1 Week
II Unit of Instructions	12.08.2019	05.10.2019	8 Weeks
II Mid Examination	07.10.2019	12.10.2019	1 Week
Comprehensive Test	14.10.2019	19.10.2019	1 Week
Preparation and Practical's	21.10.2019	25.10.2019	5 Days
End Examinations	28.10.2019	09.11.2019	2 Weeks
B.TECH IV SEM			
Commencement of Class Work	11.11.2019		
I Unit of Instructions	11.11.2019	04.01.2020	8 Weeks
I Mid Examination	06.01.2020	11.01.2020	1 Week
II Unit of Instructions	13.01.2020	07.03.2020	8 Weeks
II Mid Examination	09.03.2020	14.03.2020	1 Week
Comprehensive Test	16.03.2020	21.03.2020	1 Week
Preparation and Practical's	23.03.2020	27.03.2020	5 Days
End Examinations	30.03.2020	11.04.2020	2 Weeks

Modified Academic Calendars (2019-2020):

B.TECH III SEM			
Description	**From**	**To**	**Weeks**
Commencement of Class Work	10.06.2019		
I Unit of Instructions	10.06.2019	03.08.2019	8 Weeks
I Mid Examination	05.08.2019	10.08.2019	1 Week
II Unit of Instructions	12.08.2019	05.10.2019	8 Weeks
II Mid Examination	07.10.2019	12.10.2019	1 Week
Comprehensive Test	14.10.2019	19.10.2019	1 Week
Preparation and Practical's	21.10.2019	25.10.2019	1 Week
End Examinations	28.10.2019	09.11.2019	2 Weeks
B.TECH IV SEM			
Commencement of Class Work	11.11.2019		
I Unit of Instructions	11.11.2019	04.01.2020	8 Weeks
I Mid Examination	06.01.2020	11.01.2020	1 Week
II Unit of Instructions	13.01.2020	14.03.2020	9 Weeks
II Mid Examination	16.03.2020	24.03.2020	1 Week
Comprehensive Test	26.03.2020	04.04.2020	1 Week
Preparation and Practical's	06.04.2020	11.04.2020	1 Week
End Examinations	13.04.2020	29.04.2020	2 Weeks

Academic Calendar followed for the academic year 2019-20 for various programmes:

B.Tech I Semester			
Description	**From**	**To**	**Weeks**
Orientation and Induction Program	**05-08-2019**	**24.08.2019**	3W
Commencement of Class Work	**26-08-2019**	-	-
I Unit of Instructions	26-08-2019	19-10-2019	8W
I Mid Examination	21-10-2019	26-10-2019	1W
II Unit of Instructions	28-10-2019	21-12-2019	8W
II Mid Examination	23-12-2019	28-12-2019	1W
Comprehensive Test	30-12-2019	04-01-2020	1W
Preparation & Practicals	06-01-2020	18-01-2020	2W
End Examinations	21-01-2020	01-02-2020	2W

B.Tech II Semester			
Commencement of Class Work	**03-02-2020**		--
I Unit of Instructions	03-02-2020	28-03-2020	8W
I Mid Examination	30-03-2020	04-04-2020	1W
II Unit of Instructions	06-04-2020	30-05-2020	8W
II Mid Examination	01-06-2020	06-06-2020	1W
Comprehensive Test	08-06-2020	13-06-2020	1W
Preparation & Practicals	15-06-2020	20-06-2020	1W
End Examinations	22-06-2020	04-07-2020	2W
Commencement of III Sem Class work	**06-07-2020**		

B.TECH III SEM			
Description	**From**	**To**	**Weeks**
Commencement of Class Work	10.06.2019		
I Unit of Instructions	10.06.2019	03.08.2019	8 Weeks
I Mid Examination	05.08.2019	10.08.2019	1 Week
II Unit of Instructions	12.08.2019	05.10.2019	8 Weeks
II Mid Examination	07.10.2019	12.10.2019	1 Week
Comprehensive Test	14.10.2019	19.10.2019	1 Week
Preparation and Practical's	21.10.2019	25.10.2019	1 Week
End Examinations	28.10.2019	09.11.2019	2 Weeks
B.TECH IV SEM			
Commencement of Class Work	11.11.2019		
I Unit of Instructions	11.11.2019	04.01.2020	8 Weeks
I Mid Examination	06.01.2020	11.01.2020	1 Week
II Unit of Instructions	13.01.2020	14.03.2020	9 Weeks
II Mid Examination	16.03.2020	24.03.2020	1 Week
Comprehensive Test	26.03.2020	04.04.2020	1 Week
Preparation and Practical's	06.04.2020	11.04.2020	1 Week
End Examinations	13.04.2020	29.04.2020	2 Weeks

MBA I SEM			
Description	**From**	**To**	**Weeks**
Orientation Programme	05-09-2019	07-09-2019	3 Days
I Unit of Instructions	09-09-2019	02-11-2019	8 Weeks
I Mid Examination	04-11-2019	11-11-2019	7 Days
II Unit of Instructions	12-11-2019	04-01-2020	8 Weeks
II Mid Examination & Practicals	06-01-2020	25-01-2020	2 Weeks

End Examinations	27-01-2020	10-02-2020	2 Weeks
MBA II SEM			
Commencement of Class Work	11-02-2020		
I Unit of Instructions	11-02-2020	04-04-2020	8 Weeks
I Mid Examination	06-04-2020	15-04-2020	8 Days
II Unit of Instructions	16-04-2020	10-06-2020	8 Weeks
II Mid Examination	11-06-2020	19-06-2020	8 Days
End Examinations	22-06-2020	08-07-2020	2 Weeks
Project Period	13-07-2020	17-08-2020	5 Weeks
Commencement of Class work for III Semester	24-08-2020		

MBA III SEM			
Description	**From**	**To**	**Weeks**
Commencement of Class Work	22-07-2019		
I Unit of Instructions	22-07-2019	14-09-2019	8 Weeks
I Mid Examination	16-09-2019	25-09-2019	9 Days
II Unit of Instructions	26-09-2019	23-11-2019	8 Weeks
II Mid Examination	25-11-2019	04-12-2019	9 Days
End Examinations	09-12-2019	26-12-2019	2 Weeks
MBA IV SEM			
Commencement of Class Work	30-12-2019		
I Unit of Instructions	30-12-2019	22-02-2020	8 Weeks
I Mid Examination	24-02-2020	03-03-2020	8 Days
II Unit of Instructions	04-03-2020	28-04-2020	8 Weeks
II Mid Examination	29-04-2020	09-05-2020	11 Days
End Examinations	11-05-2020	26-05-2020	2 Weeks

M Tech I Semester			
Description	**From**	**To**	**Weeks**
Commencement of Class Work	25.09.2019		
I Unit of Instructions	25.09.2019	20.11.2019	8 Weeks
I Mid Examinations	21.11.2019	27.11.2019	1 Week
II Unit of Instructions	28.11.2019	23.01.2020	8 Weeks
II Mid Examinations	24.01.2020	30.01.2020	1 Week
Preparation & Practical’s	31.01.2020	06.02.2019	1 Week
End Examinations	07.02.2020	19.02.2020	2 Weeks
II Semester			
I Unit of Instructions	20.02.2020	16.04.2020	8 Weeks
I Mid Examinations	17.04.2020	23.04.2020	1 Week

II Unit of Instructions	24.04.2020	19.06.2020	8 Weeks
II Mid Examinations	20.06.2020	26.06.2020	1 Week
Preparation & Practical	29.06.2020	04.07.2020	1 Week
End Examinations	06.07.2020	17.07.2020	2 Weeks

M.Tech-III SEM			
Description	**From**	**To**	**Weeks**
Commencement of M.Tech III sem	22.07.2019		
Project Work Registration	22.07.2019	27.07.2019	1Week
Project Work Registration Approved by PRC	29.07.2019	03.08.2019	1Week
Project Work	05.08.2019	09.11.2019	10Weeks
First Review by PRC	11.11.2019	16.11.2019	1Week
Comprehensive Viva Voce	18.11.2019	23.11.2019	1Week
Submission of MOOCs Certificate	25.11.2019	30.11.2019	1Week
M.Tech-IV SEM			
Description	**From**	**To**	**Weeks**
Commencement of M.Tech IV sem	02.12.2019		
Project Work	02.12.2019	08.02.2020	10Weeks
Second Review by PRC	10.02.2020	15.02.2020	1Week
Project Work	17.02.2020	25.04.2020	10Weeks
Third Review by PRC	27.04.2020	02.05.2020	1Week
Project Work Thesis and Dissertation	04.05.2020	30.05.2020	4Weeks
Thesis Submission and Final Review by PRC	01.06.2020	06.06.2020	1Week
Project Viva Voce Exam	08.06.2020	03.07.2020	

Annexure-III

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Pedatadepalli, **TADEPALLIGUDEM–534 101.**W.G.Dist**. (A.P)**

Department of Electrical & Electronics Engineering (Accredited by NBA)

Date: 25-06-2020

The third meeting of Board of Studies in Department of Electrical and Electronics Engineering is held at 11.30 AM on 30-05-2020 though online mode using gotomeeting tool (Meeting ID: 661-077-229).

The following members are attended the meeting.

S.No.	Name	Designation	Role
1.	Dr. Sudha Rani Donepudi	Associate Professor, Head, Dept. of EEE, SVEC, Pedatadepalli.	Chairperson
2.	Dr. R. SrinivasaRao	Professor, Dept. of EEE, UCEK, JNTUK, Kakinada	Subject Expert Nominated By V.C.
3.	Dr. M. Sydulu	Professor, Dept. of EE, NITW, Warangal	Subject Expert Nominated By A.C.
4.	Dr. Y.P. Obulesu	Professor, School of EE, VIT, Vellore	Subject Expert Nominated By A.C.
5.	Er. B.N.V.R.C. Suresh Kumar	Retired AGM, PGCI, Hyderabad	Industry Expert Nominated By A.C
6.	Er. Ch. Vinay Kumar	Assistant Engineer, EHT Lines, APTRANSCO, Eluru.	Alumni
7.	Dr. Ch. Rambabu	Professor	Member
8.	Dr. P.V.V. Rama Rao	Professor	Member
9.	U. Chandra Rao	Sr. Asst. Professor	Member
10.	N. Sri Harish	Asst. Professor	Member

11.	Ch. V.S.R. Gopala Krishna	Sr. Asst. Professor	Member
12.	P.S.V.N. Sudhakar	Asst. Professor	Member
13.	V. Rama Narayana	Asst. Professor	Member
14.	K. Venkata Reddy	Asst. Professor	Member
15.	Mr. V.S. Aditya	Asst. Professor	Member

The following are the minutes of the meeting

Item No. 1: Welcome note by the Chairperson BOS

The HOD extended a formal welcome and introduced the members.

Item No. 2: Review of course structure for V & VI semesters of B. Tech under V18 Regulation.

Reviewed the course structure of V & VI semesters for UG (B.Tech-EEE) Programme of V18 Regulation and the following modifications have been done.

V Semester

- **Power System Protection**course (Course Code:V18EET11) is renamed as **Switchgear & Protection** (Course Code:V18EET12)
- **Renewable Energy Systems** course (Course Code:V18EET20) is move to Professional Elective-I in VI Semester and the same is replaced with **Power System Analysis** (Course Code:V18EET14)
- **Intellectual Property Rights & Patents** course is removed from MNC.
- Employability Skills– III is renamed as **Professional Communication Skills – III** (Course Code: V18ENT05)

VI Semester

- **JAVA Programming** course is move to open elective course offered by BoS of CSE and same is replaced with **Electrical Drives**(Course Code:V18EET17)
- **Power System Analysis** course is moved to V Semester and the same is replaced with **Professional Elective-II**
- **JAVA Programming Laboratory** course is replaced with **Electrical Simulation Laboratory**(Course Code:V18EEL09)
- **Technical Seminar**(V18EES01) is moved to VII Semester
- **Courses approved in Professional Elective I:**
    - Utilization of Electrical Energy
    - Advanced Control Systems
    - Renewable Energy Systems
    - Advanced Power Electronics

- **Courses approved in Professional Elective II:**
    - HVAC & HVDC Transmission
    - Programmable Logic Controllers &its Applications
    - Electrical Energy Conservation, Management & Auditing
    - Special Electrical Machines
- Employability Skills – IV is renamed as **Professional Communication Skills – IV** (Course Code: V18ENT06)

The details of the course structure for V & VI semesters of UG (B.Tech) Programme (EEE) are given in Annexure-EEE-I

Item No. 3: Approval of syllabi for the courses offered in V & VI semesters B. Tech under V18 Regulation.

Approved the syllabi for the courses offered in V & VI semesters B. Tech under V18 Regulation.

The syllabi for the courses offered in V and VI semesters of B.Tech Programme of under V18 Regulation is attached in Annexure-EEE-II.

Item No. 4: Approval of list of courses offering under Open Elective- I in VI semester B. Tech under V18 Regulation for all other branches and the approval of their detailed syllabi.

Approved the list of courses and syllabi for the courses offered as Open Elective in VI semester B. Tech for all other branches under V18 Regulation and the details are given in Annexure-EEE-III.

Item No. 5: Approval for offering minor degree in DATA SCIENCE offered by Department of Computer Science and Engineering for B. Tech Electrical and Electronics Engineering students under V18 Regulation

Approved to offer the minor degree in DATA SCIENCE for B. Tech Electrical and Electronics Engineering students under V18 Regulation.

Dr. Sudha Rani Donepudi

(BOS Chairperson)

Annexure-EEE-I

Course Structure Approved in BOS Meetings

Course Structure of Electrical and Electronics Engineering - V18 Regulation

V Semester						
S.No.	**Course Code**	**Name of the Course**	**L**	**T**	**P**	**Credits**
1.	V18EET12	Switchgear & Protection	3	-	-	3
2.	V18EET13	Power Electronics	3	1	-	4
3.	V18EET14	Power System Analysis	3	1	-	4
4.	V18EET15	Control Systems	3	1	-	4
5.	V18EET16	Signals and Systems	3	1	-	4
6.	V18MBT51	Managerial Economics and Financial Analysis	3	-	-	3
7.	V18EEL06	Electrical Machines Laboratory - II	-	-	2	1
8.	V18EEL07	Control Systems Laboratory	-	-	2	1
9.	V18ENT05	Professional Communication Skills– III	3	-	-	MNC
		Total Contact Hours(29)	**21**	**4**	**4**	**24**

Certification Course – Enrolment of Certification Course will be initiated during V Semester.

VI Semester						
S.No.	**Course Code**	**Name of the Course**	**L**	**T**	**P**	**Credits**
1.	V18EET17	Electrical Drives	3	1	-	4
2.	V18ECT23	Microprocessors & Microcontrollers	3	1	-	4
3.	V18EET18 V18EET19 V18EET20 V18EET21	Professional Elective - I ➢ Utilization of Electrical Energy ➢ Advanced Control Systems ➢ Renewable Energy Systems ➢ Advanced Power Electronics	3		-	3
4.	V18EET22 V18EET23 V18EET24 V18EET25	Professional Elective – II ➢ HVAC & HVDC Transmission ➢ Programmable Logic Controllers &its Applications ➢ Electrical Energy Conservation, Management & Auditing ➢ Special Electrical Machines	3	-	-	3
5.		Open Elective – I	3	-	-	3
6.	V18EEL08	Power Electronics Laboratory	-	-	2	1
7.	V18EEL09	Electrical Simulation Laboratory	-	-	2	1
8.	V18ECL10	Microprocessors & Microcontrollers Laboratory	-	-	2	1
9.	V18ENT06	Professional Communication Skills– IV	3	-	-	MNC

		Total Contact Hours(26)	**18**	**2**	**6**	**20**

Annexure-EEE-II

Syllabi for the courses offered in V & VI semesters B. Tech under V18 Regulation.

Programme : **B. Tech - Electrical & Electronics Engineering** **Semester: V**

Course Code : V18EET12

Course Name : Switchgear & Protection **[L : 3; T:0; P : 0 (3 credits)]**

Course Outcomes

After Successful completion of this course, students will be able to

CO No.	Course Outcome	Knowledge Level
C301.1	Understand the arc interruption phenomenon in circuit breakers of oil, air, vacuum, SF6 gas type.	(K2)
C301.2	Extract the constructional features and working of different types of electromagnetic relays	(K2)
C301.3	Use suitable relay for different types of protection	(K3)
C301.4	Relate protective schemes of generators and transformers against different faults	(K3)
C301.5	Apply suitable protective scheme for the protection of feeders & bus bars	(K3)
C301.6	Illustrate the operation of static & digital relays and the concept of grounding	(K2)

UNIT–I:CIRCUIT BREAKERS

Miniature Circuit Breaker(MCB)– Elementary principles of arc interruption– Restriking Voltage and Recovery voltages– Restriking phenomenon - RRRV– Average and Max. RRRV– Current chopping and Resistance switching– Introduction to oil circuit breakers– Description and operation of Air Blast– Vacuum and SF6 circuit breakers– CB ratings and specifications– Concept of Auto reclosing.

UNIT–II:ELECTROMAGNETIC PROTECTION

Relay connection – Balanced beam type attracted armature relay - induction disc and induction cup relays–Torque equation - Relays classification–Instantaneous– DMT and IDMT types.

UNIT-III: APPLICATIONS OF RELAYS

Over current and under voltage relays– Directional relays– Differential relays and percentage differential relays– Universal torque equation– Distance relays: Impedance– Reactance– Mho and offset mho relays– Characteristics of distance relays and comparison.

UNIT–IV:

GENERATOR PROTECTION

Protection of generators against stator faults– Rotor faults and abnormal conditions– restricted earth fault and inter turn fault protection– Numerical examples.

TRANSFORMER PROTECTION

Percentage differential protection– Design of CT's ratio– Buchholz relay protection–Numerical examples.

UNIT–V:FEEDER AND BUS BAR PROTECTION

Protection of lines: Over current Protection schemes – PSM,TMS - Numerical examples - Carrier current and three zone distance relay using impedance relays–Protection of bus bars by using Differential protection.

UNIT–VI:

STATIC AND DIGITAL RELAYS

Static relays: Static relay components– Static over current relays– Static distance relay– Micro Processor based digital relays.

NEUTRAL GROUNDING

Effects of ungrounded neutral on system performance– Methods of neutral grounding: Solid–resistance–Reactance–Arcing grounds and grounding Practices.

TEXT BOOKS:

1. Power System Protection and Switchgear by Badari Ram and D.N Viswakarma, TMH Publications, 2007
2. Power System Protection and Switchgear by B. Ravindranath, M. Chander, New Age International, 1977
3. Power system protection- Static Relays with microprocessor applications by T. S. Madhava Rao, TMH, 2017

REFERENCE BOOKS:

1. Fundamentals of Power System Protection by Paithankar and S. R. Bhide., PHI, 2003.
2. Art & Science of Protective Relaying – by C R Mason, Wiley Eastern Ltd, 1956.
3. Protection and Switch Gear by Bhavesh Bhalja, R.P. Maheshwari, Nilesh G.Chothani, Oxford University Press, 2013

Programme : **B. Tech - Electrical & Electronics Engineering** **Semester: V**

Course Code : V18EET13

Course Name : Power Electronics **[L : 3; T:1; P : 0 (4 credits)]**

Course Outcomes

After Successful completion of this course, students will be able to

CO No.	Course Outcome	Knowledge Level
C302.1	Sketch the characteristics of various power semiconductor devices and Illustrate various firing circuits for SCR.	(K3)
C302.2	Operate various 1-phase AC-DC Controlled rectifiers for R and RL Loads and compare their performances.	(K3)
C302.3	Operate various 3-phase AC-DC Controlled rectifiers for R and RL Loads and compare their performances.	(K3)
C302.4	Understand the operation of various DC-DC Converters.	(K2)
C302.5	Explain the working of AC-AC Regulators and Estimate their output voltages.	(K3)
C302.6	Understand the operation of various DC-AC Converters for R & RL Loads.	(K2)

UNIT–I:POWER SEMICONDUCTOR DEVICES

Thyristors–Silicon Controlled Rectifiers (SCR's) –Characteristics of Power MOSFET and Power IGBT– Basic theory of operation of SCR–Static characteristics– Turn on and turn off methods–Dynamic characteristics of SCR– Snubber circuit design– Triggering circuits for SCR (R & RC).

UNIT–II:AC-DC SINGLE-PHASE CONVERTERS

1-phase half wave controlled rectifiers for R load and RL load with and without freewheeling diode;1-phase full wave controlled rectifiers: Center tapped and bridge configurations for R load and RL load with and without freewheeling diode under continuous and discontinuous conduction modes; Effect of source inductance in 1-phase fully controlled bridge rectifier with continuous conduction.

UNIT–III:AC-DC 3-PHASE CONVERTERS

3-phase half wave controlled rectifier with R and RL loads; 3-phase semi controlled rectifier with R and RL loads; 3-phase fully controlled rectifier with R and RL loads.

UNIT–IV:DC–DC CONVERTERS

Analysis of Buck, Boost and Buck-Boost converters in Continuous Conduction Mode (CCM) and Discontinuous Conduction Modes (DCM) – Output voltage equations using volt- sec balance in CCM & DCM output voltage ripple & inductor current, ripple for CCM only – Principle operation of forward and fly back converters in CCM.

UNIT – V:AC – AC REGULATORS

Static V-I characteristics of TRIAC and modes of operation; 1-phase AC-AC regulator: Phase angle control and integrated cycle control with R and RL loads for continuous and discontinuous conduction modes; 3-Phase AC-AC regulators with R load only; Transformer tap changing using antiparallel Thyristors.

UNIT – VI:DC–AC CONVERTERS

1-phase half and full bridge inverters with R and RL loads; 3-phase square wave inverters: 120 degree conduction and 180 degree conduction modes of operation; PWM inverters: Quasi-square wave, pulse width modulation, Sinusoidal pulse width modulation, Prevention of shoot through fault in Voltage Source Inverter (VSI); Current Source Inverter (CSI): Introduction to Auto Sequential Commutated Current Source Inverter (ASCCSI)

TEXT BOOKS:

1. Power Electronics: Circuits, Devices and Applications – by M. H. Rashid, Prentice Hall of India, 2nd edition, 1998
2. Power Electronics – by P.S. Bhimbra, Khanna Publishers, 2014
3. Power Electronics: Essentials & Applications by L. Umanand, Wiley, Pvt. Limited, India, 2009

REFERENCE BOOKS:

1. Elements of Power Electronics–Philip T. Krein, Oxford, 2015.
2. Power Electronics by M. D. Singh, Tata McGraw Hill India, 2006
3. Thyristorised Power Controllers – by G. K. Dubey, S. R. Doradla, A. Joshi and R. M. K.Sinha, New Age International (P) Limited Publishers, 1996.
4. Power Electronics handbook by Muhammad H.Rashid, Elsevier, 2018.
5. Power Electronics: converters, applications & design -by Nedmohan, Tore M. Undeland, Robbins by Wiley India Pvt. Ltd., 2018
6. Power Converter Circuits -by William Shepherd, Li zhang, CRC Taylor & Francis Group, 2017

Programme : **B. Tech - Electrical & Electronics Engineering** **Semester: V**

Course Code : V18EET14

Course Name : Power System Analysis **[L : 3; T:1; P : 0 (4 credits)]**

Course Outcomes

After Successful completion of this course, students will be able to

CO No.	Course Outcome	Knowledge Level
C303.1	Compute Y_{BUS} matrix for a power system network	(K3)
C303.2	Find the load flow solution of a power system network using load flow methods	(K3)
C303.3	Develop the Z_{BUS} for a power system network	(K3)
C303.4	Calculate the fault currents for symmetrical faults	(K3)
C303.5	Compute the sequence components of currents for unbalanced power system network	(K3)
C303.6	Understand the concepts of power system stability	(K2)

UNIT –I:PER UNIT REPRESENTATION & TOPOLOGY

Per Unit Quantities–Single line diagram– Impedance diagram of a power system–Graph theory definition – Formation of element node incidence and bus incidence matrices – Primitive network representation – Formation of Y_{BUS} matrix by singular transformation and direct inspection methods.

UNIT –II: POWER FLOW STUDIES

Necessity of power flow studies – Derivation of static power flow equations – Power flow solution using Gauss-Seidel Method – Newton Raphson Method (Rectangular and polar coordinates form) –Decoupled and Fast Decoupled methods – Algorithmic approach – Problems on 3–bus system only.

UNIT –III:Z_{BUS} FORMULATION

Formation of Z_{BUS}: Partial network– Algorithm for the Modification of Z_{BUS} Matrix for addition element for the following cases: Addition of element from a new bus to reference– Addition of element from a new bus to an old bus– Addition of element between an old bus to reference and Addition of element between two old busses (Derivations and Numerical Problems).– Modification of Z_{BUS} for the changes in network (Problems).

UNIT – IV:SYMMETRICAL FAULT ANALYSIS

Transients on a Transmission line-Short circuit of synchronous machine(on no-load) - 3– Phase short circuit currents and reactances of synchronous machine–Short circuit MVA calculations -Series reactors – selection of reactors.

UNIT –V:SYMMETRICAL COMPONENTS & FAULT ANALYSIS

Definition of symmetrical components - symmetrical components of unbalanced three phase systems – Power in symmetrical components – Sequence impedances – Synchronous generator – Transmission line and transformers – Sequence networks –Various types of faults LG– LL– LLG and LLL on unloaded alternator–unsymmetrical faults on power system.

UNIT – VI:POWER SYSTEM STABILITY ANALYSIS

Elementary concepts of Steady state– Dynamic and Transient Stabilities– Description of Steady State Stability Power Limit–Transfer Reactance–Synchronizing Power Coefficient – Power Angle Curve and Determination of Steady State Stability –Derivation of Swing Equation–Determination of Transient Stability by Equal Area Criterion–Applications of Equal Area Criterion–Methods to improve steady state and transient stability.

TEXT BOOKS:

1. Power System Analysis by Grainger and Stevenson, Tata McGraw Hill, 1994.
2. Modern Power system Analysis – by I. J. Nagrath& D. P. Kothari: Tata McGraw–Hill Publishing Company, 2nd edition,2011.

REFERENCE BOOKS:

1. Power System Analysis – by A.R.Bergen, Prentice Hall, Inc, 1999.
2. Power System Analysis by HadiSaadat – TMH Edition, 2002.
3. Power System Analysis by B.R.Gupta, Wheeler Publications, 1998.
4. Power System Analysis and Design by J.Duncan Glover, M.S.Sarma, T.J.Overbye –Cengage Learning publications, 2017.

Programme : **B. Tech - Electrical & Electronics Engineering,** **Semester: V**

Electronics & Communication Engineering&

Electronics & Communication Technology

Course Code : V18EET15

Course Name : Control Systems **[L : 3; T:1; P : 0 (4 credits)]**

Course Outcomes

After successful completion of this course, students will be able to

CO No.	Course Outcome	Knowledge Level
C304.1	Determine the mathematical modelling of physical systems	(K3)
C304.2	Calculation of Time Domain Specification of first and second order systems and understand the effect of Controllers	(K3)
C304.3	Investigate the stability of closed loop systems using Routh's stability criterion and root locus method.	(K3)
C304.4	Find the stability of control systems using frequency response approaches.	(K3)
C304.5	Discuss the basic aspects of design and compensation of linear control systems using bode plot.	(K3)
C304.6	Analyze physical systems using state space approach.	(K4)

UNIT – I:MATHEMATICAL MODELING OF CONTROL SYSTEMS

Classification of control systems, Open Loop and closed loop control systems and their differences, Feed-Back Characteristics, transfer function of linear system, Differential equations of electrical networks, Translational and Rotational mechanical systems, Transfer Function of DC Servo motor - AC Servo motor- Synchro, transmitter and receiver - Block diagram algebra – Representation by Signal flow graph - Reduction using Mason's gain formula.

UNIT-II:TIME RESPONSE ANALYSIS

Standard test signals - Time response of first and second order systems - Time domain specifications - Steady state errors and error constants – Effects of various controllers

UNIT – III:STABILITY AND ROOT LOCUS TECHNIQUE

The concept of stability – Routh's stability criterion –limitations of Routh's stability –Root locus concept - construction of root loci (Simple problems)

UNIT–IV:FREQUENCY RESPONSE ANALYSIS

Introduction to Frequency domain specifications-Bode diagrams- transfer function from the Bode Diagram-Phase margin and Gain margin-Stability Analysis from Bode Plots, Polar Plots, Nyquist Stability criterion.

UNIT–V:CLASSICAL CONTROL DESIGN TECHNIQUES

Lag, Lead, Lag-Lead compensators, design of compensators – using Bode plots.

UNIT–VI:STATE SPACE ANALYSIS OF LTI SYSTEMS

Concepts of state, state variables and state model, state space representation of transfer function, Diagonalization-Solving the time invariant state equations- State Transition Matrix and it's Properties – Concepts of Controllability and Observability.

TEXT BOOKS:

1. Control Systems principles and design, M. Gopal, Tata McGraw Hill education Pvt Ltd., 4th Edition, 2014.
2. Automatic control systems, Benjamin C. Kuo, Prentice Hall of India,2ndEdition, 2014.

REFERENCE BOOKS:

1. Modern Control Engineering, Kotsuhiko Ogata, Prentice Hall of India, 2002.
2. Control Systems, ManikDhanesh N, Cengage Publications, 2012.
3. Control Systems Engineering, I.J.Nagarath and M.Gopal, Newage International Publications, 5th Edition, 2007.
4. Control Systems Engineering, S.Palani, Tata McGraw Hill Publications, 2009.

Programme : **B. Tech - Electrical & Electronics Engineering** **Semester: V**

Course Code : V18EET16

Course Name : Signals and Systems **[L : 3; T:1; P : 0 (4 credits)]**

Course Outcomes

After Successful completion of this course, students will be able to

CO No.	Course Outcome	Knowledge Level
C305.1	Understand and estimate various types of signals and systems.	(K2)
C305.2	Understand the basic principles of Sampling Theorem.	(K2)
C305.3	Understand the characteristics of LTI and LTV Systems and Determine the Transfer Function of LTI.	(K3)
C305.4	Understand the concepts of Cross-Correlation and Auto-Correlation of Functions	(K2)
C305.5	Differentiate Laplace Transform, Fourier Transform and apply the concept of Laplace Transform to certain signals using waveform synthesis.	(K4)
C305.6	Distinguish Laplace Transform, Fourier Transform and Z-Transforms by understanding the principles and properties of Z-Transform and its Inverse Transform.	(K4)

UNIT- I:INTRODUCTION

Definition of Signals and Systems, Classification of Signals, Classification of Systems, Operations on signals: time-shifting, time-scaling, amplitude-shifting, amplitude-scaling. Problems on classification and characteristics of Signals and Systems. Complex exponential and sinusoidal signals, Singularity functions and related functions: impulse function, step function signum function and ramp function. Analogy between vectors and signals, orthogonal signal space, Signal approximation using orthogonal functions, Mean square error, closed or complete set of orthogonal functions, Orthogonality in complex functions.

UNIT –II:SAMPLING THEOREM

Graphical and analytical proof for Band Limited Signals, impulse sampling, Natural and Flat top Sampling, Reconstruction of signal from its samples, effect of under sampling – Aliasing, Introduction to Band Pass sampling.

UNIT-III:ANALYSIS OF LINEAR SYSTEMS

Linear system, impulse response, Response of a linear system, Linear time invariant (LTI) system, Linear time variant (LTV) system, Concept of convolution in time domain and frequency domain, Graphical representation of convolution, Transfer function of a LTI system. Filter characteristics of linear systems. Distortion less transmission through a system, Signal bandwidth, system bandwidth, Ideal LPF, HPF and BPF characteristics, Causality and Poly-Wiener criterion for physical realization, relationship between bandwidth and rise time.

UNIT-IV:CROSS-CORRELATION AND AUTO-CORRELATION OF FUNCTIONS

Properties of correlation function, Energy density spectrum, Parseval's theorem, Power density spectrum, Relation between auto correlation function and energy/power spectral density function. Relation between convolution and correlation, Detection of periodic signals in the presence of noise by correlation, Extraction of signal from noise by filtering.

UNIT –V:LAPLACE TRANSFORMS

Review of Laplace transforms, Partial fraction expansion, Inverse Laplace transform, Concept of region of convergence (ROC) for Laplace transforms, constraints on ROC for various classes of signals, Properties of L.T's, Relation between L.T's, and F.T. of a signal. Laplace transform of certain signals using waveform synthesis.

UNIT –VI:Z–TRANSFORMS

Fundamental difference between continuous-time and discrete-time signals, discrete time signal representation using complex exponential and sinusoidal components, Periodicity of discrete time using complex exponential signal, Concept of Z- Transform of a discrete sequence. Distinction between Laplace, Fourier and Z transforms. Region of convergence in Z-Transform, constraints on ROC for various classes of signals, Inverse Z-transform, properties of Z-transforms.

TEXT BOOKS:

1. Signals, Systems & Communications - B.P. Lathi, BS Publications, 2003.
2. Signals and Systems - A.V. Oppenheim, A.S. Willsky and S.H. Nawab, PHI, 2nd Edn, 1996.
3. Signals & Systems- Narayan Iyer and K Satya Prasad, Cenage Publications, 1996.

REFERENCE BOOKS:

1. Signals & Systems - Simon Haykin and Van Veen, Wiley, 2nd Edition, 2017.
2. Principles of Linear Systems and Signals – BP Lathi, Oxford University Press, 2015
3. Signals and Systems – K Raja Rajeswari, B VisweswaraRao, PHI, 2009
4. Fundamentals of Signals and Systems- Michel J. Robert, MGH International Edition, 2008.
5. Signals and Systems – T K Rawat , Oxford University press, 2011

Programme : **B. Tech - Electrical & Electronics Engineering** **Semester: V**

Course Code : V18MBT51

Course Name : Managerial Economics and Financial Analysis **[L : 3; T:0; P : 0 (3 credits)]**

(Already Approved by BOS of MBA)

Course Outcomes

After Successful completion of this course, students will be able to

CO No.	Course Outcome	Knowledge Level
C306.1	Understand the basic concepts of managerial economics, demand, and elasticity of demand and methods of demand forecasting.	(K2)
C306.2	Estimate the production function with one, two and infinite variables. Understand various cost concepts and calculating breakeven point	(K2)
C306.3	Understand and showing a price output determination in different types of market structures and knowing various pricing methods	(K2)
C306.4	Understand various forms of business organizations	(K2)
C306.5	Prepare financial statements and its analysis.	(K3)
C306.6	Appraise the projects by using various capital budgeting methods	(K4)

UNIT-I:INTRODUCTION TO MANAGERIAL ECONOMICS AND DEMAND ANALYSIS:

Definition of Managerial Economics -Scope of Managerial Economics and its relationship with other subjects - Concept of Demand, Types of Demand, Determinants of Demand, Demand schedule, Demand curve, Law of Demand and its limitations- Elasticity of Demand, Types of Elasticity of Demand and Measurement- Demand forecasting and Methods of forecasting.

UNIT-II: **PRODUCTION AND COST ANALYSES**

Concept of Production function- Cobb Douglas Production function- Law of Variable proportions-Isoquants and Isocosts and choice of least cost factor combination-Concepts of Returns to scale and Economies of scale-Different cost concepts: opportunity costs, explicit and implicit costs- Fixed costs, Variable Costs and Total Cost-Cost-Volume-Profit analysis Determination of Breakeven point(simple problems)Managerial significance and limitations of Breakeven point.

UNIT-III: INTRODUCTION TO MARKETS, & PRICING POLICIES

Market Structures: Perfect Competition, Monopoly, Monopolistic competition and Oligopoly - Features - Price and Output Determination- Methods of Pricing: Average cost pricing, Limit Pricing, Market Skimming Pricing, Internet Pricing, Flat Rate Pricing, Usage sensitive pricing and Priority Pricing.

UNIT-IV:TYPES OF BUSINESS ORGANIZATION AND BUSINESS CYCLES

Features and Evaluation of Sole Trader, Partnership, Joint Stock Company ñ State/Public Enterprises and their forms - Business Cycles : Meaning and Features - Phases of Business Cycle.

UNIT-V:INTRODUCTION TO ACCOUNTING & FINANCING ANALYSIS

Introduction to Double Entry Systems- Preparation of Financial Statements-Analysis and Interpretation of Financial Statements-Ratio Analysis

UNIT-VI: **CAPITAL AND CAPITAL BUDGETING**

Capital Budgeting: Meaning of Capital Capitalization-Meaning of Capital Budgeting-Time value of money- Methods of appraising Project profitability: Traditional Methods and modern methods (simple problems)

TEXT BOOKS:

1. Managerial Economics and Financial Analysis by Dr. N. Appa Rao, Dr. P. Vijay Kumar, Cengage Publications, New Delhi ñ 2011
2. Managerial Economics and Financial Analysis by Dr. A. R. Aryasri, TMH 2011
3. Managerial Economics and Financial Analysis, Prof. J.V. Prabhakararao, Prof. P. Venkatarao, Ravindra Publication.

REFERENCE BOOKS:

1. Managerial Economics & Financial Analysis by Dr. B. Kuberudu and Dr. T. V. Ramana, Himalaya Publishing House, 2014.
2. Managerial Economics by V. Maheswari, Sultan Chand 2014.
3. Managerial Economics by Suma Damodaran, Oxford 2011.
4. Managerial Economics by Vanitha Agarwal, Pearson Publications 2011.
5. Financial Accounting for Managers by Sanjay Dhameja, Pearson.
6. Financial Accounting by Maheswari, Vikas Publications.
7. Managerial Economics and Financial Analysis by S. A. Siddiqui & A. S. Siddiqui, New Age International Publishers, 2012.
8. Indian Economy by Ramesh Singh, 7th Edn, TMH2015.
9. A Text Book of Microeconomic Theory by Pankaj Tandon, Sage Publishers, 2015.

Programme : **B. Tech - Electrical & Electronics Engineering** **Semester: V**

Course Code : V18EEL06

Course Name : Electrical Machines Laboratory - II **[L : 0; T:0; P : 2 (1 credits)]**

Course Outcomes

After Successful completion of this course, students will be able to

CO No.	Course Outcome	Knowledge Level
C307.1	Pre-determine the performance parameters of 3-phase induction motor by conducting no-load and blocked rotor tests.	(K3)
C307.2	Sketch the performance characteristics of 3-phase induction motor by conducting brake test.	(K3)
C307.3	Pre-determine the performance parameters of cylindrical pole synchronous machine by conducting OC and SC tests.	(K3)
C307.4	Determine the direct and quadrature axis reactances by conducting slip test.	(K3)
C307.5	Determine V and inverted V curves through synchronization of synchronous machine to mains.	(K3)
C307.6	Calculate the equivalent circuit parameters of a 1-phase transformer by conducting OC and SC Tests.	(K3)

The following experiments are required to be conducted as compulsory experiments:

1. Brake test on three phase Induction Motor
2. No–load & Blocked rotor tests on three phase Squirrel Cage Induction motor
3. Load test on three phase slip ring induction motor
4. No–load & Blocked rotor tests on three phase Slip Ring Induction motor
5. Regulation of a three –phase alternator by synchronous impedance &m.m.f. Methods
6. Regulation of three–phase alternator by Potier triangle method
7. V and Inverted V curves of a three—phase synchronous motor.
8. Determination of Xd and Xq of a salient pole synchronous machine
9. Equivalent circuit of single phase induction motor

10. Speed control of induction motor by V/f method.

11. Determination of efficiency of three phase alternator by loading with three phase induction motor.

12. Power factor improvement of single phase induction motor by using capacitors and load test on single phase induction motor.

13. Heat run test on a bank of 3 Nos. of single phase Delta connected transformers.

Programme : **B. Tech - Electrical & Electronics Engineering** **Semester: V**

Course Code : V18EEL07

Course Name : **Control Systems Laboratory** **[L : 0; T:0; P : 2 (1 credits)]**

Course Outcomes
After Successful completion of this course, students will be able to

CO No.	Course Outcome	Knowledge Level
C308.1	Find time response of given control system model.	(K3)
C308.2	Analyze the performance and working of Magnetic amplifier, D.C. servo motors, A.C. Servo motors and synchronous motors.	(K4)
C308.3	Analyze PID controllers for given control system model.	(K4)
C308.4	Analyze lead, lag and lead-lag systems in control system	(K4)
C308.5	Determine the transfer function of D.C. motor and D.C Generator.	(K4)
C308.6	Examine the control of temperature using PID controller.	(K3)

Any 10 of the following experiments are to be conducted:

1. Time response of Second order system

2. Characteristics of Synchros

3. Programmable logic controller – characteristics of stepper motor

4. Effect of feedback on DC servo motor

5. Effect of P, PD, PI, PID Controller on a second order systems

6. Lag and lead compensation – Magnitude and phase plot

7. DC position control system

8. Transfer function of DC motor

9. Temperature controller using PID

10. Characteristics of magnetic amplifiers

11. Characteristics of AC servo motor

12. Characteristics of DC servo motor

13. Potentiometer as an error detector

Programme : **B. Tech - Electrical & Electronics Engineering** **Semester: VI**

Course Code : V18EET17

Course Name : Electrical Drives **[L : 3; T:1; P : 0 (4 credits)]**

Course Outcomes

After Successful completion of this course, students will be able to

CO No.	Course Outcome	Knowledge Level
C311.1	Understand the fundamentals concept about an electric drive and different electric braking methods	(K2)
C311.2	Operate Chopper fed DC motor drives in various quadrants	(K4)
C311.3	Understand the closed loop operation of chopper fed dc motor drives	(K2)
C311.4	Compute the change in speed of three phase induction motor using solid state converters	(K3)
C311.5	Illustrate the speed control of induction motor using scalar control methods	(K3)
C311.6	Analyze the speed control of induction motor using rotor resistance control and various slip power recovery schemes	(K4)

UNIT-I: DC MOTOR CHARACTERISTICS

Review of emf and torque equations of DC machine, review of torque-speed characteristics of separately excited dc motor, change in torque-speed curve with armature voltage, example load torque-speed characteristics, operating point, armature voltage control for varying motor speed, flux weakening for high speed operation.

UNIT-II: CHOPPER FED DC DRIVES

Review of dc chopper and duty ratio control, chopper fed dc motor for speed control, steady state operation of a chopper fed drive, armature current waveform and ripple calculation. Single-quadrant, two-quadrant and four-quadrant choppers fed dc drive; steady-state operation of multi-quadrant chopper fed dc drives, regenerative braking.

UNIT-III: CLOSED-LOOP CONTROL OF DC DRIVES

Control structure of DC drive, inner current loop and outer speed loop, dynamic model of dc motor – dynamic equations and transfer functions, modeling of chopper as gain with switching delay, plant transfer function, for controller design, current controller specification and design, speed controller specification and design.

UNIT-IV: INDUCTION MOTOR CHARACTERISTICS

Review of induction motor equivalent circuit and torque-speed characteristic, variation of torque- speed curve with (i) applied voltage, (ii) applied frequency and (iii) applied voltage and frequency, typical torque-speed curves of fan and pump loads, operating point, constant flux operation, flux weakening operation.

UNIT-V: SCALAR CONTROL OR CONSTANT V/F CONTROL OF INDUCTION MOTOR

Review of three-phase voltage source inverter, generation of three-phase PWM signals, sinusoidal modulation, space vector theory, conventional space vector modulation; constant V/f control of induction motor, steady-state performance analysis based on equivalent circuit, speed drop with loading, slip regulation.

UNIT-VI: CONTROL OF SLIP RING INDUCTION MOTOR

Impact of rotor resistance of the induction motor torque-speed curve, operation of slip-ring induction motor with external rotor resistance, starting torque, power electronic based rotor side control of slip ring motor, slip power recovery.

TEXT BOOKS

1. Power Semiconductor Controlled Drives by G. K. Dubey, Prentice Hall, 1989.
2. Electric Motor Drives: Modeling, Analysis and Control by R. Krishnan, Prentice Hall, 2001.

REFERENCE BOOKS

1. Fundamentals of Electrical Drives by G. K. Dubey, CRC Press, 2002.
2. Control of Electric Drives by W. Leonhard, Springer Science & Business Media, 2001.

Programme : **B. Tech - Electrical & Electronics Engineering** **Semester: VI**

Course Code : V18EET18

Course Name : Utilization of Electrical Energy **[L : 3; T:0; P : 0 (3 credits)]**

Course Outcomes

After Successful completion of this course, students will be able to

CO No.	Course Outcome	Knowledge Level
C311.1	Choose a suitable motor for electric drives and industrial applications	(K3)
C311.2	Identify appropriate heating techniques for different applications	(K3)
C311.3	Identify appropriate welding techniques for different applications	(K3)
C311.4	Recognise lightning system for particular inputs and constraints in view	(K2)
C311.5	Determine the speed-time characteristics of traction motors	(K3)
C311.6	Estimate energy consumption levels at various modes of operation	(K3)

UNIT – I: SELECTION OF MOTORS

Choice of motor, type of electric drives, starting and running characteristics – Speed control – Temperature rise – Applications of electric drives – Types of industrial loads – Continuous, Intermittent and variable loads – Load equalization.

UNIT – II: ELECTRIC HEATING

Advantages and methods of electric heating–Resistance heating, induction heating and dielectric heating – Arc furnaces – Direct and indirect arc furnaces.

UNIT – III: ELECTRIC WELDING

Classification - Resistance welding and types - Arc welding and types – Electric welding equipment–Comparison between AC and DC Welding

UNIT – IV: ILLUMINATION

Basic terms used in illumination – Laws of illumination – MHCP and MSCP - Polar curves – Sources of light: Working of Filament lamps, Arc lamps and Discharge lamps.

Basic principles of light control – Types of lighting schemes – Street, Flood and LED lighting – Lumen or flux method of lighting calculation – Numerical Examples.

UNIT – V: ELECTRIC TRACTION – I

Review of existing electric traction systems in India – System of electric traction and track electrification– Special features of traction motor – Mechanics of train movement – Speed-time curves for different services – Trapezoidal and quadrilateral speed time curves – High speed transportation trains.

UNIT – VI: ELECTRIC TRACTION – II

Calculations of tractive effort– power –Specific energy consumption for given run–Effect of varying acceleration and braking retardation–Adhesive weight and braking, retardation adhesive weight and coefficient of adhesion–Modern traction motors.

TEXT BOOKS:

1. Utilization of Electric Energy by E. Openshaw Taylor, SI Edition, Orient Longman, 1971.
2. Art and Science of Utilization of Electrical Energy by H. Partab, DhanpatRai& Sons, 2006.

REFERENCE BOOKS:

1. Utilization of Electrical Power including Electric drives and Electric traction – by N. V. Suryanarayana, New Age International (P) Limited, Publishers, 1996.
2. Generation, Distribution and Utilization of electrical Energy – by C.L. Wadhwa, New Age International (P) Limited, Publishers, 1997.

Programme : **B. Tech - Electrical & Electronics Engineering** **Semester: VI**

Course Code : V18EET19

Course Name : Advanced Control Systems **[L : 3; T:0; P : 0 (3 credits)]**

Course Outcomes

After Successful completion of this course, students will be able to

CO No.	Course Outcome	Knowledge Level
C311.1	Understand the concepts of State Space Analysis	(K2)
C311.2	Find the concepts of Controllability, Observability and development of pole placement techniques	(K3)
C311.3	Demonstrate the non-linear systems behaviour by Phase Plane and describing function analysis	(K3)
C311.4	Compute the stability of linear and non-linear systems by Lypunov's Method	(K3)
C311.5	Illustrate the principle of Calculus of Variation, Optimality and its Applicants	(K3)
C311.6	Develop the Linear quadratic Regulator (LQR) and Optimal regulator design by using Lypunov's Method	(K3)

UNIT – I: STATE SPACE ANALYSIS

Introduction to State Space Analysis, State Space Representation using physical, phase and Canonical variables.

UNIT – II: CONTROLLABILITY, OBSERVABILITY AND DESIGN OF POLE PLACEMENT

Tests for controllability and observability for continuous time systems – Time varying case – Minimum energy control – Time invariant case – Principle of duality – Controllability and observability form Jordan canonical form and other canonical forms – Effect of state feedback on controllability and observability – Design of state feedback control through pole placement.

UNIT – III: DESCRIBING FUNCTION ANALYSIS

Introduction to nonlinear systems, Types of nonlinearities, describing functions, Introduction to phase–plane analysis.

UNIT–IV: STABILITY ANALYSIS

Stability in the sense of Lyapunov – Lyapunov's stability and Lypanov's instability theorems – Direct method of Lyapunov for the linear and nonlinear continuous time autonomous systems.

UNIT–V: CALCULUS OF VARIATIONS

Minimization of functional of single function – Constrained minimization – Minimum principle – Control variable inequality constraints – Control and state variable inequality constraints – Euler lagrangine equation.

UNIT –VI: OPTIMAL CONTROL

Linear Quadratic Optimal Regulator (LQR) problem formulation – Optimal regulator design by parameter adjustment (Lyapunov method) – Optimal regulator design by Continuous Time Algebraic Riccatti equation (CARE) - Optimal controller design using LQG framework.

TEXT BOOKS:

1. Modern Control Engineering – by K. Ogata, Prentice Hall of India, 3rd edition, 1998.
2. Automatic Control Systems by B.C. Kuo, Prentice Hall Publication, 9th edition, 2014.

REFERENCE BOOKS:

1. Modern Control System Theory – by M. Gopal, New Age International Publishers, 2nd edition,1996.
2. Control Systems Engineering by I.J. Nagarath and M.Gopal, New Age International (P) Ltd, 6th edition, 2018.
3. Digital Control and State Variable Methods – by M. Gopal, Tata McGraw–Hill Companies, 4th Edition, 2017.
4. Systems and Control by Stainslaw H. Zak , Oxford Press, 1st Edition, 2003.
5. Optimal control theory: an Introduction by Donald E.Kirk by Dover publications,1st Edition, 2004.

Programme : **B. Tech - Electrical & Electronics Engineering** **Semester: VI**

Course Code : V18EET20

Course Name : Renewable Energy Systems **[L : 3; T:0; P : 0 (3 credits)]**

Course Outcomes

After Successful completion of this course, students will be able to

CO No.	Course Outcome	Knowledge Level
C311.1	Understand the solar radiation and calculate geometric angle	(K3)
C311.2	Understand the working of solar thermal collectors	(K2)
C311.3	Understand the working of solar photo voltaic systems and develop the maximum power point techniques	(K3)
C311.4	Understand the wind energy conversion systems ,Betz coefficient and tip speed ratio	(K2)
C311.5	Understand the basic principle and working of hydro and tidal systems.	(K2)
C311.6	Understand the basic principle and working of, biomass, fuel cell and geothermal systems.	(K2)

UNIT–I: FUNDAMENTALS OF ENERGY SYSTEMS AND SOLAR ENERGY ENERGY CONSERVATION PRINCIPLE

Energy scenario (world and India) – various forms of renewable energy - Solar radiation: Outside earth's atmosphere – Earth surface – Analysis of solar radiation data – Geometry – Radiation on tilted surfaces – Numerical problems.

UNIT–II: SOLAR THERMAL SYSTEMS

Liquid flat plate collectors: Performance analysis –Transmissivity– Absorptivity product collector efficiency factor – Collector heat removal factor – Numerical problems. Introduction to solar air heaters – Concentrating collectors, solar pond and solar still – solar thermal plants.

UNIT–III: SOLAR PHOTOVOLTAIC SYSTEMS

Solar photovoltaic cell, module, array – construction – Efficiency of solar cells – Developing technologies – Cell I-V characteristics – Equivalent circuit of solar cell – Series resistance – Shunt resistance – Applications and systems – Balance of system components - System design: storage sizing – PV system sizing – Maximum power point techniques: Perturb and observe (P&O) technique – Hill climbing technique.

UNIT–IV: WIND ENERGY

Sources of wind energy - Wind patterns – Types of turbines –Horizontal axis and vertical axis machines - Kinetic energy of wind – Betz coefficient – Tip–speed ratio – Efficiency – Power output of wind turbine – Selection of generator(synchronous, induction) – Maximum power point tracking – wind farms – Power generation for utility grids.

UNIT–V: HYDRO AND TIDAL POWER SYSTEMS

Basic working principle – Classification of hydro systems: Large, small, micro – measurement of head and flow – Energy equation – Types of turbines – Numerical problems. Tidal power – Basics – Kinetic energy equation – Turbines for tidal power - Numerical problems – Wave power – Basics – Kinetic energy equation – Wave power devices – Linear generators.

UNIT–VI: BIOMASS, FUEL CELLS AND GEOTHERMAL SYSTEMS BIOMASS ENERGY

Fuel classification – Pyrolysis – Direct combustion of heat – Different digesters and sizing. Fuel cell: Classification of fuel for fuel cells – Fuel cell voltage– Efficiency – V-I characteristics. Geothermal: Classification – Dry rock and hot acquifer – Energy analysis – Geothermal based electric power generation

TEXT BOOKS:

1. Solar Energy: Principles of Thermal Collection and Storage, S. P. Sukhatme and J. K. Nayak, TMH, New Delhi, 3rd Edition, 2013.
2. Renewable Energy Resources, John Twidell and Tony Weir, Taylor and Francis - second edition,2013.

REFERENCE BOOKS:

1. Energy Science: Principles, Technologies and Impacts, John Andrews and Nick Jelly, Oxford University Press, 2nd edition, 2013.
2. Renewable Energy- Edited by Godfrey Boyle-oxford university.press,3rd edition,2013.
3. Handbook of renewable technology Ahmed and Zobaa, Ramesh C Bansal, World scientific, Singapore, 2011.
4. Renewable Energy Technologies /Ramesh & Kumar /Narosa.
5. Renewable energy technologies – A practical guide for beginners – Chetong Singh Solanki, PHI, 2008.
6. Non conventional energy source –B.H.khan- TMH-2nd edition, 2017.

7. **Programme** : **B. Tech - Electrical & Electronics Engineering** **Semester: VI**

Course Code : V18EET21

Course Name : Advanced Power Electronics **[L : 3; T:0; P : 0 (3 credits)]**

Course Outcomes

After Successful completion of this course, students will be able to

CO No.	Course Outcome	Knowledge Level
C309.1	Analyze and design power converter configurations for specific applications	(K3)
C309.2	Design power electronic converters to improve power quality	(K3)
C309.3	Analyze and design resonant converters	(K3)
C309.4	Develop power converter models under steady state and small signal conditions	(K3)
C309.5	Determine duty cycle and transfer functions for buck, boost and buck-boost converters	(K3)
C309.6	Synthesize and design magnetic components for power converters	(K4)

UNIT-I: DC-DC CONVERTERS

Non-isolated DC-DC converters: buck, boost, buck-boost, CUK converters under continuous and discontinuous conduction operation - Isolated DC-DC converters: forward, fly-back, push-pull, half-bridge and full-bridge converters - Relationship between I/P and O/P voltages – design of filter inductor and capacitors.

UNIT-II: FRONT-END (AC-DC) CONVERTERS

Conventional methods of power factor improvements: Semi converter, extinction angle control, symmetrical angle control – active front-end converters-Single phase: Boost, voltage doubler and PWM rectifiers –voltage and current controlled three-phase PWM rectifiers

UNIT-III: RESONANT CONVERTERS

Introduction, Basic resonant circuit concepts, Classification - Load resonant converters, resonant switch converters, Zero voltage switching clamped voltage converters, Resonant DC link inverters High frequency link integral half cycle converters, Phase modulated resonant converters, Dual active bridge converters, High gain converters.

UNIT-IV: MODELLING OF DC-DC CONVERTERS

Basic ac modelling approach, State space averaging, Circuit averaging and averaged switch modelling, Canonical circuit modelling, Converter transfer functions for buck, boost and buck-boost topologies.

UNIT-V: CURRENT MODE CONTROL

Introduction, types, advantages and disadvantages, Slope compensation, Determination of duty cycle and transfer functions for buck, boost and buck-boost converters.

UNIT-VI: DESIGN OF POWER CONVERTERS COMPONENTS

Design of magnetic components - design of transformer, design of inductor and current transformer - Selection of filter capacitors, Selection of ratings for devices, input filter design, Thermal design.

TEXT BOOKS:

1. Power Electronics-Circuits, Devices & Applications by M.H. Rashid, Pearson, 4thedition, 2013.
2. Power Electronics: Converters, Applications & Design by N. Mohan, T.M. Undeland, W.P. Robbins, J.Wiley & Sons, 3rd Edition, 2003.
3. Power Electronics by Daniel W. Hart, McGraw-Hill, 2011.

REFERENCES BOOKS:

1. Switching Power Supply Design by Abraham I. Pressman, Keith Billings & Taylor Morey, McGraw Hill International, 3rd Edition, 2009.
2. Fundamentals of Power Electronics by R.W. Erickson and Dragan Maksimonic, Springer, 2nd Edition, 2001.
3. Power Electronics: Essentials and Applications by Umanand.L, John Wiley India, 1st Edition, 2009.

Programme : **B. Tech - Electrical & Electronics Engineering** **Semester: VI**

Course Code : V18EET22

Course Name : HVAC & HVDC Transmission **[L : 3; T:0; P : 0 (3 credits)]**

Course Outcomes

After Successful completion of this course, students will be able to

CO No.	Course Outcome	Knowledge Level
C312.1	Calculate electrical parameters of EHVAC lines	(K3)
C312.2	Compute corona loss , radio interference and excitation function	(K3)
C312.3	Understand the phenomena of HVDC transmission systems	(K2)
C312.4	Choose suitable converter configuration for HVDC converters and system control	(K4)
C312.5	Understand the requirements of reactive power control in HVDC systems	(K2)
C312.6	Calculate various parameters required for designing filters	(K3)

UNIT – I: INTRODUCTION OF EHV AC TRANSMISSION

Necessity of EHV AC transmission – Advantages and problems – Power handling capacity and line losses – Mechanical considerations – Resistance of conductors –Electrostatics – Field of sphere gap – Field of line charges and properties – Charge ~ potential relations for multi–conductors – Surface voltage gradient on conductors – Bundle spacing and bundle radius – Examples – Distribution of voltage gradient on sub conductors of bundle – Examples.

UNIT – II: CORONA EFFECTS

Power loss and audible noise (AN) – Corona loss formulae – Charge voltage diagram – Generation – Characteristics – Limits and measurements of AN – Relation between 1–phase and 3–phase AN levels – Examples – Radio interference (RI) – Corona pulses generation – Properties and limits – Frequency spectrum – Modes of propagation – Excitation function – Measurement of RI, RIV and excitation functions – Examples.

UNIT – III: BASIC CONCEPTS OF DC TRANSMISSION ECONOMICS & TERMINAL EQUIPMENT OF HVDC TRANSMISSION SYSTEMS

Types of HVDC Links – Apparatus required for HVDC Systems – Comparison of AC &DC transmission – Application of DC Transmission System – Planning & Modern trends in DC transmission.

UNIT – IV: ANALYSIS OF HVDC CONVERTERS AND SYSTEM CONTROL

Choice of Converter configuration – Analysis of Graetz – Characteristics of 6 Pulse & 12 Pulse converters – Cases of two 3 phase converters in Star – Star mode and their performance – Principal of DC Link Control – Converters Control Characteristics – Firing angle control – Current and extinction angle control – Effect of source inductance on the system – Starting and stopping of DC link – Power Control.

UNIT–V: REACTIVE POWER CONTROL IN HVDC

Reactive Power Requirements in steady state – Conventional control strategies –Alternate control strategies sources of reactive power – AC Filters – Shunt capacitors – Synchronous condensers.

UNIT – VI: HARMONICS AND FILTERS

Generation of Harmonics – Characteristics harmonics – Calculation of AC Harmonics – Non–Characteristics harmonics – Adverse effects of harmonics – Calculation of voltage & current harmonics – Effect of Pulse number on harmonics. Types of AC filters, Design of Single tuned filters – Design of High pass filters.

TEXT BOOKS:

1. HVDC Power Transmission Systems: Technology and system Interactions – by K.R.Padiyar, New Age International (P) Limited and Publishers, 2nd Edition, 2005.

2. Direct Current Transmission – by E.W.Kimbark, John Wiley & Sons, Volume1, 1971.

3. EHVAC Transmission Engineering by R. D. Begamudre, New Age International (P) Ltd, 3rd Edition, 2006.

REFERENCE BOOKS:

1. EHVAC and HVDC Transmission Engineering and Practice – S.Rao, Khanna Publishers, 3rd Edition, 1993.

2. Power Transmission by Direct Current – by E.Uhlmann, B.S.Publications, 2004.

3. HVDC Transmission – J. Arrillaga, IET Publishers, 1998.

Programme : **B. Tech - Electrical & Electronics Engineering** **Semester: VI**

Course Code : V18EET23

Course Name : Programmable Logic Controllers andits Applications **[L : 3; T:0; P : 0 (3 credits)]**

Course Outcomes

After Successful completion of this course, students will be able to

CO No.	Course Outcome	Knowledge Level
C312.1	Understand working of PLC, I/O Modules of PLC and PLC Ladder design	(K2)
C312.2	Understand different types of devices to which PLC Input and Output modules are connected	(K2)
C312.3	Apply of PLC timers and counters for the control of Industrial process	(K3)
C312.4	Illustrate the program control instructions	(K3)
C312.5	Demonstrate the Data Manipulation, Arithmetic, Logical and Sequential Instructions of PLC's	(K3)
C312.6	Development of different Applications using PLC's	(K3)

UNIT I: INTRODUCTION

PLC Basics: PLC system, I/O modules and interfacing, CPU processor, programming equipment, programming formats, construction of PLC ladder diagrams, devices connected to I/O modules.

UNIT II: PLC PROGRAMMING

PLC Programming: Input instructions, outputs, operational procedures, programming examples using contacts and coils. Digital logic gates, programming in the Boolean algebra system, conversion examples. Ladder diagrams and sequence listings, ladder diagram construction.

UNIT III: PROGRAMMABLE TIMERS AND COUNTERS

Timer instructions – On delay time instruction – Off delay timer instruction – Retentive timer – Counter instructions – Up counter – Down counter - Cascading counters - Incremental encoder – Counter applications – Combining counter and timer functions.

UNIT IV: PROGRAM CONTROL INSTRUCTIONS

Master control reset instruction – Jump instructions and sub routines – Immediate input and output instructions.

UNIT V: OTHER INSTRUCTIONS

Data manipulation – Data transfer operation – Data compare instruction – Data manipulation programs – Numerical data I/O interfaces – Math instructions – Addition, subtraction, multiplication & division instruction – Sequential instructions – Sequence programs – Shift registers – Word shift registers.

UNIT VI: APPLICATIONS

Control of water level indicator – Alarm monitor - Conveyor motor control – Parking garage – Ladder diagram for process control – PID controller.

TEXT BOOKS:

1. Programmable logic controllers by Frank D. Petruzella- McGraw Hill – 3rd Edition, 2014.
2. Programmable Logic Controllers – Principle and Applications by John W. Webb and Ronald A. Reiss, Fifth Edition, PHI, 1999.

REFERENCE BOOKS:

1. Programmable Logic Controllers – Programming Method and Applications by JR. Hackworth and F.D Hackworth Jr. – Pearson, 2004.
2. Introduction to Programmable Logic Controllers- Gary Dunning- Cengage Learning, 3rd Edition, 2005.
3. Programmable Logic Controllers –W. Bolton-Elsevier publisher, 6th Edition, 2015.

Programme : **B. Tech - Electrical & Electronics Engineering** **Semester: VI**
Course Code : V18EET24
Course Name : Electrical Energy Conservation, Management & Auditing **[L : 3; T:0; P : 0 (3 credits)]**

Course Outcomes

After Successful completion of this course, students will be able to

CO No.	Course Outcome	Knowledge Level
C312.1	Describe the concepts and procedures for Energy Audit & Management	(K2)
C312.2	Understand the necessity of Energy efficient lighting systems	(K2)
C312.3	Understand the operation of Energy instruments and their use in energy audit	(K2)
C312.4	Explain Energy Conservation measures in HVAC system	(K2)
C312.5	Understand various economic aspects of Energy systems	(K2)
C312.6	Apply life cycle costing analysis for various system or organizations	(K3)

UNIT–I: BASIC PRINCIPLES OF ENERGY AUDIT AND MANAGEMENT ENERGY AUDIT

Definitions – Concept – Types of audit – Energy index – Cost index – Pie charts –Sankey diagrams – Load profiles – Energy conservation schemes and energy saving potential – Numerical problems – Principles of energy management – Initiating, planning, controlling, promoting, monitoring, reporting – Energy manager – Qualities and functions – Language – Questionnaire – Check list for top management.

UNIT–II: LIGHTING MODIFICATION OF EXISTING SYSTEMS – REPLACEMENT OF EXISTING SYSTEMS – PRIORITIES:

Definition of terms and units – Luminous efficiency – Polar curve – Calculation of illumination level – Illumination of inclined surface to beam – Luminance or brightness – Types of lamps – Types of lighting – Electric lighting fittings (luminaries) – Flood lighting – White light LED and conducting Polymers – Energy conservation measures.

UNIT–III: POWER FACTOR AND ENERGY INSTRUMENTS

Power factor – Methods of improvement – Location of capacitors – Power factor with non linear loads – Effect of harmonics on Power factor – Numerical problems. Energy Instruments – Watt–hour meter – Data loggers – Thermocouples – Pyrometers – Lux meters – Tong testers – Power analyzer.

UNIT–IV: SPACE HEATING AND VENTILATION

Ventilation – Air–Conditioning (HVAC) and Water Heating: Introduction – Heating of buildings – Transfer of Heat– Space heating methods – Ventilation and air–conditioning – Insulation–Cooling load – Electric water heating systems – Energy conservation methods.

UNIT–V ECONOMIC ASPECTS AND FINANCIAL ANALYSIS

Understanding energy cost - Economics Analysis – Depreciation Methods – Time value of money – Rate of return – Present worth method – Replacement analysis – Life cycle costing analysis – Energy efficient motors (basic concepts) – Economics of energy efficient motors and systems.

UNIT–VI: COMPUTATION OF ECONOMIC ASPECTS

Need of investment, appraisal and criteria - Calculation of simple payback period–Return on investment – Net present value – Internal rate of return – numerical examples – Power factor correction – Lighting – Applications of life cycle costing analysis – Return on investment – Numerical examples.

TEXT BOOKS:

1. Hand Book of Energy Audit by Sonal Desai- Tata McGraw hill, 2015.
2. Energy efficient electric motors by John .C. Andreas, Marcel Dekker Inc Ltd–2nd edition, 1995.

REFERENCE BOOKS:

1. Energy management by W.R. Murphy & G. Mckay Butter worth, Elsevier publications, 2012.
2. Electric Energy Utilization and Conservation by S C Tripathy, Tata McGraw hill publishing company Ltd. New Delhi, 1991.
3. Energy management by Paul o' Callaghan, Mc–Graw Hill Book company–1st edition, 1998.
4. Energy management hand book by W.C.Turner, John wiley and sons, 6th Edition, 2006.
5. Energy management and conservation –k v Sharma and pvenkataseshaiah-I K International Publishing House pvt.ltd,2011.
6. http://www.energymanagertraining.com/download/Gazette_of_IndiaPartIISecI- 37_25-08-2010.pdf

Programme : **B. Tech - Electrical & Electronics Engineering** **Semester: VI**

Course Code : V18EET25

Course Name : Special Electrical Machines **[L : 3; T:0; P : 0 (3 credits)]**

Course Outcomes

After Successful completion of this course, students will be able to

CO No.	Course Outcome	Knowledge Level
C312.1	Describe the operation and characteristics of permanent magnet dc motor	(K2)
C312.2	Understand the operation and control of stepper motors	(K2)
C312.3	Understand the operation and control of switched reluctance motor	(K2)
C312.4	Describe the operation and characteristics of brush less dc motor	(K2)
C312.5	Distinguish between square wave and sine wave brush less dc motor	(K3)
C312.6	Understand the construction and operation of linear induction motors	(K2)

UNIT I: PERMANENT MAGNET MATERIALS AND PMDC MOTORS

Introduction-classification of permanent magnet materials used in electrical machines-minor hysteresis loop and recoil line-Stator frames of conventional dc machines-Development of electronically commutated dc motor from conventional dc motor-Permanent-magnet materials and characteristics-B-H loop and demagnetization characteristics-Temperature effects: reversible and irreversible losses-high temperature effects-reversible losses-Irreversible losses recoverable by magnetization-Mechanical properties, handling and magnetization-Application of permanent magnets in motors-power density-operating temperature range-severity of operation duty.

UNIT II: STEPPER MOTORS

Classification of stepper motors – Hybrid and Variable Reluctance Motor (VRM) - Construction and principle of hybrid type synchronous stepper motor – Different configuration for switching the phase windings control circuits for stepper motors – Open loop and closed loop control of 2-phase hybrid stepping motor. Construction and principle of operation of Variable Reluctance Motor (VRM) – Single stack and multiple stack – Open loop control of 3- phase VR Stepper Motor- Applications.

UNIT III: SWITCHED RELUCTANCE MOTORS

Construction – Comparison of conventional and switched reluctance motors – Design of stator and rotor pole arcs – Torque producing principle and torque expression – Different converter configurations for SRM – Drive and power circuits for SRM – Position sensing of rotor – Applications of SRM.

UNIT IV: SQUARE WAVE PERMANENT MAGNET BRUSHLESS DC MOTOR

Types of constructions – Surface mounted and interior type permanent magnet – Principle of operation of BLDC motor. Torque and EMF equations – Torque speed characteristics – Performance and efficiency- Square wave brushless motors with 1200 and 1800 magnetic areas commutation.

UNIT V: SINE WAVE PERMANENT MAGNET BRUSHLESS MOTOR

Torque and EMF equations – Phasor Diagram – Circle diagram – Torque/speed characteristics – Comparison between square wave and sine wave permanent magnet motors - Applications.

UNIT VI: LINEAR INDUCTION MOTORS (LIM)

Construction– principle of operation–Double sided LIM from rotating type Induction Motor – Schematic of LIM drive for traction – Development of one sided LIM with back iron- equivalent circuit of LIM.

TEXT BOOKS:

1. Brushless Permanent Magnet and Reluctance Motor Drives,T.J.E. Miller ,1989, Oxford University press.
2. Special Electrical Machines, K. Venkataratnam, University press, 2009, New Delhi.

Programme : **B. Tech - Electrical & Electronics Engineering** **Semester: VI**

Course Code : V18EEL08

Course Name : Power Electronics Laboratory **[L : 0; T:0; P : 2 (1 credits)]**

Course Outcomes

After Successful completion of this course, students will be able to

CO No.	Course Outcome	Knowledge Level
C313.1	Sketch the characteristics of various power electronics devices and analyse the firing circuits	(K4)
C313.2	Analyze the performance of 1-phase and 3-phase full converter and 1-phase dual converter for resistive and inductive loads	(K4)
C313.3	Experiment the single phase AC voltage controller and cyclo converter with resistive and inductive loads.	(K4)
C313.4	Operate the DC-DC buck converter and boost converter	(K3)
C313.5	Analyze the performance of the single phase bridge inverter	(K4)
C313.6	Analyze the performance of the PWM inverter	(K4)

Any 10 of the Following Experiments are to be conducted

1. Study of Characteristics of Thyristor, MOSFET & IGBT.
2. Design and development of a firing circuit for Thyristor.
3. Design and development of gate drive circuits for IGBT.
4. Single -Phase Half controlled converter with R and RL load
5. Single -Phase fully controlled bridge converter with R and RL loads
6. Single -Phase AC Voltage Regulator with R and RL Loads
7. Single -Phase square wave bridge inverter with R and RL Loads
8. Three- Phase fully controlled converter with RL–load.
9. Design and verification of voltages gain of Boost converter in Continuous Conduction Mode(CCM) and Discontinuous Conduction Mode(DCM).
10. Design and verification of voltages ripple in buck converter in CCM operation.
11. Single -phase PWM inverter with sine and triangle PWM techniques.
12. 3-phase AC-AC voltage regulator with R-load.

Programme : **B. Tech - Electrical & Electronics Engineering** **Semester: VI**

Course Code : V18EEL09

Course Name : Electrical Simulation Laboratory **[L : 0; T:0; P : 2 (1 credits)]**

Course Outcomes

After Successful completion of this course, students will be able to

CO No.	Course Outcome	Knowledge Level
C314.1	Simulate integrator circuit, differentiator circuit	(K3)
C314.2	Simulate Boost converter, Buck converter, full convertor and PWM inverter	(K3)
C314.3	Simulate transmission line by incorporating line, load and transformer models	(K3)
C314.4	Plot of Bode plots, root locus and nyquist plots	(K3)
C314.5	Perform transient analysis of RLC circuit	(K3)
C314.6	Perform transient analysis of single machine connected to infinite bus(SMIB)	(K4)

Any 10 of the Following Experiments are to be conducted

1. Simulation of transient response of RLC circuits a. Response to pulse input b. Response to step input c. Response to sinusoidal input
2. Analysis of three phase circuit representing the generator transmission line and load. Plot three phase currents & neutral current .
3. Simulation of single–phase full converter using RLE loads and single phase AC voltage controller using RL loads
4. Plotting of Bode plots, root locus and nyquist plots for the transfer functions of systems up to 5th order
5. Simulation of Boost and Buck converters.
6. Integrator & Differentiator circuits using op–amp.
7. Simulation of D.C separately excited motor using transfer function approach.
8. Modelling of transformer and simulation of lossy transmission line.
9. Simulation of single phase inverter with PWM control.
10. Simulation of three phase full converter using MOSFET and IGBTs.
11. Transient analysis of single machine connected to infinite bus(SMIB).

REFERENCE BOOKS:

1. Simulation of Power Electronic Circuit by M.B.Patil, V. Ramanarayan, V.T.Ranganathan Narosha,2009.

2. Pspice for circuits and electronics using PSPICE – by M.H.Rashid, M/s PHI Publications.
3. Pspice A/D user`s manual – Microsim, USA.
4. Pspice reference guide – Microsim, USA
5. MATLAB user`s manual – Mathworks, USA
6. MATLAB – control system tool box – Mathworks, USA
7. SIMULINK user`s manual – Mathworks, USA
8. EMTP User`s Manual.
9. SEQUEL– A public domain circuit simulator available at www.ee.iitb.ac.in/~sequel

Annexure-EEE-III

List courses offered under Open Elective -I in VI semester under V18 Regulation for all other branches:

S.No.	Course Code	Name of the Course
1.	V18EEOE1	Energy Audit & Conservation
2.	V18EEOE2	Electrical Measuring Instruments
3.	V18EEOE3	Industrial Safety

Syllabi for the Courses offering under Open Elective - I

Programme: B. Tech - (ECE, CSE, ME, CE, ECT & CST) **Semester: VI**

Course Code : V18EEOE1

Course Name : Energy Audit & Conservation **[L : 3; T:0; P : 0 (3 credits)]**

Course Outcomes

After Successful completion of this course, students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Describe the concepts and procedures for Energy Audit	(K2)
CO2	Explain the necessity of Energy efficient lighting systems	(K2)
CO3	Discuss the role of Energy instruments in Energy Audit	(K2)
CO4	Describe the impact of harmonics on electrical systems	(K2)
CO5	Discuss various space heating methods	(K2)
CO6	Explain the necessary steps to take for energy conservation	(K2)

UNIT–I: BASIC OF ENERGY AUDIT

Energy audit – Definitions – Concept – Types of audit-Preliminary audit -Main audit– Energy index – Cost index – Pie charts –Sankey diagrams – Load profiles –– Numerical problems.

UNIT–II: LIGHTING

Definition of terms and units– Polar curve – Types of lamps - construction and working of-Incandescent lamp-Compact Florescent Lamp-sodium vapour lamp-Neon vapour lamp-LED -advantages and disadvantages – Types of lighting –Types of luminaries –- Replacement of existing lighting systems.

UNIT–III:ENERGY INSTRUMENTS

Energy Instruments – construction and working of -Watt–hour meter – Data loggers – Thermocouples – Pyrometers – Lux meters – Tong testers – Power analyzer-advantages and disadvantages

UNIT–IV:POWER FACTOR AND HARMONICS

Power factor – Methods of improvement – Location of capacitors – Power factor with non-linear loads – harmonics-Sources of harmonics- Effect of harmonics.

UNIT–V: **HEAT VENTILATION AND AIR CONDITIONING (HVAC)**

Introduction –Transfer of Heat–Space heating methods – Water heating systems -Ventilation – Air Conditioner-construction and working principle–Cooling load

UNIT–VI: ENERGY CONSERVATION AND ENERGY POLICY

Energy conservation schemes and energy saving potential-Energy conservation in Domestics Buildings- Energy conservation in commercial Buildings –comparison of Standard motors and Energy efficient motors–Energy policy-Energy Policy of an Industry(case study)

Text Books:

1. Energy management by W.R. Murphy & G. Mckay Butter worth, Elsevier publications. 2012.
2. Electric Energy Utilization and Conservation by S C Tripathy, Tata McGraw hill publishing company Ltd. New Delhi, 1991.

Reference Books:

1. Hand Book of Energy Audit by Sonal Desai- Tata McGraw hill, 2015.
2. Energy efficient electric motors by John .C. Andreas, Marcel Dekker Inc Ltd–2nd edition, 1995.

Programme : **B. Tech - (ECE, CSE, ME, CE, ECT & CST)** **Semester: VI**

Course Code : V18EEOE2

Course Name : Electrical Measuring Instruments **[L : 3; T:0; P : 0 (3 credits)]**

Course Outcomes

After Successful completion of this course, students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	choose right type of instrument for measurement of voltage and current for ac and dc.	(K3)
CO2	choose right type of instrument for measurement of power and energy – able to calibrate energy meter by suitable method	(K3)
CO3	calibrate ammeter and potentiometer.	(K3)
CO4	select suitable bridge for measurement of electrical parameters	(K3)
CO5	use the ballistic galvanometer and flux meter for magnetic measuring instruments	(K3)
CO6	measure frequency and phase difference between signals using CRO. Able to use digital instruments in electrical measurements.	(K4)

UNIT–I: MEASURING INSTRUMENTS
Classification – Deflecting, control and damping torques – Ammeters and Voltmeters – PMMC, moving iron type, dynamometer and electrostatic instruments – Expression for the deflecting torque and control torque – Errors and compensations– Extension of range using shunts and series resistance – Numerical problems.

UNIT –II: MEASUREMENT OF POWER AND ENERGY
Single phase and three phase dynamometer wattmeter – LPF and UPF – Expression for deflecting and control torques - Single phase induction type energy meter – Driving and braking torques – errors and compensations – Three phase induction type energy meter.

UNIT – III: POTENTIOMETERS
Principle and operation of D.C. Crompton's potentiometer – Standardization – Measurement of unknown Resistance, Current and Voltage.AC Potentiometers: polar and coordinate types – Applications.

UNIT – IV: MEASUREMENTS OF PARAMETERS
Method of measuring low, medium and high resistance – Sensitivity of Wheat stone's bridge – Kelvin's double bridge for measuring low resistance– Megger– Measurement of earth resistance – Measurement of inductance and Quality Factor by Anderson's bridge–Measurement of capacitance and loss angle bySchering Bridge.

UNIT – V: MAGNETIC MEASUREMENTS

Ballistic galvanometer – Equation of motion – Flux meter – Constructional details–Determination of B–H Loop methods of reversals six point method – AC testing – Iron loss of bar samples– Core loss measurements by bridges and potentiometers.

UNIT – VI: DIGITAL METERS

Digital Voltmeters: Successive approximation type – Measurement of phase difference and Frequency using lissajious patterns in CRO–Digital multimeter –Digital Tachometer.

TEXT BOOKS:

1. Electrical & Electronic Measurement & Instruments by A. K. Sawhney DhanpatRai& Co. Publications, 2013.
2. Modern Electronic Instrumentation and Measurement Techniques – A. D. Helfrick and W.D. Cooper, PHI, 5th Edition, 2002.
3. Electrical Measurements and measuring Instruments – by E.W. Golding and F. C. Widdis, fifth Edition, Wheeler Publishing, 2011.

REFERENCE BOOKS:

1. Electrical and Electronic Measurements and instrumentation by R. K. Rajput, S. Chand, 2007.
2. Electrical Measurements – by Buckingham and Price, Prentice – Hall, 1988.
3. Electrical Measurements by Forest K. Harris. John Wiley and Sons,1952.
4. Electrical Measurements: Fundamentals, Concepts, Applications – by Reissland, M.U, New Age International (P) Limited, Publishers, 1967.

Programme : **B. Tech - (ECE, CSE, ME, CE, ECT & CST)** **Semester: VI**

Course Code : V18EEOE3

Course Name : Industrial Safety **[L : 3; T:0; P : 0 (3 credits)]**

Course Outcomes

After Successful completion of this course, students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Understand the overview of industrial safety	(K2)
CO2	Understand the importance and role of industrial safety	(K2)
CO3	Understand the industrial safety training methods	(K2)
CO4	Explain the role of management in industrial safety	(K2)
CO5	Choose proper design of electrical systems in order to control the Physical Hazards	(K2)
CO6	Describe the safety legalization	(K2)

UNIT-1: INTRODUCTION TO INDUSTRIAL SAFETY

Concept of Safety, Goals of safety engineering, Need for safety engineering, definitions of Accident, injury, unsafe actions & conditions. Responsibility of Safety - Society, Govt., Management, Duties of safety officer. Safety Committee -Membership, Functions & Scope of Safety committee.

UNIT -II: SAFETY AND HEALTH MANAGEMENT

Occupational Health Hazards, Promoting Safety, Safety and Health training, Stress and Safety. Ergonomics - Introduction, Definition, Objectives, Advantages. Ergonomics Hazards, Importance of Industrial safety, role of safety department.

UNIT -III : SAFETY AWARENESS & TRAINING

Training for Safety: Assessment of needs. Design & development of training programme. Training methods and strategies. Human behaviour and safety: Human factors contributing to accidents.

UNIT -IV : SAFETY ASSESSMENT AND CONTROL

Safety Management: Role of management in Industrial Safety. Safety Management- Principles & Practices. Safety Organization: Role of safety committee and its formation, Safety awareness programme: motivation, education and training, Appraisal of plant safety and measurement of safety performance, Total loss control concept, Introduction to productivity, Quality, Reliability, and Safety (PQRS) theory.

UNIT -V : INDUSTRIAL SAFETY AND CONTROL

Control of Physical Hazards: Purpose of lighting. Advantages of good illumination. Lighting and safety. Lighting and the work. Control of Chemical Hazards Hazardous properties of chemicals and appreciation of information provided in Material safety data sheets. Classification of dangerous materials with pictorial symbols, common hazard and common precautions for each class Control of Electrical Hazards Dangers from electricity. Safe limits of amperages, Voltages Safe distance from lines. Capacity and protection of conductors, Joints and connections, Means of cutting of power overload and short circuit protection. Factors contributing towards fire. Chemistry of fire. Classification of fires. Common causes of industrial fires.

UNIT -VI : SAFETY LEGALISATION

Legal Provisions regarding safety, Accident prevention &Compensation to affected employees as under Factories Act-1948, Factories Act(Amendment)1987, The Workmen CompensationAct-1923, ESI Act, Public Liabilities Insurance Act-1991,Fatal Accident Act.

TEXT BOOKS

1. Industrial Safety, Health and Environment Management Systems by R.K.Jain and Sunil S.Rao, Khanna Publishers, New Delhi, 2006.
2. Safety Management by Grimaldi and Simonds, AITBS Publishers, New Delhi, 2001.
3. Industrial Safety -National Safety Council of India, 2000.

REFERENCE BOOKS

1. Loss of prevention in Process Industries , Vol. 1 and 2 by Frank P. Lees, Butterworth-Heinemann Ltd., London, 1991.
2. Handbook of Occupational Safety and Health by Slote.L, John Willey and Sons, New York,1987.

Annexure-IV

SRI VASAVI ENGINEERING COLLEGE (AUTONOMOUS)

(Sponsored by Sri Vasavi Educational Society)

(Approved by AICTE, New Delhi & Permanently affiliated to JNTUK, Kakinada)

(Accredited by NAAC with 'A' Grade ,Recognized by UGC under section 2(f) & 12(B))

Pedatadepalli, **TADEPALLIGUDEM – 534 101.** W.G.Dist**. (A.P)**

Department of Computer Science & Engineering (Accredited by NBA)

Dt: 01.06.2020

The third meeting of Board of Studies in Department of Computer Science and Engineering is held at 11.30 AM on 31-05-2020 through online mode using GoToMeeting App (Access Code: 309-899-781).

The following members attended the meeting:

S.No.	Name of the Member	Designation	Role
1.	Dr. D Jaya Kumari	Professor, HoD-CSE, SVEC	Chairperson
2.	Dr. Krishna Mohan Ankala	Professor, UCEK, Kakinada	University Nominee
3.	Dr. R.B.V. Subramaanyam	Professor, Department of CSE, NIT Warangal	Academic Expert
4.	Prof. S. PallamSetty	Department of CS&SE, AU College of Engineering, Visakhapatnam	Academic Expert
5.	Sri. Srinivasa Raju Vuppalapati	Senior Consultant,MSR IT Services LLP,Hitech City, Hyderabad.	Industry Expert
6.	Mr.EEdala Rambabu	microfocus, Bangolore	Alumni
7.	Dr. V. Venkateswara Rao	Professor	Member
8.	Dr. G Loshma	Associate Professor	Member
9.	Ch. Raja Ramesh	Associate Professor	Member
10.	Dr. V.S.Naresh	Associate Professor	Member
11.	Dr. S.P.Malarvizhi	Associate Professor	Member
12.	Dr Veeraraghavan J	Associate Professor	Member
13.	Dr. K. Shirin Bhanu	Associate Professor	Member
14.	Dr. O. Sri Nagesh	Assistant Professor	Member
15.	Leelavathi Arepalli	Sr. Assistant Professor	Member
16.	D. Anjani Suputri Devi	Sr. Assistant Professor	Member
17.	G Sriram Ganesh	Assistant Professor	Member

The following are the Minutes of the Meeting

Item No.1: Welcome note by the Chairman BOS.

The HOD extended a formal welcome and introduced the members.

Item No.2: Review & Approval of the Course Structure for V and VI SEM -B.Tech (CSE) Programme under V18 Regulation.

Reviewed the Course Structure of V & VI semesters for B.Tech (CSE) Programme of V18 Regulation and following changes were made:

- **In SEM-V:**
  -The courses in Electives were rearranged as per the Threads (Electives) indicated in AICTE Model Curriculum.

  -The Courses approved in **Professional Elective-I** are:

  - Advanced Computer Architecture
  - Advanced Data Structures
  - Artificial Intelligence
  - Computer Graphics

- **In SEM-VI:**
  - Advanced Java and Web Technologies (**Course Code: V18CST20) is replaced with** Data Mining (**Course Code:V18CST20).**

  - Advanced Java and Web Technologies Lab (**Course Code: V18CSL09) is replaced with Data Mining Lab (Course Code:V18CSL09).**

  - Seminar (**Course Code: V18CSMPS) is replaced with** Mini Project (**Course Code: V18CSMPS)**

  - The Courses approved in **Professional Elective-II** are:

  - Software Testing Methodologies
  - Principles of Programming Languages
  - Machine Learning
  - Image Processing

  - The approved Course Structure of V and VI SEM is given in **Annexure-CSE-I.**

Item No.3: Approval of Syllabi for the proposed courses offered in V and VI semesters of B.Tech(CSE) Programme under V18 Regulation.

- Approved the syllabi for the courses offered in V & VI semesters B.Tech(CSE) under V18 Regulation. The approved Syllabus is given in **Annexure-CSE-II (a).**

- For B.Tech(ECE) Programme, the following courses are offered in V and VI SEM .

S.No.	SEM	Course Code	Course Name
1	V	V18CST81	Introduction to Data Structures
		V18CSL34	Data Structures Lab
2	VI	V18CST11	Computer Networks

		V18CSL35	Computer Networks Lab

- For B.Tech (MECH) Programme, the following course offered in V SEM

Course Code	**Course Name**
V18CSL05	Python Programming Lab

- The approved Syllabus for B.Tech(ECE) and B.Tech(MECH) was given in **Annexure-CSE-II(b).**

Item No. 4: Approval of the Open Elective courses and their Syllabi offered in VI semester under V18 Regulation for all other branches.

- Approved the list of Open Elective courses and syllabi offered in VI Semester**,** details are given in **Annexure-CSE-III.**

Item No. 5: Review & Approval of Course Structure and Syllabus for the proposed courses offered in III and IV Semesters of B.Tech(CST) Programme under V18 Regulation.

- The BOS Members suggested and approved the III & IV SEM B.Tech(CSE) Course Structure and Syllabus for B.Tech (CST) Programme also.

- The approved Course Structure is given in **Annexure-CSE-IV.**

Item No.6: Seeking approval from Academic Council towards introduction of B.Tech(Hons/Minor) in line with the guidelines prescribed by AICTE.

- The BOS Members approved the **B.Tech(Hons) Data ScienceCourse** for CSE, CST, ECE & ECT, **B.Tech(Minor) Data ScienceCourse** for CE, ME & EEE,Approved course structure and Syllabus is given in **Annexure-V.**

Dr.D Jaya Kumari

Chairperson of BOS

Annexure-CSE-I

Approved Course Structure in 3rd BOS Meeting (V18 Regulation)

V – Semester							
S.No.	**Course Code**		**Course**	**L**	**T**	**P**	**C**
1	V18CST10	PCC	Database Management Systems	3	0	0	3
2	V18CST11	PCC	Computer Networks	3	0	0	3
3	V18CST12	PCC	Operating Systems	3	0	0	3
4	V18CST13	PCC	Design and Analysis of Algorithms	3	0	0	3
5	V18CST14	PCC	Unix Programming	3	0	0	3
6	**Elective – I**						
	V18CST15	PEC	1. Advanced Computer Architecture	3	0	0	3
	V18CST16		2.Advanced Data Structures				
	V18CST17		3.Artificial Intelligence				
	V18CST18		4. Computer Graphics				
7	V18MBET53	HSS	Organizational Behavior	3	0	0	3
8	V18CSL06	PCC	Database Management Systems Lab	0	0	3	1.5
9	V18CSL07	PCC	Operating System and Unix Lab	0	0	3	1.5
10	V18ENT05		Professional Communication Skills –III	4	0	0	MNC
11	V18CST62		Technical Skills-III	4	0	0	MNC
Total Contact Hours: 35				**29**	**0**	**6**	**24**

VI – Semester							
S.No.	**Course Code**		**Course**	**L**	**T**	**P**	**C**
1	V18CST19	PCC	Compiler Design	3	0	0	3
2	V18CST20	PCC	Data Mining	3	0	0	3
3	V18CST21	PCC	Object Oriented Analysis and Design through UML	3	0	0	3
4	V18CST22	PCC	Cryptography & Network Security	3	0	0	3

5	**Elective - II**			3	0	0	3
	V18CST23	PEC	1. Software Testing Methodologies				
	V18CST24		2. Principles of Programming Languages				
	V18CST25		3. Machine Learning				
	V18CST26		4. Image Processing				
6	**Open Elective – I (Interdisciplinary)**	**OEC**	**OPE I(1-3) -(Interdisciplinary)**	3	0	0	3
7	V18CSL08	PCC	Object Oriented Analysis and Design through UML Lab	0	0	3	1.5
8	V18CSL09	PCC	Data Mining Lab	0	0	3	1.5
9	V18CSMPS	Mini Project	Mini Project with Seminar	0	0	4	2
10	V18ENT06		Professional Communication Skills –IV	4	0	0	MNC
11	V18CST63		Technical Skills-IV	4	0	0	MNC
Total Contact Hours: 36				**26**	**0**	**10**	**23**

Annexure-CSE-II (a)

Approved Syllabi for the courses offered in V & VI semesters B. Tech(CSE) under V18 Regulation

V Sem	Database Management Systems	Course Code:V18CST10	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Demonstrate Database Systems, various Data Models and Database Architecture. (K2)

CO2: Apply ER Modeling to Design Relational Databases for Real Time Applications. (K3)

CO3: Apply SQL Constructs to Perform Database Operations. (K3)

CO4: Apply Normalization Techniques to Refine Schema. (K3)

CO5: Explain Transaction Management and Concurrency Control. (K2)

CO6: Experiment with various database indexing techniques. (K3)

UNIT-I: An Overview of Database Systems: Managing Data, File Systems verses DBMS, Advantages of DBMS, Data Independence. **Database System Architecture:** Three Levels of Architecture, External Level, Conceptual Level, Internal Level, Structure of DBMS, The Database Management Systems and Client/Server Architecture.

UNIT-II: Database Design: The E/R Models, Database Design and Er Diagrams, Entities, Attributes, Entity Sets, Relationships and Relationship Sets, Conceptual Design with ER Models. **Relational Model:** Integrity Constraints Over Relations, Key Constraints ,Foreign Key Constraints, General Constraints, Relational Algebra- Selection and Projection, Set Operation, Renaming, Joins, Division, Relational Calculus- Tuple Relational Calculus, Domain Relational Calculus.

UNIT-III: SQL Queries, Constraints and Triggers: The Form of Basic SQL Query, Union, Intersect, Except, Nested Queries, Aggregate Operators, Null Values, Complex Integrity Constraints in SQL, Triggers and Active Database.

UNIT-IV: Schema Refinement (Normalization): Purpose of Normalization or Schema Refinement, Concept of Functional Dependency, Normal Forms based on Functional Dependency (1NF, 2NF and 3NF), Concept of Surrogate Key, Boyce-Codd Normal Form (BCNF), Lossless Join and Dependency Preserving Decomposition, Fourth Normal Form(4NF).

UNIT-V:Transaction Management: Transaction, Properties of Transactions, Transaction Log, and Transaction Management with SQL Commit, Rollback and Savepoint. Concurrency Control: Concurrency Control for Lost Updates, Uncommitted Data, Inconsistent Retrievals and the Scheduler. **Concurrency Control with Locking Methods :** Lock Granularity, Lock Types, Two Phase Locking for Ensuring Serializability, Deadlocks, Concurrency Control with Time Stamp Ordering, Transaction Recovery.

UNIT-VI: Storage and Indexing: Overview of Storages and Indexing, Data on External Storage, File Organization and Indexing, Clustered Indexing, Primary and Secondary Indexes, Index Data Structures, Hash based Indexing, Tree based Indexing, Comparison of File Organization

TEXT BOOKS:

1. Introduction to Databse Systems, CJ Date,8th Edition, Pearson Education.
2. Data base Management Systems, Raghurama Krishnan, Johannes Gehrke, 3rd Edition TATA McGraw Hill.

REFERENCE BOOKS:

1. Data base Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition, Course Technology.

2. Fundamentals of Database Systems, ElmasriNavrate , 7th Edition, Pearson Education.
3. Database Systems - The Complete Book, H G Molina, J D Ullman, J Widom, 2nd Edition, Pearson.

V Sem	**Computer Networks**	Course Code: V18CST11	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Discuss fundamentals of network concepts and Reference Models.(K2)

CO2: Discuss Communication media and switching techniques.(K2)

CO3: Demonstrate Error control and protocols.(K3)

CO4: Apply Routing algorithms and congestion control algorithms.(K3)

CO5: Discuss Transport layer services and protocols. (K2)

CO6: Describe Application layer protocols.(K2)

UNIT-I: Introduction: Reference models: The OSI Reference Model- the TCP/IP Reference Model, Examples of Networks: Novell Networks, Arpanet, Internet, Network Topologies WAN, LAN, MAN.

UNIT– II: Physical Layer: Transmission Media, Multiplexing: FDM, WDM and TDM- LAN Technologies, introduction to switching: Circuit Switched Networks, Datagram Networks, and Virtual Circuit Networks.

UNIT–III: Data link layer: Design issues, Framing, Flow control, error control, error detection and correction, CRC, Checksum: idea, one's complement internet checksum, MAC: ALOHA, CSMA. Elementary Data Link Layer protocols: simplex protocol, Simplex stop and wait, Simplex protocol for Noisy Channel. Sliding window protocol: One bit, Go back N, Selective repeat-Stop and wait protocol, HDLC, point to point protocol (PPP).Piggybacking.

UNIT-IV : Network Layer : Network layer design issues- Algorithm shortest path routing, Flooding, Hierarchical routing, Broad cast, Multi cast Routing algorithms-Congestion control and algorithms, Internet Protocol (IP) Addresses, Subnet masking

UNIT–V :Transport Layer: Services, Primitives and sockets, Elements of transport protocols, Internet Transport protocols(TCP,UDP,RPC,RTTP/RTP,RTCP) Segment headers, Primitives, Control, Congestion control, Quality of Service, QoS improving techniques: Leaky Bucket and Token Bucket algorithm.

UNIT–VI: Application layer: DNS, SMTP, POP,FTP HTTP Presentation formatting. Network security: Introduction to Cryptography, Authentication, Basics of Public key and private key cryptography, digital signatures and certificates firewalls and wireless security.

TEXT BOOKS:

1. Computer Networks — Andrew S Tanenbaum, 4th Edition. Pearson Education/PHI
2. Data Communications and Networks – Behrouz A. Forouzan.Third Edition TMH

REFERENCES:

1. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition, Pearson Education
2. Understanding communications and Networks, 3rd Edition, W.A. Shay, Thomson

V Sem	Operating Systems	Course Code: V18CST12	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe Operating System Services and System Calls (K2).

CO2: Illustrate Process Management Concepts and CPU Scheduling Algorithms (K3).

CO3: Demonstrate Process Synchronization primitives (K3).

CO4: Demonstrate Deadlock Prevention, Avoidance and Detection methods (K3).

CO5: Illustrate Memory Management Techniques and Page Replacement Algorithms (K3).

CO6: Describe File System Concepts and Mass Storage Structures (K2) .

UNIT-I:Introduction: Operating-System Structure, Operating-System Services, User and Operating-System Interface, System Calls, Types of System Calls.

UNIT-II:Process Management: Process Concept, Process Scheduling, Operations on Processes, Interprocess Communication. **Threads:** Overview, Multithreading Models. **CPU Scheduling:** Basic Concepts, Scheduling Criteria, Scheduling Algorithms

UNIT-III : Process Synchronization: The Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Mutex Locks, Semaphores, Classic Problems of Synchronization, Monitors

UNIT-IV:Deadlocks: System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock

UNIT-V:Memory ManagementMain Memory: Swapping, Contiguous Memory Allocation, Segmentation, Paging, Structure of the Page Table

Virtual Memory: Introduction, Demand Paging, Page Replacement, Allocation of Frames, Thrashing

UNIT-VI:Storage Management: Overview of Mass-Storage Structure, Disk Scheduling, File Concept, Access Methods, Directory and Disk Structure, File-System Mounting, File Allocation Methods

Text Book:

1. Operating System Concepts, AbrahamSilberschatz, ,Peter Baer Galvin,Greg Gagne, 9th Edition, John Wiley and Sons Inc., 2012

Reference Books:

1. Operating Systems – Internals and Design Principles, William Stallings, 7th Edition, Prentice Hall, 2012
2. Modern Operating Systems, Andrew S. Tanenbaum, Third Edition, Addison Wesley,2007

V Sem	Design and Analysis of Algorithms	Course Code: V18CST13	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe asymptotic notation and basic concepts of algorithms (K2).

CO2: Apply divide and conquer paradigm to solve various problems (K3).

CO3: Use greedy technique to solve various problems (K3).

CO4: Apply dynamic programming technique to various problems (K3).

CO5: Employ backtracking technique to various problems (K3).

CO6: Apply branch and bound technique to various problems (K3).

UNIT-I: Introduction: What is an Algorithm, Algorithm Specification-Pseudo code Conventions Recursive Algorithm, Performance Analysis-Space Complexity, Time Complexity, Amortized Complexity, Amortized Complexity, Asymptotic Notation, Practical Complexities, Performance Measurement.

UNIT-II: Divide and Conquer: General Method, Defective Chessboard, Binary Search, Finding the Maximum and Minimum, Merge Sort, Quick Sort-Performance Measurement, Randomized Sorting Algorithms.

UNIT-III: The Greedy Method: The General Method, Knapsack Problem, Job Sequencing with Deadlines, Minimum-cost Spanning Trees-Prim's Algorithm, Kruskal's Algorithms, An Optimal Randomized Algorithm, Optimal Merge Patterns, Single Source Shortest Paths.

UNIT-IV: Dynamic Programming: All Pairs Shortest Paths, Single Source Shortest paths General Weights, Explain Optimal Binary Search Trees, String Edition, 0/1 Knapsack, Reliability Design.

UNIT-V: Backtracking: The General Method, The 8-Queens Problem, Sum of Subsets, Graph Coloring, Hamiltonian Cycles.

UNIT-VI: Branch and Bound: The Method-Least cost (LC) Search, The 15-Puzzle: an Example, Control Abstraction for LC-Search, Bounding, FIFO Branch-and-Bound, LC Branch and Bound, 0/1 Knapsack Problem-LC Branch-and Bound Solution, FIFO Branch-and-Bound Solution, Traveling Salesperson.

TEXT BOOKS:

1. Fundamentals of computer algorithms E. Horowitz S. Sahni, University Press

REFERENCE BOOKS:

1. Introduction to Algorithms Thomas H. Cormen, PHI Learning.

2. The Design and Analysis of Computer Algorithms, Alfred V. Aho, John E. Hopcroft, JeffreyD.Ullman.
3. Algorithm Design, Jon Kleinberg, Pearson.

V Sem	Unix programming	Course Code: V18CST14	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Illustrate the UNIX basics and the working of the built in commands in Unix (K2).

CO2: Demonstrate the file system and change the permissions associated with files (K2).

CO3: Develop basic programs using shell script (K3).

CO4: Demonstrate the grep family and data transforming programs sed, and awk (K2).

CO5: Construct programs for process system calls (K3).

CO6: Explain the concept of signals and its system call (K2).

UNIT-I : Introduction to UNIX: The UNIX Operating System, A brief history of UNIX, The UNIX Architecture, Basic features of UNIX. General Purpose Utilities- cal, date, man, echo, bc, clear, passwd, who, whoami,unameDirectory Handling Commands: pwd, cd, mkdir, rmdir. File Handling Utilities - cat, touch, cp, ls, rm, mv, nl, pg,tar,wc Displaying Commands: more,head,tail, simple filters and commands: cmp, comm., ulink, diff, head, tail, find, cut, paste,sort, uniq, tr, finger. Disk Utilities– du, df, mount, umount.Process Utilities–ps, kill. Networking Utilities– ping, telnet, rlogin, ftp.

UNIT-II : THE FILE SYSTEM : Types of Files, Directories and Files, UNIX File System, Absolute and relative pathnames, File Attributes and Permissions ,The File Command -knowing the File Type, Chmod Command- Changing File Permissions, Chown Command-Changing the Owner of a File, Chgrp Command- Changing the Group of a File. Vi editor-editing with vi, moving the cursor, editing, copying and moving text, pattern searching.

UNIT-III : Introduction to Shell Programming : Shell Variables-The Export Command-The Profile File a Script Run During Starting-The First Shell Script-The read Command-Positional parameters-The $? Variable knowing the exit Status-More about the Set Command-The Exit Command-Branching Control Structures-Loop Control Structures-The Continue and Break Statement-The Expr Command: Performing Integer Arithmetic-Real Arithmetic in Shell Programs-The here Document(<<)-I/O Redirection, The Sleep Command-Debugging Scripts-The Script Command-The Eval Command-The Exec Command. Command Line Structure - Met characters.

UNIT-IV : Regular Expressions:grep, egrep, fgrep, Sed- line addressing, context addressing, text editing,substitution.

Programming with awk: syntax of awk programming statement, structure of awk script, variables ,records fields, and special variables, patterns, operators ,simple input files, awk programming- simple awk programming, awk control structures, looping, functions in awk.

UNIT-V: Unix process: What is a process, process structure, process identifiers, starting new process, waiting for a process, zombie process, system call interface for process management - fork, vfork, exit, wait, waitpid, exec system call.

UNIT : VI Signals : Signal functions, unreliable signals, interrupted system calls, kill and raise functions, alarm, pause functions, abort, sleep functions

Text Books:

1. Introduction to Unix and shell programming, M G venkateshmurthy, Pearson education
2. Advanced programming in the unix environment, W. Richard Stevens, 3rd Edition, Pearson education

REFERENCES

1. Unix and shell Programming, B.A. Forouzan& R.F. Giberg, ,Thomson, First Edition, NewDelhi, 2003.

V Sem	Advanced Computer Architecture (Elective-I)	Course Code: V18CST15	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe the basics of quantitative design and analysis (K2).

CO2: Illustrate memory hierarchy schemes (K2).

CO3: Illustrate concepts of Instruction-Level Parallelism (K2).

CO4: Explain concepts of Data-Level Parallelism (K2).

CO5: Explain concepts of Thread-Level Parallelism (K2).

CO6: Describe architectural aspects of Warehouse-Scale Computers (K2).

UNIT-I : Fundamentals of Quantitative Design and Analysis: Classes of Computers, Defining Computer Architecture, Designing the Organization and Hardware to Meet Goals and Functional Requirements, Quantitative Principles of Computer Design

UNIT-II : Memory Hierarchy Design: Basics of Memory Hierarchies, Advanced Optimizations of Cache Performance, Memory Technology and Optimizations, Virtual Memory and Virtual Machines.

UNIT-III : Instruction-Level Parallelism: Concepts and Challenges, Basic Compiler Techniques, Reducing Branch Costs with Advanced Branch Prediction, Overcoming Data Hazards with Dynamic Scheduling, Tomasulo’s Approach, Hardware-Based Speculation, Multiple Issue and Static Scheduling

UNIT-IV : Data-Level Parallelism: Vector Architecture, VMIPS, Vector Processors, SIMD Instruction Set Extensions for Multimedia

UNIT-V : Thread-Level Parallelism: Introduction, Centralized Shared-Memory Architectures- Multiprocessor Cache Coherence, Basic Schemes for Enforcing Coherence, Snooping Coherence Protocols

UNIT-VI : Warehouse-Scale Computers: Introduction, Programming Models and Workloads for Warehouse-Scale Computers, Computer Architecture of Warehouse-Scale Computers

TEXT BOOK:

1. Computer Architecture: A Quantitative Approach, John L. Hennessy, David A. Patterson, 5th Edition, Morgan Kaufmann, Elsevier.

REFERENCE BOOKS:

1. Advanced Computer Architectures: A Design Space Approach, D Sima, T Fountain, P Karsuk, 1st Edition, Pearson
2. Advanced Computer Architecture, K Hwang, N Jotwani, 2nd Edition, McGraw-Hill

			L	T	P	C
V Sem	**Advanced Data Structures (Elective-I)**	Course Code: V18CST16	3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Explain external sorting method (K2).

CO2: Discuss pattern matching Algorithms (K2).

CO3: Illustrate various hash functions with appropriate examples (K3).

CO4: Illustrate various priority queues with appropriate examples (K3).

CO5: Construct self balanced tree with appropriate examples (K3).

CO6: Discuss Multiway search trees(K2).

UNIT-I: SORTING: Introduction - External Sorting- K-way Merging - Buffer Handling for parallel Operation- Run Generation- Optimal Merging of Runs.

UNIT-II: STRING MATCHING ALGORITHMS: The Navi String matching algorithms – The Robin-Krap algorithm – String Matching algorithm using finite automata – The Knuth Morris Pratt algorithm.

UNIT-III: SKIP LIST AND HASHING: Dictionaries – ADT- Linear List representation - Skip List representation: Ideal case – Insertion and Deletion –Assigning levels – The struct skip node – The class skip list – complexity of skipList methods. Hash Table Representation: Ideal hashing – Hash functions and tables -Linear probing- Hashing with Chains

UNIT-IV: PRIORITY QUEUES (HEAPS) : Definition and Applications – ADT – Linear lists – Heaps : Definition – Max heap and Min heap operations, Applications – Heap Sort – Huffman Codes.

UNIT-V: EFFICIENT BINARY SEARCH TREES : Introduction to AVL Trees- Red-Black Trees- Definition- Representation of a Red- Black Tree- Searching a Red-Black Tree- Inserting into a Red Black Tree- Deletion from a Red-Black Tree- Joining Red-Black Trees, Splitting a Red-Black tree – Splay Trees – Introduction – operation – Amortized complexity.

UNIT-VI: MULTIWAY SEARCH TREES : ISAM - M-Way Search Trees, Definition and Properties- Searching an M-Way Search Tree, B-Trees, Definition and Properties- search Elements in a B-tree- Insertion into B-Tree- Deletion from a B-Tree- Node Structure.

TEXT BOOKS:

1. Data Structures, Algorithms and Applications in C++; SartajSahni; UniverstiyPress ; Second Edition.

2. Introduction to Algorithms By Thomas H Cormen, Charless E leiserson, Ronald L Rivest and Cliford Stein PHI publication Third Edition (UNIT – II)

REFERENCES:

1. Data Structures, a Pseudocode Approach, Richard F Gilberg, BehrouzA Forouzan, Cengage.

2. An Introduction to Data Structures with applications By Jean Paul Trembly and Paul G Sorenson Tata McGraw Hill Second Edition
3. Fundamentals of Data Structures and algorithms by C V Sastry, Rakesh Nayak, Ch. Raja Ramesh, IK Publications, new Delhi.

V Sem	Artificial Intelligence (Elective-I)	Course Code: V18CST17	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Illustrate the concept of intelligent systems and current trends in AI. (K2)

CO2: Apply Problem solving, Problem reduction and Game Playing techniques in AI. (K3)

CO3: Illustrate the Logic concepts in AI. (K2)

CO4: Explain the Knowledge representation techniques in AI. (K2)

CO5: Describe Expert systems and their applications. (K2)

CO6: Illustrate Uncertainty Measures. (K2)

UNIT-I: Introduction to Artificial Intelligence: Introduction, history, intelligent systems, foundations of AI, applications, tic-tac-toe game playing, current trends in AI

UNIT-II: Problem solving: State-space Search and Control Strategies: Introduction, General Problem Solving, Characteristics of problem, Exhaustive searches, Heuristic search techniques, Iterative deepening a*, constraint satisfaction

Problem reduction and game playing: Introduction, problem reduction, game playing, alpha beta pruning, two-player perfect information games

UNIT-III:Logic concepts: Introduction, Propositional Calculus, Proportional Logic, Natural Deduction system, Axiomatic system, Semantic tableau system in proportional logic, Resolution Refutation in Propositional logic, Predicate Logic

UNIT-IV: Knowledge representation: Introduction, approaches to Knowledge representation, Knowledge representation using Semantic Networks, Extended Semantic Networks for KR, Knowledge representation using Frames

UNIT-V: Expert Systems and Applications: Introduction phases in building Expert Systems, Expert System versus Traditional Systems, Rule-based Expert Systems, Blackboard systems, Truth maintenance systems, applications of Expert Systems.

UNIT-VI: Uncertainty measure: Probability theory- Introduction, Probability Theory, Bayesian Belief networks, Certainty Factor Theory, Dempster-Shafer theory

Text Book:

1. Artificial Intelligence, Saroj Kaushik, 1st Edition, Cengage Learning.

Reference Books:

1. Artificial Intelligence, Elaine Rich, Kevin Knight, Shivashankar B Nair, 3rd Edition, Tata McGraw Hill Education Private Limited., 2009

2. Artificial Intelligence- A modern Approach, 3rd Edition, Stuart Russel, Peter Norvig, Pearson Education.

V Sem	**Computer Graphics (Elective-I)**	Course Code: V18CST18	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Understand the applications of computer graphics and learn basic algorithms (K2).
CO2: Analyze the concepts of 2D graphics along with transformation techniques (K3).
CO3: Understand 2D Views of objects and clipping algorithms (K2).
CO4: Illustrate 3D graphics and will get an idea about projections views of objects (K2).
CO5: Determine different visible surface detection methods (K2).
CO6: Understand different animation sequences and Color Models (K2).

UNIT I:Introduction: Application of Computer Graphics, raster scan systems, random scan systems, raster scan display processors. Output Primitives : Points and lines, line drawing algorithms(Bresenham's and DDA Line derivations and algorithms), mid-point circle and ellipse algorithms.

UNIT II: Filled area primitives: Boundary-fill and flood-fill algorithms. **2-D geometrical transforms:** Translation, scaling, rotation, reflection and shear transformations, and homogeneous coordinates, composite transforms.

UNIT III:2-D viewing: The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Cohen-Sutherland, Sutherland –Hodgeman polygon clipping algorithm.

UNIT IV:3-D Geometric transformations: Translation, rotation, scaling, reflection and shear transformations, composite transformations. 3D Viewing pipeline, clipping, projections (Parallel and Perspective). **3-D object representation:** Polygon surfaces, quadric surfaces, spline representation, Bezier curve and B-Spline curves.

Unit V:Visible surface detection methods: Classification, back-face detection, depth-buffer, scan-line, BSPtree methods, area sub-division.

Unit VI:Computer animation: Design of animation sequence, general computer animation functions, raster animation, computer animation languages. **Color Models** – RGB, YIQ, CMY, HSV.

TEXT BOOKS:

1. Computer Graphics C version, Donald Hearn, M.Pauline Baker, Pearson

2. Computer Graphics, Schaum's outlines", Zhigand xiang,Roy Plastock, 2nd Edition,Tata Mc-Graw Hill Edition.

3. Principles of Computer Graphics, S. Govil-Pai, 1st Edition, Springer International Edtion,2005.

REFERENCE BOOKS:

1. Computer Graphics Principles & practice, 2/e, Foley, VanDam, Feiner, Hughes, Pearson

2. Computer Graphics, Peter, Shirley, CENGAGE

3. Principles of Interactive Computer Graphics, Neuman , Sproul, TMH.

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V Sem	Data Base Management System Lab	Course Code:V18CSL06	L	T	P	C
			0	0	3	1.5

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Build SQL Queries and Constraints (K3).

CO2: Experiment with various Database Indexing Techniques.(K3).

CO3: Construct PL/SQL Cursors and Exceptions (K3).

CO4: Develop application programs using PL/SQL (K3).

CO5: Develop PL/SQL Functions, Procedures, Packages (K3).

CO6: Apply projections and aggregation on collection of MongoDB database (K3).

List of Experiments

Part-A

1. Queries to facilitate acquaintance of Built-In Functions, String Functions, Numeric Functions, Date Functions and Conversion Functions.

2. Queries using operators in SQL

3. Queries to Retrieve and Change Data: Select, Insert, Delete, and Update

4. Queries using Group By, Order By, and Having Clauses

5. Queries on Controlling Data: Commit, Rollback, and Save point

6. Queries to Build Report in SQL *PLUS

7. Queries for Creating, Dropping, and Altering Tables, Views, and Constraints

8. Queries on Joins and Correlated Sub-Queries

9. Queries on Working with Index, Sequence, Synonym, Controlling Access, and Locking Rows for Update, Creating Password and Security features PL/SQL.

10. Write a PL/SQL Code using Basic Variable, Anchored Declarations, and Usage of Assignment Operation.

11. Write a PL/SQL Code Bind and Substitution Variables. Printing in PL/SQL

12. Write a PL/SQL block using SQL and Control Structures in PL/SQL

13. Write a PL/SQL Code using Cursors, Exceptions and Composite Data Types

14. Write a PL/SQL Code using Procedures, Functions, and Packages FORMS

Part-B

1. Install and start MongoDB

2. Create and drop database and collection

3. Insert,update ,delete,query document

4. Projection, limiting records, sorting records and aggregation in MongoDB

TEXT BOOKS:

1. Oracle Database 11g The Complete Reference by Oracle Press, Kevin Loney
2. Database Systems Using Oracle, Nilesh Shah, 2nd Edition ,PHI.
3. Introduction to SQL, Rick F Vander Lans, 4th Edition, Pearson Education.

REFERENCE BOOKS:

1. Introduction to SQL, Rick F. Vander Lans, 4th Edition, Pearson education.
2. Oracle PL/SQL Interactive Workbook, B. Rosenzweig and E. Silvestrova,2nd Edition, Pearson education.
3. SQL & PL/SQL for Oracle 10 g, Black Book, Dr. P. S. Deshpande, Dream Tech.

V Sem	Operating System and Unix Lab	Course Code: V18CSL07	L	T	P	C
			0	0	3	1.5

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Illustrate CPU scheduling algorithms (K3)

CO2: Apply Bankers Algorithm for Deadlock Avoidance and Deadlock Prevention (K3)

CO3: Use Page replacement algorithms for memory management (K3)

CO4: Demonstrate the basic knowledge of Linux commands and file handling utilities by using Linux shell environment. (K3)

CO5: Experiment with the concept of shell scripting programs. (K3)

CO 6: Illustrate the process of how the parent and child relationships (K3)

List of Experiments:

Part-A: OS Lab

1. Simulate the following CPU scheduling algorithms:
   a) FCFS b) SJF c) Round Robin d) Priority
2. Implement : fork (), wait (), exec() and exit () system calls
3. Simulate Producer and Consumer problem using Semaphores
4. Simulate Bankers Algorithm for Dead Lock Avoidance
5. Simulate Bankers Algorithm for Dead Lock Prevention
6. Simulate the following page replacement algorithms:
   a) FIFO b) LRU c) LFU
7. Simulate the following File allocation strategies:
   a) Sequenced b) Indexed c) Linked

Part-A: UNIX Lab

8. **Study of Unix Commands:** General Purpose Utilities, Directory Handling Commands, File Handling Utilities, Displaying Commands, Filters, Disk Utilities
9. Shell Script to list all of the directory files in a directory.
10. Shell Script to find the factorial of a given number
11. Shell Script to generate a Multiplication table.
12. Shell Script to Perform arithmetic operations
13. Implement an AWK script to count the number of lines in a file that do not contain vowels
14. Design an awk script to find the number of characters, words and lines in a file?
15. Design a C program to create a child process and allow the parent to display “parent” and the child to display “child” on the screen
16. Demonstration of GDB tool to understand process programme.
17. Design a C program to create a Zombie Process.
18. Design a C program that illustrates how an orphan is created.

Reference Books:

1. Operating System Concepts,AbrahamSilberschatz, ,Peter Baer Galvin,Greg Gagne, 9th Edition, John Wiley and Sons Inc., 2012
2. Operating Systems – Internals and Design Principles, William Stallings, 7th Edition, Prentice Hall, 2012
3. Modern Operating Systems, Andrew S. Tanenbaum, Third Edition, Addison Wesley,2007
4. M G venkateshmurthy Introduction to Unix and shell programming Pearson education
5. W. Richard Stevens, Advanced programming in the unix environment, 3rd EditionPearson education.

V Sem	Technical Skills-III	Course Code: V18CST62	L	T	P	C
			0	0	4	MNC

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Apply fundamental data structures like List, Stack to solve real work problems in linear time i.e. O(n). (K3)

CO2: Make use of advanced data structures like queue, to solve complex problems in linear time , logarithmic time i.e. O(n) or O(nlogn).(K3)

CO3: Develop programs to solve problems by with the help of searching and sorting techniques. (K3)

CO4: Analyze linked list by comparing with Array List and develop programs to solve optimization Problems. (K4)

CO5: Experiment with types of Linked List to solve complex combinatorial problems. (K3)

CO6: Develop programs to solve complex problems by using combination of stack, Queue and List. (K3)

Data Structures

1. Problem solving using ArrayList
2. Problem solving using LinkedList
3. Problem solving using Stack
4. Problem solving using Queue
5. Problem solving using Searching
6. Problem solving using Sorting

TEXT BOOKS:

1. Introduction to Algorithms, Second Edition, Thomas H. Cormen Charles E. Leiserson.
2. Data Structures and Algorithms Made Easy: Narasimha Karumanchi .
3. The Algorithm Design Manual, Springer series, Steven Skiena.

VI Sem	Compiler Design	Course Code: V18CST19	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe the compilation process and lexical analyzer (K2)
CO2: Construct top down parsing Techniques (K3)
CO3: Construct bottom up parsing techniques (K3)
CO4: Construct syntax directed translation (K3)
CO5: Produce intermediate code generation process and run time environments (K3)
CO6: Explain the code generation process. (K2)

UNIT-I: Introduction: Language Processors, the Structure of a Compiler. **Lexical Analysis:** The Role of the Lexical Analyzer, Specification of Tokens, Recognition of Tokens and the Lexical-Analyzer Generator Lex.

UNIT-II: Syntax Analysis: Definition of CFG, Lexical Versus Syntactic Analysis, Writing a Grammar- Elimination of Left Recursion, Left Factoring. **Top Down Parsing:** Recursive Descent Parsing, First and Follow, LL(1) Grammars, Non recursive Predictive Parsing, Error Recovery in Predictive Parsing.

UNIT-III: Bottom-Up Parsing: Bottom Up Parser Classification, Reductions, Handle Pruning, Shift-Reducing, Conflicts During Shift Reduce Parsing. Introduction to LR Parsing: Difference between LR and LL Parsers, Why LR Parsers?, Items and the LR(0) automaton, The LR-Parsing Algorithm, Constructing SLR Parsing Tables

UNIT-IV: More powerful LR parsers: construction of CLR (1), LALR Parsing tables, Comparison of all Bottom Up approaches. Semantic Analysis: Syntax Directed Definitions, Evaluation Orders for SDD's, Applications of SDT.

UNIT-V: Intermediate Code Generation: Variants of Syntax Trees, Three-Address Code, Control Flow, Back-patching. Run-Time Environments: Storage Organization, Stack Allocation of Space, Heap Management.

UNIT-VI: Code Generation: Basic Blocks and Flow Graphs, Optimization of Basic Blocks, Peephole Optimization, Register Allocation and Assignment. **Machine-Independent optimizations:** The Principal Sources of Optimizations, Introduction to Data-Flow Analysis.

.TEXT BOOKS:

1. Compilers, Principles Techniques and Tools- Alfred V Aho, Monica S Lam, Ravi Sethi, Jeffrey D. Ullman,2nded, Pearson,2007

REFERENCE BOOKS:

1. Principles of compiler design, V. Raghavan, 2nd ed, TMH, 2011
2. Compiler Design, K. Muneeswaran, Oxford

VI Sem	**Data Mining**	Course Code:	L	T	P	C
		V18CST20	3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Explain the concept of Data Mining and its functionalities (K2)

CO2: Discuss various Data Preprocessing Techniques (K3)

CO3: Demonstrate Association Analysis Techniques (K3)

CO4: Illustrate various Classification Techniques (K3)

CO5: Demonstrate Alternative techniques for Classification (K3)

CO6: Use different Clustering techniques to cluster data (K3)

UNIT-I : Introduction: Need for Data Mining, Knowledge Discovery from Data, Kinds of Data mined, Kinds of Patterns mined, Technologies used, Kinds of Applications targeted, Major Issues in Data Mining, Data Objects and Attribute Types, Basic Statistical Descriptions of Data, Measuring Data Similarity and Dissimilarity

UNIT-II: Data Preprocessing: Overview of Data Preprocessing, Data Cleaning, Data Integration, Data Reduction, Data Transformation and Data Discretization

UNIT-III: Mining Frequent Patterns, Associations, and Correlations: Basic Concepts, Frequent Itemset Mining Methods- Apriori Algorithm: Finding Frequent Itemsets by Confined Candidate Generation, Generating Association Rules from Frequent Itemsets, Improving the Efficiency of Apriori, Pattern-Growth Approach for Mining Frequent Itemsets

UNIT-IV: Classification: Basic Concepts, Decision Tree Induction, Attribute Selection Measures, Tree Pruning

UNIT-V: Bayes Classification Methods: Bayes' Theorem, Naive Bayesian Classification. **Bayesian Belief Networks:** Concepts and Mechanisms, Training Bayesian Belief Networks

UNIT-VI: Cluster Analysis: Basic Concepts and Methods, Partitioning Methods, Hierarchical Methods, Density Based Method-DBSCAN

ext Books:

1. Data Mining Concepts and Techniques, Jiawei Han, Micheline Kamber, Jian Pei,3rd Edition, Morgan Kaufmann Publishers

Reference Books:

1. Introduction to Data Mining, Pang-Ning Tan, Michael Steinbach, Vipin Kumar, 1st Edition, Pearson Education.
2. Data Mining and Analysis,Mohammed J Zaki, Wagner Meira JR, 1st Edition ,Cambridge University Press.

VI Sem	**Object Oriented Analysis and Design Through UML**	Course Code: V18CST21	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Discuss importance of modeling. [K2]

CO2: Describe classes and relationships. [K2]

CO3: Develop class diagrams and object diagrams. [K3]

CO4: Develop Interaction, Use case and Activity Diagrams. [K3]

CO5: Illustrate advanced behavioral modeling. [K3]

CO6: Develop component and deployment diagrams.[K3]

UNIT-I: Introduction to UML: Importance of modeling - Principles of modeling - Object oriented modeling - Conceptual model of the UML – Architecture - Software Development Life Cycle.

UNIT-II: Advanced Structural Modeling: Classes – Relationships - Common Mechanisms and diagrams - Advanced classes - Advanced relationships – Interfaces - Types and Roles – Packages.

UNIT-III: Class & Object Diagrams: Terms, concepts - Modeling techniques for Class Diagrams - Modeling techniques for Object Diagrams.

UNIT-IV: Basic Behavioral Modeling-I: Interactions - Interaction diagrams. **Basic Behavioral Modeling-II:** Use cases - Use case Diagrams - Activity Diagrams.

UNIT-V: Advanced Behavioral Modeling: Events and signals - State machines - Processes and Threads - Time and space - State chart diagrams.

UNIT-VI: Architectural Modeling: Component- Deployment - Component diagrams - Deployment diagrams.

TEXT BOOK:

1. The Unified Modeling Language User Guide, Grady Booch, James Rumbaugh, Ivar Jacobson, Pearson Education.

REFERENCE BOOKS:

1. UML 2 Toolkit, Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado, WILEY-Dreamtech India Pvt. Ltd.
2. Fundamentals of Object Oriented Design in UML, Meilir Page-Jones, Pearson Education.
3. Modeling Software Systems Using UML2, Pascal Roques, WILEY-Dreamtech IndiaPvt. Ltd.

VI Sem	**Cryptography and Network Security**	Course Code: V18CST22	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1:Describe the fundamentals of networks security, security architecture, threats and vulnerabilities (K2)
CO2: Discuss the mathematical support for both symmetric and asymmetric key cryptography (K2)
CO3: Discuss the concept of developing encryption and decryption algorithms (K2)
CO4: Illustrate various techniques of encryption and message authentication functions (K3)
CO5: Apply various Key management and Distribution techniques and its importance (K3)
CO6: Discuss the Need of Transport level and Email security algorithms (K2)

UNIT-I: Computer Security concepts, security services, and Active vs. Passive attacks, Security mechanisms, OSI Security Architecture, A Model for Network security, Classical Encryption Techniques, Substitution ciphers, Transposition ciphers.

UNIT-II: Introduction to Number Theory, Fermat's and Euler's Theorem, the Chinese Remainder Theorem, Euclidean Algorithm, and Modular Arithmetic.

UNIT-III: Block Ciphers, Data Encryption Standard (DES), Block Cipher Design Principles, Advanced Encryption Standard (AES), Simplified AES, Multiple Encryption and Triple DES, Pseudorandom Number Generators, Pseudorandom Number Generation Using a Block Cipher, Stream Ciphers, RC4.

UNIT-IV: RSA, Diffie-HellmanKeyExchange, Elliptic Curve Cryptography, Message Authentication Code-Message Authentication Functions, Requirements, and Security, HMAC, Hash functions, Secure Hash algorithm,SHA-512.

UNIT-V: Digital Signatures, Digital Signature Standards, Authentication Protocols, Kerberos, Key Management and Distribution, X.509 Digital Certificate, NIST Digital Signature Algorithm.

UNIT-VI: Transport Level Security: Web Security Considerations, Secure Socket Layer, Transport Layer Security.Electronic mail security: Pretty Good Privacy (PGP),S/MIME.

TEXT BOOKS:

1. "Cryptography and Network Security, Principles and Practices", William Stallings Pearson Education, Sixth Edition.
2. "Network Security Essentials (Applications and Standards)", William Stallings, Pearson Education Fourth Edition.
3. Cryptographyand NetworkSecurity,BehrouzAForouzan,Debdeep Mukhopadhyay,(3e) McGrawHill.

REFERENCE BOOKS:

1. "Network Security – PrivateCommunication in a Public World" Charlie Kaufman, Radia Perlman and Mike Speciner , Pearson/PHI.

			L	T	P	C
VI Sem	**Software Testing Methodologies (Elective-II)**	Course Code: V18CST23	3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe Software testing objectives and methodology. (K2)

CO2: Apply various Software testing techniques. (K3)

CO3: Discuss Static testing techniques for software testing. (K2)

CO4: Differentiate software testing and debugging process. (K2)

CO5: Construct test cases by understanding test suite management. (K3)

CO6: Explain modern software testing tools to support software testing. (K2)

UNIT-I: Introduction to Software Testing: Evolution of software Testing, Myths and Facts, Goals of software Testing, Definitions of Testing, Model for Software Testing, Software Testing Terminology, Software Testing Life Cycle.

UNIT-II: Verification and Validation: Verification & Validation Activities, Verification, Verification of Requirements, Verification of High level and low level designs, How to verify code, Validation. **Dynamic Testing I:** Black Box testing techniques: Boundary Value Analysis, Equivalence Class Testing, Decision Table based Testing,

UNIT-III: Dynamic Testing II: White-Box Testing: Need of White-Box Testing, Logic coverage criteria, Basis path testing, Loop testing. **Static Testing:** Inspections, Structured Walkthroughs, Technical reviews.

UNIT-IV: Regression Testing: Progressive Vs Regressive Testing, Regression testability, Objectives of regression testing, When is Regression Testing done? Regression Testing Types, Regression testing techniques. **Debugging:** Debugging process, Techniques, correcting bugs.

UNIT-V: Efficient Test Suite Management: Why does a Test Suite grow, minimizing the Test suite and its benefits, Test suite prioritization, Types of Test case prioritization, Prioritization techniques, measuring the effectiveness of a prioritized Test Suite.

UNIT-VI: Software Quality Management: Software quality concept, Quality control and Quality Assurance, Software Quality metrics. **Automation and Testing Tools:** Need for automation, categorization of Testing tools, selection of testing tools, Overview of some commercial testing tools.

.TEXT BOOKS:

1. Software Testing, Principles and Practices, Naresh Chauhan, 9th Edition, Oxford Publisher.

REFERENCE BOOKS:

1. Software testing techniques - Boris Beizer, 2nd Edition, Dreamtech publisher..
2. Foundations of Software testing, Aditya P Mathur, 2nd ed, Pearson.
3. Software Testing- Yogesh Singh, CAMBRIDGE.

VI Sem	**Principles of Programming Languages (Elective-II)**	Course Code: V18CST24	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe Syntax and Semantics of Programming Languages (K2).

CO2: Illustrate Data, Data Types and basic statements of Programming Languages (K3).

CO3: Explain various sub programming Issues (K2).

CO4: Construct programs using Object Oriented, Concurrency and Event Handling (K3).

CO5: Distinguish Programming Languages, schemes and ML (K2).

CO6: Describe Logic Programming Languages (K2).

UNIT I: SYNTAX AND SEMANTICS: Reasons for studying Programming Languages, Programming Domains, Evolution of programming languages, describing syntax, context free grammars, attribute grammars, describing semantics, lexical analysis, parsing, recursive – decent bottom – up parsing.

UNIT II: DATA TYPES AND BASIC STATEMENTS: Introduction, primitive data types, strings, array types, associative arrays, record types, tuple types , union types, pointers and references, Arithmetic expressions, overloaded operators, type conversions, relational and Boolean expressions, assignment statements , mixed mode assignments, control structures – selection, iterations, branching, guarded Statements.

UNIT III: SUBPROGRAMS AND IMPLEMENTATIONS: Subprograms, design issues, local referencing, parameter passing, overloaded methods, generic methods, design issues for functions, semantics of call and return, implementing simple subprograms, stack and dynamic local variables, nested subprograms, blocks, dynamic scoping.

UNIT IV: OBJECT- ORIENTED PROGRAMMING,EVENT HANDLING: Object Model – Classes, Visibility and Information Hiding, Inheritance, Polymorphism, Abstract Classes, Event Handling- Mouse Clicks, Mouse Motion, Buttons, Labels, Text areas, Combo boxes, Examples.

UNIT V: FUNCTIONAL PROGRAMMING LANGUAGES: Introduction to lambda calculus, fundamentals of functional programming languages, Programming with Scheme, – Programming with ML.

UNIT VI: LOGIC PROGRAMMING LANGUAGES: Introduction to logic and Horn Clauses, logic programming – Programming in Prolog, Prolog Examples-Solving Word Puzzles, Eight Queens Problem.

TEXT BOOKS

1. Concepts of Programming Languages, Robert W. Sebesta ,Tenth Edition, Addison Wesley, 2012.
2. Programming Languages, Principles & Paradigms, 2ed, Allen B Tucker, Robert E Noonan, TMH

REFERENCES

1. The Scheme programming language, R. Kent Dybvig, Fourth Edition, MIT Press, 2009.
2. Elements of ML programming, Jeffrey D. Ullman, Second Edition, Prentice Hall, 1998.
3. The craft of Prolog, Richard A. O'Keefe MIT Press, 2009.

VI Sem	**Machine Learning (Elective-II)**	Course Code: V18CST25	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Demonstrate basics of Machine Learning.(K2)

CO2: Explain Various Classification Techniques.(K2)

CO3: Explain Tree Based Learning and Ensemble Learning (K2)

CO4: Demonstrate Neural Networks and Multi Layer Perceptrons. (K2)

CO5: Explain Multi Layer Perceptrons and Back Propagation (K2).

CO6: Demonstrate Dimensionality Reduction Techniques (K2).

Unit-I: Introduction:Learning: Machine Learning, Types Of Machine Learning, Supervised Learning, Regression, Classification, The Machine Learning Process. Some Terminology: Weight Space, The Curse Of Dimensionality. Knowing What You Know: Testing Machine Learning Algorithms, Over fitting, Training, Testing, And Validation Sets. Some Basic Statistics: Averages Variance And Covariance, The Bias-Variance Tradeoff.

UNIT II: Classification: The General Problem, Logistic Regression, K-Nearest Neighbor Classifiers, Support Vector Machines. Assessing Performance Of Classifiers: The Confusion Matrix, Accuracy, 0/1 Loss, Sensitivity And Specificity, The Receiver Operator Characteristic (Roc) Curve. Unbalanced Datasets Measurement: Precision, Recall And F1 Score.

UNIT-III: Ensemble Learning : Boosting, Adaboost, Stumping, Bagging , Subbagging, Random Forests.

UNIT-IV: Neural Networks: The Brain And The Neuron, Hebb's Rule, Mcculloch And Pitts Neurons, Limitations Of The Mcculloch And Pitts Neuron Model, Neural Networks, The Perceptron, The Learning Rate, The Bias Input The Perceptron Learning Algorithm, An Example Of Perceptron Learning: Logic Functions Implementation, Linear Separability, Linear Regression, Linear Regression Examples

UNIT-V: The Multi Layer Perceptron(MLP): Going Forwards, Going Backwards(Back Propagation of Errors), The MLP in practice, Examples of using the MLP: Classification and Regression, Deriving Back-Propagation.

UNIT-VI: Dimensionality Reduction: Linear Discriminant Analysis (LDA), Principal Components Analysis (PCA), Relation With The Multi-Layer Perceptron, Kernel PCA, Factor Analysis, Independent Components Analysis (ICA) Locally Linear Embedding.

TEXT BOOKS:

1. Machine Learning: An Algorithmic Approach.Stephen Marsland, 2nd Edition, CRC Press.

2. A First Course in Machine Learning; Volume in Machine Learning and Pattern Recognition Series – CRC-Taylor & Francis-Chapman & Hall Rogers S., Girolami M., (2011).

REFERENCE BOOKS:

1. Machine Learning: The art and Science of Algorithms that Make sense of Data. Peter Flach, Cambridge, First Edition, 2012.

2. Machine Learning: Tom Mitchel, McGraw Hill Learning, 1997

<table>
<tr><td rowspan="2">VI Sem</td><td rowspan="2">Image Processing (Elective-II)</td><td rowspan="2">Course Code: V18CST26</td><td>L</td><td>T</td><td>P</td><td>C</td></tr>
<tr><td>3</td><td>0</td><td>0</td><td>3</td></tr>
</table>

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Illustrate the different Transforms Techniques & their use in Image Processing applications (K3).

CO2: Demonstrate Spatial & frequency domain filtering (like smoothing & sharpening operations) on Images (K3).

CO3: Describe Restoration operations/techniques on Images (K2).

CO4: Demonstrate the Image compression Techniques and multi-resolution processing on Images (K3).

CO5: Illustrate Morphological operations on Images & Image segmentation (K3).

CO6: Illustrate the different color Image Processing Techniques on Images (K3).

UNIT-I : Introduction: Introduction to Image Processing, Fundamental steps in digital image processing, components of an image processing system, image sensing and acquisition, image sampling and quantization, some basic relationships between pixels, an introduction to the mathematical tools used in digital image processing. **Image Transforms:** Need for image transforms, Discrete Fourier transform (DFT) of one variable, Extension to functions of two variables, some properties of the 2-D Discrete Fourier transform, Importance of Phase, Walsh Transform. Hadamard transform, Haar Transform, Slant transform, Discrete Cosine transform.

UNIT-II: Intensity Transformations and Spatial Filtering: Background, Some basic intensity transformation functions, histogram processing, fundamentals of spatial filtering, smoothing spatial filters, sharpening spatial filters. **Filtering in the Frequency Domain:** Preliminary concepts, The Basics of filtering in the frequency domain, image smoothing using frequency domain filters, Image Sharpening using frequency domain filters, Selective filtering.

UNIT-III: Image Restoration and Reconstruction: A model of the image degradation / Restoration process, Noise models, restoration in the presence of noise only-Spatial Filtering, Periodic Noise Reduction by frequency domain filtering, Linear, Position –Invariant Degradations, Estimating the degradation function, Inverse filtering, Minimum mean square error (Wiener) filtering, constrained least squares filtering ,geometric mean filter .

UNIT-IV: Image compression: Fundamentals, Basic compression methods: Huffman coding, Arithmetic coding, LZW coding, Run-Length coding, Bit-Plane coding. **Wavelets and Multiresolution Processing:** Image pyramids, subband coding, Multiresolution expansions, wavelet transforms in one dimensions & two dimensions, Wavelet coding.

UNIT-V: Image segmentation: Fundamentals, point, line, edge detection, thresholding, region –based segmentation. **Morphological Image Processing:** Preliminaries, Erosion and dilation, opening and closing, basic morphological algorithms for boundary extraction, thinning, gray-scale morphology.

UNIT-VI: Color image processing: color fundamentals, color models, pseudo color image processing, basics of full color image processing, color transformations, smoothing and sharpening. Image segmentation based on color, noise in color images, color image compression.

TEXT BOOKS:

1. Digital Image Processing, R. C. Gonzalez and R. E. Woods, 3rd edition, Prentice Hall, 2008.

2. Digital Image Processing, Jayaraman, S. Esakkirajan, and T. Veerakumar, Tata McGraw-Hill Education, 2011.

REFERENCE BOOKS:

1. Fundamentals of Digital Image Processing, Anil K.Jain, Prentice Hall of India, 9th Edition, Indian Reprint, 2002.

2. Digital Image Processing and Analysis, B.Chanda, D.Dutta Majumder, PHI, 2009.

VI Sem	**Object Oriented Analysis and Design Through UML Lab**	Course Code: V18CSL08	L	T	P	C
			0	0	3	1.5

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Develop OOAD and UML concepts to identify Classes, Use Cases and their relationships (K3).

CO2: Develop Class diagrams (K3).

CO3: Develop Use case diagrams (K3).

CO4: Construct Interaction diagrams (K3).

CO5: Develop State chart, Activity diagrams (K3).

CO6: Develop Component and Deployment diagrams (K3).

List of Experiments

1. raw basic class diagrams to identify and describe key concepts like classes, and their relationships.
2. Draw one or more Use Case diagrams for capturing and representing requirements of the system. Use case diagrams must include template showing description and steps of the Use Case for various scenarios.
3. Draw sequence diagrams OR communication diagrams with advanced notation for system to show objects and their message exchanges.
4. Draw activity diagrams to display either business flows or like flow charts.
5. Develop State chart diagrams.
6. Draw component diagrams assuming that build the system reusing existing components along with a few new ones.
7. Draw deployment diagrams to model the runtime architecture of system.
8. Design Case study on Library Management System
9. Design Case Study on Hospital Management System
10. Case study-Railway Reservation System
11. Design Case study on Library Management System using C4 Model.

TEXT BOOKS:

1. The Unified Modeling Language User Guide, Grady Booch, James Rumbaugh, Ivar Jacobson, Pearson Education.

REFERENCE BOOKS:

1. UML 2 Toolkit, Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado, WILEY-Dreamtech India Pvt. Ltd.
2. Fundamentals of Object Oriented Design in UML, Meilir Page-Jones, Pearson Education.
3. Modeling Software Systems Using UML2, Pascal Roques, WILEY- Dreamtech India Pvt. Ltd.
4. (https://c4model.com/)

VI Sem	**Data Mining Lab**	Course Code:V18CSL09	L	T	P	C
			0	0	3	1.5

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Demonstrate Data Preprocessing techniques.(K3)

CO2: Demonstrate Association Rule Mining techniques.(K3)

CO3: Demonstrate Classification techniques. (K3)

CO4: Demonstrate the Clustering techniques. (K3)

List of Experiments (Using Weka Tool):

1. Demonstrate Data Preprocessing on predefined Weka dataset labor.arff
2. Create a student.arff dataset and Demonstrate Data Preprocessing on it
3. Demonstrate Association rule process on predefined Weka dataset contactlenses.arff using apriori algorithm.
4. Create an employee.arff dataset and demonstrate Association rule process on it using apriori algorithm
5. Demonstrate Classification process on student.arff dataset using j48 algorithm
6. Create a customer.arff dataset and demonstrate Classification process on it using j48 algorithm
7. Demonstrate Classification process on employee.arff dataset using id3 algorithm
8. Demonstrate Classification process on employee.arff dataset using Naïve Bayes algorithm
9. Demonstrate Clustering process on predefined Weka dataset iris.arff using simple k-means algorithm.
10. Demonstrate Clustering process on dataset student.arff using simple k- means algorithm.

Reference Books:

1. Data Mining: Practical Machine Learning Tools and Techniques, Ian H. Witten, Eibe Frank, Mark A. Hall, 3rd Edition, Morgan Kaufmann Publishers
2. Data Mining Concepts and Techniques, Jiawei Han, Micheline Kamber, Jian Pei, 3rd Edition, Morgan Kaufmann Publishers
3. Introduction to Data Mining, Pang-Ning Tan, Michael Steinbach, Vipin Kumar, 1st Edition, Pearson Education Inc.

VI Sem	Technical Skills-IV	Course Code: V18CST63	L	T	P	C
			0	0	4	MNC

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Demonstrate java fundamentals to solve real world computational problems. (K2)

CO2: Illustrate object orientated concepts in solving problems with reusability feature. (K2)

CO3: Apply collections on java to solve complex problems in linear time. (K3)

CO4: Make use of StringBuffer and StringBuilder to solve problems in linear and logarithmic time. (K3)

CO5: Experiment with Object Oriented concepts toreduce complexity of problems.(K3)

CO6: Develop programs to solve robust programs by using Exception Handling. (K3)

Java Programming

1. Problem solving using Control Statements
2. Problem solving using Arrays
3. Problem solving using Strings ,StringBuffer, StringBuilder
4. Problem solving using OOP Concepts
5. Problem solving using Inheritance
6. Problem solving using Polymorphism
7. Problem solving Collections (includes all)
8. Problem solving using Exception Handling

TEXT BOOKS:

1. Thinking on Java - O'Reilly.
2. Java Complete Reference.
3. Effective Java. Third Edition. Joshua Bloch

Annexure – CSE-II(b)

Approved Syllabi for the courses offered in V & VI semesters B. Tech(ECE) under V18 Regulation

V Sem	Introduction to Data Structures	Course Code: V18CST81	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Explain Sorting and searching techniques. (k2)
CO2: Demonstrate algorithm notations. (K2)
CO3: Develop Singly Linked Lists, Double Linked List. **(K3)**
CO4: Interpret the Basic Concepts in Data Structures, Stacks and Queues **(K3)**
CO5: Develop Binary trees and BST **(K3)**
CO6: Develop various graph algorithms. **(K3)**
Unit I: Sorting: Bubble sort, Insertion sort, selection sort, quick sort, merge sort, heap sort, radix sort. Searching: linear search, binary search. Introduction to hashing, hash functions.

Unit II: Introduction to data structures – Basic terminology, classification of data structures, operation on data structures, ADT. **Arrays**: Representation of arrays - polynomial representation, addition of two polynomials, sparse representation, transpose of sparse matrix. (**Refer Reference Text book 1**)

Unit III: Linked list: Introduction, **single linked list** Representation of node, operations on single linked list, reverses the linked list. **Double linked list**: operations (insert delete and display). **Circular linked List** and its operations (create and display single circular linked list).

Unit IV: Stacks introduction, array representation, operations, linked list representation, operation on linked stacks, infix to postfix conversion, evolution of arithmetic expression. **Queues** Introduction, Array representation, operations linked list representation, linked queue operations, circular queues.

Unit V: Trees: Introduction, Terminology, Representation of Trees, types of trees, **Binary Trees:** Properties of Binary Tress, creating a binary tree from general tree, Tree Traversals. **Binary Search Tree:** introduction, creation, insertion, delete, display and search operations.

Unit VI: Graphs: introduction, Terminology, directed graphs, Graph Representation, **Graph Traversal techniques**: Depth First Search, Breadth First Search. **Spanning Trees**: Krushkal's Algorithm, Prim's algorithm.

TEXT BOOKS:

1. Data Structures using C by Reema Thareja, Second Edition, oxford publications.

2. Data Structures, algorithms and applications in C++, Sartaj Sahni, Universities press, Second Edition.

REFERENCE BOOKS:

1. Fundamentals of Data Structures and algorithms by C V Sastry, Rakesh Nayak, Ch. Raja Ramesh, Distributed by Wiley publications, new Delhi.
2. Fundamentals of Data Structures in C++, Ellis Horowitz, Sartaj Sahni and Dinesh Mehta, 2nd Edition, Universities Press (India) Pvt. Ltd.
3. An Introduction to Data Structures with Application, Jean-Paul Tremblay , Paul Sorenson, Second Edition.
4. Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.

5. Problem solving with C++, The OOP, Fourth edition, W.Savitch, Pearson education.

V Sem	**Data Structures and Algorithms Lab**	Course Code: V18CSL34	L	T	P	C
			0	0	3	1.5

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: ConstructSorting and searching methods. (K3)
CO2: Construct hash table (K3)
CO3: Implement programs using Singly Linked Lists, Double Linked List. (K3)
CO4: Construct Stacks, Queues and Applications. (K3)
CO5: Construct Binary search tree (K3)
CO6: Implement various graph Traversal algorithm. (K3)

List of Experiments

1. Implement the following sorting techniques
   (a)Selection sort (b) Quick sort (c) Merge sort
2. Implement the following searching methods
   (a)Linear search (b) Binary search.
3. Implement hash table and its operations.(Note: Use at least one collision resolution technique)
4. Implement addition of two polynomials. (Using arrays).
5. Implement single linked list and its operations. (create, insert, delete, display, reverse list)
6. Implement double linked list and its operations.
7. Implement stack operations using arrays.
8. Implement queue operations using arrays.
9. Develop a Program to convert infix expression to postfix expression.
10. Develop a Program to implement Binary search Tree and its operations.
11. Implement Depth First Search for traverse a given graph.
12. Implement Breadth First Search for traverse a given graph.

TEXT BOOKS:

1. Data Structures, algorithms and applications in C++, Sartaj Sahni, Universities press, Second Edition.
2. Fundamentals of Data Structures in C++, Ellis Horowitz, Sartaj Sahni and Dinesh Mehta, 2nd Edition, Universities Press (India) Pvt. Ltd.

REFERENCE BOOKS:

1. An Introduction to Data Structures with Application, Jean-Paul Tremblay , Paul Sorenson, Second Edition.
2. Fundamentals of Data Structures and algorithms by C V Sastry, Rakesh Nayak, Ch. Raja Ramesh, IK Publications, new Delhi.
3. Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.
4. Problem solving with C++, The OOP, Fourth edition, W.Savitch, Pearson education.

VI Sem	Computer Networks	Course Code: V18CST11	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Discuss fundamentals of network concepts and Reference Models.(K2)

CO2: Discuss Communication media and switching techniques.(K2)

CO3: Demonstrate Error control and protocols.(K3)

CO4: Apply Routing algorithms and congestion control algorithms.(K3)

CO5: Discuss Transport layer services and protocols. (K2)

CO6: Describe Application layer protocols.(K2)

UNIT-I: Introduction: Reference models: The OSI Reference Model- the TCP/IP Reference Model, Examples of Networks: Novell Networks, Arpanet, Internet, Network Topologies WAN, LAN, MAN.

UNIT– II: Physical Layer: Transmission Media, Multiplexing: FDM, WDM and TDM- LAN Technologies, introduction to switching: Circuit Switched Networks, Datagram Networks, and Virtual Circuit Networks.

UNIT–III: Data link layer: Design issues, Framing, Flow control, error control, error detection and correction, CRC, Checksum: idea, one's complement internet checksum, MAC: ALOHA, CSMA. Elementary Data Link Layer protocols: simplex protocol, Simplex stop and wait, Simplex protocol for Noisy Channel. Sliding window protocol: One bit, Go back N, Selective repeat-Stop and wait protocol, HDLC, point to point protocol (PPP).Piggybacking.

UNIT-IV : Network Layer : Network layer design issues- Algorithm shortest path routing, Flooding, Hierarchical routing, Broad cast, Multi cast Routing algorithms-Congestion control and algorithms, Internet Protocol (IP) Addresses, Subnet masking

UNIT–V :Transport Layer: Services, Primitives and sockets, Elements of transport protocols, Internet Transport protocols(TCP,UDP,RPC,RTTP/RTP,RTCP) Segment headers, Primitives, Control, Congestion control, Quality of Service, QoS improving techniques: Leaky Bucket and Token Bucket algorithm.

UNIT–VI: Application Layer: DNS, SMTP, POP,FTP HTTP Presentation formatting. Network security: Introduction to Cryptography, Authentication, Basics of Public key and private key cryptography, digital signatures and certificates firewalls and wireless security.

TEXT BOOKS:

1. Computer Networks — Andrew S Tanenbaum, 4th Edition. Pearson Education/PHI

2. Data Communications and Networks – Behrouz A. Forouzan.Third Edition TMH

REFERENCES:

1. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition, Pearson Education

2. Understanding communications and Networks, 3rd Edition, W.A. Shay, Thomson

VI Sem	**Computer Networks Lab**	Course Code: V18CSL35	L	T	P	C
			0	0	3	1.5

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Implement Error detection techniques **[K3]**

CO2: Implement Routing Algorithms **[K3]**

CO3: Implement Congestion Algorithms [K3]

CO4:Implement Sliding Window Algorithms. **[K3]**

CO5: Implement socket programming **[K3]**

List of Experiments:

From 1-4 simulation and 5-11 implement using C/C++/Java/Python

1. Study of basic network commands and Network configuration commands.
2. Implementation of Bit Stuffing
3. Implementation of Character Stuffing
4. Implementation of Dijkstra's algorithm
5. Implementation Distance vector algorithm
6. Construct Detecting error using CRC-CCITT
7. Implementation of stop and wait protocol
8. Implementation of Congestion control using leaky bucket algorithms
9. Implementation using Socket TCP both client and server programs.
10. Implementation using Socket UDP both client and server programs

TEXT BOOKS:

1. Computer Networks — Andrew S Tanenbaum, 4th Edition. Pearson Education/PHI
2. Data Communications and Networks – Behrouz A. Forouzan.Third Edition TMH

REFERENCES:

1. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition, Pearson Education
2. Understanding communications and Networks, 3rd Edition, W.A. Shay, Thomson

V Sem	**Python Programming Lab**	Course Code: V18CSL05	L	T	P
			0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Demonstrate Basic Python Programs (K3)

CO2: Constructcontrol structures in python (K3)

CO3: Demonstrate functions and packages. (K3)

CO4: Construct python programs using structured data types. (K3)

CO5: Demonstrate TextFiles (K3)

Syllabus

Basics of python programming: Features of python – History of Python - The Future of Python installation and execution - Data types – Identifiers - variables – type conversions- Literal Constants – Numbers – Strings. I/O statements. Operators and expressions, operator precedence – expression evaluation.

Exercise 1 - Basics

a) A sample Python Script using command prompt, Python Command Line and IDLE

b) A program to purposefully raise an Indentation Error and correct it

Exercise 2 - Operations

a) A program to compute distance between two points taking input from the user (Pythagorean Theorem)

b) A program on add.py that takes 2 numbers as command line arguments and prints its sum.

Decision Control statements: conditional (if), alternative (if-else), chained conditional (if-elif-else); **Iteration:** while loop, for loop, nested for loop, range function, break, continue and pass statements.

Exercise - 3 Control Flow

a) A Program to implement for checking whether the given number is a even number or not.

b) A program to construct reverse the digits of a given number and add it to the original, If the sum is not a palindrome repeat this procedure.

c) A program using a while loop that asks the user for a number, and prints a countdown from that number to zero.

Exercise 4 - Control Flow – Continued

a) A program to construct the following pattern, using a nested for loop.

```
*
* *
* * *
* * * *
* * * * *
* * * *
* * *
* *
*
```

b) By considering the terms in the Fibonacci sequence whose values do not exceed four million, find the sum of the even-valued terms.

Functions and modules : Introduction - Function Definition - Function Call – argument types- Scope and Lifetime - The return statement - More on Defining Functions - Lambda Functions or Anonymous Functions.

Exercise - 5 – Problem Solving using Functions

a) Find mean, median, mode for the given set of numbers passed as arguments to a function

b) Develop a function nearly_equal to test whether two strings are nearly equal. Two strings a and b are nearly equal when a can be generated by a single mutation on b.

c) Develop a Recursive Function to find the Factorial of a given number .

d) Develop function to compute gcd, lcm of two numbers. Each function shouldn't exceed one line.

Lists: list operations, list slices, list methods, mutability, cloning lists, list parameters. **Tuples**: tuple assignment, tuple as return value. **Set:** Set Creation, Set Operations. **Dictionaries**: Creation, operations; comprehension, operations on strings.

Exercise - 6 Structured Data types

a) a program to count the number of strings where the string length is 2 or more and the first and last character are same from a given list of strings.

b) a program to develop unzip a list of tuples into individual lists and convert them into dictionary.

Exercise – 7 Structured Data types Continued

a) A program to count the numbers of characters in the string and store them in a dictionary data structure

b) a program to use split and join methods in the string and trace a birthday with a dictionary data structure.

Documentation Strings- Modules – Packages

Exercise - 8– Modules

a) Install packages requests, flask and explore them using (pip)

b) A program to implement a script that imports requests and fetch content from the page. Eg. (Wiki)

c) Develop a simple script that serves a simple HTTP Response and a simple HTML Page

Introduction - Types of files - Text files - reading and writing files

Exercise - 9 Files

a) a program to count frequency of characters in a given file. Can you use character frequency to tell whether the given file is a Python program file, C program file or a text file?

b) a program to compute the number of characters, words and lines in a file.

Classes, Methods, Constructor, Inheritance, Overriding Methods, Data hiding

Exercise - 10 OOP

a) Class variables and instance variable and illustration of self variable

i) Robot

ii) ATM Machine

Annexure-CSE-III

List of Open Elective -I courses offered in VI semester under V18 Regulation for all other branches:

S.No.	Course Code	Name of the Course
1.	V18CSTOE01	Data Base Management Systems
2.	V18CSTOE02	Software Engineering
3.	V18CSTOE03	Python Programming

Approved Syllabi for the Courses offered under Open Elective – I

<table>
<tr><td rowspan="2">VI Sem</td><td rowspan="2">Database Management Systems</td><td rowspan="2">Course Code:V18CSTOE01</td><td>L</td><td>T</td><td>P</td><td>C</td></tr>
<tr><td>3</td><td>0</td><td>0</td><td>3</td></tr>
</table>

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Demonstrate Database Systems, various Data Models and Database Architecture. (K2)

CO2: Apply ER Modeling to Design Relational Databases for Real Time Applications. (K3)

CO3: Apply SQL Constructs to Perform Database Operations. (K3)

CO4: Apply Normalization Techniques to Refine Schema. (K3)

CO5: Explain Transaction Management and Concurrency Control. (K2)

CO6: Experiment with various database indexing techniques. (K3)

UNIT-I: An Overview of Database Systems: Managing Data, File Systems verses DBMS, Advantages of DBMS, Data Independence. **Database System Architecture:** Three Levels of Architecture, External Level, Conceptual Level, Internal Level, Structure of DBMS, The Database Management Systems and Client/Server Architecture.

UNIT-II: Database Design: The E/R Models, Database Design and Er Diagrams, Entities, Attributes, Entity Sets, Relationships and Relationship Sets, Conceptual Design with ER Models. **Relational Model:** Integrity Constraints Over Relations, Key Constraints ,Foreign Key Constraints, General Constraints, Relational Algebra- Selection and Projection, Set Operation, Renaming, Joins, Division, Relational Calculus- Tuple Relational Calculus, Domain Relational Calculus.

UNIT-III: SQL Queries, Constraints and Triggers: The Form of Basic SQL Query, Union, Intersect, Except, Nested Queries, Aggregate Operators, Null Values, Complex Integrity Constraints in SQL, Triggers and Active Database.

UNIT-IV: Schema Refinement (Normalization): Purpose of Normalization or Schema Refinement, Concept of Functional Dependency, Normal Forms based on Functional Dependency (1NF, 2NF and 3NF), Concept of Surrogate Key, Boyce-Codd Normal Form (BCNF), Lossless Join and Dependency Preserving Decomposition, Fourth Normal Form(4NF).

UNIT-V:Transaction Management: Transaction, Properties of Transactions, Transaction Log, and Transaction Management with SQL Commit, Rollback and Savepoint. Concurrency Control: Concurrency Control for Lost Updates, Uncommitted Data, Inconsistent Retrievals and the Scheduler. **Concurrency Control with Locking Methods :** Lock Granularity, Lock Types, Two Phase Locking for Ensuring Serializability, Deadlocks, Concurrency Control with Time Stamp Ordering, Transaction Recovery.

UNIT-VI: Storage and Indexing: Overview of Storages and Indexing, Data on External Storage, File Organization and Indexing, Clustered Indexing, Primary and Secondary Indexes, Index Data Structures, Hash based Indexing, Tree based Indexing, Comparison of File Organization.

TEXT BOOKS:

1. Introduction to Databse Systems, CJ Date,8th Edition, Pearson Education.
2. Data base Management Systems, Raghurama Krishnan, Johannes Gehrke, 3rd Edition TATA McGraw Hill.

REFERENCE BOOKS:

1. Data base Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition, Course Technology.
2. Fundamentals of Database Systems, ElmasriNavrate , 7th Edition, Pearson Education.
3. Database Systems - The Complete Book, H G Molina, J D Ullman, J Widom, 2nd Edition, Pearson.

VI Sem	SOFTWARE ENGINEERING	Course Code: V18CSTOE02	L	T	P
			3	0	0

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Demonstrate Software Process Models. (K3)
CO2: Illustrate Requirement Engineering Process. (K3)
CO3: Discuss Software architecture and Design. (K2)
CO4: Apply Coding principles and Testing techniques. (K3)
CO5: Discuss Software Estimation and Maintenance. (K2)
CO6: Describe Quality Management and Metrics. (K2)

UNIT-I: The Nature of Software: Defining Software, Software application Domains, Legacy software, Software engineering, Software Myths. **Software Process:** Process and project, Component software process, Software development process models: Waterfall model, Prototyping, Iterative development, Unified process, Time boxing model, Extreme programming and agile process. Merits and Demerits of Software Process Models.

UNIT-II: Software Requirements: Functional and non-functional requirements, User requirements, System requirements, Interface specification, the Software requirements document.**Requirements engineering process:** Feasibility studies, Requirements elicitation and analysis, Requirements validation, Requirements management.

UNIT-III : Software Architecture: Role of software architecture, Architecture views, components and connector view, architecture styles for C & C view, documenting architecture design, evaluating architectures. **Design:** Design concepts, Function-oriented design, Object oriented design, Detailed design.

UNIT-IV: Coding and Testing: Programming principles and guidelines, incrementally developing code, managing evolving code. Testing concepts, Testing process, Black-box testing, White-box testing.

Risk management: Reactive vs. Proactive Risk strategies, Software risks, Risk identification, Risk projection, Risk refinement, RMMM Plan.

UNIT-V: Software Project estimation: Decomposition techniques, Empirical Estimation Models. **Software Maintenance:** Maintenance Process, Maintenance Models, Reverse Engineering, Reengineering, Configuration Management

UNIT-VI: Metrics for Process and Products: Software Measurement, Metrics for software quality.

Quality Management: Quality concepts, Software quality assurance, Software Reviews, Formal technical reviews, Statistical Software quality Assurance, Software reliability, SEI-CMM Model, Six Sigma and ISO 9000 quality standards.

Text Books:

1. Software Engineering, A practitioner's Approach- Roger S. Pressman, 7th Edition, McGrawHill International Edition.

2. Software Engineering- Ian Sommerville, 9th Edition, Pearson education.

Reference Books:

1. Software Engineering, A Precise approach, PankajJalote, Wiley

2. Software Engineering principles and practice, W S Jawadekar, 3rdEdition,TMH.

VI Sem	PYTHON PROGRAMMING	Course Code: V18CSTOE03	L	T	P
			3	0	0

Syllabus Details

Course Outcomes:After Successful completion of the Course, the student will be able to:

CO1: Illustrate basic concepts of Python Programming (K2)
CO2: Describe control structures in python (K2)
CO3: Demonstrate functions and packages. (K3)
CO4: Construct python programs using structured data types. (k3)
CO5: Compare TextFiles and Binary Files (K4)
CO6: Apply OOPs concepts to Develop Test cases (K3)

UNIT-I: INTRODUCTION TO PYTHON, DATA TYPES & OPERATORS :Basics of python programming: Features of python – History of Python - The Future of Python installation and execution - Data types – Identifiers - variables – type conversions- Literal Constants – Numbers – Strings. I/O statements. Operators and expressions, operator precedence – expression evaluation.
UNIT-II: Control Structures: Decision Control statements: conditional (if), alternative (if-else), chained conditional (if-elif-else); **Iteration:** while loop, for loop, nested for loop, range function, break, continue and pass statements.
UNIT-III Functions: Functions and modules: Introduction - Function Declaration &Definition - Function Call – Variable Scope and Lifetime -The return statement-More on Defining Functions - Lambda Functions or Anonymous Functions - Documentation Strings- Modules – Packages.
UNIT-IV Structured Data Types: Lists: list operations, list slices, list methods, cloning lists, list parameters. **Tuples**: tuple assignment, tuple as return value. **Set:** Set Creation, Set Operations. **Dictionaries**: Creation, operations; comprehension, operations on strings.
UNIT-V Files & Exception Handling: Introduction - Types of files - Text files - reading and writing files; Errors and exceptions handling.
UNIT-VI OOPS concepts and Testing Basics: Classes, Methods, Constructor, Inheritance, Overriding Methods, Data hiding, GUI programming with TKINTER.

Text Books:

1. "Python Programming using problem solving Approach" ReemaThareja, Oxford University Press – 2017.
2. Python with Machine Learning by "A.Krishna Mohan, Karunakar & T.Murali Mohan" by S. Chand Publisher

Reference Books:

1. Think Python: How to Think Like a Computer Scientist'',Allen B. Downey, 2nd edition, Updated for Python 3, Shroff /O'Reilly Publishers, 2016 (http://greenteapress.com/wp/think- python/)
2. An Introduction to Python – Revised and updated for Python 3.2, Guido van Rossum and Fred L. Drake Jr Network Theory Ltd., 2011.
3. Introduction to Computation and Programming Using Python'',John V Guttag ,Revised and expanded Edition, MIT Press , 2013
4. Introduction to Programming in Python, Robert Sedgewick, Kevin Wayne, Robert Dondero, 1st Edition Pearson -2016

Annexure -CSE-IV

Approved Course Structure for the courses offered in III and IV Semesters of B.Tech(CST) Programme under V18 Regulation

S.No.	III – Semester						
	Course Code		**Course**	**L**	**T**	**P**	**C**
1	V18MAT04	BSC	Probability & Statistics	3	1	0	4
2	V18ECT06	ESC	Digital Electronics	3	0	0	3
3	V18CST02	PCC	Data Structures and Algorithms	3	0	0	3
4	V18CST03	ESC	Discrete Mathematics	3	0	0	3
5	V18CST04	ESC	Object Oriented Programming for problem Solving	3	0	0	3
6	V18ECL04	ESC	Digital Electronics Lab	0	0	2	1
7	V18CSL02	PCC	Data Structures and Algorithms Lab	0	0	3	1.5
8	V18CSL03	ESC	Object Oriented Programming for problem Solving Lab	0	0	3	1.5
9	V18ENT03		Professional Communication Skills – I	3	0	0	MNC
10	V18CST60		**Technical Skills-I**	4	0	0	MNC
Total Contact Hours: 31				**22**	**1**	**8**	**20**

IV - Semester							
S.No	**Course Code**		**Course**	**L**	**T**	**P**	**C**
1	V18CST05	PCC	Computer Organization	3	0	0	3
2	V18CST06	PCC	Software Engineering	3	0	0	3
3	V18CST07	PCC	Formal Languages and Automata Theory	3	0	0	3
4	V18CST08	PCC	Java Programming	3	0	0	3
	V18CST09	PCC	Python Programming	3	0	0	3
5	V18MBET51	HSS	Managerial Economics and Financial Accountancy	3	0	0	3
6	V18CSL04	PCC	Java Programming Lab	0	0	3	1.5
7	V18CSL05	PCC	Python Programming Lab	0	0	3	1.5

8	V18ENT11		Constitution of India	2	0	0	MNC
9	V18ENT04		Professional Communication Skills – II	3	0	0	MNC
10	V18CST61		**Technical Skills-II**	4	0	0	MNC
Total Contact Hours: 33				**27**	**0**	**6**	**21**

Annexure –CSE-V

B.Tech(Hons/Minor) -Data Science course structure and Syllabus

List of NPTEL based courses recommended for

B.Tech(Hons/Monor) in Data Science

S.No.	Course Code	Course	NPTEL Course ID	NPTEL Relevant Course*	Course Duration (Weeks)	Credits
1	V18CSH01	Introduction to Data Science	106106212	Python for Data Science	4	2
2	V18CSH02	Artificial Intelligence	106106126	Artificial Intelligence Search Methods for Problem Solving	12	4
3	V18CSH03	Machine Learning	106106139	Introduction to Machine Learning	12	4
4	V18CSH04	Deep Learning	106105215	Deep Learning	12	4
5	V18CSMPH	Mini Project	-	-	-	4

***Will be updated in every semester as per the courses offered by NPTEL.**

The institution is offering honors/Minor degree in **"Data Science"** under V18 regulation. The rules and regulations, eligibility, evaluation process is as follows:

Rules &Regulations:

- A student will be eligible to get Under Graduate degree with Honors, if he/she completes additional 18-20 credits.
- A student can register after satisfying the eligibility criteria.
- The main objective of Honors degree is to provide additional learning opportunities for academically motivated students and it is an optional feature of the B. Tech. Programme.

Eligibility:

- Students should have a CGPA of 8.0 or above till III SEM and without any backlogs
- Students aspiring for Honors degree must register in V semester only.
- Student may register for mini project from V semester onwards and complete the same before VIII semester.

Course Details:

- In order to earn a Honors degree in his/her discipline, a student has to earn 18-20 extra credits (Four advanced courses – 14 credits and mini project - 4 credits in the concerned branch of Engineering).
- He/she can study equivalent NPTEL courses available in SWAYAM portal ie. https://swayam.gov.in/with prior approval from the department.
- The complete details are mention in **(Appendix-I)**
- The mini project shall be evaluated by the committee, which consists of Head of the department, Course Incharge and senior faculty of the department.
- The credits will be awarded for each course only after submission of required documents as Proof of Completion (NPTEL).

Syllabi for the courses offered in B. Tech(Hons.) – Data Science Course under V18 Regulation

Course Code: V18CSH01	**Introduction to Data Science**	L	T	P	C
		3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Demonstrate the data science workflow. (K2)

CO2: Make use of Exploratory Data Analysis and the Data Science Process. (K3)

CO3: Experiment with Ndarray manipulation using NumPy library. (K3)

CO4: Apply various operations on paneled data. (K3)

CO5: Build visualizations on data using matlplotlib and seaborn libraries. (K3)

CO6: Build regression and classification models. (K3)

UNIT-I: Introduction: Introduction to Data Science, Roles exist in Data Science, Data science workflow, Tools and approaches data scientists use to analyze data. Define a problem and identify appropriate data sets using the data science workflow.

UNIT-II: Statistics Fundamentals: Exploratory Data Analysis and the Data Science Process, Analyze datasets using basic summary statistics: mean, median, mode, max, min, quartile, Inter quartile range, variance, standard deviation and correlation.

UNIT-III: The Numpy Library: NumPy installation, Ndarray, Basic operations, Indexing, Slicing, Iterating an array, Conditions and Boolean arrays, Shape manipulation and Array manipulation, Copies or Views of objects, Vectorization, Broadcasting, Structured arrays, Reading and Writing array data on files.

UNIT-IV: The Pandas Library: Installation, Introduction to pandas data structures – The series, The DataFrame, The index Objects. Other functionalities on indexes, Operation between data structures, Function application and mapping, Sorting and Ranking, "Not a number" data, Hierarchical indexing and leveling.

UNIT-V: Data Visualization using matplotlib and seaborn: Scatter plots, Scatter matrix, Line graph, Box blots, and Histograms. Identify a normal distribution within a dataset using summary statistics and visualization. Causation vs. Correlation. Test a hypothesis with a sample case study, Validate your findings using statistical analysis.

UNIT-VI: Foundations of Data Modeling: Introduction Regression – Categorical variables versus Continuous variables, linear regression, Build the linear regression model using a dataset and evaluate. Introduction to Classification - define classification model, apply k-NN and Decision trees. Build the classification model using a dataset and evaluate.

TEXT BOOKS:

1. The Art of Data Science, A Guide for Anyone Who Works with Data Roger D.Peng and Elizabeth Matsui.
2. Python Data Analytics, Fabio Nelli, Second edition, Apress
3. Data Science for Business, Foster Provost, Tom Fawcett, O'reilly

REFERENCE BOOKS:

1. Mining of Massive Datasets, JureLeskovek, AnandRajaraman and Jeffrey Ullman. Cambridge University Press. 2014.
2. Machine Learning: A Probabilistic Perspective.Kevin P. Murphy, MIT Press, 2013.
3. Python for Data Science for Dummies, Luca Massaron and John Paul Mueller, John Wiley and Sons, 2015

Course Code: V18CSH02	**Artificial Intelligence**	L	T	P	C
		3	0	0	3

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Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Illustrate the concept of intelligent systems and current trends in AI. (K2)

CO2: Apply Problem solving, Problem reduction and Game Playing techniques in AI. (K3)

CO3: Illustrate the Logic concepts in AI. (K2)

CO4: Explain the Knowledge representation techniques in AI. (K2)

CO5: Describe Expert systems and their applications. (K2)

CO6: Illustrate Uncertainty Measures. (K2)

UNIT-I: Introduction to Artificial Intelligence: Introduction, history, intelligent systems, foundations of AI, applications, tic-tac-toe game playing, current trends in AI

UNIT-II: Problem solving: State-space Search and Control Strategies: Introduction, General Problem Solving, Characteristics of problem, Exhaustive searches, Heuristic search techniques, Iterative deepening a*, constraint satisfaction

Problem reduction and game playing: Introduction, problem reduction, game playing, alpha beta pruning, two-player perfect information games

UNIT-III:Logic concepts: Introduction, Propositional Calculus, Proportional Logic, Natural Deduction system, Axiomatic system, Semantic tableau system in proportional logic, Resolution Refutation in Propositional logic, Predicate Logic

UNIT-IV: Knowledge representation: Introduction, approaches to Knowledge representation, Knowledge representation using Semantic Networks, Extended Semantic Networks for KR, Knowledge representation using Frames

UNIT-V: Expert Systems and Applications: Introduction phases in building Expert Systems, Expert System versus Traditional Systems, Rule-based Expert Systems, Blackboard systems, Truth maintenance systems, applications of Expert Systems.

UNIT-VI: Uncertainty measure: Probability theory- Introduction, Probability Theory, Bayesian Belief networks, Certainty Factor Theory, Dempster-Shafer theory

Text Book:

2. Artificial Intelligence, Saroj Kaushik, 1st Edition, Cengage Learning.

Reference Books:

3. Artificial Intelligence, Elaine Rich, Kevin Knight, Shivashankar B Nair, 3rd Edition, Tata McGraw Hill Education Private Limited., 2009
4. Artificial Intelligence- A modern Approach, 3rd Edition, Stuart Russel, Peter Norvig, Pearson Education.

Course Code: V18CSH03	**Machine Learning**	L	T	P	C
		3	0	0	3

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Demonstrate basics of Machine Learning.(K2)

CO2: Explain Various Classification Techniques.(K2)

CO3: Explain Tree Based Learning and Ensemble Learning (K2)

CO4: Demonstrate Neural Networks and Multi Layer Perceptrons. (K2)

CO5: Explain Multi Layer Perceptrons and Back Propagation (K2).

CO6: Demonstrate Dimensionality Reduction Techniques (K2).

Unit-I: Introduction:Learning: Machine Learning, Types Of Machine Learning, Supervised Learning, Regression, Classification, The Machine Learning Process. Some Terminology: Weight Space, The Curse Of Dimensionality. Knowing What You Know: Testing Machine Learning Algorithms, Over fitting, Training, Testing, And Validation Sets. Some Basic Statistics: Averages Variance And Covariance, The Bias-Variance Tradeoff.

UNIT II: Classification: The General Problem, Logistic Regression, K-Nearest Neighbor Classifiers, Support Vector Machines. Assessing Performance Of Classifiers: The Confusion Matrix, Accuracy, 0/1 Loss, Sensitivity And Specificity, The Receiver Operator Characteristic (Roc) Curve. Unbalanced Datasets Measurement: Precision, Recall And F1 Score.

UNIT-III: Ensemble Learning : Boosting, Adaboost, Stumping, Bagging , Subbagging, Random Forests.

UNIT-IV: Neural Networks: The Brain And The Neuron, Hebb's Rule, Mcculloch And Pitts Neurons, Limitations Of The Mcculloch And Pitts Neuron Model, Neural Networks, The Perceptron, The Learning Rate, The Bias Input The Perceptron Learning Algorithm, An Example Of Perceptron Learning: Logic Functions Implementation, Linear Separability, Linear Regression, Linear Regression Examples

UNIT-V: The Multi Layer Perceptron(MLP):Going Forwards, Going Backwards(Back Propagation of Errors), The MLP in practice, Examples of using the MLP: Classification and Regression, Deriving Back-Propagation.

UNIT-VI: Dimensionality Reduction: Linear Discriminant Analysis (LDA), Principal Components Analysis (PCA), Relation With The Multi-Layer Perceptron, Kernel PCA, Factor Analysis, Independent Components Analysis (ICA) Locally Linear Embedding.

TEXT BOOKS:

1. Machine Learning: An Algorithmic Approach.Stephen Marsland, 2nd Edition, CRC Press.
2. A First Course in Machine Learning; Volume in Machine Learning and Pattern Recognition Series – CRC-Taylor & Francis-Chapman & Hall Rogers S., Girolami M., (2011).

REFERENCE BOOKS:

1. Machine Learning: The art and Science of Algorithms that Make sense of Data. Peter Flach, Cambridge, First Edition, 2012.
2. Machine Learning: Tom Mitchel, McGraw Hill Learning, 1997

Course Code: V18CSH04	**Deep Learning**	L	T	P	C
		3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe the mathematical foundation of neural network. (K2)

CO2: Describe the machine learning basics. (K2)

CO3: Discuss the overfitting problem and ways to overcome it. (K2)

CO4: Discuss various optimization techniques. (K2)

CO5: Develop a convolutional neural network model. (K3)

CO6: Develop RNN and LSTM models. (K3)

UNIT-I: Linear Algebra: Scalars, Vectors, Matrices and Tensors, Matrix operations, types of matrices, Norms, Eigen decomposition, Singular Value Decomposition, Principal Components Analysis. Probability and Information Theory: Random Variables, Probability Distributions, Marginal Probability, Conditional Probability, Expectation, Variance and Covariance, Bayes' Rule, Information Theory. Numerical Computation: Overflow and Underflow, Gradient-Based Optimization, Constrained Optimization, Linear Least Squares.

UNIT –II: Machine Learning: Basics, Hyper parameters and Validation Sets, Estimators, Bias and Variance, Maximum Likelihood, Bayesian Statistics, Supervised and Unsupervised Learning, Stochastic Gradient Descent, Challenges Motivating Deep Learning. Deep Feed forward Networks: Learning XOR, Gradient-Based Learning, Hidden Units, Architecture Design, Back-Propagation and other Differentiation Algorithms.

UNIT-III: Regularization for Deep Learning: Parameter Norm Penalties, Norm Penalties as Constrained Optimization, Regularization and Under-Constrained Problems, Dataset Augmentation, Noise Robustness, Semi-Supervised Learning, Multi-Task Learning, Early Stopping, Parameter Tying and Parameter Sharing, Sparse Representations, Bagging and Other Ensemble Methods, Dropout, Adversarial Training, Tangent Distance, Tangent Prop and Manifold Tangent Classifier.

UNIT-IV: Optimization for Training Deep Models: Pure Optimization, Challenges in Neural Network Optimization, Basic Algorithms, Parameter Initialization Strategies, Algorithms with Adaptive Learning Rates, Approximate Second-Order Methods, Optimization Strategies and Meta-Algorithms.

UNIT-V: Convolutional Networks: The Convolution Operation, Pooling, Convolution, Basic Convolution Functions, Structured Outputs, Data Types, Efficient Convolution Algorithms, Random or Unsupervised Features, Basis for Convolutional Networks.

UNIT-VI: Sequence Modeling: Recurrent and Recursive Nets: Unfolding Computational Graphs, Recurrent Neural Networks, Bidirectional RNNs, Encoder-Decoder Sequence-to-Sequence Architectures, Deep Recurrent Networks, Recursive Neural Networks, Echo State Networks, LSTM, Gated RNNs, Optimization for Long-Term Dependencies, Auto encoders, Deep Generative Models.

1. TEXT BOOKS:

1. Ian Goodfellow, YoshuaBengio, Aaron Courville, “Deep Learning”, MIT Press, First Edition, 2016.

2. Josh Patterson and Adam Gibson, “Deep learning: A practitioner's approach”, O'Reilly Media, First Edition, 2017.

2. REFERENCE BOOKS:

1. Fundamentals of Deep Learning, Designing next-generation machine intelligencealgorithms, Nikhil Buduma, O’Reilly, Shroff Publishers, First Edition, 2019.

2. Deep learning Cook Book, Practical recipes to get started Quickly, DouweOsinga, O’Reilly, Shroff Publishers, 2019.

ANNEXURE-V

Sri Vasavi Engineering College (Autonomous)

(Sponsored by Sri Vasavi Educational Society)
(Approved by AICTE, New Delhi & Permanently affiliated to JNTUK, Kakinada)
(Accreted by NBA & NAAC with 'A' Grade, Recognized by UGC Under Section 2(f) & 12(B))
Pedatadepalli, Tadepalligudem, W.G.Dt, A.P-534101

Department of Mechanical Engineering

Date:03-06-2020

Third meeting of BOS in Mechanical Engineering department along with external members is held on 03/06/2020 at 10.00 AM in online mode through GoTo meeting app in view of COVID-19 pandemic.

The following members are present.

S. No	Name of the BOS Members
1.	Dr.N.MohanaRao, Professor, JNTUK,Kakinada
2.	Dr. R.V. Chalam, Professor,NIT,Warangal
3.	Dr. A. Krishnaiah, Professor, Osmania University, Hyderabad
4.	Sri S.S. SubramanyaSastry, Director Projects,Renprotech Solutions Pvt. Ltd., Bangalore.
5.	Sri A.Sai Krishna, Alumni,Maruthi design and engg. Pvt.ltd ,Bangalore
6.	Dr. G.V.N.S.R. RatnakaraRao, Professor &Principal, SVEC
7.	Dr. M.V. Ramesh, Chairman & HOD, SVEC
8.	All the BOS internal members

Minutes of meeting

Chairman welcomed all the BOS members and introduced to all the BOS-internal members.

Item No. 1: Review of course structure for V & VI semesters of B. Tech under V18 Regulations.

- Lab course named Python Programming Lab (course code. V18CSL05) was included in V semester.
- Theory of Machines Lab (V18MEL08) is shifted from V semester to VI semester,
- The MNC Course Essence of Indian Traditional Knowledge **(**V18ENT08) was replaced with Intellectual Property Rights and Patents (V18MET46) in V semester.
- The credits of Operations Research (V18MET21) and that of Elective in VII semester are reduced from 4 to 3 credits.
- The approved revised course structure is attached in **Annexure-ME-I.**

Item No. 2: Approval of syllabi for the courses offered in V & VI semesters B. Tech under V18 Regulation.

- The approved syllabi for the courses are attached in **Annexure-ME-II.**

Item No. 3: Approval of list of courses offering under Open Elective- I in VI semester B. Tech under V18 Regulation for all other branches and the approval of their detailed syllabi.

- Introduction to Robotics theory course (V18MEOE3) was included in Open Elective-I of VI semester.
- The course codes of Open Elective-1, Basic Mechanical Engineering V18MET39 & Green Engineering Systems V18MET40 have been changed to V18MEOE1 & V18MEOE2.
- The approved courses and their syllabi is attached in **Annexure-ME-III.**

Item No. 4: Approval for offering minor degree in DATA SCIENCE offered by Department of Computer Science and Engineering for B. Tech Mechanical Engineering students under V18 Regulation.

- Approved by the BOS members.

Dr. M.V. Ramesh

Chairman , BOS

Annexure – ME-I

Course Structure of Mechanical Engineering - V18 Regulation
(For 2018 – 2019 Admitted Batch)

I SEMESTER						
S.No	**Course Code**	**Course Name**	**L**	**T**	**P**	**C**
1	**V18ENT01**	English – I	2	0	0	MNC
2	**V18MAT01**	Engineering Mathematics – I	3	1	0	4
3	**V18PHT01**	Optics And Waves	3	1	0	4
4	**V18EET01**	Basic Electrical and Electronics Engineering	3	1	0	4
5	**V18CHT02**	Environmental Studies	3	0	0	MNC
6	**V18ENL01**	English Communication Skills Lab - I	0	0	2	MNC
7	**V18MEL01**	Engineering & IT Workshop	0	0	3	1.5
8	**V18EEL01**	Basic Electrical and Electronics Engineering Lab	0	0	3	1.5
9	**V18PHL01**	Optics And Waves Lab	0	0	3	1.5
Total			14	3	11	16.5

Total Contact Hours: 28 Total Credits: 16.5

II SEMESTER						
S.No	**Course Code**	**Course Name**	**L**	**T**	**P**	**C**
1	**V18ENT02**	English – II	2	0	0	2
2	**V18MAT02**	Engineering Mathematics – II	3	1	0	4
3	**V18CHT01**	Engineering Chemistry	3	1	0	4
4	**V18CST01**	Programming in C for problem solving	3	0	0	3
5	**V18MET01**	Engineering Graphics	1	0	3	2.5
6	**V18ENL02**	English Communication Skills Lab – II	0	0	2	1
7	**V18CSL01**	Programming lab in C for problem solving	0	0	3	1.5
8	**V18CHL01**	Engineering Chemistry Lab	0	0	3	1.5
Total			12	2	11	19.5

Total Contact Hours: 25 Total Credits: 19.5

- V18MET02 - Introduction to Engineering Mechanics (EEE)

II B.Tech.

III Semester						
S.No.	**Course Code**	**Course**	**L**	**T**	**P**	**Credits**
1	**V18MAT04**	Probability & Statistics	3	1	0	4
2	**V18MET03**	Engineering Mechanics	3	1	0	4
3	**V18MET04**	Thermodynamics	3	1	0	4
4	**V18MET05**	Fluid Mechanics & Fluid Machines	3	0	0	3
5	**V18MET09**	Materials Engineering	3	0	0	3
6	**V18MEL02**	Machine Drawing	0	0	3	1.5
7	**V18MEL03**	Fluid Mechanics & Fluid Machines Lab	0	0	3	1.5
8	**V18ENT03**	Professional Communication Skills-I	3	0	0	MNC
			18	**3**	**6**	**21**

Contact hours: 27Total Credits: 21

IV Semester						
S.No.	**Course Code**	**Course**	**L**	**T**	**P**	**Credits**
1	**V18MET07**	Applied Thermodynamics	3	0	0	3
2	**V18MET08**	Mechanics of Solids	3	1	0	4
3	**V18MET06**	Theory of Machines – I	3	0	0	3
4	**V18MET14**	Manufacturing Processes	3	0	0	3
5	**V18MET11**	Instrumentation & Control Systems	3	0	0	3
6	**V18MEL05**	Mechanics of Solids & Materials Engineering Lab	0	0	3	1.5
7	**V18MEL11**	Manufacturing Process Lab	0	0	3	1.5
8	**V18ENT11**	Constitution of India	2	0	0	MNC
9	**V18ENT04**	Professional Communication Skills-II	3	0	0	MNC
			20	**1**	**6**	**19**

Contact hours: 27Total Credits: 19

- V18MET12 – THPM (FOR EEE BRANCH)
- V18MEL07 – THPM LAB (FOR EEE BRANCH)

III B.Tech

V Semester						
S.No.	Course Code	Course	L	T	P	Credits
1	V18MET13	Heat Transfer	3	1	0	4
2		Professional Elective – I	3	0	0	3
3	V18MET15	Theory of Machines – II	3	1	0	4
4	V18MET16	Design of Machine Elements- I	3	0	0	3
5	V18MET17	Metal Cutting & Machine Tools	3	0	0	3
6	V18MEL10	Thermal Engineering Lab	0	0	3	1.5
7	V18MEL16	Metal Cutting & Machine Tools Lab	0	0	3	1.5
8	V18CSL05	Python Programming Lab	0	0	3	1.5
9	V18MET46	Intellectual Property Rights and Patents	2	0	0	MNC
10	V18ENT05	Professional Communication Skills-III	4	0	0	MNC
			21	2	9	21.5

Contact hours:32Total Credits:21.5

VI Semester						
S.No.	Course Code	Course	L	T	P	Credits
1	V18MET10	Metrology	3	0	0	3
2	V18MET18	Design of Machine Elements –II	3	1	0	4
3	V18MET19	Robotics	3	0	0	3
4	V18MBET51	Managerial Economics and Financial Analysis	3	0	0	3
5		Open Elective-I(From other Depts.)	3	0	0	3
6	V18MEL06	Metrology and Instrumentation & Control Systems Lab	0	0	3	1.5
7	V18MEL08	Theory of Machines Lab	0	0	3	1.5
8	V18MEL09	Heat Transfer Lab	0	0	3	1.5
9	V18ENT06	Professional Communication Skills-IV	4	0	0	MNC
			19	1	9	20.5
Contact hours: 29 Total Credits:20.5						

Professional Elective –I	**Open Elective –I**
V18MET37- Internal Combustion Engines V18MET38- Nanotechnology	V18MEOE1- Basic Mechanical Engineering V18MEOE2- Green Engineering Systems V18MEOE3- Introduction to Robotics.

IV B.Tech

VII Semester						
S.No.	**Course Code**	**Course**	**L**	**T**	**P**	**Credits**
1	**V18MET20**	Automation in manufacturing	3	0	0	3
	V18MET21	Operation Research (Humanities)	3	0	0	3
	ELECTIVE-1	**V18MET22-**Industrial Engineering and management **V18MET23-**Composite Materials **V18MET24-**Refrigeration & Air Conditioning	3	0	0	3
.2	**ELECTIVE-2**	**V18MET25 -**Total Quality Management **V18MET26 -** Finite Element Methods **V18MET27 -** Micro Electro Mechanical Systems	3	0	0	3
5		**Open Elective-II**	3	0	0	3
6	**V18MEL12**	Simulation Lab	0	0	3	1.5
7	**V18MEL13**	Production Drawing Lab	0	0	3	MNC
8	**V18MEL14**	Project Work –PART-A	0	0	9	4.5
			15	**0**	**15**	**21**

Contact hours: 30 Total Credits: 21

VIII Semester						
S.No.	**Course Code**	**Course**	**L**	**T**	**P**	**Credits**
1		**OPEN ELECTIVE-III**	3	0	0	3
2	**ELECTIVE-3**	**V18MET28 -** Automobile Engineering **V18MET29 -** Mechatronics **V18MET30 -** Gas Dynamics and Jet Propulsion	3	0	0	3
3	**ELECTIVE-4**	**'18MET31 –** Process Planning & Cost Estimation **V18MET32 -** Non Destructive Evaluation **V18MET33 -** Industrial Hydraulics and Pneumatics	3	0	0	3

4	**ELECTIVE-5**	**V18MET34 -** Computational Fluid Dynamics **V18MET35-** Production Planning and Control **V18MET36 -** Energy Conservation and Management	3	0	0	3
5	**V18MEL15**	Project Work –PART-B	0	0	18	9
			12	**0**	**18**	**21**

Contact hours: 30 Total Credits: 21

Open Elective –II	Open Elective –III
V18MET41- Unconventional Machining Process **V18MET42-** Computer Aided Design **V18MET44-** Condition Monitoring & Machine learning **V18MET45-** Entrepreneurship	**V18MET43-** Power Plant Engineering **V18MBET54**- Principles of Management

Annexure –ME- II

Syllabi for the courses offered in V & VI semesters B. Tech under V18 Regulation for the Academic Year 2020-2021

V Semester

V18MET13	HEAT TRANSFER	L	T	P	C
		3	1	0	4

Note: Heat transfer data books are allowed
Course Outcomes:

After successful completion of the course, the student will be able to

CO1	Illustrate the basic modes of heat transfer, basic laws of heat transfer and to develop solution for one dimensional steady state heat conduction problems.	K3
CO2	Interpret the heat transfer through extended surfaces, to find solution for one dimensional extended surfaces and unsteady state heat conduction problems.	K3
CO3	Illustrate convective heat transfer and to apply Dimensional analysis concept to convective heat transfer.	K3
CO4	Apply empirical correlations for forced and free convection to compute values for the convection heat transfer coefficient.	K3
CO5	Apply empirical correlations for phase change process to calculate values for the convection heat transfer coefficient and to Illustrate Heat Exchangers.	K3
CO6	Employ the principles of radiation heat transfer, to find the shape factor and heat transfer rate through radiation.	K3

UNIT-I

Introduction: Different Modes of Heat Transfer, Governing Laws of Heat Transfer, Applications of Heat Transfer.

Conduction heat transfer:

General Heat Conduction Equation: Derivation of the equation in (i) Cartesian, (ii) Polar and (iii) Spherical Co-ordinate Systems.

Steady-state one-dimensional heat conduction in Cartesian System: Steady-state one-dimensional heat conduction problems (i) with and without heat generation and (ii) with and without variable thermal conductivity, Thermal Resistances in Series and in Parallel and Numerical Problems.

Steady-state radial heat conduction in Polar and spherical Systems: Steady-state one-dimensional heat conduction problems (i) with and without heat generation and (ii) with and without varying thermal conductivity, Thermal Resistances in Series and Numerical Problems.

Critical Thickness of Insulation: Concept, Derivation and Numerical Problems.

UNIT – II

Extended Surfaces (Fins): Classification, Applications, Straight Rectangular Fins - long fin, fin with insulated tip and short fin, Temperature Distribution and Heat Transfer Calculations, Fin Efficiency and Effectiveness and Numerical Problems.

One dimensional Transient (Unsteady-state) conduction heat transfer: Definition, Systems with negligible internal resistance, Numerical Problems, Heisler and Grober charts: Solutions to various one-dimensional problems using the charts, Numerical problems.

UNIT – III

Convective heat transfer: Classification of convective heat transfer, dimensional analysis – application of Buckingham Pi Theorem for forced and free convection, Significance of non-dimensional numbers, concepts of continuity, momentum and Energy Equations, boundary layer theory.

UNIT –IV

Forced convection:

External flows: Concepts about hydrodynamic and thermal boundary layer and use of empirical correlations for convective heat transfer over flat plates, cylinders, spheres and Numerical Problems.

Internal flows: Concepts about hydrodynamic and thermal boundary layer – division of internal flow based on this –use of empirical relations for horizontal pipe flow, annulus flow and Numerical Problems.

Free convection: Development of hydrodynamic and thermal boundary layer along a vertical plate – useof empirical relations for vertical plates, vertical tubes, horizontal tubes and Numerical Problems.

UNIT V

Heat transfer with phase change:

Boiling: Definition, types, regimes of Pool boiling - Numerical Problems on nucleate boiling, critical heat flux and film boiling using empirical correlations.

Condensation: Definition, Film wise and drop wise condensation, Numerical Problems on film condensation over vertical and horizontal cylinders using empirical correlations.

Heat Exchangers: Definition, Classification, LMTD method, Effectiveness - NTU method, overall heat transfer coefficient, fouling factor and Numerical Problems.

Chart Solution Procedures for solving Heat Exchanger problems: Correction Factor Charts and Effectiveness-NTU Charts and Numerical Problems.

UNIT VI

Radiation heat transfer: Fundamental principles - Gray, White, Opaque, Transparent and Black bodies, Emissivity, Planck's distribution law, Wien's displacement law, Kirchoff's law, Lambert's cosine law and the Stefan-Boltzmann law, Irradiation, total and monochromatic quantities, concepts of shape factor, heat exchange between two black bodies, heat exchange between grey bodies, radiation shields, electrical analogy for radiation networks and Numerical problems.

TEXT BOOKS:

1. Heat Transfer, JP HOLMAN, Tata McGraw HillPublications, Special Indian edition.
2. Heat Transfer, P.K.Nag, Tata McGraw Hill Publications.
3. Fundamentals of Engineering Heat and Mass Transfer, R.C.Sachdeva, New Age International Publications.

REFERENCES:

1. Heat and Mass Transfer, Cengel, McGraw Hill Publications.
2. Heat and Mass Transfer /Arora and Domkundwar/Dhanpatrai& sons
3. Principles of Heat Transfer, Frank Kreith, R. M. Manglik& M. S. Bohn, Cengage learning publishers.
4. Heat and Mass Transfer /D.S.Kumar / S.K.Kataria& Sons
5. Heat and mass transfer, R.K. Rajput, S. Chand Publications, Revised edition

V18MET37	INTERNAL COMBUSTION ENGINES (ELECTIVE-I)	L	T	P	C
		3	0	0	3

Course Outcomes:

After successful completion of the course, the student will be able to

CO1	Understand the affects of various losses that occur in the actual engine operation and the working principles of I.C.Engines.	K2
CO2	Illustrate the function of fuel supply and ignition systems.	K2
CO3	Understand the function and necessity of lubrication, cooling and governing systems.	K2
CO4	Interpret the combustion phenomena in S.I. and C.I. Engines and effect of various engine operating parameters on it.	K3
CO5	Calculate the performance parameters of I.C.Engines.	K3
CO6	Assess the emission parameters and alternate fuels used in I.C.Engines.	K3

UNIT I

Air standard and actual cycles:

Comparison of cycles, Time Loss Factor, Heat Loss Factor, Exhaust Blow down, Loss due to gas exchange process, Loss due to Rubbing Friction.

Basics of IC Engines:

Classification, Nomenclature of engine , working principles of two stroke and four stroke S.I. and C.I.Engines, comparison, Valve timing and port timing diagrams, Scavenging of two stroke engines.

UNIT II

Elements of Fuel supply system and Ignition system in IC Engines:

Requirements of fuel supply system, components and working of simple and modern carburettor, Simple carburetor limitations, components and working of electronic fuel Injection system, types of diesel injection system, requirements of ignition system, types of ignition systems.

UNIT III

Sub Systems of IC Engines:

Supercharger, methods of supercharging, supercharging limits, Turbochargers, methods of turbocharging, effect of engine variables on engine friction, types of lubrication systems, Introduction to engine cooling, types of cooling system, governing of IC engine.

UNIT IV

Combustion in IC Engines:

Combustion in S.I. Engine and C.I. Engines: Normal Combustion and abnormal combustion, Stages of combustion in S.I. Engine, Types of Abnormal combustion, Pre-ignition and knocking , Fuel requirements, fuel rating, Anti knock additives, . Detonation and its Control. Stages of combustion in C.I. Engines, Delay period, Factors influencing delay period, Diesel knock, Control of diesel knock, types of combustion chamber, Fuel requirements and fuel rating.

UNIT-V

Measurement, Testing and Performance of IC Engines:

Engine performance Parameters, Measurement of engine power , determination of IP,BP, FP, IMEP, BMEP, various efficiencies, engine performance characteristics and affecting variables, preparation of the Heat balance sheet.

UNIT VI

Emissions from IC Engines:

Sources of SI and CI engine emissions. Harmful effects. Emissions measurement methods. Methods for controlling emissions in SI and CI engine. catalytic converters, exhaust gas recirculation, EURO/ Bharat Stage emission norms.

Alternate Fuels For IC Engines: Need for use of alternate fuels. Use of alcohol fuels. Biodiesel. Biogas and Hydrogen in engines.

TEXT BOOKS:

1. Internal Combustion Engines, Ganesan,V., Tata McGraw Hill Publishing Company.
2. A Course in Internal Combustion Engines, Mathur, M.L. and Sharma, R.P., Dhanpat Rai and Sons.
3. I.C. Engines Fundamentals, Heywood J.McGraw Hill publications.

REFERENCE BOOKS:

1. Thermal Engineering, R.K.Rajput, Lakshmi Publications.
2. Heat engines, Vasandani, Kmar Publications.
3.Thermal Engineering, PL Ballany, Khanna Publications.

V18MET38	NANO TECHNOLOGY (ELECTIVE-I)	L	T	P	C
		3	0	0	3

Course Outcomes:
After successful completion of the course, the student will be able to

CO1	Understand the essential concepts used in nanotechnology	K2
CO2	Identify the various nanomaterials properties	K2
CO3	Describe the syntheses and fabrication methods	K2
CO4	Expand the various characterization Techniques	K2
CO5	Examine the Carbon nano technology and applications	K3
CO6	Use of the various applications of Nano technology	K3

UNIT-I :
INTRODUCTION: History of nano science, definition of nano meter, nano materials, nano technology. Classification of nanomaterials. Crystal symmetries, crystal directions, crystal planes. Band structure.

UNIT-II :
PROPERTIES OF MATERIALS: Mechanical properties, electrical properties, dielectric properties, thermal properties, magnetic properties, opto electronic properties. Effect of size reduction on properties, electronic structure of nano materials.

UNIT-III :
SYNTHESIS AND FABRICATION: Synthesis of bulk polycrystalline samples, growth of single crystals. Synthesis techniques for preparation of nano particle – Bottom Up Approach – sol gel synthesis, hydro thermal growth, thin film growth, PVD and CVD; Top Down Approach – Ball milling, micro fabrication, lithography. Requirements for realizing semiconductor nano structures, growth techniques for nano structures.

UNIT-IV :
CHARECTERIZATION TECHNIQUES:X-Ray diffraction and Scherrer method, scanning electron microscopy, transmission electron microscopy, scanning probe microscopy, atomic force microscopy, piezo response microscopy, X-ray photoelectron spectroscopy, XANES and XAFS, angle resolved photoemission spectroscopy, diffuse reflectance spectra, photoluminescence spectra, Raman spectroscopy.

UNIT-V :
CARBON NANO TECHNOLOGY: Characterization of carbon allotropes, synthesis of diamond – nucleation of diamond, growth and morphology. Applications of nanocrystalling diamond films, grapheme, applications of carbon nano tubes.

UNIT-VI :
APPLICATIONS OF NANO TECHNOLOGY: Applications in material science, biology and medicine, surface science, energy and environment. Applications of nano structured thin fins, applications of quantum dots.

TEXT BOOKS:

1. Nano science and nano technology by M.S Rama Chandra Rao, Shubra Singh, Wiley publishers.

REFERENCE BOOKS:

1. Introduction to Nano Technology by Charles P. Poole, Jr., Frank J.Owens, Wiley publishers.
2. Nanotechnology by Jermy J Ramsden, Elsevier publishers.
3. Nano Materials- A.K.Bandyopadhyay/ New Age Introdu.
4. Nano Essentials- T.Pradeep/TMH.
5. Nanotechnology the Science of Small by M.A Shah, K.A Shah, Wiley Publishers.
6. Principles of Nanotechnology by Phani Kumar, Scitech.

V18MET17	METAL CUTTING &MACHINE TOOLS	L	T	P	C
		3	0	0	3

Course Outcomes:

After successful completion of the course, the student will be able to

CO1	Examine the mechanism of chip formation in machining and explain different parameters involved in machining process	K3
CO2	Describe various types of lathe machines and their operations	K3
CO3	Explain the construction and working of shaper, slotter, planar, drilling and boring.	K2
CO4	Explain the construction and working of various milling and grinding machines	K2
CO5	Illustrate the basic principle and working of Ultrasonic machining, Abrasive jet machining and Electrochemical machining.	K3
CO6	Illustrate the basic principle and working of Electric discharge machining, electron beam machining, Laser beam machining.	K3

UNIT I:
FUNDAMENTALS OF MACHINING:
Elementary treatment of metal cutting theory – element of cutting process –geometry of single point tool angles, chip formation and types of chips – built up edge and its effects chip breakers, mechanics of orthogonal cutting –Merchant's force diagram, cutting forces, cutting speeds, feed, depth of cut, tool life, coolants, tool materials.

UNIT II:
LATHE MACHINES:
Engine lathe, principle of working, specification of lathe, types of lathe, work holders tool holders, taper turning, thread turning for lathes and attachments. Turret and capstan lathes, collet chucks, other work holding, tool holding devices.

UNIT III:
SHAPING, SLOTTING AND PLANNING MACHINES:
Principles of working – principal parts – specifications, operations performed, machining time calculations.

DRILLING & BORING MACHINES:
Principles of working, specifications, types, operations performed – tool holding devices – twist drill– Boring Machines – fine Boring Machines – jig boring machine, deep hole Drilling machine.

UNIT IV:
MILLING MACHINES:

Principles of working , specifications , classification of Milling Machines, Principle features of horizontal, vertical and universal Milling Machine, machining operations, types of cutters, methods of indexing.
FINISHING PROCESSES:
Theory of grinding, classification of grinding machines, cylindrical and surface grinding machines, tool and cutter grinding machines, different types of abrasives, bonds, specification and selection of a grinding wheel. Lapping, Honing & Broaching operations.

UNIT V:
Need for non-traditional machining methods-classification of modern machining processes.
Ultrasonic machining :
Basic principle, equipment, applications, advantages and limitations.
Abrasive jet machining :
Basic principle, equipment, advantages ,limitations. and applications
Electro-chemical machining:
Fundamentals of electro chemical machining, electrochemical grinding, electro chemical honing, advantages, limitations and applications.

UNIT VI:
Electric Discharge Machining:
Basic principle, equipment of Electric Discharge Machining, and wire EDM, advantages, limitations and applications.
Electron Beam Machining, Laser Beam Machining :
Basic principle and theory, advantages, limitations and applications.

TEXT BOOKS :
1. Production Technology by R.K. Jain and S.C. Gupta.
2. Workshop Technology – B.S. Raghuwanshi – Vol II/DhanpatRai& Co. (P) Ltd
3. Elements of Workshop Technology Vol 2- S K Hajra choudhury/Asia Publishing House
4. Advanced machining processes/ VK Jain/ Allied publishers.

REFERENCES:
1. Metal cutting Principles by M.C. Shaw
2. Metal cutting and machine tools by Boothroyd
3. Production Technology by H.M.T. (Hindustan Machine Tools).
4. Modern Machining Process / Pandey P.C. and Shah H.S./ TMH.
5. New Technology / Bhattacharya A/ The Institution of Engineers, India 1984.

V18MET15	THEORY OF MACHINES – II	L	T	P	C
		3	1	0	4

Course Outcomes:

After successful completion of the course, the student will be able to

CO1	Apply gyroscopic effect for stabilization of sea vehicles, aircrafts and automobile vehicles etc.,	K3
CO2	Compute friction for torque transmission of mechanical systems	K3
CO3	Interpret dynamic force analysis of slider crank mechanism in design of flywheel.	K3
CO4	Examine the performance of different types of Governors	K3
CO5	Illustrate balancing of reciprocating and rotary masses.	K3
CO6	Calculate the natural frequencies of Discrete systems starting from the general equation of displacement.	K3

UNIT – I
PRECESSION: Gyroscopes, effect of precession motion on the stability of moving vehicles such as motor car, motor cycle, aero planes and ships.

UNIT – II
FRICTION: Inclined plane, friction of screw and nuts, pivot and collar, uniform pressure, uniform wear, friction circle and friction axis.
CLUTCHES: Friction clutches- single disc or plate clutch, multiple disc clutch, cone clutch, centrifugal clutch.
BRAKES AND DYNAMOMETERS: Simple block brakes, internal expanding brake, band brake of vehicle, **Band and Block Brake.** General description and operation of dynamometers: Prony, Rope brake, Epicyclic, Bevis Gibson and belt transmission.

UNIT – III
TURNING MOMENT DIAGRAMS: Dynamic force analysis of slider crank mechanism, inertia torque, angular velocity and acceleration of connecting rod, crank effort and turning moment diagrams, fluctuation of energy, fly wheels and their design.

UNIT – IV
GOVERNERS: Watt, porter, proell and Hartnell governors, sensitiveness, isochronisms and hunting.

UNIT – V
BALANCING: Balancing of rotating masses single and multiple, single and different planes, use analytical and graphical methods. Primary and secondary balancing of reciprocating masses. analytical and

graphical methods, unbalanced forces and couples, examination of "V" multi cylinder in line and radial engines for primary and secondary balancing. Balancing machines for single plane and two plane balancing.

UNIT – VI

VIBRATIONS: Free Vibration of spring mass system, oscillation of pendulums, centers of oscillation and suspension. Transverse loads, Natural frequency, types of damping, damped free vibration. Vibrations of beams with concentrated and distributed loads. Dunkerly's methods, Raleigh's method, whirling of shafts, critical speeds, torsional vibrations, two and three rotor systems, Simple problems on forced damped vibration, vibration isolation and transmissibility.

TEXT BOOKS:

1. Theory of Machines / S.S Rattan/ Mc. Graw Hill Publ.
2. Mechanism and machine theory by Ashok G. Ambedkar, PHI Publications.

REFERENCE BOOKS:

1. Mechanical Vibrations / R.Venkatachalam/ PHI publishers
2. Theory of Machines / Shiegly / MGH
3. Theory of Machines / Thomas Bevan / CBS Publishers
4. Theory of machines / Khurmi / S.Chand.
5. Mechanism and Machine Theory / JS Rao and RV Dukkipati / New Age.

V18MET16	DESIGN OF MACHINE ELEMENTS- I	L	T	P	C
		3	0	0	3

Course Outcomes:

After successful completion of the course, the student will be able to

CO1	Calculate the stresses in the design of machine elements.	K3
CO2	Develop various criteria for designing the machine elements subjected to varying loads	K3
CO3	Examine the strength of bolted joints under different loads	K3
CO4	Examine the strength of welded and riveted joints under different loads	K3
CO5	Illustrate design of various types of Keys and different joints	K3
CO6	Apply different type of loads on shafts and different couplings	K3

UNIT – I

Design Methods: The art and science of machine design, types of design methods, stages in machine design, selection of materials, types of loads, factor of safety, Design for strength and rigidity, preferred numbers.

Theories of Failure: Maximum Principal stress theory, Maximum shear stress theory, Maximum principal strain theory, Maximum strain energy theory, Maximum distortion energy theory, impact loads, problems.

UNIT – II

Strength of Machine Elements : Stress Concentration, theoretical stress concentration factor, fatigue stress concentration factor, notch sensitivity, design for fluctuating stresses, endurance limit, Estimation of endurance strength, S-N curves, Goodman's line, soderberg's line, modified Goodman's line, Gerber parabola, related problems.

UNIT – III

Bolted Joints: Advantages , types of Bolted joints, stresses in bolts, bolts of uniforms strength bolted joints under eccentric loading, , locking devices.

UNIT – IV

Riveted Joints: Types of riveted joints, modes of failure, strength and efficiency of riveted joints, pitch of the rivets, design stresses, boiler joints, diamond joints, and riveted joints under eccentric loading.
Welded Joints: Types of welded joints, strength of welds, Design of simple welded joints &Design of welded joints subjected to eccentric loading.

UNIT – V
Keys, Cotters and Knuckle Joints: Types of Keys, stresses in Keys, design of rectangular, square and taper Keys, design of spigot and socket, sleeve and cotter, jib and cotter joints and knuckle joints.

UNIT – VI
SHAFTS: Design of solid and hollow shafts for strength and rigidity – design of shafts for combined bending and axial loads – shaft sizes – BIS code.

SHAFT COUPLING: Rigid couplings – muff, split muff and flange couplings, flexible couplings – flange coupling (modified).

Note: Design data book is NOT Permitted for examination

TEXT BOOKS :
1. Machine Design, R.K. Jain , Khanna Publishers, New Delhi.
2. Design of Machine Elements, V.B. Bhandari , TMH Publishers, New Delhi.

REFERENCE BOOKS :
1. Machine Design, Schaum'series , TMH Publishers, New Delhi.
2. Machine Design, Sadhu Singh, Khanna Publishers, New Delhi.
3. Mechanical Engineering Design, Joseph E. Shigely, TMH Publishers, New Delhi.
4. Design of Machine Elements, M.F. Spotts, PHI Publishers, New Delhi.
5. Machine Design, Pandya and Shah, Charotar Publishers, Anand.

Data Hand Book :1. Machine Design Data Hand Book, Mahadevan and Balaveera Reddy [1996], CBS Publishers, New Delhi.

V18MEL10	THERMAL ENGINEERING LAB	L	T	P	C
		0	0	3	1.5

Course Outcomes:

	After successful completion of the course, the student will be able to:	Knowledge Level
CO1	Demonstrate the valve timing diagram & port timing diagram of IC engines	K3
CO2	Test the performance of I.C. Engines.	K4
CO3	Test the performance of compressors.	K4

1. Draw the valve timing diagram of 4-stroke diesel engine
2. Draw the port timing diagram of 2-stroke petrol engine
3. Plot the performance characteristics of single cylinder diesel engine for different loads
4. Draw the heat balance sheet of multi cylinder petrol engine
5. Determine the efficiency of single cylinder petrol engine
6. Conduct economical speed test on si engine
7. Find the indicated power of individual cylinders of an engine by using morse test
8. Determine the volumetric efficiency of air compressor
9. Conduct performance test on variable compression ratio engine
10. Study on dismantling and assembly of engines
11. Study of boilers

		L	T	P	C
V18MEL16	**Metal Cutting & Machine Tools Lab**	**0**	**0**	**3**	**1.5**

Course Outcomes:

After successful completion of the course, the student will be able to

CO1	Examine the various mechanisms used in different machine tools	K3
CO2	Operate different machine tools to prepare different jobs	K3
CO3	Demonstration of simulation of metal cutting	K3

List of experiments:

1. Introduction of general purpose machines: lathe, drilling machine, milling machine, shaper, planing machine, slotting machine, cylindrical grinder, surface grinder and tool and cutter grinder.
2. Step turning and taper turning on lathe machine
3. Thread cutting and knurling on -lathe machine.
4. Drilling and tapping on drilling machine
5. Plane the surface using shaper
6. Preparation of key way using slotter
7. Gear blank preparation using milling machine
8. Ground the cylindrical pieces with cylindrical grinder
9. Finish the blocks with surface grinder
10. Preparation of tool angles using Tool and cutter grinder

Add-on experiments: Metal cutting simulation demonstration

V18MET46	INTELLECTUAL PROPERTY RIGHTS AND PATENTS	L	T	P	C
		2	0	0	MNC

Course Outcomes:

	After successful completion of the course, the student will be able to:	Knowledge Level
CO1	Understand the different types & basics of Intellectual Property Rights .	K2
CO2	Understand the principle and registration of copyrights.	K2
CO3	Understand the principle and registration of patents.	K2
CO4	Understand the principle and registration of trademark.	K2
CO5	Understand the principle and registration of trade secrets.	K2
CO6	Understand IT Act and Cyber Law.	K2

UNIT-I

Introduction to Intellectual Property Law, Intellectual Property Law Basics, Types of Intellectual Property, Innovations and Inventions of Trade related Intellectual Property Rights, Agencies Responsible for Intellectual Property Registration, Infringement, Over use or Misuse of Intellectual Property Rights.

UNIT-II

Introduction to Copyrights, Principles of Copyright, Rights Afforded by Copyright Law –Copyright Ownership, Transfer and Duration, Rights of Distribution, Rights of performers, Copyright Formalities and Registration, International Copyright Law.

UNIT-III

Introduction to Patent Law, Rights and Limitations, Patent Requirements, Ownership and Transfer , Patent Application Process and Granting of Patent, Patent Infringement and Litigation, International Patent Law Patent Cooperation Treaty.

UNIT-IV

Introduction to Trade Mark , Trade Mark Registration Process, Post registration procedures, Trade Mark maintenance, Transfer of rights, Dilution of Ownership of Trade Mark, Likelihood of confusion , Trade Marks Litigation , International Trade Mark Law.

UNIT-V

Introduction to Trade Secrets, Maintaining Trade Secret ,Employee Access Limitation, Employee Confidentiality Agreement , Trade Secret Law, Trade Secret Litigation, Breach of Contract .

UNIT-VI

Introduction to Cyber Law, Information Technology Act, Cyber Crime and E-commerce, Data Security, Confidentiality, Privacy, International aspects of Computer and Online Crime.

TEXT BOOKS:

1. Deborah E.Bouchoux: Intellectual Property. Cengage learning ,New Delhi.
2. PrabhuddhaGanguli: Intellectual Property Rights Tata Mc-GrawHill, New Delhi.
3. Cyber Law. Texts & Cases, South-Western's Special Topics Collections.

REFERENCE BOOKS:

1. Kompal Bansal & Parishit Bansal, Fundamentals of IPR for Engineers, BS Publications.
2. R. Radha Krishnan, S. Balasubramanian: Intellectual Property Rights, Excel Books. New Delhi.
3. M.Ashok Kumar and Mohd.Iqbal Ali: Intellectual Property Right, Serials Pub.

VI Semester

V18MET10	METROLOGY	L	T	P	C
		3	0	0	3

Course Outcomes:

After successful completion of the course, the student will be able to

CO1	Apply tolerances and fits for selected product quality.	K3
CO2	understand the standards of length, angles and various limit gauges	K2
CO3	Understand the optical measuring instruments and their applications	K2
CO4	Explain the measurement of surface finish with various comparators	K2
CO5	Use appropriate method and instruments for inspection of various gear elements and thread elements.	K3
CO6	Describe the flatness measurement and machine tool alignment tests	K2

UNIT-I
SYSTEMS OF LIMITS AND FITS: Introduction, nominal size, tolerance, limits, deviations, fits -Unilateral and bilateral tolerance system, hole and shaft basis systems- interchangeability, selective assembly. International standard system of tolerances, selection of limits and tolerances for correct functioning.

UNIT-II
LINEAR MEASUREMENT: Length standards, end standards, slip gauges- calibration of the slip gauges, dial indicators, micrometers.
MEASUREMENT OF ANGLES AND TAPERS: Different methods – bevel protractor, angle slip gauges- angle dekkor- spirit levels- sine bar- sine table, rollers and spheres used to measure angles and tapers.
LIMIT GAUGES: Taylor's principle – design of go and no go gauges; plug, ring, snap, gap, taper, profile and position gauges.

UNIT-III
OPTICAL MEASURING INSTRUMENTS: Tools maker's microscope and uses – autocollimators, optical projector, optical flats and their uses.

INTERFEROMETRY: Interference of light, Michaleson's interferometer, NPL flatness interferometer, and NPL gauge interferometer.

UNIT-IV

SURFACE ROUGHNESS MEASUREMENT: Differences between surface roughness and surface waviness – Numerical assessment of surface finish-CLA, Rt., R.M.S. Rz, R10 values, Method of measurement of surface finish – Profilograph, Talysurf, ISI symbols for indication of surface finish. COMPARATORS: Types – mechanical, optical , electrical and electronic, pneumatic comparators and their uses.

UNIT – V

GEAR MEASUREMENT: Nomenclature of gear tooth, tooth thickness measurement with gear tooth vernier, pitch measurement, total composite error and tooth to tooth composite errors, rolling gear tester, involute profile checking.

SCREW THREAD MEASUREMENT: Elements of measurement – errors in screw threads- concept of virtual effective diameter, measurement of effective diameter, angle of thread and thread pitch, and profile thread gauges.

UNIT – VI

FLATNESS MEASUREMENT: Measurement of flatness of surfaces- instruments used- straight edges- surface plates – auto collimator.

MACHINE TOOL ALIGNMENT TESTS: Principles of machine tool alignment testing on lathe, drilling and milling machines.

TEXT BOOKS:

1. Engineering Metrology by R.K.Jain / Khanna Publishers
2. Engineering Metrology by Mahajan / DhanpatRai Publishers

REFERENCE BOOKS:

1. Dimensional Metrology, Connie Dotson, Cengage Learning.
2. Engineering Metrology by I.C.Gupta / DhanpatRai Publishers.
3. Precision Engineering in Manufacturing by R.L.Murthy / New Age.
4. Engineering Metrology and Measurements by NV Raghavendra, L Krishna murthy, Oxford publishers.
5. Engineering Metrology by KL Narayana, Scitech publishers.

V18MET18	DESIGN OF MACHINE ELEMENTS- II	L	T	P	C
		3	1	0	4

Course Outcomes:
After successful completion of the course, the student will be able to

CO1	Apply the concepts of different types of Bearings for design	K3
CO2	Illustrate the design concept of IC Engine Parts	K3
CO3	Employ the design concepts to curved beams	K3
CO4	Examine different Transmissions Systems and power screws	K2
CO5	Analyze the design of Spur & Helical Gears	K4
CO6	Calculate various parameters of mechanical springs	K3

UNIT –I

Design Of Bearings: Applications and types of Journal bearings, Lubrication, Bearing Modulus, clearance ratio, bearing materials, journal bearing design, Ball and roller bearings, Static loading of ball & roller bearings, bearing life, Failure of bearings. Selection of Anti-friction bearings

UNIT- II

Design of Engine Parts: Design of piston, forces acting on piston. Design of Cylinder, Cylinder block. Design of Connecting Rod, stress due to whipping action on connecting rod
ends. Design of Cranks and Crank shafts-Centre and over hung cranks.

UNIT –III

Design of Curved Beams: Introduction, Stresses in curved beams, Expression for radius of neutral axis for rectangular, circular, trapezoidal and T-Section. Design of crane hooks, C –clamps, problems.

UNIT- IV

POWER TRANSMISSIONS SYSTEMS, PULLEYS: Transmission of power by belt and rope drives, transmission efficiencies, belts – flat and V types, ropes, pulleys for belt and rope drives, materials, chain drives, problems. Selection of V-Belts

DESIGN OF POWER SCREWS: Design of screws - square, ACME and buttress, design of nut, possible failures, problems.

UNIT – V

Spur & Helical Gear drives: Spur gears, Helical gears, Load concentration factor, Dynamic load factor, Surface compressive strength, Bending strength, Design analysis of spur and Helical gears, Estimation of centre distance, module and face width, Check for dynamic and wear considerations, problems.

UNIT- VI

Mechanical Springs: Stress and deflections of helical Springs, Compression springs, Springs for fatigue loading, Natural frequency of helical springs, Energy storage capacity. Shear stress multiplication Factor, Wahl correction factor and design of helical springs under static and dynamic loads. Design of leaf springs, co-axial springs, related problems.

Note: Design data book is permitted for examination

TEXT BOOKS:

1. Machine Design/V.Bandari/TMH Publishers
2. Machine Design/ NC Pandya& CS Shaw/ Charotar publishers
3. Design data book.

REFERENCES:

1. Machine Design: An integrated Approach / R.L. Norton / Pearson Education
2. Mech. Engg. Design / JE Shigley/Tata McGraw Hill education
3. Design of machine elements- spots/Pearson Publications
4. Machine Design-Norton/Pearson Publications

V18MET19	ROBOTICS	L	T	P	C
		3	0	0	3

Course Outcomes:

After successful completion of the course, the student will be able to

CO1	Describe various robot configuration and components	K2
CO2	Select appropriate actuators and sensors for a robot based on specific application	K3
CO3	Apply kinematic and dynamic analysis for simple serial kinematic chains	K3
CO4	Explain trajectory planning for a manipulator	K2
CO5	Understand the Robot Actuators And Feed Back Components	K2
CO6	Illustrate various applications of robots in manufacturing	K3

UNIT-I
INTRODUCTION: Automation principle in Robotics, CAD/CAM and Robotics – An over view of Robotics – present and future applications. classification by coordinate system.

UNIT – II
COMPONENTS OF THE INDUSTRIAL ROBOTICS: Function line diagram representation of simple Robot, Components. Degrees of freedom – Requirements and challenges of end effectors. Mechanical, Electrical and hydraulic grippers.

UNIT – III
MOTION ANALYSIS: Homogeneous transformations as applicable to rotation and translation – problems. MANIPULATOR KINEMATICS: Specifications of matrices, D-H notation joint coordinates and world coordinates Forward and inverse kinematics – problems. Differential transformation and manipulators, Jacobians – problems Dynamics

UNIT – IV
GENERAL CONSIDERATIONS IN PATH DESCRIPTION AND GENERATION: Trajectory planning and avoidance of obstacles, path planning, Skew motion, joint integrated motion –straight line motion – Robot programming, languages and software packages-description of paths with a robot programming language.

UNIT V
ROBOT ACTUATORS AND FEED BACK COMPONENTS: Actuators: Pneumatic, Hydraulic actuators, electric & stepper motors.
FEEDBACK COMPONENTS: Position sensors – potentiometers, resolvers, encoders and Velocity, proximity sensors.

UNIT VI

ROBOT APPLICATIONS IN MANUFACTURING: Material Transfer – Material handling, loading and unloading- Processing – spot and continuous arc welding & spray painting – Assembly and Inspection.

TEXT BOOKS:

1. Industrial Robotics / Groover M P /Pearson Edu.
2. Robotics and Control / Mittal R K &Nagrath I J / TMH.

REFERENCES:

1. Robotics / Fu K S/ McGraw Hill.
2. Robotic Engineering / Richard D. Klafter, Prentice Hall
3. Robot Analysis and Intelligence / Asada and Slow time / Wiley Inter-Science.
4. Introduction to Robotics / John J Craig / Pearson Edu.

<table>
<tr><td rowspan="2">V18MEL06</td><td rowspan="2">METROLOGY AND INSTRUMENTATION & CONTROL SYSTEMS LAB</td><td>L</td><td>T</td><td>P</td><td>C</td></tr>
<tr><td>0</td><td>0</td><td>3</td><td>1.5</td></tr>
</table>

CO1	Experiment and examine errors in calibration of various instruments	K3
CO2	Explain the working principle of metrology and measuring equipments.	K2
CO3	Compute distance, angle and surface finish by using standard measuring equipments	K3

METROLOGY
List of experiments :

1. Measurement of length, height and diameter by vernier calipers, micrometer and height gauge
2. Surface roughness measurement using talysurf
3. Taper angle measurement
4. Tool makers microscope
5. Measurement of bores using dial bore indicator
6. Measurement of thickness of gear tooth by vernier tooth caliper

INSTRUMENTATION & CONTROL SYSTEMS LAB
List of experiments :

1. Study and calibration of LVDT transducer for displacement measurement
2. Calibration of pressure gauge
3. Angular Measurement using angular sensor
4. Measurement of speed using opto-coupler pickup
5. Calibration of strain gauge
6. Study & calibration of resistance temperature detector (RTD) transducer for temperature measurement
7. Study and calibration of a rotameter for water flow measurement
8. Vibration measurement trainer

V18MEL08	**THEORY OF MACHINES LAB**	**L**	**T**	**P**	**C**
		0	**0**	**3**	**1.5**

Course Outcomes:

After successful completion of the course, the student will be able to

CO1	Understand the concepts on various machine elements such as governors, springs, flywheel and cam & follower	K2
CO2	Examine the motion of gyroscope and static & dynamic balancing of masses	K3
CO3	Apply the principles of various power transmission systems such as shafts, gears and belt & pulley	K3

List of experiments :

1. To determine whirling speed of shaft theoretically and experimentally.
2. To determine the position of sleeve against controlling force and speed of a Hartnell governor and to plot the characteristic curve of radius of rotation.
3. To analyse the motion of a motorized gyroscope when the couple is applied along its spin axis
4. To determine the frequency of undamped free vibration of an equivalent spring mass system.
5. To determine the frequency of damped force vibration of a spring mass system
6. To study the static and dynamic balancing using rigid blocks.
7. To find the moment of inertia of a flywheel
8. To plot follower displacement vs cam rotation for various Cam Follower systems.
9. To find coefficient of friction between belt and pulley.
10. To study simple and compound screw jack and determine the mechanical advantage, velocity ratio and efficiency
11. To study various types of gears- Spur, Helical, Worm and Bevel Gears

V18MEL09	HEAT TRANSFER LAB	L	T	P	C
		0	0	3	1.5

Course Outcomes:

	After successful completion of the course, the student will be able to:	Knowledge Level
CO1	Evaluate the amount of heat exchange in various modes of heat transfer for several geometries.	K4
CO2	Evaluate the amount of heat exchange in condensation & boiling processes and for heat exchangers.	K4

List of experiments :

1. Determination of overall heat transfer co-efficient of a composite slab.
2. Determination of efficiency of a pin-fin.
3. Determination of heat transfer rate through a lagged pipe.
4. Determination of thermal conductivity of a metal rod.
5. Determination of Thermal conductivity of liquids and gases.
6. Determination of heat transfer rate through a concentric sphere.
7. Determination of heat transfer coefficient in natural and forced convection
8. Determination of emissivity of a given surface.
9. Determination of Stefan Boltzman constant.
10. Determination of effectiveness of parallel and counter flow heat exchangers.
11. Determination of heat transfer rate in drop and film wise condensation.
12. Determination of critical heat flux.

Add-on experiments: Heat transfer modeling of a simple component used in a heat exchanger using Ansys in the lab (Virtual lab)

Annexure-ME-III

List courses offered under Open Elective -I in VI semester under V18 Regulation for all other branches:

S.No.	Course Code	Name of the Course
1	V18MEOE1	Basic Mechanical Engineering
2	V18MEOE2	Green Engineering Systems
3	V18MEOE3	Introduction to Robotics

Syllabi for the Courses offering under Open Elective - I

V18MEOE1	BASIC MECHANICAL ENGINEERING (OPEN ELECTIVE-I)	L	T	P	C
		3	0	0	3

Course Outcomes:
After successful completion of the course, the student will be able to,

CO1	Understand classification and working of major components in thermal power plants.	K2
CO2	Discuss various metal joining processes	K2
CO3	Classify types of air compressors and refrigeration systems.	K2
CO4	Illustrate the working of internal combustion engines	K2
CO5	Understand basics of heat transfer	K2
CO6	Discuss about functions and operations of machine tools including milling, shaping, grinding and lathe machines	K2

UNIT-I
Steam boilers: Definition, Classification of boilers, essentialities of boilers, working of boilers, boiler mountings and accessories.

UNIT-II
Metal casting- Pattern design, types of sands, moulding tools and mould making.
Metal joining: Arc welding, gas welding, brazing and soldering.
Sheet metal operations: Rolling and extrusion principles.

UNIT-III
Reciprocating and rotary air compressors: uses of compressed air, types, working principle, work done, simple problems. Refrigeration: concepts, principle of refrigeration and types of refrigeration.

UNIT-IV
Internal combustion engines: Classification of IC engines, basic engine components and nomenclature, working principle of engines- Four stroke and two stroke petrol and diesel engines, comparison of CI and SI engines, comparison of four stroke and two stroke engines, problems on indicated power, brake power, friction power, specific fuel consumption, brake thermal efficiency, indicated thermal efficiency and mechanical efficiency.

UNIT-V
Heat Transfer: Modes and governing laws of heat transfer, Thermal Resistance Concept, Composite Walls, Cylinders, Overall Heat Transfer Co-efficient, simple Problems on Heat Transfer.

UNIT-VI
Machine Tools and Machining Processes: Lathe Machine, types, Lathe Operations, Milling Machine-Types, Milling Operations, Drilling Machine, types, Operations, Grinding Machine, types, Operations.

TEXT BOOKS:

1. Elements of Mechanical Engineering – M. L. Mathur, F. S. Mehta and R. P. Tiwari, Jain Brothers, New Delhi.
2. Engineering Heat Transfer - Gupta &Prakash, Nem Chand & Brothers, New Delhi.
3. Workshop Technology (Vol. 1 and 2) – B. S. Raghuvanshi, DhanpathRai and Sons, New Delhi.
4. Mechanical Engineering Science K R Gopala Krishna, Subhas publications

REFERENCE BOOKS:

1. Thermal Engineering, Ballaney,P.L., Khanna Publishers, 2003
2. Elements of Mechanical Engineering, A.R.Asrani, S.M.Bhatt and P.K.Shah, B.S. Publs.
3. Production Technology by P.N.Rao by I& II McGraw-Hill publications

V18MEOE2	GREEN ENGINEERING SYSTEMS (OPEN ELECTIVE-I)	L	T	P	C
		3	0	0	3

Course Outcomes:
After successful completion of the course, the student will be able to,

CO1	Understand about solar radiation and its collection	K2
CO2	Discuss about various solar energy storage systems and applications.	K2
CO3	Explain about bio-mass, geothermal energy and ocean energy	K2
CO4	Classify the energy efficient systems.	K2
CO5	Describe different energy efficient processes.	K2
CO6	Discuss about features of green buildings	K2

UNIT-I

INTRODUCTION: SOLAR RADIATION: Role and potential of new and renewable sources, Environmental impact of solar power, structure of the sun, the solar constant, instruments for measuring solar radiation. Photo voltaic energy conversion – types of PV cells.

SOLAR ENERGY COLLECTION: Flat plate and concentrating collectors, classification of concentrating collectors, advanced collectors.

UNIT – II

SOLAR ENERGY STORAGE AND APPLICATIONS: Sensible, latent heat, solar ponds, solar applications-solar heating/cooling technique, solar distillation and drying, solar cookers, central power tower concept and solar chimney.

WIND ENERGY: Sources, basic principle of wind energy conversion, basic components, horizontal and vertical axis windmills.

UNIT – III

BIO-MASS: Principles of bio-conversion, types of bio-gas plants, bio fuels.

GEOTHERMAL ENERGY: Resources, types of wells, methods of harnessing the energy.

OCEAN ENERGY: OTEC, Principles of utilization, OTEC plants.

Tidal and wave energy: Tidal power plants, hydel power plants.

UNIT–IV

ENERGY EFFICIENT SYSTEMS:

(A) ELECTRICAL SYSTEMS: Energy efficient motors, energy efficient lighting and control, selection of luminaire, controls for HVAC (heating, ventilation and air conditioning), demand site management.

(B) MECHANICAL SYSTEMS: Fuel cells- principle, selection of fuels & working of various types of fuel cells, Environmental friendly and Energy efficient compressors and pumps.

UNIT-V

ENERGY EFFICIENT PROCESSES: Environmental impact of the current manufacturing practices and systems, benefits of green manufacturing systems, selection of recyclable and environment friendly materials in manufacturing, vegetable based cutting fluids, zero waste manufacturing.

UNIT – VI

GREEN BUILDINGS: Definition, features and benefits. Sustainable site selection and planning of buildings for maximum comfort. Environmental friendly building materials like bamboo, timber, rammed earth, hollow blocks, lime & lime pozzolana cement, agro materials and industrial waste, Ferro cement and Ferro-concrete, alternate roofing systems, paints to reduce heat gain of the buildings. Energy management.

TEXT BOOKS:

1. Solar Energy – Principles of Thermal Collection and Storage, Sukhatme S.P. and J.K.Nayak, TMH.
2. Non-Conventional Energy Resources, Khan B.H., Tata McGraw Hill, New Delhi, 2006.
3. Green Manufacturing Processes and Systems, Edited by J. Paulo Davim, Springer 2013.

REFERENCES:

1. Alternative Building Materials and Technologies / K.S Jagadeesh, B.V Venkata Rama Reddy and K.S Nanjunda Ra.
2. Principles of Solar Energy / Frank Krieth & John F Kreider.
3. Non-Conventional Energy / Ashok V Desai / Wiley Eastern.
4. Renewable Energy Technologies / Ramesh & Kumar / Narosa
5. Renewable Energy Technologies / G.D Roy

V18MEOE3	INTRODUCTION TO ROBOTICS (OPEN ELECTIVE-I)	L	T	P	C
		3	0	0	3

Course Outcomes:
After successful completion of the course, the student will be able to,

CO1	Explain various automations and components.	K2
CO2	Discuss the anatomy of the robot with its components	K2
CO3	Illustrate robot configurations	K3
CO4	compute trajectory planning system	K3
CO5	Discuss various robot actuation and feedback sensors	K2
CO6	Explain different robot applications in industrial purpose	K2

UNIT-I

INTRODUCTION: Automation principle and objectives, Reasons for automation, steps in automation strategy, drawbacks of conventional Manufacturing, elements of automation system, input/output devices for discrete data, application of automation.

UNIT – II

ROBOTICS: Definition of Robot, History of robotics, Robotics market and the future prospects, Robot Anatomy, Robot motions, Joints, Work volume, work space, Robot drive systems.

UNIT – III

Robot configurations: Polar, Cartesian, cylindrical and Jointed-arm configuration. Precision of movement – Spatial resolution, Accuracy, Repeatability, End effectors – Tools and grippers, Degrees of freedom – Asimov's laws of robotics dynamic stabilization of robots.

UNIT IV

TRAJECTORY: Introduction to trajectory, path description and generation. Trajectory planning and avoidance of obstacles, path planning, Skew motion, joint integrated motion –straight line motion.

UNIT –V

Robot actuation and feedback components

Position sensors – Potentiometers, resolvers, encoders, velocity sensors. Proximity and tactile sensor in robotics. Actuators - Pneumatic and Hydraulic Actuators, Electric Motors, Stepper motors, Servomotors, Power Transmission systems.

UNIT –VI

Robots Technology of the future: Artificial Intelligence, Goals of AI research, Telepresence and related technologies, Mechanical design features, Mobility, locomotion and navigation, system integration and networking.

TEXT BOOKS:

1. Automation, Production systems, and computer integrated manufacturing-MikellP.Groover 3rd edition, Pearson 2009
2. Industrial Robotics-Groover, Weiss, Nagel, McGraw Hill International, 2nd edition, 2012

REFERENCES:

1. Robotics / Fu K S/ McGraw Hill.
2. Robotic Engineering / Richard D. Klafter, Prentice Hall.
3. Robot Analysis and Intelligence / Asada and Slow time / Wiley Inter Science.

Annexure-VI

SRI VASAVI ENGINEERING COLLEGE (Autonomous)

(Sponsored by Sri Vasavi Educational Society; Regd. No: 898/2000)
(Approved by AICTE, New Delhi & Permanently affiliated to JNTUK,Kakinada)
(Accredited by NAAC with 'A' Grade, Recognized by UGC under section 2(f) & 12(B))
Pedatadepalli, TADEPALLIGUDEM – 534 101, W.G. Dist, (A.P.)
Department of Management Studies (MBA)

June 6, 2020.

Minutes of the third Board of Studies meeting in Management Studies held on 04-06-2020

The following members are present.

S.No	Name of the member	Designation	
1	Dr.G.V.Subba Raju	Professor & HOD Department of Management Studies Sri Vasavi Engineering College Tadepalligudem	Chairman BOS
2	Prof. B. Amarnath	Professor Department of Management Studies Sri Venkateswara University Tirupati	Council Nominee
3	Dr.J.N.V.Raghu Ram	Associate Professor Department of Technology Management VIT, Vellore	Council Nominee
4	Sri. P.S. Varma	D G M Coromandel International Limited Kakinada	Industry expert
5	Prof. D. Surya Chandra Rao	Professor Department of Management Studies Krishna University Machilipatnam	University Nominee
6	R.Satyanarayana	Associate Delivery Head Ericson India Ltd. Bengaluru	Alumni
Department of Management Studies, Sri Vasavi Engineering College members			
7	Dr. S. Krishna Murthy Naidu	Associate Professor	Member
8	Dr. RSRK Kiran Kumar	Associate Professor	Member
9	D.Satyanarayana	Sr. Asst.Professor	Member
10	D. Naveen Kumar	Asst. Professor	Member
11	R.V.Rajasekhar	Asst. Professor	Member

12	U.Bhargava	Asst. Professor	Member
13	Dr. K.Rambabu	Asst. Professor	Member
14	K.Vinaykumar	Asst. Professor	Member
15	T.Dileep	Asst. Professor	Member

Minutes of the third BOS meeting held on 04-06-2020.

The chairman of the BOS extended a formal welcome and introduced the members.

Item 1: Syllabi approval for Organizational Behaviour and Management Science Courses for the academic year 2020-21.

The Chairman of BOS proposed the syllabi for Organizational Behaviour and Management Science courses for the academic year 2020-21. After considering the suggestion made by all BOS members, the courses syllabi for Organizational Behaviour and Management Science courses has been approved. The approved syllabi copies are enclosed as Annexure-MBA-01.

Item 2: Review of MBA (Autonomous) results of 2018, 2019 Admitted batch results.

All BOS members are expressed their satisfaction on the pass percentage and performance of students in examinations.

Item 3: Summer internship (Project) guidelines for 2019 admitted batch in view of COVID-19.

In view of COVID-19 the external BOS members discussed the summer internship (Project) possibilities and suggested to look into the guidelines specified by AICTE and UGC in this connection.

Dr. G.V.Subba Raju
HOD & Chairman
BOS in Management Studies

Annexure-MBA-01

SRI VASAVI ENGINEERING COLLEGE
(Autonomous)

ORGNIZATIONAL BEHAVIOUR

With effect from the 2018-19 admitted batch

SNO	Programme	Course Code	Course Name	L	T	P	C
1	B.Tech	V18MBT53	Organizational Behaviour	3	0	0	3

After completion of this course, Student will be able to

CO 1	Identify the basic concepts of organizational behaviour	K1
CO 2	Enumerate the importance of individual personality and learning in the organizational context.	K2
CO 3	Develop decision making abilities and interpersonal communication skills	K3
CO 4	Identify the basic concepts of Group dynamics	K1
CO 5	Identify the foundations of organization development	K1
CO 6	Develop team building skills	K2

UNIT-I:

Introduction - Nature and scope: linkages with other social sciences – Individual roles and Organizational Goals - Perspectives of Human Behaviour, Approach to organizational behaviour - models of organizational behaviour.

UNIT-II:

Personality Development: Nature - Stages, Determinants of Personality, Johari Window - Transactional Analysis, Learning Processes – theories. Perception: nature -Process –Motivation – Concepts - Theories - Leadership Theories. Attitude and Values.

UNIT-III:

Decision Making Process: Decision making Process- Individual vs. Team decision Making- Interpersonal Communication. Types of decisions.

Unit IV:

Group Dynamics-Behavioural Dimensions, Groups and their formation-Informal Organizations, Group versus Individual Interaction. **Group conflict:** Listening, Feedback, Collaborative Processes in Work Groups, Conflict Resolution in Groups and Problem Solving Techniques.

UNIT-V:

Organizational Development: Goals, processes, change – resistance to change –Impact of technology on human behaviour- Nature of OD - interventions, OD techniques and OD applications.

UNIT- VI:

Team Building- Meaning and Significance of team building- stages of team building- benefits of team building-High performance teams.

REFERENCE BOOKS:

1. K.Aswathappa: "Organizational Behavior-Text, Cases and Games", Himalaya Publishing House, New Delhi, 2008,
2. Steven L McShane, Mary Ann Von Glinow, Radha R Sharma: "Organizational Behavior", Tata McGraw Hill Education, New Delhi, 2008.
3. Jerald Greenberg and Robert A Baron: "Behavior in Organizations", PHI Learning Private Limited, New Delhi, 2009.
4. PareekUdai: "Understanding Organizational Behavior", Oxford University Press, New Delhi, 2007.
5. Jai B.P.Sinha: "Culture and Organizational Behavior", Sage Publication India Private Limted, New Delhi, 2008.
6. Sharma VS, Veluri: "Organizational Behavior", JAICO Publishing House, New Delhi, 2009.
7. Slocum,nHelireigel: "Fundamentals of Organizational Behavior", Cengage Learning India, New Delhi, 2009.
8. Jennifer M.George and Gareth R. Jones: "Understanding and Managing rganizationalBehavior", Pearson Education, New Delhi, 2009.
9. Schermerhorn, Hunt and Osborn: "Organizational Behavior", Wiley India Limted, New Delhi, 2007.
10. Gregory Moor head, Ricky W. Grif fin: "Organizational Behavior", Biztantra, NewDelhi, 2009.

SRI VASAVI ENGINEERING COLLEGE

(Autonomous)

Management Science
With Effect From the 2018-19 Admitted Batch

S.NO	Programme	Course Code	Course Name	L	T	P	C
1	B.Tech	V18MBT52	Management Science	3	0	0	3

After completion of this course, Students Will be able to

CO 1	Understand various approaches to Management	K2
CO 2	Explain the principles and practices of operations management	K2
CO 3	Understand the Functions of Human Resource Management and Marketing Management	K2
CO 4	Sketch the networks for better project management	K3
CO 5	Understand the Concept of Strategic Management	K2
CO 6	Describe the knowledge of contemporary management practices	K1

UNIT I Introduction to Management: Concept –nature and importance of Management – Functions of Management – Scientific Management: F W Taylor contributions, Henry Fayal 14 Principles. Theories of Motivation: Abraham Maslow's Need Hierarchy, Theory-X and Theory Y. Herzberg Two Factor Theory.

UNIT II Operations Management: Plant Location, Plant layout types. – Work study- Statistical Quality Control- Control charts (X-chart, R-chart,) Simple problems, Material Management: Need for Inventory control- EOQ, ABC analysis (HML, SDE, VED, and FSN analysis).

UNIT III Functional Management: Concept of HRM, HRD - Functions of HR Manager-Job analysis, Job Evaluation and Merit Rating - Marketing Management- Functions of Marketing – Four P's , Product, Price, Place and Promotion- New product development-product life cycle, services marketing.

UNIT IV Project Management: (PERT/CPM): Development of Network – Difference between PERT and CPM-Identifying Critical Path- Project Crashing (Simple Problems).

UNIT V Strategic Management: Vision, Mission, Goals, Strategy- Strategic management process – Elements of Corporate Planning Process – Environmental Scanning – SWOT analysis..

UNIT VI Contemporary Management Practices: ERP, Total Quality Management (TQM), Six sigma, Supply Chain Management, Business Process outsourcing (BPO),Lean start ups and entrepreneurship.

References:

1. Dr. A. R. Aryasri, Management Science' TMH 2011.
2. Koontz &Weihrich: 'Essentials of management' TMH 2011
3. Seth &Rastogi: Global Management Systems, Cengage learning , Delhi, 2011
4. Robbins: Organizational Behaviour, Pearson publications, 2011
5. KanishkaBedi: Production & Operations Management, Oxford Publications, 2011
6. Philip Kotler & Armstrong: Principles of Marketing, Pearson publications
7. BiswajitPatnaik: Human Resource Management, PHI, 2011
8. Hitt and Vijaya Kumar: Starategic Management, Cengage learning
9. Prem Chadha: Performance Management, Trinity Press(An imprint of Laxmi Publications Pvt. Ltd.) Delhi 2015.
10. Anil Bhat& Arya Kumar : Principles of Management, Oxford University Press, New Delhi, 2015.

ANNEXURE-VII

Minutes of the 3rd meeting of BOS in Dept., of Electronics& Communication Engineering (Held on 10.06.2020)

The ECE Department 3rd meeting of Board of Studies (BOS) was conducted through online mode on 10.6.2020 at 11.00 A.M using ZOOM Application with following given link address.

https://zoom.us/j/92863815387?pwd=MnBpRFVjMXpGVVFXTURabEdmeSt2Zz09 .

Following external members have attended the meeting along with internal faculty members. The ECE HOD, Dr E. KusumaKumari, BOS Chairman headed the meeting.

Details of members attended:

S.No	Name of the BOS Member	Nominee	Address
1.	Dr.E.KusumaKumari	Chair person	Professor & Head, ECE, SVEC
2.	Prof.I.SanthiPrabha	University Nominee	Prof.in ECE Dept., University College of Engg., JNTUK, Kakinada
3.	Prof. NVSN. Sarma	Subject Expert	Director, IIIT Trichy Tiruchirapalli, Tamilnadu.
4.	Prof. M. VenugopalaRao	Subject Expert	Prof., ECE Dept., K.L.University, Vijayawada.
5.	Sri. Sunkavalli Siva Kumar	Alumni Nominee	Sr.Engineer,Qualcomm, Bangalore.
6.	All Faculty Members in Dept.	Members	ECE Dept., SVEC

The following are the key points discussed in the meeting.

- **Item No.1 : Chairperson, BOS has welcomed all the members and given the Opening Remarks.**

- **Item No.2: Review & approval of the V& VI Sem of B. Tech ECE of V18 Reg.**

- The Chairman and the members reviewed the course structure of B. Tech ECE and suggested modifications in the structure.
- Members suggested to include topics, Multipath Propagation, Fading, Types of fading concepts in Antenna & Wave Propagation course in V semester.
- Members suggested to include the concept of Cavity Resonator, Impedance , and Dielectric Constant Measurement in Microwave Engineering Course in VI Semester.
- Members suggested to include Mini-project as Lab associated Component in each Lab

Course.

- Members suggested to include topics, Introduction of DTFT in the Course of Digital Signal Processing in VI semester.
- Members suggested to include separate column in the course structure to indicate the course category.
- The approved course structure & Syllabus for the V & VI semesters of B. Tech ECE in Academic Year 2020-21 were given in**Annexure-ECE-I & Annexure-ECE-II**

➢ **Item No.3: Review & Approval the List of Open Elective Courses offered by ECE Dept., in VI Semester B. Tech ECE of V18 Reg.**

BOS Members suggested to include the Course titled as "Principles of Communication Systems" as an Open elective course instead of Bio- Medical Engineering Course in VI semester. The approved Syllabus was given in **Annexure-ECE-III**

➢ **Item No. 04: Approval for offering Honors degree in DATA SCIENCE offered by Department of Computer Science and Engineering for B. Tech Electronics and Communication Engineering students under V18 Regulation**

BOS Members approved our students to opt for the Honors degree offered by the Department of Computer Science and Engineering with the rules and regulations which will be approved by Academic Council.

➢ **Item No. 5: Approval of List of Courses offered to EEE Department in the VI Semester.**

BOS Members Approved the List of Courses offered to EEE Department in the VI Semester and details of syllabus is given in **Annexure-ECE-IV**

S.No	Programme	Semester	Course Code	Course Name
1	EEE	VI	V18ECT23	Fundamentals of Microprocessor & Microcontrollers
2	EEE	VI	V18ECL10	Microprocessors & Microcontrollers Lab

➢ **Item No. 6: Review and approval of Proposed course structure & Syllabi for III & IV semesters of B. Tech ECT under V18 Regulations.**

BOS Members suggested and approved the III & IV SEM B.Tech(ECE) Course Structure and Syllabus for B.Tech (ECT) Programme also. The approved Course Structure is given in **Annexure-ECE-V**.

Finally, the chairperson thanked all the BOS members and faculty. The meeting was ended at 12.30 P.M

Dr. E. Kusuma Kumari,
Chairperson, BOS

Annexure-ECE-I

Approved Course structure in 3rd Meeting of BOS

V- Semester

S. No	Course Code	Course Name	L	T	P	Course-Category	Credits
1	V18CST81	Data structures & Algorithms	3	-	-	Professional Core	3
2	V18ECT11	VLSI design	3	-	-	Professional Core	3
3	V18ECT12	Microprocessors & Microcontrollers	3	-	-	Professional Core	3
4	V18EET15	Control Systems	3	-	-	Professional Core	3
5	V18ECT13 V18ECT14	**Professional Elective-I** Antenna &Wave Propagation Telecommunication Switching Systems & Networks	3	1	-	Professional Elective	4
6	V18ECT15	Engineer & Society	2	-	-	Mandatory & Non Credit	-
7	V18CSL34	Data Structures& Algorithms lab (BOS of CSE)	-	-	2	Professional Core	1
8	V18ECL07	Microprocessor & Microprocontrollers Lab	-	-	2	Professional Core	1
9	V18ECL08	VLSI Design Lab	-	-	2	Professional Core	1
10	V18ECMOOCs	MOOCs Course (Any Course in Engg. with Min 8 weeks)				Mandatory Course	2
11	V18ENT05	Professional Comm. skills(Eng+ aptitude) –III (BOS of English)	4	-	-	Mandatory & Non Credit	MC
		TOTAL	**21**	**01**	**06**		**21**

VI- Semester

S. No	Course Code	Course Name	L	T	P	Course-Category	Credits
1	V18CST11	Computer Networks	3	-	-	Professional Core	3
2	V18ECT16	Digital Signal Processing	3	-	-	Professional Core	3
3	V18ECT17	Microwave Engineering	3	-	-	Professional Core	3
4	V18ECT18 V18ECT19	**Professional Elective-II** Embedded Systems-1 CMOS Digital IC Design	3	-	-	Professional Elective	3
5	V18MBET52	Management Science	3	-	-	Humanities course	3
6		**Open Elective-I**	3			Open Elective	3
7	V18ECL09	Digital Signal Processing Lab	-	-	2	Professional Core	1
8	V18CSL35	Computer Networks Lab	-	-	2	Professional Core	1
9	V18ENT06	Professional Comm. Skills (Eng+ aptitude) (MNC)- IV	4	-	-	Mandatory & Non Credit	--
		TOTAL	**22**	**-**	**04**		**20**

List of Open Elective Courses

S.No	Course Code	Name of the Course	Department Offered
1	V18ECTOE1	Internet of Things	Electronics & Communication Engineering
2	V18ECTOE2	Principles of Communication Systems	
3	V18ECTOE3	Introduction to VLSI Design	
4	V18CSTOE01	Data Base Management Systems	Computer Science Engineering.

5	V18CSTOE02	Software Engineering	
6	V18CSTOE03	Python Programming	
7	V18EEOE1	Energy Audit & Conservation	Electrical & Electronics Engineering
8	V18EEOE2	Electrical Measuring Instruments	
9	V18EEOE3	Industrial safety	
10	V18MEOE1	Basic Mechanical Engineering	Mechanical Engineering
11	V18MEOE2	Green Engineering	
12	V18MEOE3	Introduction to Robotics	

Annexure-ECE-II

Approved Syllabus for V & VI Semesters

V Sem.	Data Structures and Algorithms	Course Code: V18CST81	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Explain Sorting and searching techniques. **(K2)**

CO2: Demonstrate algorithm notations. **(K2)**

CO3: Develop Singly Linked Lists, Double Linked List. **(K3)**

CO4: Interpret the Basic Concepts in Data Structures, Stacks and Queues **(K3)**

CO5: Develop Binary trees and BST **(K3)**

CO6: Develop various graph algorithms. **(K3)**

Unit I: Sorting: bubble sort, insertion sort, selection sort, quick sort, merge sort, heap sort, radix sort.
Searching: linear search, binary search. Introduction to hashing, hash functions.

Unit II: Introduction to data structures – Basic terminology, classification of data structures, operation on data structures, ADT, time and space complexity, Big O, Omega and Theta notation.
Arrays: Representation of arrays - polynomial representation, addition of two polynomials, sparse representation, transpose of sparse matrix. (**Refer Reference Text book 1**)

Unit III: Linked list: Introduction, **single linked list** Representation of node, operations on single linked list, reverses the linked list. **Double linked list**: operations (insert delete and display). **Circular linked List** and its operations (create and display single circular linked list).

Unit IV: Stacks introduction, array representation, operations, linked list representation, operation on linked stacks, infix to postfix conversion, evolution of arithmetic expression. **Queues** Introduction, Array representation, operations linked list representation, linked queue operations, circular queues.

Unit V: Trees: Introduction, Terminology, Representation of Trees, types of trees, **Binary Trees:** Properties of Binary Tress, creating a binary tree from general tree, Tree Traversals. **Binary Search Tree:** introduction, creation, insertion, delete, display and search operations.

Unit – VI: Graphs: introduction, Terminology, directed graphs, Graph Representation, **Graph Traversal techniques**: Depth First Search, Breadth First Search. **Spanning Trees**: Krushkal's Algorithm, Prim's algorithm. Single source shortest Paths and all pair shortest path algorithm

TEXT BOOKS:

1. Data Structures using C by ReemaThareja, Second Edition, oxford publications.
2. Data Structures, algorithms and applications in C++, SartajSahni, Universities press, Second Edition.

REFERENCE BOOKS:

1. Fundamentals of Data Structures and algorithms by C V Sastry, RakeshNayak, Ch. Raja Ramesh, Distributed by Wiley publications, new Delhi.
2. Fundamentals of Data Structures in C++, Ellis Horowitz, SartajSahni and Dinesh Mehta, 2nd Edition, Universities Press (India) Pvt. Ltd.
3. An Introduction to Data Structures with Application, Jean-Paul Tremblay , Paul Sorenson, Second Edition.
4. Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.
5. Problem solving with C++, The OOP, Fourth edition, W.Savitch, Pearson education.

V Sem.	VLSI Design	Course Code: V18ECT11	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO-1: Understand different IC technologies and basic electrical properties of MOS, CMOS and Bi-CMOS Circuits. **(K2)**

CO-2: Develop layouts for MOS & Bi-CMOS circuits using design rules. **(K3)**

CO-3:Calculate the parameters of MOS circuits and assess the effects of scaling **(K3)**

CO-4: Analyze the concept of Combinational and arithmetic circuits. **(K4)**

CO-5: Describe the fundamentals of low power VLSI design. **(K2)**

UNIT-I

Review of Microelectronics and An Introduction to MOS technology: IntroductiontoICtechnology,BasicMOStransistors,EnhancementmodeMOS transistor Action, Depletion mode MOS transistor Action, NMOS, PMOS fabrication, CMOS fabrication and Bi-CMOS technology, Comparison between CMOS and Bi-CMOS technology.

UNIT-II

Basic Electrical Properties of MOS and BICMOS Circuits: I_{ds} versus V_{ds} relationships, Aspects of MOS transistor threshold voltage V_t, Trans conductance g_m, Output conductance g_{ds} and Figure of merit, NMOS inverter, Pull-up to pull- down ratio for NMOS inverter driven by another NMOS inverter and through one or more pass transistors, Alternative forms of pull-up, CMOS inverter, BICMOS inverters, Latch-up in CMOS circuits.

UNIT-III:

MOS and Bi-CMOS Circuit Design Processes: MOS Layers, Stick Diagrams, Design Rules and Layout, General observations on the Design rules, 2µm Double Metal, Double Poly, CMOS/Bi-CMOS rules, 1.2µm Double Metal, Double Poly CMOS rules, Layout Diagrams of NAND and NOR gates and CMOS inverter, Symbolic Diagrams- Translation to Mask Form.

UNIT-IV:

Basic Circuit Concepts: Sheet Resistance, Sheet Resistance concept applied to MOS transistors and Inverters, Area Capacitance of Layers, Standard unit of capacitance, Some area Capacitance Calculations, The Delay Unit, Inverter Delays, Driving large capacitive loads, Propagation Delays, Wiring Capacitances, Choice of layers.

Scaling of MOS Circuits: Scaling models and scaling factors, Scaling factors for device parameters, Limitations of scaling.

NIT-V:

Subsystem design and layout: Architectural issues, Switch logic, Gate Logic

Examples of Structured Design (Combinational Logic): A Parity Generator, Bus Arbitration Logic for n-line-Bus

An Illustration of Design Process: Multiplier, Design of an ALU Subsystem, Ripple Carry Adder, and Carry look ahead adder.

UNIT-VI:

Introduction to Low Power VLSI Design: Need for Low Power VLSI chips, Sources of Power dissipation, Short circuit power dissipation Switching power dissipation and Short channel Effects. Low Power design through Voltage Scaling: VTCMOS, MTCMOS.

Text Books:

1. Essentials of VLSI Circuits and Systems by Kamran Eshraghian, Douglas and A. Pucknell and SholehEshraghian, Prentice-Hall of India Private Limited, 2005Edition
.
2. CMOS Digital Integrated Circuits Analysis and Design by Sung-Mo Kang, Yusuf Leblebici, Tata McGraw- Hill Education, 2003.

Reference Books:

1. “Practical Low Power Digital VLSI Design” by Gary K. Yeap, , KAP, 2002
2. “Low Power CMOS VLSI Circuit Design” by Kaushik Roy, Sharat Prasad, Willey, 2000

V Sem.	Microprocessor & Microcontrollers	Course Code: V18ECT12	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO-1: Describe the basic architecture and Modes of 8086 microprocessor **(K2).**

CO-2: Construct assembly language programs for arithmetic and Logical Operations - **(K3).**

CO-3: Describe the Hardware and software requirements in interfacing **(K2)**

CO-4 Describe Architecture and features of Intel 8051 microcontroller**(K2)**

CO-5.Construct assembly language programs for 8051 microcontroller**(K3)**

CO-6.Identify latest technology in microcontroller environment**. (K2)**

UNIT-1: **Introduction to Microprocessors**: Evolution of Microprocessors, features, Intel Microprocessor families, Architecture of 8086 microprocessor, pin/signal description, Physical address formation, I/O Addressing capability. Minimum Mode Maximum mode of 8086, General bus operation, Description of Minimum mode pins, Timing diagrams.
Interrupts, Available interrupts, Interrupt Cycle, ISR (Interrupt service Routine), and subroutines, Interrupt programming.

UNIT-II: **Programming with 8086 Microprocessor**: Various addressing modes of 8086, Instruction set and Classification, Assembler Directives of 8086.Program development steps, assembly language program development tools, Machine level programming, and writing programs with an assembler, writing Assembly language program using procedures and assembler macros. Sample Programs using various types of instructions.

UNIT – III: **Interfacing with Basic Peripherals**: Semiconductor memories interfacing (RAM, ROM), Interfacing Microprocessor to keyboards, interfacing to ADC/DAC , Interfacing 8255(PPI-Parallel I/O port), 8254(programmable Interval Timer/counter), 8259(Programmable interrupt controller), 8251(serial communication UART), DMA -8237 data transfer, Stepper motor interfacing and programming.

UNIT – IV:**8051 Microcontroller**: Intel 8051 Microcontroller, Microprocessor vs. Microcontroller, 8051 Microcontroller Architecture, Microcontroller 8051 pin diagram, Internal and External Memory, Counters and Timers, Serial Communication in 8051, interrupts in 8051.
Addressing Modes, Data Transfer Instructions, Data and Bit-Manipulation Instructions, Arithmetic Instructions, simple programs using microcontroller 8051.

UNIT – V: PIC Microcontroller: Introduction, characteristics of PIC microcontroller, PIC microcontroller families, memory organization, parallel and serial input and output, timers, Interrupts, PIC 16F877 architecture, instruction set of the PIC 16F877.

UNIT – VI: **Atmega328 Microcontroller**: Architecture and PIN Description of Atmega328 Arduino microcontroller. Arduino Language reference program structure, data types, variables & constants, operators, control statements and loops.

TEXT BOOKS:

1. Advanced microprocessor and Peripherals by A.K.Ray and K.M.Bhurchandi, TMH, 2000.
2. Microprocessors and Interfacing by Programming and Hardware by Douglas V Hall, SSSP Rao, Tata McGrawHill Education Private Limited, 3rd Edition.

Reference Books:

1. The Intel Microprocessors-Architecture, Programming, and Interfacing by Barry B.Brey,Pearson, Eighth Edition-2012.
2. Beginning Arduino Programming by Brian Evans

Sem.	Antenna & Wave Propagation Professional Elective-1	Course Code: V18ECT13	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO-1: Understand the radiation mechanism and fundamental parameters of antenna **(K2)**
CO-2: Solve the field components of dipole, quarter monopole antenna and their characteristics. **(K3)**
CO-3: Solve array factor for N element linear array and directivity **(K3)**
CO-4: Design basic micro strip antennas such as rectangular and circular and explain the concepts of modern antennas **(K3)**
CO-5: Design Microwave antennas and explain the procedure for antenna gain and Radiation pattern measurement **(K3)**
CO-6: Explain concept of propagation methods and fading in wave propagation.**(K2)**

UNIT I
ANTENNA FUNDAMENTALS: Introduction, Radiation Mechanism – single wire, two wires, Current Distribution on a thin wire antenna. Antenna Parameters –Near and far field regions, Radiation Patterns, Patterns in Principal Planes, Main Lobe and Side Lobes, Beam width, Polarization, Beam Area, Radiation Intensity, Beam Efficiency, Directivity, Gain and Resolution, Antenna Apertures, Aperture Efficiency, Effective Height, Reciprocity Theorem applicable to antenna Simple Problems.

UNIT II
WIRE ANTENNAS: Retarded Potentials, Radiation from Small Electric Dipole, Quarter wave Monopole and Half wave Dipole – Current Distributions, Evaluation of Electric and magnetic Field Components, Radiation Resistance, Beam width, Directivity Loop Antennas: Small Loops - Concept of short magnetic dipole -Field Components, Comparison of far fields of small loop and short dipole, Helical Antennas – Significance, Geometry, basic properties; Design considerations for mono filer helical antennas in Axial Mode and Normal Modes

UNIT III
ANTENNA ARRAYS : Two element arrays – N element Uniform Linear Arrays – Broadside, End-fire Arrays, Array factor, EFA with Increased Directivity, Derivation of their characteristics and comparison, Principle of Pattern Multiplication, Non – Uniform arrays- Binomial arrays , Phased Arrays concept- Beam scanning-Applications –Antenna synthesis-Binomial method.

UNIT IV

MICROWAVE ANTENNAS AND ANTENNA MEASUREMENTS

Parabolic Reflectors – Geometry, characteristics, types of feeds, F/D Ratio, Spill Over, Back Lobes, Aperture Blocking, Off-set Feeds, Cassegrain Feeds. Horn Antennas – Types-Design Characteristics of Pyramidal Horns.

Antenna Measurements – Block diagram of radiation pattern measurement setup and measurement procedure, Distance Criterion, Indoor and outdoor measurement- Far field measurement – Anechoic chamber-Advantages-Block diagram of Gain Measurements and measurement procedure (Comparison, Absolute and 3-Antenna Methods).

UNIT V

MODERN ANTENNAS: Micro strip Antennas-Geometry, Features, Advantages and Limitations, Rectangular and Circular Patch Antennas –Radiation mechanism-Design –Simple design problems of MSA- Smart antennas- Block diagram- concept- switched beam and adaptive array concept –MIMO antenna-Wearable antenna.

- **UNIT VI**

WAVE PROPAGATION AND TRENDS IN WIRELESS COMMUNICATION: Concepts of Propagation – frequency ranges and types of propagations. Concept of Ground Wave Propagation - Sky Wave Propagation –Mechanism of Reflection and Refraction – Concept of Tropospheric propagation . Fading, Types of fading, Multipath propagation.

TEXT BOOKS

1. Antennas for All Applications by John D. Kraus and Ronald J. Marhefka, 3rd Edition, TMH, 2003.
2. Electromagnetic Waves and Radiating Systems by E.C. Jordan and K.G. Balmain, PHI, 2nd Edition, 2000.
3. Broadband Microstrip Antenna by Girish Kumar, Artech house Publishers

REFERENCES

1. Antenna Theory by C.A. Balanis, John Wiley and Sons, 2nd Edition, 2001.
2. Antennas and Wave Propagation by K.D. Prasad, Satya Prakashan, Tech India Publications, New Delhi, 2001.
3. Antennas and Wave Propagation by SisirK.Das and Annapurna Das – TataMcGraw Hill
4. Electronic and Radio Engineering by F.E. Terman, McGraw-Hill, 4th Edition, 1955.
5. Antennas – John D. Kraus, McGraw-Hill, 2nd Edition, 1988.

V- Sem.	Electronic Switching Systems Professional Elective-1	Course Code: V18ECT14	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO-1: Explain functioning of Manual and cross bar automatic switching systems **(K2)**

CO-2: Explain the stored program control concept involved in electronic switching systems. **(K2)**

CO-3: Describe the inherent facilities with time division switching, Combinational switching. **(K2)**

CO-4: Analyze the various CCITT signaling models, Various Plans. **(K4)**

CO-5: Investigate the methods of collecting& measuring traffic data. **(K3)**

CO-6: Explain the architecture and services of ISDN. **(K2)**

UNIT -I:

Introduction: Evolution of Telecommunications, Simple Telephone Communication, Basics of Switching System, Manual Switching System, Major Telecommunication Networks.

Crossbar Switching: Principles of Common Control, Touch Tone Dial Telephone, Principles of Crossbar Switching, Crossbar Switch Configurations, Cross point Technology, Crossbar Exchange Organization.

UNIT -II:

Electronic Space Division Switching: Stored Program Control, Centralized SPC: Standby mode, Synchronous duplex mode, Distributed SPC, Software Architecture, Application Software, Enhanced Services, Two-Stage Networks, Three-Stage Networks, n- Stage Networks.

UNIT -III

Time Division Switching: Basic Time Division Space Switching, Basic Time Division Time Switching, Generalized time division Space switch, Basic Time division time switching: modes of operation, simple problems, Time Multiplexed Space Switching, Time Multiplexed Time division space Switch, Time Multiplexed Time Switching, Combination Switching: Time Space (TS) Switching, Space-time (ST) Switching

UNIT IV

Telephone Networks: Subscriber Loop System, Switching Hierarchy and Routing, Transmission Plan, Transmission Systems, Numbering Plan, Charging Plan, Signaling Techniques, In-channel

Signaling, Common Channel Signaling, CCITT Signaling System no.6.**Packet Switching: C**oncepts of Packet switching, Local- Area and Wide- Area Networks, Large-scale Networks.

UNIT -V:

Switching Networks: Single- Stage Networks, Grading, Link Systems, and Grades of service of link systems, Application of Graph Theory to link Systems, Use of Expansion, and Call Packing.

Telecommunications Traffic: The Unit of Traffic, Congestion, Traffic Measurement, A Mathematical Model, Lost-call Systems, Queuing Systems.

UNIT -VI:

Integrated Services Digital Network: Motivation for ISDN, New Services, Network and Protocol Architecture, Transmission Channels, User- Network Interfaces, Service Characterization, Interworking, ISDN Standards, Expert Systems in ISDN, Broadband ISDN, and Voice Data Integration.

Text Books:

1. Telecommunication Switching Systems and Networks by Thiagarajan Viswanathan, 2000, PHI.
2. Telecommunications Switching, Traffic and Networks by J. E. Flood, 2006, Pearson Education.

References:

1. Digital Telephony by J. Bellamy, 2nd Edition, 2001, John Wiley.
2. Data Communications and Networks by Achyut S. Godbole, 2004, TMH.
3. Principles of Communication Systems by H. Taub& D. Schilling, 2nd Edition, 2003, TMH.
4. Data Communication & Networking by B. A. Forouzan, 3rd Edition, 2004, TMH.
5. Telecommunication System Engineering by Roger L. Freeman, 4th Ed., Wiley-Inter Science, John Wiley & Sons, 2004.

V-Sem.	Engineer and Society	Course Code: V18ECT15	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO-1: Comprehend different moral perspect ivesan done's own Ethical standards. **(K2)**

CO-2: Understand the concept of safety and risk. **(K2)**

CO-3: Explain different initiativest oprotectnature.**(K2)**

CO-4: Identify the role of Information Technology.**(K2)**

CO-5: Understand different types of infringement of Intellectual Property Rights.**(K2)**

CO-6: Understand the importance of Entrepreneurship. **(K2)**

UNIT–I: Human Values

What is engineering – who is an engineer - Morals, Values and Ethics – Integrity

– Work Ethics – Service Learning – Civic Virtue -Value time – Co-operation – Commitment – Empathy–Self-confidence –Character.

UNIT–II: Engineer's Responsibilities and Rights

Safety and risk –Types of risks – Voluntary vs. Involuntary risk –Short Term vs. LongTermConsequences–ExpectedProbability–ReversibleEffects–Threshold Levels for Risk – Delayed vs. Immediate Risk – Collegiality – Techniques for achievingCollegiality-TwosensesofLoyalty–Rights–ProfessionalResponsibilities

– Confidential and Proprietary information.

UNIT–III: Global climatic issues and mitigation strategies

Greenhouse effect –global warming – acid rain – ozone layer depletion – International efforts-key initiatives of Montreal protocol, Rio declaration, Kyoto protocol, Johannesburg summit.

UNIT–IV: Future challenges to society

Sustainable development – Measures for sustainable development – Water conservation practices–Rain water harvesting methods-Water shed management Resettlements and Rehabilitation of people-waste and reclamation–Role of informationtechnology-Roleofanengineerinmitigatingsocietalproblems.

UNIT –V: Patent law, Trade Marks and Copyrights

Introduction, Types of IPR – Patent requirements - Application process

– Ownership–Transfer–Infringement–Litigation.

Trade Mark and Copyrights: Introduction – Registration Process – Transfer – Infringement.

UNIT–VI: Entrepreneurship

Meaning, definition& concept of Entrepreneurship, characteristics &skills of entrepreneur, Role of an entrepreneur in economic development.

Text Books

1. Professional ethics and human values by Ddharani kota Suyodana, Maruti publications (unit1,2).
2. Environmental studies" by Deeksha Dave, P. Udaya Bhaskar, Cengage Learning.(unit3,4).

Reference Books

1. Professional Ethics and Human Values, by A. Alavudeen, R. Kalil Rahman and M. Jayakumaran- University Science Press.
2. Environmental Studies by R.Rajagopalan 2nd Edition 2011, Oxford University Press.
3. Intellectual Property Rights by R.Radha Krishnan, S.Balasubramanian Excel Books, NewDelhi.
4. Intellectual Property Rights by PrabhuddhaGanguli. Tata McGrawHill, New Delhi.
5. Fundamentals of Entrepreneurship by PH.Nandan, PHILearning, NewDelhi.

V Sem.	**Data Structures and Algorithms Lab**	**Course Code:V18CSL34**	**L**	**T**	**P**	**C**
			0	**0**	**2**	**1**

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Construct Sorting and searching methods. **(K3)**
CO2: Construct hash table **(K3)**
CO3: Implement programs using Singly Linked Lists, Double Linked List. **(K3)**
CO3: Construct Basic Data Structures, Stacks, Queues and Applications. **(K3)**
CO4: construct Binary search tree **(K3)**
CO5: Implement various graph operations and shortest path algorithm. **(K3)**

List of Experiments

1. Programs to implement the following sorting techniques Selection sort, Quick sort, Merge sort
2. Programs to implement the following searching methods
   (a)Linear search (b) Binary search.
3. A Program to Implement hash table and its operations.(Note: Use at least one collision resolution technique)
4. A Program to implement addition of two polynomials. (Using arrays).
5. A Program to implement single linked list and its operations. (create, insert, delete, display, reverse list)
6. A Program to implement double linked list and its operations.
7. A Program to implement stack operations using arrays.
8. A Program to implement queue operations using arrays.
9. A Program to convert infix expression to postfix expression.
10. A Program to implement Binary search Tree and its operations.
11. A Program to implement graph traversal algorithms (BFS & DFS).
12. A Program to implement minimum spanning tree algorithms (Prims & Krushkal)
13. A Program to implement single source shortest path algorithm.

TEXT BOOKS:

1. Data Structures, algorithms and applications in C++, SartajSahni, Universities press, Second Edition.
2. Fundamentals of Data Structures in C++, Ellis Horowitz, SartajSahni and Dinesh Mehta, 2nd Edition, Universities Press (India) Pvt. Ltd.

REFERENCE BOOKS:

1. An Introduction to Data Structures with Application, Jean-Paul Tremblay , Paul Sorenson, Second Edition.

2. Fundamentals of Data Structures and algorithms by C V Sastry, RakeshNayak, Ch. Raja Ramesh, IK Publications, new Delhi.
3. Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.
4. Problem solving with C++, The OOP, Fourth edition, W.Savitch, Pearson education.

V Sem.	Microprocessor &Microcontrollers Lab	Course Code:V18ECL07	L	T	P	C
			0	0	2	1

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO-1: Develop algorithm and logic for different operations using 8086 Instructions. **(K3)**
CO-2: Construct simple programs for 8086 using Assembler directives (MASM)/Machine control Instructions. . **(K3)**
CO-3: Develop ALP to perform arithmetic and logical operations using various instructions. **(K3)**
CO-4: Develop ALP to perform conversions, finding squares of a numbers by using Loop, Jump instructions. . **(K3)**
CO-5: Develop Assembly language programs for 8051 Micro controller . **(K3)**

CO-6: Perform some applications using ARDUINO BOARD **(K3)**

LIST OF EXPERIMENTS

PART- A:
8086 Assembly Language Programming using Assembler Directives
Introduction to MASM/TASM
1. Basic Arithmetical operations –Unsigned Addition, Subtraction, Multiplication and Division. (Machine programming and Assembler programs)
2. Multi byte addition/subtraction
3. Sorting of given array of elements (Ascending order /descending order)
4. Sum of squares/cubes of a given n-numbers
5. Shift and rotate operations for given number.

PART- B: 8051 Assembly Language Programming
6. Write an Assembly Language program to find average of n numbers by 8051 microcontroller.
7.Write an Assembly Language program to find the no of 1's and 0's in a given number by 8051 Microcontroller.
8. Write an Assembly Language program to interface stepper motor to 8051 microcontroller(Both directions)

PART C: ARDUINO programming:

9. Blinking a LED using ARDUINO board and provide some delay.
10. Interfacing different sensors to ARDUINO board and observe their operation. 11. 2 to 3 week Mini Project

Requirements:

PC installed with TASM/MASM, Keil Micro vision
Regulated power supplies (12v)
Interfacing modules (Study Cards),
FRC, USB (RS232) Cables.
ARDUINO Boards.

V Sem.	VLSI Design lab	Course Code:V18ECL08	L	T	P	C
			0	0	2	1

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO-1: Explain the VLSI Design Methodologies using Mentor Graphics Tools **(K2)**
CO-2: Demonstrate significance of various CMOS Analog and Digital circuits in Full-custom IC Design flow **(K2)**

CO-3: Explain the Physical Verification in Layout Design **(K2)**

CO-4: Design and analyze of Analog and mixed signal simulation **(K2)**
CO-5: Analyze the Significance of Pre-Layout Simulation and Post-Layout Simulation. **(K2)**

PART-A

List of Experiments:

Design the following experiments using 130nm CMOS technology and extract parasitics.

1. CMOS Inverter
2. Universal Logic gates
3. Full Adder
4. RS-Latch & D- latch
5. JK-Flip Flop
6. Ripple Carry Adder
7. Asynchronous Counter
8. Ring Oscillator
9. R-2R Ladder Type DAC
10. Differential Amplifier
11. 2-3 week Mini Project.

Lab Requirements:

Software:

Mentor Graphics – Pyxis Schematic, IC Station, Calibre, ELDO Simulator

VI- SemesterSyllabus

VI Sem.	Computer Networks	Course Code: V18CST11	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Discuss fundamentals of network concepts and Reference Models. **(K2)**

CO2: Discuss Communication media and switching techniques. **(K2)**

CO3: Demonstrate Error control and protocols. **(K3)**

CO4: Apply Routing algorithms and congestion control algorithms. **(K3)**

CO5: Discuss Transport layer services and protocols. **(K2)**

CO6: Describe Application layer protocols. **(K2)**

UNIT-I: Introduction: Reference models: The OSI Reference Model- the TCP/IP Reference Model, Examples of Networks: Novell Networks, Arpanet, Internet, Network Topologies WAN, LAN, MAN.

UNIT– II: Physical Layer: Transmission Media, Multiplexing: FDM, WDM and TDM- LAN Technologies, introduction to switching: Circuit Switched Networks, Datagram Networks, and Virtual Circuit Networks.

UNIT–III: Data link layer: Design issues, Framing, Flow control, error control, error detection and correction, CRC, Checksum: idea, one's complement internet checksum, MAC: ALOHA, CSMA. Elementary Data Link Layer protocols: simplex protocol, Simplex stop and wait, Simplex protocol for Noisy Channel. Sliding window protocol: One bit, go back N, Selective repeat-Stop and wait protocol, HDLC, point to point protocol (PPP).Piggybacking.

UNIT-IV : Network Layer : Network layer design issues- Algorithm shortest path routing, Flooding, Hierarchical routing, Broad cast, Multi cast Routing algorithms-Congestion control and algorithms, Internet Protocol (IP) Addresses, Subnet masking

UNIT–V :Transport Layer: Services, Primitives and sockets, Elements of transport protocols, Internet Transport protocols(TCP,UDP,RPC,RTTP/RTP,RTCP) Segment headers, Primitives, Control, Congestion control, Quality of Service, QoS improving techniques: Leaky Bucket and Token Bucket algorithm.

UNIT–VI: Application Layer: DNS, SMTP, POP, And FTP HTTP Presentation formatting. Network security: Introduction to Cryptography, Authentication, Basics of Public key and private key cryptography, digital signatures and certificates firewalls and wireless security.

TEXT BOOKS:

1. Computer Networks by Andrew S Tanenbaum, 4th Edition. Pearson Education/PHI
2. Data Communications and Networks by Behrouz A. Forouzan.Third Edition TMH

REFERENCES:

1. An Engineering Approach to Computer Networks by S.Keshav, 2nd Edition, Pearson Education
2. Understanding Communications and Networks, 3rd Edition by W.A. Shay, Thomson

VI Sem.	Digital Signal Processing	Course Code: V18ECT16	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO-1: Classify Discrete Time Signals, systems, estimate the response of various Systems **(K2)**

CO-2: Compute DFT for discrete time signals using FFT Algorithm **(K3)**

CO-3: Describe the various implementations of digital filter structures **(K2)**

CO-4: Analyze and design a Digital filter (FIR&IIR) from the given specifications **(K4)**

CO-5: Use the Multi-rate Processing concepts in various applications. **(K2)**

CO-6: Describe the concepts of DSP Processor. **(K3)**

UNIT I INTRODUCTION: Review of Signals and systems, Digital Signal Processing: Discrete time signals & sequences, Classification of Discrete time Systems, stability of LTI systems. Response of LTI systems to arbitrary inputs. Solution of Linear constant coefficient difference equations. Frequency domain representation of discrete time signals and systems.

UNIT II DISCRETE FOURIER TRANSFORMS: Introduction to DTFT**,** Discrete Fourier transforms, Properties of DFT, Introduction to Fast Fourier transforms (FFT) - Radix-2 decimation in time and decimation in frequency FFT Algorithms, Inverse FFT.

UNIT III REALIZATION OF DIGITAL FILTER: Review of Z-transform, digital filters, Block diagram representation of linear constant coefficient difference equations, Basic structures of IIR systems, Transposed forms. Basic structures of FIR systems.

UNIT IV DESIGN OF IIR and FIR DIGITAL FILTERS: Analog filter approximations – Butterworth and Chebyshev, Design of IIR Digital filters from Analog filters, Characteristics of FIR Digital Filters, frequency response. Design of FIR Digital Filters using Window Techniques and Frequency Sampling technique, Comparison of IIR & FIR filters.

UNIT V MULTIRATE DIGITAL SIGNAL PROCESSING: Introduction, Decimation, Interpolation Sampling rate conversion, Implementation of sampling rate converters**,** Applications – Sub-band Coding of Speech Signals.

UNIT VI INTRODUCTION TO DSP PROCESSORS: Introduction to programmable DSPs, Multiplier and Multiplier Accumulator, Modified bus structures and memory access schemes in P-DSPs, Multiple Access Memory, Multi ported memory, VLIW architecture, Pipelining, Special addressing modes, On-Chip Peripherals. Introduction to Software Defined Radio.

TEXT BOOKS:

1. Digital Signal Processing, Principles, Algorithms, and Applications by John G. Proakis, Dimitris G.Manolakis,Pearson Education / PHI, 2007.
2. Discrete Time Signal Processing by A.V.Oppenheim and R.W. Schaffer, PHI

Reference Books:

1. Digital Signal Processing by Andreas Antoniou, TATA McGraw Hill , 2006
2. Digital Signal Processing by MH Hayes, Schaum's Outlines, TATA Mc-Graw Hill, 2007.
3. Digital Signal Processing by Alan V. Oppenheim, Ronald W. Schafer, PHI Ed., 2006
4. Digital Signal Processing by Ramesh babu, Sci Tech publications
5. Digital Signal Processing by A.NagoorKani, RBA Publications.

VI Sem.	**Embedded Systems-1**	**Course Code: V18ECT17**	**L**	**T**	**P**	**C**
			3	**0**	**0**	**3**

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO-1: Describe the Basic Concepts of embedded systems- **(K2).**

CO-2: Describe the characteristics of Application & Domain-Specific Embedded Systems -**(K2)**.

CO-3: Discuss various hardware, software design approaches in embedded environment- **(K2)**

CO-4: Develop programming and interfacing of 8051 using development tools –**(K3)**

CO-5: Explain the fundamental concepts of ARM Architecture. **(K2)**

CO-6: Develop ALP programs using ARM/Thumb instruction set. **(K3)**

UNIT I - INTRODUCTION TO EMBEDDED SYSTEMS

Embedded system-Definition, history of embedded systems, classification of embedded systems, major application areas, purpose of embedded systems, typical embedded system-core of the embedded system, Memory, Sensors and Actuators, Communication Interface, embedded firmware.

UNIT II: APPLICATION AND DOMAIN-SPECIFIC EMBEDDED SYSTEMS

Characteristics of an embedded system, Quality attributes of embedded systems, Application-specific and Domain-Specific examples of an embedded system.

UNIT-III: EMBEDDED HARDWARE / FIRMWARE DESIGN:

Analog and digital electronic components, I/O types and examples, Serial communication devices, Wireless devices**,** Embedded Firmware design approaches, Embedded Firmware development languages, DMA, Concepts of C versus Embedded C and Compiler versus Cross-compiler.

UNIT IV- PROGRAMMING AND INTERFACING OF 8051

Interfacing: LEDs & switches interfacing, keypad is interfacing, Seven Segment Display interfacing, 16X2 LCD interfacing, stepper motor interfacing, serial port interfacing using Embedded C.

UNIT – V: ARM ARCHITECTURE

ARM Design Philosophy, ARM Core Data Flow Model, Registers, PSR, Pipeline, Interrupts and Vector Table, Architecture Revision, ARM Processor Families.

UNIT – VI: ARM PROGRAMMING MODEL

Instruction Set: Data Processing Instructions, Branch, Load, Store Instructions, PSR Instructions, Conditional Instructions.

Thumb Instruction Set: Register Usage, Other Branch Instructions, Data Processing Instructions, Single-Register and Multi Register Load-Store Instructions, Stack, Software Interrupt Instructions

Text Books:

1. "Embedded systems" by Shibu K.V Tata McGraw Hill Education Pvt. Ltd.2013
2. "Microcontrollers: Theory and Applications" by AJAY V Deshmukh TATA McGraw Hill publications2012
3. "ARM System Developer's Guide – Designing and Optimizing System Software" by Andrew Sloss, Dominic Symes, Chris Wright, , ELSEVIER

References:

1. "The8051Microcontroller:Architecture,Programming,andApplications" by Kenneth J.Ayala, West Publishing
2. "8051Microcontrollers&EmbeddedSystems" by Muhammad Ali Mazdi Pearson Education
3. "ARM System on chip Architecture" by Steve Furber 2nd Edition | Pearson

VI Sem.	Microwave Engineering Professional Elective- II	Course Code: V18ECT18	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO 1 : Derive TE/TM modes in Rectangular waveguide and characteristics.**(K4)**
CO 2 : Illustrate the construction, operation and, Derive Power output and efficiency of Two cavity Klystron and Reflex klystron**(K4)**
CO 3: Illustrate the construction and operation of Travelling wave tube, cylindrical cavity magnetron and derive Hull cut off condition **(K4)**
CO 4: Explain operation of various passive waveguide components and calculate Scattering matrix for them **(K3)**
CO 5; Explain the operation of Microwave Solid State Devices and Understand basics of Microwave Integrated circuits and Materials for MIC**(K2)**
CO 6: Explain the procedure for measuring various microwave parameters using a Microwave test bench **(K2)**

UNIT I
MICROWAVE TRANSMISSION LINES: Introduction, Microwave Spectrum and Bands, Applications of Microwaves. Rectangular Waveguides(RWG) – Solution of TE and TM wave equation in RWG- Characteristic Equation and Cut-off Frequencies, Filter Characteristics, Dominant and Degenerate Modes, Mode Characteristics – Phase and Group Velocities, Wavelengths and Impedance Relation & Characteristics - Cavity resonators – Rectangular cavity resonator – Dominant mode – Resonant frequency – related problems.

UNIT II
MICROWAVE TUBES (O type) : Limitations and Losses of conventional tubes at microwave frequencies. Re-entrant Cavities, Microwave tubes – O type and M type classifications. O-type tubes :2 Cavity Klystrons – Structure, Velocity Modulation Process and Applegate Diagram, Bunching Process and Small Signal Theory –Expressions for o/p Power and Efficiency, Applications, Reflex Klystrons – Structure, Applegate Diagram and Principle of working,
Bunching Process, Power Output, Efficiency, Applications, Related Problems.

UNIT III
HELIX TWTS: Significance, Types and Characteristics of Slow Wave Structures; Structure of TWT and Suppression of Oscillations, Nature of the four Propagation Constants(Qualitative treatment).**M-type Tubes** Introduction, Cross-field effects, Magnetrons – Different Types, 8-Cavity Cylindrical Travelling Wave Magnetron –Hull Cut-off Condition, Modes of Resonance and PI-Mode Operation, Separation of PI-Mode, o/p characteristics.

UNIT IV MICROWAVE PASSIVE COMPONENTS : Waveguide Attenuators- Waveguide phase shifters - Scattering Matrix-Significance, Formulation and Properties-Directional coupler –Magic Tee- operation and Scattering Matrix Calculation of E plane Tee, H plane Tee and Magic Tee and Directional coupler - Ferrite Components- Faraday rotation - Gyrator -Isolator and Circulator

UNIT V

MICROWAVE SOLID STATE DEVICES: TEDs – Introduction, Gunn Diode – Principle, RWH Theory, Characteristics, Basic Modes of Operation, Oscillation Modes - Avalanche Transit Time Devices – IMPATT Diodes – Principle of Operation and characteristics, Detector Diode, PIN Diode applications, Introduction to MMIC- Monolithic Microwave Integrated circuits – Materials - Related Problems.

UNIT VI

MICROWAVE MEASUREMENTS: Description of Microwave Bench – Different Blocks and their Features, Precautions; Microwave Power Measurement – Bolometer Method. Measurement of Attenuation, Frequency, VSWR, Impedance, Measurement of Dielectric constant

TEXT BOOKS:

1. Microwave Devices and Circuits by Samuel Y. Liao, PHI, 3rd Edition,1994.
2. Foundations for Microwave Engineering by R.E. Collin, IEEE Press, John Wiley, 2nd Edition, 2002.
3. “Microwave Engineering” by David M. Pozar , Fourth Edition, Wiley, India 2012.

REFERENCES:

1. Microwave Principles by Herbert J. Reich, J.G. Skalnik, P.F. Ordung and H.L. Krauss, CBS Publishers and Distributors, New Delhi, 2004
2. Microwave Engineering by Annapurna Das and Sisir K.Das, Mc Graw Hill Education, 3rd Edition.
3. Microwave and Radar Engineering by M. Kulkarni, Umesh Publications, 3rd Edition.
4. Microwave Engineering by G S N Raju , I K International
5. Microwave and Radar Engineering by G Sasibhushana Rao Pearson

VI Sem.	CMOS Digital IC Design Professional Elective- II	Course Code: V18ECT19	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO- 1: Understand the concepts of NMOS and Pseudo NMOS designs. **(K2)**

CO- 2: Describe the combinational MOS Logic Circuits, **(K2)**

CO- 3: Explain the Principle and Performance of dynamic CMOS Circuits **(K2)**

CO-4: Apply the concepts of Combinational MOS Logic Circuits in Designing the Transmission Gates **(K2)**

CO- 5: Demonstrate the behavior of Bi-stable Elements and Flip flops**(K2)**

CO- 6: Calculate Leakage Currents in various semiconductor memories. **(K2)**

UNIT-I: MOS Design

NMOS & Pseudo NMOS Logic – Inverter, Inverter threshold voltage, Output high voltage, Output Low Voltage, Gain at gate threshold voltage, Transient response, Rise time, Fall time; CMOS logic - Inverter, logic gates.

UNIT-II: Combinational MOS Logic Circuits:-**I**

MOS logic circuits with NMOS loads, Primitive CMOS logic gates – NOR & NAND gate, Complex Logic circuits design – Realizing Boolean expressions using NMOS gates and CMOS gates,

UNIT-III: Combinational MOS Logic Circuits-II:

AOI and OIA gates, CMOS full adder, CMOS transmission gates, Designing with Transmission gates.

UNIT-IV: Sequential MOS Logic Circuits

Behavior of bitable elements, Latch, Clocked latch and flip flop circuits, CMOS D latch and edge triggered flip-flop.

UNIT-V: Dynamic Logic Circuits

Basic principle, Voltage Bootstrapping, Synchronous dynamic pass transistor circuits, Dynamic CMOS transmission gate logic, High performance Dynamic CMOS circuits – Domino logic, NORA logic.

UNIT-VI: Semiconductor Memories

Types, RAM array organization, DRAM – Types, Operation, Leakage currents in DRAM cell and refresh operation, SRAM operation Leakage currents in SRAM cells, Flash Memory- NOR flash and NAND flash.

TEXT BOOKS:

1. Digital Integrated Circuit Design by Ken Martin, Oxford University Press, 2011.

2. CMOS Digital Integrated Circuits Analysis and Design by Sung-Mo Kang, Yusuf Leblebici, TMH, 3rd Ed., 2011.

REFERENCE BOOKS:

1. Introduction to VLSI Systems: A Logic, Circuit and System Perspective by Ming-BO Lin,CRC Press, 2011

2. Digital Integrated Circuits – A Design Perspective, by Jan M. Rabaey, Anantha Chandrakasan, BorivojeNikolic, 2nd Ed., PHI.

VI Sem.	Digital signal Processing Lab	Course Code: V18ECL09	L	T	P	C
			0	0	2	1

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO-1: Design and simulate Digital IIR and FIR filter **(K3)**

CO-2: Develop and simulate Interpolator and Decimator **(K3)**

CO-3: Apply DSP algorithms for audio applications **(K3)**

CO-4: Apply DSP algorithms on a DSP processor for real time applications **(K3)**

List of Experiments:

PART - A

1. Convolution

(a)To perform linear convolution of two signals

(b)To perform circular convolution of two signals

2.Discrete Fourier Transform and Fast Fourier Transform

(a)To obtain a N-point DFT of a signal using recursive algorithm.

(b)To determine the FFT of a 1-D signal.

3. Digital IIR Filter Design

To design and simulate Infinite Impulse Response (IIR) filters and analyze their Responses

4. Digital FIR Filter Design

To design and simulate Finite Impulse Response (FIR) filters and analyze their Responses

5. Interpolator and Decimator Design

To design and simulate an Interpolator and Decimator.

6. Audio application

(a)Read a .wav file and plot time domain waveform of a speech signal (b)Read a .wav file and Plot spectrograms with different window sizes and shapes

List of Experiments using CC Studio:

PART – B

TMS320C6713 Architecture

To study the architecture of TMS320C6713 DSP processor.

9. **Fast Fourier Transform**

To determine the FFT of a 1-D signal

10. **Digital IIR Filter Design**

To design Infinite Impulse Response (IIR) filters and analyze their responses in real time.

11. **Digital FIR Filter Design**

To design Finite Impulse Response (FIR) filters and analyze their responses in real time.

10.Power Spectral Density

To obtain the Power Spectral Density of a periodic signal in real time.

11 2 to3 week Mini Project.

VI Sem.	Computer Networks Lab	Course Code: V18CSL35	L	T	P	C
			0	0	3	1.5

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Implement Error detection techniques **[K3]**

CO2: Implement Routing Algorithms **[K3]**

CO3: Implement Congestion Algorithms **[K3]**

CO4:Implement Sliding Window Algorithms. **[K3]**

CO5: Implement socket programming **[K3]**

List of Experiments:

From 1-4 simulation and 5-11 implement using C/C++/Java/Python

1. Study of basic network commands and Network configuration commands.
2. Implementation of Bit Stuffing
3. Implementation of Character Stuffing
4. Implementation of Dijkstra's algorithm
5. Implementation Distance vector algorithm
6. Construct Detecting error using CRC-CCITT
7. Implementation of stop and wait protocol
8. Implementation of Congestion control using leaky bucket algorithms
9. Implementation using Socket TCP both client and server programs.
10. Implementation using Socket UDP both client and server programs

TEXT BOOKS:

1. Computer Networks — Andrew S Tanenbaum, 4th Edition. Pearson Education/PHI
2. Data Communications and Networks – Behrouz A. Forouzan.Third Edition TMH

REFERENCES:

1. An Engineering Approach to Computer Networks by S.Keshav, 2nd Edition, Pearson Education
2. Understanding communications and Networks by 3rd Edition, W.A. Shay, Thomson

Annexure-ECE-III

VI Sem.	Internet of Things Open Elective- I	Course Code: V18ECTOE1	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO- 1: Describe M2M and IOT Technologies. **(K2)**

CO- 2: Identify the layers and protocols in IOT. **(K2)**

CO- 3: Describe various communication technologies used in IOT. **(K2)**

CO- 4: Demonstrate various hardware components required for IOT applications. **(K2)**

CO- 5: Identify the cloud technologies. **(K2)**

CO- 6: Explain the applications of IoT. **(K2)**

UNIT I – INTRODUCTION

Introduction from M2M to IoT - An Architectural Overview, building architecture, Main design principles and needed capabilities, An IoT architecture outline, M2M and IoT Technology Fundamentals - Devices and gateways

UNIT II – IOT PROTOCOLS

Functionality of Layers in IoT –Study of protocols - Wireless HART, Z-Wave, 6LoWPAN, RPL, CoAP, MQTT.

UNIT III - COMMUNICATION TECHNOLOGIES IN IOT

IoT Connectivity – IEEE 802.15.4, Wi-Fi, Bluetooth, Zigbee, LPWAN, 5G Era.

UNIT IV - SYSTEM HARDWARE

Sensors, Actuators, Radio Frequency Identification, Introduction to Embedded Devices for IoT - RASPBERRY PI.

UNIT V – Cloud Computing

Data Collection, Storage and Computing Using a Cloud Platform for IoT Applications/Services.

UNIT VI - IOT APPLICATIONS

Real time applications of IoT - Smart and Connected Cities,Public Safety, Irrigation.

TEXTBOOKS:

1. "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1st Edition, by Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, StamatisKarnouskos, DavidBoyle, Academic Press, 2014.

2. IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things by David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry, Cisco Press 800 East 96th Street Indianapolis, Indiana 46240 USA.

REFERENCE BOOKS:

1.From Internet of Things to Smart Cities: Enabling Technologies - edited by Hongjian Sun, Chao Wang, Bashar I. Ahmad, CRC Press -2018.

2. "Architecting the Internet of Things" by Bernd Scholz-Reiter, Florian Michahelles, , ISBN 978-3-642-19156-5 e-ISBN 978-3-642-19157-2, Springer.

3.IOT (Internet of Things) Programming: A Simple and Fast Way of Learning IOT by DavidEtter.

4. "Internet of Things (A Hands-on- Approach)" by Vijay Madisetti and ArshdeepBahga, 1 stEdition, VPT, 2014.

5. Internet of Things by Raj Kamal, McGraw-Hill Education. Copyright.

VI Sem.	Principles of Communication Systems (Open Elective- I)	Course Code: V18ECTOE2	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO-1: Demonstrate the fundamentals of communication systems **(K2)**

CO-2: Compare the various analog modulation and demodulation schemes **(K2)**

CO-3: Compare the various digital modulation and demodulation schemes **(K2)**

CO4: Explain the wireless communication system concepts**(K2)**

CO-5: outline the satellite communication system principles **(K2)**

CO-6: outline the Optical communication system principles **(K2)**

Unit-I

Fundamentals of Communication systems: Block diagram of communication system; types of communications-analog and digital; Noise–types of noise, sources of noise, and calculation of noise in linear systems, and noise figure.

Unit-II

Fundamentals of Analog Communication: Need for modulation; Types of modulation, generation and detection of AM, Angle modulation: frequency & phase modulations, comparison of AM, FM & PM. Sampling theorem, NY Quist criteria, introduction to PAM, PWM and PPM.

Unit-III

Fundamentals of Digital Communication: Advantages; Working principle of PCM; comparison of PCM, DM; introduction to digital modulation techniques-ASK, FSK, PSK.

UNIT-IV:

Fundamentals of Wireless Communication : Evolution of mobile communications, Mobile Radio System around the world, Types of Wireless communication System, Comparison of Common wireless system, Concepts of 2G, 3G, 4G. Wireless Local Loop(WLL),Wireless Local Area network(WLAN), Bluetooth and Personal Area Networks. Introduction to 5G.

Unit-V

Fundamentals of Satellite communication: Brief history of Satellite systems; Principles, architecture, advantages, disadvantages, applications and frequency bands used for satellite communication.

UNIT VI:

Fundamentals of Optical Communication: Evolution of fiber optic system- Element of an Optical Fiber Transmission link and Reception link- Total internal reflection-Acceptance angle – Numerical aperture Optical Fiber Modes and Configurations - Linearly Polarized Modes -Single Mode Fibers-Graded Index fiber structure.

Textbooks:

1. Principles of Communications by H. Taub and D. Schilling, TMH, 2003.
2. Wireless Networks: Applications and Protocols by T. S. Rappaport, Pearson Education
3. Satellite Communications by Timothy Pratt, Charles Bostian and Jeremy Allnutt, WSE, Wiley Publications, 2nd Edition, 2003.
4. Optical Fiber Communication by John M. Senior (Pearson)

References:

1. Electronic Communication Systems by Kennedy and Davis, TMH, 4th edition, 2004.
2. Wireless Communication and Networks: 3G and Beyond by I. Saha Misra, TMH Education.
3. Satellite Communications: Design Principles by M. Richharia, B S publications, 2nd Edition, 2003.
4. Optical Fibre Communication by Gerd Kaiser (TMH)

VI Sem.	**Introduction to VLSI Design (Open Elective- I)**	**Course Code: V18ECTOE3**	**L**	**T**	**P**	**C**
			3	**0**	**0**	**3**

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Demonstrate the fundamentals of IC technology such as various MOS fabrication technologies**.** **(K2)**

CO2: Compute electrical properties of MOS circuits such as Ids – Vds relationship, And MOS circuit parameters **(K3)**

CO3: Develop stick diagrams, layouts using design rules of various MOS Technologies**. (K3)**

CO4: Compute the sheet resistance, area capacitance of various MOS layers And inverter delays.**(K3)**

CO5: Explain the various MOS circuit parameters scaling and assess the Effects ofscaling.**(K2)**

CO6: Demonstrate VHDL synthesis, simulation, design capture tools design Verification tools.**(K2)**

UNIT –I Introduction

Introduction to IC technology – The IC era – MOS and related VLSI technology – Basic MOS transistors – Enhancement and depletion modes of transistor action – IC production process – MOS and CMOS fabrication process – BiCMOS technology – Comparison between CMOS and bipolar technologies.

UNIT – II

Basic electrical properties of MOS and BiCMOS circuits I_{ds}–V_{ds} relationships – Aspects of MOS transistor threshold voltage – MOS Trans–conductance and output conductance – MOS Transistor – Figure of merit – The pMOS transistor – The nMOS inverter – Determination of pull– up to pull–down ratio for nMOS inverter driven by another nMOS inverter for an nMOS inverter driven through one or more pass Transistors – Alternative forms of pull up – The CMOS Inverter MOS transistor Circuit model – Bi–CMOS Inverters.

UNIT – III

MOS and BiCMOS circuit design process

MOS layers – Stick diagrams – Design rules and layout – General observation on the design rules, 2m double metal, double poly – CMOS/BiCMOS rules, 1.2m Double metal, Double poly CMOS rules – Layout diagrams of NAND and NOR gates and CMOS inverter – Symbolic Diagrams – Translation to MaskForm.

UNIT – IV

Basic circuit concepts

Sheet resistance – Sheet resistance concept applied to MOS transistor and inverters – Area capacitance of layers – Standard unit of capacitance – Some area capacitance calculations – The delay unit – Inverter delays – Driving large capacitive loads – Propagations Delays – Wiring Capacitance – Fan–in and Fan–out characteristics – Choice of layers – Transistor switches – Realization of gates using nMOS, pMOS and CMOS technologies.

UNIT – V

Scaling of MOS circuit

Scaling models and scaling factors – Scaling factors for device parameters – Limitations of scaling – Limits due to sub threshold currents – Limits on logic level and supply voltage due to noise – Limits due to current density.

UNIT – VI :VHDL MODELLING:

Simulation – Logic Synthesis – Inside a logic synthesizer – Constraints – Technology libraries – VHDL and logic synthesis – Functional gate – Level verification – Place and route – Post layout timing simulation – Static timing

– Major net list formats for design representation – VHDL synthesis – Programming approach.

Text Books:

1. Essentials of VLSI Circuits and Systems by Kamran Eshraghian, Douglas and A.Pucknell and SholehEshraghian, Prentice–Hall of India Private Limited, 2005Edition.
2. VLSI Design by K. LalKishor and V.S.V.Prabhakar, I.K. International Publishing House Private Limited, 2009 First Edition.
3. VLSI Design by A.Shanthi and A.Kavitha, New Age International Private Limited, 2006 FirstEdition.

References Books:

1. VLSI Design By Debaprasad Das, Oxford University Press, 2010.
2. VLSI Design By A.Albert Raj & T. Latha, PHI Learning Private Limited, 2010.

Annexure-ECE-IV

VI Sem.	Fundamentals of Microprocessors & Microcontrollers (Offered by ECE to EEE)	Course Code: V18ECT 23	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO-1: Describe the basic architecture of 8086 microprocessor along with signal Descriptions modes of operation ,stack structure and interrupt responses**(K2).**

CO-2: Construct assembly language programs using the concepts of addressing Modes and instructions with a programming tool- **(K3).**

CO-3: Demonstrate interfacing of 8086 with memory and programmable peripheral Devices- **(K3).**

CO-4: Examine the Architecture and operation of 8051 Microcontrollers, timers and ports **(K2)**

CO-5: Explain about PIC Microcontrollers with their architecture - **(K2).**

CO-6: Describe the Data types, I/O programming, logical operations, data conversion **(K2)**

UNIT–I: Introduction to Microprocessor Architecture

Introduction and evolution of Microprocessors– Architecture of 8086–Register Organization of 8086–Memory organization of 8086– General bus operation of 8086–Introduction to 80286–80386 and 80486 and Pentium.

UNIT–II: Minimum and Maximum Mode Operations

Instruction set, Addressing modes– Minimum and Maximum mode operations of 8086–8086 Control signal interfacing–Read and write cycle timing diagrams.

UNIT–III:I/O Interface
8255 PPI– Architecture of 8255–Modes of operation– Interfacing I/O devices to 8086 using 8255–Interfacing A to D converters– Interfacing D to A converters– Stepper motor Interfacing – Static memory interfacing with 8086–DMA controller (8257)–Architecture–Interfacing 8257 DMA controller– Programmable Interrupt Controller (8259)–Command Words and operating modes of 8259.

UNIT–IV: Introduction to 8051 Micro Controller
Overview of 8051 Micro Controller– Architecture– Register set–I/O ports and Memory Organization– Interrupts–Timers and Counters–Serial Communication.

UNIT– V:PIC Architecture
Block diagram of basic PIC 18 micro controller, registers I/O ports.

UNIT– VI: Programming in C for PIC
Data types, I/O programming, logical operations, data conversion

Text Books:
1. "The 8051 Micro Controller Architecture, Programming and Applications", by Kenneth J Ayala, Thomson Publishers, 2nd Edition.
2. PIC Microcontroller and Embedded Systems using Assembly and C for PIC 18 by Muhammad Ali Mazidi, RolindD.Mckinay , Danny causey -Pearson Publisher 21st Impression.

Reference Books:
1. "A Text book of Microprocessors and Micro Controllers" by R.S. Kaler, I.K. International Publishing House Pvt. Ltd.
2. "Microcontrollers – Theory and Applications" by Ajay V. Deshmukh, Tata McGraw–Hill Companies –2005.
3. "Microcontrollers – Principles and Applications" by Ajit Pal, PHI Learning Pvt Ltd, 2011.
4. Microprocessors and Interfacing by Douglas V Hall, Mc–Graw Hill, 2nd Edition.
5. "Advanced Micro Processors and Interfacing" by Ray and Burchandi, , Tata McGraw–Hill.

VI Sem.	**Microprocessors & Microcontrollers Lab (Offered by ECE To EEE)**	**Course Code: V18ECL 10**	**L**	**T**	**P**	**C**
			0	**0**	**2**	**1**

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO-1: Develop algorithm and logic for different operations using 8086 Instructions. **(K3)**
CO-2: Construct simple programs for 8086 using Assembler directives (MASM)/Machine control Instructions. . **(K3)**
CO-3: Develop ALP to perform arithmetic and logical operations using various instructions. . **(K3)**
CO-4: Develop ALP to perform conversions, finding squares of a numbers by using Loop, Jump instructions. . **(K3)**
CO-5: Develop the ALP to Interface the various peripherals to 8086 microprocessors. . **(K3)**
CO-6: Develop ALP to perform arithmetic and logical operations using 8051 Microcontroller Instruction set .**(K3)**

Any 10 of the following experiments are to be conducted:

I. Microprocessor 8086&Microcontroller 8051
Introduction to MASM/TASM.

1. Arithmetic operation – Multi byte addition and subtraction, multiplication and Division – Signed and unsigned arithmetic operation, ASCII – Arithmetic operation.
2. Logic operations – Shift and rotate – Converting packed BCD to unpacked BCD, BCD to ASCII conversion.
3. By using string operation and Instruction prefix: Move block, Reverse string sorting, Inserting, Deleting, Length of the string, String comparison.
4. Interfacing 8255–PPI
5. Interfacing 8259 – Interrupt Controller.
6. Interfacing 8279 – Keyboard Display.
7. Stepper motor control using 8253/8255.
8. Reading and Writing on a parallel port using 8051
9. Timer in different modes using 8051
10. Serial communication implementation using 8051
11. Understanding three memory areas of 00 – FF Using 8051 external interrupts.

12. Interface PIC 18 with an opt isolator
13. Interface PIC 18 with a DC motor

Annexure-ECE-V

COURSE STRUCTURE for B.TECH (ECT)

III Semester

S. No	Course Code	Course Name	L	T	P	Credits
1	V18ECT01	Electronic Devices & Circuits	3	1	-	4
2	V18ECT02	Digital System Design	3	-	-	3
3	V18ECT03	Signals & Systems	3	1	-	4
4	V18ECT 04	Network Theory	3	-	-	3
5	V18MBT51	Managerial Economics & Financial Analysis	3	-	-	3
6	V18ECL01	Electronic Devices & Circuits LAB	-	-	2	1
7	V18ECL02	Digital System Design LAB	-	-	2	1
8	V18ENT03	Professional Comm. Skills- I	3	-	-	MNC
9	V18ENT11	Constitution of India	2	-	-	MNC
		TOTAL	**20**	**2**	**4**	**19**

Total Contact Hours: 26 **Total Credits : 19**

IV Semester

S. No	Course Code	Course Name	L	T	P	Credits
1	V18ECT07	Analog & Digital Communications	3	1	-	4
2	V18ECT08	Analog Circuits	3	1	-	4
3	V18ECT09	Probability Theory & Stochastic Process	3	1	-	4
4	V18ECT10	Electromagnetic Waves & Transmission Lines	3	1	-	4
5	V18MAT03	Mathematics-III	3	-	-	3
6	V18ECL 05	Communications Lab	-	-	2	1
7	V18CSL32	Object Oriented Programming Through Java Lab	-	-	2	1
8	V18ECL06	Analog Circuits Lab	-	-	2	1
9	V18ENT04	Professional Comm. Skills- II	3	-	-	MNC
		TOTAL	**18**	**4**	**6**	**22**

Total Contact Hours: 28 **Total Credits: 22**

Annexure-VIII

SRI VASAVI ENGINEERING COLLEGE (AUTONOMOUS)

(Sponsored by Sri Vasavi Educational Society)
Approved by AICTE, New Delhi and Permanently Affiliated to JNTUK, Kakinada
Pedatadepalli, **TADEPALLIGUDEM – 534 101,** W.G. Dist, (A.P.)

Department of Civil Engineering

Dt: 30.06.2020

The Civil Engineering Department 3rd meeting of Board of Studies (BOS) was conducted through online mode on 29.6.2020 at 11.30 A.M. Following members have attended the meeting.

SL.No.	Name	Position
1	Dr.G.RadhaKrishnan	Chairman
2	Dr. GVR Prasada Raju	Member
3	Dr. C. B. Kameswar Rao	Member
4	Dr. M. Kumar	Member
5	Er. DSR Sekhar	Member
6	Mr.T.Yeswanth Sai	Faculty of CE
7	Mr.VLD Prasad Reddy	Faculty of CE
8	Mr.T.Naga Seshu Babu	Faculty of CE
9	Mr.A. Sudheer	Faculty of CE

Minutes of the BOS Meeting:

- **Item No.1 : Chairman, BOS has welcomed all the members and given the Opening Remarks.**

- **Item No.2: Review & approval of the V& VI Sem Course Structure of B. Tech CE of V18 Reg.**
  The Chairman and the members reviewed the course structure of B. Tech CE and suggested modifications in the structure. Approved course structure given in **Annexure-CE-I**
- **Item No.2: Review & approval of the syllabus V& VI Sem Courses of B. Tech CE of V18 Reg.**

The Chairman and the members reviewed the syllabus of all courses of V and VI semester B. Tech CE and suggested modifications in the few courses. Approved syllabus given in **Annexure-CE-II**

- **Item No.3: Review & Approval the List of Open Elective Courses offered by Civil Engineering Dept to all other departments.**

  List of courses approved by BOS are mentioned below has to be offered under Open Elective-I for B.Tech VI semester, under V18 regulation for all other branches.

  a) Repair and Rehabilitation of Structures (V18CEOE1)
  b) Remote Sensing & Geographical Information Systems (V18CEOE2)
  Approved syllabus given in **Annexure-CE-III**

- **Item No. 04: Approval for offering Minor degree in DATA SCIENCE offered by Department of Computer Science and Engineering for B. Tech Civil Engineering students under V18 Regulation**

  BOS Members approved our students to opt for the Minor degree in data science offered by the Department of Computer Science and Engineering with the rules and regulations which will be approved by Academic Council.

Finally, the chairman thanked all the BOS members and faculty. The meeting was ended at 12.30 P.M

Dr. G. Radha Krishnan

CHAIRMAN, BOS

ANNEXURE –CE-I

COURSE STRUCTURE APPROVED IN 3rd BOS MEETING

V SEMESTER

S.No	Course Code	Course Title	Hours per week			Credits
			L	T	P	C
1	V18CET15	Structural Analysis – I	3	0	0	3
2	V18CET16	Geotechnical Engineering – I	3	0	0	3
3	V18CET17	Hydrology & Water Resources Engineering	3	0	0	3
4	V18CET18	Design of Reinforced Concrete Structures	3	0	0	3
5	V18CET19	Transportation Engineering – I	3	0	0	3
6	V18CET33	RS & GIS	2	0	0	2
7	V18CEL07	Transportation Engineering Lab	0	0	3	1.5
8	V18CEL08	Geotechnical Engineering Lab	0	0	3	1.5
9	V18ENT11	Constitution of India	2	-	-	0
10	V18ENT05	Professional Communication Skills –III	4	0	0	0
Total			23	0	6	20

Total Contact Hours : 29

Total Credits : 20

Certification Course – Enrolment of Certification Course will be initiated during V Semester

VI SEMESTER

S.No	Course Code	Course Title	Hours per week			Credits
			L	T	P	C
1	V18CET20	Structural Analysis – II	3	0	0	3
2	V18CET21	Geotechnical Engineering – II	3	0	0	3
3	V18CET22	Design of Steel Structures	3	0	0	3
4	V18CET23	Transportation Engineering – II	3	0	0	3
5	V18CET24	Environmental Engineering – I	3	0	0	3
6		Open Elective Course – 1	3	0	0	3
7	V18CEL09	Environmental Engineering Lab	0	0	3	1.5
8	V18CEL10	CAD & GIS Lab	0	0	3	1.5
9	V18ENT06	Professional Communication Skills –IV	4	0	0	0
Total			22	0	6	21

Total Contact Hours : 28

Total Credits : 21

ANNEXURE-CE-II

SYLLABI OF V & VI SEMESTER OF B.TECH COURSES

V SEMESTER - SYLLABUS

Year/Sem	**V Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation / Year	V18 / 2020-2021	3	0	0	3	V18CET15
Name of the Course	**STRUCTURAL ANALYSIS – I**					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of this course the student will be able to

- Illustrate Shear Force, Bending Moment and Deflection of Propped Cantilevers for different fixity conditions (K3)
- Calculate Shear Force, Bending Moment and Deflections of fixed beams for different fixity conditions (K3)
- Calculate Shear Force, Bending Moment and Deflections of Continuous beams for different fixity conditions (K3)
- Apply Slope Deflection Equation to Continuous beams (K3)
- Understand the concepts of Energy Theorems (K2)
- Assess Maximum Shear Force, Bending Moment and Deflections at a given section when loads of varying spans are passing over truss (K3)

SYLLABUS

UNIT – I

Propped Cantilevers: Analysis of propped cantilevers-shear force and bending moment diagrams-Deflection of propped cantilevers.

UNIT – II

Fixed Beams: Introduction to statically indeterminate beams with U. D. load, central point load, eccentric point load, number of point loads, uniformly varying load, couple and combination of loads - shear force and Bending moment diagrams-Deflection of fixed beams including effect of sinking of support, effect of rotation of a support.

UNIT – III

Continuous Beams: Introduction-Clapeyron's theorem of three moments- Analysis of continuous beams with constant moment of inertia with one or both ends fixed continuous beams with overhang, continuous beams with different moment of inertia for different spans- Effects of sinking of supports-shear force and bending moment diagrams.

UNIT-IV

Slope-Deflection Method: Introduction, derivation of slope deflection equation, application to continuous beams with and without settlement of supports.

UNIT – V

Energy Theorems: Introduction-Strain energy in linear elastic system, expression of strain energy due to axial load, bending moment and shear forces - Castigliano's first theorem-Deflections of simple beams and pin jointed trusses.

UNIT – VI

Moving Loads And Influence Lines: Introduction, influence line diagrams, influence line diagrams for simply supported beams, cantilever beams, overhanging beams, double overhanging beams, balanced cantilever beams, girder supporting floor beams, use of influence line diagrams, maximum SF and BM values for moving loads, Train of concentrated loads

Text Books:

1. Basic Structural Analysis, C. S. Reddy Tata Mc.Graw-Hill, New Delhi.
2. Analysis of Structures by T.S. Thandavamoorthy, Oxford University Press, New Delhi.
3. Analysis of Structures- Vol. I and II, V. N. Vazirani and M. M. Ratwani, Khanna Publishers, New Delhi.
4. Structural Analysis - Vol. I and II,S.S.Bhavikatti,Vikas Publishing House,New Delhi.

References:

1. Theory of Structures, B. C Punmia, A. K Jain & Arun K. Jain, Lakshmi Publications.
2. Theory of Structures, R.S. Khurmi, S. Chand Publishers.
3. Structural analysis by R.C. Hibbeler, Pearson, New Delhi.
4. Structural Analysis-I, Hemanth Patel, Yogesh Patel, Synergy Knowledgeware, Mumbai
5. Structural Analysis I Analysis of Statically Determinate Structures, P. N. Chandramouli. Yesdee Publishing Pvt Limited, Chennai

Year/Sem	V Sem	L	T	P	C	COURSE CODE
Regulation / Year	V18 / 2020-2021	3	0	0	3	V18CET16
Name of the Course	GEOTECHNICAL ENGINEERING –I					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of this course the student will be able to

- Show the inter-relationships of various parameters related to soil mechanics (K1)
- Describe various index properties of soils and classify them (K2)
- Assess the permeability of different soils having different properties (K3)
- Employ different methods to know the stress distribution in soils (K3)
- Interpret different parameters related to consolidation of soil (K3)
- Examine the stress strain behavior of different soils under various drainage conditions (K3)

SYLLABUS

UNIT I

Introduction: Soil formation – soil structure and clay mineralogy – Adsorbed water – Mass- volume relationship –Relative density, Mechanism of compaction – factors affecting – effects of compaction on soil properties - compaction control.

UNIT II

Index Properties of Soils: Grain size analysis – Sieve and Hydrometer methods – consistency limits and indices – Various Types of soil Classifications – Unified soil classification and I.S. Soil classification.

UNIT III

Permeability: Soil water – capillary rise – One dimensioned flow of water through soils – Darcy's law- permeability – Factors affecting –laboratory determination of coefficient of permeability –Permeability of layered systems. Total, neutral and effective stresses – quick sand condition – 2-D flow and Laplace's equation - Seepage through soils – Flow nets: Characteristics and Uses.

UNIT IV

Stress Distribution in Soils: Stresses induced by applied loads - Boussinesq's and Westergaard's theories for point loads and areas of different shapes– Newmark'sinfluence chart – 2:1 stress distribution method.

UNIT V

Consolidation: Compressibility of soils – e-p and e-log p curves – Stress history – Concept of consolidation - Spring Analogy - Terzaghi's theory of one-dimensional Consolidation – Time rate of consolidation and degree of consolidation – Determination of coefficient of consolidation (c_v) - Over consolidated and normally consolidated clays.

UNIT VI

Shear Strength of Soils: Basic mechanism of shear strength - Mohr – Coulomb Failure theories – Stress-Strain behavior of Sands - Critical Void Ratio – Stress-Strain behavior of clays – Shear Strength determination- various drainage conditions.

TEXTBOOKS:

1. "Basic and Applied Soil Mechanics", Gopal Ranjan and A. S. R. Rao, New Age International Publishers.
2. "Soil Mechanics and Foundation Engineering", V. N. S. Murthy, CBS publishers.
3. "Soil Mechanics and Foundations", B.C. Punmia, Laxmi Publications.

REFERENCE BOOKS:

1. "Fundamentals of Soil Mechanics", D. W. Taylor, Wiley.
2. "An introduction to Geotechnical Engineering", Holtz and Kovacs; Prentice Hall.
3. "Fundamentals of Geotechnical Engineering", B M Das, Cengage Learning, New Delhi.

Year/Sem	V Sem	L	T	P	C	COURSE CODE
Regulation / Year	V18 / 2020-2021	3	0	0	3	V18CET17
Name of the Course	**HYDROLOGY & WATER RESOURCES ENGINEERING**					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of this course the student will be able to

- Identify the physicalprocessesinhydrologyandcomponents ofthehydrologiccycle.(K2)
- Estimate the different components of the hydrologic cycle.(K2)
- Compute the runoff of a catchment using Hydrographs. (K3)
- Compute the flood frequency, design flood, flood routing. (K3)
- Discuss the concepts of groundwater movement and well hydraulics.(K2)
- Describe the advanced concepts of Runoff modeling .(K2)

SYLLABUS

UNIT I

Introduction: Engineering hydrology and its applications, Hydrologic cycle, hydrological data-sources of data. Precipitation: Types and forms, measurement, rain gauge network, presentation of rainfall data, average rainfall, continuity and consistency of rainfall data, frequency of rainfall, Intensity-Duration-Frequency (IDF) curves, Depth-Area-Duration (DAD) curves, Probable Maximum Precipitation (PMP), design storm.

UNIT II

Abstractions from Precipitation: Initial abstractions. Evaporation: factors affecting, measurement, reduction Evapotranspiration: factors affecting, measurement, control Infiltration: factors affecting, Infiltration capacity curve, measurement, infiltration indices.

UNIT III

Runoff: Catchment characteristics, Factors affecting runoff, components, computation-empirical formulae, tables and curves, stream gauging, rating curve, flow mass curve and flow duration curve. Hydrograph analysis: Components of hydrograph, separation of base flow, effective rainfall hyetograph and direct runoff hydrograph, unit hydrograph, assumptions, derivation of unit hydrograph, unit hydrographs of different durations, principle of superposition and S-hydrograph methods, limitations and applications of unit hydrograph, synthetic unit hydrograph.

UNIT IV

Floods: Causes and effects, frequency analysis- Gumbel's and Log-Pearson type III distribution methods, Standard Project Flood (SPF) and Probable Maximum Flood (MPF), flood control methods and management. Flood Routing: Hydrologic routing, channel and reservoir routing- Muskingum and Puls methods of routing.

UNIT V

Groundwater: Occurrence, types of aquifers, aquifer parameters, porosity, specific yield, permeability, transmissivity and storage coefficient, types of wells, Darcy's law, Dupuit's equation- steady radial flow to wells in confined and unconfined aquifers, yield of a open well-recuperation test.

UNIT VI

Advanced Topics in Hydrology: Rainfall-runoff Modelling, instantaneous unit hydrograph (IUH) – conceptual models – Clark and Nash models, general hydrological models- Chow – Kulandaiswamy model.

TEXTBOOKS:

1. "Engineering Hydrology", Subramanya K., Tata Mc Graw-Hill Education Pvt. Ltd, New Delhi, 2013.
2. "Engineering Hydrology", Jayarami Reddy P., Laxmi Publications Pvt. Ltd., New Delhi, (2013)
3. "Applied hydrology", Chow V.T., D.R Maidment and L.W. Mays, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2011.

REFERENCE BOOKS:

1. "Water Resources Engineering", Mays L.W, Wiley India Pvt. Ltd, 2013.
2. "Hydrology", Raghunath. H.M., New Age International Publishers, 2010.
3. "Engineering Hydrology - Principles and Practice" Ponce V.M., Prentice Hall International, 1994.
4. "Hydrology and Water Resources Engineering", Patra K.C., Narosa Publications, 2011.
5. "Engineering Hydrology", Ojha C.S., Berndtsson P.R and Bhunya. P., Oxford University Press, 2010.

ear/Sem	V Sem	L	T	P	C	COURSE CODE
Regulation / Year	V18 / 2020-2021	3	0	0	3	V18CET18
Name of the Course	**DESIGN OF REINFORCED CONCRETE STRUCTURES**					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of this course the student will be able to

- Understand the concepts and methods for elements design (K2)
- Solve the elements of structure like flexural members (K3)
- Illustrate the design concepts structures subjected to shear, bond and torsion (K3)
- Apply design principles in the design of slabs (K3)
- Choose suitable design principle in the design of columns (K3)
- Apply suitable design procedure in the design of foundations (K3)

SYLLABUS

UNIT I

Introduction of Reinforced concrete: Structural elements- Loads on structures- Strength and serviceability - Methods of design - Working stress method- design constants - neutral axis - moment of resistance for different sections- Design of singly and doubly reinforced beams- Concepts of limit state design - Partial load and safety factors -stress-strain curves for cold worked deformed bars and mild steel bars. Assumptions in limit state design – stress - block parameters – limiting moment of Resistance. Codes of practice.

UNIT II

Design for Flexure: Limit state analysis and design of singly reinforced sections- effective depth- Moment of Resistance- Doubly reinforced and flanged (T and L) beam sections- Minimum depth for a given capacity- Limiting Percentage of Steel- Minimum Tension Reinforcement-Maximum Flexural Steel- Design of Flanged Sections (T&L)- Effective width of flange –Behavior- Analysis and Design.

UNIT III

Design for Shear, Torsion and Bond: Limit state analysis and design of section for shear and torsion – concept of bond, anchorage and development length, I.S. code provisions. Design examples in simply supported and continuous beams, detailing. Limit state design for serviceability: Deflection, cracking and code provision.

UNIT IV

Slabs: Classification of slabs, design of one - way slabs, one way continuous slab using IS Coefficients (Conventional) – Design of two - way slabs-simply supported and various edge conditions using IS Coefficients, Design of Stair Case.

UNIT V

Design of Compression members: Effective length of a column, Design of short and long columns – under axial loads, uniaxial bending and biaxial bending – IS Code provisions.

UNIT VI

Footings: Different types of footings – Design of isolated footings – pedestal, square, rectangular and circular footings subjected to axial loads, uni-axial and bi-axial bending moments.

NOTE:

All units i.e. from unit II to unit VI are to be taught in Limit State Design.

Following sheets should be prepared by the students.

Sheets-1	Reinforcement detailing of T-beams, L-beams and continuous beams.
Sheets-2	Reinforcement detailing of beam with all details.
Sheets-3	Detailing of one-way, two-way and continuous slabs.
Sheets-4	Reinforcement detailing of columns.
Sheets-5	Reinforcement detailing of isolated footings.

EXAMINATION PATTERN:

Internal Examination Pattern:

The total internal marks are distributed in three components as follows:

Descriptive (subjective type) examination	: 15 marks
Detailing sheets(For above)	: 10 marks
Assignment	: 05 marks

TEXTBOOKS:

1. "Limit State Design", A. K. Jain
2. "Design of Reinforced concrete Structures", N. Subrahmanyian.

3. "Reinforced concrete", Vol.1., H. J. Shah, Charotar publishing house Pvt. Ltd.

REFERENCE BOOKS:

1. "R C C Design", B.C Punmia, A. K. Jain and A. K Jain. Lakshmi Publications
2. "Reinforced Concrete Structures", N. Krishna Raju and R. N. Pranesh, New Age Publications.
3. "Reinforced Concrete Structures", S. Unnikrishna Pillai and Devdas Menon, Tata Mc.Graw Hill, New Delhi.
4. IS 456-2000, Code of practice for Reinforced Concrete Structures.
5. IS 875, Code of Practice for Design Loads.
6. SP-16, Design Aids for Reinforced Concrete.

ear/Sem	**V Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation / Year	V18 / 2020-2021	3	0	0	3	V18 CET 19
Name of the Course	TRANSPORTATION ENGINEERING – I					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of this course the student will be able to

- Identify engineering surveys and can decide the alignment(K2)
- Analyze and design highway geometric elements.(K3)
- Analyze and design of traffic infrastructure(K3)
- Analyze and design of flexible, rigid pavements (K3)
- Examine pavement construction activities and also conduct quality control at site(K3)
- Evaluate pavement condition and can identify and suggest remedial measures(K3)

SYLLABUS

UNIT I

Highway Planning and Alignment: Highway development in India; Classification of Roads; Necessity for Highway Planning; Different Road Development Plans

– First, second, third road development plans, road development vision 2021; Highway Alignment-Factors affecting Alignment- Engineering Surveys.

UNIT II

Highway Geometric Design: Importance of Geometric Design- Design controls

and Criteria- Highway Cross Section Elements- Sight Distance Elements- Design of Horizontal

Alignment- Design of Transition Curves-Design of Vertical alignment.

UNIT III

Traffic Engineering: Basic Parameters of Traffic-Volume, Speed and Density Traffic Volume Studies; Speed studies –spot speed and speed & delay studies; Parking

Studies; Road Accidents-Causes and Preventive measures - Condition Diagram and Collision

Diagrams; PCU Factors, Capacity of Highways – Factors Affecting; LOS Concepts; Road Traffic Signs; Road markings; Types of Intersections; At-Grade Intersections –Design of Traffic Signals – Webster Method .

UNIT IV

Design of Pavements: Types of pavements; Functions and requirements of different components of pavements; Design Factors

Flexible Pavements: Design factors – Flexible Pavement Design Methods Mechanistic method.

Rigid Pavements: Design Considerations – wheel load stresses – Temperature stresses –

Frictional stresses – Combination of stresses – Design of slabs – IRC method – Rigid pavements

UNIT V

Highway Construction

Types of Highway Construction, Earthwork, Construction of Embankments, subgrade stabilization, Construction of Bituminous Pavements and Construction of Cement Concrete Pavements

UNIT VI

Highway Maintenance: Pavement Failures, Pavement condition survey, Maintenance of Highways, Pavement evaluation, strengthening of existing pavements

TEXTBOOKS:

1. "Highway Engineering", Khanna S. K., Justo C. E. G and Veeraragavan A, Nem Chand Bros.,Roorkee.
2. "Traffic Engineering and Transportation Planning", Kadiyali L. R, Khanna Publishers, New Delhi.

REFERENCE BOOKS:

1. "Principles of Transportation Engineering", Partha Chakroborthy and Animesh Das, PHI Learning Private Limited, Delhi.
2. "Principles of Highway Engineering, Kadiyali L. R, Khanna Publishers, New Delhi
3. "Transportation Engineering - An Introduction", Jotin Khisty C, Prentice Hall, Englewood Cliffs, New Jersey.
4. "Transportation Engineering and Planning", Papacostas C.S. and Prevedouros, P.D., Prentice Hall of India Pvt.Ltd; New Delhi.
5. IRC37–2018: Guidelines for the Design of Flexible Pavements, Indian Road Congress Publications, New Delhi.
6. IRC58–2015: Guidelines for the Design of Plain Jointed Rigid Pavements for Highways, Indian Road Congress Publications, New Delhi.
7. MORTH - Specifications for Road and Bridge works, Indian Road Congress Publication, New Delhi, Latest Edition
8. IRC 67 – 2012: Code of Practice for Road Signs, Indian Road Congress Publication, New Delhi
9. IRC 35 – 2015: Code of Practice for Road Markings, Indian Road Congress Publication, New Delhi

Year/Sem	**V Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation / Year	V18 / 2020-2021	2	0	0	2	V18CET33
Name of the Course	**REMOTE SENSING AND GEOGRAPHICAL INFORMATION SYSTEM**					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of this course the student will be able to

- Define the basic principles of Remote Sensing and GIS, including ground, air and satellite based sensor platforms (K1)
- Interpret the aerial photographs and satellite imageries (K2)
- Relate the process of input spatial data entry and its types (K3)
- Examine the Spatial Data for a variety of applications (K3)
- Employ RS and GIS for diverse applications (K3)
- Apply RS and GIS concepts in water resources engineering (K3)

SYLLABUS

UNIT I

Introduction to Remote Sensing: Basic concepts of remote sensing, electromagnetic radiation, electromagnetic spectrum, interaction with atmosphere, energy interaction with the earth surfaces, Characteristics of remote sensing systems.

Sensors and platforms: Introduction, types of sensors, airborne remote sensing, space borne remote sensing, image data characteristics, digital image data formats-band interleaved by pixel, band interleaved by line, band sequential, IRS, LANDSAT, SPOT, MODIS, ASTER,RISAT and CARTOSAT.

UNIT II

Image analysis: Introduction, elements of visual interpretations, digital image processing-image preprocessing, image enhancement, image classification, supervised classification, unsupervised classification.

UNIT III

Geographic Information System: Introduction, key components, application areas of GIS, map projections.

Data entry and preparation: spatial data input, raster data models, vector data models.

UNIT IV

Spatial data analysis: Introduction, overlay function-vector overlay operations, raster overlay operations, arithmetic operators, comparison and logical operators, conditional expressions, overlay using a decision table, network analysis-optimal path finding, network allocation, network tracing and buffer analysis.

UNIT V

RS and GIS Applications: Land cover and land use, agriculture, forestry, geology, geomorphology, urban applications.

UNIT VI

Applications of Hydrology, Water Resources and Disaster Management: Food zoning and mapping, groundwater prospects and potential recharge zones, watershed management and disaster management with case studies.

TEXTBOOKS:

1. “Remote sensing and GIS”, Bhatta, B., Oxford University Press, 2008.
2. “Remote Sensing and Geographical Information Systems”, Anji Reddy, M., B S Publications, 2008.
3. “Basics of Remote Sensing and GIS” Kumar. S., Laxmi Publications,

REFERENCE BOOKS:

1. “Fundamentals of Remote Sensing”, George Joseph, Universities Press, 2013.
2. “Concepts and Techniques of Geographical Information System”, Chor Pang Lo and Yeung, A.K.W., Prentice Hall, India, 2006.
3. “Remote Sensing and its Applications”, Narayan L.R.A, Universities Press, 2012.
4. “Introduction to Geographic Information Systems”, Kand Tsung Chang, McGraw Hill Higher Education, 2009.
5. “Basics of Remote sensing & GIS”, Kumar, S., Laxmi Publications, New Delhi, 2005.
6. “Principals of Geographical Information Systems”, Burrough, P.A and McDonnell, R.A. Oxford University Press, 1998.
7. “Remote Sensing”, Schowenger, R. A., Elsevier publishers, 2006.

8. "Remote Sensing and Image Interpretation", Lillesand, T.M, Kiefer, R.W. and Chipman, J.W., Wiley India Pvt. Ltd., New Delhi, 2013.
9. "Fundamentals of Geographic Information Systems", Demers, M.N, Wiley India Pvt. Ltd, 2013.

Year/Sem	V Sem	L	T	P	C	COURSE CODE
Regulation / Year	V18 / 2020-2021	0	0	3	1.5	V18CEL07
Name of the Course	TRANSPORTATION ENGINEERING LAB					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of this course, the student will be able to

- Assess the suitability of different materials for the road construction(K3)
- Examine the given bitumen samples and judge their suitability for road construction(K3)
- Find the Optimum Bitumen content for the Bituminous mix (K3)
- Develop the gradation of Bituminous mix for stability and flow properties (K3)

LIST OF EXPERIMENTS

I. ROAD AGGREGATES:

1. Aggregate Crushing value
2. Aggregate Impact Test.
3. Specific Gravity and Water Absorption.
4. Abrasion Test.
5. Shape tests

II. BITUMINOUS MATERIALS:

6. Penetration Test.
7. Ductility Test.
8. Softening Point Test.
9. Flash and fire point tests.
10. Viscosity Test.

III. BITUMINOUS MIX:

11. Marshall Stability test.

LIST OF EQUIPMENT

1. Apparatus for aggregate crushing test.
2. Aggregate Impact testing machine
3. Pycnometers.
4. Los angles Abrasion test machine
5. Length and elongation gauges
6. Bitumen penetration test setup.
7. Bitumen Ductility test setup.
8. Ring and ball apparatus
9. Flash and Fire Apparatus
10. Viscometer.

11. Marshal Stability apparatus.

REFERENCES:

1. "Highway Material Testing Manual", S.K. Khanna, C.E.G Justo and A.Veeraraghavan, Neam Chan Brothers New Chand Publications, New Delhi.
2. IRC Codes of Practice
3. Asphalt Institute of American Manuals
4. Code of Practice of B.I.S.

Year/Sem	**V Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation / Year	V18 / 2020-2021	0	0	3	1.5	V18CEL08
Name of the Course	**GEOTECHNICAL ENGINEERING LAB**					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of this course the student will be able to

- Employ index properties required for classification of soils (K3)
- Find the permeability of different soils using different tests (K3)
- Predict the compaction, consolidation and swelling characteristics of the soils (K3)
- Compute the strength properties of soils (K3)

LIST OF EXPERIMENTS

1. Specific gravity, G
2. Atterberg's Limits.
3. Field density-Core cutter and Sand replacement methods
4. Grain size analysis by sieving
5. Hydrometer Analysis Test
6. Permeability of soil - Constant and Variable head tests
7. Compaction test
8. Consolidation test (to be demonstrated)
9. Direct Shear test
10. Triaxial Compression test (UU Test)
11. Unconfined Compression test
12. Vane Shear test
13. Differential free swell (DFS)
14. CBR Test

LIST OF EQUIPMENTS

. Casagrande's liquid limit apparatus.

2. Apparatus for plastic and shrinkage limits

3. Field density apparatus for

   a) Core cutter method

   b) Sand replacement method

4. Set of sieves: 4.75 mm, 2 mm, 1 mm, 0.6 mm, 0.42 mm, 0.3 mm, 0.15 mm, and 0.075 mm.

5. Hydrometer
6. Permeability apparatus for

   a) Constant head test

   b) Variable head test
7. Universal auto compactor for I.S light and heavy compaction tests.
8. Shaking table, funnel for sand raining technique.
9. Apparatus for CBR test
10. 10 tons loading frame with proving rings of 0.5 tons and 5 tons capacity
11. One dimensional consolation test apparatus with all accessories.
12. Triaxial cell with provision for accommodating 38 mm dia specimens.
13. Box shear test apparatus
14. Laboratory vane shear apparatus.
15. Hot air ovens (range of temperature 500 - 1500C

REFERENCES

1. Determination of Soil Properties, J. E. Bowles.
2. IS:2720 – Relevant Parts of Bureau of Indian Standards, New Delhi.

VI SEMESTER – SYLLABUS

Year/Sem	VI Sem	L	T	P	C	COURSE CODE
Regulation / Year	V18 / 2020-2021	3	0	0	3	V18CET20
Name of the Course	STRUCTURAL ANALYSIS – II					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of this course the student will be able to

- Illustrate the concepts of Arches (K3)
- Solve the structure for Lateral loads using approximate methods (K3)
- Illustrate the concepts Cables and Suspension bridges (K3)
- Employ Moment distribution method for analyzing beams/frames (K3)
- Employ Kanni's method for analyzing beams/frames (K3)
- Compute the moments/forces using matrix methods (K3)

SYLLABUS

UNIT I

Three Hinged Arches: Elastic theory of arches – Eddy's theorem – Determination of horizontal thrust, bending moment, normal thrust and radial shear – effect of temperature. Hinges with supports at different levels.

Two Hinged Arches: Determination of horizontal thrust, bending moment, normal thrust and radial shear – Rib shortening and temperature stresses, Tied arches – Fixed arches – (No analytical question).

UNIT-II

Lateral Load Analysis Using Approximate Methods: application to building frames.

(i) Portal Method (ii) Cantilever Method.

UNIT – III

Cable Structures and Suspension Bridges: Introduction, characteristics of cable, analysis of cables subjected to concentrated and uniformly distributed loads, anchor cable, temperature stresses, analysis of simple suspension bridge, three hinged and two hinged stiffening girder suspension bridges.

UNIT – IV

Moment Distribution Method: Stiffness and carry over factors – Distribution factors – Analysis of continuous beams with and without sinking of supports – Portal frames – including Sway-Substitute frame analysis by two cycle.

UNIT – V

Kani's Method: Analysis of continuous beams – including settlement of supports and single bay portal frames with and without side sway.

UNIT – VI

Introduction to Matrix Methods: Flexibility methods: Introduction, application to continuous beams (maximum of two unknowns) including support settlements. Stiffness method: Introduction, application to continuous beams (maximum of two unknowns) including support settlements.

Text Books:

Structural Analysis, T. S. Thandavamoorthy, Oxford university press, India.

1. Structural Analysis, R.C. Hibbeler, Pearson Education, India
2. Theory of Structures – II, B. C. Punmia, Jain & Jain, Laxmi Publications, India.
3. Structural Analysis, C.S. Reddy, Tata Mc-Graw hill, New Delhi.
4. Structural Analysis - Vol. I and II,S.S.Bhavikatti,Vikas Publishing House,New Delhi.

References:

1. Intermediate Structural Analysis, C. K. Wang, Tata McGraw Hill, India
2. Theory of structures, Ramamuratam, Dhanpatrai Publications.
3. Analysis of structures, Vazrani & Ratwani – Khanna Publications.
4. Comprehensive Structural Analysis-Vol. I & 2, R. Vaidyanathan & P. Perumal- Laxmi Publications Pvt. Ltd., New Delhi
5. Structural Analysis I, P.N. Chandramouli. Yesdee Publishing Pvt Limited
6. Structural Analysis, Aslam Kassimali, Cengage Learning
7. Matrix Methods of Structural Analysis, P.N. Godbole, R. S.. Sonaparote, PHI Learning Pvt Limited

Year/Sem	VI Sem	L	T	P	C	COURSE CODE
Regulation / Year	V18 / 2020-2021	3	0	0	3	V18CET21
Name of the Course	GEOTECHNICAL ENGINEERING-II					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of this course the student will be able to

- Use the field test data and arrive at the bearing capacity(K3)
- Examine the stability of slope and find earth pressures in layered soils(K3)
- Determine the bearing capacity of shallow foundations using analytical methods(K3)
- Compute the magnitude of foundation settlement and decide on the size of the foundation accordingly(K3)
- Apply the principles of bearing capacity of piles and design them accordingly(K3)
- Demonstration of the well foundations and their construction (K3)

SYLLABUS

UNIT I

Soil Exploration: Need, Methods of soil exploration – Boring and Sampling methods, Field tests, Penetration Tests, Pressure meter, planning of programme and preparation of soil investigation report.

UNIT II

Slope Stability: Infinite and finite earth slopes in sand and clay, types of failures, factor of safety of infinite slopes, stability analysis by Swedish arc method, standard method of slices ,Taylor's Stability Number, Stability of slopes of dams and embankments – different conditions.

Earth-Pressure theories: Rankine's & Coulomb's theory of earth pressure, Culmann's graphical method, earth pressures in layered soils.

UNIT III

Shallow Foundations – Bearing Capacity Criteria: Types of foundations and factors to be considered in their location , Bearing capacity – criteria for determination of bearing capacity – factors influencing bearing capacity, analytical methods to determine bearing capacity – Terzaghi's theory ,IS Methods.

UNIT IV

Shallow Foundations – Settlement Criteria: Safe bearing pressure based on N- value, allowable bearing pressure; safe bearing capacity and settlement from plate load test – Types of foundation settlements and their determination - allowable settlements of structures.

UNIT V

Pile Foundation: Types of piles, Load carrying capacity of piles based on static pile formulae , Dynamic pile formulae, Pile load tests , Load carrying capacity of pile groups in sands and clays.

UNIT VI

Well Foundations: Types, Different shapes of well, Components of well – functions, forces acting on well foundations, Design Criteria – Determination of staining thickness and plug - construction and Sinking of wells, Tilt and shift.

TEXTBOOKS:

1. Principles of Foundation Engineering, Das, B.M., (2011), 6th edition Cengage learning.
2. Basic and Applied Soil Mechanics, Gopal Ranjan & A.S.R. Rao, New Age International Pvt. Ltd, (2004).
3. Soil Mechanics and Foundations, B.C.Punmia, Laxmi Publictions.

REFERENCE BOOKS:

1. Foundation Analysis and Design, Bowles, J.E., McGraw-Hill Publishing Company, Newyork.
2. Theory and Practice of Foundation Design, N.N.SOM & S.C.DAS PHI Learning Private limited.

Year/Sem	VI Sem	L	T	P	C	COURSE CODE
Regulation / Year	V18 / 2020-2021	3	0	0	3	V18CET22
Name of the Course	DESIGN OF STEEL STRUCTURES					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of this course the student will be able to

- Estimate the strength of the riveted and welded joints (K3)
- Select suitable flexural member by using concept of design (K3)
- Understand the design concepts of tension and compression members in roof trusses (K3)
- Apply design principles in the design of columns and built up columns (K3)
- Choose suitable design principle in the design of column bases (K3)
- Apply suitable design procedure in the design of plate and gantry girder (K3)

SYLLABUS

UNIT I

Connections: Introduction - Properties of structural steel - IS Rolled sections - I.S Specifications - Lap and Butt connections (Revited and Bolted connections) - Eccentric connections.

Welded connections: Introduction - Advantages and disadvantages of welding- Strength of welds - Butt and fillet welds - Permissible stresses - IS Code requirements - Design of Butt and fillet weld subjected to moment acting in the plane and at right angles to the plane of the joints.

UNIT II

Beams: Allowable stresses - Design requirements as per IS Code-Design of simple and compound beams - Curtailment of flange plates - Beam to beam connection - check for deflection, shear, buckling, and bearing - Design of laterally unsupported beams.

UNIT III

Tension Members: Introduction to different modes of failures - gross section yielding - Net Section rupture and block shear failure - Determine the design strength due to yielding of gross section - rupture of critical section and block shear - Design of tension members.

Compression Members: Effective length of columns - Slenderness ratio -permissible stresses - Design of compression members, Design of Struts.

Roof Trusses: Different types of trusses – Design loads – Load combinations as per IS Code recommendations, structural details –Design of simple roof trusses involving the design of purlins, members and joints.

UNIT IV

Built up compression members – Design of lacings and battens. Design Splicing of columns.

UNIT V

Design of Column Foundations: Introduction - Design of slab base - Design of gusset base- Column bases subjected to moment.

UNIT VI

Design of Plate Girder: Introduction - Design consideration - IS Code recommendations - Design of plate girder - Welded -curtailment of flange plates and stiffeners - splicing and connections.

Design of Gantry Girder: Introduction - Impact factors - longitudinal forces- Design of Gantry girders.

NOTE:

All units i.e. from unit II to unit-VI to be taught in Limit State method only.

Welding Connections should be used from Unit II – Unit V.

The students should prepare the following sheets.

Sheets-1 Detailing of steel members Connection.

Sheets-2 Detailing of beams including curtailment of flange plates.

Sheets-3 Detailing of Column including lacing and battens.

Sheets-4 Detailing of Column bases, slab base and gusseted base.

Sheets-5 Detailing of Plate girder including curtailment, splicing and stiffeners.

EXAMINATION PATTERN:

Internal Examination Pattern:

The total internal marks are distributed in three components as follows:

Descriptive (subjective type) examination	: 15 marks
Detailing sheets(For above)	: 10 marks
Assignment	: 05 marks

TEXT BOOKS:

1. Design of steel structures, S.K. Duggal, Tata McGraw Hill, and New Delhi.
2. Design of steel structures, S.S.Bavakatti, I.K.International Publishing House Pvt. Ltd.
3. Steel Structures Design and Practice, N.Subramanian, Oxford University Press.
4. Design of Steel Structures, Ramachandra, Scientific Publishers Journals Dept.

REFERENCE BOOKS:

1. Structural Design in Steel, Sarwar Alam Raz, New Age International Publishers, New Delhi.
2. Design of Steel Structures, P. Dayaratnam, S. Chand Publishers.
3. Design of Steel Structures, M.Raghupathi, Tata Mc. Graw-Hill.
4. Structural Design and Drawing, N. Krishna Raju, University Press.
5. IS: 800- 2007, General construction in steel-Code of practice.
6. IS: 875-1987, Code of Practice for Design Loads.
7. Steel Tables

Year/Sem	**VI Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation / Year	V18 / 2020-2021	3	0	0	3	V18 CET 23
Name of the Course	TRANSPORTATION ENGINEERING – II					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of this course the student will be able to

- Understand the Historical development of Railways in India (K2)
- Analyze and Design the Railway Track Geometric Elements (K3)
- Apply turnouts and controllers on Railway Track (K3)
- Analyze and design geometric elements of Airport Runway and Taxiway (K3)
- Analyze design of flexible and Rigid Highway pavements (K3)

- Classify the various components of Dock & Harbors (K2)

SYLLABUS

UNIT I

Components of Railway Engineering: Historical development of railways in India – Advantages of Railways – Classification of Indian Railways – Permanent way – Components and their functions – Rail joints – Welding of Rails – Creep of Rails – Rail fixtures & Fastenings.

UNIT II

Geometric Design of Railway Track: Track Geometric design – Points & Crossings –Track drainage – Layout of Railway stations and yards – Signals – Interlocking – Track circuiting–Track Maintenance.

UNIT III

Turnouts & Controllers: Track layouts – Switches – Crossings – Turnouts – Signal Objectives – Classification – Fixed signals – Stop signals – Signaling systems – Mechanical signaling system – Electrical signaling system.

UNIT IV

Airport Planning: Airport Master plan – Airport site selection – Air craft characteristics –Airport classification – Runway orientation – Wind rose diagram – Runway length – Taxiway – Terminal area.

UNIT V

Runway Design Methods: Various Design factors – Design methods for Flexible pavements – Design methods for Rigid pavements – LCN system of Pavement Design – Airfield Pavement Failures

UNIT – VI

Docks & Harbors: Layout of Port components – Functions –Classification of Ports – Site selection – Natural Phenomenon – Tides, Winds, Waves, Currents – Drift – Navigational aids.

TEXTBOOKS:

1. Railway Engineering, Satish Chandra and Agarwal M. M., Oxford University Press, New Delhi.
2. Airport Engineering, Khanna &Arora , Nemchand Bros, New Delhi.
3. Docks and Harbor Engineering, Bindra S.P., Dhanpathi Rai & Sons, New Delhi.

REFERENCE BOOKS:

1. Railway Engineering, Saxena & Arora, Dhanpat Rai, New Delhi.
2. Airport Engineering, Virendra Kumar, Dhanpat Rai Publishers, New Delhi.
3. Airport Engineering Planning & Design, Subhash C. Saxena, CB Publishers, New Delhi.
4. Transportation Engineering Planning Design, Wright P. H. & Ashfort N. J., John Wiley & Sons.
5. Transportation Engineering Volume II, Venkatramaiah, C., Universities Press, Hyderabad.
6. Transportation Engineering, Railways, Airports, Docks & Harbors, Srinivasa Kumar R, University Press, Hyderabad.
7. Highway, Railway, Airport and Harbor Engineering, Subramanian K. P, Scitech Publications (India) Pvt. Limited, Chennai.

Year/Sem	**VI Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation / Year	V18 / 2020-2021	3	0	0	3	V18CET24
Name of the Course	**ENVIRONMENTAL ENGINEERING-I**					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of this course the student will be able to

- Describe the importance of protected water supply (K1)
- Identify the water source and select proper intake structure (K2)
- Examine the Characteristics of water (K3)
- apply a suitable process to treat raw water collected from source (K3)
- Select suitable Disinfection methods to treat water from primary treatment units (K3)
- Demonstrate various appurtenances used in the water supply (K3)

UNIT I

Protected Water Supply systems: Importance and Necessity, Water borne diseases, Flow chart of public water supply system, Role of Environmental Engineer, Agency activities. Water Demand and Quantity Estimation: Estimation of water demand for a town or city, Per capita Demand and factors influencing it - Types of water demands and its variations- factors affecting water demand, Design Period, Factors affecting the Design period, Population Forecasting

UNIT II

Sources of Water: Lakes, Rivers, Impounding Reservoirs, comparison of sources with reference to quality, quantity and other considerations- Capacity of storage reservoirs, Mass curve analysis. Groundwater sources of water: Types of water bearing formations, springs, Wells and Infiltration galleries, Yields from infiltration galleries. Collection and Conveyance of Water: Factors governing the selection of the intake structure, Types of Intakes. Conveyance of Water: Gravity and Pressure conduits.

UNIT III

Quality and Analysis of Water: Characteristics of water–Physical, Chemical and Biological-Analysis of Water – Physical, Chemical and Biological characteristics. Comparison of sources with reference to quality-I.S. Drinking water quality standards and WHO guidelines for drinking water

UNIT IV

Primary Treatment of Water: Flowchart of water treatment plant, Treatment methods: Theory and Design of Sedimentation, Coagulation, Sedimentationwith Coagulation, Filtration.

UNIT V

Secondary Treatment (Disinfection): Theory of disinfection-Chlorination and other Disinfection methods, Softening of Water, Removal of color and odours - Iron and Manganese removal – Adsorption-fluoridation and deflouridation–aeration– Reverse Osmosis-Iron exchange–Ultra filtration.

UNIT VI

Distribution of Water: Requirements- Methods of Distribution system, Layouts of Distribution networks, Pressures in the distribution layouts, Analysis of Distribution networks: Hardy Cross and equivalent pipe methods -Components of Distribution system: valves such as sluice valves, air valves, scour valves and check valves, hydrants, water meters and Pipes –Laying andtesting of pipe lines- selection of pipe materials, pipe joints.

TEXTBOOKS:

1. Elements of Environmental Engineering by K.N. Duggal, S. Chand Company Ltd., New Delhi, 2012.
2. Water Supply Engineering by Dr. P.N. Modi, Standard book house, 4th edition (2015)
3. Water Supply Engineering by B.C. Punmia, Laxmi publications, volume-1
4. Water supply and sanitary engineering by S. C. Rangwala, Charotar publishing house, 29th edition (2016)

REFERENCE BOOKS:

1. Water supply engineering by S. K. Garg , Khanna publishers, ,33rd edition (2010)
2. Environmental Engineering by Howard S. Peavy, Donald R. Rowe (2017) Mc-Graw-Hill

   Book Company, New Delhi, 1985.
3. IS 10500:2012, Drinking water specification.
4. IS :3052 (Part-08), Methods of sampling and Test(physical and chemical) for water and waste

   Water.

Year/Sem	VI Sem	L	T	P	C	COURSE CODE
Regulation / Year	V18 / 2020-2021	0	0	3	1.5	V18CEL09
Name of the Course	**ENVIRONMENTAL ENGINEERING LAB**					
Branch	CIVIL ENGINEERING					

Course outcomes:

Upon successful completion of this course the student will be able to

- Find some important characteristics of water and waste water in the laboratory (K3)
- Prepare some conclusion and decide whether the water is potable or not (K3)
- Examine whether the water body is polluted or not with reference to the state parameters
  in the list of experiments (K3)
- Find the strength of the sewage in terms of BOD and COD (K3)

LIST OF EXPERIMENTS

1. Sampling of water for testing (Demonstration)
2. Determination of alkalinity or acidity
3. Determination of chlorides in water and soil
4. Determination and estimation of total solids, organic and inorganic solids, settle able solids
5. Determination of Iron
6. Determination of pH and Electrical Conductivity of water and soil
7. Determination of Optimum coagulant dose
8. Determination of Chlorine demand
9. Determination and estimation of total hardness – calcium and magnesium
10. Determination of N, P, K values in solid waste
11. Physical parameters – Temperature, colour, odour, turbidity, taste.
12. Presumptive Coliform test
13. Determination of Dissolved Oxygen and BOD
14. Determination of COD

LIST OF EQUIPMENTS

1. pH Meter
2. Turbidity Meter
3. Conductivity Meter
4. Hot Air Oven
5. Muffle Furnace
6. Dissolved Oxygen Meter
7. U-V Visible Spectrophotometer
8. COD Reflux Apparatus
9. Jar Test Apparatus
10. BOD Incubator
11. Autoclave

12. Hazens Apparatus

13. Imhoff Cone

REFERENCES

1. “Standard methods for analysis of water and waste water”, APHA.

2. “Chemical analysis of water and soil”, Murali Krishna, KVSG., Reem publications, New Delhi.

Year/Sem	**VI Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation / Year	V18 / 2020-2021	0	0	3	1.5	V18CEL10
Name of the Course	**CAD & GIS LAB**					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of this course the student will be able to

- Employ structural analysis software to analyze and design 2D and 3D frames (K3)
- Prepare design and analyze retaining wall and simple towers using CADD software (K3)
- Demonstrate to digitize and create thematic map and extract important features (K3)
- Develop digital elevation models using GIS software (K3)

COMPUTER AIDED DESIGN AND DRAWING

SOFTWARE:

- STAAD PRO
- STRAAP
- STUDDS

LIST OF EXPERIMENTS

- 2-D Frame Analysis and Design
- Steel Tabular Truss Analysis and Design
- 3-D Frame Analysis and Design
- Retaining Wall Analysis and Design
- Simple Tower Analysis and Design.

GEOGRAPHICAL INFORMATION SYSTEM

SOFTWARE:

- Arc GIS 9.0
- ERDAS 8.7
- Mapinfo 6.5

LIST OF EXPERIMENTS

- Digitization of Map/Toposheet
- Creation of thematic maps.
- Estimation of features and interpretation
- Estimation of features and interpretation
- Simple applications of GIS in water Resources Engineering & Transportation Engineering.

REFERENCES

1. Concept and Techniques of GIS' by C.P.L.O. Albert, K.W. Yong, Printice Hall Publishers.

ANNEXURE –CE-III

COURSES OFFERED UNDER OPEN ELECTIVE – I IN VI SEMESTER TO ALL OTHER BRANCHES

Sl.No.	Course Code	Name of the Course
1	V18CEOE1	Repair and Rehabilitation of Structures
2	V18CEOE2	Remote Sensing and GIS

Year/Sem	VI Sem	L	T	P	C	COURSE CODE
Regulation / Year	V18 / 2020-2021	3	0	0	3	V18CETOE1
Name of the Course	REPAIR AND REHABILITATION OF STRUCTURES					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of this course the student will be able to

- Describe the deterioration of concrete in structures (K1)
- Estimate the degree of deterioration using Non Destructive Test methods (K2)
- Assess the failures and causes of failures in structures (K3)
- Relate different materials used for repair and rehabilitation of structures (K3)
- Employ and suggest suitable retrofitting techniques (K3)
- Organize the case studies and report the condition of structures (K3)

UNIT I

Deterioration of concrete in structures: Physical processes of deterioration like Freezing and Thawing, Wetting and Drying, Abrasion, Erosion, Pitting.

Chemical processes of deterioration like Carbonation, Chloride ingress, Corrosion, Alkali aggregate reaction, Sulphate attack, Acid attack, temperature and their causes, Mechanism, Effect, preventive measures.

Cracks: Cracks in concrete, types, pattern, quantification, measurement and preventive measures.

UNIT II

Non Destructive Testing: Non destructive test methods for concrete like Rebound hammer, Ultrasonic pulse velocity, Rebar locator, Corrosion meter, Penetration resistance and Pull out tests. Methods for corrosion measurement and assessment, including half-cell potential and resistivity, mapping of data.

UNIT III

Failure of buildings: Definition of building failure, types of failures, Causes of Failures, Faulty Design, Accidental over Loading, Poor quality of material, Poor Construction practices and Fire damage. Investigation of failures, diagnostic testing methods and equipments required. Repair of cracks in concrete.

UNIT IV

Materials for repair and rehabilitation: Admixtures, types of admixtures, purposes of using admixtures, chemical composition, Natural admixtures, Fibres, wraps, Glass and Carbon fibre wraps, Steel Plates. Concrete behavior under corrosion, disintegrated mechanisms, moisture effects and thermal effects. Visual investigation, Acoustical emission methods, Corrosion activity measurement, chloride content, Depth of carbonation, Impact echo methods, Ultrasound pulse velocity methods, Pull out tests.

UNIT V

Repair Techniques: Grouting, Jacketing, Shotcreting, Externally bonded plates, Nailing, Underpinning and under water repair. Materials, Equipments, Precautions and Processes.

UNIT VI

Investigation of structures: Distress, observation and preliminary test methods. Case studies related to rehabilitation of bridge piers, dams, canals, heritage structures, corrosion and erosion damaged structures.

TEXT BOOKS:

1. "Maintenance & Repair of Civil Structures", Gupta, B.I., and Amit Gupta, Standard Publishers and Distributors, 2015.
2. "Rehabilitation of Concrete Structures", Vidivelli, B., Standard Publishers and Distributors, 2007.
3. "Concrete Bridge Practice, Construction, Maintenance & Rehabilitation", Raina. V.K., Shroff Publishers and Distributors, 2010.

REFERENCES:

1. "Concrete Structures- protection Repair and Rehabilitation", Doodge, R. Woodson., BH Publishers.
2. "Concrete technology", Neville, A.M and Brooks, J.J. Prentice Hall, 2010.
3. "Special Structural concrete", Rafat Siddique, Galgotia Publications, 2000.
4. "Concrete repair and maintenance illustrated", Peter H Emmons, R S Means Publishers, 1993.
5. "Concrete technology", Shetty, M.S., S Chand publishers, 1982.
6. "Repair and protection of concrete structures", Noel P.Mailvaganam, CRC press, London, 1992.

Year/Sem	V Sem	L	T	P	C	COURSE CODE
Regulation / Year	V18 / 2020-2021	3	0	0	3	V18CEOE2
Name of the Course	**REMOTE SENSING AND GEOGRAPHICAL INFORMATION SYSTEM**					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of this course the student will be able to

- Define the basic principles of Remote Sensing and GIS, including ground, air and satellite based sensor platforms (K1)
- Interpret the aerial photographs and satellite imageries (K2)
- Relate the process of input spatial data entry and its types (K3)
- Examine the Spatial Data for a variety of applications (K3)
- Employ RS and GIS for diverse applications (K3)
- Apply RS and GIS concepts in water resources engineering (K3)

SYLLABUS

UNIT I

Introduction to Remote Sensing: Basic concepts of remote sensing, electromagnetic radiation, electromagnetic spectrum, interaction with atmosphere, energy interaction with the earth surfaces, Characteristics of remote sensing systems.

Sensors and platforms: Introduction, types of sensors, airborne remote sensing, space borne remote sensing, image data characteristics, digital image data formats-band interleaved by pixel, band interleaved by line, band sequential, IRS, LANDSAT, SPOT, MODIS, ASTER,RISAT and CARTOSAT.

UNIT II

Image analysis: Introduction, elements of visual interpretations, digital image processing-image preprocessing, image enhancement, image classification, supervised classification, unsupervised classification.

UNIT III

Geographic Information System: Introduction, key components, application areas of GIS, map projections.

Data entry and preparation: spatial data input, raster data models, vector data models.

UNIT IV

Spatial data analysis: Introduction, overlay function-vector overlay operations, raster overlay operations, arithmetic operators, comparison and logical operators, conditional expressions, overlay using a decision table, network analysis-optimal path finding, network allocation, network tracing and buffer analysis.

UNIT V

RS and GIS Applications: Land cover and land use, agriculture, forestry, geology, geomorphology, urban applications.

UNIT VI

Applications of Hydrology, Water Resources and Disaster Management: Food zoning and mapping, groundwater prospects and potential recharge zones, watershed management and disaster management with case studies.

TEXTBOOKS:

1. “Remote sensing and GIS”, Bhatta, B., Oxford University Press, 2008.
2. “Remote Sensing and Geographical Information Systems”, Anji Reddy, M., B S Publications, 2008.
3. “Basics of Remote Sensing and GIS” Kumar. S., Laxmi Publications,

REFERENCE BOOKS:

1. “Fundamentals of Remote Sensing”, George Joseph, Universities Press, 2013.
2. “Concepts and Techniques of Geographical Information System”, Chor Pang Lo and Yeung, A.K.W., Prentice Hall, India, 2006.
3. “Remote Sensing and its Applications”, Narayan L.R.A, Universities Press, 2012.
4. “Introduction to Geographic Information Systems”, Kand Tsung Chang, McGraw Hill Higher Education, 2009.
5. “Basics of Remote sensing & GIS”, Kumar, S., Laxmi Publications, New Delhi, 2005.
6. “Principals of Geographical Information Systems”, Burrough, P.A and McDonnell, R.A. Oxford University Press, 1998.
7. “Remote Sensing”, Schowenger, R. A., Elsevier publishers, 2006.

8. “Remote Sensing and Image Interpretation”, Lillesand, T.M, Kiefer, R.W. and Chipman, J.W., Wiley India Pvt. Ltd., New Delhi, 2013.
9. “Fundamentals of Geographic Information Systems”, Demers, M.N, Wiley India Pvt. Ltd, 2013.

Annexure-IX

MINUTES OF THE III BOS OF ENGLISH AND MATHS 1.8.'20.

The III BOS Meeting of English and Maths combinedly was held online at 4pm of 1.8.'20 .using the Zoom link.

URL **:**https://zoom.us/j/93450632552, Password : 147257.

Agenda of the Meeting

- . Opening Remarks by BOS Chairperson.
- 2. To discuss and finalize the syllabus of Professional Communication Skills-III{**V18ENT05}** for V Semester of B.Tech .,for the Academic Year 2020-2021.
- **3.** To discuss and finalize the syllabus of Professional Communication Skills-IV{**V18ENT06}** for VI Semester of B.Tech .,for the Academic Year 2020-2021.

Minutes

- The syllabus of Professional Communication Skills-III{**V18ENT05}** for V Semester of B.Tech .,under V18 Regulations, was approved by the Members of BOS of English and Maths. Details are given in Annexure-EN-01
- The syllabus of Professional Communication Skills-IV{**V18ENT06}** for VI Semester of B.Tech .,under V18 Regulations, was approved in the meeting by the BOS members of English and Maths. Details are given in Annexure-EN-02
- The suggestion regarding the usage of ampersand was considered redundant , while referring to " Ratio & Proportion", " LCM & HCF "by the BOS members of Maths and the ampersand was replaced with " hyphen"..

Members Present

1. Dr.G.V.N.S.R.Ratnakara Rao
Principal,
Sri Vasavi Engineering College

English BOS Members

1. Chairman of BOS **:** Dr.T.Sujani, Associate Professor
& Training Head
Sri Vasavi Engineering College

2. Dr. D. Kesava Rao

(Council Nominee)
Professor of English, NIT Warangal

3. Prof. K. Sree Ramesh
   (Council Nominee)
   Professorof English and
   Principal, College ofArts & Commerce
   Adikavi Nannaya University
4. Dr.A.Purna Chandra Rao
   (University Nominee)
   Assoc.Professor, PVP Siddhartha Institute of Technology, Vijayawada

Faculty Present:

1. Mr.K.V.Rama Rao
2. Mrs. K.Radha Madhavi
3. Mrs.K.V.L.B.Devi
4. Mr.T.Suresh
5. Mr.K.Ramana Rao
6. Mr.G.Srinivasa Rao

Maths BOSMembers

1. Chairman of BOS : SriN.Raja Sekhar
   Head, BSH
   Sri Vasavi Engineering College
2. Dr.GVSR Dikshithulu
   Professor, JNTUK
3. Dr.Y.N.Reddy
   NIT Warangal
4. Dr.TSR Murthy
   Professor, Vishnu Engineering College

Faculty Present

1. Mr.Amjed Ali
2. .Mr.J.N.V.Somayajulu
3. Mr.P.Someshwara Rao

Dr.T.Sujani
Chairman of the BOS

Annexure-EN-01

SRI VASAVI ENGINEERING COLLEGE(AUTONOMOUS)
(Sponsored by Sri Vasavi Educational Society)
(Approved by AICTE, New Delhi & Permanently affiliated to JNTUK, Kakinada)
(Accredited by NAAC with 'A' Grade,Recognized by UGC under section 2(f) & 12(B))
Pedatadepalli, **TADEPALLIGUDEM–534 101.**W.G.Dist**. (A.P)**
Department of Basic Sciences & Humanities

V18ENT05	**PROFESSIONAL COMMUNICATION SKILLS – III**	**L**	**T**	**P**	**C**
		0	**4**	**0**	**MNC**

COURSE OUTCOMES

	After successful completion of the course, students will be able to	Knowledge Level
CO1	Distinguish the subtle meanings of various words in different contexts, recognize similar words as well as words with contrast meanings and use them appropriately.	K2
CO2	Interpret the passage using different strategies and answer the questions with ease.	K3
CO3	Compare different pairs of words and draw analogy between the words. Choose an appropriate word to make a sentence meaningful.	K4
CO4	Recognize the easiest and best possible way of solving problems in the area of NNumber and Letter Series, Analogy, Classification, Coding & Decoding Symbols, a Ranking and Analytical Reasoning.	K1
CO5	Investigate the different types of logics involved in Mirror and Water Images, Logical Reasoning & Arithmetical Reasoning.	K4
CO6	Find the common traps in the questions and errors likely to be made from the concepts of Blood Relations, Directions, Average, Clock and Calendar, Data Sufficiency, Permutations-Combinations and Probability.	K3

SYLLABUS

UNIT – 1

Vocabulary – 500 words – Meaning – contextual Usage - Prefix – Suffix – Root words

Synonyms - Antonyms- Para jumbles – Strategies – Directional words – central theme

UNIT – 2

Sentence completion

Strategies – Cause and effect signals – support signals – contrast signals

Writing skills –

Email writing– Types -- Dos and Don’ts- Paragraph writing- Essay writing

Fabrication of a story based on the context.

UNIT – 3

Analogies

Strategies - Create a general sentence - Use the correct part of speech - Beware of homonyms - Recognize common relationship types.

Reading Comprehension

Strategies– skimming – scanning – predicting – identifying the central idea – questioning – making inferences

UNIT - 4

Number And Letter Series, Coding & Decoding, Analogy,Classification& Ranking. (K1)

Problems of how to find the next number in the series, Finding the missing number and related sums, Sums related to Classification, Sums related to letter series, Relation between number series and letter series, Finding odd one out from groups, Identify the rank in different places.

UNIT-5

Problems On Ages& Numbers,Mirror And Water Images, Logical Reasoning &Arithmetical Reasoning.(K4)

Definition and concept of Venn Diagram – its applications. statements – Affirmations, Denials and Contradictions. Sums related to Ages & numbers. Problems on ages with different logics. Identifying the images of water and Mirror.

UNIT-6

Blood Relations, Directions, Average, Clock And Calendar, Data Sufficiency, Permutations-Combinations And Probability.(K3)

Deriving the formula to find the angle between hands for the given time, History of calendar-, Finding the day for the given date, Problems related to directions. Difference between words Permutation and Combinations – Various cases -Real Time Scenarios. Concept of Probability – - Conjunctions – Rules & Cases of Probability.

Reference Books

- Pic Voc – Published by Sri Vasavi Engineering College
- Word Power Made Easy Handy – Dr.ShaliniVerma
- Essential Grammar in Use – RAYMOND MURPHY
- English for Professional Students – S.S.Prabhakar
- General English for Competitive Examination
- A Practical English Grammar – A.J.Thomson
- Soft Skills – Dr.Alex – Tata mcgra Hill
- GRE – Barons- published by Galgotia Publications
- CAT – Mohammed Muneer published by Tata McGraw - Hill Education
- Work book -1 on Aptitude Prepared by Training & Placement cell, Sri Vasavi Engineering College.
- Magical Book on Quicker Maths –Tyra
- Practice Book on Quicker Maths –Kundan & Tyra
- R.S. Agarwal – Sultan Chand Publications
- R.S.Agarwal – Non Verbal Reasoning.

Hyperlinks

1. https://www.indiabix.com/
2. https://www.campusgate.co.in/
3. https://www.questionpaper.org/

Annexure-EN-02

SRI VASAVI ENGINEERING COLLEGE (AUTONOMOUS)
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Pedatadepalli, **TADEPALLIGUDEM–534 101.**W.G.Dist**. (A.P)**

Department of Basic Sciences & Humanities

		L	T	P	C
V18ENT06	**PROFESSIONAL COMMUNICATION SKILLS – IV**	**0**	**4**	**0**	**MNC**

COURSE OUTCOMES

	After successful completion of the course, the students will be able to	Knowledge Level
CO1	Express writer's tone and relevant ideas using different types of writing skills and prepare resume to show case skills and accomplishments.	**K2**
CO2	Organize thoughts in the discussions and express views without reticence and face interviews with aplomb.	**K3**
CO3	Infer the meaning of the picture by thinking out of the box and speak without inhibitions.	**K4**
CO4	Demonstrate problem solving skills through the concepts of Percentages, Profit and loss, Simple Interest & Compound Interest and Allegation.	**K3**
CO5	Analyze appropriate methods of logical thinking on Ratio and Proportion, Partnership, LCM and HCF, Number System, Areas & Volumes.	**K4**
CO6	Calculate the end results of Cubes, Dice and Data Analysis, Time & Work, Time & Distance, Race & Games.	**K4**

SYLLABUS

UNIT – 1

Writing skills – Importance of writing skills – Types – Expository – Descriptive – Persuasive – Creative – Narrative Skills.

Resume – Basic rules for a good resume - Steps to make an effective resume format.

UNIT – 2

Group Discussion – Definition – methodology & guidelines – characteristics of a successful GD– vital role of GD in selection process- Etiquette- Types of GDs- Sentence starters for GD - Mock GDs.

Campus to corporate – Steps to a successful interview – Kinds of interviews – Screening – Face– to-Face – Panel & Skype interviews - Mock interviews

UNIT -3

Speaking skillsLevel -1 – JAM sessions – Brain storming – Picture interpretation

Speaking skillsLevel -2– Debate – Press conference – Business Skills

UNIT - 4

Percentages, Profit and Loss, Simple and Compound Interest, Allegation & Mixtures

Definition of Simple and Compound Interest. Formulas of Applications – Difference between Simple and Compound interest – Rate of Increase or Decrease Population – Expected values of Maturity. Calculate percentages on different situations, using in profit and loss. Identifying difference between Cost price, Selling Price and Marked Price, Finding Discounts, using the method of allegation.

UNIT – 5

Ratio - Proportion, Partnership, LCM - HCF, Areas & Volumes

Introducing the concept of ratio in three different methods, a method to compute and compare two ratios – The effect of increase or decrease of a quantity on the ratio – The meaning of proportion and Problems related to Ratio and Proportion. Improve problem solving skills through Lcm& Hcf.

Unit- 6

Time, Work and Distance, Cubes, Dice and Data Analysis

Men- Days -work –completion- Capability Ratio among Men, Women and Children – Application of time in Pipes and Cistern. Work Progress in positive and negative effects. Relation among Time, Speed and Distance – Concepts of Relative speed and Average Speed – Ideas about Boats and Streams and Races of Games. Calculate the end results of Cubes and Dice.

References

- Communication Skills for Engineer's – Suneetha Mishra & C.Murali Krishnan- Pearson publications.
- Interviews and Group Discussions – T.S. Jain & Gupta- Upkar's Publications.
- Effective Interpersonal and Team Communication skills – Clifford.A.Whitcomb& Leslie E. Whitcomb- Wiley Publications
- The Fine Art of small Talk- Debra Fine- Piatkus publications
- Soft Skills – Dr.Alex – Tata mc graw Hill
- GRE – Barons & CAT – Muneer
- Work book -II on Aptitude prepared by Training Dept., Sri Vasavi Engineering College.
- Magical Book on Quicker Maths –Tyra
- Practice Book on Quicker Maths –Kundan & Tyra
- R.S. Agarwal – Sultan Chand Publications
- R.s.Agarwal – Non Verbal Reasoning.

Hyperlinks

- https://www.indiabix.com/
- https://www.campusgate.co.in/
- https://www.questionpaper.org/

Annexure-X

Amendments to **UG V18** Academic Regulations

1. As per V18 regulations vide item no:7.3 :

A student shall be promoted from II year (IV Sem) to III year (V Semester) if he/she earns 50% of the total credits specified up to and including IV semester examinations.

This is amended as follows

No minimum credits required for promotion from IV semester to V Semester , for the academic year 2020-2021 only, as a special case, due to COVID-19.

2. Evaluation of Mini Project:

For the mini Project, out of total 100 marks, 40 marks shall be internal evaluation and 60 marks for end semester examination. The Internal Evaluation shall be on the basis of two seminars given by each student on the topic of project and evaluated by an internal committee consisting of supervisor and faculty nominated by the HOD. The Semester End Examination (Viva – Voce) shall be conducted by a committee consisting of an external examiner, Head of the Department and Supervisor of the Project.

Annexure-XI

Approval of Honor's / Minor degree in Data Science

1. Students, who are desirous of pursuing their special interest other than the choosen discipline, may opt for the minor/honors degree offered. We are proposing Honors degree in Data Science for CSE & CST and Minor degree in Data Science for CE, EEE, ME, ECE & ECT.

Academic Regulations for Minor degree in a discipline (Minor degree/programme):

Students, who are desirous of pursuing their special interest areas other than the chosen discipline of Engineering / Technology, may opt for additional courses in minor specialization groups offered by a department other than their parent department as per the Guidelines given by AICTE.

a. Students having a CGPA of 8.0 or above up to IV Semester and without any live backlog courses will be permitted to register for Minor discipline programme.

However CGPA of 8.0 or above up to III Semester without any live backlog courses will be permitted to register for minor degree programme for the academic year 2020-2021 only in view of pandemic Covid-19

b. In order to earn a Minor in a discipline, a student has to earn extra18 credits by studying prescribed courses. The list of courses to be studied either in MOOCs courses under SWAYAM Platform or conventional type will be decided by the College at the time of registration for Minor degree

c. The students are permitted to register for their minor specialization courses from the V semester onwards.

d. The Evaluation pattern of courses similar to the regular course evaluation / SWAYAM portal

e. Students are allowed to opt for only one Minor discipline programme in the order of preference given by them.

f. Minimum strength required for offering a Minor in a discipline is considered as 30% of the class size.

g. Minors degree should be completed along with regular B. Tech. program. That is, Minors degree should be completed by the end of final year B. Tech. program along with the major discipline. A student can continue to pursue the minor degree as long as he has no backlogs.

h. A student registered for Minor in a discipline shall pass in all courses that constitute the requirement for the Minor degree programme. No class/division (i.e., second class, fist class and distinction, etc.) shall be awarded for Minor degree programme.

i. The Minor in a discipline will be mentioned in the degree certificate as Bachelor of Technology in XXX with Minor in YYY. For example, Bachelor of Technology in Mechanical Engineering with Minor in Data Science. This fact will also be reflected in the transcripts, along with the list of courses taken for Minor programme with CGPA mentioned separately.

j. Curriculum and the syllabus of the courses shall be approved by the Board of studies and the Academic Council.

Academic Regulations for Honors degree in a discipline:

A new academic programme B.Tech. (Hons.) is introduced in order to facilitate the students to choose additionally the specialized courses and build their competence in a specialized area. Students should opt for additional courses in Honors degree offered by their parent department and as per the Guidelines given by AICTE.

a. Students having a CGPA of 8.0 or above up to IV Semester and without any live backlog courses will be permitted to register for Honors degree.

However CGPA of 8.0 or above up to III Semester without any live backlog courses will be permitted to register for Honors degree programme for the academic year 2020-2021 only in view of pandemic Covid-19

b. In order to earn a Honors degree, a student has to earn extra 18 credits by studying prescribed courses.The list of courses to be studied either in MOOCs courses under SWAYAM Platform or conventional type will be decided by the College at the time of registration for Honors degree.

c. The students are permitted to register for their honors degree courses from the V semester onwards.

d. The Evaluation pattern of courses similar to the regular course evaluation / SWAYAM portal

e. Students are allowed to opt for only one honors degree in the order of preference given by them.

f. Minimum strength required for offering a honors degree is considered as 30% of the class size.

g. Honors degree should be completed along with regular B. Tech. program. That is, Honors degree should be completed by the end of final year B. Tech. program along with the major discipline. A student can continue to pursue the Honors degree as long as he has no backlogs.

h. A student registered for honors degree shall pass in all courses that constitute the requirement for the Minor degree programme. No class/division (i.e., second class, fist class and distinction, etc.) shall be awarded for honors degree programme.

i. The Honors in a discipline will be mentioned in the degree certificate as Bachelor of Technology in XXX with honors in YYY. For example, Bachelor of Technology in Computer Science and Engineering with honors in Data Science. This fact will also be reflected in the transcripts, along with the list of courses taken for honors programme with CGPA mentioned separately.

j. Curriculum and the syllabus of the courses shall be approved by the Board of studies and the Academic Council.

Annexure-XII

Amendments to **MBA V18** Academic Regulations

1. Evaluation of MNC(Mandatory Non Credit Courses) Courses

The evaluation and minimum academic requirements of MNC courses are at par with other theory courses. These courses will not carry any credits. The performance will be graded as Pass / Fail. The grades obtained in these courses will not affect the Grade Point Average.

2. Internal evaluation for Mini Project

The evaluation of Mini project shall be made by a departmental committee. The committee adjudges the report either as satisfactory or not satisfactory. Satisfactory report deemed to be successful completion of the course

***

Annexure-XIII

Result Analysis

Autonomous Results

BRANCH WISE PERFORMANCE ANALYSIS (EXTERNAL)

NAME OF THE EXAM: **B.Tech II Semester Regular. May– 2019**

S. No.	Branch	Appeared	Passed	Fail	Pass %
1.	CE	42	11	31	26.19
2.	EEE	44	30	14	68.18
3.	ME	79	24	55	30.37
4.	ECE	178	153	25	85.95
5.	CSE	235	151	84	64.25
Overall		**578**	**369**	**209**	**63.84**

PROGRAMME WISE PERFORMANCE ANALYSIS (EXTERNAL)

NAME OF THE EXAM: **M.Tech II Semester Regular. June – 2019**

S. No.	Specialization	Appeared	Passed	Fail	Pass %
1.	STE	7	5	2	71.43
2.	PSCA	3	3	0	100
3.	MD	9	5	4	55.56
4.	VLSI&ES	1	1	0	100
5.	CSE	5	5	0	100
6.	**Overall**	**25**	**19**	**6**	**76.00**

PROGRAMME WISE PERFORMANCE ANALYSIS (EXTERNAL)

NAME OF THE EXAM: **MBA II Semester Regular. May – 2019**

S. No.	Programme	Appeared	Passed	Fail	Pass %
1.	MBA	57	46	11	**80.70**

University Results

BRANCH WISE PERFORMANCE ANALYSIS (EXTERNAL)

NAME OF THE EXAM: **IV B.Tech II Semester Regular. April– 2019**

S. No.	Branch	Appeared	Passed	Fail	Pass %
1.	CE	70	64	6	91.43
2.	EEE	120	107	13	89.16
3.	ME	126	96	30	76.19
4.	ECE	201	161	40	80.09
5.	CSE	243	215	28	88.47
Overall		**760**	**643**	**117**	**84.60%**

BRANCH WISE PERFORMANCE ANALYSIS (EXTERNAL)

NAME OF THE EXAM: **III B.Tech II Semester Regular. April – 2019**

S. No.	Branch	Appeared	Passed	Fail	Pass %
1.	CE	64	16	48	25
2.	EEE	117	64	53	54.70
4.	ME	130	85	45	65.38
6.	ECE	199	107	92	53.76
9.	CSE	234	195	39	83.33
Overall		**744**	**467**	**277**	**62.77%**

BRANCH WISE PERFORMANCE ANALYSIS (EXTERNAL)

NAME OF THE EXAM: **II B.Tech II Semester Regular. April – 2019**

S. No.	Branch	Appeared	Passed	Fail	Pass %
1.	CE	70	29	41	41.43
2.	EEE	129	80	49	62.01
4.	ME	124	50	74	40.32
6.	ECE	200	99	101	49.5
9.	CSE	214	135	79	63.08
Overall		**737**	**393**	**344**	**53.32%**

Autonomous Results

BRANCH WISE PERFORMANCE ANALYSIS (EXTERNAL)

NAME OF THE EXAM: **B.Tech I Semester Regular. January– 2020**

S. No.	Branch	Appeared	Passed	Fail	Pass %
1.	CE	28	18	10	64.29
2.	EEE	47	32	15	68.09
3.	ME	61	27	34	44.26
4.	ECE	179	138	41	77.09
5.	CSE	253	232	21	91.69
6.	CST	59	45	14	76.27
7.	ECT	52	38	14	73.08
Overall		**679**	**530**	**149**	**78.06%**

BRANCH WISE PERFORMANCE ANALYSIS (EXTERNAL)

NAME OF THE EXAM: **B.Tech III Semester Regular. November– 2019**

S. No.	Branch	Appeared	Passed	Fail	Pass %
1.	CE	65	31	34	47.69
2.	EEE	119	75	44	63.02
3.	ME	128	68	60	53.12
4.	ECE	197	119	78	60.40
5.	CSE	257	190	67	73.92
Overall		**766**	**483**	**283**	**63.05**

PROGRAMME WISE PERFORMANCE ANALYSIS (EXTERNAL)

NAME OF THE EXAM: **MBA III Semester Regular. December – 2019**

S. No.	Programme	Appeared	Passed	Fail	Pass %
1.	MBA	54	45	9	**83.33**

PROGRAMME WISE PERFORMANCE ANALYSIS (EXTERNAL)

NAME OF THE EXAM: **MBA I Semester Regular. February – 2020**

S. No.	Programme	Appeared	Passed	Fail	Pass %
1.	MBA	61	57	4	**93.44**

PROGRAMME WISE PERFORMANCE ANALYSIS (EXTERNAL)

NAME OF THE EXAM: **M.Tech I Semester Regular. February – 2020**

S. No.	Specialization	Appeared	Passed	Fail	Pass %
1.	STE	1	1	0	100
2.	PSCA	1	1	0	100
3.	VLSI&ES	3	3	0	100
4.	CSE	2	0	2	0
5.	**Overall**	**7**	**5**	**2**	**71.43**

University Results

BRANCH WISE PERFORMANCE ANALYSIS (EXTERNAL)

NAME OF THE EXAM: **IIIB.Tech I Semester Regular. November– 2019**

S. No.	Branch	Appeared	Passed	Fail	Pass %
1.	CE	68	36	32	52.94
2.	EEE	122	80	42	65.57
3.	ME	113	36	77	31.85
4.	ECE	196	133	63	67.85
5.	CSE	211	176	35	83.41
Overall		**710**	**461**	**249**	**64.92**

BRANCH WISE PERFORMANCE ANALYSIS (EXTERNAL)

NAME OF THE EXAM: **IVB.Tech I Semester Regular. November– 2019**

S. No.	Branch	Appeared	Passed	Fail	Pass %
1.	CE	61	32	29	52.46
2.	EEE	114	75	39	65.78
3.	ME	134	66	68	49.25
4.	ECE	197	139	58	70.55
5.	CSE	228	189	39	82.89
Overall		**734**	**501**	**233**	**68.25**

Annexure- XIV

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Pedatadepalli, TADEPALLIGUDEM – 534 101, W.G. Dist, (A.P.)

Dt: 01/07/2020.

Dr. Guduru VNSR Ratnakara Rao
B.E., M.E., Ph.D
PRINCIPAL

ACADEMIC CALENDAR For B.Tech – III Year 2018 Batch

B.Tech V Semester

Description	From	To	Weeks
Commencement of Class Work	**01-07-2020**	-	-
I Unit of Instructions	01-07-2020	26-08-2020	8W
I Mid Examination	27-08-2020	05-09-2020	1W
II Unit of Instructions	07-09-2020	31-10-2020	8W
II Mid Examination	02-11-2020	07-11-2020	1W
Comprehensive Test	09-11-2020	14-11-2020	1W
Preparation & Practicals	16-11-2020	21-11-2020	1W
End Examinations	23-11-2020	05-12-2020	2W
Commencement of VI Sem Class work	**07-12-2020**		

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Annexure- XV

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Pedatadepalli, TADEPALLIGUDEM – 534 101, W.G. Dist, (A.P.)

Date: 30.07.2020

Academic Calendar
For
B Tech II Year
2019 Batch

B.TECH III Semester			
Description	**From**	**To**	**Weeks**
Commencement of Class Work	**03.08.2020**		
I Unit of Instructions	03.08.2020	26.09.2020	8W
I Mid Examination	28.09.2020	03.10.2020	1W
II Unit of Instructions	05.10.2020	28.11.2020	8W
II Mid Examination	30.11.2020	05.12.2020	1W
Comprehensive Test	07.12.2020	12.12.2020	1W
Preparation & Practicals	14.12.2020	19.12.2020	1W
End Examinations	21.12.2020	02.01.2021	2W
Commencement of IV Sem Class work	**04.01.2021**		

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Annexure- XVI

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Dr.Guduru VNSRRatnakaraRao
B.E., M.E.,Ph.D
PRINCIPAL

Date: 24/08/2020

ACADEMIC CALENDAR FOR MBA III SEMESTER

(ACADEMIC YEAR 2020-21)

MBA III SEMESTER			
DESCRIPTION	**FROM**	**TO**	**WEEKS**
Commencement of class work for 3rd semester 24-08-2020			
I Unit of Instructions	24-08-2020	17-10-2020	8 Weeks
I Mid Examinations	19-10-2020	28-10-2020	8 Days
II Unit of Instructions	29-10-2020	26-12-2020	8 Weeks
II Mid Examinations	28-12-2020	06-01-2021	8 Days
End Examinations	08-01-2021	30-01-2021	2 Weeks

Annexure- XVII

B.Tech IV Sem				
S.No	**Exam**	**Description**	**Status as on 30/08/2020**	**Proposed**
1	B Tech MID-II Examinations	The said examination consists of Part-A and Part-B, Part-A being objective type for 10 marks and Part-B being a written examination for 15 marks.	Before lockdown Mid-II for three courses completed	Mid-II for remaining courses will be conducted as per regulations.
2	Comprehensive Test	The Comprehensive examination is conducted for 60 marks and scaled down to 10 Marks covering the total syllabus.	Not held	Marks will be awarded based on the performance in Mid-I and Mid-II examinations (best out of two mid exams will be scaled down to 10 marks)
3	Final Internal Marks	CIE= 0.8 X Best performance in MID exam +0.2 X Next best performance in MID exam +(AAT1+AAT2)/2+ Performance in comprehensive test	--	CIE= Best marks in MID exam + best of two AAT+ marks awarded for comprehensive test
4	Lab End Examination	There shall be continuous evaluation during the semester for 40 internal marks and semester end examination for 60 marks.The Semester end examination shall be conducted by the teacher concerned and an external examiner.	Not held	Will be conducted as per Academic regulations
4	Semester End Examination	The end semester examination is conducted for 60 marks covering the total syllabus.There will be 6 questions with internal choice (One from each Unit). The student has to answer all the 6 questions which carry a weightage of 10 marks each.	Not Held	Will be conducted based on the instructions from University/Government

B.Tech II Sem				
S.No	**Exam**	**Description**	**Status as on 30/08/2020**	**Proposed**
1	B Tech MID-I &II Examinations	The said examination consists of Part-A and Part-B, Part-A being objective type for 10 marks and Part-B being a written examination for 15 marks.	Not held	Will be held as per regulations
2	Comprehensive Test	The Comprehensive examination is conducted for 60 marks and scaled down to 10 Marks covering the total syllabus.	Not held	Marks will be awarded based on the performance in Mid-I and Mid-II examinations (best out of two mid exams will be scaled down to 10 marks)
3	Final Internal Marks	CIE= 0.8 X Best performance in MID exam +0.2 X Next best performance in MID exam +(AAT1+AAT2)/2+ Performance in comprehensive test	--	CIE= Best marks in MID exam + best of two AAT+ marks awarded for comprehensive test
4	Lab Internal and External Examination	There shall be continuous evaluation during the semester for 40 internal marks and semester end examination for 60 marks.The Semester end examination shall be conducted by the teacher concerned and an external examiner.	Not-held	Will be held as per regulations

5	Semester End Examination	The end semester examination is conducted for 60 marks covering the total syllabus.There will be 6 questions with internal choice (One from each Unit). The student has to answer all the 6 questions which carry a weightage of 10 marks each.	Not-held	Will be conducted based on the instructions from University/Government

***

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Pedatadepalli, Tadepalligudem, W.G.Dt, A.P-534101

Fifth Meeting of Academic Council

Agenda Notes

Item No.1: Welcoming the members.

Item No.2: To approve the minutes of the previous meeting. The details are given in **Annexure-I, Page No: 03**

Item No.3: Approval of the minutes of the meeting of joint BOS held on 26/12/2020.

a. To approve V20 regulation for the award of B.Tech degree. (Details are given in **Annexure-II(a)**). **Page No: 04**
b. To approve course structure for different branches of B.Tech programme. (Details are given in **Annexure-II(b)**). **Page No: 35**

Item No.4: To approve the minutes of the meeting of BOS of various departments.

a. Minutes of 4th BOS meeting of Electrical & Electronics Engineering.(Details are given in **Annexure-III**) **Page No: 40**
b. Minutes of 4th BOS meeting of Mechanical Engineering.(Details are given in **Annexure-IV**) **Page No: 54**
c. Minutes of 4th BOS meeting of Electronics &Communication Engineering. (Details are given in **Annexure-V**) **Page No: 64**
d. Minutes of 4th BOS meeting Computer Science and Engineering. (Details are given in **Annexure-VI**) **Page No: 69**
e. Minutes of 4th BOS meeting of Mathematics. (Details are given in **Annexure-VII**) **Page No: 82**
f. Minutes of 4th BOS meeting of Physics. (Details are given in **Annexure-VIII**) **Page No: 88**
g. Minutes of 4th BOS meeting of Chemistry. (Details are given in **Annexure-IX**) **Page No: 95**

h. Minutes of 4th BOS meeting of English.
(Details are given in **Annexure-X**) **Page No: 104**

Item No.5: To approve M.Tech& MBA students results (2018 Admitted Batch)
(Details are given in **Annexure-XI**) **Page No: 114**

Item No.6: Replacement and Extension of BOS members to another term(Two Years).

(Details are given in **Annexure-XII**) **Page No: 118**

Item No.7: Any other item with the permission of the chair.

Annexure-I

Minutes of the Fourth Academic Council Meeting held on 30/08/2020.

Item No.1: Welcome address by Principal& Introduction of members.

Principal **Prof. Guduru VNSR RatnakaraRao** welcomed the members and chaired the meeting.

Item No.2: Review of institute progress for the Academic Year 2019-2020

The council reviewed the progress of the institute for the academic year 2019-2020 and appreciated.

Item No.3: Action taken report on the minutes of the previous meeting (held on02.06.2019).

The council approved the action taken report presented.

Item No.4: Approval of the minutes of the meeting of BOS of Various departments.

The council approved the minutes of the meeting of BOS of Various Departments.

Item No.5: Amendments to **UG V18** Academic Regulations

The proposed amendments are approved by the council.

Item No.6: Approval of Honor's/ Minor degree in Data Science

The proposed Academic regulations for Honor's/ Minor degree in Data Science are approved by the council.

Item No.7: Amendments to **MBA V18** Academic Regulations

The proposed amendments are approved by the council.

Item No.8: Any other item with the permission of the Chair

1) Reviewed result analysis
2) Approved the academic calendars for 2020-21 academic year and modifications in Internal Evaluation for A.Y 2019-2020

The meeting concluded with vote of thanks by the Member Secretary.

Annexure-II(a)

ACADEMIC RULES & REGULATIONS (V20)

Applicable for the batch of students admitted from the Academic Year **2020-2021**

1.0 INTRODUCTION:

Under-Graduate Degree Programme in Engineering & Technology in Sri Vasavi Engineering College offers a 4-year (8 semesters) Bachelor of Technology (B.Tech.) degree programme, under V20 Regulations with effect from the academic year 2020-21. All the rules and regulations specified here after shall be read as a whole for the purpose of interpretation and when any doubt arises, the decision of the Chairman Academic Council of Sri Vasavi Engineering College is final. As per the norms, the Principal of the college (Autonomous) shall be the Chairman of Academic Council.

The provisions of these regulations shall be applicable to any new discipline that may be introduced from time to time

2.0 DEFINITIONS:

"Commission" means University Grants Commission(UGC);

"Council" means All India Council for Technical Education(AICTE);

"University" means Jawaharlal Nehru Technological University Kakinada(JNTUK);

"College" means Sri Vasavi Engineering College, Tadepalligudem;

An **Academic Programme**means any combination of courses and/or requirements leading to award of a degree.

"Course" means a subject either theory or practical identified by its course title and code number and which is normally studied in a semester.

"Degree" means an academic degree conferred by the university upon those who complete the undergraduate curriculum.

"MOOC" means Massive Open Online Course

"Regular Students" means students enrolled into the four year programme in the first year.

"Lateral Entry Students" means students enrolled into the four year programme in the second year.

3.0 ADMISSION CRITERIA:

The eligibility criteria for admission into UG Engineering programmes are as per the norms approved by Government of Andhra Pradesh from time to time.

The sanctioned seats in each programme in the college are classified into CATEGORY-A, and CATEGORY-B at I year level and only CATEGORY-A at Lateral Entry II year level.

The percentages of Category–A, Category-B and Lateral Entry Seats are decided from time to time by the Government of Andhra Pradesh.

3.1 Category – A Seats

Category - A seats are filled as per the norms approved by the Government of Andhra Pradesh.

3.2 Category – B Seats

Category - B seats are filled by the College as per the norms approved by the Government of Andhra Pradesh.

3.3 Lateral Entry Seats

Lateral entry candidates shall be admitted into the III semester directly as per the norms approved by Government of Andhra Pradesh.

3.4 Admissions Under Special Cases:

These may arise in the following situations.

1. When a student gets detained due to academic regulations and re-joins the college to complete the programme. However, the academic regulations under which he/she was first admitted shall continue to be applicable to him/her.
2. When a student discontinues for some time and re-joins the college to complete the programme. However, the academic regulations under which he/she was first admitted shall continue to be applicable to him/her.

3. When a student seeks transfer from other colleges to SVEC and intends to pursue B.Techprogramme in the eligible branch of study.

These admissions may be permitted by the College Academic Council as per the norms stipulated by the statutory bodies and the Government of Andhra Pradesh from time-to-time.

4.0 B.TECH. PROGRAMME STRUCTURE:

4.1 Programs of Study in B.Tech:

The four year B.Techprogramme is offered in the following branches of study at present:

S.No	Title of the UG Programme	Programme Code
1.	Civil Engineering	CE
2.	Electrical and Electronics Engineering	EEE
3.	Mechanical Engineering	ME
4.	Electronics and Communication Engineering	ECE
5.	Computer Science & Engineering	CSE
6.	Computer Science & Technology	CST
7.	Electronics and Communication Technology	ECT

And any other course as approved by the authorities from time to time.

4.2 Medium of Instruction

The medium of instructions for the entire under graduate programme in Engineering & Technology will be English only.

4.3 UGC/ AICTE specified definitions:

The followingdescriptions are adopted appropriately for various termsand abbreviations used in these academic regulations/ norms.

4.3.1 Each under graduate programme is of 4 academic years (8 semesters) with the academic year divided into two semesters of 22 weeks (≥ 90 instructional days) each, each semester having - 'Continuous Internal Evaluation (CIE)' and 'Semester End Examination (SEE)' under V20 Regulations.

4.3.2 All courses are to be registered by the student in a semester to earn credits which shall be assigned to each course in an L: T: P: C (lecture periods: tutorial periods: practical periods: credits) structure based on the following general pattern.

1 Hr. Lecture (L) per week - 1 credit

1 Hr. Tutorial (T) per week - 1 credit

1 Hr. Practical (P) per week - 0.5 credits

Other than credit courses there will be Mandatory Non-credit Courses. These courses will not carry any credits.

4.4 Course Classification

Every course of B. Tech. Program shall be placed in one of the nine categories as listed in table below:

S.No.	**Category**	**Code**	**Suggested breakup of Credits (APSCHE)**	**Suggested breakup of Credits (AICTE)**
1.	Humanities and social science including Management courses	HSMC	10.5	12
2.	Basic Science courses	BSC	21	25
3.	Engineering Science Courses	ESC	24	24
4.	Professional core Courses	PCC	51	48
5.	Open Elective Courses	OEC	12	18
6.	Professional Elective Courses	PEC	15	18
7.	Internship, Seminar, Project work	Proj	16.5	15
8.	Mandatory courses	MNC	Non-Credit	Non-Credit

9.	Skill Oriented Courses	SC	10	-
Total Credits			**160**	**160**

4.5 Curriculum Structure

1. There shall be mandatory student induction program for fresher's, with a three-week duration before the commencement of first semester. Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to local Areas, Familiarization to Dept./Branch & Innovations etc., shall be included in the guidelines issued by AICTE
2. **All undergraduate students shall register for NCC/NSS/Club activities. A student will be required to participate in an activity for two hours in a week during second and third semesters. Grade shall be awarded as Satisfactory or Unsatisfactory in the mark sheet on the basis of participation, attendance, performance and behavior. If a student gets an unsatisfactory Grade, he/she shall repeat the above activity in the subsequent years, in order to complete the degree requirements.**
3. There shall be 05 Professional Elective courses and 04 Open Elective courses. All the Professional & Open Elective courses shall be offered for 03 credits, wherever lab component is involved it shall be (2-0-2-3) and without lab component it shall be (3-0-0-3). If a course comes with a lab component, that component has to be cleared separately.
4. All Open Electives are offered to students of all branches in general. However, a student shall choose an open Elective from the list in such a manner that he/she has not studied the same course in any form during the Programme
5. A student shall be permitted to pursue up to a maximum of two elective courses under MOOCs during the Programme. Each of the courses must be of minimum 12 weeks in duration. Attendance will not be monitored for MOOC courses. Student has to pursue and acquire a certificate for a MOOC course only from the organizations/agencies approved by the BOS in order to earn the 3

credits. The Head of the department shall notify the list of such courses at the beginning of the semester.

6. The college will invite registration forms from the students at the beginning of the semester for offering professional and open elective courses. There shall be a limit on the minimum and maximum number of registrations based on class/section strength. A course may be offered to the students, only if a minimum of 20 students (1/3 of the section strength) opt for it. The maximum strength of a section is limited to 80 (60 + 1/3 of the section strength).
7. Two summer internships each with a minimum of six weeks duration, done at the end of second and third years, respectively are mandatory. The internship can be done by the students at local industries, Govt. Organizations, construction agencies, Industries, Hydel and thermal power projects and also in software MNCs or at other agencies approved by BOS.
8. There shall also be mandatory full internship in the final semester of the Programme along with the project work.
9. There shall be 05 skill-oriented courses offered during III to VII semesters. Among the five skill courses, four courses shall focus on the basic and advanced skills related to the domain courses and the remaining one shall be a soft skills course.
10. A pool of interdisciplinary job-oriented skill courses shall be designed by a common Board of studies by the participating departments/disciplines and the syllabus along with the pre requisites shall be prepared for each of the laboratory infrastructure requirements. The list of such courses shall be included in the curriculum structure of each branch of Engineering, so as to enable the student to choose from the list.
11. The student shall be given an option to choose either the skill courses being offered by the college or to choose a certificate course being offered by industries/Professional bodies/APSSDC or any other accredited bodies as approved by the concerned BOS.

12. The Board of studies of the concerned discipline of Engineering shall review the skill advanced courses being offered by eligible external agencies and prepare a fresh list every year incorporating latest courses based on industrial demand.
13. Under graduate Degree with Honors/Minor shall be issued by the institute to the students who fulfill all the academic eligibility requirements for the B. Tech program and Honors/Minor program. The objective is to provide additional learning opportunities to academically motivated students.

5.0 ATTENDANCE REQUIREMENTS:

i. A student shall be eligible to appear for end semester examinations if he/she acquires a minimum of 75% of attendance in aggregate of all the courses in a semester.

ii. Shortage of attendance in aggregate up to 10% (65% and above, and below 75%) in each semester may be condoned by the college academic committee on genuine and valid grounds, based on the student's representation with supporting evidence.

iii. A stipulated fee shall be payable towards condonation of shortage of attendance to the college**. (a) A student is eligible to write the University examinations if he acquires a minimum of 50% in each subject and 75% of attendance in aggregate of all the subjects.** (b) Shortage of Attendance below 65% in aggregate shall in NO case be condoned.

iv. Students whose shortage of attendance is not condoned in any semester are not eligible to take their end examinations of that semester. They get detained and their registration for that semester shall stand cancelled. They will not be promoted to the next semester. They may seek re-registration for all those courses registered in that semester in which the student is detained, by seeking re-admission into that semester as and when offered; if there are any professional electives and/ or open electives, the same may also be re-registered if offered. However, if those electives are not offered in later semesters, then alternate electives may be chosen from the same set of elective courses offered under that category.

v. A student fulfilling the attendance requirement in the present semester shall not be eligible for repetition of same semester.

6.0 ACADEMIC REQUIREMENTS

6.1 Minimum Academic requirement

A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each course, if student secures not less than 35% (24 marks out of 70 marks) in the semester end examination, and a minimum of 40% (40 marks out of 100 marks) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

6.2 Promotion Rules:

A. A student shall be promoted from II semester to III semester if he fulfills the minimum attendance requirements.

B. A student will be promoted from IV Semester to V Semester if he fulfills the academic requirement of 50% of credits up to either III Semester or IV Semester from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in IV semester.

C. A student shall be promoted from VI semester to VII semester if he fulfills the academic requirements of 50% of the credits up to either V semester or VI semester from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in VI semester.

6.2.1 For Lateral Entry Students:

A. A student shall be promoted from IV semester to V semester if he fulfills the minimum attendance requirements.

B. A student shall be promoted from VI semester to VII semester if he fulfills the academic requirements of 50% of the credits up to either V semester or VI semester from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in VI semester.

6.3 Gap - Year:

Gap Year – concept of Student Entrepreneur in Residence shall be introduced and outstanding students who wish to pursue entrepreneurship are allowed to take a break of one year at any time after I year/II year/III year to pursue entrepreneurship full time. This period shall be counted for the maximum time for graduation. An evaluation committee at Institute level shall be constituted to evaluate the proposal submitted by the student and the committee shall decide on permitting the student for availing the Gap Year.

7 AWARD OF DEGREE

A student will be declared eligible for the award of B. Tech. degree if he/she fulfills the following:

a. Eight academic years in sequence from the year of admission for a normal student admitted into the first year of the Programme.
b. Six academic years in sequence from the year of admission for a lateral entry student admitted into the second year of the Programme.
c. After maximum stipulated academic years from the year of their admission, he/she shall forfeit their seat in B. Tech programme and their admission stands cancelled.
d. Registers for 160 credits and must secure all the 160 credits for a normal student admitted into the first year of the Programme.
e. Registers for 121 credits and must secure all the 121 credits for a lateral entry student admitted into the second year of the Programme.
f. Has no dues to the Institute, hostels, Libraries, NCC/NSS etc., and
g. No disciplinary action is pending against him/her.

A student shall be eligible for the award of B.Tech degree with Honors or Minor if he/she earns 20 credits in addition to the 160/121 credits. A student shall be permitted to register either for Honors or for Minor and not for both simultaneously.

8 EVALUATION - DISTRIBUTION AND WEIGHTAGE OF MARKS

The performance of a student in every course will be evaluated for 100 marks each, with 30 marks allotted for CIE (Continuous Internal Evaluation) and 70 marks for SEE (Semester End-Examination).

8.1 Evaluation of Theory Courses:

Continuous Internal Evaluation(CIE): For theory Courses, during a semester, there shall be two mid-term examinations. Each mid-term examination consists of one objective paper, one descriptive paper and one assignment. The objective paper shall be for 10 marks and the descriptive paper shall be for 15 marks with duration of 20 minutes for objective and 90 minutes for descriptive paper.

The objective paper is set with 20 multiple choice, fill-in the blanks and matching type of questions for a total of 10 marks. The descriptive paper shall contain 3 full questions, the student has to answer all 3 questions, each carrying 5 marks.

While the first mid-term examination shall be conducted on 50% of the syllabus, the second mid-term examination shall be conducted on the remaining 50% of the syllabus.

Five marks are allocated for assignments (as specified by the course instructor concerned). The first assignment should be submitted before the conduct of the first mid-term examination, and the second assignment should be submitted before the conduct of the second mid-term examination.

The total marks secured by the student in each mid-term examination are evaluated for 30 marks, and the weighted average of the two mid-term examinations shall be taken as follows

CIE= (Best performance in MID exam x 0.8 + Next best Performance in MID exam x 0.2)

In case the student is unable to appear for any internal evaluation component owing to Pre-approved participation in

University/State/National/International co-curricular and extra-curricular activities, or due to Death of immediate family member, the Dean Academics can permit to conduct of reexamination for such students.

Semester End-Examination(SEE):

The semester end examinations (SEE) will be conducted for 70 marks consisting of two parts viz. i) Part- A for 10 marks, ii) Part - B for 60 marks.

Part-A is a compulsory question. It comprises six sub-questions for 10 marks. The four sub-questions of 2 marks each will be given from any of the 4 units and the remaining 2 questions will be of 1 mark each from the other 2 units from which the 2 marks questions are not given.

Part-B consists of six questions (numbered from 2 to 7) carrying 10 marks each. Each of these questions is from one unit and may contain sub-questions. For each question there will be an “either” “or” choice, which means that there will be two questions from each unit and the student should answer either of the two questions.

8.2 Evaluation of Laboratory Courses

For Laboratory courses, there shall be continuous evaluation during the semester for 30 marks and semester end evaluation for 70 marks.

Continuous Internal Evaluation(CIE):

The distribution of marks for continuous internal evaluation is given in the following Table:

Distribution of Marks (CIE)

S. No.	Criterion	Marks
1	Day to Day Evaluation	10
2	Record	10
3	Internal Examination	10

Semester End-Examination(SEE):

The Semester end examination for laboratory courses shall be conducted with three hour duration at the end of semester for 70 marks. The semester end examination shall be conducted with an external examiner and the laboratory Course Instructor. The distribution of marks is shown in the below table.

Distribution of Marks (SEE)

S. No.	Criterion	Marks
1	Procedure	15
2	Experiment/Programme Execution	25
3	Result	20
4	Viva-Voce	10

The distribution of marks maybe changed by the examiner in consultation with concerned HOD.

8.3 Design/Drawing Based Courses

Evaluation and examination pattern for other courses related to design/drawing is mentioned along with the syllabus.

8.4 Evaluation of Mandatory Noncredit Courses:

There shall be mandatory courses with zero credits. There shall be no external examination. However, attendance in these courses shall be considered while calculating aggregate attendance and student shall be declared to have passed the mandatory course only when he/she secures 40% or more in the mid semester examinations.

In case, the student fails, a re-examination shall be conducted for failed candidates every six months/semester at a mutually convenient date of college/student.

8.5 Evaluation of MOOCS Courses:

A student shall be permitted to pursue up to a maximum of two elective courses under MOOCs during the Programme. Each of the courses must be of minimum 12 weeks in duration. Attendance will not be monitored for MOOC courses. Student has to pursue and acquire a certificate for a MOOC course only from the organizations/agencies approved by the BoS in order to earn the 3 credits. The Head of the department shall notify the list of such courses at the beginning of the semester.

Students who have qualified in the examination conducted by the MOOCs providers are exempted from appearing in the continuous and semester end evaluations conducted by the institution.

In case, a student fails to complete the MOOCs course offered by MOOC's providers, he/she may be allowed to register again for the same with any of the providers from the list provided by the department or the student may be allowed to register for the course as and when offered by the college as supplementary candidate.

The Scheme of Evaluation for MOOCs courses shall be scaled to continuous internal evaluation as 30 marks and semester end examination as 70 marks.

8.6 Evaluation of the summer internships:

A student will be required to submit a summer internship report to the concerned department and appear for an oral presentation before the departmental committee. The report and the oral presentation shall carry 40% and 60% weightages respectively.

The student shall submit a diary and a technical report for evaluation before the due date notified by the COE then schedule shall be given for oral presentation. Summer internship done at the end of second year shall be evaluated in V semester for 100 marks and summer internship done at the end of third year shall be evaluated in VII semester for 100 marks.

These evaluations shall be done by a committee consisting of Head of the department/Faculty Coordinator along with two senior faculty members of the Department. A student shall acquire credits assigned, when he/she secures 40% or more marks.

In case, if a student fails, he/she shall reappear as andwhen the V/VII semester supplementary examinations are conducted. There shall be no external evaluation.

8.7 Evaluation of the internship/Project/Seminar:

In the final semester, the student should mandatorily undergo internship and parallelly he/she should work on a project with well-defined objectives. At the end of the semester the candidate shall submit an internship completion certificate and a project report. A student shall also be permitted to submit project report on the work carried out during the internship. The project report shall be evaluated in three phases as follows

Students should submit the intern reports along with the log book signed by the industry representative at the end of 3rd month and 5th month. Students shall submit the final project report after completion of 6 months Along with the internship completion certificate.

Distribution of Marks

Time frame	Student Activity	Evaluation	Max.Marks
At the end of 3rd month	Submit log book and report signed by the industry representative	By the committee consists of supervisor along with two senior faculty nominated by HOD in coordination with industry representative	50 marks
At the end of 5rd month			50 marks
After completion of 6 months	Submit log book, final project report and internship completion certificate	By the committee consists of HOD, supervisor, one senior faculty and external examiner.	100 marks
Total			200 marks

The College shall facilitate and monitor the student internship programs. Completion of internships is mandatory, if any student fails to complete internship, he/she will not be eligible for the award of degree. In such cases, the student shall repeat and complete the internship.

8.8 Evaluation of skill oriented courses

If a student chooses to take a Certificate Course offered by industries/Professional bodies/APSSDC or any other accredited bodies, in lieu of the skill advanced course offered by the Department, the credits shall be awarded to the student upon producing the Course Completion Certificate from the agency/professional bodies as approved by the Board of studies.

If a student prefers to take a certificate course offered by external agency, the department shall mark attendance of the student for the remaining courses in that semester excluding the skill course in all the calculations of mandatory attendance requirements upon producing a valid certificate as approved by the concerned Board of Studies, the student is deemed to have fulfilled the attendance requirement of the course and acquire the credits assigned to the course.

A college level committee will evaluate the grades/marks given for a course by external agencies and convert to the equivalent marks/grades. The recommended conversions and appropriate grades/marks are to be approved by the Academic Council.

9 GRADING:

After each course is evaluated for 100 marks, the marks obtained in each course will be converted to a corresponding letter grade as given below, depending on the range in which the marks obtained by the student fall.

Marks Range	Level	Letter Grade	Grade Point
≥ 90	Outstanding	A^+	10
80-89	Excellent	A	9
70-79	Very Good	B	8
60-69	Good	C	7
50-59	Fair	D	6
40-49	Satisfactory	E	5
<40	Fail	F	0
-	Absent	Ab	0
-	Malpractice	MP	0
-	Withheld	WH	0

Calculation of Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA):

The Semester Grade Point Average (SGPA) is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student, i.e.

$$SGPA = \Sigma (C_i \times G_i) / \Sigma C_i$$

where, C_i is the number of credits of the i^{th} course and G_i is the grade point scored by the student in the i^{th} course

ii. The Cumulative Grade Point Average (CGPA) will be computed in the same manner taking into account all the courses undergone by a student over all the semesters of a program, i.e.

$$CGPA = \Sigma (C_i \times S_i) / \Sigma C_i$$

where 'S_i' is the SGPA of the i^{th} semester and C_i is the total number of credits in that semester

iii. Both SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.

iv. While computing the SGPA/CGPA, the courses in which the student is awarded Zero grade points will also be included.

v. Grade Point: It is a numerical weight allotted to each letter grade on a 10-point scale.

vi. Letter Grade: It is an index of the performance of students in a said course. Grades are denoted by letters A+, A, B, C, D, E and F.

vii. As per AICTE regulations, conversion of CGPA into equivalent percentage as follows:

Equivalent Percentage = (CGPA – 0.50) x 10

Award of Class:

After a student has satisfied the requirements prescribed for the completion of the program and is eligible for the award of B. Tech. degree, he/she shall be placed in one of the following:

Class Awarded	CGPA Secured
First Class with Distinction	≥ 7.50*
First Class	≥ 6.50 < 7.50
Second Class	≥ 5.50 < 6.50
Pass Class	≥ 4.00 < 5.50

*In addition to the required CGPA of 7.50, the student must have necessarily passed all the courses of every semesterin the minimum stipulated period for the programme.

10 REVALUATION

Semester End Examination

1. As per the notification issued by the Controller of Examinations, the students can submit the applications for revaluation, along with the requisite fee receipt for revaluation of his/her answer script(s) of theory course(s), if he/she is not satisfied with the marks obtained.
2. The Controller of Examinations shall arrange for re-evaluation of those answer script(s).
3. A new examiner, other than the first examiner, shall re-evaluate the answer script(s).
4. Better marks out of the two shall be taken into consideration.
5. If the difference of marks between the two valuations is more than 15%, the answer script will be referred to third valuation. The average of nearest two marks will be awarded.

11 IMPROVEMENT OF CLASS:

A candidate, after becoming eligible for the award of the degree, may reappear for the Final Examination in any two (maximum) of the theory courses as and when conducted, for the purpose of improving the aggregate and the class. But this reappearance shall be within a period of one academic year after becoming eligible for the award of the Degree.

However, this facility shall not be availed of by a candidate who has taken the Provisional Certificate. Candidates shall not be permitted to reappear either for CIE in any course or for Semester End Examination (SEE) in laboratory courses (including project Viva-voce) for the purpose of improvement.

12 SUPPLEMENTARY EXAMINATION:

In addition to the Regular End Examinations held at the end of each semester, Supplementary End Examinations will be conducted during the Semester break. A Student can appear for any number of supplementary examinations till he clears all courses which he could not clear in the first attempt. However the maximum stipulated period shall not be relaxed under any circumstances.

13 ADVANCED SUPPLEMENTARY EXAMINATIONS:

Candidates who fail in courses of VII semester can appear for Advanced Supplementary Examination conducted after declaration of the revaluation of the said exam.

14 WITHHOLDING OF RESULTS

If the student has not paid the fees to the college at any stage, or has dues pending due to any reason whatsoever, or if any case of indiscipline is pending, the result of the student may be withheld, and the student will not be allowed to go into the next higher semester. The award or issue of the degree may also be withheld in such cases.

15 MALPRACTICES:

The Principal shall refer the cases of malpractices in Examination to an Enquiry Committee constituted by him. The committee will submit a report on the malpractice allegedly committed by the student to the Principal. The Principal along with the members of the committee is authorized to award a suitable punishment, if the student is found guilty.

Disciplinary action for malpractices/improper conduct in examinations

	Nature of Malpractices/Improper conduct	Punishment
1 (a)	If the candidate possesses or keeps accessible, any paper, note book, programmable calculators, mobile phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in the examination hall but has not made use of (material shall include any marks on the student's body that can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only.
(b)	If the candidate gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through mobile phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2	If the candidate has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work. He shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The hall ticket of the candidate is to be cancelled.
3	If the candidate impersonates any other candidate in	The candidate who has impersonated shall be expelled from examination

	connection with the examination.	hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate, who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.
4	If the candidate smuggles in an answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all other examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5	If the candidate uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject.
6	If the candidate refuses to obey	In case of students of the Institute,

	the orders of the Chief Superintendent/Assistant - Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which results in damage to or destruction of property in the examination hall or any part of the Institute campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.
7	If the candidate leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all other

		examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8	If the candidate possesses any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.
9	If student of the Institute, who is not a candidate for the particular examination or any person not connected with the Institute indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the Institute: Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work. He shall not be permitted for the remaining examinations of the subjects of that semester/ year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the Institute: Will be handed over to police and a police case will be registered against them.
10	If the candidate comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work. He shall not be permitted for the remaining examinations of the subjects of that semester/year.
11	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year

		examinations.
12	If any malpractice is detected which is not covered in the above clauses 1 to 11, shall be awarded suitable punishment.	

16 AMENDMENTS:

1. The Institute may change or amend the academic regulations, course structure or syllabi at any time, and the changes or amendments made shall be applicable to all students with effect from the dates notified by the College authorities.
2. The Principal shall deal with any academic problem, which is not covered under these rules and regulations, in consultation with the Heads of the Departments in an appropriate manner, and subsequently such actions shall be placed before the academic council for ratification. Any emergency modification of regulation, approved in the Heads of the Departments Meetings, shall be reported to the academic council for ratification.

17 GENERAL:

a) Where ever the words “he”, “him”, “his”, occur in the regulations, they include “she”, “her”, “hers”.

b) The Academic regulations should be read as a whole for the purpose of any interpretation.

c) In case of any doubt or ambiguity in the interpretation of the above rules the decision of the Chairman of the Academic Council is final.

d) The Academic Council reserves the right to revise, amend, change or nullify the Regulations, Schemes of Examinations and/or Syllabi or any other matter depending on the needs of the students, society and industry.

18 CURRICULAR FRAMEWORK FOR HONORS DEGREE PROGRAMME

i. B.Tech. (Hons.) is introduced in order to facilitate the students to choose additionally the specialized courses and build their competence in a specialized area.

ii. Students of a Department/Discipline are eligible to opt for Honors Programme offered by the same Department/Discipline.

iii. A student shall be permitted to register for Honors program at the beginning of V semester subject to a maximum of two additional courses per semester, provided that the student must have acquired 8 CGPA upto the end of IV semester without any history of backlogs. An CGPA of 8 has to be maintained in the subsequent semesters without any backlog in order to keep the Honors registration active.

iv. Students can select the additional and advanced courses from their respective branch in which they are pursuing the degree and get an honors degree in the same. e.g. If a Mechanical Engineering student completes the selected advanced courses from same branch under this scheme, he/she will be awarded B.Tech. (Honors) in Mechanical Engineering.

v. In addition to fulfilling all the requisites of a Regular B.TechProgramme, a student shall earn 20 additional credits to be eligible for the award of B. Tech (Honors) degree. This is in addition to the credits essential for obtaining the Under Graduate Degree in Major Discipline (i.e. 160/121 credits).

vi. Of the 20 additional Credits to be acquired, 16 credits shall be earned by undergoing specified courses listed as pools, with four courses, each carrying 4 credits. The remaining 4 credits must be acquired through two MOOCs, which shall be domain specific, each with 2 credits and with a minimum duration of 8/12 weeks as recommended by the Head of the department concerned.

vii. It is the responsibility of the student to acquire/complete prerequisite before taking the respective course. The courses offered in each pool shall be domain specific courses and advanced courses.

viii. Minimum enrollment required for offering a honors degree is considered as 30% of the class size. If minimum enrolments criteria are not met then the students shall be permitted to register for the equivalent MOOC courses as approved by the concerned Head of the department in consultation with BOS.

ix. Each pool can have theory as well as laboratory courses. If a course comes with a lab component, that component has to be cleared separately. The concerned BoSshall explore the possibility of introducing virtual labs for such courses with lab component.

x. MOOC courses must be of minimum 8 weeks in duration. Attendance will not be monitored for MOOC courses. Students have to acquire a certificate from the agencies approved by the BOS with grading or marks or pass/fail in order to earn 4 credits. If the MOOC course is a pass/fail course without any grades, the grade to be assigned will be as decided by the academic council.

xi. The concerned BOS shall also consider courses listed under professional electives of the respective B. Tech programs for the requirements of B. Tech (Honors). However, a student shall be permitted to choose only those courses that he/she has not studied in any form during the Programme.

xii. If a student drops or is terminated from the Honors program, the additional credits so far earned cannot be converted into free or core electives; they will remain extra. These additional courses will find mention in the transcript (but not in the degree certificate). In such cases, the student may choose between the actual grade or a “pass (P)” grade and also choose to omit the mention of the course as for the following: All the courses done under the dropped Minors will be shown in the transcript. None of the courses done under the dropped Minor will be shown in the transcript.

xiii. In case a student fails to meet the CGPA requirement for Degree with Honors at any point after registration, he/she will be dropped from the list of students eligible for Degree with Honors and they will receive regular B.Tech degree only. However, such students will receive a separate grade sheet mentioning the additional courses completed by them.

xiv. Switching from honors degree to minor degree is not permitted.

xv. Honors must be completed simultaneously with a major degree program. A student cannot earn Honors after he/she has already earned bachelor's degree.

19 CURRICULAR FRAMEWORK FOR MINOR DEGREE PROGRAMME:

i. a) Students who are desirous of pursuing their special interest areas other than the chosen discipline of Engineering may opt for additional courses in minor specialization groups offered by a department other than their parent department. For example, If Mechanical Engineering student selects courses from Civil Engineering under this scheme, he/she will get Major degree of Mechanical Engineering with minor degree of Civil Engineering

   b) Student can also opt for Industry relevant tracks of any branch to obtain the Minor Degree, for example, a B.Tech Mechanical student can opt for the industry relevant tracks like Data Mining track, IOT track, Machine learning track etc.

ii. The BOS concerned shall identify as many tracks as possible in the areas of emerging technologies and industrial relevance / demand. For example, the minor tracks can be the fundamental courses in CSE, ECE, EEE,CE,MEetc or industry tracks such as Artificial Intelligence (AI), Machine Learning (ML), Data Science (DS), Robotics, Electric vehicles, Robotics, VLSI etc.

iii. The list of disciplines/branches eligible to opt for a particular industry relevant minor specialization shall be clearly mentioned by the respective BoS.

iv. There shall be no limit on the number of programs offered under Minor. The Institute can offer minor programs in emerging technologies based on expertise in the respective departments or can explore the possibility of collaborating with the relevant industries/agencies in offering the program.

v. Minimum enrollment required for offering a honors degree is considered as 30% of the class size. If a minimum enrolments criterion is not met, then the students may be permitted to register for the equivalent MOOC courses as approved by the concerned Head of the department in consultation with BoS.

vi. A student shall be permitted to register for Minors program at the beginning of V semester subject to a maximum of two additional courses per semester, provided that the student must have acquired 8 CGPA upto the end of IV semester without any history of backlogs. An CGPA of 8 has to be maintained in the subsequent semesters without any backlog in order to keep the Minors registration active.

vii. A student shall earn additional 20 credits in the specified area to be eligible for the award of B. Tech degree with Minor. This is in addition to the credits essential for obtaining the Under Graduate Degree in Major Discipline (i.e. 160/121 credits).

viii. Out of the 20 Credits, 16 credits shall be earned by undergoing specified courses listed by the concerned BoS along with prerequisites. It is the responsibility of the student to acquire/complete prerequisite before taking the respective course. If a course comes with a lab component, that component has to be cleared separately. A student shall bepermitted to choose only those courses that he/she has not studied in any form during the Programme.

ix. In addition to the 16 credits, students must pursue at least 2 courses through MOOCs. The courses must be of minimum 8 weeks in duration. Attendance will not be monitored for MOOC courses. Student has to acquire a certificate from the agencies approved by the BOS with grading or marks or pass/fail in order to earn 4 credits. If the MOOC course is a pass/fail course without any grades, the grade to be assigned as decided by academic council.

x. Student can opt for the Industry relevant minor specialization as approved by the concerned departmental BoS. Student can opt the courses from Skill Development Corporation (APSSDC) or can opt the courses from an external agency recommended and approved by concerned BOS and should produce course completion certificate. The Board of studies of the concerned discipline of Engineering shall review such courses being offered by eligible external agencies and prepare a fresh list every year incorporating latest skills based on industrial demand.

xi. A committee shall be formed at the level of College/department to evaluate the grades/marks given by external agencies to a student which are approved by concerned BoS. Upon completion of courses the departmental committee should convert the obtained grades/marks to the maximum marks assigned to that course. The controller of examinations can take a decision on such conversions and may give appropriate grades.

xii. If a student drops (or terminated) from the Minor program, they cannot convert the earned credits into free or core electives; they will remain extra. These additional courses will find mention in the transcript (but not in the degree certificate). In such cases, the student may choose between the actual grade or a “pass (P)” grade and also choose to omit the mention of the course as for the following: All the courses done under the dropped Minors will be shown in the transcript. None of the courses done under the dropped Minor will be shown in the transcript.

xiii. In case a student fails to meet the CGPA requirement for B.Tech degree with Minor at any point after registration, he/she will be dropped from the list of students eligible for degree with Minors and they will receive B. Tech degree only. However, such students will receive a separate grade sheet mentioning the additional courses completed by them.

xiv. Switching from minor degree to honor degree is not permitted.

xv. Minor must be completed simultaneously with a major degree program. A student cannot earn the Minor after he/she has already earned bachelor's degree.

Annexure-II(b)

PROPOSED COURSE STRUCTURE OF FIRST YEAR B.TECH
(Civil Engineering)

I SEMESTER

S.No	Course Code	Course Title	Hours per week			Credits
			L	T	P	
1	V20MAT01	Linear Algebra and Differential Equations	3	0	0	3
2	V20PHT01	Engineering Physics	3	0	0	3
3	V20ENT01	English for Professional Enhancement	3	0	0	3
4	V20MEL01	Engineering Graphics	1	0	4	3
5	V20CST01	Programming in C for problem solving	3	0	0	3
6	V20ENL01	Hone Your Communications Skills Lab-I	0	0	3	1.5
7	V20PHL01	Engineering Physics Lab	0	0	3	1.5
8	V20CSL01	Programming lab in C for problem solving	0	0	3	1.5
9	V20CHT02	Environmental Studies	2	0	0	-
Total			15	0	13	19.5

Total Contact Hours : 28 Total Credits : 19.5

II SEMESTER

S.No	Course Code	Course Title	Hours per week			Credits
			L	T	P	
1	V20MAT02	Numerical Methods and Vector Calculus	3	0	0	3
2	V20CHT01	Engineering Chemistry	3	0	0	3
3	V20MET01	Engineering Mechanics	3	0	0	3
4	V20EET02	Basic Electrical and Electronics Engineering	3	0	0	3
5	V20MEL02	Engineering Workshop	1	0	4	3
6	V20EEL02	Basic Electrical and Electronics Engineering Lab	0	0	3	1.5
7	V20CHL01	Engineering Chemistry Lab	0	0	3	1.5
8	V20ENL02	Hone Your Communications Skills Lab-II	0	0	3	1.5
Total			13	0	13	19.5

Total Contact Hours : 26 Total Credits : 19.5

PROPOSED COURSE STRUCTURE OF FIRST YEAR B.TECH(EEE)

I-Semester

S.No.	Course Code	Course Title	Hours per Week			Credits
			L	T	P	
1	V20MAT01	Linear Algebra and Differential Equations	3	0	0	3
2	V20CHT01	Engineering Chemistry	3	0	0	3
3	V20ENT01	English for Professional Enhancement	3	0	0	3
4	V20MEL02	Engineering Workshop	1	0	4	3
5	V20CST01	Programming in C for problem solving	3	0	0	3
6	V20ENL01	Hone Your Communications Skills Lab-I	0	0	3	1.5
7	V20CHL01	Engineering Chemistry Lab	0	0	3	1.5
8	V20CSL01	Programming lab in C for problem solving	0	0	3	1.5

Total Contact Hours : 26 Total Credits : 19.5

II-Semester

S.No.	Course Code	Course Title	Hours per Week			Credits
			L	T	P	
1	V20MAT02	Numerical Methods and Vector Calculus	3	0	0	3
2	V20PHT01	Engineering Physics	3	0	0	3
3	V20ECT01	Switching Theory and Logic Design	3	0	0	3
4	V20EET03	Electrical Circuit Analysis-I	3	0	0	3
5	V20MEL01	Engineering Graphics	1	0	4	3
6	V20EEL03	Electrical Engineering Workshop	0	0	3	1.5
7	V20CSL01	Engineering Physics Lab	0	0	3	1.5
8	V20ENL02	Hone Your Communications Skills Lab-II	0	0	3	1.5
9	V20CHT02	Environmental Studies	2	0	0	0

Total Contact Hours : 28 Total Credits : 19.5

PROPOSED COURSE STRUCTURE OF FIRST YEAR B.TECH (Mechanical Engineering)

I SEMESTER

S.No	Course Code	Course Title	Hours per week			Credits
			L	T	P	
1	V20MAT01	Linear Algebra and Differential Equations	3	0	0	3
2	V20PHT01	Engineering Physics	3	0	0	3
3	V20ENT01	English for Professional Enhancement	3	0	0	3
4	V20MEL01	Engineering Graphics	1	0	4	3
5	V20CST01	Programming in C for problem solving	3	0	0	3
6	V20ENL01	Hone Your Communications Skills Lab-I	0	0	3	1.5
`7	V20PHL01	Engineering Physics Lab	0	0	3	1.5
8	V20CSL01	Programming lab in C for problem solving	0	0	3	1.5
9	V20CHT02	Environmental Studies	2	0	0	0

Total Contact Hours: 26 Total Credits: 19.5

II SEMESTER

S.No	Course Code	Course Title	Hours per week			Credits
			L	T	P	
1	V20MAT02	Numerical Methods and Vector Calculus	3	0	0	3
2	V20CHT01	Engineering Chemistry	3	0	0	3
3	V20MET01	Engineering Mechanics	3	0	0	3
4	V20EET02	Basic Electrical and Electronics Engineering	3	0	0	3
5	V20MEL02	Engineering Workshop	1	0	4	3
6	V20EEL02	Basic Electrical and Electronics Engineering Lab	0	0	3	1.5
7	V20CHL01	Engineering Chemistry Lab	0	0	3	1.5
8	V20ENL02	Hone Your Communications Skills Lab-II	0	0	3	1.5

Total Contact Hours: 28 Total Credits: 19.5

PROPOSED COURSE STRUCTURE OF FIRST YEAR B.TECH(ECE & ECT)

I Semester

Sl.No.	Course Code	Course Title	Hours per week			Credits
			L	T	P	
1	V20MAT01	Linear Algebra and Differential Equations	3	0	0	3
2	V20PHT01	Engineering Physics	3	0	0	3
3	V20ENT01	English for Professional Enhancement	3	0	0	3
4	V20EET01	Basic Electrical Engineering	3	0	0	3
5	V20MEL01	Engineering Graphics	1	0	4	3
6	V20ENL01	Hone Your Communications Skills Lab-I	0	0	3	1.5
7	V20PHL01	Engineering Physics Lab	0	0	3	1.5
8	V20EEL01	Basic Electrical Engineering Lab	0	0	3	1.5
9	V20CHT02	Environmental Studies	2	0	0	0

Total Contact Hours: 28 Total Credits: 19.5

II Semester

Sl.No.	Course Code	Course Title	Hours per week			Credits
			L	T	P	
1	V20MAT02	Numerical Methods and Vector Calculus	3	0	0	3
2	V20CHT01	Engineering Chemistry	3	0	0	3
3	V20CST01	Programming in C for problem solving	3	0	0	3
4	V20MEL02	Engineering Workshop	1	0	4	3
5	V20ECT01	Switching Theory and Logic Design	3	0	0	3
6	V20CSL01	Programming lab in C for problem solving	0	0	3	1.5
7	V20CHL01	Engineering Chemistry Lab	0	0	3	1.5
8	V20ENL02	Hone Your Communications Skills Lab-II	0	0	3	1.5

Total Contact Hours: 26 Total Credits: 19.5

PROPOSED COURSE STRUCTURE OF FIRST YEAR B.TECH(CSE & CST)

I SEMESTER

S.No.	Course Code	Course Title	Hours per week L	T	P	Credits
1	V20MAT01	Linear Algebra and Differential Equations	3	-	-	3
2	V20CHT01	Engineering Chemistry	3	-	-	3
3	V20ENT01	English for Professional Enhancement	3	-	-	3
4	V20MEL02	Engineering Workshop	**1**	-	4	**3**
5	V20CST01	Programming in 'C' for problem Solving	3	-	-	3
6	V20ENL01	Hone Your Communications Skills Lab-I	-	-	3	1.5
7	V20CHL01	Engineering Chemistry Lab	-	-	3	1.5
8	V20CSL01	Programming Lab in 'C' for problem Solving	-	-	3	1.5

Total Contact Hours: 26 Total Credits: 19.5

II SEMESTER

S.No.	Course Code	Course Title	Hours per week L	T	P	Credits
1	V20MAT02	Numerical Methods and Vector Calculus	3	-	-	3
2	V20PHT01	Engineering Physics	3	-	-	3
3	V20ECT01	Switching Theory and Logic Design	3	-	-	3
4	V20CST02	Python Programming	3	-	-	3
5	V20MEL01	Engineering Graphics	**1**	-	4	**3**
6	V20PHL01	Engineering Physics Lab	-	-	3	1.5
7	V20CSL02	Python Programming Lab	-	-	3	1.5
8	V20ENL02	Hone Your Communications Skills Lab-II	-	-	3	1.5
9	V20CHT02	Environmental Studies	2	-	-	0

Total Contact Hours: 28 Total Credits: 19.5

Annexure-III

SRI VASAVI ENGINEERING COLLEGE (AUTONOMOUS)

(Sponsored by Sri Vasavi Educational Society)
(Approved by AICTE, New Delhi & Permanently affiliated to JNTUK, Kakinada)
(Accredited by NAAC with 'A' Grade & NBA,)
Pedatadepalli, **TADEPALLIGUDEM–534 101.**W.G.Dist**. (A.P)**
Department of Electrical & Electronics Engineering

Date: 02-01-2021

The fourth meeting of Board of Studies in Department of Electrical and Electronics Engineering was held at 11.30 AM on 30-12-2020 though online mode using Zoom tool (Meeting ID: 84243075482).

The following members have attended the meeting.

S.No.	**Name**	**Designation**	**Role**
1.	Dr. Sudha Rani Donepudi	Associate Professor, Head, Dept. of EEE, SVEC, Pedatadepalli.	Chairperson
2.	Dr. R. SrinivasaRao	Professor, Dept. of EEE, UCEK, JNTUK, Kakinada	Subject Expert Nominated By V.C.
3.	Dr. M. Sydulu	Professor, Dept. of EE, NITW, Warangal	Subject Expert Nominated By A.C.
4.	Dr. Y.P. Obulesu	Professor, School of EE, VIT, Vellore	Subject Expert Nominated By A.C.
5.	Er. B.N.V.R.C. Suresh Kumar	Retired AGM, PGCI, Hyderabad	Industry Expert Nominated By A.C
6.	Er. Ch. Vinay Kumar	Assistant Engineer, EHT Lines, APTRANSCO, Eluru.	Alumni

7.	Dr. Ch. Rambabu	Professor	Member
8.	Mr. U. Chandra Rao	Sr. Asst. Professor	Member
9.	Mr. Ch. V.S.R. Gopala Krishna	Sr. Asst. Professor	Member
10.	Mr. N. Sri Harish	Asst. Professor	Member
11.	Mr. K. Ramesh Babu	Asst. Professor	Member
12.	Mr. P.S.V.N. Sudhakar	Asst. Professor	Member
13.	Mr. K. Suresh	Asst. Professor	Member
14.	Mr. V. Rama Narayana	Asst. Professor	Member
15.	Mr. G. Chandra Babu	Asst. Professor	Member
16.	Mr. G. MadhuSagarBabu	Asst. Professor	Member
17.	Mr. P.K.S. Sarvesh	Asst. Professor	Member
18.	Mr. K. Venkata Reddy	Asst. Professor	Member
19.	Mr. G. Saveen	Asst. Professor	Member
20.	Mr. N. Madhusudhan Reddy	Asst. Professor	Member
21.	Mr. K. Amarendra	Asst. Professor	Member
22.	Mr. V.S. Aditya	Asst. Professor	Member
23.	Mr. S. Krishna	Asst. Professor	Member
24.	Mr. A.V.V.N. Phanindra	Asst. Professor	Member
25.	Mr. Pradeep V	Asst. Professor	Member
26.	Mr. P. DattaSai	Asst. Professor	Member
27.	Mr. Ch. Srinivas	Asst. Professor	Member
28.	Ms. I. Meghana Krishna Durga	Asst. Professor	Member

<u>The following are the minutes of the meeting</u>

Item No. 1: Welcome note by the Chairperson BOS

The HOD extended a formal welcome and introduced the members.

Item No. 2: Review of course structure for I & II semesters of B. Tech under V20 Regulation.

Reviewed the course structure of I& II semesters for UG (B.Tech-EEE) Programme of V20 Regulation.

The details of the course structure for I & II semesters of UG (B.Tech- EEE) Programme under V20 Regulation are given in Annexure-III(a)

Item No. 3: Approval of syllabi for the courses offered by the department in I& II semesters of B. Tech under V20 Regulation.

Approved the syllabi for the courses offered by department in I& II B. Tech under V20 Regulation.

The syllabi for the courses offered by department in I & II B. Tech Programme of under V20 Regulation is attached in Annexure-III(b).

Dr. Sudha Rani Donepudi **(BOS Chairperson)**

Annexure-III(a)

Approved Course Structure for B.Tech-EEE Programme under V20 Regulation

I-Semester

S.No.	Course Code	Course Title	Hours per Week L	T	P	Credits
1	V20MAT01	Linear Algebra and Differential Equations	3	0	0	3
2	V20CHT01	Engineering Chemistry	3	0	0	3
3	V20ENT01	English for Professional Enhancement	3	0	0	3
4	V20MEL02	Engineering Workshop	1	0	4	3
5	V20CST01	Programming in C for problem solving	3	0	0	3
6	V20ENL01	Hone Your Communications Skills Lab-I	0	0	3	1.5
7	V20CHL01	Engineering Chemistry Lab	0	0	3	1.5
8	V20CSL01	Programming lab in C for problem solving	0	0	3	1.5

Total Contact Hours : 26 Total Credits : 19.5

II-Semester

S.No.	Course Code	Course Title	Hours per Week L	T	P	Credits
1	V20MAT02	Numerical Methods and Vector Calculus	3	0	0	3
2	V20PHT01	Engineering Physics	3	0	0	3
3	V20ECT01	Switching Theory and Logic Design	3	0	0	3
4	V20EET03	Electrical Circuit Analysis-I	3	0	0	3
5	V20MEL01	Engineering Graphics	1	0	4	3
6	V20EEL03	Electrical Engineering Workshop	0	0	3	1.5
7	V20CSL01	Engineering Physics Lab	0	0	3	1.5
8	V20ENL02	Hone Your Communications Skills Lab-II	0	0	3	1.5
9	V20CHT02	Environmental Studies	2	0	0	0

Total Contact Hours : 28 Total Credits : 19.5

Annexure-III(b)

Syllabi for the courses offered by EEE Dept. in I& II semesters of B. Tech under V20 Regulation.

Semester	**I SEM**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	3	-	-	3	**V20EET01**
Name of the Course	**Basic Electrical Engineering**					
Branches	**Common to ECE & ECT**					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	**Course Outcome**	**Knowledge Level**
C204.1	Understand and compute electrical quantities in DC excited circuits	K3
C204.2	Understand and compute electrical quantities in AC excited circuits	K3
C204.3	Study the working principles of DC machines	K2
C204.4	Study the working principles of transformers	K2
C204.5	Understand construction details and explain the working principles of AC machines	K2
C204.6	Understand the operation of electrical systems	K2

Unit 1 : DC Circuits

Electrical circuit elements (R, L and C), Kirchhoff's Laws, Mesh analysis of simple circuits with dc excitation.Superposition, Thevenin's, and Maximum Power Transfer Theorems, Simple problems.

Unit 2: AC Circuits

Basic Definitions, Peak and RMS values, Types of Powers, Power Factor.Analysis of Single-Phase AC series circuits consisting of RL, RC, RLC combinations, Simple problems.

Unit 3: DC Machines

Construction and operation of DC generator-EMF equation - Types of DC motors: shunt and series motors – applications – Speed control of DC shunt motor: field and armature controls, Simple Problems.

Unit 4: Transformers

Classification, Operation of ideal and practical transformers, EMF equation, losses in transformer, efficiency, OC and SC Test, Simple problems.

Unit 5: AC Machines

Construction and operation of a three-phase induction motor, Slip, torque equation, torque-slip characteristics. Construction and operation of Synchronous Generator, Simple problems.

Unit 6: Overview of Electrical System

Introduction-Single line representation of Electrical Power System–Layout and operation of Hydro, Solar and Wind Power Plants.

Text Books

1. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 4th Edition, 2018.
2. E. Hughes, "Electrical and Electronics Technology", Pearson Education India, 1st Edition, 2010.
3. T. K. Nagsarkar, M. S. Sukhija, "Basic Electrical Engineering", Oxford University Press, 3rd Edition, 2017.
4. M. L. Soni, P. V. Gupta, U. S. Bhatnagar and Chakrabarti, "Text Book on Power System Engineering", DhanpatRai& Co. Pvt. Ltd, 2013.
5. SmarajitGhosh, "Fundamentals of Electrical and Electronics Engineering", PHI Publishers, 2nd Edition, 2010.

Reference Books

1. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, Asian Edition, 2013.
2. Vincent Del Toro, "Principles of Electrical Engineering", Prentice Hall, 2nd Edition, 1986.
3. S. K. Bhattacharya, "Basic Electrical and Electronics Engineering", Pearson Education India, 2nd Edition, 2017.
4. SK Sahdev, "Basic Electrical Engineering", Pearson Education India, 1st Edition, 2015.

5. J. B. Gupta, “A Course in Power Systems”, S K Kataria& Sons Publishers, 11th Edition, 2014.
6. D. C. Kulshreshtha, “Basic Electrical Engineering”, McGraw Hill, 2nd Edition, 2019.

Semester	**I SEM**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	-	-	3	1.5	**V20EEL01**
Name of the Course	**Basic Electrical Engineering Lab**					
Branches	**Common to ECE & ECT**					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	**Course Outcome**	**Knowledge Level**
C208.1	Determine the load currents by applying various laws and theorems	K3
C208.2	Find the maximum power delivered to the load	K3
C208.3	Analyze the steady state performance of series circuits	K4
C208.4	Plot the speed control characteristics of DC shunt motor	K3
C208.5	Find the losses and efficiency of a transformer	K3
C208.6	Calculate the energy bill for Domestic loads	K3

Any 10 of the following experiments are to be conducted

1. Verification of Kirchhoff's Laws.
2. Verification of Superposition theorem.
3. Verification of Thevenin's theorem.
4. Verification of Maximum Power Transfer theorem.
5. Analysis of Series RL and RC circuits.
6. Analysis of Series RLC circuit.
7. Speed control of D.C. Shunt motor by Armature control method.
8. Speed control of D.C. Shunt motor by field flux control method.
9. Brake test on DC shunt motor. Determination of performance characteristics.
10. Load Test on Single-Phase transformer
11. OC and SC test on Single-phase transformer (Measurement of Losses)
12. Energy Bill calculation for Domestic loads.

Semester	**II SEM**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	3	-	-	3	**V20EET02**
Name of the Course	**Basic Electrical & Electronics Engineering**					
Branches	**Common to ME & CE**					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	**Course Outcome**	**Knowledge Level**
C113.1	Understand and compute electrical quantities in DC excited circuits	K3
C113.2	Understand and compute electrical quantities in AC excited circuits	K3
C113.3	Study the working principles of DC machines	K2
C113.4	Study the working principles of transformers	K2
C113.5	Understand construction details and explain the working principles of AC machines	K2
C113.6	Understand the basic operation of uninterrupted power supplies	K2

Unit 1 : DC Circuits

Electrical circuit elements (R, L and C), Kirchhoff's Laws, Mesh analysis of simple circuits with dc excitation.Superposition, Thevenin's, and Maximum Power Transfer Theorems, Simple problems.

Unit 2: AC Circuits

Basic Definitions, Peak and RMS values, Types of Powers, Power Factor.Analysis of Single-Phase AC series circuits consisting of RL, RC, RLC combinations, Simple problems.

Unit 3: DC Machines

Construction and operation of DC generator -EMF equation - Types of DC motors: shunt and series motors – applications – Speed control of DC shunt motor: field and armature controls, Simple Problems.

Unit 4: Transformers

Classification, Operation of ideal and practical transformers, EMF equation, losses in transformer, efficiency, OC and SC Test, Simple problems.

Unit 5: AC Machines

Construction and operation of a three-phase induction motor, Slip, torque equation, torque-slip characteristics. Construction and operation of Synchronous Generator, Simple problems.

Unit 6: Uninterrupted Power Supplies

Introduction –Basic operation of Rectifier, Inverter and UPS -On-line UPS, Off- line UPS and Line interactive UPS, Comparison between UPS and Inverter, Basic operation of SMPS.

Text Books

1. SmarajitGhosh, "Fundamentals of Electrical and Electronics Engineering", PHI Publishers, 2nd Edition, 2010.
2. S. K. Sahdev, "Fundamentals of Electrical Engineering & Electronics", DhanpatRai& Company, 2nd Re Edition, 2010.
3. S. K. Bhattacharya, "Basic Electrical and Electronics Engineering", Pearson Education India, 2nd Edition, 2017.
4. M. S. Sukhija,T. K. Nagsarkar, "Basic Electrical and Electronics Engineering", Oxford University Press, 1st Edition, 2012.
5. Ned Mohan, T M Undeland and W P Robbins, "Power Electronics-Converters, Applications and Design", John Wiley & Sons, INC, 2nd Edition, 2008.

Reference Books

1. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 4th Edition, 2018.
2. E. Hughes, "Electrical and Electronics Technology", Pearson Education India, 1st Edition, 2010.
3. R. K. Rajput, "Basic Electrical and Electronics Engineering", University Science Press, 2nd Edition, 2012.

Semester	**II SEM**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	-	-	3	1.5	**V20EEL02**
Name of the Course	**Basic Electrical & Electronics Engineering Lab**					
Branches	**Common to CE & ME**					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	**Course Outcome**	**Knowledge Level**
C115.1	Determine the load currents by applying various laws and theorems	K3
C115.2	Analyze the steady state performance of series circuits	K3
C115.3	Plot the speed control characteristics of DC shunt motor	K3
C115.4	Find the losses and efficiency of a transformer	K3
C115.5	Calculate the energy bill for Domestic loads	K3
C115.6	Plot characteristics of full wave rectifier	K3

Any 10 of the following experiments are to be conducted

1. Verification of Kirchhoff's Laws.
2. Verification of Superposition theorem.
3. Verification of Thevenin's theorem.
4. Verification of Maximum Power Transfer theorem.
5. Analysis of Series RL and RC circuits.
6. Analysis of Series RLC circuit.
7. Speed control of D.C. Shunt motor by Armature control method.
8. Speed control of D.C. Shunt motor by field flux control method.
9. Brake test on DC shunt motor. Determination of performance characteristics.
10. Load Test on Single-Phase transformer
11. OC and SC test on Single-phase transformer (Measurement of Losses)
12. Energy Bill calculation for Domestic loads.
13. Full wave rectifier with and without filters.

Semester	**II SEM**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	3	-	-	3	**V20EET03**
Name of the Course	**Electrical Circuit Analysis-I**					
Branches	**EEE**					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	**Course Outcome**	**Knowledge Level**
C112.1	Apply various network reduction techniques for solving electrical DC circuits.	K3
C112.2	Calculate different parameters of single phase alternating quantities.	K3
C112.3	Understand the concepts of different powers and apply network reduction techniques for solving electrical AC circuits.	K3
C112.4	Determine various parameters in series and parallel resonant circuits.	K3
C112.5	Apply the network theorems for solving electrical DC and AC circuits.	K3
C112.6	Compute electrical parameters for 3-phase balanced systems	K3

Unit-I: Introduction to Electrical Circuits

Classification of network elements, Basic terminology, Kirchhoff's laws; RLC Parameters - series and parallel combinations; Energy Sources; Source transformation; Y-Δ and Δ-Y transformation; Mesh analysis and Nodal analysis – Numerical problems

Unit-II: Single Phase A.C Systems - I

Basic terminology associated with alternating quantity- RMS value, Average value, form factor and peak factor; phase angle and phase difference –lagging, leading networks; steady state analysis of series and parallel combinations of R, L and C circuits, numerical problems.

Unit- III: Single Phase A.C Systems - II

Types of Powers; Power Factor and its significance; Power triangle, Mesh analysis and Nodal analysis of AC networks; Numerical problems.

Unit-IV: Resonance

Concept of Resonance - Series and parallel resonance, Bandwidth, quasi factor, selectivity; Numerical problems; Introduction to locus diagrams; Concept of Duality and Dual networks.

Unit-V: Magnetic Circuits

Basic definitions of MMF, Flux and Reluctance; Analogy between electrical and magnetic circuits; Analysis of series, parallel and composite magnetic circuits; Faraday's laws of electromagnetic induction; Concepts of self-inductance, mutual inductance and coefficient of coupling; Concept of Dot Convention and coupled coils.

Unit-VI: Balanced Three phase circuits

Generation of three phase voltages; Advantages of three phase system; Inter connection of three phase windings: Star and delta connection, Phase sequence, Relation between line, phase voltages and currents in balanced - Star and delta connected load.

Text Books:

1. Chakrabarthi ,"Circuit Theory (Analysis and Synthesis)",DhanpatRai& Co, 7th Re Edition, 2018.
2. William Hayt and Jack E. Kemmerley , "Engineering Circuit Analysis", McGraw Hill Company,8th edition, 2013.
3. Mac E. Van Valkenburg, "Network Analysis", Prentice-Hall of India Private Ltd., 3rd Edition, 2019.

Reference Books:

1. Charles K. Alexander and Mathew N.O. Sadiku, "Fundamentals of Electrical Circuits", McGraw Hill Education (India), 6th Edition, 2019.
2. C. L. Wadhwa, "Network Analysis", New Age International Publishers, 3rd Edition, 2018.
3. Sudhakar A. &Shyammohan S. Palli, "Electrical Circuit Analysis",McGraw Hill Publication, 5th Edition, 2017.
4. Robert L. Boylestad, "Introductory Circuit Analysis", Pearson Publications, 13th Edition, 2016.
5. Lawrence P. Huelsman, "Basic Circuit Theory", 3rd Ed Pearson Publications, 2015.

Semester	II SEM	L	T	P	C	COURSE CODE
Regulation	V20	-	-	3	1.5	**V20EEL03**
Name of the Course	**Electrical Engineering Workshop**					
Branches	**EEE**					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
C114.1	Design different wiring circuits	K4
C114.2	Use electrical parameter measuring instruments	K3
C114.3	Construct the circuits on PCB board	K4
C114.4	Test the domestic appliances	K4
C114.5	Identify the parts of the Machine	K3
C114.6	Analyze electrical circuits through simulation	K4

Any 12 of the following experiments are to be conducted

1. Wiring tools and Accessories
2. Electrical Wiring Joints
3. Lamp Circuits
4. Soldering Practice
5. AC and DC circuits
6. Resistance Measurement
7. Capacitance Measurement
8. Battery voltage measurement
9. Special Lamp Connections
10. Wiring Practice for Power Loads
11. Motor Connections
12. Practice on Motor winding
13. Earthing
14. Testing and repair of Domestic appliances
15. Verification of Kirchoff's Laws.
16. Measurement of Choke Coil Parameters.
17. Simulation of series RLC circuit.

Annexure-IV

SRI VASAVI ENGINEERING COLLEGE (AUTONOMOUS)

(Sponsored by Sri Vasavi Educational Society)
(Approved by AICTE, New Delhi & Permanently affiliated to JNTUK, Kakinada)
(Accredited by NAAC with 'A' Grade & NBA,)
Pedatadepalli, **TADEPALLIGUDEM–534 101.**W.G.Dist**. (A.P)**
Department of Mechanical Engineering

Date: 30-12-2020

Fourth meeting of BOS in Mechanical Engineering department was held on 30/12/2020 at 10.00 AM in online mode through Zoom platform.

The following members were present:

S. No	Name of the BOS Members
1.	Dr.N.MohanRao, Professor & Director (IIIPT & SDC) JNTUK, Kakinada
2.	Dr. R.V. Chalam, Professor, NIT,Warangal
3.	Dr. A. Krishnaiah, Professor, Osmania University, Hyderabad
4.	Sri S.S. SubramanyaSastry, Director - Projects, Renprotech Solutions Pvt. Ltd., Bangalore.
5.	Sri A.Sai Krishna, Alumni, Maruthi design and engg. Pvt.ltd ,Bangalore
6.	Dr. G.V.N.S.R. RatnakaraRao, Professor &Principal, SVEC
7.	Dr. M.V. Ramesh, Chairman & HOD, SVEC
8.	All the BOS internal members

Minutes of meeting of 4th BOS held on 30.12.2020

Chairman welcomed all the BOS members and introduced to all the BOS internal members.

Item No. 1: Review and approval of course structure of I & II semesters of B. Tech (ME) under V20 Regulations.

- The approved course structure is attached in **Annexure-IV(a)**

Item No. 2: Approval of syllabi for the Mechanical Engineering courses offered in I & II semesters B. Tech under V20 Regulation.

- The approved syllabi for the courses are attached in **Annexure-IV(b).**

Chairman (Head –ME)

Head of the Department
Mechanical Engineering
Sri Vasavi Engineering College
TADEPALLIGUDEM-53410

Annexure – IV(a)

Course Structure of Mechanical Engineering – V20 Regulation
(For 2020 – 2021 Admitted Batch)
I SEMESTER

S.No	Course Code	Course Title	Hours per week			Credits
			L	T	P	
1	V20MAT01	Linear Algebra and Differential Equations	3	0	0	3
2	V20PHT01	Engineering Physics	3	0	0	3
3	V20ENT01	English for Professional Enhancement	3	0	0	3
4	V20MEL01	Engineering Graphics	1	0	4	3
5	V20CST01	Programming in C for problem solving	3	0	0	3
6	V20ENL01	Hone Your Communications Skills Lab-I	0	0	3	1.5
`7	V20PHL01	Engineering Physics Lab	0	0	3	1.5
8	V20CSL01	Programming lab in C for problem solving	0	0	3	1.5
9	V20CHT02	Environmental Studies	2	0	0	0

Total Contact Hours: 26 Total Credits: 19.5

II SEMESTER

S.No	Course Code	Course Title	Hours per week			Credits
			L	T	P	
1	V20MAT02	Numerical Methods and Vector Calculus	3	0	0	3
2	V20CHT01	Engineering Chemistry	3	0	0	3
3	V20MET01	Engineering Mecha nics	3	0	0	3
4	V20EET02	Basic Electrical and Electronics Engineering	3	0	0	3
5	V20MEL02	Engineering Workshop	1	0	4	3
6	V20EEL02	Basic Electrical and Electronics Engineering Lab	0	0	3	1.5
7	V20CHL01	Engineering Chemistry Lab	0	0	3	1.5
8	V20ENL02	Hone Your Communications Skills Lab-II	0	0	3	1.5

Total Contact Hours: 28 Total Credits: 19.5

Annexure – IV(b)

Syllabi for the Mechanical Engineering courses offered in I & II semesters B. Tech under V20 Regulation

Semester	**I/ II SEM**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	1	-	4	3	**V20MEL01**
Name of the Course	**ENGINEERING GRAPHICS**					
Branches	**Common to All Branches**					

Course Outcomes: After successful completion of the course, the student will be able to:

CO No.	**Course Outcome**	**Knowledge Level**
CO1	Understand the basic commands in CAD Software and draw the conic sections	K3
CO2	Construct different types of scales and special curves	K3
CO3	Draw the projections of the points and lines	K3
CO4	Develop the projections of planes and surfaces of regular solids	K3
CO5	Draw the Isometric projections and conversion of views	K3

PART – A

UNIT1:

Introduction to CAD Software: CAD Software Mechanical Desktop, Draw, Modify, Dimension tool bars, Annotations, Layers, ISI conventions in drawing.

CONIC SECTIONS – Ellipse, Parabola and Hyperbola

UNIT 2: SPECIAL CURVES & SCALES: Special Curves – cycloid, epicycloids, hypocycloid; Scales – Plain, Diagonal and Vernier Scales.

UNIT 3: ORTHOGRAPHIC PROJECTIONS: Introduction to Orthographic Projections- Projections of Points, Projection of lines inclined to both the planes.

UNIT 4: PROJECTION OF PLANES: Inclined to both the Planes.

PROJECTION OF REGULAR SOLIDS: Prisms, Pyramids, Cones and Cylinders with the axis inclined to one of the planes, Development of Surfaces of regular solids.

PART – B

UNIT 5: ISOMETRIC PROJECTIONS: Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple solids.

UNIT 6: Conversion of Isometric Views to Orthographic Views and Vice-versa.

Text Books:

1. Engineering Drawing by N.D. Bhat, Chariot Publications, 53rd Edition-2014
2. Engineering Drawing by Agarwal&Agarwal, Tata McGraw Hill Publishers, 2nd Edition-2016

Reference Books:

1. Engineering Drawing by K.L.Narayana& P. Kannaiah, Scitech Publishers, 2nd Edition-2014
2. Engineering Graphics for Degree by K.C. John, PHI Publishers-2014
3. Engineering Graphics by PI Varghese, McGrawHill Publishers-2013
4. Engineering Drawing AutoCad – K Venugopal, V. Prabhu Raja, New Age, 5th Edition-2015

Course Evaluation:
Continuous Internal Evaluation (30M):
1. Day to Day Evaluation (20M): CAD Practice (Minimum of 20 Exercises)
2. Mid Examination (10M):

MID-I (10M) - Answer all 3 questions, each question carries 10 Marks with a total of 30M and scaled down to 10M.

i. Question -1 ---CO1
ii. Question -2 ---CO2
iii. Question -3 ---CO3

MID-II (10M) - Answer all 3 questions, each question carries 10 Marks with a total of 30M and scaled down to 10M.

i. Question -1 ---CO4
ii. Question -2 ---CO5
iii. Question -3 ---CO5

10Marks will be allocated as, 80% of best and 20% of least of the mid examinations.

Semester External Examination (70M):
1. Part A (48M): Answer four questions (Each question carry 12 marks)
2. Part B (22M) : Answer any one question

Part-A:

i. Question-1 or Question-2 --- CO1 (12M)
ii. Question-3 or Question-4 --- CO2 (12M)
iii. Question-5 or Question-6 --- CO3 (12M)
iv. Question-7 or Question-8 --- CO4 (12M)

PART-B:

i. Question-9 or Question-10 --- CO5 (22M)

Semester	**I/II SEM**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	3	-	-	3	**V20MET01**
Name of the Course	**ENGINEERING MECHANICS**					
Branches	**Common to CE & ME**					

Course Outcomes: After successful completion of the course, the student will be able to

CO No.	**Course Outcome**	**Knowledge Level**
CO1	Compute the resultant force of a given system of forces and understanding of concepts on friction.	K3
CO2	Calculate the forces in the different types of plane trusses	K3
CO3	Find the Centroid, Center of Gravity and Moment of Inertia for plane figures and bodies	K3
CO4	Illustrate the different types of plane motions of a particle to compute its velocity, acceleration and force.	K3
CO5	Illustrate the concept of Work and Energy	K3
CO6	Apply the principle of Virtual Work to stability of equilibrium of Ladder	K3

Unit I: Introduction to Engineering Mechanics – Basic Concepts.
Systems of Forces: Coplanar Concurrent Forces – Resultant – Moment of Force and its Application – Couples and Resultant of Force Systems.
Equilibrium of Systems of Forces: Free Body Diagrams, Equations of Equilibrium of Coplanar Systems for concurrent forces. Lami's Theorem, Graphical method for the equilibrium of coplanar forces, Converse of the law of Triangle of forces, converse of the law of polygon of forces condition of equilibrium.
Friction : Introduction, Limiting friction and impending friction, ladder and wedge friction.

Unit II: Analysis of Trusses by Method of Joints: Types of Trusses - Assumptions for forces in members of a perfect truss, Force table, Cantilever Trusses, Structures with one end hinged and the other freely supported on rollers carrying horizontal or inclined loads.

Unit III: Centroid: Centroid of simple figures (from basic principles) – Centroid of Composite Figures Centre of Gravity: Centre of gravity body (from basic principles), centre of gravity of composite bodies, Pappus theorems.
Moment of inertia of plane figures: I-section, T-section, Channel section, Z-section and L-section.

Unit IV: Kinematics: Rectilinear and Curvilinear motions – Velocity and Acceleration – Motion of Rigid Body – Types and their Analysis in Planar Motion.

Kinetics: Analysis as a Particle and Analysis as a Rigid Body in Translation – Central Force Motion – Equations of Plane Motion – Fixed Axis Rotation – Rolling Bodies.

Unit V: Work – Energy Method: Equations for Translation, Work-Energy Applications to Particle Motion, Connected System-Fixed Axis Rotation and Plane Motion. Impulse momentum method.

Unit VI: Principle of Virtual Work: Principle of virtual work, advantages of principle of virtual work, principle of virtual applied to stability of equilibrium. Application of principle of virtual work limited to ladder problems.

Text Books:

1. Engineering Mechanics by A.K.Tayal ,Umesh Publications.
2. Engineering Mechanics, Fedinand . L. Singer, Harper – Collins.
3. Engineering Mechanics, S.S Bhavikatti, K. G. Rajashekarappa. New Age International publication.

Reference Books:

1. Engg.Mechanics - S.Timoshenko&D.H.Young., 4th Edn - , McGraw Hill publications.
2. Theory & Problems of engineering mechanics, statics & dynamics – E.W.Nelson, C.L.Best& W.G. McLean, 5th Edn – Schaum’s outline series - McGraw Hill Publ.
3. Meriam J. L., Kraige L. G., “Engineering Mechanics – Dynamics”, Wiley Student Edition, (Sixth Edition) reprint 2011.
4. Beer F. P., Johnston E. R., “Vector Mechanics for Engineers Statics and Dynamics”, Tata, McGraw Hill Publishing company Ltd., New Delhi (Eighth Edition) reprint 2009
5. Shames Irving H., “Engineering Mechanics”, Prentice Hall, New Delhi (Fourth edition) reprint 2009.

Semester	**I/II SEM**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	1	-	4	3	**V20MEL02**
Name of the Course	**ENGINEERING WORKSHOP**					
Branches	**Common to All Branches**					

Course Outcomes:
After successful completion of the course, the student will be able to

CO No.	**Course Outcome**	**Knowledge Level**
CO1	Prepare different models in the carpentry trade and understand basic concepts of carpentry	K3
CO2	Develop various basic prototypes in the trade of Tin smithy and understand basic concepts of Tin smithy.	K3
CO3	Prepare various basic prototypes in the trade of fitting and understand basic concepts of fitting.	K3
CO4	Prepare different models in the Black smithy and understand basic concepts of Black smithy.	K3
CO5	Develop various basic House Wiring techniques, Electrical wiring circuits	K3
CO6	Develop various basic prototype models in Welding and Foundry shop.	K3

Module-I
General safety Considerations during operation of:
Bench Tools, Hammers, Screw Drivers, Punches, Chisels, Scrapers, Scribers, Files, Pliers and Cutters, Wrenches, Hacksaw, Bench Vise, Hand drill, Taps and Dies, Hand Shears, Rules, Tapes and Squares, Soldering Iron, Rivets.
Hand Working Operations:
Sawing, Filing, Threading, Scribing, Shearing, Soldering, Sharpening of hand tools.
Measuring and Gauging:
Calipers, depth Gauge, Feeler Gauge, Micrometers, Vernier Calipers, Vernier Height Gauge, Snap Gauge, Hole Gauge, Bevel Protractor, Dial Indicator, Gauge Blocks and Surface Plate

Module-II
Carpentry:
Introduction, Carpentry Tools, Marking and Layout, Operations.
Sheet Metal Works :
Introduction, Sheet Metal Tools, Marking and Layout, Operations – Bending, Cutting, Rolling.
Fitting :
Introduction, Fitting Tools, Marking and Layout, Operations.

Forging :
Introduction , Forging Tools ,Operations – Upsetting, Drawing, Cutting, Bending, Punching ,Forging Presses and Hammers.

House wiring:
Introduction, House wiring Tools and accessories, Connections, Circuit diagrams.

Metal Joining:
Safety Considerations, Introduction, Soldering, Brazing, Welding – Gas Welding, Arc Welding,

Foundry:
Introduction, Pattern Making, Foundry Tools, Core Making, Melting Furnace – Cupola, Sand Casting Process.

Module-III
Note: At least two exercises to be done from each.

Carpentry
1. T-Lap Joint
2. Cross Lap Joint
3. Dovetail Joint
4. Mortise and Tenon Joint

Tin Smithy
1. Taper Tray
2. Square Box without lid
3. Open Scoop
4. Funnel

Fitting shop
1. V- Fit
2. Square Fit
3. Half Round Fit
4. Dovetail Fit

Black smithy
1. Round rod to Square
2. S-Hook
3. Round Rod to Flat Ring
4. Round Rod to Square headed bolt

House wiring
1. Parallel / Series Connection of three bulbs
2. Stair Case wiring
3. Florescent Lamp Fitting
4. Measurement of Earth Resistance

Welding shop (Arc welding)

1. Butt Joint
2. Lap Joint

Foundry Practice

Preparation of sand mould using split piece pattern and cast the component.

Text Books:

1. A Course in Work shop Technology, Vol.1, Raghuwanshi,DhanpatRai&Co.
2. Elements of Workshop Technology, Vol.1, S.K.HajraChoudary, Asia Publishing House.
3. Production Technology, Vol.1, R.K.Jain and S.C Gupta, Khanna Publications.
4. Workshop Practice Manual,K.Venkata Reddy, B.S.Publications.
5. Workshop Manual, P.Kannaiah, KL.Narayana, Scitech Publications.

Annexure-V

SRI VASAVI ENGINEERING COLLEGE (AUTONOMOUS)

(Sponsored by Sri Vasavi Educational Society)
(Approved by AICTE, New Delhi & Permanently affiliated to JNTUK, Kakinada)
(Accredited by NAAC with 'A' Grade & NBA,)
Pedatadepalli, **TADEPALLIGUDEM–534 101.**W.G.Dist**. (A.P)**
Department of Electronics and Communication Engineering

Dt: 28-12-2020

Fourth meeting of BOS in ECE department along with external members was held on 28/12/2020 at 2.00 PM in online mode through Zoom meeting app with the link https://us02web.zoom.us/j/83813811675.

The following members are present:

S. No	**Name of the BOS Members**
1.	Dr. I. ShanthiPrabha, Prof, JNTUK,Kakinada
2.	Prof. NVSN. Sarma, Director, IIIT, Trichy
3.	Dr. M. VenugopalaRao, Professor, KL University, Vijayawada
4.	Sri S.Siva Kumar, Senior Engineer, Qualcomm, Bangalore.
5.	Dr. GVNSR. RatnakarRao, Principal, Sri Vasavi Engineering College
6.	Dr. E. KusumaKumari, Chairman & HOD, SVEC
7.	All the Internal BOS members

The following members are absent:

1. Dr.J.V.R.Sagar, Director ANURAG, Hyderbad.

Minutes of 4th BOS Meeting

Item No 1: **Welcome Note by the Chairperson BOS**.

The Chairperson welcomed all the BOS members and introduced to all the BOS- internal members.

Item No.2: Review and approval of course structure of I & II semesters of B. Tech (ECE & ECT) under V20 Regulations.

Reviewed the Course structure of I & II Semesters for UG (B. Tech – ECE & ECT) Programme of V 20 Regulation and the approved course structure is attached in **Annexure-V(a).**

Item No.3: Approval of syllabi for the courses offered by the department in I& II semesters B. Tech under V20 Regulation.

Members Approved the syllabi for the courses by the department in I & II semesters B. Tech under V20 Regulation and details are attached in **Annexure-V(b).**

E. Kumari

CHAIRPERSON OF BOS

Vision

- To develop the department into a centre of excellence and produce high quality, technically competent and responsible Electronics and communication engineers

Mission

- To create a learner centric environment that promotes the intellectual growth of the students..
- To develop linkages with R & D organizations and educational institutions for excellence in teaching, learning and consultancy practices..
- To build the student community with high ethical standards.

ANNEXURE-V(a)

COURSE STRUCURE FOR FIRST YEAR B.TECH ECE & ECT

(FOR 2020-21 ADMITTED BATCH) I Semester

I Semester

Sl.No.	Course Code	Course Title	Hours per week			Credits
			L	T	P	
1	V20MAT01	Linear Algebra and Differential Equations	3	0	0	3
2	V20PHT01	Engineering Physics	3	0	0	3
3	V20ENT01	English for Professional Enhancement	3	0	0	3
4	V20EET01	Basic Electrical Engineering	3	0	0	3
5	V20MEL01	Engineering Graphics	1	0	4	3
6	V20ENL01	Hone Your Communications Skills Lab-I	0	0	3	1.5
7	V20PHL01	Engineering Physics Lab	0	0	3	1.5
8	V20EEL01	Basic Electrical Engineering Lab	0	0	3	1.5
9	V20CHT02	Environmental Studies	2	0	0	0

Total Contact Hours: 28 Total Credits: 19.5

II Semester

Sl.No.	Course Code	Course Title	Hours per week			Credits
			L	T	P	
1	V20MAT02	Numerical Methods and Vector Calculus	3	0	0	3
2	V20CHT01	Engineering Chemistry	3	0	0	3
3	V20CST01	Programming in C for problem solving	3	0	0	3
4	V20MEL02	Engineering Workshop	1	0	4	3
5	V20ECT01	Switching Theory and Logic Design	3	0	0	3
6	V20CSL01	Programming lab in C for problem solving	0	0	3	1.5
7	V20CHL01	Engineering Chemistry Lab	0	0	3	1.5
8	V20ENL02	Hone Your Communications Skills Lab-II	0	0	3	1.5

Total Contact Hours: 26 Total Credits: 19.5

ANNEXURE- V(b)

Semester	**II SEM**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	-	-	3	1.5	**V20ECT01**
Name of the Course	**Switching Theory and Logic Design**					
Branches	**Common to EEE, ECE, ECT, CSE & CST**					

Course Outcomes (CO's) (Along with Knowledge Level (K)):

After going through this course the student will be able to

CO No.	**Course Outcome**	**Knowledge Level**
CO-1	**Explain** the different types of number Systems, number conversions, codes and logic Gates.	K_2
CO-2	**Apply** the concepts of Boolean algebra and use the knowledge of K-maps and tabular method for minimization of Boolean expressions.	K_3
CO -3	**Construct** the higher order modules from their lower order structures of various combinational logic circuits.	K_3
CO-4	**Explain** the concept of various flip flops	K_2
CO-5	**Develop** various sequential circuits like registers, counters by using basic flip flops.	K_3
CO-6	**Develop** the various Finite State Machine Models	K_3

Unit – I: **Number Systems & Codes:**

i) Representation of numbers of different radix, conversation from one radix to another radix, r-1's compliments and r's compliments of signed members, problem solving. ii) 4 bit codes, BCD, Excess-3, 2421, 84-2-1 9's compliment code etc., iii) Logic operations and error detection & correction codes; Basic logic operations -NOT, OR, AND, Universal building blocks, EX-OR, EX-NOR - Gates, Gray code, error detection, error correction codes (parity checking, even parity, odd parity, Hamming code).

Unit – II :**Minimization Techniques**

Boolean theorems, principle of complementation & duality, De-morgan theorems, minimization of logic functions using Boolean theorems, Standard SOP and POS, Forms, NAND-NAND and NOR-NOR realizations, minimization of switching functions using K-Map up to 5 variables, tabular minimization, problem solving (code-converters using K-Map etc..).

Unit – III :**Combinational Logic Circuits Design**

Design of Half adder, full adder, half subtractor, full subtractor, applications of full adders, 4-bit binary subtractor, adder-subtractor circuit, BCD adder circuit, Excess 3 adder circuit, look-a-head adder circuit, Design of decoder, demultiplexer, 7 segment decoder, higher order demultiplexing, encoder, multiplexer, higher order multiplexing, realization of Boolean functions using decoders and multiplexers, priority encoder, 4-bit digital comparator.

Unit – IV :**Sequential Circuits –I**

Classification of sequential circuits (synchronous and asynchronous); basic flip-flops, truth tables and excitation tables (Nand RS latch, nor RS latch, RS flip-flop, JK flip-flop, T flip-flop, D flip-flop with reset and clear terminals). Asynchronous Inputs (Preset and Clear), Race around condition, Master Slave JK Flip flop, Conversion from one flip-flop to another flip-flop.

Unit – V :**Sequential Circuits -II**

Design of ripple counters, design of synchronous counters, Johnson counter, ring counter. Design of registers - Buffer register, control buffer register, shift register, bi-directional shift register, universal shift register.

Unit – VI :**Finite State Machines**

Finite State machine; Analysis of Clocked sequential circuits, state Diagrams, state Tables, Reduction of State Tables and State assignments, design Procedures. Realization of Circuits using various Flip Flops.Meelayto Moore Conversion and Vice-versa.

Text Books

1. Digital Design by M. Morris Mano, Michael D. Ciletti, PEA.
2. Switching & Finite Automata Theory, 2nd Edition, ZviKohavi, TMH,1978
3. Fundamentals of Logic Design, 5/e Roth, Cengage.

Reference Books

1. Modern Digital Electronics by RP Jain, TMH
2. An Engineering Approach to Digital Design, William I. Fletcher, Pearson edition.
3. Switching Theory and Logic Design by A. Anand Kumar

Annexure-VI

SRI VASAVI ENGINEERING COLLEGE (AUTONOMOUS)

(Sponsored by Sri Vasavi Educational Society)
(Approved by AICTE, New Delhi & Permanently affiliated to JNTUK, Kakinada)
(Accredited by NAAC with 'A' Grade & NBA,)
Pedatadepalli, **TADEPALLIGUDEM–534 101.**W.G.Dist**. (A.P)**
Department of Computer Science & Engineering

Dt: 29.12.2020

The fourth meeting of Board of Studies of the Department of Computer Science and Engineering was held at 11.30 AM on 31-05-2020 through online mode using,

https://us02web.zoom.us/j/86038326979

The following members attended the meeting:

S.No.	Name of the Member	Designation	Role
1.	Dr. D Jaya Kumari	Professor, HoD-CSE, SVEC	Chairperson
2.	Dr.Krishna Mohan Ankala	Professor, UCEK, Kakinada	University Nominee
3.	Dr. R.B.V. Subramanyam	Professor, Department of CSE, NIT Warangal	Academic Expert
4.	Sri. SrinivasaRajuVuppalapati	Senior Consultant, MSR IT Services LLP, Hitech City, Hyderabad.	Industry Expert
5.	Mr.EEdalaRambabu	microfocus, Bangalore	Alumni
6.	Dr. V. VenkateswaraRao	Professor	Member
7.	Dr. G Loshma	Associate Professor	Member
8.	Ch. Raja Ramesh	Associate Professor	Member
9.	Dr. V S Naresh	Associate Professor	Member
10.	Dr.K. ShirinBhanu	Associate Professor	Member
11.	A. Leelavathi	Assistant Professor	Member
12.	R. LeelaPhani Kumar	Assistant Professor	Member
13.	G. Nataraj	Assistant Professor	Member
14.	B.SriRamya	Assistant Professor	Member
15.	G.Sriram Ganesh	Assistant Professor	Member
16.	N.V.Murali Krishna Raja	Assistant Professor	Member
17.	N. Hiranmayee	Assistant Professor	Member
18.	Y.DivyaVani	Assistant Professor	Member
19.	M NageswaraRao	Assistant Professor	Member
20.	B Kiran Kumar	Assistant Professor	Member
21.	Y. Ravi Raju	Assistant Professor	Member

22.	D.S L Manikanteswari	Assistant Professor	Member
23.	M. Anantha Lakshmi	Assistant Professor	Member
24.	M. Satyanarayana Reddy	Assistant Professor	Member
25.	J.N. Chandra Sekhar	Assistant Professor	Member
26.	P. Bhavani Shankar	Assistant Professor	Member
27.	David Raju. K	Assistant Professor	Member
28.	P Rajesh	Assistant Professor	Member
29.	P Suneetha	Assistant Professor	Member
30.	P Laxmikanth	Assistant Professor	Member
31.	K Satyanarayana	Assistant Professor	Member
32.	M SreeRadhaMangamani	Assistant Professor	Member
33.	S K Shabuddin	Assistant Professor	Member
34.	G RamanjaneyaRaju	Assistant Professor	Member
35.	G V Lakshmi Narayana	Assistant Professor	Member
36.	A NageswaraRao	Assistant Professor	Member
37.	Mr. L Balaji	Lecturer	Member

The following members are absent:

1. Prof. S.PallamSetty, Prof. Computer Science and Systems Engineering, AU College of Engineering.

The following are the Minutes of the Meeting

Item No.1: Welcome note by the Chairman BOS.

The HOD extended a formal welcome and introduced the members.

Item No.2: Review & Approval of the Course Structure for I and II SEM -B.Tech (CSE) and B.Tech (CST) Programme under V20 Regulation.

Reviewed the Course Structure of I& II semesters for B.Tech (CSE) and B.Tech (CST) Programme of V20 Regulation**.** The approved Syllabus is given in **Annexure-VI(a).**

Item No.3: Approval of Syllabi for the proposed courses offered in B.Tech I and II SEM by the CSE Department under V20 Regulation.

Approved the syllabi for the courses offered in B.Tech I & II semesters by the CSE Department of V20 Regulation. The approved Syllabus is given in **Annexure-VI(b).**

Dr.D Jaya Kumari

Chairperson of BOS

Annexure-VI(a)

COURSE STRUCTURE OF FIRST YEAR B.TECH(CSE & CST)

I SEMESTER

S.No.	Course Code	Course Title	Hours per week			Credits
			L	T	P	
1	V20MAT01	Linear Algebra and Differential Equations	3	-	-	3
2	V20CHT01	Engineering Chemistry	3	-	-	3
3	V20ENT01	English for Professional Enhancement	3	-	-	3
4	V20MEL02	Engineering Workshop	**1**	-	4	**3**
5	V20CST01	Programming in 'C' for problem Solving	3	-	-	3
6	V20ENL01	Hone Your Communications Skills Lab-I	-	-	3	1.5
7	V20CHL01	Engineering Chemistry Lab	-	-	3	1.5
8	V20CSL01	Programming Lab in 'C' for problem Solving	-	-	3	1.5

Total Contact Hours: 26 Total Credits: 19.5

II SEMESTER

S.No.	Course Code	Course Title	Hours per week			Credits
			L	T	P	
1	V20MAT02	Numerical Methods and Vector Calculus	3	-	-	3
2	V20PHT01	Engineering Physics	3	-	-	3
3	V20ECT01	Switching Theory and Logic Design	3	-	-	3
4	V20CST02	Python Programming	3	-	-	3
5	V20MEL01	Engineering Graphics	**1**	-	4	**3**
6	V20PHL01	Engineering Physics Lab	-	-	3	1.5
7	V20CSL02	Python Programming Lab	-	-	3	1.5
8	V20ENL02	Hone Your Communications Skills Lab-II	-	-	3	1.5
9	V20CHT02	Environmental Studies	2	-	-	0

Total Contact Hours: 28 Total Credits: 19.5

Annexure-VI(b)

Semester	I /II SEM	L	T	P	C	COURSE CODE
Regulation	V20	-	-	3	1.5	V20CST01
Name of the Course	**Programming in 'C' for problem Solving**					
Branches	**Common to All**					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Describe various problem solving strategies such as Algorithms and Flowcharts	K2
CO2	Develop various programming constructs using Control Structures	K3
CO3	Construct Programs using modular programming approach	K3
CO4	Illustrate the usage of Arrays, String and pointers	K3
CO5	Construct Programs using Structures and Unions	K3
CO6	Distinguish between Sequential files and Random access files	K4

UNIT-I: Problem solving concepts: Algorithms, Flow-charts, Types of Programming Languages, Compiler, Assembler and Linker, Testing and Debugging a program. **Introduction to C Programming:** Overview and importance of C, C Program Structure, Creation and Compilation of C Programs, Identifiers, Variables, Data types, Constants, Declarations, **Input and output statements:** Input and output functions..

UNIT-II: Operators: Arithmetic, relational and logical operators, increment and decrement operators, conditional operator, assignment operator, bitwise operators, special operators, expressions, Precedence, Associatively, Order of evaluation, Type conversion, Programming Examples. **Control Structures:** Conditional statements - If-else, Switch-case constructs, Loops - while, do-while, for.

UNIT-III: Functions: Top down approach of problem solving, standard library functions, user defined functions, parameter passing - call by value, call by reference, return statement, passing arrays as parameters to functions, recursion. **Storage Classes:** Scope and extent, Storage Classes - auto, extern, static and register.

Understanding pointers: Accessing the address of a variable, declaring pointer variables, initialization of pointer variables, accessing a variable through its pointer, pointer arithmetic.

UNIT-IV: Arrays: Single-Dimensional Arrays, multi-Dimensional Arrays, initialization and accessing individual elements. **Strings** in C- Concepts, string handling functions. Pointer and arrays, pointers and character strings, array of pointers. **Dynamic Memory Allocation**: calloc(), malloc() and free()

UNIT-V: Structures: Defining, declaring, initialization, accessing, comparing, operations on individual members, array of structures, structures within structures, structures and functions, bit fields, Programming Examples. **Unions:** Definition – difference between structures and unions – declaring and accessing unions.– pointers and structures – self-referential structures.

UNIT-VI: File Processing: Creating and Opening a file, file opening modes, closing a file, input/output operations on files, error handling during I/O operations, random access to files, Command line arguments. Programming Examples.

TEXT BOOKS:

1. Programming in ANSI C by E Balagursamy, McGraw Hill, 8th Edition.

REFERENCE BOOKS:

1. Let Us C, YashavantKanetkar, BPB Publications, 15th Edition
2. Programming in C, ReemaThareja, Oxford.
3. Programming with C, Second edition, Byron S Gottfried, Tata McGrawhill
4. Problem Solving and Programm design in C, Hanly J R &Koffman E.B, Pearson Education, 2009.
5. Programming in C, PradipDey, ManasGhosh, Oxford University Press, 2007.
6. Problem Solving Using C: Structured Programming Techniques, YukselUckan.
7. C Programming, A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE.
8. Computer Programming in C – Kerninghan& Ritchie, PHI
9. C: The Complete Reference: Herbert Schildt, Osborne/Mcgraw Hill, Inc.

Semester	I/II SEM	L	T	P	C	COURSE CODE
Regulation	V20	-	-	3	1.5	V20CSL01
Name of the Course	**Programming Lab in ‘C’ for problem Solving**					
Branches	**Common to All**					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Demonstrate problem solving techniques using Control Structures	K3
CO2	Construct Programmes using the concepts of Arrays, Strings and Pointers	K3
CO3	Apply the concepts of Functions, Structures and Unions	K3
CO4	Use various file processing operations to develop real-time applications	K4

LIST OF EXPERIMENTS

Tutorial 1: Problem solving using computers.

Lab1: Familiarization with programming environment.

Tutorial 2: Variable types and type conversions.

Lab 2: Simple computational problems using arithmetic expressions.

Tutorial 3: Branching and logical expressions.

Lab 3: Problems involving if-then-else structures switch – case.

Tutorial 4: Loops, while and for loops.

Lab 4: Iterative problems e.g. sum of series.

Tutorial 5: Functions call by value, call by reference

Lab 5: Simple functions.

Tutorial 6: Recursion, structure of recursive calls.

Lab 6: Recursive functions.

Tutorial 7: Pointers.

Lab 7: Programming with pointers.

Tutorial 8: 1D Arrays: searching, sorting.

Lab 8: 1D Array manipulation.

Tutorial 9: 2D arrays.

Lab 9: Matrix problems.

Tutorial 10: String handling.

Lab 10: String handling functions.

Tutorial 11: Structures, unions and dynamic memory allocation.

Lab 11: Structures & unions.

Tutorial 12: File handling, command line arguments.

Lab 12: File operations.

TEXT BOOKS:

1. Programming in Ansi C by E Balagursamy, McGraw Hill, Eight Edition.

Reference Books:

1. Mastering C, K.R. Venugopal and S.R. Prasad, TMH Publishers.
2. Computer Programming in C, V. Rajaraman, PHI.
3. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
4. C- The Complete Reference, Herbert Schildt, Osborne/Mcgraw Hill, Inc.
5. Programming with C, Byron S Gottfried, Second edition, Tata McGrawhill.
6. Programming in C, ReemaThareja, Oxford.
7. Problem Solving and Program design in C, Hanly J R &Koffman E.B, Pearson Education, 2009
8. Programming and Problem Solving Using C, ISRD Group, Tata McGraw Hill,2008

Semester	**II SEM**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	3	-	-	3	V20CST02
Name of the Course	**PYTHON PROGRAMMING**					
Branches	**Common to CSE & CST**					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	**Course Outcome**	**Knowledge Level**
CO1	Illustrate basic concepts of Python Programming	K2
CO2	Describe control structures in python	K2
CO3	Construct python programs using structured data types	K3
CO4	Demonstrate functions and packages	K3
CO5	Compare TextFiles and Binary Files	K4
CO6	Apply OOPs concepts to Develop Test cases	K3

Syllabus

UNIT-I: Introduction to Python, Data Types & Operators: Basics of python programming: Features of python – History of Python - Python installation and execution - Data types – Identifiers - variables – type conversions- Literals, Constants – Numbers – Strings. I/O statements.Operators and expressions, operator precedence – expression evaluation.

UNIT-II: Control Structures: Decision Control statements: conditional (if), alternative (if-else), chained conditional (if-elif-else); **Iteration:** while loop, for loop, nested for loop, range function, break, continue and pass statements.

UNIT-III: Structured Data Types: Lists: list operations, list slices, list methods, cloning lists, list parameters. **Tuples**: tuple assignment, tuple as return value. **Set:** Set Creation, Set Operations. **Dictionaries**: Creation, operations; comprehension, operations on strings.

UNIT-IV:Functions& modules: Introduction - Function Declaration &Definition - Function Call – Variable Scope and Lifetime - The return statement-More on Defining Functions - Lambda Functions or Anonymous Functions - Documentation Strings- Modules – Packages.

UNIT-V: Files & Exception Handling: Introduction - Types of files - Text files - reading and writing files; Errors and exceptions handling.

UNIT-VI:OOPS concepts Classes, Methods, Constructor, Inheritance, Overriding Methods, Data hiding, TKINTER.

Text Books:

1. "Python Programming using problem solving Approach" ReemaThareja, Oxford University Press – 2017.
2. Python with Machine Learning by "A.Krishna Mohan, Karunakar&T.Murali Mohan" by S. Chand Publisher-2018.

Reference Books:

1. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2nd edition, Updated for Python 3, Shroff /O'Reilly Publishers, 2016 (http://greenteapress.com/wp/think- python)
2. Guido van Rossum and Fred L. Drake Jr, ―An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.
3. John V Guttag, ―Introduction to Computation and Programming Using Python", Revised and expanded Edition, MIT Press , 2013

Semester	II SEM	L	T	P	C	COURSE CODE
Regulation	V20	-	-	3	1.5	V20CSL02
Name of the Course	PYTHON PROGRAMMING LAB					
Branches	Common to CSE & CST					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Demonstrate Basic Python Programs	K3
CO2	Construct control structures in python	K3
CO3	Demonstrate functions and packages	K3
CO4	Construct python programs using structured data types	K3
CO5	Demonstrate Text Files and exception handling	K3
CO6	Test Rock – paper – Scissors game	K4

Syllabus

Exercise 1 - Basics

a) A sample Python Script using command prompt, Python Command Line andIDLE

b) A program to purposefully raise an Indentation Error and correct it

Exercise 2 - Operations

a) A program to compute distance between two points taking input from the user (Pythagorean Theorem)

b) A program on add.py that takes 2 numbers as command line arguments and prints its sum.

Exercise - 3 Control Flow

a) A Program to implement for checking whether the given number is a even number or not.

b) A program to construct reverse the digits of a given number and add it to the original, If the sum is not a palindrome repeat this procedure.

c) A program using a while loop that asks the user for a number, and prints a countdown from that number to zero.

Exercise 4 - Control Flow – Continued

a) A program to construct the following pattern, using a nested for loop.

```
*
*                       *
*           *           *
*       *       *       *
*     *     *     *     *
*       *       *       *
*           *           *
*                       *
*
```

b) By considering the terms in the Fibonacci sequence whose values do not exceed four million,find the sum of the even-valued terms.

Exercise - 5 Structured Data types

a) A program to count the number of strings where the string length is 2 or more and the first and last
character are same from a given list of strings.
b) a program to develop unzip a list of tuples into individual lists and convert them into dictionary.

Exercise – 6Structured Data types Continued

a) A program to count the numbers of characters in the string and store them in a dictionary data structure
b) A program to use split and join methods in the string and trace a birthday with a dictionary data structure.

Exercise - 7 – Problem Solving using Functions

a) Find mean, median, mode for the given set of numbers passed as arguments to a function
b) Develop a function nearly_equal to test whether two strings are nearly equal. Two strings a and b are
nearly equal when a can be generated by a single mutation on b.
c) Develop a Recursive Function to find the Factorial of a given number.
d) Develop function to compute gcd, lcm of two numbers. Each function shouldn't exceed one line.

Exercise - 8– Modules

a) Install packages requests, flask and explore themusing (pip)
b) A program to implement a script that imports requests and fetch content from the page. Eg. (Wiki)
c) Develop a simple script that serves a simple HTTPResponse and a simple HTML Page

Exercise - 9 Files

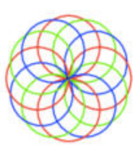
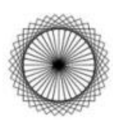
a) A program to count frequency of characters in a given file. Can you use character frequency to tell whether the given file is a Python program file, C program file or a text file?
b) A program to compute the number of characters, words and lines in a file.

Exercise - 10 OOP

a) Class variables and instance variable and illustration of self variable
i) Robot
ii) ATM Machine

Exercise - 11 GUI, Graphics

1. Develop a GUI for an Expression
2. A program to implement the following figures using turtle

Text Books:

1. "Python Programming using problem solving Approach" ReemaThareja, Oxford University Press – 2017.
2. Python with Machine Learning by "A.Krishna Mohan, Karunakar&T.Murali Mohan" by S. Chand Publisher-2018.

Annexure-VII

SRI VASAVI ENGINEERING COLLEGE (AUTONOMOUS)

(Sponsored by Sri Vasavi Educational Society)
(Approved by AICTE, New Delhi & Permanently affiliated to JNTUK, Kakinada)
(Accredited by NAAC with 'A' Grade & NBA,)
Pedatadepalli, **TADEPALLIGUDEM–534 101.**W.G.Dist**. (A.P)**
Department of BS&H, Mathematics Section

Date: 31/12/2020

Minutes of the 4th Meeting of Board of Studies in Mathematics was held on 31-12-2020 at 10:30 AM through online zoom meeting in the SrinivasaRamanujan Hall of Learning (E-block) BS&H Department.

Members present:

The following items are discussed in the meeting:

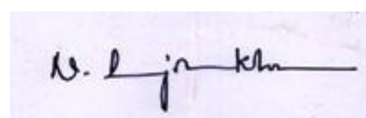
S.No	Name of the	Designation & Address	Designation on
1	Sri. N Raja Sekhar	Assoc. Professor & HOD	Chairman
2	Prof. G.V.S.R.Deekshitulu	Professor, Department of Mathematics,	University Nominee
3	Dr. K.K.M. Sarma	Professor, Department of Mathematics,	Council Nominee
4	Prof. Y.N.Reddy	Professor, Department of Mathematics,	Council Nominee
5	Dr. T.S.R Murthy	Professor of Mathematics, Sri Vishnu Engineering College for Women,	Academician
6	Smt.B.Adi Lakshmi	Assistant.Professor of Mathematics	Member
7	Smt.G S Prasanthi	Assistant.Professor of Mathematics	Member
8	Sri S K Dhana Prasad	Assistant.Professor of Mathematics	Member
9	Sri.AKiran Kumar	Assistant.Professor of Mathematics	Member
10	Sri.D.N.V.Rama	Assistant.Professor of Mathematics	Member
11	Smt.B.V.D. Santhi	Assistant.Professor of Mathematics	Member
12	Sri.V.SrinivasRao	Assistant.Professor of Mathematics	Member
13	Sri.T.D.Rama	Assistant.Professor of Mathematics	Member

Item No-1:Introducing the members of BOS by Chairman.

The chairman of BOS extended a formal welcome and introduced the members.

Item No.2: Syllabi for the courses offered in I and II semesters of B.TechProgramme.

The detailed syllabi for the courses “Linear Algebra and Differential Equations” and “Numerical Methods and Vector Calculus” along withprescribed text books have been presented. With minor changes, the syllabi for the courses mentioned above have been approved. The approved syllabi for the courses are given in Annexure-VII(a)



Chairman

Board of Studies,
Mathematics

ANNEXURE – VII(a)

Semester	**I SEM**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	3	-	-	3	V20MAT01
Name of the Course	**Linear Algebra and Differential Equations**					
Branches	**Common to All Branches**					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	**Course Outcome**	**Knowledge Level**
CO1	Apply matrix technique to solve system of linear equations	K3
CO2	Find Eigenvalues and Eigen vectors	K3
CO3	Solve the ordinary differential equations of first order & first degree	K3
CO4	Solve the linear differential equations of higher order with constant coefficients	K3
CO5	Apply Laplace Transformation to given function	K3
CO6	Find maxima and minima of functions of two variables	K3

UNIT I: System of linear equations:

Rank-Echelon form-Normal form – Solution of linear systems – Gauss elimination – Gauss Jordon- Gauss Jacobi and Gauss Seidal methods.

UNIT II: Eigenvalues, Eigen vectors and Cayley-Hamilton theorem:

Eigenvalues - Eigen vectors– Properties – Cayley-Hamilton theorem (without proof) - Inverse and powers of a matrix by using Cayley-Hamilton theorem.

UNIT-III: Differential equations of first order and first degree:

Linear-Bernoulli-Exact-Reducible to exact differential equations -Newton’s Law of cooling-Law of natural growth and decay-Orthogonal Trajectories.

UNIT IV: Linear differential equations of higher order:

Linear non homogeneous differential equations of higher order with constant coefficients involving RHS term of the type e^{ax}, sinax, cosax, polynomials in x, $e^{ax}V(x)$, $xV(x)$- method of variation of parameters.

UNIT V: Laplace Transformation:

Laplace transforms of standard functions, properties(without proof), transforms of tf(t), f(t)/t, transforms of derivatives and integrals, transforms of unit step function, Dirac delta function, Inverse Laplace transforms, convolution theorem (without proof)

Application: Solving ordinary differential equations with initial conditions using Laplace transforms.

UNIT VI: Partial Differentiation:

Introduction to partial differentiation -Total derivative - Functional dependence - Jacobian.- maxima and minima of functions of two variables (without constraints) and Lagrange's method (with constraints).

Text Books:

1. B.S.Grewal, Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.

2. N.P.Bali, Engineering Mathematics, Lakshmi Publications.

Reference Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, Wiley-India

2. Dean G. Duffy, Advanced engineering mathematics with MATLAB, CRC Press

3. Srimanta Pal, SubodhC.Bhunia, Engineering Mathematics, Oxford University Press.

4. Dass H.K., RajnishVerma. Er., Higher Engineering Mathematics, S. Chand Co. Pvt. Ltd, Delhi.

Semester	II SEM	L	T	P	C	COURSE CODE
Regulation	V20	3	-	-	3	V20MAT02
Name of the Course	**Numerical Methods and Vector Calculus**					
Branches	**Common to All Branches**					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Compute approximate roots of algebraic and transcendental equations and interpolating polynomial for the given data	K3
CO2	Solve ordinary differential equations with initial conditions using numerical methods	K3
CO3	Find multiple integrals and improper integrals	K3
CO4	Calculate gradient of a scalar function, divergence and curl of a vector function	K3
CO5	Apply the knowledge of vector integral concepts to find characteristics of vector fields	K3
CO6	Find Fourier series of a periodic functions	K3

UNIT I:Solutionof Algebraic and Transcendental Equations and Interpolation:

Introduction- Bisection method – Method of false position– Newton-Raphson method (One variable) - finite differences- forward differences, backward differences – simple relations on forward, backward, central, average and shifting operators - Newton's formulae for interpolation - Lagrange's interpolation formula.

UNIT II: Numerical Integration and solution of Ordinary Differential equations:

Trapezoidal rule- Simpson's 1/3rd and 3/8th rule-Solution of ordinary differential equations by Taylor's series- Picard's Method - Euler's method-Euler's modified Method – Runge-Kutta method (fourth order).

UNIT III: Multiple Integrals:

Definition of Improper integrals - Double and triple integrals – Change of variables – Change of order of integration.

UNIT IV: Vector Differentiation:

Vector differential operator - Gradient- Divergence- Curl - Laplacian and second order operators -Vector identities.

UNIT V: Vector Integration:

Line integral: Work done – Potential function – Surface and volume integrals - Vector integral theorems: Greens, Stokes and Gauss Divergence theorems (without proof) and related problems.

UNIT VI: Fourier series:

Fourier series **-**Introduction, Periodic functions, Fourier series of a periodic function, Dirichlet's conditions, Even and odd functions, Change of interval, Half-range sine and cosine series.

Text Books:

1. B.S.Grewal, Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.
2. N.P.Bali, Engineering Mathematics, Lakshmi Publications.

Reference Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, Wiley-
2. Dean G. Duffy, Advanced engineering mathematics with MATLAB, CRC Press
3. V.Ravindranath and P.Vijayalakshmi, Mathematical Methods, Himalaya Publishing House. India
4. Srimanta Pal, SubodhC.Bhunia, Engineering Mathematics, Oxford University Press.
5. Dass H.K., RajnishVerma. Er., Higher Engineering Mathematics, S. Chand Co. Pvt. Ltd, Delhi.

Annexure-VIII

SRI VASAVI ENGINEERING COLLEGE (AUTONOMOUS)

(Sponsored by Sri Vasavi Educational Society)
(Approved by AICTE, New Delhi & Permanently affiliated to JNTUK, Kakinada)
(Accredited by NAAC with 'A' Grade & NBA,)
Pedatadepalli, **TADEPALLIGUDEM–534 101.**W.G.Dist**. (A.P)**
Department of BS&H, Physics Section

Date:28-12-2020

Minutes of the Physics Board of studies second meeting washeld on 28-12-2020 at 12:15 PM through online zoom meeting in the Physics Laboratory

Members present:

S.No	Name of the Member	Designation & Address	Designation on BOS
1	Sri. P. Sita Rama Raju	Assoc. Professor of Physics Sri Vasavi Engineering College	Chairman
2	Prof. G. Padmaja Rani	Professor Dept of UCEK, Kakinada	University Nominee
3	Prof. S.V.S.R. Reddy	Professor Dept of Physics, NIT Warangal	Council Nominee
4	Dr. P. S. V. SubbaRao	Asst. Prof. Department of Physics Andhra University Visakhapatnam	Council Nominee
5	Dr. Ch. V. Srinivas	Dept of Physics, SVCE W, BVRM	Academician
6	Dr. K. Jagadeesh	Sr. Assistant. Professor of physics	Member
7	Sri. B. SasiBhushan	Assistant Professor of physics	Member
8	Ms. G. Rama Devi	Assistant Professor of physics	Member
9	Sri. R. SarathBabu	Assistant Professor of physics	Member
10	Sri. P. Ravi	Assistant Professor of physics	Member

The following items are discussed in the meeting:

Item No-1: Introducing the members of BOS by chairman.

- The chairman of BOS extended a formal welcome and introduced the members.

Item No-2: Syllabi for the courses offered in I and II semesters of B Tech programme.

- The detailed syllabi for the Engineering Physics theory and Engineering Physics Laboratory along with prescribed text books have been presented. With minor changes, the syllabi for the above courses have been approved. The approved syllabi for the courses are given in Annexure-VIII(a).

Chairman
Board of Studies,
Physics section

ANNEXURE-VIII(a)

Semester	**I/II SEM**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	3	-	-	3	V20PHT01
Name of the Course	ENGINEERING PHYSICS					
Branches	**Common to All Branches**					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	**Course Outcome**	**Knowledge Level**
CO1	Grasp the basic principles of structure of materials, crystallography and X-ray diffraction.	K2
CO2	Expose the students to the basic concepts of Lasers and their applications in optical fiber communication link	K3
CO3	Classify the applications of sound waves in various fields.	K2
CO4	Interpret wavelike behavior of matter and motivates the need of fundamental physical laws for better understanding of materials.	K3
CO5	Describe the properties of semiconducting materials	K2
CO6	Illustrate the fundamental concepts of dielectrics and Superconductors.	K4

UNIT-I

CRYSTALLOGRAPHY : Introduction – Space lattice – Basis – Unit Cell – Lattice parameters –Crystal systems- Bravais lattices– Structures and packing fractions of SC,BCC and FCC

X-RAY DIFFRACTION: Directions and planes in crystals – Miller indices – Separation between successive [h k l] planes – Bragg's law-Bragg's x-ray spectrometer.

UNIT-II

LASERS: Introduction –Characteristics of lasers – Spontaneous and Stimulated emission of radiation – Einstein's coefficients –Pumping schemes– Population inversion– Ruby laser- Helium Neon laser- Applications of LASER.

FIBER OPTICS: Introduction –Structure of an optical fiber- Principle of Optical Fiber – Acceptance angle and acceptance cone – Numerical aperture- Basic optical communication system-Advantages of optical fibers over conventional transmission lines.

UNIT – III

ACOUSTICS: Introduction - Sound absorption- Absorption coefficient-Reverberation- Reverberation Time –Basic requirements for constructing an acoustically good hall - Sabine's formula-Factors affecting acoustics of buildings and their remedial measures.

ULTRASONICS: Introduction- Production of Ultrasonic Waves Using Piezoelectric Effect and Magnetostriction Method- Non-Destructive Testing - Pulse Echo Technique –Applications of ultrasonics.

UNIT – IV

QUANTUM MECHANICS: Introduction-de-Broglie's concept of matter waves – Schrodinger's Time Independent& time dependent wave equations –Physical significance of the wave function- Particle in a one dimensional potential box.

FREE ELECTRON THEORY: Classical free electron theory (qualitative) – Assumptions and failures-Quantum free electron theory – Equation for electrical conductivity based on quantum free electron theory-Density of states (3D) - Fermi energy-Fermi – Dirac distribution.

UNIT – V

BAND THEORY OF SOLIDS: Bloch's function (qualitative) – Kronig – Penney model (qualitative)–formation of energy bands in crystalline solids based on Kronig Penny model –E vs K diagram- v vs K diagram- effective mass of an electron-Classification of crystalline solids-concept of hole.

SEMICONDUCTOR PHYSICS: Introduction - Types of Semiconductors-Intrinsic Semiconductors- Carrier concentration– Expression for Conductivity-Extrinsic semiconductors-Carrier concentrations-Dependence of Fermi energy on carrier concentration and temperature-Drift and diffusion currents-Einstein's Equation-Hall Effect-Hall coefficient-Applications of Hall Effect.

UNIT-VI

SUPERCONDUCTIVITY: Introduction- General properties – Meissner effect - Type I and Type II Superconductors- BCS Theory – Josephson effects (AC and DC) -Applications of superconductors.

DIELECTRIC PROPERTIES: Introduction- Types of polarizations-Electronic, Ionic and Orientation polarizations (qualitative) – Internal electric field – Clausius- Mossoti Equation.

Text Books:

1. A Text book of Engineering Physics, M.N. Avadhanulu and P.G.Kshirasagar,S.Chand Publications.
2. Engineering Physics DK Bhattacharya, Poonam and Tandom Publications.

Reference books:

1. Solid state Physics, A.J. Dekker by McMillan India Ltd.
2. Introduction to Solid state Physics, Charles Kittle, Willey India Pvt. Ltd.
3. Solid state Physics, S.O. Pillai by New Academic Science.
4. Basic Engineering Physics,Dr.P. SreenivasaRao, Himalaya Publishers.
5. Engineering Physics, V. Rajendran, McGraw Hill.
6. Engineering Physics, Sanjay D Jain and Girish G Sahasrabudhe., University Press.
7. Engineering Physics, Gaur and Guptha, DhanpatRai Publications.
8. Engineering Physics, P.K. Palanisamy, Sci Tech Publishers.

Semester	**I/II SEM**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	-	-	3	1.5	V20PHL01
Name of the Course	ENGINEERING PHYSICS LAB					
Branches	**Common to All Branches**					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	**Course Outcome**	**Knowledge Level**
CO1	Analyze the physical principle involved in the various instruments; also relate the principle to new application.	K4
CO2	Demonstrate the various experiments in the areas of optics, mechanics and Electronics in all branches of engineering.	K3
CO3	Think innovatively and also apply the creative skills that are essential for engineering.	K4

<u>List of Experiments:</u>

(Any eight of the following to be done)

1. Determination of Rigidity modulus of a material – Torsional Pendulum
2. Determination of acceleration due to gravity – Compound Pendulum
3. Verification of laws of vibrations in stretched strings – Sonometer
4. Determination of velocity of sound – Volume Resonator
5. Verification of Magnetic field Induction along the axis of current carrying coil – Stewart and Gee's apparatus.
6. Determination of Planck's constant using photocell.
7. Determination of wave length of laser source using diffraction grating.
8. Determination of frequency of electrically driven tuning fork - Melde's experiment – Transverse and longitudinal modes.
9. Study of V/I Characteristics of Zener diode.
10. Draw the frequency responsive curves of L-C-R Series Resonance Circuit.
11. Determination of Energy band gap of a Semiconductor p-n junction.

12. Characteristics of Thermistor – Negative Temperature Coefficient of resistivity.

Virtual labs:

(Any two of the following to be done)

1. Crystal Structure.
2. Numerical Aperture of an Optical Fiber.
3. Photo-Electric Effect.
4. Hall Effect.

Annexure-IX

SRI VASAVI ENGINEERING COLLEGE (AUTONOMOUS)

(Sponsored by Sri Vasavi Educational Society)
(Approved by AICTE, New Delhi & Permanently affiliated to JNTUK, Kakinada)
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Pedatadepalli, **TADEPALLIGUDEM–534 101.**W.G.Dist**. (A.P)**
Department of BS&H, Chemistry Section

Minutes of the Second meeting of Board of Studies, Chemistry was conducted on 28-12-2020 at 12.30 PM through online Zoom meeting.

Members present:

S. No.	Name of the member	Designation in BOS
1	Sri A. VamsiSubbarayan	Chairman
2	Dr. K. Anji Reddy	University Nominee
3	Dr. A. Ratnakar	Subject Expert
4	Dr. G. Rambabu	Subject Expert
5	Sri J. Chandra Rao	Member
6	Sri M. Durga Prasad	Member
7	Smt. P. Durga Devi	Member
8	Smt. SSV. Sumalatha	Member
9	Sri J. Suresh Kumar	Member

Members absent:

Dr.P.NageswaraRao	Prof., Dept of Chemistry, NIT Warangal.

The following are the conclusions of the meeting:

Item 1:

- The Chairman welcomed all the external members and introduced them to members of the college.

Item 2:

- Changes brought to the present course structure from previous regulation were shown. Members approved the course structure.
- Thorough discussion took place on syllabi, members appreciated Engineering Chemistry laboratory syllabus and proposed some changes to Engineering Chemistry and Environmental Studies. The prescribed textbooks and syllabus were approved with minor changes and it is given in Annexure-IX(a).
- External members suggested balance between online and offline mode of teaching if the need arises.

Cloud Recording Link:
https://us02web.zoom.us/rec/share/zW1KIWg4IwNzI3o9ztI6aUKFSHSeegsPZIzfQP24836XuimRil2m-ESEEaG3R8O3.fD3qWb0nujTHGrTk

Chairman
Board of Studies, Chemistry

Annexure-IX(a)

Semester	**I/II SEM**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	3	-	-	3	V20CHT01
Name of the Course	ENGINEERING CHEMISTRY					
Branches	**Common to All Branches**					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	**Course Outcome**	**Knowledge Level**
CO1	Solve boiler troubles originated due to poor water quality and suggest suitable water treatment methods.	K3
CO2	Choose plastics and rubbers for engineering applications	K3
CO3	Associate concepts of Electro Chemistry in designing electrochemical energy systems	K2
CO4	Assess the quality of fuels	K3
CO5	Apply corrosion principles for protection of metallic structures	K3
CO6	Interpret important applications of engineering materials	K2

UNIT I: WATER TECHNOLOGY

Sources of water; Impurities in water, Hardness of water, Types of Hardness, Units of hardness, Determination of hardness of water, Numerical problems on temporary and permanent hardness.

Boiler troubles: Priming and Foaming, Sludge and Scale formation, Boiler corrosion, Caustic embrittlement. Softening of hard water- Zeolite process and Ion exchange process; Water for drinking purpose, BSI standards of drinking water, Disinfection: Chlorination, Break point chlorination. Desalination - Reverse Osmosis and Electro dialysis.

UNIT II: POLYMER TECHNOLOGY

Introduction, Polymerization, Mechanism of Free radical addition polymerization; Plastics as engineering materials; Advantages and limitations, Thermoplastics and Thermosetting plastics, Fabricationof plastics (Compression, Injection, Transfer, and Extrusion Moulding) - Preparation,properties and applications of Polythene (HDPE and LDPE), PVC, Bakelite.

Elastomers: Disadvantages of natural rubber, Vulcanization of rubber, Advantages of vulcanized rubber, Preparation, properties and applications of Buna -S and Buna-N.

UNIT III: ELECTROCHEMISTRY

Galvanic cell, Electrode potential and EMF - Reference electrodes (Calomel and Glass electrodes), Determination of pH of a solution using glass electrode, Conductometric titration (Strong Acid– Strong Base).

Batteries: Types, Primary battery - Li-MnO_2 battery, Secondary batteries - Lead acid battery,Lithium ion battery.

Fuel cells: Definition, H_2 - O_2 fuel cell

UNIT IV: FUEL TECHNOLOGY

Fuels – Characteristics of a good fuel, Classification of fuels, Calorific value (HCV and LCV), Dulong's formula, Numerical problems on HCV and LCV.

Solid fuels: Coal – Proximate and ultimate analysis, Significance of the analyses.

Liquidfuels: Petroleum composition, Classification, Synthetic petrol (Fischer Tropsch and Bergius process), Knocking, Anti knocking agents, Octane and Cetane ratings.

Gaseous fuels – Natural gas, LPG and CNG

Biofuels - Biogas, Biodiesel.

UNIT V: CORROSION AND ITS PREVENTION

Definition, Theories of Corrosion (Chemical & Electrochemical), Pilling-Bedworth Rule, Types of electrochemical corrosion (Galvanic corrosion, Concentration cell corrosion, Stress corrosion and

Pitting corrosion), Galvanic series, Factors which influence the rate of corrosion. Protection from corrosion - Design & Selection of metals, Cathodic protection, Protective coatings – Metallic coatings (Anodic and cathodic coatings), Methods of application of coatings on metals (Galvanizing, Tinning, and Electroplating).

UNIT VI: CHEMISTRY OF ENGINEERING MATERIALS

Nano materials: Introduction, Carbon nanotubes - Types, preparation (Arc discharge, Laser ablation and CVD Method) - Properties and applications of carbon nanotubes.

Cement: Composition, Manufacture of cement (Wet process), Setting and hardening of cement.

Biodegradable polymers: PHBV, Poly Lactic Acid - Applications

Conducting polymers: Types, Conduction mechanism in Polyacetylene, Applications.

Text Books:

1. Engineering Chemistry by Jain and Jain; DhanpatRai Publications & Co.
2. A Text book of Engineering Chemistry by S. S. Dara; S. Chand &Co Ltd.

Reference Books:

1. Engineering Chemistry by Vajiram and others. Wiley India Pvt. Ltd.,
2. Engineering Chemistry by PrasanthRath, Cengage Learning.
3. Engineering Chemistry by ShikhaAgarwal; Cambridge University Press.
4. Engineering Chemistry, by B. Sivasankar, McGraw-Hill.

Semester	**I SEM & II SEM**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	2	-	-	0	V20CHT02
Name of the Course	ENVIRONMENTAL STUDIES					
Branches	**Common to All Branches**					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Recognise the importance of environment and ecosystem services	K2
CO2	Identify the characteristic features, uses and impact of overutilization of natural resources	K2
CO3	Explain biodiversity, biodiversity services and conservation of biodiversity	K2
CO4	Report the causes and impacts of various pollutions	K2
CO5	Illustrate social and global environmental issues; sustainable development practices	K2
CO6	Describe environmental management and environmental legislations in India	K2

UNIT 1: MULTIDISCIPLINARY NATURE OF ENVIRONMENT & ECOSYSTEM

Definition, Scope and importance of environment, Typesof environment, Multidisciplinary nature of Environmental Studies, Components of environment.

Ecosystem - Concept of an Ecosystem, Structure and function of an Ecosystem, Food chain & food web, Ecological Pyramids, Structure and function of Forest, Desert, Pond and Marine ecosystem.

UNIT 2: NATURAL RESOURCES

Forest Resources: Uses, Overexploitation, Deforestation.

Water resources: Aquifers, Dams and benefits, Conflicts over water.

Mineral resources: Uses, Overexploitation, Environmental impact of extraction and use of mineral resources.

Land resources: Degradation, Soil erosion and desertification, Landslides.

Renewable Energy resources: Solar energy, Geo thermal energy, Tidal Energy.

UNIT 3: BIODIVERSITY AND ITS CONSERVATION

Definition,LevelsofBiodiversity,ValuesofBiodiversity,HotspotsofBiodiversity,ThreatstoBiodiversity, Endangered and Endemic species of India, In-situ and Ex-situConservation.

UNIT 4: ENVIRONMENTAL POLLUTION

Definition of pollution, Air pollution- Types of Air pollutants, Effects and control measures; Water pollution- Causes, Effects and control measures; Soil pollution;

Biomedical waste; Industrial waste- Process of waste management, Sanitary land fill, Incineration, 3R strategy; E- Waste and its management.

UNIT 5: SOCIAL AND GLOBAL ENVIRONMENTAL ISSUES

Family welfare - Women Education, Value education, Role of information technology on environment and human health, Acid rains, Global warming, Ozone layer depletion and Population growth.

UNIT 6: ENVIRONMENTAL MOVEMENTS, LEGISLATIONS AND MANAGEMENT

Chipko movement, Tehri dam conflict, and Silent Valley Project.

Importance of environmental legislation, Environmental Protection Act, Wildlife Protection Act, Air Act (Prevention and control of pollution), Water Act; Environmental management- EIA.

Text books:

1. Environmental Studies, Fourth Edition, ANubhaKaushik, C P Kaushik, New Age International Pubishers.
2. A Textbook of Environmental Studies, ShashiChawla, TMH, New Delhi.
3. Fundamentals of Environmental Studies, DD Mishra, S Chand & Co. Ltd.
4. Textbook of Environmental Science, DR M. Anjireddy, B.S Publications, Hyderabad.

Semester	**I / II SEM**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	-	-	3	1.5	V20CHL02
Name of the Course	ENGINEERING CHEMISTRY LABORATORY					
Branches	**Common to All Branches**					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	**Course Outcome**	**Knowledge Level**
CO1	Analyze quantitatively a variety of samples using volumetric methods and instrumental methods	K4
CO2	Apply volumetric and instrumental methods for the determination of water quality parameters namely Alkalinity, Hardness and pH	K3
CO3	Prepare polymeric materials, nanoparticles and analyze the given coal samples	K3

List of Experiments:

1. Introduction to chemistry laboratory – Molarity, Normality, Primary, Secondary standard solutions,
   Volumetric titrations, Quantitative analysis, Qualitative analysis etc.,
2. Estimation of HCl using standard Na_2CO_3 solution.
3. Estimation of $KMnO_4$ using standard oxalic acid solution.
4. Determination of alkalinity of a sample of water.
5. Determination of total hardness of water using standard EDTA solution.
6. Estimation of copper using standard EDTA solution.
7. Estimation of ferrous iron using standard $K_2Cr_2O_7$ solution.
8. Estimation of pH of the given sample solution using pH meter.
9. Conductometric titration between strong acid and strong base.
10. Proximate analysis of coal.
11. Preparation of phenol – formaldehyde resin.
12. Preparation of ZnO_2 Nanoparticles by sol-gel method.

Text Book:

1. Lab manual prepared by Department of Chemistry, Sri Vasavi Engineering College.

Reference Books:

1. Practical Engineering Chemistry by K. Mukkanti, B.S. Publications.
2. Vogel's Quantitative Chemical Analysis – 5th Edition, Longman.
3. A Text Book on experiments and Calculations Engineering by S.S.Dara, S.Chand& Co Ltd.

Annexure-X

SRI VASAVI ENGINEERING COLLEGE (AUTONOMOUS)

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Pedatadepalli, **TADEPALLIGUDEM–534 101.**W.G.Dist**. (A.P)**
Department of BS&H, English Section

MINUTES OF THE IV BOS OF ENGLISH ON 31-12-2020.

The IV BOS Meeting of English was held online at 11am on 31-12-2020 using the Zoom link : http://us02web.zoom.us/j/86829486188.

AGENDA OF THE MEETING

Item No.1: Opening Remarks by BOS Chairperson.

Item No.2: To discuss the syllabi of "English for professional Enhancement and Hone Your communication Skills Lab-I" for I Semester of B.Tech.,

Item No.3: To discuss and finalize the syllabus of "Hone Your Communication Skills Lab-II" for II semester of B.Tech.,

MINUTES of MEETING:

Item No 1:

The Chairman welcomed all the external members and introduced them to members of the college.

Item No 2:

The syllabi of "English for Professional Enhancement" (V20ENT01) and "Hone Your Communication Skills Lab-I" (V20ENL01) for Semester-I of B.Tech., have been approved by the members of BOS.

Item No 3:

The syllabus of "Hone Your Communication Skills Lab-II" (V20ENL02) for Semester-II of B.Tech., has been approved by the members of BOS of English.

The approved syllabus of English for Professional Enhancement, Hone Your Communication Skills Lab-I and Hone Your Communication Skills Lab-II given in Annexure-X(a)

Members Present

Dr.G.V.N.S.R.RatnakaraRao, Principal, Sri Vasavi Engineering College

English BOS Members Present:

1. Chairperson of BOS: Dr. T Sujani, Assoc. Professor of English Sri Vasavi Engineering College
2. Dr.D.KesavaRao (Council Nominee) Professor of English, NIT Warangal
3. Prof.K.Sree Ramesh (Council Nominee) Professor of English and Principal, College of Arts and Commerce AdikaviNannaya University Rajamahendravarm
4. Dr.Purna Chandra Rao (University Nominee) Assoc.Professor of English, PVP Siddhartha Institute of Technology,Vijayawada .

Faculty Present:

1. Dr.K. VenkataRao, Assistant Professor
2. B.AnandaRao, Assistant Professor
3. K.V.RamaRao, Assistant Professor
4. K.RadhaMadhavi, Assistant Professor
5. Tanuja .Ch, Assistant Professor
6. Aparanjani.U, Assistant Professor

Annexure-X(a)

Semester	**I SEM**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	3	-	-	3	V20ENT01
Name of the Course	English for Professional Enhancement					
Branches	**Common to All Branches**					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	**Course Outcome**	**Knowledge Level**
CO1	Identify the central theme of the text, use cohesive items for coherence in a paragraph, recognize nouns and basic sentence structures.	K2
CO2	Restate the central idea of the letter by using appropriate vocabulary. Gain mastery over articles and prepositions	K2
CO3	Find the success formula after reading the text in detail to answer questions. Use appropriate tense and concord, find suitable vocabulary and format to draft letters and e-mails.	K3
CO4	Employ reading skills to comprehend the given biography. Interpret visual information .Use quantifiers appropriately and get acquainted with writing for media and statement of purpose	K3
CO5	Appraise the delivered lecture and text, recognize the contextual vocabulary, write error free academic proposals and prepare poster presentations.	K4
CO6	Infer the real meaning of the text, listen for global comprehension and identify foreign phrases, use active and passive voice, practise note making.	K4

Syllabus

UNIT-I

A DRAWER FULL OF HAPPINESS (From Infotech English, Maruthi Publications).

Vocabulary: Technical vocabulary, GRE Vocabulary , Antonyms and Synonyms, Word Applications, Verbal Reasoning and Sequencing of Words.

Grammar: Word forms and Function words; Nouns: singular and plural, Countable and uncountable, Basic Sentence Structure and Word Order, yes/no questions, Wh-questions.

Listening: Listening to short audio texts and identifying the topic, context and specific pieces of information to answer a series of questions both in speaking and writing.

Speaking: Self- Introduction and Introducing others. Asking and answering general questions on topics such as home, family, work, studies and interests.

Reading: Skimming text to get the main idea. Scanning to look for specific pieces of information.

Writing: Mechanics of Writing, Punctuation, Paragraph Writing

Non- Detailed : The Post Office by Rabindranath Tagore (Macmillan India)

UNIT-II

NEHRU'S LETTER TO HIS DAUGHTER INDIRA ON HER BIRTHDAY (From Infotech English, Maruthi Publications).

Vocabulary: Technical Vocabulary, GRE Vocabulary, Analogies, Antonyms and Synonyms, Word Applications.

Grammar: Articles, Prepositions

Listening: Answering a series of questions about main idea and supporting ideas after listening to audio texts both in speaking and writing.

Speaking: Discussion in pairs/ small groups on specific topics. Functional English: Greeting and Leave Taking.

Reading: Identifying sequence of ideas; Recognizing verbal techniques that help to link the ideas in a paragraph together.

Writing: Identifying the main ideas, Rephrasing and Summarizing them, Paraphrasing.

Non- Detailed : The Post Office by Rabindranath Tagore (Macmillan India)

UNIT-III
STEPHEN HAWKING - POSITIVITY 'BENCHMARK' (From Infotech English, Maruthi Publications).

Vocabulary: Technical Vocabulary, GRE Vocabulary, Verbal Reasoning, Using Equivalents.

Grammar: Verbs, Tenses, Concord: Subject - Verb Agreement.

Listening: Listening for global comprehension and summarizing what is listened to both in speaking and writing

Speaking: Discussing specific topics in pairs or small groups and reporting what is discussed. Functional English: Complaining and Apologizing.

Reading: Reading a text in detail by making basic inferences –recognizing, and interpreting specific context clues; strategies to use text clues for comprehension, critical reading.

Writing: Letter writing- types, format and principles of letter writing, E-mail Etiquette, Writing a Resume/CV and Covering Letter.

Non- Detailed : The Post Office by Rabindranath Tagore (Macmillan India)

UNIT-IV

LIKE A TREE, UNBOWED : WANGARI MAATHAI - BIOGRAPHY (From Infotech English, Maruthi Publications).

Vocabulary: Technical Vocabulary, GRE Vocabulary, Antonyms and Synonyms, Word Applications, Cloze Encounters, Phrasal Verbs, Verbal Reasoning.

Grammar: Quantifying Expressions - Adjectives and Adverbs: comparing and contrasting; Degrees of comparison

Listening: Making predictions while listening to conversations/ transactional dialogues without video (only audio), listening to audio-visual texts.

Speaking: Role plays for practice of conversational English in academic contexts (formal and informal) - Asking for and Giving Information/Directions. Functional English: Asking for Permissions, Requesting, Inviting.

Reading: Studying the use of graphic elements in text to convey information.

Writing: Interpreting Visual Information, Statement of Purpose, Writing for Media, Writing for Clarity.

Non- Detailed : The Post Office by Rabindranath Tagore (Macmillan India)

UNIT-V

STAY HUNGRY, STAY FOOLISH (From Infotech English, Maruthi Publications).

Vocabulary: Technical Vocabulary, GRE Vocabulary, Antonyms and Synonyms, Word Applications, Phrasal Verbs, Verbal Reasoning.

Grammar: Identifying and Correcting Common Errors in Grammar and Usage (articles, prepositions, tenses, subject-verb agreement), Reported Speech.

Listening: Identifying key Terms, Understanding Concepts and Interpreting the Concepts both in speaking and writing.

Speaking: Formal oral presentations on topics from academic contexts. Functional English: Suggesting/Opinion giving.

Writing: Writing Academic Proposals - Writing Research Articles, Poster Presentation.

Non- Detailed : The Post Office by Rabindranath Tagore (Macmillan India)

UNIT-VI
ON SAYING PLEASE – A.G.Gardiner

Vocabulary: Technical Vocabulary, GRE Vocabulary, Antonyms and Synonyms, Foreign phrases.

Grammar: Active and Passive Voice.

Listening: Understanding Concepts, Global Comprehension from a TED talk.

Speaking: Giving Commands/instructions.

Readin : Reading Comprehension Practice for IELTS.

Writing: Note making, Blog writing.

Non- Detailed : The Post Office by Rabindranath Tagore (Macmillan India)

Books Prescribed

"Infotech English", Maruthi Publications. (Detailed)

"The post Office" by Rabindranath Tagore, Macmillan India(Non - Detailed)

Reference books:

1. Bailey,Stephen. Academic writing: A handbook for international students. Routledge,2014.
2. Chase, Becky Tarver. Pathwasys: Listening,Speaking and Critical Thinking. Heinley ELT; 2nd Edition, 2018.
3. Skillful Level 2 Reading and Writing Student's Book Pack (B1) Macmillan Educational.
4. The Official Cambridge Guide to IELTS, for Academic and General Training.(2015)

Practical English Usuage, Michael Swan, OUP ,1995.

Semester	**I SEM**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	-	-	3	1.5	V20ENL01
Name of the Course	Hone your Communication Skills, Lab-I					
Branches	**Common to All Branches**					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	**Course Outcome**	**Knowledge Level**
CO1	Identify suitable expressions to greet people, say good bye to them, introduce one another, listen to consonants	K2
CO2	Select suitable words to invite someone, accept or decline invitations, listen to…, identify and produce vowel sounds	K2
CO3	Choose suitable expressions to seek/refuse permissions, to apologize and listen to word accent	K3
CO4	Find apt expressions to give suggestions, express opinions and identify tone groups.	K3
CO5	Use appropriate words to give commands, requests and identify pauses and prominent syllables	K3
CO6	Practise listening to dialogues, role-plays using common vocabulary used in dialogues	K3

Syllabus

Unit-1 Hello, I'm

- Greeting people
- Saying goodbye to people
- Introducing yourself to someone/someone to someone else
- Listening and Identifying Consonants

Unit-2 I Would Love to…. but,

- Inviting someone
- Accepting or declining invitations
- Complaining about something
- Listening to, Identifying and Producing Vowel Sounds

Unit-3 With Your Permission I would like to.....

- Seeking Permission
- Granting/refusing permissions
- Apologising
- Listening to syllables and Word Accent and practise.

Unit-4 Why don't we....?

- Making Suggestions
- Agreeing/disagreeing with a suggestion
- Expressing Opinions
- Using Weak Forms
- Identifying Tone Groups

Unit-5 Could you Please....

- Giving Commands/instructions
- Requesting someone for something
- Identifying pauses and prominent syllables
- Identifying and using different tones

Unit-6 Dialogues

- The norms of dialogues
- Common vocabulary used in dialogues
- Carrying on a dialogue
- Listening to dialogue.

Book Prescribed

Strengthen Your Steps - A multimodal course in communication skills (Maruthi Publications)

Books for Further Reference

1. Better English Pronunciation (J.D.O'Connor), Cambridge University.

2. English Conversation Practice (A Practical Guide to improve Conversational Skills), Sterling Publishers.

3. Exercise in spoken English, Parts-I-III.CIFEL, Hyderabad, Oxford University Press.

Semester	**II SEM**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	-	-	3	1.5	V20ENL02
Name of the Course	Hone your Communication Skills, Lab-II					
Branches	**Common to All Branches**					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	**Course Outcome**	**Knowledge Level**
CO1	Collect suitable expressions and vocabulary to participate in JAM.	K1
CO2	Prepare, face and perform well in interviews with required etiquette.	K3
CO3	Use appropriate telephone etiquette to succeed in telephonic interviews.	K3
CO4	Show team spirit and communicative skills in group discussion.	K3
CO5	Arrange ideas and prepare to give presentations in a professional manner.	K4
CO6	Debate rationally and cogently while putting forth the ideas.	K4

Syllabus

Unit-1 JAM Session

- Preparation for JAM Session
- Participation in JAM

Unit-2 Interviews

- Guidelines for facing interviews
- Three R's of interviews
- Practice Activity (Mock Interviews)

Unit-3 Effective Telephone Interviews

- Telephone Etiquette
- Preparing for telephonic interviews
- Acing interviews
- Practice Activity (Mock Interviews)

Unit-4 Group Discussions

- Tips to participate in Group Discussion
- Practice Activity

Unit-5 Presentation and Public Speaking

- Three P's of Presentation
- Do's and Don'ts in a Power-point Presentation
- Oral Presentations
- Introduction to Public Speaking
- Strategies for successful Public Speaking
- Practice Activity

Unit-6 Debate

- Introduction to Debate
- Parts of a Debate
- Guidelines to participate in a Debate
- Practice Activity

Book Prescribed

Strengthen Your Steps - A multimodal course in communication skills (Maruthi Publications)

Books for further reference

1. English Language Communication Skills, Lab Manual cum Workbook (with CD),Cengage Learning.

2. The Students Companion –Wilfred D. Best (New Edition) – Harper,CollinsPublishers,2012.

3. Hewings, Martin. Cambridge Academic English (B2).CUP, 2012.

Annexure XI

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SRI VASAVI ENGINEERING COLLEGE (Autonomous)

(Sponsored by Sri Vasavi Educational Society; Regd.No:898/2000)
|Accredited by NAAC with 'A' Grade | & | Accredited by NBA |
Approved by AICTE, New Delhi and Permanently Affiliated to JNTUK, Kakinada
Pedatadepalli, TADEPALLIGUDEM – 534 101, W.G. Dist, (A.P.)

PROGRAMME WISE PERFORMANCE ANALYSIS (EXTERNAL)

NAME OF THE EXAM: **M.Tech I SemesterRegular.January– 2019**

S.No.	Specialization	Appeared	Passed	Fail	Pass %
1.	STE	7	6	1	85.71
2.	PSCA	3	3	0	100
3.	MD	9	7	2	77.77
4.	VLSI&ES	1	1	0	100
5.	CSE	5	5	0	100
6.	Overall	**25**	**22**	**3**	**88.00%**

PROGRAMME WISE PERFORMANCE ANALYSIS (EXTERNAL)

NAME OF THE EXAM: **M.Tech II SemesterRegular.June– 2019**

S.No.	Specialization	Appeared	Passed	Fail	Pass %
7.	STE	7	5	2	71.43
8.	PSCA	3	3	0	100
9.	MD	9	5	4	55.56
10.	VLSI&ES	1	1	0	100
11.	CSE	5	5	0	100
12.	Overall	25	19	6	76.00

PROGRAMME WISE PERFORMANCE ANALYSIS (EXTERNAL)
NAME OF THE EXAM: M.Tech III Semester Regular. November – 2019

S. No.	Branch & Specialization	Appeared	Passed	Fail	Pass %
1	CE-STE	7	4	3	57.14
2	EEE- PSC&A	3	3	0	100
3	ME – MD	9	4	5	44.44
4	ECE – VLSI & ES	1	1	0	100
5	CSE – CSE	5	5	0	100
6	Overall	25	17	8	68.00

PROGRAMME WISE PERFORMANCE ANALYSIS (EXTERNAL)
NAME OF THE EXAM: M.Tech IV Semester Regular. September – 2020

S. No.	Branch & Specialization	Appeared	Passed	Fail	Pass %
1	CE-STE	7	7	0	100
2	EEE- PSC&A	3	3	0	100
3	ME – MD	6	5	1	83.33
4	ECE – VLSI & ES	1	1	0	100
5	CSE – CSE	5	5	0	100
6	Overall	22	21	1	95.46

Successful Completion of M.TechProgramme

(2018-20 Batch)

S.No.	Branch & Specialization	Appeared	For Award of Degree		Degree Awarded %
			Eligible	Not Eligible	
1.	CE-STE	7	4	3	57.14%
2.	EEE-PSC&A	3	3	0	100%
3.	ME-MD	9	3	6	33.33%
4.	ECE-VLSI&ES	1	1	0	100%
5.	CSE-CSE	5	5	0	100%
	Overall	25	16	9	64.00%

PROGRAMME WISE PERFORMANCE ANALYSIS (EXTERNAL)

NAME OF THE EXAM: **MBA I SemesterRegular.December– 2018**

S.No.	Programme	Appeared	Passed	Fail	Pass %
6.	MBA	58	43	15	74.14

PROGRAMME WISE PERFORMANCE ANALYSIS (EXTERNAL)

NAME OF THE EXAM: **MBA II SemesterRegular.May– 2019**

S.No.	Programme	Appeared	Passed	Fail	Pass %
1.	MBA	57	46	11	80.70

PROGRAMME WISE PERFORMANCE ANALYSIS (EXTERNAL)

NAME OF THE EXAM: **MBA III SemesterRegular.December– 2019**

S.No.	Programme	Appeared	Passed	Fail	Pass %
1.	MBA	54	45	9	83.33

PROGRAMME WISE PERFORMANCE ANALYSIS (EXTERNAL)

NAME OF THE EXAM: **MBA IV Semester(V18) Regular.September– 2020**

S.No.	Programme	Appeared	Passed	Fail	Pass %
1.	MBA	54	48	6	88.89

Successful Completion of MBAProgramme

(2018-20 Batch)

S.No.	Programme	Appeared	For Award of Degree		Degree Awarded %
			Eligible	Not Eligible	
1.	MBA	54	49	5	90.74%

Annexure-XII

Existing Members to be Replaced

BOS, Chemistry

Existing Member	New Member
Dr.P.NageswaraRao Prof., Dept of Chemistry, NIT Warangal.	Dr.Amarendar Reddy Asst. Prof., School of Science, NIT-AP.

Extension of Subject Experts as Members on Boards of Studies

Department: Civil Engineering

S.No.	Name of the Member	Designation
1	Dr.C.B.KameswarRao	Prof., Dept of Civil Engg., NIT Warangal.
2	Dr.M.Kumar	Prof., Dept of Civil Engg., Osmania University College of Engg., Hyderbad.

Department: Electrical and Electronics Engineering

S.No.	Name of the Member	Designation
1	Dr.M.Sydulu	Prof., Dept of Electrical & Electronics Engg., NIT Warangal.
2	Dr.Y.P.Obulesu	Prof., Dept of Electrical & Electronics Engg., VIT Vellore.

Department: Mechanical Engineering

S.No.	Name of the Member	Designation
1	Dr.R.V.Chalam	Prof., Dept of Mechanical Engg., NIT Warangal.
2	Dr.A.Krishnaiah	Prof., Dept of Civil Engg., Osmania University College of Engg., Hyderbad.

Department: Electronics and Communication Engineering

S.No.	Name of the Member	Designation
1	Dr.N.V.S.N.Sarma	Prof., Dept of Electrical & Communication Engg., NIT Warangal.
2	Dr.M.VenugopalaRao	Prof., Dept of Electrical & Communication Engg., KL Deemed University, Vijayawada.

Department: Computer Science and Engineering

S.No.	Name of the Member	Designation
1	Dr.R.B.V.Subrahmanyam	Prof., Dept of Computer Science and Engg., NIT Warangal.
2	Dr.S.PallamSetty	Prof., Dept of Computer Science and Systems Engg., AU College of Engineering, Visakapatnam.

Department: BSH (English)

S.No.	Name of the Member	Designation
1	Dr.D.KesavaRao	Prof., Dept of English, NIT Warangal.
2	Dr.K.Sree Ramesh	Special Officer AdikaviNannaya University PG Center, Tadepalligudem.

Department: BSH (Physics)

S.No.	Name of the Member	Designation
1	Dr.S.V.S.R.Reddy	Prof., Dept of Physics, NIT Warangal.
2	Dr.P.S.V.Subbarao	Asst. Prof., Dept of Physics, Andhra University, Visakhapatnam.

Department: BSH (Chemistry)

S.No.	Name of the Member	Designation
1	Dr.G.Rambabu	Asst. Prof., Dept of Chemistry, Sri Vidyaniketan Engineering College(A), Tirupathi.

Department: BSH (Mathematics)

S.No.	Name of the Member	Designation
1	Dr.Y.N.Reddy	Prof., Dept of Mathematics, NIT Warangal..
2	Dr.K.K.M.Reddy	Prof., Dept of Mathematics, Andhra University, Visakhapatnam.

Department: Management Studies

S.No.	Name of the Member	Designation
1	Dr.B.Amarnath	Professor & Registrar, Rayalaseema University, Kurnool.
2	Dr.J.N.V.Raghu Ram	Associate Prof., Dept of Technology Management, VIT, Vellore.

***

Sri Vasavi Engineering College (Autonomous)

(Sponsored by Sri Vasavi Educational Society)
(Approved by AICTE, New Delhi & Permanently affiliated to JNTUK, Kakinada)
(Accreted by NBA & NAAC with 'A' Grade)
Pedatadepalli, Tadepalligudem, W.G.Dt, A.P-534101

Sixth Meeting of Academic Council

Agenda Notes

Item No.1: Welcoming the members.

Item No.2: To review the progress of the institute

Item No.3: To approve the minutes of the previous meeting. The details are given in **Annexure-I**

Item No.4:

a. To approve V21 regulations for the award of M.Tech degree.(Details are given in Annexure-II(a)).
b. To approve course structure for VariousSpecializations of M.Techprogramme under V21 Regulations. (Details are given in Annexure-II(b)).
c. To approve V21 regulations & course structure for the award of MBA degree.(Details are given in Annexure-II(c)).

Item No.5: To approve the minutes of the meeting of BOS of various departments.

a. Minutes of 4th BOS meeting of Civil Engineering Department.(Details are given in Annexure-III)
b. Minutes of 5th BOS meeting of Electrical & Electronics Engineering. (Details are given in Annexure-IV)
c. Minutes of 5th BOS meeting of Mechanical Engineering.(Details are given in Annexure-V)
d. Minutes of 5th BOS meeting of Electronics& Communiction Engineering.(Details are given in Annexure-VI)
e. Minutes of 5th BOS meeting Computer Science and Engineering.(Details are given in Annexure-VII)
f. Minutes of 5th BOS meeting of Mathematics.
(Details are given in Annexure-VIII)

g. Minutes of 5th BOS meeting of English.
   (Details are given in Annexure-IX)
h. Minutes of 4th BOS meeting of MBA.
   (Details are given in Annexure-X)

Item No.6: To approve the minutes Results committee.
(Details are given in Annexure-XI)

Item No.7: Amendments to UG V18 Academic Regulations

The proposed amendments are given in Annexure-XII

Item No.8: To nominate BOS members for AI&ML.

(Details are given in Annexure-XIII)

Item No.9: Any other item with the permission of the chair.

Annexure-I

Action taken report on the Minutes of the Fourth Academic Council Meeting held on 07/01/2021.

Item No.1: Welcoming the members.

Principal **Prof. Guduru VNSR Ratnakara Rao** welcomed the members and chaired the meeting.

Item No.2: The approve the minutes of the previous meeting.

The council approved the action taken report presented.

Item No.3: Approval of the minutes of the meeting of joint BOS held on 26/12/2020.

The council approved the minutes of joint BOS meeting held on 26/12/2020.

Item No.4: To approve the minutes of the meeting of BOS of various departments.

The council approved the minutes of the meeting of BOS of Various Departments.

Item No.5: To approve M.Tech & MBA students results (2018 Admitted Batch).

The council approved the results of M.Tech & MBA students(2018 Admitted Batch).

Item No.6: Replacement and Extension of BOS members to another term

(Two Years). The council approved to continue the existing council nominee BOS members for another term(two years)

Item No.7: Any other item with the permission of the chair.

The Council reviewed and approved the Results of IV Semester (2018 admitted batch) and II Semester (2019 admitted batch).

As per the directions of university authorities common academic regulations for all autonomous colleges of JNTUK is followed for the B.Tech programme is followed for the batches admitted from 2020-2021. The detail regulations are already communicated to all the council members on 5th of June 2021 through emails. The detailed regulations are as follows

AUTONOMOUS COLLEGES OF JNTUK

COMMON ACADEMIC REGULATIONS (R20) FOR B. TECH PROGRAMME

(Applicable for from the Academic Year 2020-21)

1. Award of B. Tech.Degree

(a) A student will be declared eligible for the award of B. Tech. Degree if he fulfils the following academic regulations:

(i) A student shall be declared eligible for the award of B. Tech Degree, if he pursues a course of study in not less than four and not more than eight academic years. After eight academic years from the year of their admission, he/she shall **forfeit** their seat in B. Tech course and their admission standscancelled.

(ii) The candidate shall register for 160 credits and secure all the 160credits.

(b) The medium of instruction for the entire under graduate programme in Engineering & Technology will be in **English**only.

2. ProgrammePattern:

a) Total duration of the of B. Tech (Regular) Programme is four academicyears
b) Each Academic year of study is divided into **TwoSemesters**.
c) Minimum number of instruction days in each semester is90.
d) Grade points, based on percentage of marks awarded for each course will form the basis for calculation of SGPA (Semester Grade Point Average) and CGPA (Cumulative Grade Point Average).
e) The total credits for the Programme is160.
f) Three week induction program is mandatory for all first year UG students and shall be conducted as per AICTE/UGC/APSCHE guidelines.
g) Student is introduced to “Choice Based Credit System(CBCS)”.
h) A pool of interdisciplinary and job-oriented mandatory skill courses which are relevant to the industry are integrated into the curriculum of concerned branch of engineering (total five skill courses: two basic level skill courses, one on soft skills and other two on advanced level skill courses)
i) A student has to register for all courses in asemester.
j) All the registered credits will be considered for the calculation of finalCGPA.
k) Each semester has - ‘Continuous Internal Evaluation (CIE)’ and ‘Semester End Examination (SEE)’. Choice Based Credit System (CBCS) and Credit Based Semester System (CBSS) as indicated by UGC and course structure as suggested by AICTE arefollowed.
l) A 10 months industry/field mandatory internship, both industry and social, during the summer vacation and also in the final semester to acquire the skills required for job and make engineering graduatestoconnectwiththeneedsoftheindustryandsocietyatlarge.
m) All the students shall be mandatorily registered for NCC, NSS activities and Community Service Project as per the Government and Universitynorms.
n) Each college shall assign a faculty advisor/mentor after admission to each student or group of students from same department to provide guidance in courses registration/career growth/placements/opportunities for higher studies/GATE/other competitive examsetc.

3. Registration forCourses:

a) In each semester a student shall mandatorily register courses which he/she wishes to pursue within a week from the starting of the class work with the advice of Head of the Department and mentor of the student of the concerned department of thecollege.

b) If any student wishes to withdraw the registration of the course, he/she shall submit a letter to the Principal of the college through the Head of the Department and mentor within fifteendays.

c) The concerned college shall thoroughly verify and upload the data/courses registered by each student in the university examination center within 20 days. The Principal of the concerned college shall ensure that there no wrong registration courses by the student. The university registration portal will be closed after 20days.

4. (a) Award of B. Tech. Degree: A student will be declared eligible for the award of B. Tech. Degree if he fulfills the following academicregulations:

i. A student shall be declared eligible for award of the B. Tech Degree, if he pursues a course of study in not less than four and not more than eight academic years. After eight academic years from the year of their admission, he/she shall **forfeit** their seat in B. Tech course and their admission stands cancelled.

ii. The student shall register for 160 credits and must secure all the 160credits.

iii. All students shall mandatorily register for the courses like Environmental Sciences, Universal Human Values, Ethics, Indian Constitution, Essence of Indian Traditional Knowledge etc., shall be included in the curriculum as non-credit mandatory courses. Environmental Sciences is to be offered compulsorily as mandatory course for all branches. A student has to secure at least 40% of the marks allotted in the internal evaluation for passing the course and shall maintain 75% of attendance in the course.

iv. All students shall mandatorily register for NCC/NSS activities and will be required to participate in an activity specified by NSS officer during second and third semesters. Grade shall be awarded as Satisfactory or Unsatisfactory in the mark sheet on the basis of participation, attendance, performance and behavior. If a student gets an unsatisfactory Grade, he/she shall repeat the above activity in the subsequent years, in order to complete the degreerequirements.

v. Credits are defined as per AICTEnorms.

(b) Award of B. Tech. (Honor)/B. Tech. (Minor)**:** B. Tech. with Honors or a B. Tech. with a Minor will be awarded if the student earns 20 additional credits are acquired as per the regulations/guidelines. The regulations/guidelines are separately provided. Registering for an Honors/Minor is optional.

5. AttendanceRequirements

a) A student is eligible to write the University examinations if he acquires a minimum of 40% in each subject and 75% of attendance in aggregate of all thesubjects.

b) Condonation of shortage of attendance in aggregate up to 10% (65% and above, and below 75%) may be granted by the College Academic Committee. However, this condonation concession is applicable only to any two semesters during the entireprogramme.

c) Shortage of Attendance below 65% in aggregate shall not becondoned.

d) A student who is short of attendance in a semester may seek re-admission into that semester when offered within 4 weeks from the date of commencement of classwork.

e) Students whose shortage of attendance is not condoned in any semester are not eligible to write their end semester examination of thatclass.

f) A stipulated fee of Rs. 500/- in the concerned semester shall be payable towards condonation of shortage of attendance. Students availing condonation on medical ground shall produce a medical certificate issued by the competitiveauthority.

g) A student will be promoted to the next semester if he satisfies the (i) attendance requirement of the present semester and (ii) minimum requiredcredits.

h) If any candidate fulfills the attendance requirement in the present semester, he shall not be eligible for readmission into the sameclass.

i) For induction programme attendance shall be maintained as per AICTEnorms.

j) For non-credit mandatory courses the students shall maintain the attendance similar to creditcourses

6. Evaluation-Distribution and Weightage ofmarks

(i) Paper setting and evaluation of the answer scripts shall be done as per the procedures laid down by the University Examination section from time totime.

(ii) To maintain the quality, external examiners and question paper setters shall be selected from reputed institutes like IISc, IITs, IIITs, IISERs, NITs andUniversities.

(iii) For non-credit mandatory courses, like Environmental Sciences, Universal Human Values, Ethics, IndianConstitution,EssenceofIndianTraditionalKnowledge,thestudenthastosecure40 %ofthemarks allotted in the internal evaluation for passing the course. No marks or letter grade shall be allotted for all mandatory non-credit courses.

(iv) A student is deemed to have satisfied the minimum academic requirements if he has earned the credits allotted to each theory/practical design/drawing subject/ project etc by securing not less than 35% of marks in the end semester exam and minimum 40% of marks in the sum total of the internal marks and end semester examination markstogether.

(v) Distribution and Weightage ofmarks:

The assessment of the student's performance in each course will be as per the details given:

S. No	Components	Internal	External	Total
1	Theory	30	70	100
2	Engineering Graphics/Design/Drawing	30	70	100
3	Practical	15	35	50
4	Mini Project/Internship/Industrial Training/ Skill Development programmes/Research Project	- -	50	50
5	Project Work	60	140	200

(vi) Continuous Internal Theory Evaluation:

a) For theory subjects, during a semester, there shall be two mid-term examinations. Each mid-term examination consists of (i) one online objective examination (20 multiple choice questions) for 10 marks for a duration of 20 minutes (ii) one descriptive examination (3 full questions for 5 marks each) for 15 marks for a duration of 90 minutes and (iii) one assignment for marks. All the internal exams shall be conducted as per university norms from first 50% of thesyllabi.

b) In the similar lines, the second online, descriptive examinations assignment shall be conducted on the rest of the 50%syllabus.

c) The total marks secured by the student in each mid-term examination are evaluated for 30 marks. The first mid marks (Mid-1) consisting of marks of online objective examination, descriptive examination and assignment shall be submitted to the University examination section within one week after completion of first midexamination.

d) The mid marks submitted to the University examination section shall be displayed in the concerned college notice boards for the benefit of thestudents.

e) If any discrepancy found in the submitted Mid-1 marks, it shall be brought to the notice of university examination section within one week from thesubmission.

f) Second mid marks (Mid-2) consisting of marks of online objective examination, descriptive examination and assignment shall also be submitted to University examination section within one week after completion of second mid examination and it shall be displayed in the notice boards. If any discrepancy found in the submitted mid-2 marks, it shall be brought to the notice of university examination section within one week from thesubmission.

g) Internal marks can be calculated with 80% weightage for better of the two mids and

20% Weightage for other midexam.

Example:

Mid-1 marks = Marks secured in (online examination-1+descriptive examination 1+one assignment-1)

Mid-2 marks = Marks secured in (online examination-2+descriptive examination-2+one assignment-2)

Final internal Marks = (Best of (Mid-1/Mid-2) marks x 0.8+ Least of (Mid-1/Mid-2) marks x 0.2)

h) With the above criteria, university examination section will send mid marks of all courses in consolidated form to all the concerned colleges and same shall be displayed in the concerned college notice boards. If any discrepancy found, it shall be brought to the notice of university examination section through proper channel within one week with all proofs. Discrepancies brought after the given deadline will not be entertained under anycircumstances.

(vii) Semester End Theory ExaminationsEvaluation:

a) The semester end examinations will be conducted university examination section for 70 marks consists of five questions carrying 14 marks each. Each of these questions is from one unit and may contain sub-questions. For each question there will be an "either" "or" choice, which means that there will be two questions from each unit and the student should answer either of the two questions.

b) For practical courses there shall be continuous evaluation during the semester for 15 internal marks and 35 end examination marks. The internal 15 marks shall be awarded as follows: day to day work - 5 marks, Record-5 marks and the remaining 5 marks to be awarded by conducting an internal laboratory test. The end examination shall be conducted by the teacher concerned and external examiner appointed.

c) For the courses having design and / or drawing, (such as Engineering Graphics, Engineering Drawing, Machine Drawing) and estimation, the distribution shall be 30 marks for internal evaluation (15 marks for continuous Assessment (day–to–day work) and 15 marks for internal tests) and 70 marks for end examination. There shall be two internal tests in a Semester for 15 marks each and final marks can be calculated with 80% weightage for better of the two tests and 20% weightage for other test and these are to be added to the marks obtained in day to daywork.

d) Evaluation of the summer internships: It shall be completed in collaboration with local industries, Govt. Organizations, construction agencies, Industries, Hydel and thermal power projects and also in software MNCs in the area of concerned specialization of the UG programme. Students shall pursue this course during summer vacation just before its offering as per course structure. The minimum duration of this course is at least 6 weeks. The student shall register for the course as per course structure after commencement of academic year. A supervisor/mentor/advisor has to be allotted to guide the students for taking up the summer internship. The supervisor shall monitor the attendance of the students while taking up the internship. Attendance requirements are as per the norms of the University. After successful completion, students shall submit a summer internship technical report to the concerned department and appear for an oral presentation before the departmental committee consists of an external examiner; Head of the Department; supervisor of the internship and a senior faculty member of the department. A certificate from industry/skill development center shall be included in the report. The report and the oral presentation shall carry 40% and 60% weightages respectively. It shall be evaluated for 50 external marks at the end of the semester. There shall be no internal marks for Summer Internship. A student shall secure minimum 40% of marks for successful completion. In case, if a student fails, he/she shall reappear as and when semester supplementary examinations are conducted by theUniversity.

e) The job oriented skill courses may be registered at the college or at any accredited external agency. A student shall submit a record/report on the on the list skills learned. If the student completes job oriented skill course at external agency, a certificate from the agency shall be included in the report. The course will be evaluated at the end of the semester for 50 marks (record: 15 marks and viva-voce: 35 marks) along with laboratory end examinations in the presence of external and internal examiner (course instructor or mentor). There are no internal marks for the job oriented skillcourses.

f) Mandatory Course (M.C): Environmental Sciences, Universal Human Values, Ethics, Indian Constitution, Essence of Indian Traditional Knowledge etc non-credit (zero credits) mandatory courses. Environmental Sciences shall be offered compulsorily as mandatory course for all branches. A minimum of 75% attendance is mandatory in these courses. There shall be an external examination for 70 marks and it shall be conducted by the college internally. Two internal examinations shall be conducted for 30 marks and a student has to secure at least 40% of the marks for passing the course. There is no online internal exam for mandatory courses. No marks or letter grade shall be printed in the transcripts for all mandatory non-credit courses, but only Completed (Y)/Not-completed (N) will bespecified.

g) **Procedure for Conduct and Evaluation of MOOC:** There shall be a Discipline Centric Elective Course through Massive Open Online Course (MOOC) as Program Elective course. The student shall register for the course (Minimum of 12 weeks) offered by SWAYAM/NPTEL through onlinewiththeapprovalofHeadoftheDepartment.TheHeadoftheDepartmentshallappointone mentor for each of the MOOC courses offered. The student needs to register the course in the SWAYAM/NPTEL portal. During the course, the mentor monitors the student's assignment submissions given by SWAYAM/NPTEL. The student needs to submit all the assignments given and needs to take final exam at the proctor center. The student needs to earn a certificate by passing the exam. The student will be awarded the credits given in curriculum only by submission of the certificate. In case if student does not pass courses registered through SWAYAM/NPTEL, the same or alternative equivalent course may be registered again through SWAYAM/NPTEL in the next semester with the recommendation of HOD and shall be pass.

h) *Major Project (*Project - Project work, seminar and internship inindustry):

In the final semester, the student should mandatorily register and undergo internship and in parallel he/she should work on a project with well-defined objectives. At the end of the semester the candidate shall submit an internship completion certificate and a project report. A student shall also be permitted to submit project report on the work carried out during the internship. The project report shall be evaluated with an external examiner.

Evaluation: The total marks for project work 200 marks and distribution shall be 60 marks for internal and 140 marks for external evaluation. The supervisor assesses the student for 30 marks (Report: 15 marks, Seminar: 15 marks). At the end of the semester, all projects shall be showcased at the department for the benefit of all students and staff and the same is to be evaluated by the departmental Project Review Committee consisting of supervisor, a senior faculty and HOD for 30 marks. The external evaluation of Project Work is a Viva-Voce Examination conducted in the presence of internal examiner and external examiner and is evaluated for 140marks.

7. ResultsDeclaration:

(i) Before results declaration, an academic council meeting shall be conducted and results shall be placed before the academic council for approval.
(ii) With the approval of academic council, the results shall be submitted to the University to get the approval from HonorableVice-Chancellor.
(iii) The University may normalize the result, if required, before declaration of the

result (Guidelines for normalization will be providedseparately)
(iv) A copy of approved results in a CD shall be submitted to the University examinationCenter.

8. Academic Audit: Academic audit in each semester will be conducted as pernorms.

9. Recounting or Re-evaluation of Marks in the End Semester Examination: A student can request for recounting of revaluation of his/her answer book on payment of a prescribed fee as per universitynorms.

10. Supplementary Examinations: A student who has failed to secure the required credits can appear for a supplementary examination, as per the schedule announced by theUniversity.

11. Malpractices in Examinations: Disciplinary action shall be taken in case of malpractices during Mid/End examinations as per the rules framed by theUniversity.

12. PromotionRules

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item no.5 for promotion to higher classes

a) A student shall be promoted from first year to second year if he fulfills the minimum attendance requirement as per Universitynorm.
b) A student will be promoted from II year to III year if he fulfills the academic requirement of 40% of credits up to either II year I-Semester or II year II-Semester from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in II year II semester.
c) A student shall be promoted from III year to IV year if he fulfills the academic requirements of 40% of the credits up to either III year I semester or III year II semester from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in III year IIsemester.

13. CoursePattern

a) The entire course of study is for four academic years; all years are on semesterpattern.
b) A student eligible to appear for the end semester examination in a course, but absent from it or has failed in the end semester examination, may write the exam in that course when conductednext.
c) When a student is detained for lack of credits / shortage of attendance, he may be re-admitted into the same semester/year in which he has been detained. However, the academic regulations under which he was first admitted shall continue to be applicable tohim.

14. Earning ofCredit:

A student shall be considered to have completed a course successfully and earned the credits if he/she secures an acceptable letter grade in the range A+ to E as given below. Letter grade 'F' in any course implies failure of the student in that course and no credits earned. Absent is also treated as no credits earned. For project same % percentages will be followed for grading.

Marks Range Theory (Max – 100)	Marks Range Lab (Max – 50)	Level	Letter Grade	Grade Point
≥ 90	≥ 45	Outstanding	A+	10
≥80 to <89	≥40 to <44	Excellent	A	9
≥70 to <79	≥35 to <39	Very Good	B	8
≥60 to <69	≥30 to <34	Good	C	7
≥50 to <59	≥25 to <29	Fair	D	6
≥40 to <49	≥20 to <24	Satisfactory	E	5
<40	<20	Fail	F	0
-		Absent	AB	0

15. Award ofClass

After a student has satisfied the requirements prescribed for the completion of the program and is eligible for the award of B. Tech. Degree, he shall be placed in one of the following fourclasses:

Class Awarded	CGPA to be secured	Remarks
First Class with Distinction	≥ 7.75 (Without any supplementary appearance)	From the CGPAsecured from160 Credits
First Class	≥ 6.75	
Second Class	≥ 5.75 to < 6.75	
Pass Class	≥ 5.00 to < 5.75	

16. Minimum InstructionDays

The minimum instruction days for each semester shall be 90 working days. There shall be no branch transfers after the completion of the admission process. There shall be no transfer from one college/stream to another within the Constituent Colleges and Units of Jawaharlal Nehru Technological University Kakinada.

17. Withholding ofResults

If the student is involved in indiscipline/malpractices/court cases, the result of the student will be withheld.

18. TransitoryRegulations

a) Discontinued or detained candidates are eligible for re-admission as and when nextoffered.
b) The re-admitted candidate will be governed by the rules & regulations under which the candidate has beenadmitted.
c) (i) In case of transferred students from other Universities, credits shall be transferred to JNTUK as per the academic regulations and course structure ofJNTUK.
d) The students seeking transfer to colleges affiliated to JNTUK from various other Universities / Institutions have to obtain the credits of any equivalent courses as prescribed by JNTUK. In addition, the transferred candidates have to pass the failed courses at the earlier Institute with already obtained internal/sessional marks to be conducted byJNTUK.

19. Gap –Year

Gap Year concept of Student Entrepreneur in Residence shall be introduced and outstanding students who wish to pursue entrepreneurship are allowed to take a break of one year at any time after I/II/III year to pursue entrepreneurship full time. This period shall be counted for the maximum time for graduation. An evaluation committee at universitylevel shall be constituted to evaluate the proposal submitted by the student and the committee shall decide on permitting the student for availing the GapYear.

20. General

a) Wherever the words “he”, “him”, “his”, occur in the regulations, they include “she”, “her”,“hers”.
b) The academic regulation should be read as a whole for the purpose of anyinterpretation.
c) In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Vice- Chancellor isfinal.

d) The University may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by theUniversity.

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ACADEMIC REGULATIONS (R19) FOR B. TECH. (LATERAL ENTRY SCHEME)

Applicable for the students admitted into II year B. Tech. from the Academic Year 2020-21 onwards

1. **Award of B. Tech. Degree**

A student will be declared eligible for the award of B. Tech. Degree if he fulfills the following academic regulations:

a) A student shall be declared eligible for the award of the B. Tech Degree, if he pursues a course of study in not less than three academic years and not more than six academic years. Aftersixacademicyearsfromtheyearoftheiradmission,he/sheshall**forfeit**theirseat inB. Tech course and their admission stands cancelled.

b) The candidate shall register for 121 credits and secure all the 121credits.

2. The attendance regulations of B. Tech. (Regular) shall be applicable to B.Tech (lateral entry).

3. **PromotionRules**

A student shall be promoted from second year to third year if he fulfills the minimum attendance requirement.

A student shall be promoted from III year to IV year if he fulfills the academic requirements of 40% of the credits up to either III year I semester or III year II semester from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in III year II semester.

4. **Award ofClass**

After a student has satisfied the requirement prescribed for the completion of the program and is eligible for the award of B. Tech. Degree, he shall be placed in one of the following four classes:

Class Awarded	CGPA to be secured	Remarks
First Class with Distinction	≥ 7.75 (Without any supplementary appearance)	From the CGPA secured from 121 Credits from II Yearto IVYear
First Class	≥ 6.75	
Second Class	≥ 5.75 to < 6.75	
Pass Class	≥ 5.00 to < 5.75	

The Grades secured, Grade points and Credits obtained will be shown separately in the memorandum of marks.

5. All the other regulations as applicable to **B. Tech. 4-year degree course (Regular) will hold good for B. Tech. (Lateral EntryScheme)**

Annexure-II(a)

ACADEMIC RULES & REGULATIONS (V21) FOR M.Tech

Applicable for the batch of students admitted from the Academic Year **2021-2022**

ACADEMICREGULATIONSV21FORM.TechDEGREECOURSE

Applicable for the students of M. Tech (Regular) programme from the Academic Year 2020-21onwards. The M. Tech Degree from Sri Vasavi Engineering college, Tadepalligudem shall beconferred on candidates by the affiliaty university who are admitted to the program and who fulfill all the requirements for theawardof theDegree.

1.0ELIGIBILITYFORADMISSIONS

Admission to the above program shall be made subject to eligibility,qualification andspecialization as prescribed bytheUniversity/ State Government from timeto time.

Admissions shall be made on the basis of merit/rank obtained by the candidates at thequalifying Entrance Test conducted by the University or on the basis of any other order of meritas approved by the University/ State Government, subject to reservations as laid down by the Govt. from time totime.

2.0 AWARDOFM.Tech DEGREE

2.1 AstudentshallbedeclaredeligiblefortheawardoftheM.TechDegree,ifhepursuesprogramof studyin not less than twoand not morethan four academicyears.

2.2 The student shall register for all 68 credits and secure all the 68 credits.

2.3 Theminimuminstructiondaysineachsemesterare90.

3.0PROGRAMMEOFSTUDY

ThefollowingspecializationsareofferedatpresentfortheM.TechProgrammeofstudy.

Civil	M.Tech. – CIVIL(Structural Engineering)
EEE	M.Tech-PowerElectronicsandPowerSystems
ME	M.Tech-ThermalEngineering
ECE	M.Tech-EmbeddedSystem &VLSI
CSE	M.Tech-ComputerScience

and anyother courseas approved byAICTE/ Universityfrom timeto time.

4.0 **ATTENDANCE**

4.1 A student shall be eligible to appear for examinations if he acquires a minimum of75% of attendance in aggregate of all the courses, and with minimum 50% ineachand everycourseincludingpracticals.

4.2 Condonation of shortage of attendance in aggregate up to 10% (65% and above andbelow75%) ineach semestershall begrantedbytheCollegeAcademicCommittee.

4.3 Shortage of Attendance **below** 65% in aggregate shall not be condoned.

4.4 Studentswhose shortage of attendance is not condoned in any semester are not eligibleto write their end semester examination of that semester.

4.5 Aprescribedfeeshallbe payabletowardscondonationofshortageofattendance.

4.6 A student shall not be promoted to the next semester unless, he satisfies the attendancerequirement of the present semester, as applicable. They may seek re-admission into thatsemester when offered next. If any candidate fulfills the attendance requirement in thepresentsemester, heshallnot be eligiblefor re-admission intothe same class.

5.0 EVALUATION

The performance of the candidate in each semester shall be evaluated course-wise, with amaximumof100marksfortheoryandpractical,onthebasisofInternalEvaluationand End SemesterExamination.

5.1 For the theory courses 70 marks shall be awarded based on the performance in the EndSemester Examination and 30 marks shall be awarded based on the continuous Internal Evaluation.The internal evaluation shall be made based on the **average** of the marks secured in thetwo Mid Term-Examinations conducted-one in the middle of the Semester and the otherimmediately after the completion of instruction. Each mid term examination shall beconducted for a total duration of 120 minutes with 3 questions (without choice) eachfor 10 marks. End semester examination isconducted for 70 marks for all FIVE (5) questions (one question from one unit) to beanswered(either or).

5.2 For practical courses, 70 marks shall be awarded based on the performance in the EndSemesterExaminationsand30marksshallbeawardedbasedontheday-to-dayperformance as Internal Marks. The internal evaluation based on the day to day work-10marks, record- 10 marks and the remaining 10 marks to be awarded by conducting aninternal laboratory test. The end examination shall be conducted by the examiners, with abreakupmarks ofProcedure-20,Experimentation-20, Results-20, Viva-voce-10.

5.3 For Mini Project with Seminar, a student under the supervision of a faculty member, shallcollect the literature on a topic and critically review the literature and submit it to thedepartment in a report form and shall make an oral presentation before the Project ReviewCommittee consisting of Head of the Department, supervisor/mentor and two other seniorfacultymembersofthedepartment.ForMiniProjectwithSeminar,therewillbeonlyinternalevaluationfor50marks.Acandidatehastosecureaminimumof50%of markstobe declared successful.

5.4 A candidate shall be deemed to have secured the minimum academic requirement in acourse if he secures a minimum of 40% of marks in the End semester Examination and aminimum aggregate of 50% of the total marks in the End Semester Examination andInternalEvaluation takentogether.

5.5 In case the candidate does not secure the minimum academic requirement in any course (as specified in 5.4) he has to re-appear for the End semester Examination in that course.A candidate shall be given **one** chance to re-register for each course provided the internalmarks secured by a candidate **are less than 50% and has failed in the end examination.**In such a case, the candidate must re-register for the course(s) and secure the requiredminimum attendance. The candidate's attendance in the re-registered course(s) shall becalculated separately to decide upon his eligibility for writing the end examination in thosecourse(s). In the event of the student taking another chance, his internal marks and endexaminationmarksobtainedinthepreviousattemptshallstandscancelled. Forre-registration the candidates have to apply to the college by payingthe requisite fees and get approval before the start of the semester inwhichre-registration is required.

5.6 Incasethecandidatesecureslessthantherequiredattendanceinanyre-registeredcourse(s), he shall not be permitted to write the End Examination in that course.He shallagainre-register thecourse when next offered.

5.7 Laboratory examination for M. Tech. courses must be conducted with two Examiners, oneof them being the Laboratory Class Teacher and thesecondexaminershallbeappointedbytheprincipalfromthepanelofexaminerssubmitted bytherespectivedepartment.

6.0EVALUATION OF PROJECT/DISSERTATION WORK

Every candidate shall be required to submit a thesis or dissertation on a topic approved bytheProject ReviewCommittee.

6.1 The work on the project shall be initiated at the beginning of the II year and the durationof the project is two semesters. A candidate is permitted to submit Project Thesis onlyafter successful completion of theory and practical course with the approval of PRC notearlier than 40 weeks from the date of registration of the project work. The candidate hastopass all the theoryandpractical courses beforesubmissionof theThesis.

6.2 A Project Review Committee (PRC) shall be constituted with Head of the Departmentand two otherseniorfacultymembersin thedepartment.

6.3 Registration of Dissertation/Project Work: A candidate is permitted to register for theproject work after satisfying the attendance requirement of all the courses, both theoryandpractical upto 2nd semester

6.4

Aftersatisfying6.3,acandidatehastosubmit,inconsultationwithhisprojectsuper visor, the title, objective and plan of action of his project work for approval. Thestudent can initiate the Project work, only after obtaining the approval from the ProjectReviewCommittee(PRC).

6.5 If a candidate wishes to change his supervisor or topic of the project, he can do so withthe approval of the Project Review Committee (PRC).However, the PRC shall examinewhether or not the change of topic/supervisor leads to a major change of his initial plansof project proposal.If yes, his date of registration for the project work will be taken as the date on which thechangeof Supervisor ortopicas the casemaybe applied.

6.6 Continuous assessment of Dissertation-I and Dissertation-II during the Semester(s) willbemonitored bythePRC.

6.7 A candidate shall submit his status report in two stages to the PRC, at least with a gap of3months between them.

6.8 At the end of the III semester project phase-1 is evaluated for 50 marks by the committee casting of HOD,supervisor and external examiner appointed by principal.

6.9 Three copies of the Project Thesis certified by the supervisor shall be submitted to thedepartment.

6.10 The thesis shall be adjudicated by one examiner selected by the principal.For this, theHOD of the department shall submit a panel of 5 examiners, eminent in that field, withthehelp of theguide concerned.

6.11 The Head of the Department shall coordinate and make arrangements for the conduct ofViva-Voceexamination.

6.12 If thereport of theexaminer is favorable,Viva-Voce examination shall be conductedby a board consisting of the Supervisor, Head of the Department and the examiner whoadjudicatedtheThesis.TheBoardshalljointlyevaluate thecandidate'sworkforamaximumof 100 marks.

6.13 If the report of the examiner isnotfavourable, the candidate shallrevise and resubmitthe Thesis, in the time frame as decided by the PRC. If the report of the examiner isunfavorable again, the thesis shall be summarily rejected. The candidate has tore-registerfortheprojectandcompletetheprojectwithinthestipulatedtimeaftertakin gtheapproval from the principal.

6.14 If the report of the Viva-Voce is unsatisfactory (ie, < 50 marks), the candidate shallretaketheViva-Voceexaminationonlyafterthreemonths.Ifhefailstogetasatisfactory report at the second Viva-Voce examination, the candidate has to re-registerfor the projectandcomplete the projectwithinthe stipulatedtime after taking theapprovalfrom theUniversity.

7.0 Supplementary Examinations

Supplementary examinations will be conducted twice in a year at the end of odd and even semester.

8.0 Revaluation

Recounting of marks in the end semester examinations

8.1 As per the notification issued by the controller of examinations, the students can submit the application for revaluation, along with the requisite fee receipt for revaluation of his/her answer script(s) of the theory course(s), if he /she is not satisfied with the marks obtained.
8.2 The Controller of examinations shall arrange for re-evaluate the answer script(s).
8.3 A new Examiner, other than the first examiner, shall re-evaluate the answer script(s).
8.4 Better marks out of the two shall be taken into consideration.
8.5 If the difference of marks between the two valuations is more than 15%, the answer script will be referred to third valuation. The average of nearest two marks will be awarded.

9.0 CumulativeGradePointAverage(CGPA)

MarksRangeTheory/Laboratory (Max–100)	LetterGrade	Level	GradePoint
≥90%	O	Outstanding	10
≥80to<90%	S	Excellent	9
≥70to<80%	A	VeryGood	8
≥60to<70%	B	Good	7
≥50to<60%	C	Satisfactory	6
<50%	F	Fail	0
		Absent	0

ComputationofSGPA

- The following procedure will be adopted to compute the Semester GradePointAverage(SGPA)andCumulativeGradePointAverage(CGPA):

- The **SGPA** is the ratio of sum of the product of the number of creditswith the grade points scored by a student in all the courses taken by astudent and the sum of the number of credits of all the courses undergonebyastudent, i.eSGPA(Si)=∑(CiXGi) /∑Ci

- Where Ci is the number of credits of the ith course and Gi is the gradepointscored bythe student in the ithcourse.

ComputationofCGPA

- The**CGPA**isalsocalculatedinthesamemanner takingintoaccountallthe courses undergone by a student over all the semester of aProgramme,i.e.
- **CGPA=∑(CiX Si)/∑Ci**
- Where Si is the SGPA of the i^{th} semester and Ci is the total number ofcreditsin that semester.
- TheSGPAand CGPAshall berounded offto 2decimal pointsandreportedin thetranscripts.

- EquivalentPercentage=(CGPA–0.75)x10

10.0AWARDOFDEGREE ANDCLASS

Afterastudenthassatisfiedtherequirementsprescribedforthecompletionoftheprog ramand is eligible for the award of M. Tech. Degree he shall be placed in one of the followingfourclasses:

	CGPAtobesecured	
FirstClasswithDistinction	≥ 7.75	**From theCGPA securedfrom68Credits** .
FirstClass	≥ 6.75	
SecondClass	≥ 5.75 to < 6.75	
PassClass	≥ 4.75 to < 5.75	

TheGrades secured,GradepointsandCredits obtainedwill beshown separatelyinthememorandumof marks.

11.0WITHHOLDINGOF RESULTS

Ifthestudentisinvolvedinindiscipline/malpractices/courtcases,theresultofthe studentwill bewithheld.

12.0TRANSITORYREGULATIONS (forV21)

12.1 When a student gets detained due to academic regulations and rejoins the college to complete the programme. However, the academic regulations under which he/she was first admitted shall continue to be applicable to him/her.

12.2 When a student discontinues for some time and rejoins the college to complete the programme. However, the academic regulations under which he/she was first admitted shall continue to be applicable to him/her.

13.0GENERAL

13.1 Whereverthe words“he”, “him”,“his”,occurin theregulations,theyinclude“she”,“her”,“hers”.

13.2 Theacademicregulationshouldbereadasawholeforthepurposeofanyinterpr etation.

13.3 In the case of any doubt or ambiguity in the interpretation of the above rules, thedecisionofthe Vice-Chancelloris final.

13.4 The University may change or amend the academic regulations or syllabi at any timeand the changes oramendments made shall be applicable to all the students witheffectfrom thedates notified bytheUniversity.

MALPRACTICESRULES

DISCIPLINARYACTIONFOR/IMPROPER CONDUCTINEXAMINATIONS

	NatureofMalpractices/Improperconduct
	Ifthecandidate:
1. (a)	Possessesor keeps accessible in examinationhall,anypaper,note book, programmable calculators, Cellphones,pager,palmcomputers or any other form of material concernedwithorrelatedtothe courseoftheexamination(theoryor practical)inwhichheisappearing buthasnotmadeuseof(material shallincludeanymarksonthebody ofthecandidatewhichcanbeused asanaidinthesubjectofthe examination)
(b)	Givesassistanceorguidanceorreceives it from any other candidateorally or by any oth languagemethodsorcommunicatesthroughcellphoneswithanycandidateorpersonsinoroutsi amhallinrespect ofanymatter.

2.	Has copied in the exa hallfromanypaper,book,programmablecalculators,palmcomputersoranyotherformofmateri relevant to the subject of theexamination (theory or practical) inwhichthecandidate isappe
3.	Impersonatesanyothercandidateinconnectionwith theexamination.
4.	SmugglesintheAnswerbookoradditionalsheetortakesoutorarrangestosendoutthequestionpa ngtheexaminationoranswerbookoradditionalsheet,duringorafter theexamination.
5.	Usesobjectionable,abusiveoroffensivelanguageintheanswerpaper or inletterstothe exa writes to the examiner requestinghimto award pass marks.
6.	Refusestoobeytheordersofthe Chief Superintendent/Assistant– Superintendent/anyofficeronduty ormisbehavesorcreatesdisturbance ofanykind in and around the examinationhallororganizesawalk outorinstigatesotherstowalkout, orthreatenstheofficer-inchargeor anypersonondutyinoroutsidethe examinationhallofanyinjurytohis personortoanyofhisrelations whetherbywords,eitherspokenor

	writtenorbysignsorbyvisible representation,assaultstheofficer-in-charge,oranypersonondutyin oroutsidetheexaminationhallor anyofhisrelations,orindulgesin anyother act of misconduct or mischiefwhichresultindamageto ordestructionofpropertyinthe examinationhalloranypartofthe Collegecampusorengagesinany otheractwhichintheopinionofthe officerondutyamountstouseof unfairmeansormisconductorhas thetendencytodisrupttheorderly conductoftheexamination.
7	Leavestheexamhalltakingaway answer script or intentionallytears of thescriptoranypartthereofinside oroutsidethe examinationhall.
8.	Possess any lethal weapon or firearmintheexamination hall.
9.	If student of the college, who is acandidatefortheparticularexaminationoranypersonnotconnected with the indulgesinanymalpracticeorimproperconductmentioned in clause6to8.
10.	Comesinadrunkenconditiontotheexaminationhall.
11.	Copyingdetectedonthebasisofinternalevidence,suchas,duringvaluationorduringspecialscru
12.	If any malpractice is detected whichis not covered in the above 1to11shallbereportedtotheUniversityforfurtheractiontoawardsuitablepunishment.

Annexure-II(b)

COURSESTRUCTUREPROPOSEDFORM.Tech (Structural Engineering)

(From 2021 – 2022 Admitted Batch) – V21 Regulation

ISEMESTER

S.No	Course Code	CourseName	L	T	P	C
1	V21STET01	TheoryofElasticity	3	0	0	3
2	V21STET02	StructuralDynamics	3	0	0	3
3	V21STET03V21MAT01 V21STET04	ElectiveI 1. MatrixAnalysis ofStructures 2. Analytical & Numerical Methods forStructuralEngineering(BosofMaths) 3. DesignofRCCFoundations	3	0	0	3
4	V21STET05V21STET06 V21STET07	ElectiveII 1. BridgeEngineering 2. Repair and Rehabilitation ofStructures 3. StructuralOptimization	3	0	0	3
5	V21STET08	AdvancedConcreteTechnology	2	0	0	2
6	V21STEL01	AdvancedConcreteTechnologyLaboratory	0	0	4	2
7	V21STEL02	AdvancedStructuralEngineeringLaboratory	0	0	4	2
8		AuditCourse-1	2	0	0	0
Total			16	0	8	18

Total Contact Hours : 24
TotalCredits : 18

II SEMESTER

S. No	Course Code	CourseName	L	T	P	C
1	V21STET09	FiniteElementMethodsinStructural Engineering	3		0	3
2	V21STET10	StabilityofStructures	3		0	3
3	V21STET11V21STET12 V21STET13	ElectiveIII 1. TheoryofPlatesandShells 2. AdvancedSteelDesign 3. AnalysisofOffshoreStructures	3		0	3
4	V21STET14V21STET15 V21STET16	ElectiveIV 1. EarthquakeResistantDesig nofBuildings 2. PrecastandPrefabricat edStructures 3. EarthRetainingStructures	3	0		3
5	V21STET17	AdvancedReinforcedConcreteDesig n	2	0	0	2
6	V21STEL03	StructuralDesign laboratory	0	0	4	2
7	V21STEP01	MiniProject WithSeminar	0	0	4	2
8		AuditCourse-2	2	0	0	0
		Total	16	0	8	18

Total Contact Hours : 24
TotalCredits : 18

Auditcourse 1 &2

1. EnglishforResearchPaperWriting(BOSEnglish)
2. DisasterManagement (BOS of CIVIL)
3. ValueEducation(BOSEnglish)
4. ConstitutionofIndia(BOSEnglish)
5. PedagogyStudies (BOSEnglish)
6. PersonalityDevelopment throughLifeEnlightenmentSkills(BOSEnglish)

III SEMESTER

S. No	Course Code	CourseName	L	T	P	C
1	V21STET18 V21STET19V21STET20	ElectiveIII/MOOCS*/NPTEL* 1. DesignofPrestressedConcreteStructures 2. StructuralHealthMonitoring 3. IndustrialStructures 4. MOOCS-1 throughNPTEL/SWAYAM12 WeekProgramme related to theprogramme which is not listed inthecoursestructure	3	0	0	3
2	V21MAT02	OpenElective/MOOCS*/NPTEL* 1. OperationalResearch(BOSof Maths) 2. CostManagementforEngineering Projects(BOSof MBA) 3. MOOCS-2 throughNPTEL/SWAYAM12 WeekProgramme related to theprogramme which is not listed inthecoursestructure	3	0	0	3
3	V21STEP02	ProjectPhase I	0	0	20	10
Total			6	0	20	16

Total Contact Hours: 26
TotalCredits : 16

IV SEMESTER

S.No	Course Code	CourseName	L	T	P	C
1	V21STEP03	ProjectPhase II	0	0	32	16
Total			0	0	32	16

Total Contact Hours: 32
TotalCredits : 16

Course Structure of M. Tech EEE for Power Electronics & Power Systems (PE&PS) under V21 Regulation

M. Tech - I Semester							
S.No.	**Course Code**	**Course Title**	**L**	**T**	**P**	**Credits**	**Marks**
1.	V21PET01	Analysis of Power Electronic Converters	3	0	0	3	100
2.	V21PET02	Power System Operation & Control	3	0	0	3	100
3.	V21PET03 V21PET04 V21PET05	Elective – I: 1. Control & Integration of Renewable Energy systems 2. Smart Grid 3. Power Quality	3	0	0	3	100
4.	V21PET06 V21PET07 V21PET08	Elective – II: 1. Electrical Distribution Automation 2. HVDC Transmission 3. Advanced Power System Protection	3	0	0	3	100
5.		Research Methodology and IPR	2	0	0	2	100
6.	V21PEL01	Power Electronics Simulation Lab	0	0	4	2	100
7.	V21PEL02	Power Systems Lab	0	0	4	2	100
8.		Audit Course – I	2	0	0	0	100
			16	0	8	18	800

M. Tech – II Semester							
S.No.	**Course Code**	**Course Title**	**L**	**T**	**P**	**Credits**	**Marks**
1.	V21PET09	Switched Mode Power Conversion	3	0	0	3	100
2.	V21PET10	Real Time Control of Power Systems	3	0	0	3	100
3.	V21PET11 V21PET12 V21PET13	Elective – III: 1. Electrical Machine Modeling & Analysis 2. Controlled Drives 3. Application of Power Converters	3	0	0	3	100
4.	V21PET14 V21PET15 V21PET16	Elective – IV: 1. EHVAC Transmission 2. Flexible AC vvvTransmission Systems 3. Power System Dynamics & Stability	3	0	0	3	100
5.		Mini Project with Seminar	0	0	4	2	100
6.	V21PEL03	Power Converters Lab	0	0	4	2	100
7.	V21PEL04	Power Systems Simulation Lab	0	0	4	2	100
8.		Audit Course – II	2	0	0	0	100
			14	0	12	18	800

Audit course 1 & 2

1. English for Research Paper Writing
2. Disaster Management
3. Value Education
4. Constitution of India
5. Pedagogy Studies
6. Stress Management by Yoga
7. Personality Development through Life Enlightenment Skills.

M. Tech – III Semester							
S.No.	**Course Code**	**Course Title**	**L**	**T**	**P**	**Credits**	**Marks**
1.	V21PET17 V21PET18 V21PET19	Elective – V: 1. Hybrid Electric Vehicles 2. Soft Computing Techniques 3. MOOCS-1 through NPTEL/ SWAYAM- 12 Week Program related to the programme which is not listed in the course structure	3	0	0	3	100
2.	V21OET01 V21OET02 V21OET03	Open Elective : 1. Operations Research 2. Cost Management of Engineering Projects 3. MOOCs-2 Through NPTEL /SWAYAM - Any 12 week course on Engineering/ Management/ Mathematics offered by other than parent department	3	0	0	3	100
3.		Dissertation Phase - I	0	0	20	10	50
			6	0	20	16	250

M. Tech – IV Semester							
S.No.	**Course Code**	**Course Title**	**L**	**T**	**P**	**Credits**	**Marks**
1.		Dissertation Phase – II	0	0	32	16	100
			0	0	32	16	100

M.Tech-Mechanical(Thermal Engineering) Programme Course Structure

(With effect from 2021-22 Admitted Batch onwards)

I-SEMESTER

S.No	Course Code	Course	L	T	P	C
1	**V21TET01**	AdvancedFluidMechanics	3	0	0	3
2	**V21TET02**	ComputationalFluidDynamics	3	0	0	3
3		**Program Elective – I**	3	0	0	3
4		**Program Elective – II**	3	0	0	3
5	**V21TEL01**	ComputationalFluidDynamicsLab –I	0	0	3	2
6	**V21TEL02**	ThermalEngineeringLab-I	0	0	3	2
7		ResearchMethodologyAndIPR (Under BOS of MBA)	2	0	0	2
8		Audit course-I (Under BOS of English & MBA)	2	0	0	0
		Total:	**16**	**0**	**6**	**18**

Total Contact Hours = 22

II-SEMESTER

S.No.	Course Code	Course	L	T	P	C
1	**V21TET03**	Advanced Heat and Mass Transfer	3	0	0	3
2	**V21TET04**	Thermal Measurements and Process Controls	3	0	0	3
3		**Program Elective – III**	3	0	0	3
4		**Program Elective -IV**	3	0	0	3
5	**V21TEL03**	Computational Fluid Dynamics Lab–II	0	0	3	2
6	**V21TEL04**	Thermal Engineering Lab-II	0	0	3	2
7	**V21TET05**	Mini Project with Seminar	2	0	0	2
8		Audit course-II (Under BOS of English & MBA)	2	0	0	0
	Total		**16**	**0**	**6**	**18**

Total Contact Hours = 22

List of Audit course I & II

1. English for Research paper writing
2. Disaster Management
3. Value Education
4. Constitution of India
5. Pedagogy Studies
6. Stress management by yoga
7. Personality development through life enlightenment skills

III-SEMESTER

S.No	Course Code	Course	L	T	P	C
1		**Program Elective - V** (OR) **MOOCS-I Through NPTEL** /SWAYAM- 12 week Course related to the program which is not listed in the course structure.	3	0	0	3
2		**Open Elective** 1. Cost Management for Engineering Projects (Under BOS of MBA) 2. Operations Research (Under BOS of Maths) Students are advised to opt for an open elective course of their choice being offered by other Departments of the Institute (OR) **MOOCS-II Through NPTEL** /SWAYAM- Any 12weeek Course in Engineering/ Management certification courses duly approved by the Department.	3	0	0	3
3	**V21TEL05**	Dissertation phase –I	0	0	20	10
	Total		**6**	**0**	**20**	**16**

Total Contact Hours = 26

IV-SEMESTER

S.No.	Course Code	Course	L	T	P	C
1	**V21TEL06**	Dissertation phase –II	0	0	32	16
	Total		**-**	**-**	**32**	**16**

Total Contact Hours = 32
Total Credits (for all sem) = 68

Program Elective –I **V21TEE01 –** AdvancedI.Cengine, Electric&Hybrid Vehicles **V21TEE02 –** GasDynamics **V21TEE03 –** CryogenicEngineering **V21TEE04 –** AdvancedThermodynamics	**Program Elective – II** **V21TEE05 –** GasTurbines **V21TEE06 –** AlternativeFuelTechnologies **V21TEE07 –** EnergyConservationandManagement **V21TEE08 –** TheoryandTechnologyofFuelCells
Program Elective – III **V21TEE09 –** Equipment Design for Thermal Systems **V21TEE10 –** Solar Energy Technologies **V21TEE11 –** Advanced Power Plant Engineering **V21TEE12 –** Combustion, Emissions and Environment	**Program Elective – IV** **V21TEE13 –** Jet Propulsion and Rocket Engineering **V21TEE14 –** Automotive Engineering **V21TEE15 –** Modelling of I.C engines **V21TEE16 –** Renewable Energy Technologies

Program Elective –V

V21TEE17 – Optimization Techniques and Applications
V21TEE18 – Design and Analysis of Experiments
V21TEE19 – Convective Heat Transfer
V21TEE20 – Extraction of Energy from Waste
V21TEE21– Advanced Finite Element Methods

(OR)

MOOCS/ NPTEL certification courses

Course Structure for
M. Tech (Embedded Systems &VLSI) w.e.f A.Y 2021-22
I Semester

Sl. No.	Course Code	Course Name	L	T	P	C
1.	V21ESVT01	System Design through VERILOG	3	-	-	3
2.	V21ESVT02	Embedded Systems Design	3	-	-	3
3.	V21ESVT03 V21ESVT04 V21ESVT05	**ELECTIVE-1** Programming Languages for Embedded Systems Parallel processing System On Chip & Applications	3	-	-	3
4.	V21ESVT06 V21ESVT07 V21ESVT08	**ELECTIVE-II** Digital System Design CPLD & FPGA Architectures And Applications VLSI Signal Processing	3	-	-	3
5.		Research methodology and IPR	2	0	0	2
6.	V21ESVL01	System Design through Verilog Lab	-	-	4	2
7.	V21ESVL02	Embedded Systems Design Lab		-	4	2
8.	Aud. 1	Audit Course 1	2	0	0	0
			16	**0**	**8**	**18**

Total Contact Hours: 24 **Total Credits: 18**

II Semester

Sl. No.	Course Code	Course Name	L	T	P	C
1.	V21ESVT09	Analog and Digital CMOS VLSI Design	3	-	-	3
2.	V21ESVT10	Real Time Operating Systems	3	-	-	3
3.	V21ESVT11 V21ESVT12 V21ESVT13	**ELECTIVE-III** MEMS Technology & Applications Design for Testability Semiconductor Memory Design And Testing	3	-	-	3
4.	V21ESVT14 V21ESVT15 V21ESVT16	**ELECTIVE-IV** Hardware Software Co-Design Embedded Computing Communication Buses and Interfaces	3	-	-	3
5.	V21ESVL03	Analog and Digital CMOS VLSI Design Lab	-	-	4	2
6.	V21ESVL04	Real time Operating Systems Lab		-	4	2
7.	V21ESVL05	Mini project	0	0	4	2
8.	Aud. 2	Audit course 2	2	0	0	MNC
			14	**0**	**12**	**18**

Total Contact Hours: 26 **Total Credits: 18**

III Semester

Sl. No.	Course Code	Course Name	L	T	P	Credits
1.	V21ESVT17 V21ESVT18 V21ESVT19	1.IOT and its Applications 2.Low Power VLSI Design 3.MOOCs Course	3	0	0	3
2.	V21ESVOE01	1.Operations Research 2.Cost Management of Engineering projects 3. MOOCs Course	3	0	0	3
3.	V21ESVP01	Dissertation phase-I/Industrial Project **(to be continued and evaluated next semester**)	0	0	20	10#
					Total Credits	**16**

#Evaluated and Displayed in IV semester Marks list.

*Students going for Industrial project/Thesis will complete these courses through MOOCs

IV Semester

Sl. No.	Course Code	Course Name	P.Os	Category	L	T	P	C
1.	V21ESVP02	Project/Dissertation phase-II (continued from III semester)			0	0	32	16
							Total Credits	**16**

Total Credits : 66

Audit course 1&2

1. English for Research paper Writing

2. Disaster Management

3. Value Education

4. Constitution of India

5. Pedagogy Studies

6. Stress Management by Yoga

7. Personality Development through Life Enlightenment Skills

M.Tech-CSE(CS)ProgrammeCourse Structure

(Witheffectfrom**2021-22**AdmittedBatchonwards)

SEMESTER-I

S.No.	Course Code	Course	L	T	P	C
1	V21CTT01	**Program Core-1** Mathematical Foundations of Computer Science	3	-	-	3
2	V21CTT02	**Program Core-2** Advanced Data Structures	3	-	-	3
3	**Program Elective-I**		3	-	-	3
	V21CTT03	1. Advanced Operating Systems				
	V21CTT04	2. Advanced Computer Architecture				
	V21CTT05	3. Parallel Computing				
4	**Program Elective-II**		3	-	-	3
	V21CTT06	1. Advanced Databases				
	V21CTT07	2. Advanced Computer Networks				
	V21CTT08	3. Object Oriented Software Engineering				
5		Research Methodology and IPR	2	-	-	2
6	V21CTL01	**Laboratory-1** Advanced Data Structures Lab	-	-	4	2
7	**Laboratory-2:** Advanced Computing Lab-1***(Lab programs based on elective taken by student may be offered)***		-	-	4	2
	V21CTL02	Advanced Operating Systems				
	V21CTL03	Parallel Computing				
	V21CTL04	Advanced Computer Networks				
	V21CTL05	Object Oriented Software Engineering				
8		**Audit Course-1***	2	-	-	0
TotalCredits			**16**	**0**	**8**	**18**

Student has to choose any one audit course listed below

SEMESTER-II

S.No.	Course Code	Course	L	T	P	C
1	V21CTT09	**Program Core-3** Web Technologies	3	-	-	3
2	V21CTT10	**Program Core-4** Data Science through Python Programming	3	-	-	3
3	**Program Elective-III**		3	-	-	3
	V21CTT11	1. Machine Learning				
	V21CTT12	2. Ad hoc and Sensor Networks				
	V21CTT13	3. Internet of Things				
4	**Program Elective-IV**		3	-	-	3
	V21CTT14	1. Principles of Cyber Security				
	V21CTT15	2. Cloud Computing				
	V21CTT16	3. Natural Language Processing				
7	V21CTL06	Advanced Web Technologies Lab	-	-	4	2
8	V21CTL07	Data Science Applications with Python Lab	-	-	4	2
9	V21CTM01	Mini Project with Seminar	2	-	-	2
10		**Audit Course-2***	2	0	0	0
TotalCredits			**16**	**0**	**8**	**18**

**Student has to choose any one audit course listed below.*

Audit Course 1 & 2:

1. English for Research Paper Writing
2. Disaster Management
3. Value Education
4. Stress Management by Yoga
5. Personality Development through Life Enlightenment Skills
6. Pedagogy Studies

SEMESTER-III

S.No.	Course Code	Course	L	T	P	C
1	**Program Elective-V**		3	-	-	3
	V21CTT17	1. MOOCS-1 through NPTEL/ SWAYAM12 Week Program related to the programme which is not listed in the course structure				
	V21CTT18	2. Mobile Applications and Development				
	V21CTT19	3. Big Data Analytics				
2	**Open Elective**		3	-	-	3
	V21CTT20	MOOCs-2 Through NPTEL /SWAYAM - Any 12 week course on Engineering/ Management/ Mathematics offered by other than parent department				
		Operations Research				
		Cost Management of Engineering Projects				
3	V21CTP01	Dissertation-I/Industrial Project #	-	-	-	10
TotalCredits						16

#Students going for Industrial Project/Thesis will complete these courses through MOOCs

SEMESTER-IV

S.No.	Course Code	Course	L	T	P	C
1	V21CTP02	Dissertation-II	-	-	-	16
TotalCredits						16

Annexure-II(c)

ACADEMICREGULATIONSV21FORMBADEGREE COURSE

Applicable for the students of MBA (Regular) Course from the Academic Year 2021-22onwards.TheMBADegreeofSriVasaviEngineeringCollege,Tadepalligudemshallbeconferred on candidates who are admitted to the program and who fulfil all the requirements for theawardoftheDegree.

1.0ELIGIBILITYFORADMISSIONS

Admission to the above program shall be made subject to eligibility,qualification andspecializationasprescribedbytheUniversity/StateGovernmentfromtimetotime.

Admissions shall be made on the basis of merit/rank obtained by the candidates at thequalifying Entrance Test conducted by the University or on the basis of any other order of meritas approved by the University/ State Government, subject to reservations as laid down by theGovt. fromtime to time.

2.0 AWARDOFMBADEGREE

2.1 Astudentshallbedeclaredeligiblefortheawardofthe MBADegree,ifhe pursues a courseofstudyin notless than twoandnot morethan fouracademicyears.

2.2 The student shall register for all 106 credits and secure all the 106 credits.

2.3 Theminimum instruction daysineachsemesterare90.

3.0 ATTENDANCE

3.0 Astudentshallbeeligibletowriteendexaminationsifheacquiresaminimum of75%of attendance in aggregate of all the courses, and with minimum 50% in each and everycourseincludingpracticals.

3.1 Condonation of shortage of attendance in aggregate up to 10% (65% and above andbelow75%)in eachsemestershallbegranted bytheCollegeAcademicCommittee.

3.2 ShortageofAttendance**below**65%inaggregateshallnotbecondonedandnoteligibletowritetheirend semester examination of thatclass.

3.3 Studentswhoseshortageofattendanceisnotcondonedinanysemesterare noteligibletowritetheirend semester examination of thatclass.

3.4 Aprescribedfeeshall bepayabletowardscondonationofshortageofattendance.

3.5 A student shall not be promoted to the next semester unless, he satisfies the attendancerequirement of the present semester, as applicable. They may seek re-admission into thatsemester when offered next. If any candidate fulfills the attendance requirement in thepresentsemester, heshallnot be eligibleforre-admission intothe same class.

4.0 Examination and Scheme of Evaluation

The distribution of marks for internal and external examinations shall be evaluated course-wise as follows:

Sl.No.	Component	Internal	External	Total
1	Theory	30	70	100
2	Laboratory	20	30	50
3	Project & viva-voce	40	60	100

4.1 Internal assessment

i) 30 marks for internal assessment, 10 marks are for seminar/presentation and 20 marks are based on **average** of two mid-term examinations.
ii) 10 marks for presentation (5 marks are for report content and 5 marks are for presentation)
iii) Each mid-term examination is conducted for 20 marks with two hours duration. Each mid-term examination consists of four questions, each for 5 marks. All questions need to be answered.
iv) The final marks are the sum of average of two mid-term examinations for 20 marks and 10 marks for presentation.

4.2External Assessment

The semester end examination shall be conducted for a duration of three hours with A,B&C sections (Section A consists of 5 questions out of which Three questions are to be answered. Each question carries 5 marks, Section B consists of 5 eassy questions with internal choice, each for 8 marks & Section C case study for 15 marks) All Sections are to be answered.

4.3 Laboratory Course

i) For practical courses distribution shall be 20 marks for internal evaluation and 30 marks for the end semester examinations. There shall be continuous evaluation by the internal course teacher during the semester for 20 internal marks. Out of 20 marks for internal , 10 marks shall be for day-to-day performance (5 marks for day-to-day evaluation and 5 marks for Record) and 10 marks shall be evaluated by conducting an internal test conducted at the end of semester.

ii) End semester laboratory examination shall be conducted for 30 marks with two examiners, one of them being the Laboratory Class Teacher and second examiner shall be appointed by the Principal. The total 30 marks are break-up as 5 marks for procedure, 15 marks for experimentation and 5 marks each for results and Viva-Voce.

5.0 EVALUATION OF PROJECT WORK:

5.1 **A Project Review Committee** (PRC) will be constituted with Head of the Department, and two other senior faculty members of the department.

5.2 **Registration of Project work**: A Candidate is permitted to register for theproject work after satisfying the attendance requirement up to II semester.

5.3 Every candidate shall work on projects approved by the PRC.

5.4 A student has to undergo practical training for a period of 5 weeks in a Corporate Enterprise (as a part of the project) after the Second Semester. In training period, the candidates should work on a specific problem related to the elective course.

At the end of practical training, the student should submit a certificate obtained from the organization.

The student should prepare a Project Report under the supervision of a guide from the faculty of management of the college. However, the students who prepare Project Report in the area of systems can also work under the guidance of a Faculty member from Computer Science Department.

5.5 The progress of the project work shall be periodically reviewed by PRC. The PRC shall authorize/approve change of guide/topic/title as deemed fit. A student shall submit status report in line with the recommended project calendar as approved by PRC. Three copies of Project dissertation certified by the Project Supervisor shall be submitted to the College.

5.6 The project is evaluated for 100 Marks at the end of IV Semester. A student shall engage a minimum of 2 hours per week in III and IV semester in consolidating the data, report writing, results & analysis, conclusions etc. Evaluation shall comprise of internal and external assessment.

Internal: 40 Marks

External: 60 Marks

Out of a total of 100 Marks for the Project and viva voce 40 Marks shall be for internal evaluation and 60 Marks for the end semester project and viva voce. The internal evaluation shall be made by the departmental committee on the basis of the two seminars given by the student on the topic of his/her dissertation. The end semester project and viva voce shall be adjudicated by one external examiner selected from a panel of 5 examiners outside the college. For this Head of the department shall submit a 5 member panel who are eminent in the field of study.

5.7 An internal departmental committee consisting of HOD, Supervisor and one senior faculty shall monitor the progress of the project work.

5.8 The project and viva voce examination shall be conducted by a board consisting of External examiner, HOD and Supervisor. A Candidate shall be allowed to take project and viva voce examination after fulfilling the attendance requirements.

5.9 The Candidate should secure minimum 40% marks in External assessment of project and viva voce. If the candidate fails to secure minimum 50% of marks in project internal and End semester project and viva voce together, the candidate should retake the project and viva voce examination after three months. If he fails to get minimum marks at the second project and viva voce examination, he will not be eligible for the award of the degree, unless the candidate is asked to revise and resubmit. If the candidate fails to secure minimum marks again, the project shall be summarily rejected.

6.0 <u>Course Pattern</u>

a) The entire course of study is for two academic years (four semesters); all the years are in semester pattern

b) A student eligible to appear for the end semester examination in a course, but absent from it or has failed in the end semester examination, may write the exam in that course as and when college conducted next.

c) When a student has shortage of attendance, he/she may be re-admitted into the same semester/year in which he has been detained. However, the academic regulations under which he was **first admitted** shall continue to be applicable to him.

7.0 Criteria for passing a course and award of grades

a) Criteria for passing a course

i) A Candidate shall be declared to have passed in individual theory/laboratory/project and viva voce if he secures a minimum of 50% aggregate marks (internal & semester end examination marks put together), course to a minimum of 40% marks in the semester end examination.

ii) In case the candidate does not secure the minimum academic requirement in any course (as specified in (i) above) he/she has to re-appear for the end semester examination in that course. A candidate shall be given **one** chance to re-register for each course provided the internal marks secured by a candidate **are less than 50% and has failed in the end examination**. In such a case, the candidate must re-register for the course (s) and secure the required minimum attendance. The attendance in the re-registered course (s) shall be calculated separately to decide upon his eligibility for writing the end examination in those course (s). In the event of the student taking another chance, his internal marks and end examination marks obtained in the previous attempt shall **stands cancelled**. For re-registration the candidates have to apply to the Dean Academics by paying the requisite fees and get approval from College before start of semester in which re-registration is sought.

iii) In case the candidate secures less than the required attendance in any re-registered course (s), he shall not be permitted to write the End Examination in that course. He shall again re-register the course when next offered.

b) Award of grades: Method of awarding grade point and grade in each course based on his performance is given below.

Marks Range Theory / Laboratory/ Project and viva -voce (Max-100)	Letter Grade	Level	Grade Point
≥ 90%	O	Out standing	10
≥80 to <90%	S	Excellent	9
≥70 to <80%	A	Very Good	8
≥60 to <70%	B	Good	7
≥50 to <60%	C	Satisfactory	6
<50	F	Fail	0
	AB	Absent	0

c) **Computation of Cumulative and Semester Grade Point Averages**

ComputationofSGPA

- ThefollowingprocedureistobeadoptedtocomputetheSemesterGrade PointAverage(SGPA)and Cumulative GradePointAverage(CGPA):

- The **SGPA** is the ratio of sum of the product of the number of credits with the grade pointsscored by a student in all the courses taken by a student and the sum of the number ofcreditsof all the coursesundergonebyastudent, i.e
  SGPA(Si)=∑(CiXGi)/ ∑Ci

- WhereCiisthenumberofcreditsoftheithcourseandGiisthegradepoint scoredbythestudentin the ithcourse.

ComputationofCGPA

- The**CGPA**isalsocalculatedinthesamemannertakingintoacco untall the coursesundergonebyastudent overall the semester ofaProgramme, i.e.CGPA=∑(CiX Si)/ ∑ Ci
- Where Si is the SGPA of the i^{th} semester and Ci is the total number of credits in thatsemester.
- TheSGPAandCGPAshall beroundedoffto2 decimalpoints and reportedinthetranscripts.
- EquivalentPercentage= (CGPA–0.75)x10

8.0 AWARDOFDEGREE AND CLASS

After a student has satisfied the requirements prescribed for the completion of the programand is eligible for the award of MBA Degree he shall be placed in one of the following threeclasses:

	CGPAtobesecured	
FirstClasswithDistinction	≥ 7.75	**From theCGPA securedfrom 106Credits.**
FirstClass	≥ 6.75	
SecondClass	≥ 5.75 to < 6.75	

TheGradessecured, GradepointsandCredits obtainedwillbe shown separatelyinthememorandumofmarks.

9.0 WITHHOLDINGOFRESULTS

Ifthestudentisinvolvedinindiscipline/malpractices/courtcases,theresultof thestudentwill bewithheld.

10.0SupplementaryExaminations

i) Supplementaryexaminationswillbeconductedtwiceinayearatthe endofodd and evensemesters.
ii) Semester end supplementary examinations shall be conducted till next regulation comes into force for that semester after the conduct of the last set of regular examinations under the present regulation.
iii) Thereafter, supplementary examinations will be conducted in the equivalent courses as decided by the Board of Studies concerned.

11.0Revaluation

Recountingofmarksin theendsemesterexaminations, Astudentcan requestforrevaluationofhis/her answer book onpayment ofaprescribed fee.

12.0TRANSITORYREGULATIONS (for V21)

Discontinuedordetainedcandidatesareeligibleforre-admissionintosameorequivalentcourses at atime as andwhen offered.

13.0 GENERAL

13.1 Wherever the words "he", "him", "his", occur in the regulations, they include "she", "her","hers".
13.2 Theacademicregulationshouldbereadasawholeforthepurposeofany interpretation.
13.3 In the case of any doubt or ambiguity in the interpretation of the above rules, thedecisionofthe Chairman of the Academic Council is final.
13.4 The College may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effectfrom thedates notified bythe College.

MALPRACTICESRULES

DISCIPLINARYACTION FOR/IMPROPERCONDUCTINEXAMINATIONS

oncernedwithorrelatedtothe eisappearing buthasnotmadeuseof(material asanaidinthesubjectofthe examination)	Expulsionfromtheexaminationhalland cancellationoft
candidateorally or by any other body lidateorpersonsinoroutsidetheexamhallinrespect	Expulsionfromtheexaminationhallandcancellationoft case of an outsider, he will be handedover to the poli
the examination soranyotherformofmaterial relevant to the ateis appearing.	Expulsionfromtheexaminationhallandcancellationoft candidatehasalreadyappearedincludingpracticalexam andshallnotbepermittedtoappearfortheremaining ofthatSemester/year.TheHallTicketofthecandidateist

ation.	The candidate who has impersonated shall be expel the seat. The performance of the original candidate v examination (including practicals and project work) a the remaining subjects of that semester/year. The ca and all University examinations. The continuation o connection with forfeiture of seat. If the imposter is a against him.
arranges to send out the question paper during ter the examination.	Expulsion from the examination hall and cancella candidate has already appeared including practica remaining examinations of the subjects of that seme from class work and all University examinations. The regulations in connection with forfeiture of seat.
paper or in letters to the examiners or writes to	Cancellation of the performance in that subject.

	Incaseofstudentsofthecollege,theyshall beexpelledfr and all other subjects the candidat remainingexaminationsofthesubjectsof thatsemes outsiders,theywillbehandedovertothe policeandapolic
	Expulsionfromtheexaminationhalland cancellatio already appeared including practical examinationsa of the subjects of that semester/year. The candida University examinations. The continua academicregulationsinconnectionwith forfeitureofsea
	Expulsionfromtheexaminationhallandcancellationoft candidatehasalreadyappearedincludingpracticalexam workandshallnotbepermittedfortheremainingexamin forfeits the seat.
examinationoranypersonnotconnected with the clause 6to 8.	Student of the colleges expulsion from andallothersubjects the candidate has already appe permitted forthe remaining examinations of the su the seat. Person(s) who do not belong to theCollege willbe han

	Expulsionfromtheexaminationhallandcancellationoft candidatehasalreadyappearedincludingpracticalexam andshallnotbepermittedfortheremainingexamination
ationorduringspecial scrutiny.	Cancellationoftheperformanceinthatsubject and all examinationsandprojectworkofthat semester/yearex
covered in the above clauses blepunishment.	

Course Structure MBA (Regular)

(Effective for the students admitted into first year from the Academic Year 2021-2022)

Semester-I

SNo	Course Code	Course	L	P	C	I	E	TM
1	V21MBT01	Management Theory & Organizational Behaviour	4	--	4	30	70	100
2	V21MBT02	Managerial Economics	4	--	4	30	70	100
3	V21MBT03	Accounting for Managers	4	--	4	30	70	100
4	V21MBT04	Legal & Business Environment	4	--	4	30	70	100
5	V21MBT05	Business Communication	4	--	4	30	70	100
6	V21MBT06	Quantitative Analysis for Business Decisions	4	--	4	30	70	100
7	V21MBL01	IT-LAB	---	4	2	20	30	50
8	V21MBL02	Business Communication & Soft Skills Lab	---	4	2	20	30	50
		TOTAL	24	8	28	220	480	700

Semester-II

SNo	Course Code	Course	L	P	C	I	E	TM
1	V21MBT07	Financial Management	4	--	4	30	70	100
2	V21MBT08	Human Resource Management	4	--	4	30	70	100
3	V21MBT09	Marketing Management	4	--	4	30	70	100
4	V21MBT10	Production and Operations Management	4	--	4	30	70	100
5	V21MBT11	Business Research & Statistical Analysis	4	--	4	30	70	100
6	V21MBT12	Business Ethics & Corporate Governance	4	--	4	30	70	100
7	V21MBT13	Entrepreneurship Development	4	--	4	30	70	100
		TOTAL	28	--	28	210	490	700

Semester-III

SNo	Course Code	Course	L	P	C	I	E	TM
1	V21MBT14	Business Policy & Corporate Strategy	4	--	4	30	70	100
I		**Marketing Specialization-1**						
1		Elective-1	4	--	3	30	70	100
2		Elective-2	4	--	3	30	70	100
3		Elective-3	4	--	3	30	70	100
II		**Finance Specialization-2**						
1		Elective-1	4	--	3	30	70	100
2		Elective-2	4	--	3	30	70	100
3		Elective-3	4	--	3	30	70	100
III		**HRM Specialization-3**						
1		Elective-1	4	--	3	30	70	100
2		Elective-2	4	--	3	30	70	100
3		Elective-3	4	--	3	30	70	100
		TOTAL	28	--	22	210	490	700

Semester-IV

SNo	Course Code	Course	L	P	C	I	E	TM
1	V21MBT24	Logistics & Supply Chain Management	4	--	4	30	70	100
I		**Marketing Specialization-1**						
1		Elective-4	4	--	3	30	70	100
2		Elective-5	4	--	3	30	70	100
3		Elective-6	4	--	3	30	70	100
II		**Finance Specialization-2**						
1		Elective-4	4	--	3	30	70	100
2		Elective-5	4	--	3	30	70	100
3		Elective-6	4	--	3	30	70	100
III		**HRM Specialization-3**						
1		Elective-4	4	--	3	30	70	100
2		Elective-5	4	--	3	30	70	100
3		Elective-6	4	--	3	30	70	100
	V21MBP02	Industrial Project & Viva voce	--	--	6	40	60	100
		TOTAL	28	--	28	250	550	800
		GRAND TOTAL	**108**	**08**	**106**	**890**	**2010**	**2900**

L-LECTURE HOURS, P-PRACTICAL HOURS, C-CREDITS, I-INTERNAL MARKS, E-EXTERNAL MARKS, TM-TOTAL MARKS

Dual Specialization:

The Specialization papers will be offered in the areas of Marketing, Finance, and Human Resource Management (HRM). The students should choose any **Two** of the listed Specialization areasin the beginning of the third semester of MBA. Specialization will be offeredsubject to a minimum of 20 students.

Semester-III

Specialization I: Marketing

S.No.	***Course Code***	***Course***
1	V21MBT15	Consumer Behavior
2	V21MBT16	Retail Management
3	V21MBT17	Digital & Social Media Marketing

Specialization II: Finance

S.No.	***Course Code***	***Course***
1	V21MBT18	Security Analysis & Portfolio Management
2	V21MBT19	Banking & Insurance Management
3	V21MBT20	Advance Management Accounting

Specialization III: HRM

S.No.	***Course Code***	***Course***
1	V21MBT21	Leadership & Change Management
2	V21MBT22	Performance Evaluation & Compensation Management
3	V21MBT23	Strategic Human Resource Management

Semester-IV

Specialization I: Marketing

S.No.	***Course Code***	***Course***
4	V21MBT25	Sales and Distribution Management
5	V21MBT26	Services Marketing
6	V21MBT27	Advertising & Brand Management

Specialization II: Finance

S.No.	***Course Code***	***Course***
4	V21MBT28	Financial Derivatives
5	V21MBT29	Financial Markets & Services
6	V21MBT30	Business Taxation & Planning

Specialization III: HRM

S.No.	***Course Code***	***Course***
4	V21MBT31	Human Resource Metrics & Analytics
5	V21MBT32	Management of Industrial Relations

6 V21MBT33 Labour Welfare & Legislations

Annexure-III

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SRI VASAVI ENGINEERING COLLEGE (AUTONOMOUS)

(Sponsored by Sri Vasavi Educational Society)

Approved by AICTE, New Delhi and Permanently Affiliated to JNTUK, Kakinada

Pedatadepalli, **TADEPALLIGUDEM – 534 101,** W.G. Dist, (A.P.)

Department of Civil Engineering

Dt: 30.08.2021

Fourth BOS Meeting of Civil Engineering Department is held in online mode on 28.08.2021 at 10:30 AM with the following members were present.

Sl.No	Name	Position
1	Dr.G.Radhakrishnan	Chairperson
2	Dr.G.V.R.Prasada Raju	Member
3	Dr.C.B.Kameswara Rao	Member
4	Dr.M.Kumar	Member
5	Mr.T.Raj kumar	Member
6	Mr.T Naga Seshu Babu	Faculty of CE
7	Mr.A Sudheer	Faculty of CE
8	Mr.B Hema Sundar	Faculty of CE
9	Mr.J Pavan Kumar	Faculty of CE

Minutes of the BOS Meeting:

The following points have been suggested/discussed by the committee in BOS meeting and the same has been approved.

1. The proposed course structure and syllabus of VII & VIII semesters V18 Regulation is approved and the same have to be followed for the Academic year 2021-22 for the autonomous admitted batch 2018-19.
2. The list of courses mentioned below have to be offer under open elective in VII & VIII semesters of B.Tech under V18 Regulation for other branches

Open Elective - II	VII Sem	1. Environmental Pollution and Control 2. Disaster Management
Open Elective - III	VIII Sem	1. Solid Waste Management 2. Water Quality and Conservation

3. The proposed course structure and syllabus of III & IV semesters V20 Regulation is approved and the same have to be followed for the Academic year 2021-22 for the autonomous admitted batch 2020-21.
4. The comment made by Dr.C.B.Kameswara Rao in the course structure of III & IV semester under Skill Oriented Course which includes Parent Institution in addition to Industries/Professional bodies/APSSDC and other accredited bodies.
5. Few comments made by Dr.C.B.Kameswara Rao in the course structure and syllabus of I to IV semesters of V21 Regulation M.Tech Structural Engineering were acknowledged, approved and suitable modification have to be made.
6. **Comments**
   a) **Advanced Reinforced Concrete Design** course in I semester is elective it could be made mandatory.
   b) The course **Theory of Plates and Shells**&**Stability of Structures** could be interchanged from Elective to mandatory.
   c) **Computer Aided Design Laboratory**&**Structural Design Laboratory** courses are similar and both could be joined as one laboratory only.

   Modifications have to be made by making **Advanced Reinforced Concrete Design** as mandatory in II semester. New course **Structural Optimization** is included in I Semester II Elective.

   Theory of Plates and Shells have to be made elective and **Stability of Structures** have to be made as mandatory course. **Computer Aided Design Laboratory& Structural Design Laboratory** have to be joined as one Laboratory only.

CHAIRPERSON OF BOS

ANNEXURE - I

COURSE STRUCTURE APPROVED IN PREVIOURS BOS MEETINGS

(For 2018 – 2019 Admitted Batch) - V18 Regulation

I SEMESTER

S.No	Course Code	Course Name	L	T	P	C
1	V18ENT01	English – I	2	-	-	MNC
2	V18MAT01	Engineering Mathematics – I	3	1	-	4
3	V18CHT01	Engineering Chemistry	3	1	-	4
4	V18CST01	Programming in C for problem solving	3	-	-	3
5	V18MET01	Engineering Graphics	1	-	3	2.5
6	V18ENL01	English Communication Skills Lab – I	-	-	2	MNC
7	V18CSL01	Programming lab in C for problem solving	-	-	3	1.5
8	V18CHL01	Engineering Chemistry Lab	-	-	3	1.5
Total			12	2	11	16.5

Total Contact Hours : 25

Total Credits : 16.5

II SEMESTER

S.No	Course Code	Course Name	L	T	P	C
1	V18ENT02	English – II	2	-	-	2
2	V18MAT02	Engineering Mathematics – II	3	1	-	4
3	V18PHT01	Optics and Waves	3	1	-	4
4	VI8MET03	Engineering Mechanics	3	1	-	4
5	V18ENL02	English Communication Skills Lab – II	-	-	2	1
6	V18CEL01	Computer aided Civil Engineering Drawing Lab	-	-	3	1.5
7	V18PHL01	Optics and Waves Lab	-	-	3	1.5
8	VI8MELO1	Engineering and IT Workshop	-	-	3	1.5
Total			11	3	11	19.5

Total Contact Hours: 25

Total Credits: 19.5

III SEMESTER

S.No	Course Code	Course Title	Hours per week			Credits
			L	T	P	C
1	V18CET04	Strength of Materials-I	3	1	0	4
2	V18CET36	Building Materials Planning & Construction	3	1	0	4
3	V18CET10	Introduction to Fluid Mechanics	3	1	0	4
4	V18CET35	Principles of Environmental Science & Engineering	2	0	0	2
5	V18MAT04	Probability & Statistics	3	1	0	4
6	VI8EET01	Basic Electrical and Electronics Engineering	3	1	0	4
7	V18CEL02	Material Testing Lab	0	0	3	1.5
8	VI8EEL01	Basic Electrical and Electronics Engineering Lab	0	0	2	1
9	V18ENT03	Professional Communication Skills -I	3	0	0	0
Total			20	3	6	24.5

Total Contact Hours: 29

Total Credits: 24.5

IV SEMESTER

S.No	Course Code	Course Title	Hours per week			Credits
			L	T	P	C
1	V18CET13	Strength of Materials-II	3	0	0	3
2	V18CET08	Engineering Geology	2	0	0	2
3	V18CET09	Concrete Technology	3	1	0	4
4	V18CET14	Hydraulic Engineering	3	1	0	4
5	V18CET11	Surveying and Geomatics	2	1	0	3

6	V18MBT51	Managerial Economics & Financial Analysis	3	0	0	3
7	V18CEL03	Concrete Technology Lab	0	0	3	1.5
8	V18CEL04	Surveying Lab	0	0	3	1.5
9	V18CEL05	Fluid Mechanics And Hydraulic Machinery Lab	0	0	3	1.5
10	V18CEL06	Engineering Geology Lab	0	0	2	1
11	V18ENT04	Professional Communication Skills -II	3	0	0	0
Total			17	4	11	24.5

Total Contact Hours: 32

Total Credits: 24.5

V SEMESTER

S.No	Course Code	Course Title	Hours per week			Credits
			L	T	P	C
1	V18CET15	Structural Analysis-I	3	0	0	3
2	V18CET16	Geotechnical Engineering-I	3	0	0	3
3	V18CET17	Hydrology & Water Resources Engineering	3	0	0	3
4	V18CET18	Design of Reinforced Concrete Structures	3	0	0	3
5	V18CET19	Transportation Engineering-I	3	0	0	3
6	V18CET33	Remote Sensing And Geographical Information System	2	0	0	2
7	V18CEL07	Transportation Engineering Lab	0	0	3	1.5
8	V18CEL08	Geotechnical Engineering Lab	0	0	3	1.5
9	V18ENT11	Constitution of India	2	-	-	0
10	V18ENT05	Professional Communication Skills -III	4	0	0	0
Total			23	0	6	20

Total Contact Hours: 29

Total Credits: 20

VI SEMESTER

S.No	Course Code	Course Title	Hours per week			Credits
			L	T	P	C
1	V18CET20	Structural Analysis -II	3	0	0	3
2	V18CET21	GeotechnicalEngineering–II	3	0	0	3
3	V18CET22	DesignofSteelStructures	3	0	0	3
4	V18CET23	TransportationEngineering–II	3	0	0	3
5	V18CET24	EnvironmentalEngineering-I	3	0	0	3
6		Open Elective I	3	0	0	3
7	V18CEL09	EnvironmentalEngineeringLab	0	0	3	1.5
	V18CEL10	CAD&GISLab	0	0	3	1.5
8	V18ENT06	Professional Communication Skills–IV	4	0	0	0
Total			22	0	6	21

Total Contact Hours: 28

Total Credits: 21

VII SEMESTER

S.No	Course Code	Course Title	Hours per week			Credits
			L	T	P	C
1	V18CET26	Elective-II	3	0	0	3
2	V18CET27	Elective-III	3	0	0	3
3	V18CET28	Open Elective-II Suggested (Metro Systems & Engineering) See Annexure-I	3	0	0	3
4	V18CEL10	Project work part - A (Project work, seminar and internship in industry or at appropriate work place)	0	0	12	6
Total			9	0	12	15

Total Contact Hours: 21

VIII SEMESTER

S.No	Course Code	Course Title	Hours per week			Credits
			L	T	P	C
1	V18CET29	Elective-IV	3	0	0	3
2	V18CET30	Elective-V	2	0	0	2
3	V18CET31	Prestressed Concrete	3	0	0	3
4	V18CET32	Applications of Remote Sensing and GIS in Civil Engineering	2	0	0	2
5	V18CEL11	Project work part - B (Continued from VII Semester, Project work, seminar and internship in industry or at appropriate work place	0	0	13	6.5
Total			10	0	13	16.5

Total Contact Hours: 23

Total Credits - 160

COURSE STRUCTURE PROPOSED FOR APPROVAL IN 4th BOS MEETING

VII SEMESTER

S.No	Course Code	Course Title	Hours per week			Credits
			L	T	P	C
1	V18CET25	Estimation, Specification and Contracts	3	0	0	3
2	V18CET26	Environmental Engineering - II	3	0	0	3
3	V18CET27 V18CET28 V18CET29 V18CET30 V18CET31	Professional Elective Course – 1 1. Pavement Analysis and Design 2. Air Pollution and Control 3. Irrigation Engineering 4. Bridge Engineering 5. Advanced Foundation Engineering	3	0	0	3
3	V18CET32 V18CET33 V18CET34 V18CET35 V18CET36	Professional Elective Course – 2 1. Traffic Engineering & Management 2. Construction Project Planning & Systems 3. Solid Waste Management 4. Ground Water Development 5. Earthquake Engineering	3	0	0	3
4		Open Elective Course – 2	3	0	0	3
6	V18CEPWA	Project Work Part - A	0	0	6	3
Total			15	0	6	18

Total Contact Hours: 21

Total Credits: 18

VIII SEMESTER

S.No	Course Code	Course Title	Hours per week			Credits
			L	T	P	C
1	V18CET37 V18CET38 V18CET39 V18CET40 V18CET41	Professional Elective Course – 3 1. Highway Construction and Management 2. Repair and Rehabilitation of Structures 3. Rural Water Supply and onsite sanitation Systems. 4. Pre stressed Concrete 5. Engineering with Geo-synthetics	3	0	0	3
2	V18CET42 V18CET43 V18CET44 V18CET45 V18CET46	Professional Elective Course – 4 1. Urban Hydrology and Hydraulics 2. Environmental Impact Assessment and Management 3. Advanced Concrete Technology 4. Finite Element Methods 5. Ground Improvement Techniques	3	0	0	3
3		Open Elective Course – 3	3	0	0	3
4	V18CEPWB	Project Work Part - B	0	0	14	7
Total			9	0	14	16

Total Contact Hours: 23

Total Credits: 16

ANNEXURE – II

SYLLABI OF VII & VIII SEMESTER OF B.TECH COURSES FOR THE

ACADEMIC YEAR 2021-2022

VII SEMESTER – SYLLABUS

Year/Sem	VII Sem	L	T	P	C	COURSE CODE
Regulation	V18	3	0	0	3	V18CET25
Name of the Course	ESTIMATION, SPECIFICATION & CONTRACTS					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of this course the student will be able to

- Explain to student for understanding different construction works and can estimate approximate cost required for a building (K2)
- Develop the student to a position for finding the cost of various building components (K3)
- Illustrate the calculation of quantities for earthwork of roads and canals to students (K3)
- Discuss to students about contracts and their types ,value a property(K2)
- Describe the students in calculating the approximate costs of building using various techniques(K2)
- Demonstrate the students in determining the quantities of different components of buildings(K3)

SYLLABUS

UNIT I

Introduction: General items of work in Building – Standard Units Principles of working out quantities for detailed and abstract estimates.

UNIT II

Rate Analysis: Working out data for various items of work over head and contigent charges.

UNIT III

Earthwork: Introduction to earthwork, Lead and lift, Earthwork volume calculation by mid-sectional area method, Mean sectional area method, Trapezoidal rule, Prismoidal rule estimation of quantities for canals

UNIT IV

Contracts: Types of contracts – Contract Documents – Conditions of contract, Valuation of buildings- Standard specifications for different items of building construction.

UNIT V

Approximate estimation of building: Introduction to approximate estimation of building, Advantages of estimating building by approximate estimation- Types of approximate estimation –problems on approximate estimation

UNIT VI

Detailed Estimation of Buildings: Estimation of quantities for one roomed building, two roomed building.

Text Books:

1. Estimating and Costing' by B.N. Dutta, UBS publishers, 2000.

2. Civil Engineering Contracts and Estimates' by B. S. Patil, Universities Press (India) Pvt.Ltd. Hyd.

3.Construction Planning and Technology' by Rajiv Gupta, CBS Publishers &Distributors Pvt.Ltd. New Delhi.

4 Estimating and Costing' by G.S. Birdie.

References:

1. 1'Standard Schedule of rates and standard data book' by public works department.
2. IS 1200 (Parts I to XXV-1974/ Method of Measurement of Building & Civil Engg Works – B.I.S.)
3. 'Estimation, Costing and Specifications' by M. Chakraborthi; Laxmi publications.
4. National Building Code

Year/Sem	VII Sem	L	T	P	C	COURSE CODE
Regulation	V18	3	0	0	3	V18CET26
Name of the Course	**ENVIRONMENTAL ENGINEERING-II**					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of this course, the students will be able to:

- Estimate the sewage and storm water flow and design the sewerage system (K3)
- Relate the appropriate pumps in the sewerage systems (K3)
- Analyze sewage quality and design suitable primary treatment units (K3)
- Employ the secondary treatment units (K3)
- Employ miscellaneous treatment units (K3)
- Identify suitable disposable method with respect to effluent standards.(K2)

SYLLABUS

UNIT I

Introduction: Sanitation – Systems of sanitation – relative merits & demerits – collection and conveyance of waste water – sewerage – classification of sewerage systems- Estimation of sewage flow and storm water drainage – fluctuations – types of sewers - Hydraulics of sewers and storm drains– design of sewers – appurtenances in sewerage – cleaning and ventilation of sewers

UNIT II

Pumping of Wastewater: Pumping stations – location – components– types of pumps and their suitability with regard to wastewaters – Problems in sewage pumping.

House Plumbing: Systems of plumbing-sanitary fittings and other accessories–one pipe and two pipe systems – Design of building drainage

UNIT III

Characteristics and Treatment of sewage: Sampling and analysis of wastewater - Physical, Chemical and Biological Examination-Measurement of BOD and COD - BOD equations

Primary treatment of sewage - Screens-grit chambers-grease traps–floatation–sedimentation – design of preliminary and primary treatment units.

UNIT IV

Secondary Treatment: Aerobic and anaerobic treatment process-comparison. Suspended growth process: Activated Sludge Process, principles, designs, and operational problems, modifications of Activated Sludge Processes, Oxidation ponds, Aerated Lagoons, Fluidized bed reactors.

Attached Growth Process: Trickling Filters–mechanism of impurities removal- classification–design-operation and maintenance problems, Rotating Biological Contactors.

UNIT V

Miscellaneous Treatment Methods: Nitrification and Denitrification – Removal of Phosphates –UASB–Membrane reactors-Integrated fixed film reactors. Anaerobic Processes: Septic Tanks and Imhoff tanks- working Principles and Design–Reuse and disposal of septic tank effluent.

UNIT VI

Sludge Management: Characteristics-SVI, handling and treatment of sludge-thickening – anaerobic digestion of sludge, Sludge Drying Beds. Centrifuge.

Disposal of sewage: Methods of disposal – disposal into water bodies-Oxygen Sag Curve-Disposal into sea, disposal on land- sewage sickness.

Text Books:

1. Wastewater Engineering Treatment and Reuse, Metcalf & Eddy, Tata McGraw-Hill edition.
2. Industrial Water and Wastewater Management, K.V.S.G. Murali Krishna.
3. Elements of Environmental Engineering, K. N. Duggal, S. Chand & Company Ltd. New Delhi, 2012.

References:

1. Environmental Engineering, Howard S. Peavy, Donald R. Rowe, Teorge George Tchobanoglus – Mc-Graw-Hill Book Company, New Delhi, 1985
2. Wastewater Treatment for Pollution Control and Reuse, Soli. J Arceivala, Sham R Asolekar, Mc-GrawHill, NewDelhi; 3rd Edition
3. Environmental Engineering –II: Sewage disposal and Air Pollution Engineering, Garg, S. K., Khanna Publishers
4. Sewage treatment and disposal, P. N. Modi & Sethi.
5. Environmental Engineering, Ruth F. Weiner and Robin Matthews – 4th Edition Elsevier, 2003

6. Environmental Engineering, D. Srinivasan, PHI Learning Private Limited, New Delhi, 2011.

Year/Sem	**VII Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V18	3	0	0	3	V18CET27
Name of the Course	**PAVEMENT ANALYSIS AND DESIGN**					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of this course the student will be able to

- Understand the factors influencing the design methodologies.(K2)
- Analyze stresses and strains in a flexible pavement using multi-layered elastic theory (K3)
- Analyze stresses and strains in a rigid pavement using Westergaard's theory (K3)
- Design a flexible pavement using IRC, Asphalt Institute, and AASHTO methods (K3)
- Design a rigid pavement using IRC, and AASHTO methods (K3)
- Design of joints, Dowel & tie bars.(K3)

SYLLABUS

UNIT I

Factors Affecting Flexible Pavement Design: Variables Considered in Pavement Design, Types of Pavements, Functions of Individual Layers, EAL and ESWL Concepts, Traffic Analysis: ADT, AADT, Truck Factor, Growth Factor, Lane Distributions & Vehicle Damage Factors, Effect of Transient & Moving Loads.

UNIT II

Factors Affecting Rigid Pavement Design : Rigid pavement layers**,** Classification of Axle Types of Rigid Chassis and Articulated Commercial Vehicles, Legal Axle and Gross Weights on Single and Multiple Units, Tire Pressure, Contact Pressure,

UNIT III

Stresses in Flexible Pavement: Vehicle-Pavement Interaction: Transient, Random & Damping Vibrations, Steady State of Vibration, Experiments on Vibration, Stress Inducing Factors in Flexible and Rigid pavements; Stress In Flexible Pavements: Visco-Elastic Theory and Assumptions, Layered Systems Concepts, Stress Solutions for One, Two and Three Layered Systems, Fundamental Design Concepts;.

UNIT IV

Stresses in Rigid Pavements: Westergaard's Theory and Assumptions, Stresses due to Curling, Stresses and Deflections due to Loading, Frictional Stresses, and Stresses in Dowel Bars & Tie Bars

UNIT V

Design of Flexible Pavements: Factors effecting Design. Deflection studies in Flexible Pavements. Present Serviceability Index.IRC guidelines for Flexible Pavements. Pavement Performance and methods- AASHTO and Asphalt Institute Method. Need for Overlays, Overlays design methods for Flexible and Rigid pavements.

UNIT VI

Design of Rigid Pavements: Factors effecting Design – Wheel load & its repetition, subgrade strength & proportion, strength of concrete- modulus of elasticity. Reinforcement in slab. Design of joints. Design of Dowel bars. Design of Tie bars. IRC and AASHTO methods of Rigid Pavement design.

Text Books:

1. Principles of Pavement Design, Yoder.J. &Witzorac Mathew, W. John Wiley & Sons Inc
2. Pavement Analysis & Design, Yang H. Huang, Prentice Hall Inc.
3. AASHTO Pavement Design Guide (1993)

References:

1. Design of Functional Pavements, Nai C. Yang, McGraw Hill Publications
2. Concrete Pavements, AF Stock, Elsevier, Applied Science Publishers.
3. Pavement and Surfacing for Highway & Airports, Micheal Sargious, Applied Science Publishers Limited.
4. IRC: 37 & 58 Codes for Flexible and Rigid Pavements Design.

Year/Sem	VII Sem	L	T	P	C	COURSE CODE
Regulation	V18	3	0	0	3	V18CET28
Name of the Course	**AIR POLLUTION AND CONTROL**					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of this course, the students will be able to:

- Understand the ambient air quality based on the analysis of air pollutants
- employ particulate and gaseous control measures for an industry
- Illustrate the plume behavior in a prevailing environmental condition
- Estimate carbon credits for various day to day activities
- operate air pollution gases methods(K3)
- Classify the air pollution controlling methods(K4)

SYLLABUS

UNITI

Air Pollution: Sampling and analysis of air pollutants, conversion of ppm into µg/m3. Definition of terms related to air pollution and control - secondary pollutants – Indoor air pollution – Ozone holes and Climate Change and its impact - Carbon Trade.

UNIT II

Thermodynamics and Kinetics of Air-pollution: Applications in the removal of gases like SOx, NOx, CO and HC - Air-fuel ratio- Computation and Control of products of combustion, Automobile pollution. Odour pollution control, Flares.

UNIT III

Meteorology and Air Pollution: Properties of atmosphere: Heat, Pressure, Wind forces, Moisture and relative Humidity, Lapse Rates - Influence of Terrain and Meteorological phenomena on plume behaviour and Air Quality - Wind rose diagrams and Isopleths Plume Rise Models

UNIT IV

Ambient Air Quality Management: Monitoring of SPM - RPM SO2; NOx and CO - Stack Monitoring for flue gases - Micro-meteorological monitoring –

Noise Monitoring - Weather Station. Emission Standards- Gaussian Model for Plume Dispersion

UNIT V

Air Pollution Control: Control of particulates – Control at Sources, Process Changes, Equipment modifications, Design and operation of control Equipments – Settling Chambers, Cyclone separators –Fabric filters– Scrubbers, Electrostatic precipitators

UNIT VI

Air Pollution Control Methods: Control of NOx and SOx emissions – Environmental friendly fuels - In-plant Control Measures, process changes, methods of removal and recycling. Environmental criteria for setting industries and green belts.

Text Books:

1. Air Pollution and Control, K.V.S.G. Murali Krishna, Laxmi Publications, New Delhi, 2015

2. Air Pollution, M. N. Rao and H. V. N. Rao, Tata McGraw Hill Company.

3. Environmental Science and Engineering by J.G. Henry and G.W. Heinke – Pearson Education.

References:

1. An Introduction to Air pollution, R. K. Trivedy and P.K. Goel, B.S. Publications.

2. Air Pollution by Wark and Warner - Harper & Row, New York.

Year/Sem	**VII Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V18	3	0	0	3	V18CET29
Name of the Course	**IRRIGATION ENGINEERING**					
Branch	CIVIL ENGINEERING					

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:

- Explain the importance, type and quality of Irrigation Water (K2)
- Estimate the Irrigation water requirements (K2)
- Asses different parameters needed for the design of irrigation canal networks (K3)
- Asses different irrigation canal structures (K3)
- Asses different diversion head works (K3)
- Assess the stability of gravity and earth dams (K3)

SYLLABUS

UNIT I

Introduction: Definition – Importance of Irrigation in India – Advantages and Dis advantages – Types of Irrigation – Quality of Irrigation water- Different types techniques used for water distribution in field.

UNIT II

Irrigation and Water Requirement of Crops: Different types of crops and crop seasons- Soil, water and plant relationship- Irrigation efficiencies-Consumptive use –Estimation of consumptive use-Crop water requirement-Duty and Delta-Factors affecting duty-Depth and Frequency of Irrigation-Water logging and Drainage-crop rotation.

UNIT III

Canals: Classification-Alluvial and Non Alluvial canals-Design of non-erodible canals-Different command areas-Methods of economic section and maximum permissible velocity-Design of erodible canals-Kennedy's silt theory and Lacey's regime theory.

UNIT IV

Canal structures: Falls-Types and location- Design principle of Sarda type wall and straight glacis wall

Regulators: Head and cross regulators –design principles

Cross Drainage works: Design principles of aqueduct- siphon aqueduct-super passage

Outlets: Types-proportionality-sensitivity and flexibility

UNIT V

Diversion Head Works: Types of diversion head works-Weirs and Barrages-Layout of diversion head works-components- causes and failures of weirs on permeable foundations-Bligh's creep theory-Khosla's theory-exit gradient.

UNIT VI

Reservoir planning: Site selection-zones of storage-yield and storage capacity of reservoir and reservoir sedimentation-Types of dams- selection of type of dam-selection of site for a dam.

Gravity Dams: Forces acting on gravity dam-causes of failure of gravity dam-elementary profile and practical profile of gravity dam-limiting height of dam-stability analysis-drainage galleries-grouting.

Earthen Dams: Types of earthen dams-causes of failure-criteria for safe design-seepage-measures of control of seepage filters.

Text Books:

1. Irrigation Engineering and Hydraulic structures, Santosh Kumar Garg, Khanna Publishers.
2. Irrigation and Water power Engineering, B.C. Punmia, Pande B.B. Lal, Ashok Kumar Jain, Arun Kumar Jain, Lakshmi Publications Ltd.
3. Water resources and Irrigation engineering by Sri Krishna publications.

References:

1. Irrigation and Water Resources Engineering, Asawa G L (2013), New Age International Publishers.
2. Irrigation Water Resources and Water Power Engineering, Modi P N (2011), Standard book House, New Delhi.
3. Irrigation and Drainage Engineering" by Peter Waller and Muluneh Yitayew

Year/Sem	VII Sem	L	T	P	C	COURSE CODE
Regulation	V18	3	0	0	3	V18CET30
Name of the Course	**BRIDGE ENGINEERING**					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion the course the student will be able to

- Generalize different types of Bridges with diagrams and Loading standards (K2)
- Asses the moments in the girders (K3)
- Illustrate different sub structural works of bridges (K3)
- Illustrate different parameters of Well Foundations (K3)
- Report the effectiveness of different Bearings of a Bridge (K2)
- Generalize the suspension bridge and cable stayed bridge (K2)

SYLLABUS

UNIT I

Introduction: Bridges- Types- Slab bridges, T Beam, Arch bridges, Cable Stayed bridges, prestressed concrete bridges, Truss Bridges, Culverts, -Nomenclature- Selection of Bridge Site- Economical span- Abutments pier and end connections- types of foundations- Open, Pile, Well Foundations, Bearings – Types- Introduction to Loading standards- Railway and IRC Loading

UNIT II

T-Beam Bridge: Pigeaud's method for computation of slab moments; Courbon's method for computation of moments in girders; Design of simply supported T-beam bridge.

UNIT III

Sub Structure for Bridges: Pier and abutment caps; Materials for piers and abutments, Design of pier; Design of abutment; Backfill behind abutment; approach slab.

UNIT IV

Foundations For Bridges: scour at abutments and piers; Grip length; Types of foundations; Design of well foundation.

Box Culverts: Loading – Analysis and Design- Reinforcement detailing

UNIT V

Bearings for Bridges: Importance of bearings; bearings for slab bridge; bearings for girder bridges; Expansion bearings; Fixed bearings; Design of elastomeric pad bearing.

UNIT VI

Cable Supported Bridge: Different types of cable supported bridge, difference between suspension bridge and cable stayed bridge. Different components and factors considered for design of a) suspension bridge, b) cable stayed bridge.

Text Books:

1. Essentials of Bridge Engineering by Dr. Johnson Victor; Oxford & IBH publishing Co. Pvt.Ltd
2. Cable supported bridges, concepts and design by N J Gimsing. John Willey and Sons
3. Design of Bridges, N. Krishna Raju, Tata McGraw Hill

References:

1. Design of Bridge Structures by T. R Jagadeesh, M.A Jayaram, Prentice Hall of India Pvt. Ltd.
2. Design of Concrete Bridges, Aswini, Vazirani, Ratwani
3. Bridge Engineering by S.Ponnuswamy

Year/Sem	VII Sem	L	T	P	C	COURSE CODE
Regulation	V18	3	0	0	3	V18CET31
Name of the Course	ADVANCED FOUNDATION ENGINEERING					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of this course, the student will be able to

- Illustrate the safe bearing capacity of footings subjected to different types of loading on varied soil strata using different methods (K3)
- Compute the settlements of foundations using advanced methods (K3)
- Employ different techniques for proportioning of foundations laid on different soils strata (K3)
- Assess the forces acting on Earth Retaining Structures using different Earth Pressure Theories (K3)
- Predict the load carrying capacity, pull-out capacity, negative skin friction of piles and their settlements (K3)
- Interpret different foundation practices in expansive soils (K3)

SYLLABUS

UNIT I

Bearing capacity of Foundation susing general bearing capacity equation–Meyerhof's, Brinch Hansen's and Vesic's methods-Bearing capacity of Layered Soils:Strong layer over weak layer, Weak layer on strong layer – Bearing capacity of foundations on at opof slope– Bearing capacity of foundations at theedge of the slope.

UNIT II

Settlement analysis: Immediate settlement of footings resting on granular soils –Schmertmann& Hartman method – De Beer and Martens method - Immediate settlement inclays–Janbu'smethod–correctionforconsolidationsettlementusingSkemptonandBjerrum'smethod – Correction forconstruction period

UNIT III

Mat foundations – Purpose and types of isolated and combined footings – Mats/Rafts – Proportioning of footings – Ultimate bearing capacity of mat foundations – allowable bearing capacity of mats founded in clays and granular soils– compensated rafts.

UNIT IV
Earth-retaining structures – cantilever sheet piles – anchored bulkheads – fixed and free earth support methods – design of anchors – braced excavations – function of different components– forces in ties – stability against bottom heave.

UNIT V
Pile foundations – single pile versus group of piles – load-carrying capacity of pile groups – negative skin friction (NSF) -settlement of pile groups in sands and clays – laterally loaded piles in granular soils – Reese and Matlock method – laterally loaded piles in cohesive soils– Davisson and Gill method – Broms'analysis.

UNIT VI
Foundationsinexpansivesoils–definitionsofswellpotentialandswellingpressure – determination of free swell index – factors affecting swell potential and swelling pressure – foundation practices – sand cushion method – CNS layer - drilled piers and belled piers– under-reamed piles – moisture control methods.

Text Books:
1. Principles of Foundation Engineering, B M Das, CENTAG Learning
2. Soil Mechanics and Foundation Engineering, V N S Murthy, CBS Publishers
3. Basic and applied soil mechanics by Gopal Ranjan and ASR Rao, New Age Publishers

References:
1. Foundation Analysis and Design, J.E.Bowles, JohnWiley
2. Foundation Design, W.C.Teng, PrenticeHallPublishers
3. Analysis and Design of Foundations and Retaining Structures by Prakash S edited by Saritha Prakashan

Year/Sem	**VII Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation / Year	V18 / 2021-2022	3	0	0	3	V18CET32
Name of the Course	**TRAFFIC ENGINEERING & MANAGEMENT**					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of the course the student will be able to:

- Understand basics principles of Traffic Engineering(K2)
- Analyze parking data and model accidents(K3)
- Determine capacity and LOS(K3)
- Design of Signalized systems at congested intersections(K3)
- Design of interchanges and Rotary Intersections(K3)
- To provide engineering techniques to achieve Safe and efficient movement of people and goods on roadways(K2)

SYLLABUS

UNIT I

Traffic Studies (Part- I) : Basic principles of Traffic, Volume, Speed and Density; Definitions and their interrelationships; Traffic Volume studies - Objectives, Methods of Volume counts, Presentation of Volume Data; Speed studies- Types of Speeds, Objectives, Methods of speed studies, Statistical Methods for speed data Analysis, Presentation of speed data. Delay Studies; Head ways and Gap Studies - Headway and Gap acceptance, Origin and Destination Studies.

UNIT II

Traffic Studies (Part-II) : Parking Studies: parameters of parking, definitions, Parking inventory study, Parking survey by Patrolling method; Analysis of Parking Survey data;
Accident studies- Causative factors of Road accidents, Accident data collection: Accidentanalysis and modeling;, Road Safety Auditing, Measures to increase Road safety.

UNIT III

Capacity and LOS Analysis: Introduction to Traffic capacity, Analysis concepts, Level ofService, Basic definitions, Factors affecting Capacity and LOS, Capacity of Urban/RuralHighway, With or without access control, Basic freeway segments - Service flow rate ofLOS, Lane width or Lateral clearance adjustment; Heavy vehicle adjustment;Driverpopulation adjustment.

UNIT IV

Signal Designing: Fixed Time signals, Determination of Optimum Cycle length and Signalsetting for Fixed Time signals, Warrants for Signals, Time Plan Design for Pre-TimedControl- Lane group analysis, Saturation flow rate, and Adjustment factors, Uniform andIncremental Delay, Vehicle Actuated Signals, Signal Coordination.

UNIT V

Design of Intersections: **Rotary Design, Weaving angles, Entry width, Exit Radius, Capacity of Rotary, Types of interchanges, Implementation.**

UNIT VI

Transportation System Management: Measures for Improving vehicular flow – one wayStreets, Signal Improvement, Transit Stop Relocation, Parking Management, Reversiblelanes- Reducing Peak Period Traffic - Strategies for working hours, Congestion Pricing,Differential Toll Policies.

Text Books:

1. Traffic Engineering and Transportation Planning – L.R. Kadiyali, Khanna Publishers
2. Principles of Highways Engineering and Traffic Analysis - Fred Mannering & Walter Kilareski, John Wiley & Sons Publication.
3. Transportation Engineering - An Introduction - C. Jotin Khisty, Prentice Hall Publication.

References:

1. Fundamentals of Transportation Engineering - C. S. Papacostas, Prentice Hall India.
2. Traffic Engineering - Theory & Practice - Louis J. Pignataro, Prentice Hall Publication.
3. Traffic Engineering by Roger P. Roess, William R. Mc. Shane, Elena S. Prassas , Prentice Hall, 1977.
4. Relevant IRC Codes

Year/Sem	VII Sem	L	T	P	C	COURSE CODE
Regulation	V18	3	0	0	3	V18CET33
Name of the Course	CONSTRUCTION PROJECT PLANNING & SYSTEMS					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of this course the student will be able to

- Identify the importance of Project Manager, Project Planning & scheduling and different charts (K3)
- Solve the networks by using different network analysis methods such as PERT & CPM (K2)
- Discuss the functioning of various Construction equipment & Earthwork equipment (K2)
- Discuss the functioning of various Hoisting equipment (K2)
- Discuss the methods of production of Aggregate products and concreting (K2)
- Describe the Quality control, Safety Engineering and construction techniques (K2)

SYLLABUS

UNIT I

Introduction: Construction project management and its relevance – qualities of a project manager – project planning – coordination –scheduling - monitoring – bar charts – milestone charts

UNIT II

PERT & CPM: Project Evaluation and Review Technique – Critical Path Method – Applications- cost analysis - updating – crashing for optimum cost – crashing for optimum resources – allocation of resources

UNIT III

Construction & Earthwork equipment: Economical considerations – earthwork equipment – Trucks and handling equipment – rear dump trucks – capacities of trucks and handling equipment – calculation of truck production – compaction equipment – types of compaction rollers.

UNIT IV

Hoisting Equipment: Hoists – cranes – tractors - bulldozers – graders – scrapers– draglines - clamshell buckets

UNIT V

Concreting Equipment: Crushers – jaw crushers – gyratory crushers – impact crushers – selection of crushing equipment - screening of aggregate – concrete mixers – mixing and placing of concrete – consolidating and finishing

UNIT VI

Construction methods: Earthwork – piling – placing of concrete – form work – fabrication and erection – quality control and safety engineering

Textbooks:

1. Basic and Applied Soil Mechanics, Gopal Ranjan and A. S. R. Rao, New Age International Publishers.
2. Soil Mechanics and Foundation Engineering, V. N. S. Murthy, CBS publishers.
3. Soil Mechanics and Foundations, Dr.B.C.Punmia, Laxmi Publications

References:

1. Fundamentals of Soil Mechanics, D. W. Taylor, Wiley.
2. An introduction to Geotechnical Engineering, Holtz and Kovacs; Prentice Hall.
3. Fundamentals of Geotechnical Engineering, B M Das, Cengage Learning, New Delhi.

Year/Sem	VII Sem	L	T	P	C	COURSE CODE
Regulation	V18	3	0	0	3	V18CET34
Name of the Course	SOLID WASTE MANAGEMENT					
Branch	CIVIL ENGINEERING					

Course Outcomes:
Upon successful completion of this course, the students will be able to

- Generalize Solid Waste and its management (K2)
- Assess different elements for managing Solid Waste (K3)
- Employ different methods for transfer and transport of solid waste (K3)
- Employ different methods for Separation and Transformation of Solid waste (K3)
- Organize different methods for processing and treatment of municipal solid waste (K3)
- Identify suitable disposal methods with respect to solid waste (K2)

SYLLABUS

UNIT I

Introduction to Solid Waste Management: Goals and objectives of solid waste management, Classification of Solid Waste – Factors Influencing generation of solid waste – sampling and characterization –Future changes in waste composition, major legislation, monitoring responsibilities.

UNIT II

Basic Elements In Solid Waste Management: Elements and their inter relationship – principles of solid waste management- onsite handling, storage and processing of solid waste Collection of Solid Waste: Types and methods of waste collection systems, analysis of collection system – optimization of collection routes.

UNIT III

Transfer and Transport: Need for transfer operation, compaction of solid waste – transport means and methods, transfer station types and design requirements.

UNIT IV

Separation and Transformation of Solid Waste: Unit operations used for separation and transformation: shredding – materials separation and recovery, source reduction and waste minimization.

UNIT V

Processing and Treatment: Processing of solid waste – Waste transformation through combustion and composting, anaerobic methods for materials recovery and treatment – Energy recovery – biogas generation and cleaning– Incinerators.

UNIT VI

Disposal of Solid Waste: Methods of Disposal, Landfills: Site selection, design and operation, drainage and leachate collection systems –designated waste landfill remediation.

Text Books:

1. George Techobanoglous "Integrated Solid Waste Management", McGraw Hill Publication, 1993
2. Gerard Kiely " Environmental Engineering", McGraw Hill Publication, 2007
3. J Glynn Henry,. Gary W.Heinke "Environmental Science and Engineering", Prentice-Hall of India Pvt Ltd, 1996

References:

1. Vesilind, P.A., Worrell, W., Reinhart, D. "Solid Waste Engineering", Cenage learning, New Delhi, 2004
2. Charles A. Wentz; "Hazardous Waste Management", McGraw Hill Publication, 1995.
3. Mackenzie L Davis, David A.Cornwell :Introduction to Environmental Engineering" McGraw Hill Publication, 2017

Year/Sem	**VII Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V18	3	0	0	3	V18CET35
Name of the Course	**GROUND WATER DEVELOPMENT**					
Branch	CIVIL ENGINEERING					

Course Outcomes

At the end of the course the student will be able to

- Analyse radial flow towards wells in confined and unconfined aquifers (K3)
- Design wells and understand the construction practices (K5)
- Construct the wells and development of ground water (K2)
- Determine the process of artificial recharge for increasing groundwater potential (K4)
- Employ different geo physical methods to explore ground water (K3)
- Apply appropriate measures for groundwater management (K3)

SYLLABUS

UNIT I

Introduction: Groundwater in the hydrologic cycle, groundwater occurrence, aquifer parameters and their determination, general groundwater flow equation.

Well Hydraulics Steady radial flow and unsteady radial flow to a well in confined and unconfined aquifers, Theis solution, Jocob and Chow's methods, Leaky aquifers.

UNITII

Well Design: Water well design-well diameter, well depth, well screen-screen length, slot size, screen diameter and screen selection, design of collector wells, infiltration gallery.

UNIT III

Well Construction and Development: Water wells, drilling methods-rotary drilling, percussion drilling, well construction-installation of well screens-pull-back method, open- hole, bail- down and wash-down methods, well development-mechanical surging using compressed air, high velocity jetting of water, over pumping and back washing, well completion, well disinfection, well maintenance.

UNIT IV

Artificial Recharge: Concept of artificial recharge of groundwater, recharge methods-basin, stream-channel, ditch and furrow, flooding and recharge well methods, recharge mounds and induced recharge

Saline Water Intrusion: Occurrence of saline water intrusion, Ghyben-Herzberg relation, Shape of interface, control of saline water intrusion.

UNITV

Geophysics: Surface methods of exploration of groundwater – Electrical resistivity and Seismic refraction methods, Sub-surface methods – Geophysical logging and resistivity logging. Aerial Photogrammetry applications.

UNITVI

Groundwater Modeling and Management: Basic principles of groundwater modelling- Analog models-viscous fluid models and membrane models, digital models-Finite difference and finite element models, Concepts of groundwater management, basinmanagement by conjunctive use-case studies.

Text Books:

1. Groundwater, Raghunath H M, New Age International Publishers, 2005.
2. Groundwater Hydrology, Todd D. K., Wiley India Pvt Ltd., 2014.
3. Groundwater Hydrology, Todd D K and L W Mays, CBS Publications, 2005.

References:

1. Groundwater Assessment and Management, Karanth K R, Tata McGraw Hill Publishing Co., 1987.
2. Groundwater Hydrology, Bouwer H, McGraw Hill Book Company, 1978.
3. Groundwater Systems Planning and Management, Willis R and W.W.G. Yeh,Prentice Hall Inc., 1986.
4. Groundwater Resources Evaluation, Walton W C, McGraw Hill Book Company,1978.

Year/Sem	**VII Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V18	3	0	0	3	V18CET36
Name of the Course	**EARTHQUAKE ENGINEERING**					
Branch	CIVIL ENGINEERING					

Course Outcomes

At the end of the course the student will be able to

- Differentiate types of lodes and it's characteristic(K2)
- Recognize foundations of many basic engineering concepts related earthquake engineering(K2)
- Examine the strong ground motion and seismic hazard(K3)
- Assess the frequency of wave propagation in different mediums(K3)
- Find the behavior of structures during earthquake and earthquake resistant Features of structure(K3)
- Relate the properties of liquefaction and soil improvement for remediation of seismic hazards(K3)

SYLLABUS

UNIT I

Introduction to Dynamic Loads: Static Load v/s Dynamic Load, Types of Dynamic forces, Force Control and Displacement Control.

UNIT II

Seismology and Earthquakes: Introduction, Seismic Hazards, seismic waves, internal structure of earth, Continental drift and plate tectonics, faults, elastics rebound theory, geometric notations, location of earthquakes, size of earthquakes.

UNIT III

Strong Ground Motion: Strong ground motion measurement, ground motion parameters, estimation of ground motion parameters.

Seismic Hazard Analysis: Identification and Evaluation of Earthquake Sources, deterministic seismic hazard analysis, probabilistic seismic hazard analysis.

UNIT IV

Wave Propagation: Waves in unbounded media, waves in a semi – infinite body, waves in a layered media, attenuation of stress waves.

Artificial Ground Motion Generation: Modification of actual ground motion records, time –domain generation, frequency domain generation.

UNIT V

Behavior of Structures: During Earthquake and Earthquake Resistant Features of Structure Inertia forces in structures, Behavior of Masonry Structures, Behavior of RC Structures

UNIT VI

Liquefaction: Flow liquefaction, cyclic mobility, evaluation of liquefaction hazards, liquefaction susceptibility, initiation of liquefaction, effects of liquefaction.

Soil Improvement for Remediation of Seismic Hazards: Densification techniques, Reinforcement Techniques, Grouting and Mixing techniques, Drainage techniques.

Text Books:

1. Earthquake Resistant Design of Structures By Pankaj Agarwal & Manish Shrikhande, PHI Publications
2. S. K. Duggal; Earthquake Resistance Design of Structures; Oxford University Press, New Delhi.
3. K. Chopra; Dynamics of Structures, Pearson, New Delhi
4. Park & Pauly; Behavior of R.C Structures
5. Geotechnical Earthquake Engineering by Steven L. Kramer, prentice Hall

Reference Books:

1. IS: 1893 (Part-I) 2002, Criteria for Earthquake Resistant Design General Provision to Building.
2. S: 13920 (1993), Code of Practice for Ductile Detailing of RC Structures
3. IS: 4326 (1993), Code of Practice for Earthquake Resistant Design and Construction of Buildings
4. IS: 13827 (1993), Improving Earthquake Resistance of Earthen Buildings
5. IS: 13828 (1993), Guide lines for Improving Earthquake Resistance of low Strength Masonry Buildings.
6. S S Rao; Mechanical Vibration; Pearson, New Delhi.

VIII SEMESTER – SYLLABUS

Year/Sem	VIII Sem	L	T	P	C	COURSE CODE
Regulation / Year	V18 / 2021-2022	3	0	0	3	V18CET37
Name of the Course	**HIGHWAY CONSTRUCTION & MANAGEMENT**					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon the successful completion of course students will be able to

- Understand the concepts of PMS and evaluate strategies for pavement maintenance (K2)
- Evaluate the pavements based on the functional and structural characteristics(K3)
- Understand constructions of Construction methods of Base, Subbase, Shoulders and drains(K2)
- Understand constructions of bituminous pavements(K2)
- Understand the concepts of construction of cement concrete pavements(K2)
- Evaluate the concepts of maintenance of cement concrete pavements(K3)

SYLLABUS

UNIT I

Pavement management system: Components of PMS and their activities; Major steps in implementing PMS; Inputs; Design, Construction and Maintenance; Rehabilitation and Feedback systems; Examples of HDM and RTIM packages; Highway financing; Fund generation; Evaluating alternate strategies and Decision criteria ; Pavement Maintenance Management Components of Maintenance Management and Related Activities – Network and Project Level Analysis; Prioritization Techniques and Formulation of Maintenance Strategies.

UNIT II

Pavement Inventories, Quality Control and Evaluation: Serviceability Concepts; Visual Rating; Pavement Serviceability Index; Roughness Measurements; Distress Modes – Cracking Rutting Etc; Pavement Deflection –

Different Methods and BBD, Skid Resistance, Roughness, Safety – Aspects; Inventory System. Causes of Deterioration, Traffic and Environmental Factors, Pavement Performance Modeling Approaches and Methods of Maintaining WBM, Bitumen and Cement Concrete Roads, Quality Assurance; Quality Control – ISO 9000, Sampling Techniques – Tolerances and Controls related to Profile and Compaction.

UNIT III

Construction of Base, Subbase, Shoulders and Drain: Roadway and Drain Excavation, Excavation and Blasting, Embankment Construction, Construction of Gravel Base, Cement Stabilised Sub- Bases, WBM Bases, Wet Mix Construction; Crushed Cement Bases, Shoulder Construction; Drainage Surface, Turfing Sand Drains; Sand Wicks; Rope Drains, Geo- Textile Drainage; Preloading Techniques.

UNIT IV Bituminous Construction: Preparation and Laying of Tack Coat; Bituminous Macadam, Penetration Macadam, Built up Spray Grout, Open Graded Premix, Mix Seal, Semi-Dense Asphalt Concrete-Interface Treatments and Overlay Construction, IRC Specifications.

UNIT V Cement Concrete pavement Construction: Cement Concrete Pavement Analysis - Construction of Cement Roads, Manual, and Mechanical Methods, Joints in Concrete and Reinforced Concrete Pavement and Overlay Construction.

UNIT VI Bituminous and Cement Concrete pavement Maintenance: Repair of surface layer, Base layer, sub base layer, Sub grade. Maintenance of Concrete slab, Dry Lean concrete sub base layer and Subgrade in concrete pavement.

Text Books :

1. Highway Engineering, Khanna S. K., Justo C. E. G and Veeraragavan A, NemChand Bros., Roorkee.
2. Principles of Highway Engineering, Kadiyali L. R, Khanna Publishers, New Delhi.
3. MORTH - Specifications.

References:

1. Principles of Transportation Engineering, Partha Chakroborthy and AnimeshDas PHI Learning Private Limited, Delhi.
2. Transportation Engineering - An Introduction, JotinKhisty C, Prentice Hall,Englewood Cliffs, New Jersey.
3. Transportation Engineering and Planning, Papacostas C.S. and P.D. Prevedouros,Prentice Hall of India Pvt.Ltd; New Delhi.

Year/Sem	VIII Sem	L	T	P	C	COURSE CODE
Regulation	V18	3	0	0	3	V18CET38
Name of the Course	REPAIR AND REHABILITATION OF STRUCTURES					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon the successful completion of course students will be able to

- Develop various maintenance and repair strategies(K2)
- Evaluate the existing buildings through field investigations(K2)
- Understand and use the different techniques for structural rehabilitation(K2)
- To assess damage to structures and various repair techniques(K2)
- To understand the importance of maintenance of structures(K2)
- Understand the importance of advanced concretes mixes(K2)

SYLLABUS

UNIT I

Introduction: Deterioration of Structures – Distress in Structures – Causes and Prevention. Mechanism of Damage – Types of Damage.

UNIT II

Non Destructive Testing: Corrosion of Steel Reinforcement – Causes – Mechanism and Prevention. Damage of Structures due to Fire – Fire Rating of Structures – Inspection and Testing – Symptoms and Diagnosis of Distress – Damage assessment

UNIT III

Materials for repair and rehabilitation: Admixtures- types of admixtures- purposes of using admixtures- chemical composition- Natural admixtures- Fibres- wraps- Glass and Carbon fibre wraps- Steel Plates

UNIT IV

Strengthening and stabilization: Techniques- design considerations-Beam shear capacity strengthening- Shear Transfer strengthening-stress reduction techniques- Column strengthening-flexural strengthening- Connection stabilization and strengthening, Crack stabilization

UNIT V

Fibre reinforced concrete: Properties of constituent materials- Mix proportions, mixing and casting methods-Mechanical properties of fiber reinforced concrete- applications of fibre reinforced concretes-Light weight concrete- properties of light weight concrete- No fines concrete- design of light weight concrete- Flyash concrete-Introduction- classification of flyash-properties and reaction mechanism of flyash- Properties of flyash concrete in fresh state and hardened state-Durability of flyash concretes.

UNIT VI

High performance concretes: Introduction- Development of high performance concretes- Materials of high performance concretes- Properties of high performance concretes- Self Consolidating concrete-properties-qualifications.

Text Books:

1. Maintenance and Repair of Civil Structures, B.L. Gupta and Amit Gupta, Standard Publications.
2. Concrete Technology by A.R. Santa Kumar, Oxford University press
3. Concrete technology by Neville and J J Brooks, Pearson publications, 2nd edition

References:

1. Concrete technology by M S Shetty, S. Chand publications (2006).
2. Defects and Deterioration in Buildings, EF & N Spon, London
3. Non-Destructive Evaluation of Concrete Structures by Bungey – Surrey University Press
4. Concrete Repair and Maintenance Illustrated, RS Means Company Inc W.H.Ranso, (1981)
5. Building Failures: Diagnosis and Avoidance, EF & N Spon, London, B.A. Richardson, (1991)

Year/Sem	VIII Sem	L	T	P	C	COURSE CODE
Regulation	V18	3	0	0	3	V18CET39
Name of the Course	RURAL WATER SUPPLY AND ONSITE SANITATION SYSTEMS					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon the successful completion of course students will be able to

- Relate various approaches for planning the water supply systems in rural areas (K3)
- Apply suitable methods of water treatment for rural areas(K3)
- Develop distribution system in rural areas (K3)
- Apply the sanitary engineering concept and principals(K3)
- Apply the different public sanitation methods in rural areas(K3)
- Apply different solid waste methods in rural areas(K3)

SYLLABUS

UNIT I

Concept of environmental and scope of sanitation in rural areas: Magnitude of problem of water supply and sanitation – population to be covered and difficulties National policy. Various approaches for planning of water supply systems in rural areas. Selection and development of preferred sources of water, springs, wells and infiltration galleries, collection of raw water from surface source.

UNIT II

Specific problems: Specific problems in rural water supply and treatment e.g. iron, manganese, fluorides etc. Low cost treatment, appropriate technology for water supply and sanitation. Improvised method and compact system of treatment of surface and ground waters such as MB settlers, slow and sand filter, chlorine diffusion cartridge etc. Water supply through spot sources, hand pumps, open dug –well.

UNIT III

Planning of distribution system in rural areas: Water supply during fairs, festivals and emergencies. Treatment and disposal of wastewater/sewage. Various method of collection and disposal of night soil.

UNIT IV

On site sanitation system and community latrines: Simple wastewater treatment system for rural areas and small communities such as stabilization ponds, septic tanks, soakage pits etc.

UNIT V

Industrial Hygiene And Sanitation: Occupational Hazards- Schools- Public Buildings- Hospitals- Eating establishments- Swimming pools – leanliness and maintenance and comfort- Industrial plant sanitation

UNIT VI

Solids Waste: Collection, Transfer, Transport and deposit of solid waste management, composting, land filling.

Text Books:

1. Low cost on site sanitation option, Hoffman & Heijno Occasional Nov.1981 paper no.

2. 21, P.O. Box 5500 2280 HM Rijswijk, the Netherlands offices, J.C. Mokeniaan, 5

3. Rijswijk (the Haque). Wagner, E.G. and Lanoik, J.N. water supply for rural areas and Small Communities, Geneva: W.H.O.1959.

References:

1. Manual of water supply and treatment, 3rd edition, CPHEEO, GOI, New Delhi.
2. Vesilind, P.A., Worrell, W., Reinhart, D. “Solid Waste Engineering”, Cenage learning, New Delhi, 2004

Year/Sem	VIII Sem	L	T	P	C	COURSE CODE
Regulation	V18	3	0	0	3	V18CET40
Name of the Course	PRESTRESSED CONCRETE					
Branch	CIVIL ENGINEERING					

COURSE OUTCOMES:

Upon the successful completion of course students will be able to

- Generalize the basic concepts of prestressed concrete (K2)
- Compute prestress and bending stresses (K3)
- Estimate effective prestress including the short- and long-term losses (K2)
- Analyze and design prestressed concrete beams under flexure (K4)
- Analyze and design prestressed concrete beams under Shear and torsion (K4)
- Generalize the end zone of prestressed concrete members (K2)

SYLLABUS

UNIT I

Introduction: Basic concepts of prestressing; Need for High strength steel and High strength concrete. Terminology; Advantages and Applications of Prestressed Concretes. Materials For Prestressed Concrete: High strength concrete; High tensile steel.

UNIT II

Prestressing Systems: Prestressing Systems- Introduction, Tensioning devices, Pre-tensioning Systems, Post tensioning Systems

Analysis of Prestress and Bending Stresses: Basic assumptions; Analysis of prestress; Resultant stresses at a section; Pressure (Thrust) line and internal resisting couple; Concept of Load balancing.

UNIT III

Losses of Prestress: Nature of losses of prestress; Loss due to elastic deformation of concrete, shrinkage of concrete, creep of concrete, relaxation of stress in steel, friction and anchorage slip; Total losses allowed for in design.

UNIT IV

Deflections of Prestressed Concrete Members: Importance of control of deflections; Factors influencing deflections; Short term deflections of un-cracked members; Effect of tendon profile on deflections.

Limit State of Collapse: Flexural Strength of Prestressed Concrete Sections: Ultimate flexural strength of rectangular sections and T-sections using simplified IS code recommendations.

UNIT V

Limit State of Collapse:Shear Resistance of Prestressed Concrete Members: Shear and principal stresses; Shear- IS Code recommendations: Ultimate shear resistance of prestressed concrete members; Design of shear reinforcement.

Torsional Resistance of Prestressed Concrete Members: Design of reinforcements for torsion, shear and bending.

UNIT VI

Design of End Blocks: Transmission of prestress in pretensioned members; Transmission length; Anchorage stress in post tensioned members; Bearing stress and bursting tensile force stresses in end blocks-Methods. IS Code provision for the design of end block reinforcement.

Text Books: (supplemented with IS: 1343)

1. Prestressed Concrete by N. Krishna Raju; Tata Mc.Graw - Hill Publishing CompanyLimited, New Delhi.
2. Pre-stressed Concrete- P. Dayarathnam: Oxford and IBH Publishing Co.
3. Prestressed Concrete, S. Ramamrutham

References:

1. Prestressed concrete by N. Rajagopalan; Narosa Publishing House.
2. Design of pre-stressed concrete structures- T.Y. Lin and Ned H. Burns - John Wiley & Sons, New York.
3. Fundamental of pre-stressed concrete- N.C. Sinha & S.K. Roy
4. Prestressed Concrete, T. Y. Lin & Burns, Wiley Publications

Year/Sem	**VIII Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V18	3	0	0	3	V18CET41
Name of the Course	**ENGINEERING WITH GEO-SYNTHETICS**					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of this course, the students will be able to

- Relate the need and demand of geo-synthetic materials in the field of geotechnical construction works (K3)
- Employ various parameters related to the use and application of geotextiles, geogrids (K3)
- Examine the use and field testing of geo-synthetics in road construction (K3)
- Design reinforced earth retaining walls with strip, sheet and gird reinforcement (K5)
- Distinguish survivability requirements of geo-composites and could design geowebs, geocells, and moisture barriers and natural geotextiles etc. (K4)
- Employ other methods to use the natural geotextiles like jute fibres, coir, bamboo and their combination (K3)

SYLLABUS

UNIT I

Geosynthetics: Introduction to Geosynthetics – Basic description – Polymeric materials– Uses and Applications. Properties of Geotextiles – Geogrids – Geomembranes – Geocomposites.

UNIT-II

Geotextiles: Design criteria for Separation – Reinforcement – Stabilization – Filtration – Drainage and Moisture barriers.

Geogrids: Designing for Reinforcement – Stabilization – Designing Gabions – Construction methods.

UNIT-III

Use of Geosynthetics in Roads: Geosynthetics in road ways- applications role of subgrade conditions-design criteria-survivability-application in paved roads.

UNIT-IV

Reinforced Earth Retaining Walls: Components - External stability – Internal stability-Design of reinforced earth walls with strip, sheet and grid reinforcement.

UNIT-V

Geomembranes: Pond Liners – Covers for Reservoirs – Canal Liners – Landfill Liners– Caps and closures, moisture barriers.

Geocomposites: An added advantage – Geocomposites in Separation – Reinforcement – Filtration – Geocomposites as Geowebs and Geocells.

UNIT-VI

Natural Geotextiles: Natural fibres as geotextiles- factors governing the use jute fibres-coir geotextiles-bamboo/timber-combination of geotextiles.

Text Books:

1. Designing with Geosynthetics by Robert M. Koerner, Prantice Hall, Eaglewood Cliffs, NJ.

2. An Introduction to Soil Reinforcement and Geosynthetics' by G.L.Sivakumar Babu

(2009), Universities Press (India) Pvt. Ltd.

3. Engineering with Geosynthetics', by G. Venkatappa Rao and GVS Suryanarayana Raju –

Tata McGraw Hill Publishing Company Limited – New Delhi.

References:

1. 'Construction and Geotechnical Engineering using Synthetic Fabries' by Robert M.

Koerner and Josoph P. Welsh. John Willey and Sons, New York.

2. 'Foundation Analysis and Design' by J.E. Bowles McGraw Hill Publications.

Year/Sem	**VIII Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V18	3	0	0	3	V18CET42
Name of the Course	**URBAN HYDROLOGY & HYDRAULICS**					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of this course, the students will be able to

- Generalize the effect of urbanization on hydrological cycle (K2)
- Develop intensity duration frequency curves for urban drainage systems (K3)
- Calculate runoff parameters in urban drainage system (K3)
- Develop design storms to size the various components of drainage systems (K3)
- Apply best management practices to manage urban flooding (K3)
- Prepare master drainage plan for an urbanized area (K3)

SYLLABUS

UNIT I

Introduction: Urbanization and its effect on water cycle – urban hydrologic cycle – Trends in urbanization – Effect of urbanization on hydrology

UNIT II

Precipitation Analysis: Importance of short duration of rainfall and runoff data, methods of estimation of time of concentration for design of urban drainage systems, Intensity-Duration -Frequency (IDF) curves, design storms for urban drainage systems.

UNIT III

Approaches to urban drainage: Time of concentration, peak flow estimation approaches, rational method, NRCS curve number approach, runoff quantity and quality, wastewater and storm water reuse, major and minor systems.

UNIT IV

Elements of drainage systems: Open channel, underground drains, appurtenances, pumping, source control.

UNIT V

Analysis and Management: Storm water drainage structures, design of storm water network- Best Management Practices–detention and retention facilities, swales, constructed wetlands, models available for storm water management.

UNIT VI

Master drainage plans: Issues to be concentrated upon – typical urban drainage master plan, interrelation between water resources investigation and urban planning processes, planning objectives, comprehensive planning, use of models in planning.

Text Books:

1. Manual on Drainage in Urbanised area, Geiger W. F., J Marsalek, W. J. Rawls and F.C. Zuidema, (1987 - 2 volumes), UNESCO,

2. Urban Hydrology, Hall M J (1984), Elsevier Applied Science Publisher.

3. Hydrology – Quantity and Quality Analysis, Wanielista M P and Eaglin (1997), Wiley and Sons

4. Urban Hydrology, Hydraulics and Storm water Quality: Engineering Applications and Computer Modelling, Akan A.O and R.L. Houghtalen (2006), Wiley International.

References:

1. Storm water Detention for Drainage, Stahre P and Urbonas B (1990), Water Quality and CSO Management, Prentice Hall.

2. Urban water cycle processes and interactions, Marsalek et.al. (2006), Publication No. 78, UNESCO, Paris(http://www.bvsde.paho.org/bvsacd/cd63/149460E.pdf)

3. Frontiers in Urban Water Management – Deadlock or Hope, by Maksimovic C and J A Tejada-Guibert (2001), IWA Publishing

Year/Sem	VIII Sem	L	T	P	C	COURSE CODE
Regulation	V18	3	0	0	3	V18CET43
Name of the Course	ENVIRONMENTAL IMPACT ASSESSMENT AND MANAGEMENT					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of the course, the student will be able to

- Prepare EMP, EIS, and EIA report (K3)
- Select the an appropriate EIA methodologies (K2)
- Assess the Impact of development activities and land use (K3)
- Employ in procuring the natural resources for assessing the environment (K3)
- Assess the ecosystem (K3)
- Develop the EIA notifications and reports (K3)

SYLLABUS

UNIT I

Basic concept of EIA: Elements of EIA-factors affecting EIA-Initial environmental Examination-life cycle analysis preparation of Environmental Base map-Classification of environmental parameters role of stakeholders in the EIA preparation stages in EIA

UNIT II

E I A Methodologies: introduction, Criteria for the selection of EIA Methodology, E I A methods, Ad-hoc methods, matrix methods, Network method Environmental Media Quality Index method, overlay methods, cost/benefit Analysis – EIS and EMP

UNIT III

Impact of Developmental Activities and Land use: Introduction and Methodology for the assessment of soil and ground water, Delineation of study area, Identification of actives- application of remote sensing and GIS for EIA.

UNIT IV

Procurement of natural resources: Procurement of relevant soil quality, Impact prediction, Assessment of Impact significance, Identification and Incorporation of mitigation measures - E I A with reference to surface water, Air and Biological environment: Methodology for the assessment of Impacts on surface water environment, generalized approach for assessment of Air pollution Impact.

UNIT V

Assessment of ecosystem: Assessment of Impact of development Activities on Vegetation and wildlife, environmental Impact of Deforestation. Environmental Risk Assessment and Risk management in EIA: Risk assessment and treatment of uncertainty-key stages in performing an Environmental Risk Assessment advantages of Environmental Risk Assessment

UNIT VI

EIA notification: EIA notification by Ministry of Environment and Forest (Govt. of India): Provisions in the EIA notification, procedure for environmental clearance, and procedure for conducting environmental impact assessment report- evaluation of EIA report. Environmental legislation objectives, evaluation of Audit data and preparation of Audit report. Post Audit activities, Concept of ISO and ISO 14000. Case studies and preparation of Environmental Impact assessment statement for various Industries.

Text Books:

1. Environmental Impact Assessment, Canter Larry W., McGraw-Hill education Edi (1996)
2. Environmental Impact Assessment Methodologies, Y.Anjaneyulu, B. S. Publication, Sultan Bazar, Hyderabad.
3. Environmental Impact Assessment and Management, B B Hosetti, A.Kumar, Daya Publishing House (2014)

References:

1. Environmental Science and Engineering, J. Glynn and Gary W. Hein Ke PrenticeHall Publishers
2. Environmental Science and Engineering, Suresh K. Dhaneja, S. K. ,Katania& Sons Publication., New Delhi.
3. Environmental Pollution and Control, H. S. Bhatia, Galgotia Publication (P) Ltd, Delhi

Year/Sem	VIII Sem	L	T	P	C	COURSE CODE
Regulation	V18	3	0	0	3	V18CET44
Name of the Course	**ADVANCED CONCRETE TECHNOLOGY**					
Branch	CIVIL ENGINEERING					

Course Outcomes

Upon successful completion of course the students will be able to

- Relate material characteristics and their influence on microstructure of concrete(K3)
- Predict concrete behavior based on its durability properties(K3)
- Illustrate proportioning of different types of concrete mixes for required fresh and hardened properties using professional codes(K3)
- Select a suitable type of concrete based on specific application(K3)
- Employ suitable concreting methods to place the concrete based on requirement(K3)
- Illustrate different types of concrete tests for hardened properties(K3)

SYLLABUS

UNIT I

Ingredients of Concrete: Cement –chemical composition and their importance, hydration of cement, types of cement. Testing of cement.
Fine aggregate: Functions, requirement, Alternatives to River sand, M-sand introduction and manufacturing.
Coarse aggregate: Importance of size, shape and texture. Grading and blending of aggregate. Testing on aggregate, requirement. Recycled aggregates Water – qualities of water.
Chemical admixtures: Plasticizers, accelerators, retarders and air entraining agents. Mineral admixtures – Pozzolanic and cementitious materials, Fly ash, GGBS, silica fumes, Metakaolin and rice huskash.

UNIT II
Durability of Concrete: Durability, Transport mechanism of fluids and gases in concrete, cracking in concrete - corrosion and carbonation induced cracking, Alkali Aggregate Reaction, degradation by freeze and thaw, chloride attack, sulphate and sea water attack (marine conditions). Hot and cold weather concreting.

UNIT III

Concrete Mix Design: Design of concrete mixes by IS code method - ACI method Design of high strength concrete mixes, design of fly-ash cement concrete mixes, design of high density concrete mixes.

UNIT IV

Special Concrete: Lightweight concrete, autoclaved aerated concrete, no-fines concrete, lightweight aggregate concrete and foamed concrete, High strength concrete, refractory concrete, high density and radiation-shielding concrete, polymer concrete, fibre-reinforced concrete, mortars, renders, recycled concrete, Ferro Cement, Self Compacting Concrete.

UNIT V

Special processes and technology for particular types of structure: Sprayed concrete, underwater concrete, grouts, grouting and grouted concrete, mass concrete, slip form construction, pumped concrete, concrete for liquid retaining structures, vacuum process

UNIT VI

Testing of Concrete: Test methods: Analysis of fresh concrete, Accelerated testing methods, Tests on hardened concrete, Core cutting and testing, partially destructive testing, Non-destructive testing of concrete structure

Text Books:

1. Neville, A.M., Properties of Concrete, Pearson Education Asia (P) Ltd, England, 2000.
2. Concrete Technology, Gambhir M.L, Tata McGraw Hill
3. Concrete Technology, M.S.Shetty, S.Chand& Company New Delhi
4. Concrete microstructure, properties & materials, P.KumarMehata, Paulo & J.M. Monteiro,
5. Light Weight Concrete, Short &Kenniburg, Asia Publishing House, Bombay

References:

1. N. V. Nayak, A. K. Jain Handbook on Advanced Concrete Technology, ISBN: 978-81-8487-186-9
2. Job Thomas, “Concrete Technology”, CENGAGE Learning,2015.
3. IS 4926 (2003): Code of Practice Ready-Mixed Concrete [CED 2: Cement and Concrete] Criteria for RMC Production Control, Basic Level Certification for Production Control of Ready Mixed Concrete BMTPC.
4. Specification and Guidelines for Self-Compacting Concrete, EFNARC, Association House.

Year/Sem	**VIII Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V18	3	0	0	3	V18CET45
Name of the Course	**FINITE ELEMENT METHOD**					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of the course, the student will be able to

- Apprise the students about the basics of the Finite Element Technique(K2)
- Describe the finite element method, identify different types of finite elements and apply to respective engineering problems(K3)
- Analyze one dimensional solid elements of various engineering problems(K3)
- Illustrate frame structures of various engineering problems (K3).
- Analyze 2-D and 3-D engineering problems using finite element method(K3)
- Examine finite element for elastic stability, fluid mechanics and dynamic analysis (K3)

SYLLABUS

UNIT I

Introduction to Finite Element Analysis: Basic Concepts of Finite Element Analysis - Introduction to Elasticity -Steps in Finite Element Analysis

UNIT II

Finite Element Formulation Techniques: Virtual Work and Variational Principle -Galerkin Method- Finite Element Method: Displacement Approach - Stiffness Matrix and Boundary Conditions

UNIT III

Element Properties: Natural Coordinates -Triangular Elements - Rectangular Elements - Lagrange and Serendipity Elements -Solid Elements - Isoparametric Formulation -Stiffness Matrix of Isoparametric Elements - Numerical Integration: One Dimensional - Numerical Integration: Two and Three Dimensional- Worked out Examples

UNIT IV

Analysis of Frame Structures: Stiffness of Truss Members -Analysis of Truss -Stiffness of Beam Members - Finite Element Analysis of Continuous Beam - Plane Frame Analysis - Analysis of Grid and Space Frame

UNIT V

FEM for Two and Three Dimensional Solids: Constant Strain Triangle - Linear Strain Triangle - Rectangular Elements - Numerical Evaluation of Element Stiffness - Computation of Stresses, Geometric Nonlinearity and Static Condensation - Axisymmetric Element - Finite Element Formulation of Axisymmetric Element - Finite Element Formulation for 3 Dimensional-Elements Worked out Examples

UNIT VI

Additional Applications of FEM: Finite Elements for Elastic Stability - Finite Elements in Fluid Mechanics - Dynamic Analysis

Text Books:

1. Introduction to Finite Elements in Engineering, Tirupati R. Chandrupatla, Ashok D. Belgundu, PHI publications.

2. A first course in the Finite Element Method, Dary L. Logan, Thomson Publications.

3. The Finite Element Method- Zinkiewicz, O.C. and Taylor, R.L , Oxford .

4. Finite Element Analysis Theory and Programming- Krishnamoorthy, C.S, Tata McGraw-Hill Education.

References:

1. Concepts and applications of Finite Element Analysis, Robert D. Cook, Michael E Plesha, John Wiley & sons Publication.

2. Introduction to Finite Element Method, Desai & Abel CBS Publication.

3. Introduction to Finite Element Method- P.N. Godbole, I K International Publishing House Pvt. Ltd.

4. The Finite Element Method in Engineering- S.S. Rao, Butterworth-Heinemann;

5. An Introduction to Finite Element Method- Reddy, J. N., McGraw-Hill Education

Year/Sem	VIII	L	T	P	C	COURSE CODE
Regulation	V18	3	0	0	3	V18CET46
Name of the Course	GROUND IMPROVEMENT TECHNIQUES					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of this course. the student will be able to

- To make the student appreciate the need for different ground improvement methods adopted for improving the properties of remoulded and in-situ soils (K2)
- The student should be in a position to understand the importance of dewatering and different dewatering techniques (K3)
- The student should be in a position to know the importance of stabilization of soils and types of stabilizations (K3)
- To make the student understand how the reinforced earth technology and soil nailing can obviate the problems posed by the conventional retaining walls (K3)
- To enable the students to know how geotextiles and geosynthetics can be used to improve the engineering performance of soils (K2)
- To make the student learn the concepts, purpose and effects of grouting (K2)

SYLLABUS

UNIT I

In situ densification methods: In situ densification of granular soils- vibration at ground surface and at depth, impact at ground and at depth – in situ densification of cohesive soils – pre loading – vertical drains – sand drains and geo drains – stone columns.

UNIT II

Dewatering: Sumps and interceptor ditches – single and multi stage well points – vacuum well points – horizontal wells– electro osmosis

UNIT III

Stabilization of soils: Methods of soil stabilization – mechanical – cement – lime – bitumen and polymer stabilization – use of industrial wastes like fly ash and granulated blast furnace slag.

UNIT IV

Reinforced earth: Principles – components of reinforced earth –stability checks – soil nailing

UNIT V

Geosynthetics: Geotextiles – types – functions, properties and applications – geogrids , geomembranes and gabions – properties and applications.

UNIT VI

Grouting: Objectives of grouting – grouts and their applications – methods of grouting – stage of grouting.

Text Books:

1. Ground Improvement Techniques, Purushotham Raj, Laxmi Publications, New Delhi.
2. Ground Improvement Techniques, Nihar Ranjan Patro, Vikas Publishing House (p) limited , New Delhi.
3. An introduction to Soil Reinforcement and Geosynthetics, G. L. Siva Kumar Babu, Universities Press.

References:

1. Ground Improvement, M.P.Moseley, Blackie Academic and Professional, USA
2. Designing with Geosynethetics, R. M Koerner, Prentice Hall
3. Engineering Principles of Ground Modification by Manfred R. Hausmann,McGraw-Hill Inc.,

ANNEXURE - III

COURSES OFFERED UNDER OPEN ELECTIVE IN VII & VIII SEMESTER TO OTHER BRANCHES

Open Elective 2	VII Sem	3. Environmental Pollution and Control 4. Disaster Management	V18CEOE03 V18CEOE04
Open Elective 3	VIII Sem	3. Solid Waste Management 4. Water Quality and Conservation	V18CEOE05 V18CEOE06

Year/Sem	VII	L	T	P	C	COURSE CODE
Regulation	V18	3	0	0	3	V18CEOE03
Name of the Course	ENVIRONMENTAL POLLUTION AND CONTROL					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of this course the student will be able to

- Describe about air pollution and its control methods to students(K2)
- Develop the student to understand about industrial wastewater and ways to control it (K3)
- Describe student to understand about solid waste and methods to control it(K2)
- Express to student about importance of Environmental sanitation(K2)
- Prepare student to understand about Hazardous waste and ways to control it(K3)
- Illustrate the importance of Sustainable development to student(K3)

SYLLABUS

UNIT I

Air Pollution: Air pollution Control Methods–Particulate control devices – Methods of Controlling Gaseous Emissions – Air quality standards.Noise Pollution: Noise standards, Measurement and control methods –Reducing residential and industrial noise – ISO14000.

UNIT II

Industrial wastewater Management: – Strategies for pollution control - Volume and Strength reduction – Neutralization – Equalization – Proportioning – Common Effluent Treatment Plants - Recirculation of industrial wastes – Effluent standards.

UNIT III

Solid Waste Management: solid waste characteristics – basics of on-site handling and collection – separation and processing – Incineration Composting-Solid waste disposal methods – fundamentals of Land filling.

UNIT IV

Environmental Sanitation: Environmental Sanitation Methods for Hostels and Hotels, Hospitals, Swimming pools and public bathing places, social gatherings (melas and fares), Schools and Institutions, Rural Sanitation-low cost waste disposal methods.

UNIT V

Hazardous Waste: Characterization - Nuclear waste – Biomedical wastes – Electronic wastes - Chemical wastes – Treatment and management of hazardous waste-Disposal and Control methods.

UNIT VI

Sustainable Development: Definition- elements of sustainable developments-Indicators of sustainable development- Sustainability Strategies- Barriers to Sustainability–Industrialization and sustainable development – Cleaner production in achieving sustainability- sustainable development.

Text Books:

1. Environmental Engineering, by Ruth F. Weiner and Robin Matthews – 4th Edition Elesevier, 2003.
2. Environmental Science and Engineering by J.G. Henry and G.W. Heinke – Pearson Education.
3. Environmental Engineering by Mackenzie L Davis & David A Cornwell. McGraw Hill Publishing.

References:

1. Air Pollution and Control by M.N. Rao & H.N. Rao
2. Solid Waste Management by K. Sasi Kumar, S.A. Gopi Krishna. PHI New Delhi.
3. Environmental Engineering by Gerard Kiley, Tata McGraw Hill.
4. Environmental Sanitation by KVSG Murali Krishna, Reem Publications, New Delhi.
5. Industrial Water Pollution Control by Nemerow Jr., McGraw Hill Publishing.
6. Unit Operations and Processes in Environmental Engineering by Reynolds. Richard – Cengage Learning.
7. Environmental Engineering by D. Srinivasan, PHI Learning Private Limited, NewDelhi, 2011.
8. Environmental Engineering – Howard S. Peavy, Donald R. Rowe,Teorge George Tchobanoglus – Mc-Graw-Hill Book Company,New Delhi, 1985.

Year/Sem	VII Sem	L	T	P	C	COURSE CODE
Regulation	V18	3	0	0	3	V18CEOE04
Name of the Course	DISASTER MANAGEMENT					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of this course the student will be able to

- Describe to student to have a idea on different natural hazards and disaster management (K2)
- Develop the student to understand manmade disaster and their management (K3)
- Prepare the student in such a way inorder to understand building codes and vulnerability of disaster (K3)
- Illustrate to student about role of technology in disaster management (K2)
- Assess the importance of education and community preparedness in disaster management to student (K3)
- Classify the multi-sectional issues caused by disaster to student (K2)

SYLLABUS

UNIT I

Natural Hazards and Disaster Management: Introduction of DM Disaster Management cycle – Five priorities for action- Case study methods of the following: floods, droughts – Earthquakes – global warming, cyclones & Tsunamis – Post Tsunami hazards along the Indian coast – landslides.

UNIT II

Man Made Disastar And Their Management Along With Case Study Methods Of The Following: Fire hazards – transport hazard dynamics – solid waste management – post disaster – bio terrotirism - rail and air craft's accidents-Management of these disasters

UNIT III

Risk And Vulnerability: – Building codes and land use planning – social vulnerability – environmental vulnerability-Financial management of disaster.

UNIT IV

Role Of Technology In Disaster Managements: Disaster management for infra structures, taxonomy of infra structure - mitigation programme for earth quakes –geospatial information in agriculture drought assessment-multimedia technology in disaster risk management and training-transformable indigenous knowledge in disaster reduction.

UNIT V

Education And Community Preparedness: Education in disaster risk reduction-Essentials of school disaster education-Community capacity and disaster resilience-Community based disaster recovery -Community based disaster management and social capital-Designing resilience- building.

UNIT VI

Multi-sectional Issues: Impact of disaster on poverty and deprivation-Climate change adaptation and human health -Exposure , health hazards and environmental risk-Forest management and disaster risk reduction - The Red cross and red crescent movement.

Text Books:

1. Disaster Management – Global Challenges and Local Solutions' by Rajib shah & R R Krishnamurthy(2009),Universities press.
2. Disaster Science & Management' by Tushar Bhattacharya, Tata McGraw Hill Education Pvt. Ltd., New Delhi.
3. Disaster Management – Future Challenges and Opportunities' by Jagbir Singh (2007), I K International Publishing House Pvt. Ltd.

Reference Books:

1. 'Disaster Management' edited by H K Gupta (2003), Universities press.
2. Natural Hazards and Disaster Management, Vulnerability and Mitigation by RB Singh
3. Disaster Management by Harish K.Gupta

Year/Sem	VIII Sem	L	T	P	C	COURSE CODE
Regulation	V18	3	0	0	3	V18CEOE05
Name of the Course	SOLID WASTE MANAGEMENT					
Branch	CIVIL ENGINEERING					

Course Outcomes:
Upon successful completion of this course, the students will be able to

- Generalize Solid Waste and its management(K2)
- Assess different elements for managing Solid Waste(K3)
- Employ different methods for transfer and transport of solid waste(K3)
- Employ different methods for Separation and Transformation of Solid waste(K3)
- Organize different methods for processing and treatment of municipal solid waste(K3)
- Identify suitable disposal methods with respect to solid waste(K2)

SYLLABUS

UNIT I

Introduction to Solid Waste Management: Goals and objectives of solid waste management, Classification of Solid Waste – Factors Influencing generation of solid waste – sampling and characterization –Future changes in waste composition, major legislation, monitoring responsibilities.

UNIT II

Basic Elements In Solid Waste Management: Elements and their inter relationship – principles of solid waste management- onsite handling, storage and processing of solid waste Collection of Solid Waste: Types and methods of waste collection systems, analysis of collection system – optimization of collection routes.

UNIT III

Transfer and Transport: Need for transfer operation, compaction of solid waste – transport means and methods, transfer station types and design requirements.

UNIT IV

Separation and Transformation of Solid Waste: Unit operations used for separation and transformation: shredding – materials separation and recovery, source reduction and waste minimization.

UNIT V

Processing and Treatment: Processing of solid waste – Waste transformation through combustion and composting, anaerobic methods for materials recovery and treatment – Energy recovery – biogas generation and cleaning– Incinerators.

UNIT VI

Disposal of Solid Waste: Methods of Disposal, Landfills: Site selection, design and operation, drainage and leachate collection systems –designated waste landfill remediation.

Text Books:

1. George Techobanoglous "Integrated Solid Waste Management", McGraw Hill Publication, 1993
2. Gerard Kiely " Environmental Engineering", McGraw Hill Publication, 2007
3. J Glynn Henry,. Gary W.Heinke "Environmental Science and Engineering", Prentice-Hall of India Pvt Ltd, 1996

References:

1. Vesilind, P.A., Worrell, W., Reinhart, D. "Solid Waste Engineering", Cenage learning, New Delhi, 2004
2. Charles A. Wentz; "Hazardous Waste Management", McGraw Hill Publication, 1995.
3. Mackenzie L Davis, David A.Cornwell :Introduction to Environmental Engineering" McGraw Hill Publication, 2017

Year/Sem	**VIII Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation Year	V18 / 2021-2022	3	0	0	3	V18CEOE06
Name of the Course	**WATER QUALITY AND CONSERVATION SYSTEMS**					
Branch	CIVIL ENGINEERING					

Course Outcomes:
Upon successful completion of the course, the student will be able to

- Describe the Engineering Hydrology and application (K2)
- Assess the importance and necessity of water supply systems (K3)
- Relate different sources of surface and ground water (K3)
- Predict the quality of water in reference to IS and WHO standards (K3)
- Design of plumbing and sanitary fittings (K3)
- Employ different conservation techniques (K3)

SYLLABUS

UNIT I
Introduction to Hydrology: Engineering hydrology, applications, Hydrologic cycle, evaporation, evapotranspiration, precipitation, run off, infiltration, hydrological data-sources

UNIT II

Sources of Water: Surface water, Lakes, Rivers, Reservoirs, comparison of sources with reference to quality, quantity and other considerations.

Groundwater, types of water bearing formations, springs, Wells and Infiltration galleries, Yields from infiltration galleries.

UNIT III

Importance and Necessity: Protected Water Supply systems, Flow chart of public water supply system, Water borne diseases. Estimation of water usages in different purpose.

UNIT IV

Quality and Analysis of Water: Characteristics of water–Physical, Chemical and Biological-Analysis of Water – Physical, Chemical and Biological characteristics. Comparison of sources with reference to quality- I.S. Drinking water quality standards and WHO guidelines for drinking water.

UNIT V

Plumbing Systems: Systems of plumbing-types of pipes and sanitary fittings and other accessories–one pipe andtwo pipe systems – Design parameters and factors.

UNIT VI

Water conservation: importance and necessity, objectives, systems-rainwater harvesting, recharge pits, watershed.

Text Books:

1. Environmental Engineering – Howard S. Peavy, Donald R. Rowe, Teorge George Tchobanoglus – Mc-Graw-Hill Book Company, New Delhi, 1985
2. Elements of Environmental Engineering, K. N. Duggal, S. Chand & Company Ltd. New Delhi, 2012.
3. Water Supply and Sanitary Engineering – G. S. Birdie and J. S. Birdie

References:

1. Water Supply Engineering – P. N. Modi.
2. Water Supply Engineering – B. C. Punmia
3. Water Supply and Sanitary Engineering – G. S. Birdie and J. S. Birdie

ANNEXURE - IV

COURSE STRUCTURE APPROVED IN 2nd JOINT BOS MEETING

(For 2020 – 2021 Admitted Batch) – V20 Regulation

I SEMESTER

S.No	Course Code	Course Title	Hours per week			Credits
			L	T	P	
1	V20MAT01	Linear Algebra and Differential Equations	3	0	0	3
2	V20PHT01	Engineering Physics	3	0	0	3
3	V20ENT01	English for Professional Enhancement	3	0	0	3
4	V20MEL01	Engineering Graphics	1	0	4	3
5	V20CST01	Programming in C for problem solving	3	0	0	3
6	V20ENL01	Hone Your Communications Skills Lab-I	0	0	3	1.5
7	V20PHL01	Engineering Physics Lab	0	0	3	1.5
8	V20CSL01	Programming lab in C for problem solving	0	0	3	1.5
9	V20CHT02	Environmental Studies	2	0	0	-
		Total	15	0	13	19.5

Total Contact Hours : 28 Total Credits : 19.5

II SEMESTER

S.No	Course Code	Course Title	Hours per week L	T	P	Credits
1	V20MAT02	Numerical Methods and Vector Calculus	3	0	0	3
2	V20CHT01	Engineering Chemistry	3	0	0	3
3	V20MET01	Engineering Mechanics	3	0	0	3
4	V20EET02	Basic Electrical and Electronics Engineering	3	0	0	3
5	V20MEL02	Engineering Workshop	1	0	4	3
6	V20EEL02	Basic Electrical and Electronics Engineering Lab	0	0	3	1.5
7	V20CHL01	Engineering Chemistry Lab	0	0	3	1.5
8	V20ENL02	Hone Your Communications Skills Lab-II	0	0	3	1.5
		Total	13	0	13	19.5

Total Contact Hours : 26 Total Credits : 19.5

COURSE STRUCTURE PROPOSED FOR APPROVAL IN 4th BOS MEETING

III SEMESTER

S.No	Course Code	Course Title	Hours per week L	T	P	Credits
1		Probability & Statistics (BOS of Maths)	3	0	0	3
2	V20CET01	Strength of Materials	3	0	0	3
3	V20CET02	Fluid Mechanics & Hydraulics	3	0	0	3
4	V20CET03	Surveying and Geomatics	3	0	0	3
5	V20CET04	Building Materials & Concrete Technology	3	0	0	3
6	V20CEL01	Strength of Materials Lab	0	0	3	1.5
7	V20CEL02	Surveying Lab	0	0	3	1.5
8	V20CEL03	Concrete Technology Lab	0	0	3	1.5
9	V20CESOC1	Skill Oriented Course (Certificate course offered by Parent Institution / Industries / Professional Bodies/APSSDC or any other accredited bodies)	1	0	2	2
10		Professional Communication Skills-I (MNC) (BOS of Eng)	2	0	0	0
		Total	18	0	11	21.5

Total Contact Hours : 29

Total Credits : 21.5

IV SEMESTER

S.No	Course Code	Course Title	Hours per week			Credits
			L	T	P	
1	V20CET05	Engineering Geology	3	0	0	3
2	V20CET06	Structural Analysis - I	3	0	0	3
3	V20CET07	Water Resources Engineering	3	0	0	3
4	V20CET08	Transportation Engineering	3	0	0	3
5		Managerial Economics Financial Analysis (BOS of MBA)	3	0	0	3
6	V20CEL04	Engineering Geology Lab	0	0	3	1.5
7	V20CEL05	FM & Hydraulic Machinery Lab	0	0	3	1.5
8	V20CEL06	Transportation Engineering Lab	0	0	3	1.5
9	V20CESOC2	Skill Oriented Course (Certificate course offered by Parent Institution/ Industries/ Professional Bodies/APSSDC or any other accredited bodies)	1	0	2	2
10		Professional Communication Skills-II (MNC) (BOS of Eng)	2	0	0	0
		Total	18	0	11	21.5

Total Contact Hours : 29

Total Credits : 21.5

Internship for 2 months/Mini Project is mandatory during summer vacation and is evaluated in V semester.

V SEMESTER

S.No	Course Code	Course Title	Hours per week			Credits
			L	T	P	
1		Structural Analysis - II	3	0	0	3
2		Geotechnical Engineering	3	0	0	3
3		Design of Reinforced Concrete Structures	3	0	0	3

4		Professional Elective Course I	3	0	0	3
5		Open Elective Course I	2	0	2	3
6		Geotechnical Engineering Lab	0	0	3	1.5
7		Building Planning & Drawing Lab	0	0	3	1.5
8		Skill Advanced Course	1	0	2	2
9		Mandatory Course	2	0	0	0
10		Summer Internship	0	0	0	1.5
		Total	17	0	10	21.5

Total Contact Hours: 27 Total Credits: 21.5

VI SEMESTER

S.No	Course Code	Course Title	Hours per week			Credits
			L	T	P	
1		Design of Steel Structures	3	0	0	3
2		Foundation Engineering	3	0	0	3
3		Environmental Engineering	3	0	0	3
4		Professional Elective Course - II	3	0	0	3
5		Open Elective Course - II	2	0	2	3
6		Environmental Engineering Lab	0	0	3	1.5
7		CAD & GIS Lab	0	0	3	1.5
8		Professional Core Courses Lab	0	0	3	1.5
9		Skill Advanced Course / Soft skill course	1	0	2	2
10		Mandatory Course	2	0	0	0
		Total	17	0	13	21.5

Total Contact Hours: 30

Total Credits: 21.5

Internship 2 months/Mini Project is mandatory during summer vacation and is evaluated in VII semester.

VII SEMESTER

S.No	Course Code	Course Title	Hours per week			Credits
			L	T	P	
1		Professional Elective Course III	3	0	0	3
2		Professional Elective Course IV	3	0	0	3
3		Professional Elective Course V	3	0	0	3
4		Open Elective Course III	2	0	2	3
5		Open Elective Course IV	2	0	2	3
6		Humanities and Social Science Elective	3	0	0	3
7		Skill Advanced Course	1	0	2	2
8		Summer Internship	0	0	0	3
		Total	17	0	6	23

Total Contact Hours: 23

Total Credits: 23

VIII SEMESTER

S.No	Course Code	Course Title	Hours per week			Credits
			L	T	P	
1		Project	0	0	0	12
		Total	0	0	0	12

Total Contact Hours: 0

Total Credits: 12

ANNEXURE – V

SYLLABI OF III & IV SEMESTERS OF B.TECH V20 REGULATION

ACADEMIC YEAR 2021-2022

III SEMESTER – SYLLABUS

Year/Sem	**III Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	3	0	0	3	V20CET01
Name of the Course	**STRENGTH OF MATERIALS**					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon completion of the course, the student will be able to

- Understand the basic materials behavior under the influence of different external loading conditions and the support conditions (K2)
- Draw the diagrams indicating the variation of the key performance features like bending moment and shear forces (K3)
- Understand bending concepts and calculation of section modulus and for determination of stresses developed in the beams and torsion (K3)
- Understand the basic concepts of Principal stresses developed in a member when it is subjected to stresses along different axes and design the sections (K2)
- Asses stresses in different engineering applications like columns and struts subjected to different loading conditions (K3)

SYLLABUS

UNIT I

Simple Stresses ,Strains and Strain Energy: Elasticity and plasticity –Types of stresses and strains – Hooke‘s law – stress – strain diagram for mild steel – Workingstress – Factor of safety – Lateral strain, Poisson‘s ratio and volumetric strain – Elasticmoduli and the relationship between them – Bars of varying section – composite bars –Temperature stresses. Strain Energy – Resilience – Gradual, sudden, impact and shock loadings – simple applications.

UNIT II

Shear Force and Bending Moment: Definition of beam – Types of beams – Concept of shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, uniformly distributed loads, uniformly varying loads and combination of these loads – Point of contra flexure – Relation between S.F., B.M and rate of loading at a section of a beam

Deflection of Beams: Bending into a circular arc – slope, deflection and radius of curvature – Differential equation for the elastic line of a beam – Double integration and Macaulay‘s methods – Determination of slope and deflection for cantilever and simply supported beams subjected to point loads, - U.D.L. Uniformly varying load. Mohr‘s theorems – Moment area method – application to simple cases.

UNIT III

Flexural Stresses: Theory of simple bending – Assumptions – Derivation of bending equation: M/I = f/y = E/R, Neutral axis – Determination bending stresses – section modulus of rectangular and circular sections (Solid and Hollow), I, T, Angle and Channel sections – Design of simple beam sections.

Shear Stresses: Derivation of formula – Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T angle sections, built up beams, shear centreTorsion- Derivation of torsion equation and its assumptions.

UNIT-IV

Principal Stresses and Strains: Introduction – Stresses on an inclined section of a bar under axial loading – compound stresses – Normal and tangential stresses on an inclined plane for biaxial stresses – Two perpendicular normal stresses accompanied by a state of simple shear – Mohr’s circle of stresses – Principal stresses and strains – Analytical and graphical solutions. Theories of failures: Various Theories of failures such as Maximum Principal stress theory –Maximum Principal Strain Theory – Maximum shear stress theory – Maximum strain energy theory –Maximum shear strain energy theory.

UNIT-V

Columns and Struts: Introduction – Types of columns – Short, medium and long columns –Axially loaded compression members – Crushing load – Euler’s theorem for long columns –assumptions – derivation of Euler's critical load formulae for various end conditions – Equivalent length of a column – Slenderness ratio –Euler' critical stress – Limitations of Euler' theory – Rankine– Gordon formula – Long columns subjected to eccentric loading – Secant formula –Empirical formulae – Straight line formula – Prof. Perry' formula.

Text Books:

1. Mechanics of Materials- R. C. Hibbler, Pearson; 10 edition (January 15, 2016)
2. Strength of materials -S. S. Bhavakatti, Vikas Publishing House; Fourth edition (2013)
3. Strength of Materials -R. K. Rajput, S. Chand Publishing (6th Edition) (2015)
4. Strength of Materials - R.K Bansal,Laxmi Publications; Sixth edition (2018)

References:

1. Fundamentals of Solid Mechanics M.L. Gambhir, PHI Learning Pvt. Ltd., New Delhi. (1 December 2009)
2. Introduction to Strength of Material by U.C. Jindal, Pearson Education; Second edition (28 September 2017)
3. Strength of materials by R. Subramanian, Oxford university press, New Delhi, third edition (15 June 2016)

Year/Sem	III Sem	L	T	P	C	COURSE CODE
Regulation	V20	3	0	0	3	V20CET02
Name of the Course	FLUID MECHANICS & HYDRAULICS					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon completion of the course, the student will be able to

- Understand the physical properties of fluids and their influences on fluid motion (K2)
- Calculate the forces acting on plane and curved surfaces and solve fluid flow problems in kinematics and dynamics (K3)
- Solve various laminar and turbulent flow problems (K2)
- Solve uniform and non uniform open channel flow problems (K2)
- Estimate the impact of jet on plane and curved surfaces using momentum Principle (K2)

SYLLABUS

UNIT I

Introduction and Hydrostatics: Dimensions and units – Physical properties of fluid specific gravity, viscosity, surface tension, vapor pressure and their influences on fluid motion - pressure at a point, Pascal‘s law, hydrostatic law, atmospheric, gauge and vacuum pressure, measurement of pressure - pressure gauges, Manometers: Differential Manometers- Hydrostatic forces on submerged plane - Horizontal, Vertical, Center of pressure, derivations and problems.

UNIT II

Fluid Kinematics and Dynamics: Description of fluid flow - Stream line, path line and streak lines and stream tube - Classification of flows: Steady, unsteady, uniform, non-uniform, laminar, turbulent, rotational and irrotational flows - Surface and body forces - Euler and Bernoulli’s equations for flow

UNIT III

Closed Conduit and Measurement of Flow: Laws of Fluid friction-Darcy’s equation-Minor losses-pipes in series, pipes in parallel, Pipe network problem- variation friction factor with Reynolds’s number- Pitottube,Venturi meter and Orifice meter - flow over rectangular, triangular and trapezoidal notches.

UNIT IV

Uniform Flow and Non Uniform Flow: Types of flows - Type of channels - Chezy's, manning's and Bazin formulae for uniform flow - Most Economical sections - Critical flow: Specific energy-critical depth computation of critical depth critical, sub-critical and super critical flows - Dynamic equation for G.V.F., Mild, Critical, Steep, horizontal and adverse slopes, surface profiles - direct step method - Rapidly varied flow, hydraulic jump, energy dissipation.

UNIT V

Hydraulic Similitude and Momentum Principles: Dimensional analysis-Buckingham's-Pi theorem - study of hydraulic models-Geometric, Kinematic and Dynamic similarities-dimension less numbers, model laws-Hydrodynamic force of jets on stationary and moving flat-inclined and curved vanes-jet striking centrally and at tip- velocity triangles at inlet and outlet-expressions for work done and efficiency

Textbooks:

1. Hydraulics and Fluid Mechanics including Hydraulic Machines by Dr. P.N.Modiand Dr.S.N.Seth, Standard Book house, Rajsons Pvt.Ltd.,21stEdition.
2. A text book of Fluid Mechanics and Hydraulic Machines by Dr.R.K.Bansal,Laxmi Publications(P)Ltd.,NewDelhi,10thEdition,2018.
3. A text book of Fluid mechanics and Hydraulic machines by Er. R.K.Rajput, S.Chand&company,6thEdition,2016

References:

1. Introduction to Fluid Mechanics and Fluid Machines by S.K.Som, G.Biswas, Suman Chakraborthy, McGraw Hill Education, 3rd Edition,2017.
2. Fluid Mechanics by A.K.Mohanty, Prentice Hall of India Pvt. Ltd., NewDelhi,2nd Edition,1994.
3. Fluid Mechanics and Hydraulic Machines by K.Subramanya, McGraw Hill Education,1st Edition,2010.

Year/Sem	**III Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	3	0	0	3	V20CET03
Name of the Course	**SURVEYING AND GEOMATICS**					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of this course, the students will be able to

- Demonstrate the basic surveying skills (K2)
- Computation of bearings by various surveying instruments (K3)
- Perform different methods of leveling (K3)
- Compute various data required for various methods of surveying (K3)
- Compute area and volume quantities by different methods (K3)

SYLLABUS

UNIT I

Introduction: Definition-Uses of surveying- overview of plane surveying (chain, Compass and plane table), Objectives, Principles and classifications – Errors in survey Measurements

UNIT II

Compass survey and traversing: Electronic distance measurements (EDM)-principles of electro optical EDM-Errors and corrections to linear measurements- Compass survey-Meridians, Azimuths and Bearings, declination, computation of angle. Traversing-Purpose-types of traverse-traverse computation-traverse adjustments-Introduction omitted measurements

UNIT III

Leveling, contouring and Curves: Concept and Terminology, Leveling Instrument and their Temporary and permanent adjustments- method of leveling. Characteristics and Uses of contours- methods of conducting contour surveys.Types of curves, design and setting out – simple and compound curves

UNIT IV

Theodolite Surveying: principles-uses and adjustments – temporary and permanent, measurement of horizontal and vertical angles. Principles of Electronic Theodolite – Introduction to Trigonometrically leveling,. Tachometric Surveying: Stadia and tangential methods of Tacheometry. Distance and-Elevation formulae for Staff vertical position

UNIT V

Computation of Areas and Volumes: Area from field notes, computation ofareas along irregular boundaries and area consisting of regular boundaries. Embankments and cutting for a level section and two level sections with and without transverse slopes, determination of the capacity of reservoir, volume of barrow pits.

Geomatics: Introduction, Total Station and Global positioning system, Electromagnetic spectrum, Visual image interpretation, Digital image processing

Text Books:

1. Surveying, Vol No.1, 2 &3, B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain –
2. Laxmi Publications Ltd, New Delhi,seventeenth edition (2016)
3. 2 Text book of Surveying, S.K. Duggal (Vol No. 1&2), Tata McGraw Hill Publishing
4. Co. Ltd. New Delhi.Fourth edition (1 July 2017)
5. Text book of Surveying, Arora (Vol No. 1&2), STANDARD BOOK HOUSE SINCE 1960; Edition: Year-2015 edition (2015)
6. Anji Reddy, M., Remote sensing and geographical information system,BS Publications/BSP Books (2012)

References:

1. Text book of Surveying, C. Venkataramaiah, universities Press (India) Pvt. Ltd. (12 January 2011)
2. Surveying and levelling, R. Subramanian, Oxford University Press; 2 edition (30 June 2012)

Year/Sem	**III Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	3	0	0	3	V20CET04
Name of the Course	**BUILDING MATERIALS & CONCRETE TECHNOLOGY**					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon completion of the course, the student will be able to

- Discuss the basic concepts of building materials (K2)
- Distinguish the basic ingredients of concrete and their role in the production of concrete and its behavior in the field (K2)
- Apply fundamental knowledge in the fresh concrete (K3)
- Apply fundamental knowledge in the hardened properties of concrete and factors (K3)
- Find test on hardened concrete and properties, evaluate the ingredients of concrete through lab test results and design the concrete mix by BIS method (K3)

SYLLABUS

Unit I(Stones, Bricks, Tiles, Wood and Paints)

Stones: Classification of Stones – Properties of stones in structural requirements

Bricks: Composition of good brick earth, Various methods of manufacturing of bricks

Tiles: Characteristics of good tile – Manufacturing methods, Types of tiles

Wood: Structure – Properties – Seasoning of timber – Classification of various types of woods used in buildings – Defects in timber

Paints: White washing and distempering, Constituents of paint – Types of paints – Painting of new and old wood – Varnish

Unit II (Aggregates, Cement and Admixtures)

Aggregates: Classification of aggregate, Bond, Strength and other mechanical properties of aggregate, Physical properties of aggregate, bulking of sand, Deleterious substance in aggregate, Soundness of aggregate, Alkali-Aggregate reaction – Thermal properties, Sieve analysis – Fineness modulus – Grading curves – Grading of fine and coarse aggregates as per relevant IS code, Maximum aggregate size

Portland Cement: Chemical composition, Hydration, Structure of hydrated cement – Setting of cement, Fineness of cement, Tests for physical properties – Different grades of cements **Supplementary cementitious materials:** Fly ash, GGBS, Silica fume, Rice husk ash, Calcinated ash (Basic properties and their contribution to concrete strength)

Admixtures: Mineral and Chemical admixtures

Unit III (Fresh Concrete)

Manufacture of concrete: Mixing and vibration of concrete, Workability – Segregation and bleeding – Factors affecting workability, Measurement of workability by different tests, Effect of time and temperature on workability – Quality of mixing water, Ready mix concrete, Shotcrete

Unit IV (Hardened Concrete)

Water / Cement ratio: Abram's law, Gel space ratio, Nature of strength of concrete – Maturity concept, Strength in tension and compression – Properties of Hardened Concrete (Elasticity, Creep, Shrinkage, Poisson's ratio, Water absorption, Permeability, etc.), Relating between compression and tensile strength, Curing

Unit V (Testing of Hardened Concrete, Mix Design)

Testing of Hardened Concrete: Factors affecting properties of Hardened concrete, Compression tests, Tension tests, Flexure tests, Non-destructive testing methods – Codal provisions for NDT – Rebound hammer and UPV method.

MixDesign: Factorsinthechoiceofmixproportions– Quality Controlofconcrete-Acceptancecriteria–Concepts Proportioningof concretemixes byvarious methods – BISmethod ofmix design.

Text Books:

1. "Concrete Technology" by M. S. Shetty - S. Chand & Co., 2004
2. "Engineering Materials" by Rangwala S C, (36th edition), Anand Charotar Publishing House
3. "Concrete Technology" by Shantha Kumar – Oxford Publications

Reference Books:

1. "Building Materials" by S. K. Duggal, New Age International Publications
2. "Building Materials" by P. C. Verghese, PHI learning (P) Ltd., 2009
3. "Properties of Concrete" by A. M. Neville – Pearson – 4th edition

Year/Sem	III Sem	L	T	P	C	COURSE CODE
Regulation	V20	0	0	3	1.5	V20CEL01
Name of the Course	STRENGTH OF MATERIALS LAB					
Branch	CIVIL ENGINEERING					

Course outcomes:

Upon completion of the course, the student will be able to

- Identify the engineering properties of materials in the laboratory
- Assess torsion test to determine elastic constants
- Assess spring test to determine elastic constants
- Assess flexural test to determine elastic constants
- Determine hardness of metals
- Determine Impact strength of metals

List of Experiments

1. Tension test on Steel bar
2. Bending test on (Steel / Wood) Cantilever beam.
3. Bending test on simple support beam.
4. Torsion test
5. Hardness test
6. Spring test
7. Compression test on wood or concrete
8. Impact test
9. Shear test
10. Verification of Maxwell‘s Reciprocal theorem on beams.
11. Continuous beam – deflection test.

List of Major Equipment:

1. UTM for conducting tension test on rods
2. Steel beam for flexure test
3. Wooden beam for flexure test
4. Torsion testing machine
5. Brinnell‘s / Rock well‘s hardness testing machine
6. Setup for spring tests
7. Compression testing machine
8. Izod Impact machine
9. Shear testing machine
10. Beam setup for Maxwell‘s theorem verification.
11. Continuous beam setup

Year/Sem	**III Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	0	0	3	1.5	V20CEL02
Name of the Course	**SURVEYING LAB**					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon completion of the course, the student will be able to

- Use different Survey instruments to collect filed data
- Calculate distances, levels and angles from collected data
- Transfer points on ground to drawing sheet
- Interpret survey data to compute areas and volumes by using different methods
- Prepare profile of land from the collected survey data

List of experiments:

1. Survey by chain survey of road profile with offsets in case of road widening.
2. Finding the area of the given boundary using compass (Closed Traverse)
3. Plane table survey; finding the area of a given boundary by the method of Radiation
4. Plane table survey; finding the area of a given boundary by the method of intersection.
5. Fly leveling : Height of the instrument method (differential leveling)
6. Fly leveling: Rise and Fall method.
7. Theodolite Survey: Determining the Horizontal and Vertical Angles by the method of repetition method.
8. Theodolite Survey: Finding the distance between two inaccessible points.
9. One Exercise on Curve setting.
10. One Exercise on contours.
11. Determination of area using total station
12. Determination distance between two inaccessible points.
13. Introduction to GPS.

References:

1. Surveying Vol No.1, 2 &3 by Dr.B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain –Laxmi Publications, seventeenth edition (2016), New Delhi.
2. Text book of Surveying by S.K. Duggal (Vol No. 1&2), McGraw Hill Education; Fourth edition (1 July 2017), New Delhi.
3. Text book of Surveying,Dr.K.R.Arora (Vol No. 1&2), STANDARD BOOK HOUSE SINCE 1960; Edition: Year-2015 edition (2015), Delhi.

Year/Sem	**III Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	0	0	3	1.5	V20CEL03
Name of the Course	**CONCRETE TECHNOLOGY LAB**					
Branch	CIVIL ENGINEERING					

Course outcomes:

Upon completion of the course, the student will be able to

- Find some properties of cement by consistency, fineness, setting times, specific gravity, soundness and compressive strength.
- Determine the workability of cement concrete by compaction factor, slump and Vee – Bee tests.
- Determine properties of self-compacting concrete by Slump cone, V funnel, L Box
- Determine the specific gravity of coarse aggregate and fine aggregate by Sieve analysis.
- Determine the flakiness and elongation index of coarse aggregates.
- Determine the bulking of sand.
- Understand the non-destructive testing procedures on concrete

I. Tests on Cement

1. Normal Consistency and fineness of cement.
2. Initial setting time and final setting time of cement.
3. Specific gravity of cement
4. Soundness of cement.
5. Compressive strength of cement.

II. Tests on Aggregate

1. Sieve Analysis and gradation chairs
2. Bulking of sand.
3. Bulk and compact densities of fine and coarse aggregates

III. Tests on Fresh Concrete

1. Slump test
2. Compact factor test
3. Vee-bee Test
4. Flow Table Test

Tests on Self Compacting Concrete

1. Slump cone
2. V funnel
3. L Box

IV. Tests on hardened concrete

1. Compression test on cubes & Cylinders
2. Flexure test
3. Splitting Tensile Test
4. Modulus of Elasticity

V. Non Destructive tests of concrete

1. Rebound hammer
2. Ultrasound pulse Velocity (UPV)

Text Books:

1. Concrete Technology, M. S. Shetty. – S. Chand & Company

References:

1. Concrete Technology, M.L. Gambhir. – Tata Mc. Graw Hill Publishers, New Delhi.

Codes for reference:

1. IS: 4031 – chemical analysis and tests on cement.
2. IS 650:1991 –Standards and testing
3. IS 383:1970- Specification for coarse & fine aggregate
4. IS 2386 (Part III) 1963- Methods of test for aggregate for specific gravity, density, voids, absorption & bulking
5. IS 516:1959- Specification for compressive strength, Flexural strength
6. IS 5816:1999-Method of test for splitting tensile strength of concrete.
7. IS 13311(Part 1):1992 Methods of non-destructive testing of concrete: Part 1 Ultrasonic pulse velocity.
8. IS 13311(Part 2):1992 Methods of non-destructive testing of concrete: Part 2 Rebound hammer.
9. IS 6461(Part 7):1973 Glossary of terms relating to cement concrete: Part 7 Mixing, laying, compaction, curing and other construction aspects.

IV SEMESTER – SYLLABUS

Year/Sem	IV Sem	L	T	P	C	COURSE CODE
Regulation	V20	3	0	0	3	V20CET05
Name of the Course	**ENGINEERING GEOLOGY**					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of this course, the students will be able to

- Relate the features of geological agents (K3)
- Employ different techniques to identify different types of minerals and rocks (K3)
- Interpret hazard zonaation with reference to secondary structures (K3)
- Review earthquakes and landslides and their resulting subsidence (K3)
- Examine the engineering geological conditions of the strata and its suitability to major projects like Dams, Tunnels and Reservoirs etc. (K3)

SYLLABUS

UNIT I

Introduction: Branches of geology, Importance of geology in Civil engineering with case studies. Physical Geology: Geological processes, Weathering, Erosion and Civil engineering importance of weathering and Erosion

UNIT II

Mineralogy: Definition of mineral, Importance of study of minerals, Significance of different physical properties in mineral identification, Study of physical properties, Structure and chemical composition of common rock forming and economic minerals viz. Feldspar, Quartz, Olivine, Augite, Hornblende, Muscovite, Biotite, Asbestos, Apatite , Kyanite, Garnet, Beryl, Talc, Calcite, Dolomite, Pyrite, Hematite, Magnetite, Galena, Graphite, Magnesite, Bauxite and Clay minerals Petrology: Introduction, Civil Engineering importance of petrology, Definition of Rock, Rock cycle, Geological Classification of rocks Igneous Rocks: Forms, Structures and textures of igneous rocks, Megascopic description and civil engineering uses of Granite, Basalt, Dolerite, Pegmatite and Charnockite Sedimentary Rocks: Formation, Structures and textures of sedimentary rocks, Megascopic description and civil engineering uses of Laterite, Conglomerate, Sand stone, Lime stone and Shale Metamorphic Rocks: Types of metamorphism, Structures and textures of metamorphic rocks, Megascopic Description and Civil engineering uses of Gneiss, Schist, Quartzite, Marble and Slate

UNIT III

Structural Geology: Introduction, Out crop, Strike and dip, Causes for development of secondary structures, Classification of Structures associated with Folds, Faults, Joints, Unconformities and their Civil engineering importance

UNIT IV

Earthquakes: Classification and causes, Intensity and magnitude and their measuring scales, Effects of earthquakes, Seismic belts, Civil Engineering considerations in seismic areas, Seismic zones of India Land Slides: Classification, Causes and effects, Preventive measures of landslides Ground water: Introduction, Classification of rocks based on porosity and permeability, Types of aquifers, Effects of groundwater over draft

Geophysics: Importance of Geophysical methods, Classification, Principles of Geophysical study by Gravity method, Magnetic method, Electrical methods, Seismic methods, Radiometric method and Electrical resistivity, Seismic refraction methods

UNIT V

Dams & Reservoirs: Types of Dams, Geological considerations for the selection of dam sites, Stages of investigation, Case histories of few dam failures, Geology of few Indian dam sites

Tunnels: Purpose of Tunneling, Geological considerations for tunneling, Effects of tunneling, Over break, Geology of some tunnel sites

Textbooks:

1. A text Book of Engineering Geology by N. Chenna Kesavulu, Macmillan India Ltd., Delhi, second edition, 2009.
2. Principles of Engineering Geology by K M Bangar, Standard Publishers and Distributers, 2009.
3. Principles of Engineering Geology- K Gokhale, B. S. Publication, Revised Edition, 2010.

Reference Books:

1. Fundamentals of Engineering Geology, F.G.Bell, published by Butterworth-Heinemann, 1983.
2. Principles of Engineering Geology and Geotechnics by D P Krynine and W R Judd, CBS Publishers & Distribution, first edition, 2005.
3. Engineering Geology for Civil Engineers by D. Venkata Reddy, Oxford & IBM Publishing Company Pvt. Ltd., New Delhi, second edition, 2017.
4. Engineering and General Geology by Parbin Singh, Published by S. K. Kataria & Sons, New Delhi, 2013.
5. Engineering Geology and Rock Mechanics by Dr B.P.Varma, Khanna Publishers, Delhi, 1998.

Year/Sem	**IV Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	3	0	0	3	V20CET06
Name of the Course	**STRUCTURAL ANALYSIS-I**					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon completion of the course, the student will be able to

- Illustrate Shear Force, Bending Moment and Deflection of Propped Cantilevers for different fixity conditions (K3)
- Calculate Shear Force, Bending Moment and Deflections of fixed beams for different fixity conditions (K3)
- Calculate Shear Force, Bending Moment and Deflections of Continuous beams fordifferent fixity conditions (K3)
- Understand the concepts of Energy Theorems (K2)
- Assess Maximum Shear Force, Bending Moment and Deflections at a given section when loads of varying spans are passing over truss (K3)

SYLLABUS

UNIT I

Propped Cantilevers: Analysis of propped cantilevers-shear force and bending moment diagrams-Deflection of propped cantilevers..

UNIT II

Fixed Beams: Introduction to statically indeterminate beams with U. D. load, central point load, eccentric point load, number of point loads, uniformly varying load, couple and combination of loads - shear force and Bending moment diagrams-Deflection of fixed beams including effect of sinking of support, effect of rotation of a support.

UNIT III

Continuous Beams: Introduction-Clapeyron's theorem of three moments-Analysis of continuous beams with constant moment of inertia with one or both ends fixed continuous beams with overhang, continuous beams with different moment of inertia for different spans Effects of sinking of supports-shear force and bending moment diagrams.

UNIT IV

Energy Theorems: Introduction-Strain energy in linear elastic system, expression of strain energy due to axial load, bending moment and shear forces - Castigliano's first theorem Deflections of simple beams and pin jointed trusses.

UNIT V

Moving Loads And Influence Lines: Introduction, influence line diagrams, influence line diagrams for simply supported beams, cantilever beams, overhanging beams, double overhanging beams, balanced cantilever beams, girder supporting floor beams, use of influence line diagrams, maximum SF and BM values for moving loads, Train of concentrated loads

Text Books:

1. Basic Structural Analysis, C. S. Reddy Tata Mc.Graw-Hill, New Delhi.
2. Analysis of Structures by T.S. Thandavamoorthy, Oxford University Press, New Delhi.
3. Analysis of Structures- Vol. I and II, V. N. Vazirani and M. M. Ratwani, Khanna Publishers, New Delhi.
4. Structural Analysis - Vol. I and II,S.S.Bhavikatti,Vikas Publishing House,New Delhi.

References:

1. Theory of Structures, B. C Punmia, A. K Jain & Arun K. Jain, Lakshmi Publications.
2. Theory of Structures, R.S. Khurmi, S. Chand Publishers.
3. Structural analysis by R.C. Hibbeler, Pearson, New Delhi.
4. Structural Analysis-I, Hemanth Patel, Yogesh Patel, Synergy Knowledgeware, Mumbai 5. Structural Analysis I Analysis of Statically Determinate Structures, P. N. Chandramouli. Yesdee Publishing Pvt Limited, Chennai

Year/Sem	**IV Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	3	0	0	3	V20CET07
Name of the Course	**WATER RESOURCES ENGINEERING**					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of this course the student will be able to

- Calculate average rainfall and check consistency, continuity of rainfall (K3)
- Estimate the different components of the hydrologic cycle (K2)
- Compute the runoff of a catchment using Hydrographs (K3)
- Compute the flood frequency, design flood, flood routing (K3)
- Discuss the concepts of groundwater movement and well hydraulics (K2)

SYLLABUS

UNIT I

Introduction: Engineering hydrology and its applications, Hydrologic cycle, hydrological

Data - sources of data. Precipitation: Types and forms, measurement, rain gauge network, presentation of rainfall data, average rainfall, continuity and consistency of rainfall data, frequency of rainfall, Intensity-Duration-Frequency (IDF) curves, Depth-Area-Duration (DAD) curves, Probable Maximum Precipitation (PMP), design storm.

UNIT II

Abstractions from Precipitation: Initial abstractions. Evaporation: factors affecting, measurement, reduction Evapotranspiration: factors affecting, measurement, control Infiltration: factors affecting, Infiltration capacity curve, measurement, infiltration indices.

UNIT III

Runoff: Catchment characteristics, Factors affecting runoff, components, computation empirical formulae, tables and curves, stream gauging, rating curve, flow mass curve and flow duration curve. Hydrograph analysis:

Components of hydrograph, separation of base flow, effective rainfall hyetograph and direct runoff hydrograph, unit hydrograph, assumptions, derivation of unit hydrograph, unit hydrographs of different durations, principle of superposition and S-hydrograph methods, limitations and applications of unit hydrograph, synthetic unit hydrograph.

UNIT IV

Floods: Causes and effects, frequency analysis- Gumbel's and Log-Pearson type III distribution methods, Standard Project Flood (SPF) and Probable Maximum Flood (MPF), flood control methods and management. Flood Routing: Hydrologic routing, channel and reservoir routing- Muskingum and Puls methods of routing.

UNIT V

Groundwater: Occurrence, types of aquifers, aquifer parameters, porosity, specific yield,permeability, transmissivity and storage coefficient, types of wells, Darcy's law, Dupuit'sequation- steady radial flow to wells in confined and unconfined aquifers, yield of a openwell-recuperation test.

Textbooks:

1. "Engineering Hydrology", Subramanya K., Tata Mc Graw-Hill Education Pvt. Ltd, New Delhi, 2013.
2. "Engineering Hydrology", Jayarami Reddy P., Laxmi Publications Pvt. Ltd., New Delhi, (2013)
3. "Applied hydrology", Chow V.T., D.R Maidment and L.W. Mays, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2011.

References:

1. "Water Resources Engineering", Mays L.W, Wiley India Pvt. Ltd, 2013.
2. "Hydrology", Raghunath. H.M., New Age International Publishers, 2010.
3. "Engineering Hydrology - Principles and Practice" Ponce V.M., Prentice Hall International,1994.
4. "Hydrology and Water Resources Engineering", Patra K.C., Narosa Publications, 2011.
5. "Engineering Hydrology", Ojha C.S., Berndtsson P.R and Bhunya. P., Oxford University Press,

Year/Sem	**IV Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	3	0	0	3	V20CET08
Name of the Course	TRANSPORTATION ENGINEERING					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of this course the student will be able to

- Design highway geometric elements for the decided alignment through engineering surveys (K3)
- Analyze and design of flexible, rigid pavements and examine pavement construction activities and also conduct quality control at site (K3)
- Analyze and design of traffic infrastructure facilities and evaluate pavement condition to suggest remedial measures (K3)
- Analyze the Railway Track Geometric Elements (K3)
- Analyze and design geometric elements of Airport Runway and Taxiway and classify the various components of Dock & Harbors (K3)

SYLLABUS

UNIT I

Highway Alignment and Geometric Design: Historical development of roads–Highway development in India –Different Road Development Plan–Highway Alignment–Factors affecting Alignment– Engineering Surveys. Highway Geometric Design: Importance of Geometric Design– Factors–Highway Cross Section Elements–Sight Distance Elements–Design of Horizontal Alignment–Design of Vertical alignment.

UNIT II

Design of Pavements and Highway Construction: Types of pavement–Components of pavement–Flexible Pavements – Design factors – Flexible Pavement Design Methods– Mechanistic method, Rigid Pavements– Design Considerations– wheel load stresses– Temperature stresses–Design of slabs–IRC method of rigid pavements–Highway Construction–Types of Highway Construction – Earthwork – Stabilization of soils–Construction of Bituminous Pavements –Construction of Cement Concrete Pavements

UNIT III

Highway Maintenance and Traffic Infrastructure Design: Pavement Failures – Pavement Condition Survey–Maintenance of Highways– Pavement evaluation– Strengthening of existing pavements– Traffic Engineering – Basic Parameters of Traffic– Volume,– Speed– Density- Volume Studies Speed Studies– spot speed– speed & delay studies, Parking Studies, Condition Diagram and Collision Diagrams-–PCU Factors –Capacity and LOS of Highways – Road Traffic Signs –Road markings – Types of Intersections– At-Grade Intersections–Design of Traffic Signals– Webster Method .

UNIT IV

Railway Engineering : Permanent way – Components and their functions – Rail joints – Welding of Rails – Creep of Rails – Rail fixtures & Fastenings – Geometric Design of Railway Track:Gradients- Grade Compensation- Cant and Negative Super elevation- Cant Deficiency –Degree of Curve , Layout of Railway stations and yards – Signals – Interlocking –Track layouts –Turnouts – Layout of Turnout – Crossings –Diamond crossing – Scissors crossing. Signal Objectives – Classification – Fixed signals – Stop signals – Signalingsystems

UNIT V

Airport Planning and Docks Harbors: Airport Master plan – Airport site selection – Air craft characteristics –Airport classification – Runway orientation – Wind rose diagram – Runway length – Taxiway – Terminal area. Docks Harbors: Layout of Port components – Functions –Classification of Ports – Site selection – Natural Phenomenon – Tides, Winds, Waves, Currents – Drift – Navigational aids.

Textbooks

1. Highway Engineering, Khanna S. K., Justo C. E. G and Veeraragavan A, Nem ChandBros.,Roorkee.
2. Traffic Engineering and Transportation Planning, Kadiyali L. R, Khanna Publishers,New Delhi.
3. Railway Engineering, Satish Chandra and Agarwal M. M., Oxford University Press, New Delhi.
4. Airport Engineering, Khanna & Arora, Nemchand Bros, New Delhi.
5. Docks and Harbor Engineering, Bindra S.P., Dhanpathi Rai & Sons, New Delhi.

References

1. Principles of Transportation Engineering, Partha Chakroborthy and Animesh Das, PHI Learning Private Limited, Delhi.
2. Principles of Highway Engineering, Kadiyali L. R, Khanna Publishers, New Delhi
3. Transportation Engineering - An Introduction, Jotin Khisty C, Prentice Hall, Englewood Cliffs, New Jersey.
4. Railway Engineering, Saxena & Arora, Dhanpat Rai, New Delhi.
5. Airport Engineering Planning & Design, Subhash C. Saxena, CB Publishers, New Delhi.
6. Transportation Engineering, Railways, Airports, Docks & Harbors, Srinivasa Kumar R, University Press, Hyderabad.

IRC CODES

- IRC 37–2018: Guidelines for the Design of Flexible Pavements, Indian Road Congress Publications, New Delhi.
- IRC58–2015: Guidelines for the Design of Plain Jointed Rigid Pavements for Highways, Indian Road Congress Publications, New Delhi.

- MORTH - Specifications for Road and Bridge works, Indian Road Congress Publication, New Delhi, Latest Edition.

Year/Sem	**IV Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	0	0	3	1.5	V20CEL04
Name of the Course	**ENGINEERING GEOLOGY LAB**					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon completion of the course, the student will be able to

- Understand the importance of geology in civil engineering
- Identify the geological process of any region to carry civil engineering works
- Evaluate the formation and properties of minerals, rocks and soil
- Develop the ability to prepare geological maps and sections to interpret site conditions

List of Experiments

1. Physical properties of minerals and their megascopic identification
2. Rock forming minerals: Quartz group, Feldspar group, Garnet group, Mica group, Talc, Chlorite, Olivine, Kyanite, Asbestos, Tourmelene, Calcite, Gypsum etc.
3. Ore forming minerals: Magnetite, Hematite, Pyrite, Pyralusite, Graphite, Chromite etc.
4. Megascopic description and identification of rocks
5. Igneous rocks: Granite, Pegmatite, Gabbro, Dolerite, Syenite, Granite Poryphery, Basalt, etc.
6. Sedimentary rocks: Sand stone, Ferrugineous sand stone, Lime stone, Shale, Laterite, Conglamorate, etc.
7. Metamorphic rocks: Biotite, Granite Gneiss, Slate, Muscovite & Biotiteschist, Marble, Khondalite, etc.
8. Interpretation and drawing of sections for geological maps showing tilted beds, faults, unconformities etc.
9. Simple Structural Geology problems
10. Bore hole data
11. Strength of the rock using laboratory tests
12. Field work to identify Minerals and Rocks, Geomorphology and Structural Geology

References:

1. Applied Engineering Geology Practicals by M T Maruthesha Reddy, New Age International Publishers, Second Edition, 2007.
2. Foundations of Engineering Geology by F G Bell, B S Publications, first edition, 2005.

Year/Sem	**IV Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	0	0	3	1.5	V20CEL05
Name of the Course	**FLUID MECHANICS & HYDRAULIC MACHINERY LAB**					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon completion of the course, the student will be able to

- Employ the basic principles of Fluid mechanics to assess discharge with different devices and different losses in a pipe line (K3)
- Calculate the performance parameters of Reciprocating and Centrifugal pumps (K3)
- Calculate the performance parameters of different types of turbines (K3)

List of Experiments

1. Determination of friction factor for the given pipe line.
2. Determination of loss of head due to sudden contraction.
3. Determination of force exerted by a jet on a vane.
4. Calibration of Venturimeter.
5. Calibration of Orificemeter.
6. Calibration of Turbine flow meter.
7. Determination of performance parameters of Reciprocating pump.
8. Determination of performance parameters of Single stage Centrifugal pump.
9. Determination of performance parameters of Multi stage Centrifugal pump.
10. Determination of performance parameters of Pelton wheel.
11. Determination of performance parameters of Francis Turbine.
12. Determination of performance parameters of Kaplan Turbine.

Add On Experiments:

1. Determination of loss of head due to sudden expansion.
2. Verification of Bernoulli's theorem.

References:

1. Fluid Mechanics and Fluid Machines lab – College lab manual.
2. Hydraulics And Fluid Mechanics Including Hydraulics Machines (In Si Units)
   – Modi & Seth,20th edition, Standard publishers, 2015.

Year/Sem	IV Sem	L	T	P	C	COURSE CODE
Regulation	V20	0	0	3	1.5	V20CEL06
Name of the Course	TRANSPORTATION ENGINEERING LAB					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of this course, the student will be able to

- Assess the suitability of different materials for the road construction (K3)
- Examine the given bitumen samples and judge their suitability for road construction (K3)
- Find the Optimum Bitumen content for the Bituminous mix (K3)
- Develop the gradation of Bituminous mix for stability and flow properties (K3)

List of Experiments

I. Road Aggregates:

1. Aggregate Crushing value
2. Aggregate Impact Test.
3. Specific Gravity and Water Absorption.
4. Abrasion Test.
5. Shape tests

II. Bituminous Materials:

6. Penetration Test.
7. Ductility Test.
8. Softening Point Test.
9. Flash and fire point tests.
10. Viscosity Test.

III. Bituminous Mix:

11. Marshall Stability test.

List of Equipment

1. Apparatus for aggregate crushing test.
2. Aggregate Impact testing machine

3. Pycnometers.
4. Los angles Abrasion test machine
5. Length and elongation gauges
6. Bitumen penetration test setup.
7. Bitumen Ductility test setup.
8. Ring and ball apparatus
9. Flash and Fire Apparatus
10. Viscometer.
11. Marshal Stability apparatus.

References:

1. “Highway Material Testing Manual”, S.K. Khanna, C.E.G Justo and A.Veeraraghavan, Neam Chan Brothers New Chand Publications, New Delhi.
2. IRC Codes of Practice
3. Asphalt Institute of American Manuals
4. Code of Practice of B.I.S.

ANNEXURE – VI

COURSE STRUCTURE PROPOSED FOR M.Tech (Structural Engineering)

(For 2021 – 2022 Admitted Batch) – V21 Regulation

I SEMESTER

S.No	Course Code	Course Name	L	T	P	C
1	V21STET01	TheoryofElasticity	3	0	0	3
2	V21STET02	StructuralDynamics	3	0	0	3
3	V21STET03 V21MAT01 V21STET04	ElectiveI 1. Matrix AnalysisofStructures 2. Analytical&NumericalMethods for Structural Engineering (Bos of Maths) 3. DesignofRCCFoundations	3	0	0	3
4	V21STET05 V21STET06 V21STET07	ElectiveII 1. Bridge Engineering 2. Repair and Rehabilitation of Structures 3. Structural Optimization	3	0	0	3
5	V21STET08	AdvancedConcrete Technology	2	0	0	2
6	V21STEL01	AdvancedConcreteTechnologyLaboratory	0	0	4	2
7	V21STEL0	AdvancedStructuralEngineeringLaborat	0	0	4	2

	2	ory				
8		AuditCourse -1	2	0	0	0
Total			16	0	8	18

Total Contact Hours : 24

Total Credits : 18

II SEMESTER

S.No	Course Code	Course Name	L	T	P	C
1	V21STET09	FiniteElementMethodsinStructural Engineering	3	0	0	3
2	V21STET10	StabilityofStructures	3	0	0	3
3	V21STET11 V21STET12 V21STET13	ElectiveIII 1. TheoryofPlatesandShells 2. Advanced Steel Design 3. Analysis of Offshore Structures	3	0	0	3
4	V21STET14 V21STET15 V21STET16	ElectiveIV 1. Earthquake Resistant Design of Buildings 2. Precast and Prefabricated Structures 3. Earth Retaining Structures	3	0	0	3
5	V21STET17	Advanced Reinforced Concrete Design	2	0	0	2
6	V21STEL03	StructuralDesignlaboratory	0	0	4	2
7	V21STEP01	MiniProjectWithSeminar	0	0	4	2
8		AuditCourse -2	2	0	0	0
Total			16	0	8	18

Total Contact Hours : 24

Total Credits : 18

Auditcourse1 &2

1. EnglishforResearchPaper Writing (BOS English)

2. Disaster Management
3. Value Education (BOS English)
4. ConstitutionofIndia (BOS English)
5. Pedagogy Studies (BOS English)
6. PersonalityDevelopmentthroughLifeEnlightenment Skills (BOS English)

III SEMESTER

S.No	Course Code	Course Name	L	T	P	C
1	V21STET18 V21STET19 V21STET20	ElectiveIII/ MOOCS*/NPTEL* 1. Design of Prestressed Concrete Structures 2. Structural Health Monitoring 3. Industrial Structures 4. MOOCS-1 through NPTEL/SWAYAM 12 Week Programme related to the programme which is not listed in the course structure	3	0	0	3
2	V21MAT02 V21MBT56	OpenElective/MOOCS*/NPTEL* 1. Operational Research (BOS of Maths) 2. Cost Management of Engineering Projects (BOS of MBA) 3. MOOCS-2 through NPTEL/SWAYAM 12 Week Programme related to the programme which is not listed in the course structure	3	0	0	3
3	V21STEP02	Project Phase I	0	0	20	1 0
Total			6	0	20	16

Total Contact Hours: 26

Total Credits : 16

IV SEMESTER

S.No	Course Code	Course Name	L	T	P	C
1	V21STEP03	Project Phase II	0	0	32	16
Total			0	0	32	16

Total Contact Hours: 32

Total Credits : 16

ANNEXURE – VII
SYLLABI PROPOSED FOR M.Tech (Structural Engineering)

I SEMESTER – SYLLABUS

Year/Sem	I Sem	L	T	P	C	COURSE CODE
Regulation / Year	V21 / 2021-2022	3	0	0	3	V21STET01
Name of the Course	THEORY OF ELASTICITY					
Branch	STRUCTURAL ENGINEERING					

Course Outcomes:

Upon successful completion of this course, the students will be able to

- Relate the stress and deformation and how to determine the components of the stress and strain tensors (K3)
- Apply the conditions of compatibility and equations of equilibrium (K3)
- Employ the mechanical characteristics of materials, constitutive equations and generalized Hook law (K3)
- Use the equilibrium equations stated by the displacements and compatibility conditions stated by stresses (K3)
- Develop index notation of equations, tensor and matrix notation and define state of plane stress, state of plane strain (K3)

SYLLABUS

UNIT I

Elasticity – Notation for forces and stresses – components of stresses and strains – Hooke's Law - Plane Stress – Plane strain – Differential Equations of equilibrium – Boundary conditions – Compatibility equations Stress function – Boundary Conditions.

UNIT II

Two dimensional problems in rectangular co-ordinates – Solution by polynomials – Saint Venant's principle – Determination of displacements –

Bending of simple beams – Application of Fourier series for two dimensional problems for gravity loading.

UNIT III

Two dimensional problems in polar coordinates - General equations in polar coordinates – Stress distribution for problems having symmetrical about an axis - Strain components in polar co-ordinates– Displacements for symmetrical stress distributions - Stresses for plates with circular holes subjected to far field tension – stress concentration factor.

UNIT IV

Analysis of stress and strain in three dimension - Principal stresses – Stress ellipsoid and stress director surface – Determination of principal stresses - Maximum shear stress – Homogeneous Deformation – General Theorems - Differential equations of equilibrium – Conditions of compatibility– Equations of equilibrium in terms of displacements – Principle of superposition – Uniqueness of solution –Reciprocal theorem.

UNIT V

Torsion of Prismatic bars – Bars with elliptical cross section – Other elementary solution – Membrane analogy – Torsion of rectangular bars – Solution of Torsional problems by energy method.

Text Books:

1. 1.Theory of Elasticity- Stephen Timoshenko & J. N. Goodier, Mc.Grawhill Publishers
2. Advanced Mechanics of Solids L.S. Srinath, McGraw Hill Publishers
3. Theory of Elasticity By A.I. Lurie

References:

1. Elasticity: Theory, Applications and Numeric Martin H. Sadd, Wiley Publishers
2. Theory of Elasticity -Sadhu Singh 3rd Edition, Khanna Publishers.
3. An Introduction to the Theory of Elasticity
4. By R. J. Atkin, N. Fox · 2005, Dover Publications

Year/Sem	I Sem	L	T	P	C	COURSE CODE
Regulation	V21	3	0	0	3	V21STET02
Name of the Course	STRUCTURAL DYNAMICS					
Branch	STRUCTURAL ENGINEERING					

Course Outcomes:

Upon successful completion of this course, the students will be able to

- Asses the behavior of structures subjected to dynamic loads Harmonic excitation and earthquake load(K3)
- Demonstrate thebehavior andresponseofSDOFstructureswithvariousdynamic loading. (K3)
- Illustratetheresponseofstructuralsystemstodynamicloads and Realizethebehavior andresponseoflinear andnonlinearSDOFandMDOF structures with various dynamic loading. (K3)
- Develop the ability to find out suitable solution for continuous system of various beams with different end conditions. (K3)
- Interpret the analysis of building subject to earthquake by various methods. (K3)

SYLLABUS

UNIT I

Theory of vibrations: Introduction - Elements of vibratory system - Degrees of Freedom - Continuous System - Lumped mass idealization - Oscillatory motion - Simple Harmonic motion - Victorian representation of S.H.M. - Free vibrations of single degree of freedom system - undamped and damped vibrations - critical damping - Logarithmic decrement - Forced vibration of SDOF systems - Harmonic excitation - Vibration Isolation -Dynamic magnification factor – Phase angle.

UNIT II

Introduction to Structural Dynamics: Fundamental objectives of dynamic analysis -Types of prescribed loading - Methods of discretization - Formulation of equations of motion by different methods – Direct equilibration using Newton’s law of motion / D’Alembert’s Principle, Principle of virtual work and Hamilton principle.

Single Degree of Freedom Systems : Formulation and solution of the equation of motion – Free vibration response - Response to Harmonic, Periodic, Impulsive and general dynamic loadings - Duhamel integral.

UNIT III

Multi Degree of Freedom Systems: Selection of the degrees of Freedom - Evaluation of structural property matrices - Formulation of the MDOF equations of motion -Undamped free vibrations - Solutions of Eigen value problem for natural frequencies and mode shapes - Analysis of Dynamic response – Normal co-ordinates - Uncoupled equations of motion - Orthogonal properties of normal modes - Mode superposition procedure.

UNIT IV

Practical Vibration Analysis: Introduction - Stodola method - Fundamental mode analysis - Analysis of second and higher modes - Holzer method - Basic procedure.

Continuous Systems: Introduction - Flexural vibrations of beams - Elementary case – Derivation of governing differential equation of motion - Analysis of undamped free vibrations of beams in flexure - Natural frequencies and mode-shapes of simple beams with different end conditions - Principles of application to continuous beams.

UNIT V

Introduction to Earthquake Analysis: Deterministic Earthquake Response: Systems on Rigid Foundations -Types of Earthquake Excitations – Lumped SDOF Elastic Systems, Translational Excitations -Generalized coordinate - SDOF Elastic Systems, Translational Excitations, Linear Static Method – Analysis for obtaining response of multi storied RC Building.

Text Books:

1. Structural Dynamics Anil K Chopra, 4edition, Prentice Hall Publishers
2. Structural Dynamics Theory & Computation – Mario Paz, CBS Publishes and Distributors
3. Elementary Structural Dynamics- V.K. Manika Selvam, Dhanpat Rai Publishers

References:

1. Dynamics of Structures by Clough & Penzien 3e, Computers & Structures Inc.
2. Theory of Vibration -William T Thomson, Springer Science.
3. Mechanical Vibrations- S. S. Rao, 5e, Pearson Publications.
4. Structural Dynamics of Earthquake Engineering - Theory and Application using Mathematica and Matlab- S. Rajasekharan.

Year/Sem	I Sem	L	T	P	C	COURSE CODE
Regulation	V21	3	0	0	3	V21STET03
Name of the Course	MATRIX ANALYSIS OF STRUCTURES					
Branch	STRUCTURAL ENGINEERING					

Course Outcomes:

Upon successful completion of this course, the students will be able to

- Assess the structural analysis of determinate and indeterminate structures using classical compatibility methods, such as method of consistent displacements, force and equilibrium Methods (K3)
- Solve multiple degree of freedom two- and three-dimensional problems involving trusses, beams, frames and plane stress (K3)
- Asses the analysis of grid element by stiffness method (K3)
- Discuss the band width, loads at joints and their support displacement (K2)
- Complete analysis of plane frames with and without side sway by various approaches. (K3)

SYLLABUS

UNIT I

Introduction of matrix methods of analysis – Static and kinematic indeterminacy – Degree of freedom– Structure idealization-stiffness and flexibility methods – Suitability: Element stiffness matrix for truss element, beam element and Torsional element- Element force -displacement equations.

UNIT II

Stiffness method – Element and global stiffness equation – coordinate transformation and global assembly – structure stiffness matrix equation – analysis of simple pin jointed trusses – continuous beams – rigid jointed plane frames

UNIT III

Stiffness method for Grid elements – development of stiffness matrix – coordinate transformation. Examples of grid problems – tapered and curved beams

UNIT IV

Additional topics in stiffness methods – discussion of band width – semi band width – static condensation – sub structuring –Loads between joints- Support displacements- inertial and thermal stresses-Beams on elastic foundation by stiffness method.

UNIT V

Analysis of plane frame - continuous beams with and without settlement - plane frame including side sway single storey, single – bay and gable frame by flexibility method using system approach.

Text Books:

1. Matrix analysis of structures, Robert E Sennet- Prentice Hall- Englewood cliffs,New Jercy.
2. Advanced structural analysis, P. Dayaratnam, Tata McGraw hill publishing company limited.
3. Structural Analysis Matrix Approach - Pandit and Gupta, Mc Graw Hill Education

References:

1. IndeterminateStructuralanalysis,C.KWang,AmazonPublications
2. AnalysisofTallbuildingsbyforce–displacement–MethodM.SmoliraMc. GrawHill.
3. FoundationAnalysisanddesign,J.E.Bowls,AmazonPublications.
4. MatrixAnalysisofFramedStructures-WilliamWeaver,Jr.JamesM.Gere, VanNostrand Reinhold,Newyork.
5. MatrixMethodsofStructuralAnalysis MadhuB.Kanchi,WileyPublications.
6. IndeterminateStructuralAnalysis byK. U.Muthu, IKInternationalPublishinghouse.

Year/Sem	**I Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V21	3	0	0	3	V21MAT01
Name of the Course	**ANALYTICAL& NUMERICAL METHODS FORSTRUCTURAL ENGINEERING**					
Branch	STRUCTURAL ENGINEERING					

Course Outcomes:

Upon successful completion of this course, the students will be able to

- Calculate of Laplace transform methods on heat conduction problems (K3)
- Apply the principles and techniques of Elliptic Equations-Laplace equation (K3)
- Develop the principles and techniques of Integral Equations (K3)
- Adopt the principles and techniques of Finite Difference and their Applications (K3)
- Apply the principles and techniques of Numerical Integration (K3)

SYLLABUS

UNIT I

Transform Methods- Laplace transform methods for one-dimensional wave equation - Displacements in a long string - Longitudinal vibration of an elastic bar - Fourier transforms methods for one-dimensional heat conduction problems in infinite and semi-infinite rod

UNIT II

Elliptic Equations-Laplace equation - Properties of harmonic functions - Fourier transform methods for Laplace equation-Calculus Of Variations-Variation and its properties - Euler's equation - Functionals dependent on first and higher order derivatives - Functionals dependent on functions of several independent variables - Some applications - Direct methods - Ritz and Kantorovich methods

UNIT III

Integral Equations- Fredholm and Volterra integral equations - Relation between differential and integral equations - Green's function -Fredholm equation with separable kernel - Iterative method for solving equations of second kind

UNIT IV

Finite Difference and their Applications: Introduction- Differentiation formulas by Interpolating parabolas – Backward and forward and central differences- Derivation of Differentiation formulas using Taylor series- Boundary conditions- Beam deflection – Solution of characteristic value problems - Richardson's extrapolation - Use of unevenly spaced pivotal points- Integration formulae by interpolating parabolas- Numerical solution to spatial differential equations – Application to Simply Supported Beams, Columns & rectangular Plates.

UNIT V

Numerical Differentiation: Difference methods based on undetermined coefficients- optimum choice of step length– Partial differentiation.

Numerical Integration: Method based on interpolation-method based on undetermined coefficient – Gauss – Lagrange interpolation method- Radaua integration method- composite integration method – Double integration using Trapezoidal and Simpson's method – New Marks Method and Application to Beams – Calculations of Slopes & Deflections.

Textbooks:

1. Introduction to Partial Differential Equations, Sankar Rao. K, PHI, New Delhi, 1995
2. Numerical Methods For Scientific and Engineering Computations. M. K. Jain- S. R. K. Iyengar – R. K. Jain, New Age International (p) Ltd., Publishers.
3. Numerical Methods for Engineering Problems N. Krishna Raju, K.U. Muthu Macmillan Publishers

References:

1. Differential Equations and Calculus of Variations Elsgolts. L, Mir Publishers, Moscow, 1966
2. Fundamentals of Mathematical Statistics Gupta. S.C, & Kapoor. V.K, Sultan Chand & Sons, Reprint 1999.
3. Higher Engineering Maths for Engg. And Sciences Venkataraman. M. K, National Publishing Company, Chennai
4. Elements of Partial Differential Equations, Sneddon. I.N, Mc Graw Hill, 1986
5. Computer based numerical analysis by Dr. M. Shanta Kumar, Khanna Book publishers New Delhi

Year/Sem	**I Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V21	3	0	0	3	V21STET04
Name of the Course	**DESIGN OF RCC FOUNDATIONS (Elective-I)**					
Branch	STRUCTURAL ENGINEERING					

Course Outcomes:

Upon successful completion of this course, the students will be able to

- Attain the perception of site investigation to select suitable type of foundation based on soil category (K3)
- Capable of ensuring design concepts of shallow foundation (K3)
- Can be efficient in selecting suitable type of pile for different soil stratum and in evaluation of group capacity by formulation (K3)
- Design different types of well foundation (K3)
- Explain the properties of soil and mechanism of suitable foundation (K3)

SYLLABUS

UNIT I

Foundation Structures & Design of Centrally Loaded Isolated Footings and Column Pedestals – Introduction, Rigid and Flexible Foundations, Loads and their Effects, Design Requirements, Geotechnical Design, Empirical and Exact Methods of Analysis of foundations, Design Loads for Foundations, Recommended Approach to Structural Design of Foundations**.**

Introduction, General Procedure for Design, Design of Square Footing of Uniform Depth (Pad Footing), Design of sloped Rectangular Footings, Design Procedure, Detailing of Steel, Design of Rectangular Pad Footings, Design of Plain Concrete Footings, Design of Pedestals, Design Calculation for Pedestals.

UNIT II

Wall Footings – Introduction Simple Plain Concrete Wall Footings, Reinforced Concrete Continuous Strip Wall Footings, Design of continuous Strip Wall Footings, Design for Longitudinal Steel, R.C. T Beam Footings in Shrinkable Soils, Foundations of Partition Wall in Ground Floors, Summary.

Strip Footings Under Several Columns – Introduction, Design Procedure for Equally loaded and Equally Spaced Columns, Analysis of Continuous Strip

Footing for Unsymmetrical Loading, Analysis of Strip Footing with Unsymmetrical Loads, Detailing of Members.

UNIT III

Raft Foundations – Introduction, Rigid and Flexible Foundations, common Types of Rafts, Deflection Requirements of Beams and Slabs in Rafts, General considerations in Design of Rigid Rafts, Types of Loadings and Choice of Rafts, Record of Contact Pressures Measured Under Rafts, Modern Theoretical Analysis.

Design of Flat Slab Rafts-Mat Foundations – Introduction, Components of Flat Slabs, Preliminary Planning of Flat Slab Rafts, Analysis of Flat Slab by Direct Design Method, Method of Analysis, Values for Longitudinal Distribution and Transverse, Redistribution, Shear in Flat Slabs, Bending of Columns in flat Slabs, Limitations of Direct Design Method for Mats, Detailing of Steel, Design of Edge Beam in Flat Slabs.

Beam and Slab Rafts – Introduction, Planning of the Raft, Action of the Raft, Approximate Dimensioning of the Raft, Design of the Beam and Slab Raft under Uniform Pressure, Structural Analysis for the Main Slab, Design of Secondary and Main Beams, Analysis by Winkler Model, Detailing of Steel.

UNIT IV

Combined Piled Raft Foundations (CPRF) – Introduction, Types and uses of Piled Rafts, , Interaction of Pile and Raft, Ultimate Capacity and Settlement of Piles, Estimation of Settlement of Raft in Soils, Allowable Maximum and Differential Settlement in Buildings, Design of CPRF System, conceptual Method of Design, Conceptual Method of Analysis, Distribution of Piles in the Rafts, Theoretical Methods of Analysis.

Circular and Annular Rafts – Introduction, Positioning of chimney Load on Annular Raft, Forces Acting on Annular Rafts, Pressures Under Dead Load and Moment, Methods of Analysis, Conventional Analysis of Annular Rafts, Analysis of Ring Beams Under circular Layout of Columns, Analysis of Ring Beam Transmitting Column Load to Annular Rafts, Detailing of Annular Raft Under Columns of a Circular Water Tank.

UNIT V

Under-reamed Pile Foundations – Introduction, Safe Loads on Under-reamed Piles, Design of Under-reamed Pile Foundation for Load Bearing Walls of Buildings, Design of Grade Beams, Design of Under-reamed Piles Under Columns of Buildings, Use of Under-reamed Piles for Expansive Soils.

Design of cantilever and Basement Retaining Walls – Introduction, Earth Pressure and Rigid Walls, Calculation of Earth Pressure on Retaining Walls, Design of Rigid Walls, Design of Ordinary R.C. cantilever Walls, Design of cantilever Walls without Toe, Design of Basement Walls, Calculation of Earth Pressures in Clays, Design of Free Standing Basement Walls.

Text Books:

1. Design of Reinforced Concrete Foundations by P. C Varghese, PHI Learning Private Limited., New Delhi.
2. Krishnaraju.N " Design of Reinforced Concrete Structurres", CBS Publishers & Distributors Pvt. Ltd., New Delhi.
3. Design of Reinforced Concrete Structures by N. Subramaniam- Oxford University.

References:

1. Reinforced Concrete Design by Unnikrishna Pillai and Devdas Menon, Tata Mc Graw Hill.
2. Ramachandra, "Limit state Design of Concrete Structures" Standard Book House, New Delhi.
3. IS 456 (2000): Plain and Reinforced Concrete - Code of Practice.

Year/Sem	**I Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V21	3	0	0	3	V21STET05
Name of the Course	**BRIDGE ENGINEERING**					
Branch	STRUCTURAL ENGINEERING					

Course Outcomes:

Upon successful completion of this course, the students will be able to

- Illustrate the different types of loads and stresses acting on various bridges (K3)
- Asses the various methodologies to analyses the bridges and also interpret the specifications of bridge super structure (K3)
- Demonstrate the box culverts and its design (K3)
- Develop the knowledge on design of plate girder bridges (K3)
- Illustrate the different types of bearings, abutments, piers and various types of foundations for Bridges (K3)

SYLLABUS

UNIT I

Concrete Bridges: Introduction-Types of Bridges-Economic span length-Types of loading-Dead load-live load-Impact Effect-Centrifugal force-wind loads-Lateral loads-Longitudinal forces- Seismic loads- Frictional resistance of expansion bearings-Secondary Stresses-Temperature Effect-Erection Forces and effects-Width of roadway and footway-General Design Requirements.

UNIT II

Design of Girders & Slabs: Pigeaud's MethodDesign of longitudinal girders-Guyon-Messonet method- Hendry Jaegar method- Courbon's theory. (Ref: IRC-21), voided slabs.

Super Structure: Slab bridge- Wheel load on slab- effective width method-slabs supported ontwo edges- cantilever slabs- dispersion length- Design of interior panel of slab- T-Beam bridges.

UNIT III

Box Culverts: Single Cell Box Culvert – Design Loads, Design Moments, Shears and Thrusts. Design of Critical sections.

UNIT IV

Plate Girder Bridges: Elements of plate girder and their design-web-flange-intermediate stiffener- vertical stiffeners- bearing stiffener-design problem

UNIT V

Sub structure: Abutments- Stability analysis of abutments- piers- loads on piers – Analysis of piers- Design problem(Ref: IRC-13, IRC-21, IRC-78)- Pipe culvert- Flow pattern in pipe culvers- culvert alignment-culvert entrance structure- Hydraulic design and structural design of pipe culverts-reinforcements in pipes .(Ref: IRC: SP-13)

Text Books:

1. 1.Design of Bridges by N. Krishna Raju CBS Publishers and Distributors
2. Bridge Engineering by S. Ponnuswamy, Mc Grawhill Publications
3. 3.Essentials of Bridge Engineering- Jhonson Victor D, 7e, Oxford IBH Publications

References:

1. Bridge Deck Behavior- E.C. Hambly 2e- CRC Press
2. Concrete Bridge Design and Practice- V.K. Raina, Tata McGraw- Hill Publishing Company Limited
3. IRC 6- 2016 Standard Specifications and Code of Practice for Road bridges
4. IRC 112-2011 Code of Practice for Concrete Road Bridges.

Year/Sem	I Sem	L	T	P	C	COURSE CODE
Regulation / Year	V21 / 2021-2022	3	0	0	3	V21STET06
Name of the Course	REPAIR AND REHABILITATION OF STRUCTURES					
Branch	STRUCTURAL ENGINEERING					

Course Outcomes:

Upon successful completion of this course, the students will be able to

- Recognize the mechanisms of degradation of concrete structures and to design durable concrete structures. (K2)
- Describe and suggest repair strategies for deteriorated concrete structures including repairing with composites. (K2)
- Develop the methods of strengthening methods for concrete structures. (K3)
- Demonstrate the fiber reinforced concrete and its properties. (K3)
- Examine the structural member's strength by high performance concrete. (K3)

SYLLABUS

UNIT I

Materials for repair and rehabilitation: Admixtures- types of admixtures- purposes of using admixtures- chemical composition- Natural admixtures- Fibres- wraps- Glass and Carbon fibre wraps- Steel Plates-Non destructive evaluation: Importance- Concrete behavior under corrosion, disintegrated mechanisms- moisture effects and thermal effects – Visual investigation- Acoustical emission methods- Corrosion activity measurement- chloride content – Depth of carbonation- Impact echo methods- Ultrasound pulse velocity methods- Pull out tests.

UNIT II

Strengthening and stabilization: Techniques- design considerations-Beam shear capacity strengthening- Shear Transfer strengthening-stress reduction techniques- Column strengthening- flexural strengthening- Connection stabilization and strengthening, Crack stabilization.

UNIT III

Bonded installation techniques: Externally bonded FRP- Wet layup sheet, bolted plate, near surface mounted FRP, fundamental debonding mechanisms-intermediate crack debonding- CDC debonding- plate end debonding- strengthening of floor of structures

UNIT IV

Fibre reinforced concrete: Properties of constituent materials- Mix proportions, mixing and casting methods-Mechanical properties of fiber reinforced concrete- applications of fibre reinforced concretes-Lightweight concrete- properties of light weight concrete- No fines concrete- design of light weight concrete- Fly ash concrete-Introduction- classification of Fly ash-properties and reaction mechanism of fly ash- Properties of fly ash concrete in fresh state and hardened state- Durability of fly ash concretes

UNIT V

High performance concretes: Introduction- Development of high-performance concretes- Materials of high-performance concretes- Properties of high-performance concretes- Self Consolidating concrete- properties-qualifications.

Textbooks:

1. Maintenance Repair Rehabilitation & Minor works of Buildings- P.C. Varghese, PHI Publications
2. Repair and Rehabilitation of Concrete Structures – P.I. Modi, C.N. Patel, PHI Publications
3. Rehabilitation of Concrete Structures- B. Vidivelli, Standard Publishers Distributors
4. Concrete Bridge Practice Construction Maintenance & Rehabilitation- V.K. Raina, Shroff Publishers and Distributors.

References:

1. **Concrete Technology Theory and Practice- M.S. Shetty, S Chand and Company**
2. **Concrete Repair and Maintenance illustrated- Peter H Emmons**
3. **Concrete Chemical Theory and Applications- Santa Kumar A.R. Indian Society for Construction Engineering and Technology, Madras**
4. **Handbook on Repair and Rehabilitation of RC Buildings published by CPWD, Delhi**

Year/Sem	**I Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V21	3	0	0	3	V21STET07
Name of the Course	**STRUCTURAL OPTIMIZATION**					
Branch	STRUCTURAL ENGINEERING					

Course Outcomes:

Upon successful completion of this course, the students will be able to

- Study the optimization methodologies applied to structural engineering
- Solve some continuous structural optimization problems using calculus of variations.
- Have sufficient knowledge on various optimization techniques like, non-linear programming, geometric and dynamic
- Describe numerical algorithms and linear programming suitable for structural optimization problems.
- Use and describe quadratic and dynamic programming .

SYLLABUS

UNIT I
Introduction: Need and scope for optimization – statements of optimization problems Objective function and its surface design variables- constraints and constraint surface Classification of optimization problems (various functions continuous, discontinuous and discrete) and function behavior (monotonic and unimodal)

UNIT II
Classical optimization techniques: Differential calculus method, multi variable optimization by method of constrained variation and Lagrange multipliers (generalized problem) Khun-Tucker conditions of optimality -Fully stressed design and optimality criterion based algorithms introduction, characteristics of fully stressed design theoretical basis-examples

UNIT III
Non-Liner programming: Unconstrained minimization- Fibonacci, golden search, Quadratic and cubic interpolation methods for a one dimensional minimization and univariate method, Powel's method, Newton's method and Davidon Fletcher Powell's method for multivariable optimization- Constrained minimization- Cutting plane method- Zoutendjik's method- penalty function methods

UNIT IV
Linear programming: Definitions and theorems- Simplex method-Duality in Linear programming- Plastic analysis and Minimum weight design and rigid frame

UNIT V
Introduction to quadratic programming: Geometric programming- and dynamic programming Design of beams and frames using dynamic programming technique

Text books:

1. Iyengar.N.G.R and Gupta.S.K, “Structural Design Optimization”, Affiliated East West Press Ltd, New Delhi, 1997 .
2. Rao,S.S. “Optimization theory and applications”, Wiley Eastern (P) Ltd., 1984
3. Spunt, “Optimization in Structural Design”, Civil Engineering and Engineering Mechanics Services, Prentice-Hall, New Jersey 1971.
4. Uri Krish, “Optimum Structural Design”, McGraw Hill Book Co. 1981

References:

1. G. Hadley,"Linear programming", Narosa Publishing House, New Delhi, 1990.
2. H.A. Taha,"Operations Research:An Introduction", 5th Edition, Macmillan, New York, 1992.
3. K. Deb,"Optimization for Engineering DesignAlgorithms and Examples",Prentice-Hall of India Pvt. Ltd., New Delhi, 1995.
4. K.Srinivasa Raju and D. Nagesh Kumar, "Multicriterion Analysis in Engineering and Management",PHI Learning Pvt. Ltd., New Delhi, India, ISBN 978-81-203-3976-7, pp.28

Year/Sem	I Sem	L	T	P	C	COURSE CODE
Regulation	V21	2	0	0	2	V21STET08
Name of the Course	ADVANCED CONCRETE TECHNOLOGY					
Branch	STRUCTURAL ENGINEERING					

Course Outcomes:

Upon successful completion of this course, the students will be able to

- Explain the materials of concrete and its chemical proportions (K2)
- Describe the fresh and hardened properties of concrete (K2)
- Explain high strength and high-performance concrete manufacturing process and its properties (K2)
- Develop the special concrete and enhance the durability properties (K3)
- Describe the formwork considerations used in designs (K2)

SYLLABUS

UNIT I

Concrete Making Materials: Cement – Bogus Compounds – Hydration Process – Types of Cement – Aggregates – Gradation Charts – Combined Aggregate – Alkali Silica Reaction – Admixtures – Chemical and Mineral Admixtures - Bureau of Indian Standards (BIS) Provisions.

UNIT II

Fresh And Hardened Concrete: Fresh Concrete – workability tests on Concrete – Setting Times of Fresh Concrete – Segregation and bleeding.

Hardened Concrete: Abrams Law, Gel space ratios, Maturity concept – Stress strain Behaviour– Creep and Shrinkage – Durability Tests on Concrete – Non-Destructive Testing of Concrete. BIS Provisions.

UNIT III

High Strength Concrete – Microstructure – Manufacturing and Properties – Design of HSC Using Erintroy Shaklok method – Ultra High Strength Concrete.

High Performance Concrete – Requirements and Properties of High-Performance Concrete – Design Considerations. BIS Provisions.

UNIT IV

Special Concretes: Self Compacting concrete, Polymer Concrete, Fibre Reinforced Concrete – Reactive Powder Concrete – Requirements and Guidelines – Advantages and Applications.

Concrete Mix Design: Quality Control – Quality Assurance – Quality Audit - Mix Design Method – BIS Method – IS.10262 – 2019 Concrete Mix proportion guidelines. DOE Method– Light Weight Concrete, Self-Compacting Concrete.

UNIT V

Form work – materials – structural requests – form work systems – connections – specifications – design of form work – shores – removal for forms - shores – reshoring – failure of form work**.**

Text Books:

1. Properties of Concrete by A. M. Neville, ELBS publications Oct 1996.
2. Concrete Technology by A. R. Santhakumar, 2nd Edition, Oxford University Press.
3. Concrete Technology by M.S. Shetty, S.Chand & Co 2009.

References:

1. **Concrete: Micro Structure, Properties and Materials by P. K. Mehta and P. J. Monteiro,. Mc. Graw-Hill Publishing Company Ltd. New Delhi**
2. **Design of Concrete Mixes by N. Krishna Raju, CBS Publications, 2000.**
3. **Special Structural concretes by Rafat Siddique, Galgotia Publications 2000.**
4. **IS 10262-2009: Concrete Mix Proportioning - Guidelines.**

Year/Sem	I Sem	L	T	P	C	COURSE CODE
Regulation	V21	0	0	4	2	V21SEL01
Name of the Course	ADVANCED CONCRETE TECHNOLOGY LABORATORY					
Branch	STRUCTURAL ENGINEERING					

Course Outcomes:

Upon successful completion of this course, the students will be able to

- Develop relation between Water / Cement Ratios Vs Workability, Water / Cement Ratios Vs Strength in concrete.
- Develop strength and workability relation between fine aggregate, coarse aggregates.
- Calculate Strain measurement in concrete.
- Assess concrete properties by using Non destructive testing methods.
- Find properties of Self compaction concrete by using L Box , J Box , U box and Slump tests

SYLLABUS

List of Experiments:

1. Study on Water / Cement Ratios Vs Workability of different concretes
2. Study on Water / Cement Ratios Vs Strength of different concretes
3. Study of variation of Coarse Aggregate to Fine Aggregates on Workability
4. Study of variation of Coarse Aggregate to Fine Aggregates on Strength
5. Strain measurement - Electrical resistance strain gauges
6. Non destructive testing- Impact Hammer test, UPV test
7. Qualifications tests on Self compaction concrete- L Box , J Box , U box and Slump tests

NOTE: **A minimum of five experiments from the above set have to be conducted.**

Year/Sem	**I Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V21	0	0	4	2	V21SEL02
Name of the Course	**ADVANCED STRUCTURAL ENGINEERING LABORATORY**					
Branch	STRUCTURAL ENGINEERING					

Course Outcomes:

Upon successful completion of this course, the students will be able to

- Conduct various laboratory tests on Cement, Aggregates
- Know strain measurement
- Non destructive testing
- Chemical analysis on concrete and Aggregate and Sand

List of Experiments:

1. StudyonDeflectionand CracksonaUnder Reinforced OverReinforcedand BalancedSections
2. StudyonPerformanceofRCCBeamsdesignedfor BendingandfailinginShear
3. StudyonPerformanceofRCCBeamsdesignedforShearandfailinginBending
4. StudyonPerformanceofRCC Onewayslabs
5. StudyonPerformanceofRCCTwowayslabs withsimplysupportededge conditions
6. StudyonPerformance ofRCCTwo wayslabswithfixededge conditions
7. CalculationofYoung's ModulusofElasticityofConcrete
8. ExtractionandStudyofConcrete Coresamplesfrompavements

NOTE : **A minimum of five experiments from the above set have to be conducted as demonstration to entire class..**

II SEMESTER – SYLLABUS

Year/Sem	II Sem	L	T	P	C	COURSE CODE
Regulation	V21	3	0	0	3	V21STET09
Name of the Course	**FINITE ELEMENT METHODS IN STRUCTURAL ENGINEERING**					
Branch	STRUCTURAL ENGINEERING					

Course Outcomes:

Upon successful completion of this course, the students will be able to

- Compute principle of potential energy of an elastic body (K3)
- Calculate the stiffness matrices of truss element (K3)
- Calculate the stiffness matrices of beam elements (K3)
- Interpret displacements, strains and stress resultants (K3)
- Formulate the shape functions for element (K3)

SYLLABUS

UNIT I

Introduction: Review of stiffness method- Principle of Stationary potential energy- Potential energy of an elastic body- Rayleigh-Ritz method of functional approximation - variational approaches -weighted residual methods

UNIT II

Finite Element formulation of truss element: Stiffness matrix- properties of stiffness matrix – Selection of approximate displacement functions- solution of a plane truss- transformation matrix and stiffness matrix for a 3-D truss- Inclined and skewed supports-Galerkin's method for 1-D truss – Computation of stress in a truss element.

UNIT III

Finite element formulation of Beam elements: Beam stiffness- assemblage of beam stiffness matrix- Examples of beam analysis for concentrated and distributed loading-Galerkin's method - 2-D Arbitrarily oriented beam element – inclined and skewed supports –rigid plane frame examples.

UNIT IV

Finite element formulation: Plane stress, plane strain and axi-symmetric problems- Derivation of CST and LST stiffness matrix and equations- treatment of body and surface forces-Finite Element solution for plane stress and axi-symmetric problems- comparison of CST and LST elements – convergence of solution- interpretation of stresses.

UNIT V

Iso-parametric Formulation: Iso-parametric bar element- plane bilinear Iso-parametric element – quadratic plane element - shape functions, evaluation of stiffness matrix, consistent nodal load vector - Gauss quadrature- appropriate order of quadrature – element and mesh instabilities – spurious zero energy modes, stress computation- patch test.

Text Books:

1. A first course in the Finite Element Method – Daryl L. Logan, Thomson Publications.
2. Concepts and applications of Finite Element Analysis – Robert D. Cook, Michael E Plesha, John Wiley & Sons Publications
3. Fundamental Finite Element Analysis and Applications: with Mathematica and Matlab Computations, Bhatti, M.A. Wiley Publications
4. A first course in the Finite Element Method, Dary L. Logan, Thomson Publications.

References:

1. Introduction to Finite Elements in Engineering- Tirupati R. Chandrupatla, Ashok D.Belgunda, PHI publications.
2. Finite Element Methods (For Structural Engineers) Wail N Rifaie, Ashok K Govil, New Age International (P) Limited.
3. Introduction to Finite Element Method, Desai & Abel CBS Publication.
4. An Introduction to Finite Element Method- Reddy, J. N., McGraw-Hill Education.

Year/Sem	**II Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V21	3	0	0	3	V21STET10
Name of the Course	**STABILITY OF STRUCTURES**					
Branch	STRUCTURAL ENGINEERING					

Course Outcomes:

Upon successful completion of this course, the students will be able to

- Develop differential equation based on loading and end conditions of beam column (K3)
- Illustrate and work out the elastic buckling using various methodologies (K3)
- Illustrate and work out the in-elastic buckling using various methodologies (K3)
- Assess the torsional buckling behaviour of pure and non uniform torsion of thin walled bars (K3)
- Illustrate and work out the lateral buckling of various cross sections (K3)

SYLLABUS

UNIT I

Beam columns: Differential equation for beam columns – Beams column with concentrated loads – continuous lateral load – couples – Beam column with built in ends – continuous beams with axial load – application of Trigonometric series – Determination of allowable stresses

UNIT II

Elasticbuckling of bars: Elastic buckling of straight columns – Effect of shear stress on buckling – Eccentrically and laterally loaded columns –Sway & Non Sway mode - Energy methods – Buckling of a bar on elastic foundation – Buckling of bar with intermediate compressive forces and distributed axial loads – Buckling of bars with change in cross section – Effect of shear force on critical load – Built up columns – Effect of Initial curvature on bars – Buckling of frames – Sway & Non Sway mode

UNIT III

In-elastic buckling: Buckling of straight bars – Double modulus theory Tangent modulus theory. Experiments and design formulae: Experiments on columns – Critical stress diagram – Empirical formulae of design – various end conditions – Design of columns based on buckling. Mathematical

Treatment of stability problems: Buckling problem orthogonality relation – Ritz method –Stiffness method and formulation of Geometric stiffness matrix- Applications to simple frames

UNIT IV

Torsional Buckling: Pure torsion of thin walled bars of open cross section – Non uniform torsion of thin walled bars of open cross section - Torsional buckling – Buckling of Torsion and Flexure

UNIT V

Lateral Buckling of simply supported Beams: Beams of rectangular cross section subjected for pure bending, Buckling of I Section subjected to pure bending

Text Books:

1. Theory of Stability of Structures by Alexander ChaJes.
2. Theory of Elastic Stability by S. P. Timshenko & J.M. Gere-Mc Graw Hill Publications
3. Theory of Elastic Stability by Manikaselvam

References:

1. Fundamentals of Structural Stability by George J Smith & Dewey H. Hodges, Elsevier Publications
2. Elastic Stability of Structural Elements, N.G.R. Iyengar Macmillan Publications
3. Structural stability of Steel, Theodore v. Galambos & andrea e. Surovek

Year/Sem	II Sem	L	T	P	C	COURSE CODE
Regulation	V21	3	0	0	3	V21STET11
Name of the Course	**THEORY OF PLATES AND SHELLS**					
Branch	STRUCTURAL ENGINEERING					

Course Outcomes:

Upon successful completion of this course, the students will be able to

- Analyze Navier's solution, Levy's solution and solve for the rectangular and square plates (K3)
- Analyze circular plates with various boundary conditions (K3)
- Practice on the finite difference method of solving plate problems(K3)
- Develop the potential energy principle and find the solution of rectangular plates for various loadings(K3)
- Identify the behavior of folded plates and shells.(K3)

SYLLABUS

UNIT I

Rectangular Plates: Derivation of governing differential equation for plate– in plane bending and transverse bending effects - Plates under various loading conditions like concentrated, uniformly distributed load and hydrostatic pressure. Navier and Levy's type of solutions for various boundary condition.

UNIT II

Circular plates: Symmetrically loaded, circular plates under various loading conditions, annular plates.

UNIT III

Shells: Introduction to Shells- Single and double curvature- Equations of Equilibrium of shells. Derivation of stress resultants, Principles of membrane theory and bending theory

UNIT IV

Cylindrical Shells: Derivation of the governing DKJ equation for bending theory, details of Schorer's theory. Application to the analysis and design of short and long shells. Use of ASCE Manual coefficients for the design.

UNIT V

Beam theory of cylindrical shells: Beam and arch action. Design of diaphragms - Geometry analysis and design of elliptic Paraboloid, Conoidal and Hyperbolic Paraboloid shapes by membrane theory.

Text Books:

1. Theory of Plates and Shells 2e –S. Timoshenko and S. Woinowsky Krieger, McGraw-Hill book company, INC, New York.
2. Reinforced Concrete Shells and Folded Plates by P.C. Varghese, Prentice Hall India Publications
3. Analysis of Thin Concrete Shells by K. Chandrasekhara, New Age International (P) Ltd

References:

1. Theory and Analysis of Elastic Plates and Shells by J. N. Reddy, CRS Press
2. A Text Book of Shell Analysis – Bairagi, K, Khanna Publisher, New Delhi.
3. Design and Construction of Concrete Shell Roofs – Ramaswamy, G.S, Mc Graw Hill, New York

Year/Sem	**II Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V21	3	0	0	3	V21STET12
Name of the Course	**ADVANCED STEEL DESIGN**					
Branch	STRUCTURAL ENGINEERING					

Course Outcomes:

Upon successful completion of this course, the students will be able to

- Examine the simple connection used in various joints and design of connection (K3)
- Assess the plastic analysis to different beams based on their considerations (K3)
- Illustrate the eccentric and moment connection on various structural members (K3)
- Develop and analyse the industrial buildings subjected to transverse and lateral loading (K3)
- Complete the design of steel truss girder bridges and strengthening measures to girders (K3)

SYLLABUS

UNIT I

Simple Connections – Riveted, Bolted Pinned And Welded Connections: Riveted Connections – Bolted Connections –Load Transfer Mechanism – Failure of Bolted Joints – Specifications for Bolted Joints – Bearing – Type Connections – Tensile Strength of Plate – Strength and Efficiency of the Joint – Combined Shear and Tension – Slip-Critical connections – Prying Action – Combined Shear and Tension for Slip-Critical Connections. Design of Groove Welds - Design of Fillet Welds – Design of Intermittent Fillet Welds – Failure of Welds.

UNIT II

Plastic Analysis: Introduction – Plastic Theory – Plastic neutral Axis plastic moment, Elastic & Plastic Section moduli - shape factors plastic Hinge – Fundamental condition conditions in plastic analysis, methods of plastic analysis – collapse load – simply supported, propped cantilever beam, fixed beams continuous beams, portal frame single bay single storey portal frame at different level subjected to vertical and horizontal loads.

UNIT III

Eccentric and Moment Connections: Introduction – Beams – Column Connections – Connections Subjected to Eccentric Shear – Bolted Framed Connections –Bolted Seat Connections – Bolted Bracket Connections. Bolted Moment Connections – Welded Framed Connections- Welded Bracket Connections – Moment Resistant Connections.

UNIT IV

Analysis and Design of Industrial Buildings: Dead loads, live loads and wind loads on roofs. Design wind speed and pressure, wind pressure on roofs; wind effect on cladding and louvers; Design of angular roof truss, tubular truss, truss for a railway platform. Design of purlins for roofs, design of built up purlins, design of knee braced trusses and stanchions. Design of bracings.

UNIT V

Design af Steel Truss Girder Bridges: Types of truss bridges, component parts of a truss bridge, economic Proportions of trusses, self weight of truss girders, design of bridge Compression members, tension members; wind load on truss girder Bridges; wind effect on top lateral bracing; bottom lateral bracing; portal Bracing; sway bracing Design of Lacing.

Text Books:

1. Limit State Design of Steel Structures S.K. Duggal Mc Graw Hill Education Private Ltd. New Delhi.
2. Design of steel structures by N. Subramanian, Oxford University Press
3. Design Steel Structures Volume-II, Ramachandra & Vivendra Gehlot, Scientific Publishes Journals Department.

References:

1. Design of Steel Structures. P. Dayaratnam, S. Chand, Edition 2011-12.
2. Design of Steel Structures Galyord & Gaylord, Tata Mc Graw Hill, Education, Edition 2012.
3. Indian Standard Code – IS – 800-2007.
4. Indian Standard Code – IS – 875 – Part III - 2015

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Year/Sem	II Sem	L	T	P	C	COURSE CODE
Regulation	V21	3	0	0	3	V21STET13
Name of the Course	ANALYSIS OF OFFSHORE STRUCTURES					
Branch	STRUCTURAL ENGINEERING					

Course Outcomes:

Upon successful completion of this course, the students will be able to

- Illustrate different types of offshore structures. (K3)
- Calculation of Conservation mass and momentum. (K3)
- Assess the Wave force estimation on small bodies. (K3)
- Assess the Wave force estimation on long bodies. (K3)
- Compute Static and dynamic analysis of fixed offshore structures. (K3)

SYLLABUS

UNIT I

Introduction: Types of offshore structures, Concept of fixed, compliant and floating structures, Law of floatation, fluid pressure and centre of pressure, estimation of centre of gravity, hydrostatic particulars, stability criteria of floating bodies, and motions of a floating body.

UNIT II

Dynamics and Kinematics : Conservation mass and momentum, Euler equation, Bernoullis Equation, Potential flow, Classification of waves, small amplitude or Linear Airy's theory, dispersion relationship, water particle kinematics, wave energy.

UNIT III

Wave force on small bodies: Estimation - Morison equation, Estimation of wave force on a vertical cylinder, Force due to current, Effect of marine growth on vertical cylinders.

UNIT IV

Wave force on large bodies: Froude-krylov theory, Diffraction theory.

UNIT V

Static and dynamic analysis of fixed offshore structures.

Text Books:

1. Graff, W. J., Introduction to Offshore Structures, Gulf Publ. Co.1981.
2. Dawson, T. H., Offshore Structural Engineering, Prentice Hall, 1983.
3. McClelland, B & Reifel, M. D., Planning & Design of fixed Offshore Platforms, Van Nostrand, 1986.

References:

1. API RP 2A., Planning, Designing and Constructing Fixed Offshore Platforms, API.
2. Hand book of offshore Engineering, Vol I, Subrata Chakrabarti, Offshore Structure Analysis, Inc., Plainfield, Illinois, USA.
3. Dynamic Analysis and Design of Offshore Structures 2015th Edition, by Srinivasan Chandrasekaran

Year/Sem	**II Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V21	3	0	0	3	V21STET14
Name of the Course	**EARTHQUAKE RESISTANT DESIGN OF BUILDINGS**					
Branch	STRUCTURAL ENGINEERING					

Course Outcomes:

Upon successful completion of this course, the students will be able to

- Demonstrate the fundamentals of seismology and basic earthquake mechanisms, tectonics types of ground motion, magnitude and propagation of ground motion. (K3)
- Assess the seismic design concepts of various moment resisting frames and their ductility behaviour (K3)
- Compute the earthquake load on various building frames and study on ductile behavior of building frames (K3)
- Assess the Cyclic loading behavior of RC, steel and pre- stressed concrete elements (K3)
- Illustrate the methods of Retrofitting and restoration of buildings subjected to damage due to earthquakes (K3)

SYLLABUS

UNIT I

Engineering seismology: Rebound theory – plate tectonics – seismic waves - earthquake size and various scales – local site effects – Indian seismicity – seismic zones of India – theory of vibrations – near ground and far ground rotation and their effects

UNIT II

Seismic design concepts: EQ load on simple building – load path – floor and roof diaphragms – seismic resistant building architecture – plan configuration – vertical configuration – pounding effects – mass and stiffness irregularities – torsion in structural system- Provision of seismic code (IS 1893 & 13920) – Building system – frames – shear wall – braced frames – layout design of Moment Resisting Frames(MRF) – ductility of MRF – Infill wall – Non-structural elements

UNIT III

Calculation of EQ load: 3D modeling of building systems and analysis (theory only) Design and ductile detailing of Beams and columns of frames Concept of strong column weak beams, Design and ductile detailing of shear walls.

UNIT IV

Cyclic loading behavior of RC, steel and pre- stressed concrete elements: modern concepts- Base isolation – Adaptive systems – case studies

UNIT V

Retrofitting and restoration of buildings subjected to damage due to earthquakes- effects of earthquakes – factors related to building damages due to earthquake- methods of seismic retrofitting- restoration of buildings

Text Books:

1. Earthquake Resistant Design of Structures Pankaj Agarwal and Manish ShriKhande, Prentice Hall of India, 2007, New Delhi.
2. Earthquake Resistant Design of Structures- S.K. Duggal, Oxford Publications.
3. Seismic design of reinforced concrete and masonry buildings by Paulay and Priestley .

References:

1. Earthquake Resistant Design and Risk Reduction- David Dowrick
2. IS 4326 -1998: Earthquake Resistant Design and Construction of Buildings
3. IS 1893 (Part 1 to 5)- 2016: General Provisions and Building
4. IS 4928–1993: Code of practice for Earthquake Resistant Design and Construction of Buildings
5. IS 13920-2016: Code of Practice for Ductile Detailing of Reinforced Concrete Structures subjected to Seismic Forces
6. IS 13935-1993: Guidelines for Repair and Seismic Strengthening of Building

Year/Sem	II Sem	L	T	P	C	COURSE CODE
Regulation	V21	3	0	0	3	V21STET15
Name of the Course	PRECAST AND PREFABRICATED STRUCTURES					
Branch	STRUCTURAL ENGINEERING					

Course Outcomes

Upon successful completion of this course, the students will be able to

- Explain impotence of prefabrication and Principles of Prefabrication. (K3)
- Find Prefabricated Load Carrying Members. (K3)
- Assess Joints for different structural connections. (K3)
- Analyze the production technology of prefabrication. (K3)
- Design and detailing of precast UNIT for factories. (K3)

SYLLABUS
UNIT I

Introduction to prefabrication: General Principles of Prefabrication - Comparison with monolithic construction, types of prefabrication, site and plant prefabrication, economy of prefabrication, modular coordination, standardization – Materials – Modular coordination – Systems – Production – Transportation – Erection.

UNIT II

Prefabricated Members: Load Carrying Capacity - Planning for components of prefabricated structures, disuniting of structures, design of simple rectangular beams and I-beams, handling and erection stresses, elimination of erection stresses, beams, columns, symmetric frames. Behaviour of structural components – Large panel constructions – Construction of roof and floor slabs – Wall panels – Columns – Shear walls..

UNIT III

Joints: Joints for different structural connections, effective sealing of joints for water proofing, provisions for non-structural fastenings, expansion joints in precast construction.

UNIT IV

Production Technology: Choice of production setup, manufacturing methods, stationary and mobile production, planning of production setup, storage of precast elements, dimensional tolerances, acceleration of concrete hardening. Hoisting Technology - Equipment for hoisting and erection, techniques for erection of different types of members like beams, slabs, wall panels and columns, vacuum lifting pads.

UNIT V

Designing and detailing of precast: For factory structures, purlins, principal rafters, roof trusses, lattice girders, gable frames, singe span single storied simple frames, single storied buildings, slabs, beams and columns. Progressive collapse – Code provisions – Equivalent design loads for considering abnormal effects such as earthquakes, cyclones, etc., - Importance of avoidance of progressive collapse.

Text Books:

1. Precast Concrete Structures- Kim S Elliott, CRC Press
2. CBRI, Building materials and components, India, 1990
3. Gerostiza C.Z., Hendrikson C. and Rehat D.R., Knowledge based process planning for construction and manufacturing, Academic Press Inc., 1994

References:

1. Structural design manual, Precast concrete connection details, Society for the studies in the use of precast concrete, Netherland Betor Verlag, 1978.
2. Mokk. L, (1964), Prefabricated Concrete for Industrial and Public Structures, Publishing House of the Hungarian Academy of Sciences, Budapest.
3. Koncz T., Manual of precast concrete construction, Vols. I, II and III, Bauverlag, GMBH, 1971.

Year/Sem	II Sem	L	T	P	C	COURSE CODE
Regulation	V21	3	0	0	3	V21STET16
Name of the Course	EARTH RETAINING STRUCTURES					
Branch	STRUCTURAL ENGINEERING					

Course Outcomes:

Upon successful completion of this course, the students will be able to

- Compute thelateralearthpressuresassociatedwithdifferentearthsystems (K3)
- Assess the failure criterion and stability requirements in selecting the most technically appropriate type of retaining wall (K3)
- Employ different techniques to design a sheet pile structure considering both external and internal stability (K3)
- Apply the knowledge of reinforced earth in the designing the earth retaining systems (K3)
- Relate different methods in analyzing the stability of braced cuts and cofferdams (K3)

SYLLABUS

UNIT I

Earth pressures: Different types and their coefficients; Classical Theories of Earth pressure – Rankine's and Coulomb's Theories for Active and Passive earth pressure; Computation of Lateral Earth Pressure in Homogeneous and Layered soils; Graphical solutions for Coulomb's Theory in active and passive conditions.

UNIT II

Retaining walls: Types, Type of Failures of Retaining Walls – Stability requirements –Drainage behind Retaining walls – Provision of Joints – Relief Shells.

UNIT III

Sheet Pile Structures: Types of Sheet piles – Cantilever sheet piles in sands and clays – Anchored sheet piles – Free earth and Fixed earth support methods – Rowe's moment reduction method – Location of anchors and Design of Anchorage system.

UNIT IV

Soil reinforcement: Reinforced earth - Different components – their functions – Design principles of reinforced earth retaining walls.

UNIT V

Braced cuts and Cofferdams: Lateral Pressure in Braced cuts – Design of Various Components of a Braced cut – Stability of Braced cuts – Bottom Heave in cuts. – Types of cofferdam, suitability, merits and demerits – Design of single – wall cofferdams and their stability aspects – TVA method and Cummins' methods.

Text Books:

1. Principles of Foundation Engineering by Braja M Das, Cengage Learning
2. Foundation analysis and design by Bowles, J.E., McGraw Hill
3. Soil Mechanics in Engineering Practice – Terzaghi, K and Ralph B. Peck, John Wiley & Sons.

References:

1. Earth Pressure and Earth Retaining Structures by Chris RI Clayton, Rick I woods, Andrew J Bond and Jarbas Milititsky, CRC Press, Taylor and Francis Group, New York.
2. Analysis and Design of Foundations and Retaining Structures, Samsher Prakash
3. Gopal Ranjan and Swami Saran, Saritha Prakashan Publishers, New Delhi.
4. NPTEL course materials on Geo-synthetics and Earth Retaining Structures

Year/Sem	I Sem	L	T	P	C	COURSE CODE
Regulation	V21	2	0	0	2	V21STET17
Name of the Course	ADVANCED REINFORCED CONCRETE DESIGN					
Branch	STRUCTURAL ENGINEERING					

CourseOutcomes:

Uponsuccessfulcompletionofthiscourse,thestudentswillbeableto

- Explainthelimitstatemethodprovisionsinanalysisofstructures(K2)
- Applytheyieldlinemethodtoanalyzeslab (K3)
- Developthedesignstoflatslabsandribbedslabs(K3)
- Explainthedesign stepsinvolvedin deepbeams,corbel designprocedure(K2)
- Interpretthe Designmethodofslender andeccentriccolumn(K3)

SYLLABUS

UNIT I

Limit Analysis of R C Structures: Rotation of a plastic hinge, Redistribution of moments,momentrotationcharacteristicsofRCmember,I.S.codeprovisions,loadingpattern,Bending Moment Envelop, Application for Fixed Beams and Continuous Beams.

UNITII

Yield line analysis for slabs: Yield line criterion – Virtual work and equilibrium methods ofanalysis–Forsquarecircular,Rectangular,TriangularandHexagonalwithsimpleandcontinuousend conditions**.**

UNITIII

Ribbedslabs: AnalysisoftheSlabsforMomentandShears,UltimateMomentofResistance,Design for shear, Deflection, ArrangementofReinforcements**.**

UNITIV

Design of Reinforced Concrete Deep Beams & Corbels: Steps of Designing Deep Beams,Design by IS 456. Checking for Local Failures, Detailing of Deep Beams, Analysis of Forcesina Corbels,Design ofProcedureofCorbels, Designof Nibs.Detailingof reinforcement.

UNITV

Design of Slender Columns – Slenderness limits, Methods of Design of Slender Columns,AdditionalMomentMethod,ProcedureforDesignofSlenderColumns. Detailingofreinforcement.

TextBooks:

1. AdvancedReinforcedConcreteDesign,byP.C.VarghesePrenticeHall IndiaLimited
2. DesignofReinforcedConcreteStructuresbyN.Subramanian,OxfordUn iversityPress.
3. ReinforcedConcreteDesign,byS.UnnikrishnaPillai&DevdasMenonTat aMc.Graw-HillPublishingCompanyLtd. New Delhi 2010.

References:

1. LimitStateTheoryandDesignofReinforcedConcreteS.R.KarveandV.LS hah.StandardPublishers
2. Reinforcedconcretestructuralelements–behavior,AnalysisanddesignbyP.Purushotham,Tata Mc.Graw-Hill, 1994.
3. Designofconcretestructures–ArthusH.Nilson,DavidDarwin,andChorlesW.Dolar,Tata Mc. Graw-Hill, 3rdEdition, 2005.
4. ReinforcedConcretedesignbyKennathLeet,TataMc.Graw-HillInternational,editions,2nd edition, 1991.

Year/Sem	**II Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V21	0	0	4	2	V21SEL03
Name of the Course	**STRUCTURAL DESIGN LABORATORY**					
Branch	STRUCTURAL ENGINEERING					

Course Outcomes:

Upon successful completion of this course, the students will be able to

- Develop Computer Programs for Analysis and Design of various Structural Elements
- Use different Structural Engineering software's to solve various civil Engineering programs

SYLLABUS

1. Analysis and Design of reinforced concrete multistoried building
2. Analysis of plane and space truss
3. Analysis of plane and space frame
4. Wind analysis on tall structure
5. Analysis of Cylindrical shell
6. Dynamic Analysis of Multistory structure Analysis and Design using STADD, STADD FOUNDATION, ETABS, ANSYS

NOTE: A minimum of four from the above set have to be conducted.

References:

1. Computer aided design laboratory (Civil Engineering) by Shesha Prakash and Suresh.S

III SEMESTER – SYLLABUS

Year/Sem	III Sem	L	T	P	C	COURSE CODE
Regulation / Year	V21 / 2021-2022	3	0	0	3	V21STET18
Name of the Course	**DESIGN OF PRESTRESSED CONCRETE STRUCTURES**					
Branch	STRUCTURAL ENGINEERING					

Course Outcomes:

Upon successful completion of this course, the students will be able to

- Compute the Analysis of prestress , losses in prestress and Anchorage slip (K3)
- Deflections of prestressed concrete members (K3)
- Employ types and advantages and analysis of composite sections (K3)
- Apply the knowledge of prestressed concrete slabs (K3)
- Analyze continuity beams in prestressed concrete structures (K3)

SYLLABUS

UNIT I

Introduction – Prestressing Systems – Pretensioning Systems – Postensioning Systems – High Strength Steel and Concrete - Analysis of Prestress - Resultant Stresses at a Section – Pressure Line or Thrust Line – Concept of Load Balancing - Losses of Prestress – Loss Due to Elastic Deformation of Concrete – Shrinkage of Concrete – Creep – Relaxation of Stress in Steel – Friction – Anchorage Slip.

UNIT II

Deflections Of Prestressed Concrete Members: Importance of Control of Deflections – Factors Influencing Deflection – Short-term Deflections of Uncracked Members – Prediction of Long-time Deflections – Deflections of Cracked Members – Requirements of IS 1343-2012. Ultimate Flexural Strength of Beams: Introduction, Flexural theory using first principles – Simplified Methods – Ultimate Moment of Resistance of untensioned Steel.

UNIT III

Composite Constructions: Introduction, Advantages, Types of Composite Construction, Analysis of Composite beams- Differential shrinkage- Ultimate Flexural and shear strength of composite sections- Deflection of Composite Beams. Design of Composite sections.

UNIT IV

Prestressed Concrete Slabs: Types Of Prestressed Concrete Floor Slabs-Design of Prestressed Concrete One Way and Two Way Slabs. Prestressed Concrete Pipes and Poles : Circular prestressing- Types of Prestressed Concrete Pipes- Design of Prestressed Concrete Pipes - Prestressed Concrete Poles.

UNIT V

Continuous Beams: Advantage of Continuous Members – Effect of Prestressing Indeterminate Structures – Methods of Achieving Continuity – Methods of Analysis of Secondary Moments – Concordant Cable Profile – Guyon’s Theorem. Redistribution of moments in a continuous beam. Anchorage Zone Stresses in Beams : Introduction, Stress distribution in End Block – Anchorage zone stresses –Magnel’s method- Guyon’s Method - Anchorage zone Reinforcement.

Text Books:

1. Prestressed Concrete, by N. Krishna Raju, Mc Graw Hill Publishers – fourth edition
2. Prestressed Concrete by K. U.Muthu, PHI Learning Pvt Limited - 18 January 2016
3. Design of Prestressed Concrete by S.S.Bhavikatti **–** 1 January 2019

References:

1. 1 Prestressed Concrete Analysis and Design, Antone E. Naaman, Techno Press 3000
2. Design of Prestressed Concrete- T. Y. Lin, Ned H. Burns
3. 3 Wiley Publications 3. Design of prestressed Concrete by E.G. Nawy

Year/Sem	III Sem	L	T	P	C	COURSE CODE
Regulation	V21	3	0	0	3	V21STET19
Name of the Course	STRUCTURAL HEALTH MONITORING					
Branch	STRUCTURAL ENGINEERING					

Course Outcomes:

Upon successful completion of this course, the students will be able to

- Assess the structural health by investigation and regular maintenance (K3)
- Employ various measures for monitoring structural health (K3)
- Employ various Investigations for monitoring structural audit (K3)
- Discover the dynamic field testing (K3)
- Apply the knowledge of Repairing and rehabilitation of structures (K3)

SYLLABUS

UNIT I

Structural Health: Factors affecting Health of Structures, Causes of Distress, Regular Maintenance Structural Audit: Assessment of Health of Structure, Collapse and Investigation, Investigation Management, SHM Procedures.

UNIT II

Structural Health Monitoring: Concept, Various Measures, Structural Safety in Alteration.

UNIT III

Structural Audit: Assessment of Health of Structure, Collapse and Investigation, Investigation Management, SHM Procedures.

UNIT IV

Dynamic Field Testing: Types of Dynamic Field Test, Stress History Data, Dynamic Response Methods, Hardware for Remote Data Acquisition Systems, Remote Structural Health Monitoring.

UNIT V

Introduction to Repairs and Rehabilitations of Structures: Case Studies (Site Visits), Piezo– electric materials and other smart materials, electro–mechanical impedance (EMI) technique, adaptations of EMI technique.

Text Books:

1. Structural Health Monitoring, Daniel Balageas, Claus Peter Fritzen, Alfredo Güemes, John Wiley and Sons, 2006.
2. Health Monitoring of Structural Materials and Components Methods with Applications, Douglas E Adams, John Wiley and Sons, 2007.
3. Structural Health Monitoring by Daniel Balageas, Claus-peter fritzen and Alfredo Guemes

References:

1. Structural Health Monitoring and Intelligent Infrastructure, Vol1, J. P. Ou, H. Li and Z. D. Duan, Taylor and Francis Group, London, UK, 2006.
2. Structural Health Monitoring with Wafer Active Sensors, Victor Giurglutiu, Academic Press Inc, 2007.
3. Advances in Condition Monitoring and Structural Health Monitoring: WCCM by Len Gelman .et.al.

Year/Sem	**III Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V21	3	0	0	3	V21STET20
Name of the Course	**INDUSTRIAL STRUCTURES**					
Branch	STRUCTURAL ENGINEERING					

Course Outcomes:

Upon successful completion of this course, the students will be able to

- functional requirements of structural systems for various industries (K3)
- Get an idea about the materials used and design of industrial structural elements (K3)
- Pre Engineered Buildings (K3)
- Realize the basic concepts and design of power plant structures (K3)
- Design power transmission structures (K3)

SYLLABUS

UNIT I

Planning and functional requirements- classification of industries and industrial structures- planning for layout- requirements regarding lighting ventilation and fire safety- protection against noise and vibrations.

UNIT II

Industrial buildings- roofs for industrial buildings (Steel) - design of gantry girder- design of corbels and nibs- machine foundations

UNIT III

Design of Pre Engineered Buildings

UNIT IV

Power plant structures- Bunkers and silos- chimney and cooling towers- Nuclear containment structures

UNIT V

Power transmission structures- transmission line towers- tower foundations- testing towers

Text books:

1. Machine Foundations by P. Srinivasulu and C. V. Vaidyanathan, Structural Engineering Research Center - 1 July 2017
2. Tall Chimneys- Design and Construction by S. N. Manohar Tata Mc Grawhill Publishing Company -
3. The Design & Construction of Industrial Buildings by Moritz Kahn

References:

1. Transmission Line Structures by S. S. Murthy and A. R. Santakumar McGraw Hill
2. SP 32: 1986, Handbook on functional requirements of Industrial buildings 3. Design of steel structures by N. Subramanian
3. The Architect's Studio Companion: Rules of Thumb for Preliminary Design by Edward Allen

Year/Sem	**III Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V21	3	0	0	3	V21MBT56
Name of the Course	**COSTMANAGEMENTOFENGINEERINGPROJECTS**					
Branch	STRUCTURAL ENGINEERING					

Course Outcomes:

Upon successful completion of this course, the students will be able to

- Understand the cost management process and various costs involved in a project (K2)
- Understand various aspects of a project and related processes. (K2)
- Analyze the concepts of Break even and CVP analysis. (K3)
- Demonstrate quality management techniques besides budgeting strategies (K2)
- Apply quantitative techniques for cost management (K4)

SYLLABUS

UNIT I

IntroductionandOverviewoftheStrategicCostManagementProcess: Costconceptsindecision-making;relevantcost,Differentialcost, Marginal cost, IncrementalcostandOpportunity cost.ObjectivesofCosting System;Creationofa Database foroperational control;Provision of datafor Decision-Making.

UNIT II

Project Management: Meaning, Different types of projects.

Various stages of projectexecution:conceptiontocommissioning,Projectexecutionas aconglomerationoftechnicalandnontechnicalactivities, DetailedEngineeringactivities,Preprojectexecution,mainclearancesanddocuments.

Project team: Role of each member, Importance of Project site. Project contracts: Types and its contents. CPM & PERT Techniques.

UNIT III

Cost Behavior and Profit Planning: Marginal Costing, Distinction between Marginal Costing andAbsorptionCosting;Break-evenAnalysis,Cost-Volume-ProfitAnalysis, Standard Costing and Variance Analysis.

UNIT IV

Quality management and Budgeting strategies: Pareto Analysis, Target costing,Life Cycle Costing, Just-in-time approach, Material Requirement Planning,Enterprise Resource Planning, Total Quality Management and Theory of constraints. Activity-Based CostManagement,BenchMarking;BalancedScoreCardandValue-ChainAnalysis.
BudgetaryControl;FlexibleBudgets;Performancebudgets;Zero-basedbudgets. MeasurementofDivisionalprofitabilitypricing &decisionsincludingtransferpricing.

UNIT V

Quantitative techniques for cost management, Linear Programming, Transportationproblems,Assignmentproblems, Simulation,LearningCurve Theory

ReferenceBooks:

1. CostAccountingAManagerialEmphasis,PrenticeHallofIndia,NewDelhi
2. CharlesT.HorngrenandGeorgeFoster,AdvancedManagementAccounting
3. RobertSKaplanAnthonyA.Alkinson,Management&CostAccounting
4. AshishK.Bhattacharya,Principles&PracticesofCostAccountingA.H.Wheelerpublisher
5. N.D.Vohra,QuantitativeTechniquesinManagement,TataMcGrawHillBookCo.Ltd.

ANNEXURE - VIII

AUDIT COURSES OFFERED IN I & II SEMESTER

Audit course	I & II Sem	Disaster Management	V21STEAC1

Year/Sem		**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation Year	V21 / 2021-2022	3	0	0	3	V21STEAC1
Name of the Course	**DISASTER MANAGEMENT**					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of this course the student will be able to

- Describe to student to have a idea on different natural hazards and disaster management (K2)
- Develop the student to understand manmade disaster and their management (K3)
- Prepare the student in such a way inorder to understand building codes and vulnerability of disaster (K3)
- Illustrate to student about role of technology in disaster management (K2)
- Assess the importance of education and community preparedness in disaster management to student (K3)

SYLLABUS

UNIT I

Natural Hazards and Disaster Management: Introduction of DM Disaster Management cycle – Five priorities for action- Case study methods of the following: floods, droughts – Earthquakes – global warming, cyclones & Tsunamis – Post Tsunami hazards along the Indian coast – landslides.

UNIT II

Man Made Disastar And Their Management Along With Case Study Methods Of The Following: Fire hazards – transport hazard dynamics – solid waste management – post disaster – bio terrotirism - rail and air craft's accidents-Management of these disasters

UNIT III

Risk And Vulnerability: – Building codes and land use planning – social vulnerability – environmental vulnerability-Financial management of disaster.

UNIT IV

Role Of Technology In Disaster Managements: Disaster management for infra structures, taxonomy of infra structure - mitigation programme for earth quakes –geospatial information in agriculture drought assessment-multimedia technology in disaster risk management and training-transformable indigenous knowledge in disaster reduction.

UNIT V

Education And Community Preparedness: Education in disaster risk reduction-Essentials of school disaster education-Community capacity and disaster resilience-Community based disaster recovery -Community based disaster management and social capital-Designing resilience- building.

Text Books:

1. Disaster Management – Global Challenges and Local Solutions' by Rajib shah & R R Krishnamurthy(2009),Universities press.
2. Disaster Science & Management' by Tushar Bhattacharya, Tata McGraw Hill Education Pvt. Ltd., New Delhi.
3. Disaster Management – Future Challenges and Opportunities' by Jagbir Singh (2007), I K International Publishing House Pvt. Ltd.

Reference Books:

1. 'Disaster Management' edited by H K Gupta (2003), Universities press.
2. Natural Hazards and Disaster Management, Vulnerability and Mitigation by RB Singh
3. Disaster Management by Harish K.Gupta

Annexure-IV

SRI VASAVI ENGINEERING COLLEGE

(AUTONOMOUS)

(Sponsored by Sri Vasavi Educational Society)
(Approved by AICTE, New Delhi &Recognized by UGC under section 2(f) & 12(B))
(Permanently affiliated to JNTUK, Kakinada, Accredited by NBA and NAAC with 'A' Grade)
Pedatadepalli, **TADEPALLIGUDEM–534 101.**W.G.Dist**. (A.P)**

Department of Electrical & Electronics Engineering

Date: 07-09-2021

The fifth meeting of Board of Studies in Department of Electrical and Electronics Engineering is held at 11.00 AM on 03-09-2021 though online mode using gotomeeting tool (Meeting ID: 954129285).

The following members are attended the meeting.

S.No.	Name	Designation	Role
1.	Dr. Sudha Rani Donepudi	Professor, Head, Dept. of EEE, SVEC, Pedatadepalli.	Chairperson
2.	Dr. R. SrinivasaRao	Professor, Dept. of EEE, UCEK, JNTUK, Kakinada	Subject Expert Nominated By V.C.
3.	Dr. M. Sydulu	Professor, Dept. of EE, NITW, Warangal	Subject Expert Nominated By A.C.
4.	Dr. Y.P. Obulesu	Professor, School of EE, VIT, Vellore	Subject Expert Nominated By A.C.
5.	Er. B.N.V.R.C. Suresh Kumar	Retired AGM, PGCI, Hyderabad	Industry Expert Nominated By A.C
6.	Er. Ch. Vinay Kumar	Assistant Engineer, EHT Lines, APTRANSCO, Eluru.	Alumni
7.	Dr. Ch. Rambabu	Professor	Member
8.	U. Chandra Rao	Sr. Asst. Professor	Member
9.	N. Sri Harish	Asst. Professor	Member
10.	K Ramesh Babu	Asst. Professor	Member
11.	M.T.V. L Ravi Kumar	Asst. Professor	Member
12.	V. Rama Narayana	Asst. Professor	Member
13.	G Madhu Sagar Babu	Asst. Professor	Member
14.	A Uma Siva Naga Prasad	Asst. Professor	Member

15.	K. Venkata Reddy	Asst. Professor	Member
16.	K Amarendra	Asst. Professor	Member
17.	Mr. V.S. Aditya	Asst. Professor	Member
18.	Pradeep Vejju	Asst. Professor	Member
19.	Ch Srinivas	Asst. Professor	Member

The following are the minutes of the meeting

Item No. 1: Welcome note by the Chairperson BOS

The HOD extended a formal welcome and introduced the members.

Item No. 2: Progress Report of the Department

Chairperson BOS had given the Brief on Progress Report of the Department.

Item No. 3: Review of course structure for VII & VIII semesters of B. Tech EEE under V18 Regulation.

Reviewed and approved the course structure of VII & VIII semesters of B.Tech-EEE Programme under V18 Regulation.

The details of the approved course structure for VII & VIII semesters of UG (B.Tech) Programme (EEE) under V18 Regulation are given in Annexure-I

Item No. 4: Approval of syllabi for the courses offered in VII & VIII semesters B. Tech EEE under V18 Regulation.

Approved the syllabi for the courses offered in VII & VIII semesters B. Tech EEE under V18 Regulation.

The approved syllabi for the courses offered in VII and VIII semesters of B.Tech EEE of under V18 Regulation is attached in Annexure-II.

Item No. 5: Approval of list of courses offering under Open Elective- II & III in VII & VIII semester B. Tech respectively under V18 Regulation for all other branches and the approval of their detailed syllabi.

Approved the list of courses and syllabi for the courses offered as Open Electives in VII and VIII semesters B. Tech for all other branches under V18 Regulation and the details are given in Annexure III.

Item No. 6: Approval of course structure for III & IV semesters of B. Tech EEE under V20 Regulation.

Approved the course structure of III & IV semesters of B.Tech-EEE Programme under V20 Regulation with the following modifications.

SEM	Suggestions	Inclusions / Modifications
III & IV Skill Oriented Courses (SOC)	Suggested to add Raspberry-pi, Arduino, and E-CAD	Included Arduino Board and E-CAD into pool of SOC at second year level and Raspberry-pi will be included at third year level

The details of the approved course structure for III & IV semesters of UG (B.Tech) Programme (EEE) under V20 Regulation are given in Annexure-IV

Item No. 7: Approval of syllabi for the courses offered in III & IV semesters of B. Tech EEE under V20 Regulation.

Approved the syllabi for the courses offered in III & IV semesters B. Tech EEE under V20 Regulation with the following suggestions/modifications.

SEM	Course Code	Course Title	Suggestions	Inclusions / Modifications
III	V20EET04	Electrical Circuit Analysis-II	Replace Network Synthesis Unit with Filters	Replaced Network Synthesis Unit with Filters
IV	V20EET10	Electrical Power Generation & Transmission	Add introduction level of Renewable Sources in Unit-I	Included Introduction to Renewable Energy Sources, Solar and wind Power plant Layouts.
IV	V20EEL06	Electrical Measurements Laboratory	Add demonstration of new electronic meters available for field electrical engineers	Included demonstration of electronic meters as an experiment

The approved syllabi for the courses offered in III and IV semesters of B. Tech EEE of under V20 Regulation is attached in Annexure-V.

Item No. 8: Approval of syllabi for the courses offered in III & IV semesters for other branches of B. Tech under V20 Regulation.

Approved the syllabus for the course offered in IV semesters B. Tech ECE under V20 Regulation and is given in Annexure – VI.

Item No. 9: Approval of course structure for I to IV semesters of M. Tech Power Electronics and Power Systems (PE&PS) under V21 Regulation.

Approved the proposed course structure from I to IV semesters M. Tech Power Electronics and Power Systems (PE&PS) under V21 Regulation with following suggestions/modifications.

SEM	Suggestions	Inclusions / Modifications
I	Advanced Digital Signal Processing Course (Course Code: V21PET04) in Elective –I can be replaced with Smart Grid	Advanced Digital Signal Processing Course (Course Code: V21PET04) is replaced with Smart Grid (Course Code: V21PET04)
II	DSP Controlled Drives course (Course code: V21PET12) in Elective-III can be changed as Control of Electric Drives	DSP Controlled Drives course (Course code: V21PET12) in Elective-III is modified as Control of Electric Drives (Course code: V21PET12)
III	In Elective-III, Optimization Techniques (Course code: V21PET18) and Artificial Intelligent Techniques (Course code: V21PET19) can combine together as a Soft Computing Techniques	Optimization Techniques (Course code: V21PET18) is merged with Artificial Intelligent Techniques (Course code: V21PET19) and renamed as Soft Computing Techniques in Electrical Engineering (Course code: V21PET18)

The approved course structure from I to IV semesters M. Tech Power Electronics and Power Systems (PE&PS) under V21 Regulation is given in Annexure VII.

Item No. 10: Approval of syllabi for the courses offered form I to IV semesters of M. Tech Power Electronics and Power Systems (PE&PS) under V21 Regulation.

Approved the syllabi for various courses offered from I to IV semesters of M. Tech Power Electronics and Power Systems (PE&PS) under V21 Regulation with the following modifications.

SEM	Course Code	Course Title	Suggestions	Inclusions / Modifications
I	V21PET02	Power System Operation & Control	Included Load Flow Analysis	Load Flow Analysis is added in the syllabus

The approved syllabi for various courses offered from I to IV semesters of M. Tech Power Electronics and Power Systems (PE&PS) under V21 Regulation is given in Annexure VIII.

Dr. Sudha Rani Donepudi

(BOS Chairperson)

Annexure I
Approved Course Structure of VII and VIII Semesters
under V18 Regulation

S.No.	Course Code	Name of the Course	L	T	P	Credits
		VII Semester				
1.	V18EET26	Power System Operation and Control	3	-	-	3
2.	V18EET27	AI Techniques for Power Systems	3	-	-	3
3.	V18EET28 V18EET29 V18EET30 V18EET31	Professional Elective - III Power Quality High Voltage Engineering Modelling and Simulation of Power Electronics Flexible AC Transmission Systems	3		-	3
4.	V18EET32 V18EET33 V18EET34 V18EET35	Professional Elective – IV Modern Control Theory Smart Grid Electrical Machine Modelling Analysis Control of Grid Connected PV and Wind Energy Systems	3	-	-	3
5.		Open Elective – II	3	-	-	3
6.	V18EEL10	Power Systems Laboratory	-	-	2	1
7.	V18EEP01	Project Part – A	-	-	6	3
		Total Contact Hours(23)	**15**	**0**	**8**	**20**
		VIII Semester				
S.No.	**Course Code**	**Name of the Course**	**L**	**T**	**P**	**Credits**
1.	V18EET36 V18EET37 V18EET38 V18EET39	Professional Elective - V Electrical Distribution Systems Digital Signal Processing Digital Control Systems Electrical and Hybrid Vehicles	3	-	-	3
2.	V18EET40 V18EET41 V18EET42 V18EET43	Professional Elective – VI Power Systems Reforms Energy Storage and Management Switched Mode Power Converters Electrical Machine Design	3	-	-	3
3.		Open Elective – III	3	-	-	3
4.	V18EEP02	Project Part - B	-	-	18	9
		Total Contact Hours(27)	**9**	**0**	**18**	**18**

- **Internship/Industrial Training certificate must be submitted on or before last instruction day of VII Semester, otherwise his/her Semester End Examination results will not be declared.**
- **Certification Course certificate must be submitted on or before last instruction day of VII Semester, otherwise his/her Semester End Examination results will not be declared.**

Annexure II

Syllabi for the Courses offered in VII & VIII Semesters B. Tech EEE Under V18 Regulation

Semester	VII SEM	L	T	P	C	Course Code
Regulation	V18	3	-	-	3	V18EET26
Name of the Course	Power System Operation and Control					
Branches	EEE					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Analyze the optimal scheduling of power generating thermal units	K4
CO2	Compute optimal hydro and thermal scheduling.	K3
CO3	Predict the optimal unit commitment problem	K3
CO4	Calculate the transfer function of single area and two area load frequency control.	K4
CO5	Evaluate the steady state response of single area load control with PI controller.	K5
CO6	Assess the reactive power control and compensation of transmission lines.	K3

UNIT–I: ECONOMIC OPERATION OF POWER SYSTEMS

Optimal operation of Generators in Thermal power stations, Heat rate curve, Cost Curve, Incremental fuel and Production costs, Input–output characteristics, Optimum generation allocation with line losses neglected, Optimum generation allocation including the effect of transmission line losses, Loss Coefficients, General transmission line loss formula.

UNIT–II: HYDROTHERMAL SCHEDULING

Optimal scheduling of Hydrothermal System: Hydroelectric power plant models, Scheduling problems, Short term hydrothermal scheduling problem.

UNIT–III: UNIT COMMITMENT

Optimal unit commitment problem, Need for unit commitment, Constraints in unit commitment, Cost function formulation, Solution methods, Priority ordering, Dynamic programming.

UNIT–IV: LOAD FREQUENCY CONTROL-I

Modeling of steam turbine, Generator, Mathematical modeling of speed governing system– Transfer function – Modeling of Hydro turbine –Necessity of keeping frequency constant–Definitions of Control area – Single area control system – Block diagram representation of an isolated power system – Steady state analysis – Dynamic response – Uncontrolled case. Proportional plus Integral control of single area and its block diagram representation – Steady state response.

UNIT–V: LOAD FREQUENCY CONTROL-II

Block diagram development of Load Frequency Control of two area system uncontrolled
case and controlled case. Tie-line bias control. Load Frequency Control and Economic
dispatch control.

UNIT–VI: REACTIVE POWER CONTROL

Overview of Reactive Power control – Reactive Power compensation in transmission systems– Advantages and disadvantages of different types of compensating equipment for transmission systems – Load compensation – Specifications of load compensator –
Uncompensated and compensated transmission lines: Shunt and series compensation – Need for FACTS controllers.

TEXT BOOKS:

1. Electric Energy Systems Theory – by O. I. Elgerd, Tata Mc Graw–hill Publishing Company Ltd., Second edition. 2017
2. Power System stability & control, Prabha Kundur, TMH ,First Edition 2006.
3. Modern Power System Analysis – by I. J. Nagrath & D. P. Kothari Tata Mc Graw – Hill Publishing Company Ltd, 2nd edition Energy management by Paul o' Callaghan, Mc–Graw Hill Bookcompany–1st edition, 1998.

REFERENCE BOOKS:

1. Power System Analysis and Design by J. Duncan Glover and M.S. Sarma, THOMPSON, 6rd Edition2019.
2. Power System Analysis by Grainger and Stevenson, Tata McGraw Hill2017.
3. **https://nptel.ac.in/courses/108/101/108101040/**

Semester	VII SEM	L	T	P	C	Course Code
Regulation	V18	3	-	-	3	V18EET27
Name of the Course	AI Techniques for Power Systems					
Branches	EEE					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Understand fundamentals concepts of artificial neural networks.	K2
CO2	Understand concepts of different algorithms ANN paradigms.	K2
CO3	Understand fundamentals of fuzzy set properties and membership functions.	K2
CO4	Understand the concept of evolutionary techniques operation.	K2
CO5	Understand fundamentals of optimization techniques.	K2
CO6	Apply optimization techniques to power system applications.	K4

UNIT-I: ARTIFICIAL INTELLIGENCE

Artificial Neural Networks (ANN) – definition and fundamental concepts – Biological neural networks – Artificial neuron – activation functions – setting of weights – typical architectures – biases and thresholds – learning/training laws and algorithms.

UNIT-II: ANN PARADIGMS

ADALINE – feed forward networks – Back Propagation algorithm-Radial Basis Function (RBF) network- Hopfield Neural Network.

UNIT- III: CLASSICAL AND FUZZY SETS

Introduction to classical sets- properties, Operations and relations; Fuzzy sets, Membership, Operations, Properties, Fuzzy relations, Membership functions.

UNIT-IV: EVOLUTIONARY TECHNIQUES

Introduction-concepts of genetic algorithms: Initialization-Selection-Genetic operators, Mutation- Evolutionary programming-Evolutionary techniques.

UNIT-V: FUNDMENTALS OF OPTIMIZATION

Classification of optimization problems-Unconstrained and Constrained optimization- Particle swarm optimization.

UNIT-VI: APPLICATIONS OF AI

PSO based Economic load dispatch without losses, Load flow, and Load frequency control: Single area system using ANN.

TEXT BOOKS:

1. Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications by Rajasekharan and pai – PHI Publication, 2011.
2. Fuzzy logic with Fuzzy Applications – T.J Ross – Mc Graw Hill Inc, 1997.
3. NP Padhy, Artificial Intelligence and Intelligent Systems, Oxford University Press, 1st Edition, 2005.

REFERENCE BOOKS:

1. Goldberg D.E. “Genetic Algorithms in Search Optimization & Machine Learning”, 13th Edition Addition Wesley Co., New York 1996.
2. D.P.Kothari and J.S.Dhillon, “Power System Optimization”, 2ndEdition, PHI learning private limited, 2010
3. **https://nptel.ac.in/content/storage2/courses/109101003/downloads/Lecture-notes/Lecture-19-20-21.pdf**

Semester	VII SEM	L	T	P	C	Course Code
Regulation	**V18**	**3**	**-**	**-**	**3**	**V18EET28**
Name of the Course	**Power Quality (Professional Elective – III)**					
Branches	**EEE**					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Explain different types of power quality phenomena	**K2**
CO2	Illustrate sources for voltage sag, voltage swell, interruption, transients, long duration over voltages & harmonics in a power system	**K3**
CO3	Describe power quality terms & study power quality standards	**K2**
CO4	Discuss principle of voltage regulation & power factor improvement methods	**K2**
CO5	Assess the relationship between distributed generation & power quality	**K3**
CO6	Discuss the power quality monitoring concepts & the usage of measuring instruments	**K2**

UNIT–I: INTRODUCTION

Overview of power quality – Concern about the power quality – General classes of power quality and voltage quality problems – Transients – Long–duration voltage variations – Short–duration voltage variations – Voltage unbalance – Waveform distortion – Voltage fluctuation – Power frequency variations.

UNIT–II: VOLTAGE IMPERFECTIONS IN POWER SYSTEMS

Power quality terms – Voltage sags – Voltage swells and interruptions – Sources of voltage sag, swell and interruptions – Nonlinear loads – IEEE and IEC standards. Source of transient over voltages – Principles of over voltage protection – Devices for over voltage protection – Utility capacitor switching transients.

UNIT–III: VOLTAGE REGULATION AND POWER FACTOR IMPROVEMENT

Principles of regulating the voltage – Device for voltage regulation – Utility voltage
regulator application – Capacitor for voltage regulation – End–user capacitor application – Regulating utility voltage with distributed resources – Flicker – Power factor penalty – Static VAR compensations for power factor improvement.

UNIT– IV: HARMONIC DISTORTION AND SOLUTIONS

Voltage distortion vs. Current distortion – Harmonics vs. Transients – Harmonic indices – Sources of harmonics – Effect of harmonic distortion – Impact of capacitors, transformers, motors and meters – Point of common coupling – Passive and active filtering – Numerical problems.

UNIT–V: DISTRIBUTED GENERATION AND POWER QUALITY

Resurgence of distributed generation – DG technologies – Interface to the utility system – Power quality issues and operating conflicts – DG on low voltage distribution networks.

UNIT–VI: MONITORING AND INSTRUMENTATION

Power quality monitoring and considerations – Historical perspective of PQ measuring instruments – PQ measurement equipment – Assessment of PQ measuring data – Application of intelligent systems – PQ monitoring standards.

TEXTBOOKS:

1. Electrical Power Systems Quality, Dugan R C, Mc Granaghan M F, Santoso S, and Beaty H W, Second Edition, McGraw–Hill, 2012, 3rdedition.
2. Electric power quality problems –M. H. J. Bollen IEEE series-Wiley Indiapublications,2011.

REFERENCE BOOKS:

1. Power Quality Primer, Kennedy B W, First Edition, McGraw–Hill,2000.
2. Understanding Power Quality Problems: Voltage Sags and Interruptions, Bollen M HJ, First Edition, IEEE Press;2000.
3. Power System Harmonics, Arrillaga J and Watson N R, Second Edition, John Wiley & Sons,2003.
4. Power Quality C. shankaran, CRC Press,2001
5. Power Quality in Power systems and Electrical Machines–Ewald F. fuchs, Mohammad A. S. Masoum–Elsevier.2nd edition 2015
6. **https://nptel.ac.in/courses/108/106/108106025/**

Semester	VII SEM	L	T	P	C	Course Code
Regulation	**V18**	**3**	**-**	**-**	**3**	**V18EET29**
Name of the Course	**High Voltage Engineering (Professional Elective – III)**					
Branches	**EEE**					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Describe the electric field stress on different configuration of electrodes.	K2
CO2	Understand the breakdown phenomena in various dielectric materials.	K2
CO3	Illustrate the generation of high DC, AC and Impulse voltages and Currents.	K2
CO4	Explain various methods available for measurement of high DC, AC and Impulse voltages and currents.	K2
CO5	Describe different methods for measuring DC Resistivity, Dielectric Constant, Loss Factor & explain the phenomena of Partial Discharge.	K2
CO6	Illustrate the testing techniques for various equipment's used in High Voltage Engineering.	K2

UNIT–I: INTRODUCTION TO HIGH VOLTAGE TECHNOLOGY

Electric Field Stresses – Uniform and non–uniform field configuration of electrodes – Estimation and control of electric Stress – Numerical methods for electric field computation.

UNIT–II: BREAK DOWN PHENOMENON IN GASEOUS, LIQUID AND SOLID INSULATION

Gases as insulating media – Collision process – Ionization process – Townsend's criteria of breakdown in gases – Paschen's law – Liquid as Insulator – Pure and commercial liquids – Breakdown in pure and commercial liquid – Intrinsic breakdown – Electromechanical breakdown – Thermal breakdown –Breakdown of solid dielectrics, composite dielectrics used in practice.

UNIT–III: GENERATION OF HIGH VOLTAGES AND HIGH CURRENTS

Generation of High DC voltages – Generation of High Alternating Voltages – Generation of Impulse Voltages and Currents – Tripping and Control of Impulse Generators.

UNIT–IV: MEASUREMENT OF HIGH VOLTAGES AND HIGH CURRENTS

Measurement of High - Direct Current Voltages, AC and Impulse Voltages; Measurement of High – DC, AC and Impulse Currents.

UNIT–V: NON–DESTRUCTIVE TESTING OF MATERIAL AND ELECTRICAL APPARATUS

Measurement of DC Resistivity – Measurement of Dielectric Constant and Loss Factor – Partial Discharge Measurements.

UNIT–VI: High Voltage Testing of Electrical Apparatus

Testing of Insulators and Bushings – Testing of Isolators and Circuit Breakers – Testing of Cables – Testing of Transformers – Testing of Surge Diverters – Radio Interference Measurements.

TEXT BOOKS:

1. High Voltage Engineering: Fundamentals by E.Kuffel, W.S.Zaengl, J.Kuffel by Elsevier, 2nd Edition,2000.
2. High Voltage Engineering and Technology by Ryan, IET Publishers.3rd Edition,2013.

REFERENCE BOOKS:

1. High Voltage Engineering by M.S.Naidu and V. Kamaraju – TMH Publications, 4th Edition2009
2. High Voltage Engineering by C.L.Wadhwa, New Age Internationals (P) Limited, 1997.
3. High Voltage Insulation Engineering by Ravindra Arora, Wolfgang Mosch, New Age International (P)Limited, 1995.
4. https://nptel.ac.in/courses/108/104/108104048/

Semester	VIISEM	L	T	P	C	Course Code
Regulation	V18	3	-	-	3	V18EET30
Name of the Course	Modelling and Simulation of Power Electronics (Professional Elective – III)					
Branches	EEE					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Understand the background activities i.e. numerical solution used in the simulation software.	K3
CO2	Describe the transient analysis in circuit simulation	K2
CO3	Explain the concepts of simulation of power electronic converters	K2
CO4	Compute properties of switching functions in single and parallel switch	K3
CO5	Express mathematical modelling of different converters	K2
CO6	Develop state space averaging technique and Hybrid Modelling for DC-DC converter	K3

UNIT-I: INTRODUCTION

Challenges in computer simulation – Simulation process–mechanics of simulation, Solution techniques for time domain analysis-Equation solvers, circuit-oriented simulators.

UNIT-II: SIMULATION OF POWER ELECTRONIC CONVERTERS-1

MNA and ST Approaches- Nodal Analysis, Modified Nodal Analysis, The Spare Tableau Approach, Nonlinear Circuits - The Newton Raphson Method, Computation Time, Convergence Issues, Nonlinear Circuit Equations, Introduction to Transient Simulation-Introduction, Discretization of Time, Transient Analysis, Accuracy and Stability, Explicit and Implicit Schemes, Methods for Transient Simulation - FE, BE and TRZ, Transient Analysis in Circuit Simulation, Equivalent Circuit Approach: RC Circuit,

UNIT- III: SIMULATION OF POWER ELECTRONIC CONVERTERS– II

Buck Converter; Some Practical Aspects: Undamped Oscillations, Ringing, Global Error in Switching Circuits, Round-off Error, Assessment of Accuracy,SingularMatrixProblem,Trapezoidalintegration,M&Nmethodforsim ulatingpowerelectronicconverters(with buck converter as are presentative example).

UNIT-IV: SWITCHINGFUNCTION

Introduction, Application of the switching function technique, Properties of the switching function, Voltage-Current relations in switched circuits - Single Switch, Parallel Switch, Pulse Width Modulation- Unipolar, PWM Signal of a composite function, bipolar square wave modulation.

UNIT-V: MATHEMATICAL MODELING OF CONVERTERS

Mathematical Modeling of Buck Converter, Modeling using switching function-buck converter, Rectifier,3-phase VSI inverter, matrix converter, m-phase rectifier. PWM rectifier topologies, modeling of power electronic converters-PWM rectifier in different frames-abc, alpha-beta and d-q.

UNIT-VI: MODELING, SIMULATION OF SWITCHING CONVERTERS WITH STATE SPACE AVERAGING, HYBRID MODEL

State space approach, averaging method, State Space Averaging Technique–Modeling AND linearization of converter transfer function-Hybrid Modeling for DC-DC converter.

TEXT BOOKS:

1. M. B. Patil, V. Ramnarayanan, V. T. Ranganathan: *Simulation of Power Electronic Converters*, 1st ed., Narosa Publishers, 2010

REFERENCE BOOKS:

1. Ned Mohan, Undeland and Robbins, “Power Electronics: Converters, Design and control”-3rd ed., John Wiley 2009.
2. https://nptel.ac.in/courses/108/106/108106023/

Semester	VII SEM	L	T	P	C	Course Code
Regulation	V18	3	-	-	3	V18EET31
Name of the Course	Flexible AC Transmission Systems (Professional Elective – III)					
Branches	EEE					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Determine power flow control in transmission lines by using FACTS controllers.	**K3**
CO2	Explain operation and control of voltage source converter.	**K2**
CO3	Discuss compensation methods to improve stability and reduce power oscillations in the transmission lines.	**K2**
CO4	Explain the method of shunt compensation by using static VAR compensators.	**K2**
CO5	Appreciate the methods of compensations by using series compensators..	**K3**
CO6	Explain the operation of two modern power electronic controllers (Unified Power Quality Conditioner and Interline Power Flow Controller)	**K2**

UNIT-I: FACTS CONCEPTS

Introduction to FACTS: Transmission interconnections power flow in an AC system, loading capability limits, Dynamic stability considerations, importance of controllable parameters basic types of FACTS controllers, benefits from FACTS controllers.

UNIT-II: VOLTAGE SOURCE CONVERTERS

Single & three phase full wave bridge converters, Three level voltage source converter, pulse width modulation, basic concept of current source converters, and comparison of current source converters with voltage source converters

UNIT- III: STATIC SHUNT COMPENSATION

Objectives of shunt compensation: mid-point voltage regulation, voltage instability prevention, improvement of transient stability, Power oscillation damping, Methods of controllable VAR generation, variable impedance type static VAR generators switching converter type VAR generators, hybrid VAR generators.

UNIT-IV: STATICSHUNT COMPENSATION-2

Thyristor Switched Capacitor (TSC)– Thyristor Switched Capacitor – Thyristor Switched Reactor (TSC–TCR). Static VAR compensator (SVC) and Static Compensator (STATCOM): The regulation and slope transfer function and dynamic performance – Transient stability enhancement and power oscillation damping– Operating point control and summary of compensation control.

UNIT-V: SERIESCOMPENSATORS

Static series compensators: Concept of series capacitive compensation Improvement of transient stability – Power oscillation damping – Functional requirements. GTO thyristor controlled Series Capacitor (GSC) – Thyristor Switched Series Capacitor (TSSC) and Thyristor Controlled Series Capacitor (TCSC).

UNIT-VI: COMBINED CONTROLLERS

Schematic and basic operating principles of unified power flow controller (UPFC) and Interline power flow controller (IPFC) – Application of these controllers on transmission lines.

TEXT BOOKS:

1. Understanding FACTS" N. G. Hingorani and L. Guygi, IEEE Press. Indian Edition is available:—Standard Publications, 2001.
2. Thyristor-based FACTS Controllers for Electrical Transmission Systems, by R. Mohan Mathur and Rajiv K. Varma, Wiley, 2002.

REFERENCE BOOKS:

1. Zhang, Xiao-Ping, Rehtanz, Christian, Pal, Bikash "Flexible AC Transmission Systems: Modeling and Control", Springer, 2012.
2. Yong-Hua Song, Allan Johns, "Flexible AC Transmission Systems", IET, 1999.
3. https://nptel.ac.in/courses/108/107/108107114/

Semester	**VII SEM**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	**V18**	**3**	**-**	**-**	**3**	**V18EET32**
Name of the Course	**Modern Control Theory (Professional Elective – IV)**					
Branches	**EEE**					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	**Course Outcome**	**Knowledge Level**
CO1	Describe and analyse systems in state space model	K2
CO2	Model a system in various canonical forms	K3
CO3	Design a controller and observer using state feedback	K4
CO4	Analyse non-linear system using describing functions	K3
CO5	Analyse non-linear system using Phase plane analysis	K3
CO6	Analyse non-linear system using Lypanov method	K3

UNIT – I: STATE VARIABLE DESCRIPTION
Concept of State – State Equations for Linear Continuous time Models-Non uniqueness of state model – State diagrams for continuous time state models – Solution of state equations – State transmission matrix.

UNIT – II: CONTROLLABILITY AND OBSERVABILITY
Tests for controllability and observability for continuous time systems – Time varying case, minimum energy control, time invariant case, Principle of Duality, Controllability and observability of state models in Jordan canonical form and other canonical forms.

UNIT – III: MODAL CONTROL
Effect of state feedback on controllability and observability, Design of State Feedback Control through Pole placement. Full order observer and reduced order observer.

UNIT – IV: DESCRIBING FUNCTION ANALYSIS
Introduction to nonlinear systems, Types of nonlinearities, Concepts of describing functions, Derivation of describing functions for Dead zone, Saturation, backlash, relay with dead zone and Hysteresis – Jump Resonance.

UNIT-V: PHASE-PLANE ANALYSIS
Introduction to phase-plane analysis, Method of Isoclines for Constructing Trajectories, Singular points, Phase-plane analysis of nonlinear control systems.

UNIT-VI: STABILITY ANALYSIS
Stability in the sense of Lyapunov. Lyapunov's stability and Lypanov's instability theorems. Direct method of Lypanov for the Linear and Nonlinear continuous time autonomous systems.

TEXT BOOKS:

1. Modern Control System Theory – by M. Gopal, New Age International Publishers, 2nd edition, 1996.
2. Systems and Control by Stainslaw H. Zak, Oxford Press, 2003.

REFERENCE BOOKS:

1. Modern Control Engineering – by K. Ogata, Prentice Hall of India, 3rd edition, 1998.
2. Control Systems Engineering by I.J. Nagrath and M.Gopal, New Age International (P) Ltd. 2007.
3. Digital Control and State Variable Methods – by M. Gopal, Tata Mc Graw-Hill companies, 1997.
4. https://nptel.ac.in/courses/108/103/108103007/

Semester	VII SEM	L	T	P	C	Course Code
Regulation	V18	4	-	-	3	V18EET33
Name of the Course	Smart Grid (Professional Elective – IV)					
Branches	EEE					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Understand concept of smart grid and its advantages over conventional grid.	K2
CO2	Explain the architecture of smart Grid	K2
CO3	Illustrate the concept of Micro Grid and its integration	K3
CO4	Understand smart metering techniques and measuring techniques	K2
CO5	Examine different communication technologies that can be used for smart grid	K3
CO6	Identify the power quality problems associated with smart grid	K2

UNIT –I: INTRODUCTION TO SMART GRID

Introduction to Smart Grid - Need of Smart Grid, Working definitions of Smart Grid and Associated Concepts – Smart Grid Functions – Traditional Power Grid and Smart Grid – New Technologies for Smart Grid – Advantages — Key Challenges for Smart Grid.

UNIT—II: SMART GRID ARCHITECTURE

Components and Architecture of Smart Grid Design – Review of the proposed architectures for Smart Grid-Geographic Information System(GIS)-The fundamental components of Smart Grid designs – Transmission Automation – Sub-Station Automation -Distribution Automation – Feeder Automation, Renewable Integration

UNIT-III: DISTRIBUTION GENERATION

Introduction-necessity of DG– Concept of micro grid-Issues of interconnection-protection & control of micro grid – Storage Technologies – Smart Storages, Battery, SMES– Economic Issues.

UNIT-IV: SMART METERS

Introduction to smart Meters-Phasor Measurement Unit (PMU)-Wide Area Measurement Systems (WAMS). Intelligent Electronic Devices (IED) & their application for monitoring & protection

UNIT-V: INFORMATION AND COMMUNICATION TECHNOLOGY FOR SMART GRID

Advanced Metering infrastructure (AMI) drivers and benefits-AMI protocols-Standards and initiatives-AMI needs in the smart grid, Home Area Network (HAN), Wide Area Network (WAN)

UNIT – VI: POWER QUALITY MANAGEMENT IN SMART GRID

Introduction, Power Quality, Power Quality Issues of Grid Connected Renewable Energy Sources, Load Frequency Control (LFC) and Voltage Control in Micro Grid System – Reactive Power Control in Smart Grid- Web based Power Quality Monitoring- Permanent Power Quality Monitoring Equipment-Power Quality Audit.

TEXT BOOKS:

1. James Momoh, "Smart Grid :Fundamentals of Design and Analysis"-Wiley, IEEE Press,2012
2. Ali Keyhani, Mohammad N. Marwali, Min Dai ―Integration of Green and Renewable Energy in Electric Power Systems‖, Wiley2010.
3. JanakaEkanayake, KithsiriLiyanage, Jianzhong.Wu, AkihikoYokoyama, Nick Jenkins,"Smart Grid: Technology and Applications"- Wiley, 2012.
4. A.G. Phadke and J.S. Thorp, "Synchronized Phasor Measurements and their Applications", Springer Edition, 2010

REFERENCE BOOKS:

1. Yang Xiao, "Communication and Networking in Smart Grids", CRC Press 2012.
2. Wiley Blackwell 3.Peter S. Fox Penner, "Smart Power: Climate Changes, the Smart Grid, and the Future of Electric Utilities", Island Press; 1 edition 8 Jun 2010.
3. Stuart Borlase, "Smart Grids (Power Engineering)", CRC Press2015.
4. https://nptel.ac.in/courses/108/107/108107113/

Semester	**VII SEM**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	**V18**	**3**	**-**	**-**	**3**	**V18EET34**
Name of the Course	**Electrical Machine Modelling & Analysis (Professional Elective – IV)**					
Branches	**EEE**					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Analyze Kroon's Primitive Machine	K2
CO2	Develop modeling of dc machine	K3
CO3	Explain linear Transformation	K4
CO4	Apply mathematical modeling concepts to 3-phase Induction machines	K3
CO5	Design control strategies based on dynamic modeling of 3-ph Induction machines and3-phase Synchronous machine	K4
CO6	Analyze BLDC Machine and switched reluctance machine based on Mathematical modeling of BLDCM and SRM	K4

UNIT – I: BASIC CONCEPTS OF MODELING

Basic Two-pole Machine representation of Commutator machines, 3-phase synchronous machine with and without damper bars and 3-phase induction machine, Kron's primitive Machine-voltage, current and Torque equations.

UNIT – II: DC MACHINE MODELING

Mathematical model of separately excited D.C motor – Steady State analysis-Transient State analysis- Sudden application of Inertia Load-Transfer function of separately excited D.C Motor- Mathematical model of D.C Series motor, Shunt motor

UNIT- III: REFERENCE FRAME THEORY & MODELING OF SINGLE PHASE INDUCTION MACHINES

Linear transformation-Phase transformation - three phase to two phase transformation (abc to dq0) and two phase to three phase transformation dq0 to abc -Power equivalence- Mathematical modeling of single phase induction machines.

UNIT – IV: MODELING OF THREE PHASE INDUCTION MACHINE

Generalized model in arbitrary reference frame-Electromagnetic torque-Derivation of commonly used Induction machine models- Stator reference frame model-Rotor reference frame model-Synchronously rotating reference frame model-state space model with flux linkages as variables.

UNIT –V: MODELING OF SYNCHRONOUS MACHINE

Synchronous machine inductances–voltage equations in the rotor's dq0 reference frame electromagnetic torque- current in terms of flux linkages-three synchronous machine model.

UNIT –VI: MODELING OF SPECIAL MACHINES

Modeling of PM Synchronous motor, modeling of BLDC motor, modeling of Switched Reluctance motor.

TEXT BOOKS:

1. Generalized theory of Electrical Machinery–P. S. Bimbra - Khanna Publishers.- 6th Edition 2017.
2. Electric Motor Drives-Modeling, Analysis &control- R. Krishnan-Pearson Publications-1st edition- 2002.

REFERENCE BOOKS:

1. Analysis of Electrical Machinery and Drive systems– P. C. Krause, Oleg Wasynczuk, Scott D. Sudhoff – Second Edition-IEEE Press2002.
2. Dynamic simulation of Electric machinery using Matlab / Simulink – Chee Mun Ong - PHI.1997.
3. Modern Power Electronics and AC Drives-B. K. Bose –PHI2001.
4. https://nptel.ac.in/courses/108/106/108106023/

Semester	VII SEM	L	T	P	C	Course Code
Regulation	V18	3	-	-	3	V18EET35
Name of the Course	Control of Grid Connected Converters for PV and Wind Energy Systems (Professional Elective – IV)					
Branches	EEE					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Understand the basic requirements of grid for connecting PV and WT converters.	K2
CO2	Describe various grid synchronization techniques for single phase power converters.	K2
CO3	Describe various grid synchronization techniques for three phase power converters.	K2
CO4	Illustrate various filter topologies and control techniques for grid connected converters.	K2
CO5	Explain different MPPT Control Methods and limitations of standard MPPT.	K2
CO6	Illustrate the control of grid converter for renewable energy interface	K2

UNIT–I: GRID REQUIREMENT FOR PV AND WT SYSTEM

Introduction, International Regulations, Response to Abnormal Grid Conditions, Power Quality. Grid Code Evolution for WT system, Frequency and Voltage Deviation under Normal Operation, Active Power Control in Normal Operation, Reactive Power Control in Normal Operation.

UNIT–II: GRID SYNCHRONIZATION FOR SINGLE-PHASE POWER CONVERTERS

Grid Synchronization Techniques for Single-Phase Systems, Phase Detection Based on In-Quadrature Signals, Some PLLs Based on In-Quadrature Signal Generation.

UNIT–III: GRID SYNCHRONIZATION FOR THREE-PHASE POWER CONVERTERS

The Three-Phase Voltage Vector under Grid Faults, Synchronous Reference Frame PLL under Unbalanced and Distorted Grid Conditions, Decoupled Double Synchronous Reference Frame PLL (DDSRF-PLL), Double Second-Order Generalized Integrator FLL (DSOGI-FLL).

UNIT–IV: INTRODUCTION TO CONTROL STRATEGY OF CONVERTERS WITH DIFFERENT FILTER CONFIGURATIONS

Filter Topologies, Design Considerations, Practical Examples of LCL Filters and Grid Interactions, Resonance Problem and Damping Solutions, Nonlinear Behavior of the Filter. Converter configurations, Different current Control techniques– PI control, PR control, HCC, Model Predictive control.

UNIT–V: MPPT CONTROL FOR PV AND WT SYSTEM

The Dynamic Optimization Problem, Fractional Open-Circuit Voltage and Short-Circuit Current, MPPT Control Methods, The Perturb and Observe Approach, Improvements of the P&O Algorithm, The Incremental Conductance Method, MPPT Efficiency, Limitation of standard MPPT. Charge controller for off grid PV system.

UNIT–VI: GRID CONVERTER CONTROL FOR RENEWABLE ENERGY INTERFACE

Model of the Converter-Mathematical Model of the L-Filter Inverter; AC Voltage and DC Voltage Control-Management of the DC Link Voltage, Cascaded Control of the DC Voltage through the AC Current, Tuning Procedure of the PI Controller, PI-Based Voltage Control; Voltage Oriented Control (VOC) and Direct Power Control (DPC): Synchronous Frame VOC: PQ Open-Loop Control, PQ Closed-Loop Control, Direct Power Control, Stand-alone.

REFERENCES BOOKS:

1. Grid Converters for Photovoltaic and Wind Power systems, IEEE, A John Wiley and Sons, Ltd, Publication2010.
2. Power Electronics and Control Techniques for Maximum Energy Harvesting in Photovoltaic systems, CRC Press, Taylor and Francis Group2013.
3. Photovoltaic Power System: Modeling, Design, and Control by Weidong Xiao, Wiley Publication2017.
4. Modern MPPT Techniques for Photovoltaic Energy Systems by Ali M. Eltamaly, Almoataz Y. Abdelaziz, Springer International Publishing2020.
5. https://nptel.ac.in/courses/117/108/117108141/

Semester	VII SEM	L	T	P	C	COURSE CODE
Regulation	V18	3	-	-	3	V18EEL10
Name of the Course	Power Systems Lab					
Branches	EEE					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Calculate the sequence impedances of 3 phase Transformer	K4
CO2	Determine the power Angle Characteristics of 3-phase Alternator with infinite bus bars	K4
CO3	Calculate the dielectric strength of Transformer oil	K4
CO4	Explain load flow studies using N-R method	K5
CO5	Assess load frequency control with &without controller	K5
CO6	Evaluate economic load dispatch with & without losses	K5

Any 10 of the Following experiments are to be conducted:

1. Sequence impedances of 3 phase Transformer.
2. Sequence impedances of 3 phase Alternator by Fault Analysis.
3. Sequence impedances of 3 phase Alternator by Direct method.
4. ABCD parameters of Transmission line.
5. Power Angle Characteristics of 3phase Alternator with infinite bus bars.
6. Dielectric strength of Transformer oil.
7. Calibration of Tong Tester.
8. Load flow studies using Gauss-Seidel method
9. Load flow studies using N-R method
10. Transient Stability Analysis
11. Load frequency control with & without control
12. Load frequency control with control
13. Economic load dispatch with & without losses
14. Economic load dispatch with losses.

Semester	VIII SEM	L	T	P	C	Course Code
Regulation	**V18**	**3**	**-**	**-**	**3**	**V18EET36**
Name of the Course	**Electrical Distribution Systems (Professional Elective – V)**					
Branches	**EEE**					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Understand various factors of distribution system	**K2**
CO2	Construct the distribution substation and feeders	**K3**
CO3	Calculate the voltage drop and power loss calculations on Distribution System	**K3**
CO4	Understand the distribution system protection and its coordination.	**K2**
CO5	Understand the effect of compensation for power factor improvement.	**K2**
CO6	Understand the effect of voltage control on distribution system.	**K2**

UNIT I: GENERAL CONCEPTS

Introduction to distribution systems, Load modeling and characteristics, Coincidence factor, Contribution factor loss factor, Relationship between the load factor and loss factor, Classification of loads (Residential, commercial, Agricultural and Industrial).

UNIT II: SUBSTATIONS & DISTRIBUTION FEEDERS

Location of substations: Rating of distribution substation, Service area with 'n' primary feeders, Benefits and methods of optimal location of substations.

Design Considerations of distribution feeders: Radial and loop types of primary feeders, Voltage levels, Feeder loading, Basic design practice of the secondary distribution system.

UNIT III: SYSTEM ANALYSIS

Voltage drops and power–loss calculations: Derivation for voltage drop and power loss in lines, uniformly distributed loads and non-uniformly distributed loads, Numerical problems, three phase balanced primary lines.

UNIT IV: PROTECTION & CO-ORDINATION

Objectives of distribution system protection, Types of common faults and procedure for fault calculations for distribution system, Protective devices: Principle of operation of fuses, Circuit reclosures, Line sectionalizes and circuit breakers.

Co-ordination of protective devices: General coordination procedure, Various types of coordinated operation of protective devices, Residual Current Circuit Breaker.

UNIT V: COMPENSATION FOR POWER FACTOR IMPROVEMENT

Capacitive compensation for power factor control, Different types of power capacitors,
shunt and series capacitors, Effect of shunt capacitors (Fixed and switched), Power factor correction, Capacitor allocation, Economic justification, Procedure to determine the best capacitor location, Numerical problems.

UNIT VI: VOLTAGE CONTROL

Equipment for voltage control, Effect of series capacitors, Effect of AVB/AVR, Line drop compensation

TEXT BOOK:

1. "Electric Power Distribution system, Engineering" – by Turan Gonen, CRC press, 2nd edition, 2007.
2. Electric Power Distribution – by A.S. Pabla, Tata McGraw–hill Publishing Company, 4th edition, 1997.

REFERENCE BOOKS:

1. Electrical Distribution Systems by Dale R. Patrick and Stephen W. Fardo,
CRC press, 2nd edition, 2021.
2. Electrical Power Distribution Systems by V. Kamaraju, 8th edition, 2014, Right Publishers.
3. https://nptel.ac.in/courses/108/107/108107112/.

Semester	VIII SEM	L	T	P	C	Course Code
Regulation	V18	3	-	-	3	V18EET37
Name of the Course	Digital Signal Processing (Professional Elective – V)					
Branches	EEE					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Classify Discrete Time Signals, systems, estimate the response of various Systems	K2
CO2	Compute DFT for discrete time signals using FFT Algorithm.	K3
CO3	Describe the various implementations of digital filter structures.	K2
CO4	Analyze and design a Digital filter (FIR&IIR) from the given specifications.	K4
CO5	Use the Multi-rate Processing concepts in various applications.	K2
CO6	Describe the concepts of DSP Processor.	K3

UNIT I: INTRODUCTION

Review of Signals and systems, Digital Signal Processing: Discrete time signals & sequences, Classification of Discrete time Systems, stability of LTI systems. Response of LTI systems to arbitrary inputs. Solution of Linear constant coefficient difference equations. Frequency domain representation of discrete time signals and systems.

UNIT II: DISCRETE FOURIER TRANSFORMS

Introduction to DTFT, Discrete Fourier transforms, Properties of DFT, Introduction to Fast Fourier transforms (FFT) - Radix-2 decimation in time and decimation in frequency FFT Algorithms, Inverse FFT.

UNIT III: REALIZATION OF DIGITAL FILTER

Review of Z-transform, digital filters, Block diagram representation of linear constant coefficient difference equations, Basic structures of IIR systems, Transposed forms. Basic structures of FIR systems.

UNIT IV: DESIGN OF IIR and FIR DIGITAL FILTERS

Analog filter approximations – Butterworth and Chebyshev, Design of IIR Digital filters from Analog filters, Characteristics of FIR Digital Filters, frequency response. Design of FIR Digital Filters using Window Techniques and Frequency Sampling technique, Comparison of IIR & FIR filters.

UNIT V: MULTIRATE DIGITAL SIGNAL PROCESSING

Introduction, Decimation, Interpolation, Sampling rate conversion, Implementation of sampling rate converters, Applications – Sub-band Coding of Speech Signals.

UNIT VI: INTRODUCTION TO DSP PROCESSORS

Introduction to programmable DSPs, Multiplier and Multiplier Accumulator, Modified bus structures and memory access schemes in P-DSPs, Multiple Access Memory, Multiported memory, VLIW architecture, Pipelining, Special addressing modes, On-Chip Peripherals.

TEXT BOOKS:

1. Digital Signal Processing, Principles, Algorithms, and Applications by John G. Proakis, Dimitris G. Manolakis, Pearson Education / PHI, 4th edition, 2007.
2. Discrete Time Signal Processing by A. V. Oppenheim and R.W. Schaffer, 3rd edition, 2010, PHI.

REFERENCE BOOKS:

1. Digital Signal Processing by Andreas Antoniou, TATA McGraw Hill, 2nd edition, 2006
2. Digital Signal Processing by MH Hayes, Schaum's Outlines, TATA Mc-Graw Hill, 2nd edition, 2007.
3. Digital Signal Processing by Alan V. Oppenheim, Ronald W. Schafer, PHI Ed., 2nd edition, 2006
4. Digital Signal Processing by Ramesh babu, Sci Tech publications, 6th edition, 2011.
5. Digital Signal Processing by A. Nagoor Kani, RBA Publications, 2nd edition, 2017.
6. https://nptel.ac.in/courses/117/102/117102060/

Semester	VIII SEM	L	T	P	C	Course Code
Regulation	V18	3	-	-	3	V18EET38
Name of the Course	Digital Control Systems (Professional Elective – V)					
Branches	EEE					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Understand the concepts of digital signal processing	K2
CO2	Solve difference equations and determine pulse transfer functions	K3
CO3	Analyze a discrete time system using state space model	K3
CO4	Determine the stability of a discrete time system	K4
CO5	Design a controller for discrete time system using conventional methods	K4
CO6	Design a controller for discrete time system using state feedback	K4

UNIT – I: INTRODUCTION AND SIGNAL PROCESSING

Introduction to analog and digital control systems – Advantages of digital systems – Typical examples – Signals and processing – Sample and hold devices – Sampling theorem and data reconstruction – Digital to Analog conversion and Analog to Digital conversion Frequency domain characteristics of zero order hold.

UNIT–II: Z-TRANSFORMS

Z-Transform and theorems, finding inverse and method for solving difference equations; Pulse transforms function, block diagram analysis of sampled – data systems.

UNIT–III: STATE SPACE ANALYSIS

State Space Representation of discrete time systems, Pulse Transfer Function Matrix solving discrete time state space equations, State transition matrix and it's Properties, Methods for Computation of State Transition Matrix, Discretization of continuous time state – space equations- Concepts of controllability and observability – Tests(without proof).

UNIT–IV: STABILITY ANALYSIS

Mapping between the S-Plane and the Z-Plane – Primary strips and Complementary Strips – Constant frequency loci, Constant damping ratio loci, Stability Analysis of closed loop systems in the Z-Plane. Jury stability test – Stability Analysis by use of the Bilinear Transformation and Routh Stability criterion.

UNIT – V: DESIGN OF DISCRETE TIME CONTROL SYSTEM BY CONVENTIONAL METHODS

Transient and steady – State response Analysis – Design based on the frequency response method –Bilinear Transformation and Design using frequency response in the w–plane for lag and led compensators and digital PID controllers.

UNIT – VI: STATE FEEDBACK CONTROLLERS AND OBSERVERS

Design of state feedback controller through pole placement – Necessary and sufficient conditions, Ackerman's formula.

TEXT BOOKS:

1. K. Ogata, "Discrete–Time Control systems", Pearson Education/PHI, 2nd Edition.
2. M. Gopal, "Digital Control and State Variable Methods", TMH, 4th Edition.

REFERENCE BOOKS:

1. Kuo, "Digital Control Systems", Oxford University Press, 2nd Edition, 2003.
2. https://nptel.ac.in/courses/108/103/108103008/

Semester	VIII SEM	L	T	P	C	Course Code
Regulation	V18	3	-	-	3	V18EET39
Name of the Course	Electrical and Hybrid Vehicles (Professional Elective – V)					
Branches	EEE					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Differentiate between Electric vehicles and Hybrid Electric Vehicles	K2
CO2	Discriminate between various Drive-Train Topologies	K2
CO3	Identify different motors used for hybrid electric vehicles.	K2
CO4	Explain the Sizing of Drive Train	K2
CO5	Illustrate different batteries and other energy storage systems.	K3
CO6	Discuss Various issues of energy management strategies	K2

UNIT-I: INTRODUCTION TO ELECTRIC VEHICLES

Conventional Vehicles: Basics of vehicle performance, vehicle power source characterization, transmission characteristics-Social and environmental importance of hybrid and electric vehicles, impact of modern drive-trains on energy supplies.

UNIT-II: DRIVE TRAINS

Hybrid Electric Drive-trains: Basic concept of hybrid traction, introduction to various hybrid drive-train topologies, power flow control in hybrid drive-train.

Electric Drive-trains: Basic concept of electric traction, introduction to various electric drive-train topologies, power flow control in electric drive-train.

UNIT-III: ELECTRIC PROPULSION UNIT

Introduction to electric components used in hybrid and electric vehicles, control of DC Motor drives, Control of Permanent Magnet Motor drives, control of Switch Reluctance Motor drives, drive system efficiency.

UNIT-IV: ENERGY STORAGE

Introduction to Energy Storage Requirements in Hybrid and Electric Vehicles, Battery based energy storage, Fuel Cell based energy storage - Super Capacitor based energy storage - Flywheel based energy storage

UNIT-V: SIZING THE DRIVE SYSTEM

Matching the electric machine and the internal combustion engine (ICE), Sizing the propulsion motor, sizing the power electronics, selecting the energy storage technology, Communications, supporting subsystems

UNIT-VI: ENERGY MANAGEMENT STRATEGIES

Introduction to energy management strategies used in hybrid and electric vehicles, classification of different energy management strategies, implementation issues of energy management strategies.

TEXT BOOKS:

1. Ali Emadi, Advanced Electric Drive Vehicles, CRC Press, 1st edition, 2014.
2. Iqbal Hussein, Electric and Hybrid Vehicles: Design Fundamentals, CRC Press, 1st edition, 2003.

REFERENCE BOOKS:

1. Mehrdad Ehsani, Yimin Gao, Ali Emadi, “Modern Electric, Hybrid Electric, and Fuel Cell Vehicles: fundamentals, theory, and design, 2nd edition, 2009.
2. Sandeep Dhameja, “Electric Vehicle Battery Systems”, Newnes, 1st edition, 2001.
3. http://nptel.ac.in/courses/108103009/

Semester	VIII SEM	L	T	P	C	Course Code
Regulation	V18	4	-	-	3	V18EET40
Name of the Course	Power System Reforms (Professional Elective – VI)					
Branches	EEE					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Understand fundamentals of power system deregulation and restructuring.	K2
CO2	Compute Available Transfer Capability (ATC)	K3
CO3	Apply methods to reduce congestion	K3
CO4	Compute electricity pricing in deregulated environment	K3
CO5	Understand the power system operation in deregulated environment	K2
CO6	Understand importance of ancillary services	K2

UNIT-I: BASIC ISSUES IN ELECTRIC UTILITIES

Introduction – Restructuring models – Independent system operator (ISO) – Power Exchange – Market operations – Market Power – Stranded cost – Transmission Pricing – Congestion Pricing

UNIT-II: OVERVIEW OF OASIS

Structure of OASIS – Posting of Information – Transfer capability on OASIS –Definitions of Transfer capability – Transfer Capability Issues – ATC calculations – TTC calculations – TRM calculations – CBM calculations – Methods to calculate ATC.

UNIT-III: CONGESTION MANAGEMENT

Introduction to congestion management –Effects of congestion – Methods to relieve congestion – Non market methods –Market Based methods –Management of Inter zonal/Intra zonal Congestion

UNIT-IV: PRICING OF ELECTRICITY

Introduction – Electricity price volatility – Factors effecting volatility – Measuring Volatility – electricity price indexes– Construction of forward price curves – Short–time price forecasting – Factors impacting electricity prices – Forecasting Methods – Analysing forecasting errors – Impact of data pre-processing – Impact of training vectors.

UNIT-V: POWER SYSTEM OPERATION IN DEREGULATED ENVIRONMENT

Introduction – Operational planning activities of ISO – The ISO in pool markets – The ISO in bilateral markets – Operational planning activities of a GENCO– the GENCO in pool markets – The GENCO in bilateral markets.

UNIT-VI: ANCILLARY SERVICES

Introduction – Types of ancillary services – Reactive power as an ancillary service – Synchronous generators as ancillary service providers.

TEXT BOOKS

1. Mohammad Shahidehpour, and Muwaffaqalomoush, – “Restructured electrical Power systems” Marcel Dekker, Inc. 1st edition, 2001
2. Kankar Bhattacharya, Math H.J. Boller, Jaap E. Daalder, ‘Operation of Restructured Power System’ Kluver Academic Publisher, 2nd edition, 2001

REFERENCE BOOKS

1. Loi Lei Lai; “Power system Restructuring and Deregulation”, Jhon Wiley & Sons Ltd., England, 1st edition, 2001.
2. Electrical Power Distribution Case studies from Distribution reform, upgrades and Management (DRUM) Program, by USAID/India, TMH, 1st edition, 2012.
3. https://nptel.ac.in/courses/108/101/108101005/.

Semester	VIII SEM	L	T	P	C	Course Code
Regulation	V18	3	-	-	3	V18EET41
Name of the Course	Energy Storage and Battery Management (Professional Elective – VI)					
Branches	EEE					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Understand need of energy storage systems	K3
CO2	Determine various types of energy storage and various devices used for the purpose	K3
CO3	Examine various real time applications	K3
CO4	Interpret the role of battery management system	K3
CO5	Illustrate the requirements of Battery Management System	K3
CO6	Interpret the concept associated with battery charging / discharging process	K3

UNIT-I: INTRODUCTION TO ENERGY STORAGE

Necessity of energy storage, different types of energy storage, mechanical, chemical, electrical, electrochemical, biological, magnetic, electromagnetic, thermal, comparison of energy storage technologies.

UNIT-II: NEEDSFOR ELECTRICAL ENERGY STORAGE

Emerging needs for EES, More renewable energy, less fossil fuel, Smart Grid uses, the roles of electrical energy storage technologies, the roles from the viewpoint of a utility, the roles from the viewpoint of consumers, the roles from the viewpoint of generators of renewable energy.

UNIT- III: FEATURES OF ENERGY STORAGE SYSTEMS

Classification of EES systems , Mechanical storage systems, Pumped hydro storage (PHS), Compressed air energy storage (CAES), Flywheel energy storage

(FES),Electrochemical storage systems, Secondary batteries, Flow batteries, Chemical energy storage, Hydrogen (H2),Synthetic natural gas (SNG).

UNIT- IV: INTRODUCTION TO BATTERY MANAGEMENT SYSTEM

Introduction to Battery Management System, Cells & Batteries, Nominal voltage and capacity, C rate, Energy and power, Cells connected in series, Cells connected in parallel, Electrochemical and lithium-ion cells, Rechargeable cell, Charging and Discharging Process, Overcharge and Undercharge, Modes of Charging.

UNIT- V: BATTERY MANAGEMENT SYSTEM REQUIREMENT

Introduction and BMS functionality, Battery pack topology, BMS Functionality, Voltage Sensing, Temperature Sensing, Current Sensing, BMS Functionality, High-voltage contactor control, Isolation sensing, Thermal control, Protection, Communication Interface, Range estimation, State-of charge estimation, Cell total energy and cell total power.

UNIT- VI: BATTERY STATE OF CHARGE AND STATE OF HEALTH ESTIMATION, CELL BALANCING

Battery state of charge estimation (SOC), voltage-based methods to estimate SOC, Model-based state estimation, Battery Health Estimation, Lithium-ion aging: Negative electrode, Lithium ion aging: Positive electrode, Cell Balancing, Causes of imbalance, Circuits for balancing

TEXT BOOKS:

1. "James M. Eyer, Joseph J. Iannucci and Garth P. Corey ", "Energy Storage Benefits and Market Analysis", Sandia National Laboratories, 1st edition, 2004.
2. The Electrical Energy Storage by IEC Market Strategy Board.

REFERENCE BOOK:

1. "Jim Eyer, Garth Corey", Energy Storage for the Electricity Grid: Benefits and Market Potential Assessment Guide, Report, Sandia National Laboratories, Feb 2010.
2. Plett, Gregory L. Battery management systems, Volume I: Battery modeling. Artech House, 1st edition, 2015.
3. Plett, Gregory L. Battery management systems, Volume II: Equivalent-circuit methods. Artech House, 1st edition, 2015.
4. Bergveld, H.J., Kruijt, W.S., Notten, P.H.L "Battery Management Systems -Design by Modelling" Philips Research Book Series 2002.
5. https://nptel.ac.in/content/storage2/courses/108103009/download/M9.pdf.

Semester	VIII SEM	L	T	P	C	Course Code
Regulation	V18	3	-	-	3	V18EET42
Name of the Course	Switched Mode Power Converters (Professional Elective – VI)					
Branches	EEE					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Compute the operation and control of non-isolated switch mode converters	K3
CO2	Explain the operation and control of isolated switch mode converters	K2
CO3	Describe the concepts of resonant converters	K2
CO4	Compute control strategies of switching converters	K3
CO5	Develop modeling of DC-DC converters	K3
CO6	Illustrate controller design based on linearization	K3

UNIT-I: NON-ISOLATEDSWITCHMODECONVERTERS

Control of DC-DC converters: Buck converters, Boost converters, Buck-Boost converter, CUK Converter, continuous and discontinuous operation, Converter realization with non-ideal components.

UNIT-II: ISOLATED SWITCHED MODE CONVERTERS

Forwarded converter, fly back converter, push-pull converter, half-bridge converter, full bridge converter

UNIT- III: RESONANT CONVERTERS

Basic resonant circuit concepts, series resonant circuits, parallel resonant circuits, zero current switching quasi-resonant buck converter, zero current switching quasi-resonant boost converter, zero voltage switching quasi-resonant buck converter, zero voltage switching quasi-resonant boost converter.

UNIT-IV: CONTROL SCHEMES OF SWITCHING CONVERTERS

Voltage control, Current mode control, control scheme for resonant converters. Magnetic design consideration: Transformer design, inductor and capacitor design

UNIT-V: MODELING OF DC-DC CONVERTERS

Formulation of averaged models for buck and boost converters: state space analysis, average circuit models, linearization and small– signal analysis, small-signal models.

UNIT-VI: CONTROLLER DESIGN BASED ON LINEARIZATION

Control design based on linearization: Transfer function of converters, control design, large signal issues in voltage-mode and current-mode control.

TEXT BOOKS:

1. Fundamentals of Power Electronics-Erickson, Robert W.,Maksimovic, Dragan, Springer,2nd edition, 2011.
2. Power switching converters –SimonAng, Alejandro Oliva, CRCPress, 3rd edition, 2010.
3. Elements of Power Electronics–Philip T. Krein, Oxford University press, 2nd edition, 2014.
4. Design of Magnetic Components for Switched Mode Power Converters-Umanand, S.P. Bhat, John Wiley & Sons Australia, 1st edition, 1992.

REFERENCE BOOKS:

1. Power Electronics: Essentials and applications-L. Umanand, Wiley publications, 1st edition, 2009.
2. Switching Power Supply Design – Abraham I. Pressman, McGraw-Hill Ryerson, Limited, 3rd edition, 2009.
3. Power Electronics– Issa Batareseh, Jhon Wiley publications, 4th edition, 2004.
4. Power Electronics: converters Applications & Design–Mohan, Undeland, Robbins-Wiley publications 3rd edition, 2007.
5. https://nptel.ac.in/courses/108/108/108108036/.

Semester	**VIII SEM**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	**V18**	**3**	**-**	**-**	**3**	**V18EET43**
Name of the Course	**Electrical Machine Design (Professional Elective – VI)**					
Branches	**EEE**					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Study mmf calculation and thermal rating of various types of electrical machines.	**K2**
CO2	To design armature and field systems for D.C. machines.	**K3**
CO3	To design core, yoke, windings and cooling systems of transformers.	**K3**
CO4	To design stator and rotor of induction machines.	**K3**
CO5	To design stator and rotor of synchronous machines and study their thermal behavior	**K3**
CO6	The importance of computer aided design method.	**K3**

UNIT I:DESIGN OF FIELD SYSTEM AND ARMATURE
Major considerations in Electrical Machine Design – Electrical Engineering Materials – Space factor – Choice of Specific Electrical and Magnetic loadings – Thermal considerations – Heat flow – Temperature rise and Insulating Materials – Rating of machines – Standard specifications.

UNIT II: DESIGN OF DC MACHINES
Construction - Output Equations – Main Dimensions – Choice of specific loadings – Selection of number of poles – Design of Armature – Design of commutator and brushes – design of field Computer program: Design of Armature main dimensions.

UNIT III: DESIGN OF TRANSFORMERS
Construction - KVA output for single and three phase transformers – Overall dimensions – design of yoke, core and winding for core and shell type transformers – Estimation of No load current – Temperature rise in Transformers – Design of

Tank and cooling tubes of Transformers. Computer program: Complete Design of single phase core transformer.

UNIT IV: DESIGN OF INDUCTION MOTORS
Construction - Output equation of Induction motor – Main dimensions – choice of specific loadings – Design of squirrel cage rotor and wound rotor –Magnetic leakage calculations – Operating characteristics : Magnetizing current - Short circuit current – Circle diagram - Computer program: Design of slip-ring rotor .

UNIT V: DESIGN OF SYNCHRONOUS MACHINES

Output equations – choice of specific loadings – Design of salient pole machines – Short circuit ratio – Armature design – Estimation of air gap length – Design of rotor –Design of damper winding – Determination of full load field MMF – Design of field winding – Design of turbo alternators.

UNIT VI: DESIGN OF BLDC MACHINES
Computer program: Design of Stator main dimensions-Brushless DC Machines.

TEXT BOOKS:

1. Sawhney, A.K., 'A Course in Electrical Machine Design', Dhanpat Rai & Sons, New Delhi, 1st edition, 1984.
2. M. V. Deshpande "Design and Testing of Electrical Machine Design" Wheeler Publications, 1st edition, 2010.

REFERENCES BOOKS:

1. A. Shanmuga Sundaram, G. Gangadharan, R. Palani 'Electrical Machine Design Data Book', New Age International Pvt. Ltd., Reprint, 1st edition, 2007.
2. R. K. Agarwal "Principles of Electrical Machine Design" Esskay Publications, Delhi, 1st edition, 2002.
3. Sen, S.K., 'Principles of Electrical Machine Designs with Computer Programmes', Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi, 1st edition, 1987.
4. https://nptel.ac.in/courses/108/106/108106023/.

Annexure III

List courses offered under Open Elective –II & III in VII & VII semesters respectively under V18 Regulation for all other branches:

Open Electives(Offered to the other Departments)						
S. No.	**Course Code**	**Name of the Course**	**L**	**T**	**P**	**Credits**
Open Elective-I: (Approved by BOS)						
1.	V18EEOE1	Energy Audit & Conservation	3	-	-	3
2.	V18EEOE2	Electrical Measuring Instruments	3	-	-	3
3.	V18EEOE3	Industrial Safety	3	-	-	3
Open Elective-II: (For the Approval from BOS)						
1.	V18EEOE4	Non-Conventional Energy Sources	3	-	-	3
2.	V18EEOE5	Electrical Engineering Materials	3	-	-	3
3.	V18EEOE6	Servicing of Electrical Appliances	3	-	-	3
Open Elective-III: (For the Approval from BOS)						
1.	V18EEOE7	Energy Storage Systems	3	-	-	3
2.	V18EEOE8	Basics of Electrical Power Generation	3	-	-	3
3.	V18EEOE9	Industrial Automation	3	-	-	3

Semester	**No. of Credits**
I	16.5
II	19.5
III	22
IV	21
V	24
VI	20
VII	19
VII	18
Total	160

Syllabi for the Courses offering under Open Elective – II & III

Semester	VII SEM	L	T	P	C	Course Code
Regulation	**V18**	**3**	**-**	**-**	**3**	**V18EETOE4**
Name of the Course	**Non Conventional Energy Sources (Open Elective-II)**					
Branches	**EEE**					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Understand the solar radiation and calculate geometric angle	**K3**
CO2	Understand the working of solar thermal collectors	**K2**
CO3	Understand the working of solar photo voltaic systems and develop the maximum power point techniques	**K3**
CO4	Understand the wind energy conversion systems, Betz coefficient and tip speed ratio.	**K2**
CO5	Understand the basic principle and working of hydro and tidal systems.	**K2**
CO6	Understand the basic principle and working of, biomass, fuel cell and geothermal systems.	**K2**

UNIT–I: FUNDAMENTALS OF SOLAR ENERGY AND ENERGY CONSERVATION PRINCIPLE

Energy scenario (world and India) – various forms of renewable energy - Solar radiation: Outside earth's atmosphere –Earth surface– Analysis of solar radiation data –Geometry–Radiation on tilted surfaces– Numerical problems.

UNIT–II: SOLAR THERMAL SYSTEMS

Liquid flat plate collectors: Performance analysis –Transmissivity– Absorptivity product collector efficiency factor –Collector heat removal factor – Numerical problems. Introduction to solar air heaters – Concentrating collectors, solar pond and solar still– solar thermal plants.

UNIT–III: SOLAR PHOTOVOLTAIC SYSTEMS

Solar photovoltaic cell, module, array – construction – Efficiency of solar cells – Developing technologies – Cell I-V characteristics – Equivalent circuit of solar cell –

Series resistance – Shunt resistance – Applications and systems –Balance of system components - System design: storage sizing – PV system sizing – Maximum power point techniques: Perturb and observe(P&O)technique–Hill climbing technique.

UNIT–IV: WIND ENERGY

Sources of wind energy - Wind patterns – Types of turbines –Horizontal axis and vertical axis machines - Kinetic energyofwind–Betzcoefficient–Tip–speedratio–Efficiency–Poweroutputofwindturbine–Selection of generator(synchronous,induction) – Maximum power point tracking –wind farms–Power generation for utility grids.

UNIT–V: HYDRO AND TIDAL POWER SYSTEMS

Basic working principle – Classification of hydro systems: Large, small, micro–measurement of head and flow–Energy equation – Types of turbines – Numerical problems. Tidal power – Basics – Kinetic energy equation – Turbines for tidal power - Numerical problems – Wave power – Basics – Kinetic energy equation – Wave power devices – Linear generators.

UNIT–VI: BIOMASS AND GEOTHERMALSYSTEMS

Fuel classification – Pyrolysis – Direct combustion of heat– Different digesters and sizing. Geothermal: Classification – Dry rock and hot aquifer–Energy analysis–Geothermal based electric power generation

TEXT BOOKS:

1. Solar Energy: Principles of Thermal Collection and Storage, S.P. Sukhatme and J.K. Nayak, TMH, New Delhi, 3rdedition , 2013.
2. Renewable Energy Resources, John Twidell and Tony Weir, Taylor and Francis-2ndedition,2013.

REFERENCE BOOKS:

1. Energy Science: Principles, Technologies and Impacts, John Andrews and Nick Jelly, Oxford University Press, 2ndedition, 2013.
2. Renewable Energy-Edited by Godfrey Boyle- oxford University. Press, 3rd edition, 2013.
3. Hand book of renewable technology Ahmed and Zobaa, Ramesh C Bansal, World scientific, Singapore, 1st edition, 2011.
4. Renewable Energy Technologies, Ramesh & Kumar, Narosa, 1st edition, 1997.
5. Renewable energy technologies– A practical guide for beginners –Chetong Singh Solanki, PHI, 1st edition, 2008.
6. Non-conventionalenergysource–B.H.khan-TMH-2nd edition, 2017.

7. https://nptel.ac.in/courses/121/106/121106014/.

Semester	**VII SEM**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	**V18**	**3**	**-**	**-**	**3**	**V18EEOE5**
Name of the course	**Electrical Engineering Materials (Open Elective-II)**					
Branches	**EEE**					

Course Outcomes:
After successful completion of this course, the students will be able to

CO No.	**Course Outcome**	**Knowledge Level**
CO1	Familiarise the properties of different conducting materials and their applications	**K2**
CO2	Analyse the properties of Insulating materials	**K2**
CO3	Understand semi conducting and dielectric materials and their properties	**K2**
CO4	Understand Magnetic materials and their properties	**K2**
CO5	Comprehend the working function of Special purpose materials	**K2**
CO6	Understand and analyse the working of Various Batteries	**K3**

UNIT-I: CONDUCTING MATERIALS

Conducting Materials – Properties -Hardening, Annealing – Its effects- Low Resistive Materials –Requirements – Properties and applications of Copper and Aluminum - Comparison between Copper and Aluminum - ACSR Conductors, AAAC, - High Resistive Materials – Requirements-Properties and applications of Manganin, Eureka, Constantan, Nichrome, Tungsten, Mercury and Carbon-colour coding of resistor.

UNIT-II: INSULATING MATERIALS

Properties -Insulation resistance - Factors effecting Insulation resistance - Classification of Insulating materials - Properties & Applications i) Impregnated paper ii) Wood iii) Cardboard iv) Asbestos v)Mica vi)Ceramics and vii) Glass- Thermo Plastics, Thermo Setting resins – PVC- Effects on PVC- Properties and Applications of Insulating Gases(Air, Nitrogen, Hydrogen and Sulphur Hexa Fluoride).

UNIT- III: SEMICONDUCTING & DIELECTRIC MATERIALS

Semiconductors - Intrinsic and Extrinsic semiconductors- `P’ and `N’ type materials- Distinguish between P-type and N- type Semi-Conductors. Permittivity of different Di-electric materials-Polarization-Dielectric Loss– Applications of Dielectrics- Colour coding of capacitors.

UNIT-IV: MAGNETIC MATERIALS

Classification of magnetic materials - Soft & Hard magnetic materials- B-H Curves – Hysteresis loop - Hysteresis loss - Steinmetz constant - Eddy Current Loss -- Curie Point – Magneto striction.

UNIT-V: SPECIAL PURPOSE MATERIALS

Need of Protective materials – List of Special Purpose Materials (Lead, Paints, Steel Tapes) - Thermocouple - Bi-metals- Fabrication -Soldering- Fuses -Galvanizing and Impregnating-Importance of Nano Materials.

UNIT-VI: BATTERIES

Primary cell and Secondary cells-Lead-Acid, Nickel iron and Nickel - cadmium - Chemical reactions during charging and discharging– Charging of Batteries-Constant Current method and Constant Voltage method-Trickle charging- Capacity of Battery - Ampere-Hour efficiency and Watt-Hour efficiency-Numerical problems on Ampere-Hour efficiency and Watt-Hour efficiency - Maintenance free batteries

TEXT BOOKS:

1. Electrical Engineering Materials – N.I.T.T.T.R Publications, 1st edition, 1959.
2. Introduction to Engineering materials – B. K. Agarwal, 1st edition, 2006.
3. Electrical Engineering Materials by PL Kapoor, Khanna Publishers, New Delhi, 1st edition, 1988.
4. Electrical & Electronics Engineering Materials BR Sharma and Others, Satya Parkashan, New Delhi, 1st edition, 2013.

REFERENCE BOOKS

1. Electronic Components -Dr. K. Padmanabham, laxmi publications (p) Ltd, 1st edition, 2016.
2. Electronic Components -D. V. Prasad
3. Material science for Electrical and Electronic Engineers – Ian P. Jones, Oxford Publications, 1st edition, 2000.
4. Electrical and Electronic Engineering Materials by SK Bhattacharya, Khanna Publishers, New Delhi Electronic Components and Materials by Grover and Jamwal, Dhanpat Rai and Co., New Delhi, 1st edition, 1996.
5. Electrical Engineering Materials by Sahdev, Unique International Publications
6. Electronic Components and Materials by SM Dhir, Tata McGraw Hill, New Delhi, 1st edition, 2006.
7. Electronic Engineering Materials by ML Gupta, Dhanpat Rai & Sons, New Delhi

Semester	VII SEM	L	T	P	C	Course Code
Regulation	V18	3	-	-	3	V18EEOE6
Name of the Course	Servicing of Electrical Appliances (Open Elective-II)					
Branches	EEE					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Understand Testing of Electrical Domestic Appliances	**K2**
CO2	Understand maintenance of U.P.S and SMPS	**K2**
CO3	Understand Maintenance of Electrical Power devices	**K2**
CO4	Understand Safety procedure	**K2**
CO5	Understand Departmental Tests	**K2**
CO6	Understand Rural electrification and Indian Electricity Act	**K2**

UNIT-I: TESTING OF ELECTRICAL DOMESTIC APPLIANCES

Tools & meters required for testing and repair of Domestic appliances-Principle, construction & working with fault finding, dismantling, assembling and testing after repair of the Domestic appliances.

Note: Suitable tests to be conducted on the above Electrical Domestic appliances are Open circuit, Short circuit, Earth fault and Leakage tests.

UNIT-II: U.P.S AND SMPS

Commercial power supply-Disturbances and Spikes in voltages-UPS-SMPS

UNIT- III: MAINTENANCE OF ELECTRICAL POWER DEVICES

Preventive and periodical maintenance schedule of the following electrical power devices. i.e Batteries (Dry / Wet), UPS / Inverters, DC & AC Motors, Motor starters (AC & DC), Air conditioners, Power transformers, Pole mounted & Plinth mounted transformer yards, Circuit breakers.

UNIT-IV: SAFETY

Need of safety - Equipment used in Electrical and general safety - Different types of Electrical hazards / accidents - Causes of different Electrical hazards / accidents - Methods to avoid Electrical hazards / accidents - First-Aid methods followed to rescue a person met with Electric shock - Do's & Don't's of Electrical supervisor at Electrical substations - Different fire extinguishers- operation and application of different fire extinguishers.

UNIT-V: DEPARTMENTAL TESTS

Electrical installation testing - departmental procedure for testing before giving service connection – departmental procedure for obtaining service connection - desirable insulation resistance for domestic and power circuits – Tests for measuring insulation resistance - procedure for conducting insulation resistance test and continuity tests, earth continuity test

UNIT-VI: RURAL ELECTRIFICATION AND INDIAN ELECTRICITY ACTS.

Design of rural electrification scheme - Load survey-determination of capacity of transformer - estimation of quantity of materials required for the erection of distribution lines and 11 kV feeder from a nearby 11 kV feeder - determining the economic feasibility of the scheme as per the procedure laid out in NEC, - Indian Electricity Act-2003 rules related to domestic and Industrial lighting- power, agricultural and earthing installations, erection of 11 kV, 400 Volt

TEXT BOOKS:

1. Operation & Maintenance of Electrical Machines Vol – I by B.V.S. Rao - Media Promoters & Publisher, 1963.
2. Operation & Maintenance of Electrical Machines Vol – II by B.V.S. Rao - Media Promoters & Publisher, 1967.
3. Study of Electrical Appliances and devices by K. B. Bhatia, Khanna Publishers, New Delhi, 1st edition, 1988.

REFERENCE BOOKS:

1. Preventive Maintenance by C.J. Hubert, zs
2. Testing, Commissioning Operation & Maintenance of Electrical equipment by S. Rao
3. Indian Electricity Act-2003
4. APERC regulation Act (www.aperc.gov.in)
5. Electrical Installation design and drawing by CR Dargar -New Asian publishers

Semester	**VIII SEM**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	**V18**	**3**	**-**	**-**	**3**	**V18EEOE7**
Name of the Course	**Energy Storage Systems (Open Elective-III)**					
Branches	**EEE**					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	**Course Outcome**	**Knowledge Level**
CO1	Identify the Factors for the Need of Energy Storage	**K2**
CO2	Classify various types of energy Storages	**K2**
CO3	Describe the performance factors of Energy Storage Systems.	**K2**
CO4	Describe charging patterns in Battery Storage Systems	**K2**
CO5	Identify Various Types of Fuel Cells	**K2**
CO6	Identify various applications of Electrical Storage	**K2**

UNIT – I: NEED FOR ENERGY STORAGE

Electricity and the roles of EES, High generation cost during peak-demand periods, Long distance between generation and consumption-Variations in Energy Demand Variations in Energy Supply - Interruptions in Energy Supply - Transmission Congestion - Demand for Portable Energy

UNIT-II: TYPES OF ENERGY STORAGE SYSTEMS

Potential energy -pumped hydro, compressed air, springs - Kinetic energy - mechanical flywheels - Thermal energy with phase change-ice, molten salts, steam - Chemical energy-hydrogen, methane, gasoline, coal, oil - Electrochemical energy-batteries, fuel cells, Electrostatic energy -capacitors, Electromagnetic energy-superconducting magnets.

UNIT-III: PERFORMANCE FACTORS OF ENERGY STORAGE SYSTEMS

Energy capture rate and efficiency - Discharge rate and efficiency - Dispatch ability and load flowing characteristics, scale flexibility, durability – Cycle lifetime, mass and safety – Risks of fire, explosion, toxicity - Ease of materials, recycling and recovery -Environmental consideration and recycling

UNIT-IV: BATTERY STORAGE SYSTEM

Introduction with focus on Lead Acid and Lithium - Chemistry of Battery Operation, Power storage calculations, Reversible reactions, Charging patterns, Battery Management system.

UNIT-V: FUEL CELL

Fuel Cell-Construction-Working Principle-Types of Fuel Cells-Polymer electrolyte membrane Fuel Cell-Alkaline Fuel Cell-Solid oxide Fuel Cell-Merits and Demerits

UNIT – VI: APPLICATIONS OF ELECTRICAL ENERGY STORAGE

Waste heat recovery-Solar energy storage- Power plant applications-Energy storage in automotive applications

TEXT BOOKS:

1. Doughty Liaw, Narayan and Srinivasan, “Batteries for Renewable Energy Storage".
2. The Electroc Jiujun Zhang, Lei Zhang, Hansan Liu, Andy Sun, Ru-Shi Liu, “Electrochemical Technologies for Energy Storage and Conversion", John Wiley and Sons, 2012.hemical Society, New Jersy, 2010.
3. Detlef Stolten, "Hydrogen and Fuel Cells: Fundamentals, Technologies and Applications ", Wiley, 2010.

REFERENCE BOOKS:

1. The Electrical Energy Storage by IEC Market Strategy Board.
2. “James M. Eyer, Joseph J. Iannucci and Garth P. Corey “, “Energy Storage Benefits and Market Analysis”, Sandia National Laboratories, 2004.
3. https://nptel.ac.in/content/storage2/courses/108103009/download/M9.pdf

Semester	VIII SEM	L	T	P	C	Course Code
Regulation	V18	3	-	-	3	V18EETOE8
Name of the Course	Basics of Electrical Power Generation (Open Elective-III)					
Branches	EEE					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Understand the various energy sources, substations and switchgear devices.	K2
CO2	Understand the principle of operation of different components of thermal power stations.	K2
CO3	Understand the principle of different components of a Nuclear power stations.	K2
CO4	Understand the principle of operation of different components of hydro power stations.	K2
CO5	Understand the working of solar photo voltaic systems and applications.	K3
CO6	Understand the wind energy conversion systems, efficiency and power generation.	K2

UNIT–I: FUNDAMENTALS OF ELECTRICAL POWER SYSTEM

Energy scenario (world and India) – various Conventional and non-conventional energy sources–structure of electric power system: generation, transmission, distribution- classification of substations-switchgear devices: switches, fuses, relay, MCB.

UNIT–II: THERMAL POWER STATIONS

Schematic arrangement- Selection of site- general layout of a thermal power plant showing paths of coal, steam, water, air, ash handling system: generation, transmission, distribution and flue gasses, ash handling system- Brief description of components: Boilers, Super heaters, Economizers, electrostatic precipitators Condensers, feed water circuit, Cooling towers and Chimney.

UNIT–III: NUCLEAR POWER STATIONS

Location of nuclear power plant, Working principle, Nuclear fission, Nuclear fuels, Nuclear chain reaction, nuclear reactor Components: Moderators, Control rods, Reflectors and Coolants. Types of Nuclear reactors, Radiation: Radiation hazards and Shielding, nuclear waste disposal.

UNIT–IV: HYDRO POWER STATIONS

Schematic arrangement, advantages and disadvantages, choice of site constituents of hydro power plant, Hydro turbine. Environmental aspects for selecting the sites and locations of hydro power stations.

UNIT–V: SOLAR POWER PLANT

Solar photovoltaic cell, module, array – construction of power plant– Efficiency of solar cells – Cell I-V characteristics – Equivalent circuit of solar cell – Series resistance – Shunt resistance – Applications and systems - System design: storage sizing – PV system sizing.

UNIT–VI: WIND POWER PLANT

Sources of wind energy - Wind patterns – Types of turbines –Horizontal axis and vertical axis machines - construction of power plant –Efficiency– Poweroutputofwindturbine–Selectionofgenerator(synchronous,induction) –Power generation for utility grids.

TEXT BOOKS:

1. A Text Book on Power System Engineering by M. L. Soni, P. V. Gupta, U. S. Bhatnagar and A. Chakrabarti, Dhanpat Rai & Co. Pvt. Ltd.- 2ndedition, 2013.
2. Renewable Energy Resources, John Twidell andTonyWeir,TaylorandFrancis-2ndedition,2013.

REFERENCE BOOKS:

1. Elements of Electrical Power Station Design by – M V Deshpande, PHI, NewDelhi-3rdedition,2010.
2. Renewable Energy – Edited by Godfrey Boyle – oxford university Press, 3rdedition, 2013.
3. Electrical Power Systems by C. L. Wadhwa, 6th Edition, New Age International Publishers, 2018.
4. Non-conventionalenergysource–B.H.khan-TMH-2ndedition,2017.
5. https://nptel.ac.in/content/storage2/courses/108105053/pdf/L-02(TB)(ET)%20((EE)NPTEL).pdf

Semester	VIII SEM	L	T	P	C	Course Code
Regulation	V18	3	-	-	3	V18EEOE 9
Name of the Course	Industrial Automation (Open Elective-III)					
Branches	EEE					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Understand the basic concepts of control systems.	K3
CO2	Understand the concepts of industrial automation and components of control system.	K3
CO3	Illustrate the concepts of electrical actuators and controllers.	K3
CO4	Analyse the Control Procedures in Control systems	K4
CO5	Analyse the Process control	K4
CO6	Understand the concept of PLC and its application	K3

UNIT-I: BASIC CONCEPTS OF CONTROL SYSTEMS

Basic concepts-Definition of open loop and closed loop system, examples with block diagrams. Terms used in the control systems-Types of feedback-Transfer function Definition &derivation control systems- Equivalence of physical system components

UNIT-II: INTRODUCTION TO INDUSTRIAL AUTOMATION

Need of Automation and its requirements, Structure & components Industrial Automation systems, Architectural levels of Industrial controls. Components of control systems-Contact types-Normally open & Normally closed, Solenoids-AC/DC, Input devices Push button, Selector switch, Photo electric, Level Control, Pressure sensing device, Output devices- contactors, valves, Pilot lamps, Relays-Electromagnetic and Reed Relay

UNIT- III: ELECTRICAL ACTUATORS AND CONTROLLERS

Potentiometers –working principle, AC & DC Servomotors-working principle, working of Synchro's - transmitter, control transformer, concept and purpose of a Tacho –generator

UNIT-IV: CONTROL PROCEDURES IN CONTROL SYSTEMS

Types of control systems-Time Variant/ Invariant systems, Continuous data and sampled data system, Linear and Non-Linear control system, Digital Control system Concept of controllers- P Controller, I Controller, PI Controller, PD Controller, PID Controller

UNIT-V: PROCESS CONTROL

Introduction to process control, PID control, controller tuning, implementation of PID controllers, speed control structures- feed forward and ratio control, predictive control, cascade, override and split range control.

UNIT-VI: PLC AND ITS APPLICATIONS

PLC Definition-advantages-Block diagram-Ladder diagrams for AND, OR, NOT, NAND, NOR-Instruction set-Ladder diagram for DOL starter, Star-Delta Starter, Stair case lighting, Traffic light control, Temperature controller-Special control systems DCS, SCADA.

TEXT BOOKS:

1. I J Nagarath & Gopal- Control Systems Engineering, New Age International Publishers,6th edition, 2017.
2. Webb J.W-Programmable controllers: Principle and Applications, PHI publishers, 5th edition, 2002.
3. B.C. Kuo – Automatic Control Systems –John Wiley and Sons, 9th edition, 2014.

REFERENCE BOOKS:

1. Gary Dunning- Introduction to PLC - Delmar Cengage learning publisher, 3rd edition, 2005.
2. Jon Sterenson-Industrial automation and process control, Pearson publisher, 1st edition, 2002.
3. Ogata-Modern Control Engineering, Pearson publisher, 5th edition,2009.
4. https://nptel.ac.in/noc/courses/noc16/SEM1/noc16-ee02/

Annexure- IV

APPROVED COURSE STRUCTURE B. TECH (EEE) UNDER V20 REGULATION

III-Semester

S.No.	Course Code	Course Title	Hours per Week			Credits
			L	T	P	
1	V20MAT03	Transform Calculus	3	0	0	3
2	V20EET04	Electrical Circuit Analysis-II	3	0	0	3
3	V20EET05	Electro Magnetic Fields	3	0	0	3
4	V20EET06	Electrical Machines-I	3	0	0	3
5	V20ECT06	Analog Electronics	3	0	0	3
6	V20EEL04	Electrical Circuits Lab	0	0	3	1.5
7	V20ECL03	Analog Electronics Laboratory	0	0	3	1.5
8	V20CSL31	Data Structures & Algorithms Lab	0	1	3	1.5
9		Skill Oriented Course	1	0	2	2
10	V20ENT02	Professional Communication Skills-I	2	0	0	0
				Total Credits		21.5

Total Contact Hours: 29 Total Credits : 21.5

IV-Semester

S.No.	Course Code	Course Title	Hours per Week			Credits
			L	T	P	
1	V20EET07	Signals and Systems	3	0	0	3
2	V20EET08	Electrical Machines - II	3	0	0	3
3	V20EET09	Electrical and Electronic Measurements	3	0	0	3
4	V20EET10	Electrical Power Generation and Transmission	3	0	0	3
5	V20MBT51	Managerial Economics and Financial Analysis	3	0	0	3
6	V20CSL32	Python Programming Lab	0	1	3	1.5
7	V20EEL05	Electrical Machines-I Lab	0	0	3	1.5
8	V20EEL06	Electrical Measurements Lab	0	0	3	1.5

9		Skill Oriented Course	1	0	2	2
10	V20ENT03	Professional Communication Skills-II	2	0	0	0
					Total Credits	21.5

Total Contact Hours: 29 Total Credits : 21.5

Internship two months (Mandatory) during summer vacation.

List of Skill Oriented Courses:

S. No.	Course Code	Course Title
1.	V20EES01	PCB Design
2.	V20EES02	Scilab
3.	V20EES03	Electrical CAD
4.	V20EES04	Arduino Board
5.	V20EES05	Fundamentals of Drone Technology
6.	V20EES06	Industrial Automation with PLC

Annexure- V

Syllabi for the course offered in III & IV Semesters of B. Tech by Department of EEE under V20 Regulation

Semester	III SEM	L	T	P	C	Course Code
Regulation	V20	3	-	-	3	V20EET04
Name of the Course	Electrical Circuit Analysis –II					
Branches	EEE					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Determine electrical parameters for 3-phase unbalanced systems	K3
CO2	Apply the network theorems for solving electrical circuits.	K3
CO3	Analyze circuit parameters under transient conditions	K3
CO4	Calculate two-port network parameters for any type of electrical networks	K3
CO5	Understand the concept of filters	K2

Unit-I: Unbalanced Three phase circuits

Unbalanced star connected load supplied from: Balanced 3-ϕ, 4-wire system and balanced 3-ϕ, 3-wire system using Millman's, Mesh/Loop and Star-Delta transformation methods; Unbalanced delta connected load supplied from: Balanced 3-ϕ, 3-wire system; Measurement of 3-ϕ active power using two wattmeter method; Measurement of 3-ϕ reactive power using one wattmeter method; Numerical Problems.

Unit-II: Network Theorems (DC & AC Excitations)

Superposition, Thevenin's, Norton's, Milliman's, Reciprocity, Compensation, Maximum Power Transfer, Tellegen's theorems; Problem solving for the network consisting of independent and dependent sources; Concept of Duality and Dual networks.

Unit-III: Transient analysis in DC and AC Circuits

Initial Conditions; Analysis of R-L, R-C and R-L-C circuits with DC and AC excitations using differential equations and Laplace transforms; Numerical Problems.

Unit-IV: Two-Port Networks

Basic Definitions; Z-parameters; Y-parameters; Transmission line (ABCD) parameters; h-parameters; Relationship between parameter sets; Series, Parallel and Cascade connections of two port networks; Problem solving for the network consisting of independent and dependent sources.

Unit-V: Passive Filters

Classification of filters; Analysis and Design of low pass, high pass, band pass and band stop filters (Constant-k & m-derived); Low Pass and High Pass Filters with RC and RL Circuits; Band Pass and Band Stop Filters with RLC Circuit.

Text Books:

1. Engineering Circuit Analysis by William Hayt and Jack E. Kemmerley, McGraw Hill Company,6th edition,Jan 2005
2. Network Analysis by Van Valkenburg, Prentice-Hall of India Private Ltd, revised 3rd edition, 15 April 2019
3. Circuit Theory (Analysis and Synthesis) by A.Chakrabarthi, DhanpatRai& Co.,7th revised edition,1 Jan 2018
4. Network Analysis and Synthesis by Ravish R Singh, Mc Graw Hill Education (I) Pvt. Ltd., 2nd edition, 1 may 2019

Reference Books:

1. Network Theory-Analysis and Synthesis by Smarajit Ghosh, PHI Publishers, 9th edition, Aug 2015
2. Network Theory by N.C. Jagan, C. Lakshminarayana, Anshan Publications, 2nd edition September 30, 2005
3. Fundamentals of Electrical Circuits by Charles K. Alexander and Mathew N.O. Sadiku, McGraw Hill Education (India), 5th edition, 1st july 2013
4. Network Analysis by C.L.Wadhwa, New Age International Publishers., 3rd edition, 1 Aug 2018
5. Electrical Circuit Analysis by Sudhakar A. & Shyammohan S. Palli, McGraw Hill Publication, 5th edition 1 july 2017
6. Introductory Circuit Analysis by Robert L Boylestad, Pearson Publications,12th edition,1st Jan 2013
7. https://nptel.ac.in/courses/108/105/108105159/

Semester	III SEM	L	T	P	C	Course Code
Regulation	V20	3	-	-	3	V20EET05
Name of the Course	Electro Magnetic Fields					
Branches	EEE					

Course Outcomes:

After successful completion of the course, the student will be able to:

CO No.	Course Outcome	Knowledge Level
CO1	Compute the electric field and potential due to different configurations of static charges and electric dipole.	K3
CO2	Calculate the capacitance of various configurations and understand the concept of conduction and convection current densities.	K3
CO3	Apply the Biot-Savart‘s law and Amperes Circuital Law for finding MFI for different cables and develop the Maxwell equations.	K3
CO4	Determine the magnetic forces, torque produced by currents in magnetic fields, self-inductance of solenoid and toroid.	K3
CO5	Calculate the induced E.M.F‘s and understand the concept of fields varying with time.	K3

Unit-I: Electrostatics

Electrostatic Fields; Coulomb‘s Law; Electric Field Intensity (EFI) - EFI due to a line and a surface charges; Work done in moving a point charge in an electrostatic field; Electric Potential - Properties of potential function, Potential gradient; Guass‘s law; Maxwell‘s first law, div(D)=ρv; Laplace‘s and Poison‘s equations; Electric dipole - Potential and EFI due to an electric dipole, Torque on an Electric dipole placed in an electric field.

Unit-II: Conductors, Dielectrics and Capacitance Conductors & Dielectrics

Conductors - Behavior of conductors in an electric field; Dielectrics - Polarization; Electric boundary conditions.

Capacitance: Capacitance of parallel plates, spherical and coaxial cables with composite dielectrics; Energy density in a static electric field; Current density - Conduction and Convection current densities; Ohm‘s law in point form, Equation of continuity.

Unit-II: Magneto Statics

Introduction; Biot-Savart‘s law; Magnetic Field Intensity (MFI) - MFI due to a straight current carrying filament, circular, square and solenoidal current carrying wires; Maxwell‘s second Equation i.e, div(B)=0.

Ampere‘s circuital law - MFI due to an infinite sheet of current, long filament current carrying conductor, Pointform of Ampere‘s circuital law; Maxwell‘s third equation i.e, Curl (H)=J.

Unit-IV: Forces in Magnetic fields and Inductance

Magnetic force; Behavior of charges moving in magnetic field; Lorentz force equation; Force on a current carrying element placed in a magnetic field; Force on a straight and a long current carrying conductor placed in a magnetic field; Force between two straight long and parallel current carrying conductors; Magnetic dipole - a differential current loop as a magnetic dipole, Torque on a current loop placed in a magnetic field; Inductance: Basic expressions for self and mutual inductances, self-inductance of a solenoid and toroid.

Unit-V: Time Varying Fields

Introduction; Integral and point forms of faraday‘s laws of electromagnetic induction; statically and dynamically induced EMFs; Maxwell‘s fourth equation, Curl (E) = $-\partial B/\partial t$; Modification of Maxwell‘s equations for time varying fields; Simple problems.

Text Books:

1. Engineering Electromagnetics by William H. Hayt& John. A. Buck Mc. Graw-Hill Companies, 7th Editon.2006.
2. Electromagnetic Fields by R MeenaKumari, R Subhasri, New Age International, 2nd edition, Jan 2007.
3. Elements of Electromagnetics by Matthew N.O. Sadiku, Oxford University Press, 4th edition, 1 Jan 2006

Reference Books:

1. Introduction to Electro Dynamics by D J Griffiths, Prentice-Hall of India Pvt. Ltd, 4th edition, 1st Jan 2015
2. Electromagnetic Field Theory by Yaduvir Singh, Pearson., 1st edition 23 April 2011
3. Fundamentals of Engineering Electromagnetics by Sunil Bhooshan, Oxford higher education., 1st edition 30 june 2012

4. https://nptel.ac.in/courses/108/106/108106073/

Semester	III SEM	L	T	P	C	Course Code
Regulation	V20	3	-	-	3	V20EET06
Name of the Course	Electrical Machines – I					
Branches	EEE					

Course Outcomes:

After successful completion of the course, the student will be able to:

CO No.	Course Outcome	Knowledge Level
CO1	Asses the performance of a DC Machines	K3
CO2	Understand the torque production mechanism and control the speed of DC Machines	K2
CO3	Asses the performance of single phase transformers	K3
CO4	Calculate the regulation, losses and efficiency of single phase transformers	K3
CO5	Understand the parallel transforms, control voltages with tap changing methods and achieve three phase to two phase transformation	K2

Unit-I: Introduction and Performance of DC machines

Construction and principle of operation of DC machine; EMF equation of DC generator; Classification of DC machines based on excitation; Magnetization Characteristics of DC shunt generator, DC machine acts as a motor - back-emf and Torque, Armature Reaction and Commutation; Characteristics of separately-excited, shunt, series and compound motors; losses and efficiency of a DC machine; Applications of DC motors

Unit-II: Starting, Speed Control and Testing of D.C. Machines

Necessity of Starter - Working of 3-Point and 4-Point Starters; Speed Control of DC shunt motor by armature voltage and field flux control; Testing of DC machines - Brake Test, Swinburne‘s method, Hopkinson‘s Test, Retardation Test; Simple Numerical Problems.

Unit-III: Single-phase Transformers

Types, Constructional details, Principle of operation, EMF Equation of a 1-Φ Transformer; Transformer operation on No-Load and On-Load for lagging, leading and unity power factors loads and their phasor diagrams; Transformer equivalent circuit; Transformer Regulation, Losses and efficiency; effect of variation of supply frequency and voltage on losses; All day efficiency.

Unit-IV: Testing of Single-phase Transformers

O.C. and S.C. tests; Sumpner‘s test; Separation of losses of a 1-Φ transformer; Parallel operation with equal voltage ratios; Auto Transformer - equivalent circuit, comparison with two winding transformers.

Unit-V:-3-Phase Transformers

Poly-phase connections, Y/Y, Y/Δ, Δ/Y, Δ/Δ and open-Δ; Scott Connection; Three winding Transformer: Determination of Zp, Zs and Zt; Off-load and On-load tap changers.

Text Books:

1. Electrical Machines by P.S. Bhimbra, Khanna Publishers.7th edition 1st Jan 1977

2. Theory & Performance of Electrical Machines by J. B. Guptha. S. K. Kataria& Sons. 15th edition 2015

Reference Books:

1. Electrical Machines by D. P.Kothari, I .J .Nagarth, Mc Graw Hill Publications, 5thedition 23 june 2017

2. Electrical Machines by R. K. Rajput, Lakshmi publications, 5th edition, 1st Jan 2016

3. Electrical Machinery by Abijith Chakrabarthi and Sudhipta Debnath, McGraw Hill

Education 1st edition 9th Feb 2015

4. Electrical Machinery Fundamentals by Stephen J Chapman, McGraw Hill education

4th edition 1st july 2017

5. Electric Machines by Mulukutla S. Sarma & Mukeshk. Pathak, CENGAGE Learning., 1st edition 1st November 2009

6. Electric Machinery by A. E. Fitzgerald, Charles kingsley, Stephen D. Umans, TMH 6th edition 16th Aug 2002

7.https://nptel.ac.in/courses/108/105/108105155/

Semester	III SEM	L	T	P	C	Course Code
Regulation	V20	0	0	3	1.5	V20EEL04
Name of the Course	Electrical Circuits Laboratory					
Branches	EEE					

Course Outcomes:

After successful completion of the course, the student will be able to:

CO No.	Course Outcome	Knowledge Level
CO1	Compute response in the electrical circuits using various Network theorems	K3
CO2	Sketch Locus Diagrams of RL and RC Series Circuits	K2
CO3	Find parameters of the circuit under resonance conditions	K3
CO4	Determine two port network parameters	K3
CO5	Calculate 3phase power and choke coil parameters	K3

Any 10 experiments are to be conducted

1. Verification of KVL and KCL
2. Verification of Thevenin‘s and Norton‘s Theorems
3. Verification of Superposition and Reciprocity Theorem
4. Verification of Compensation and Millmann‘s Theorems.
5. Verification of Maximum Power Transfer Theorem.
6. Locus Diagrams of RL and RC Series Circuits.
7. Time Response of first order RC and second order RLC Networks.
8. Series and Parallel Resonance
9. Determination of Z and Y parameters.
10. Determination of Transmission and hybrid parameters.
11. Determine the Parameters of a choke coil
12. Measurement of 3-phase Power by two Wattmeter Method for unbalanced loads

Semester	IV SEM	L	T	P	C	Course Code
Regulation	V20	3	-	-	3	V20EET07
Name of the Course	Signals and Systems					
Branches	EEE					

Course Outcomes
After Successful completion of this course, students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Understand and estimate various types of signals and systems.	(K2)
CO2	Understand the basic principles of Sampling Theorem.	(K2)
CO3	Understand the characteristics of LTI Systems	(K2)
CO4	Understand the concepts of Cross-Correlation and Auto-Correlation of Functions	(K2)
CO5	Apply the concept of ROC for Laplace Transform and Z transform, Inverse Z transforms.	(K3)

Unit-I:Introduction

Definition of Signals and Systems, Classification of Signals, Classification of Systems, Operations on signals: time-shifting, time-scaling, amplitude-shifting, amplitude-scaling. Problems on classification and characteristics of Signals and Systems. Complex exponential and sinusoidal signals, Singularity functions and related functions: impulse function, step function signum function and ramp function. Analogy between vectors and signals, orthogonal signal space, Signal approximation using orthogonal functions, mean square error, closed or complete set of orthogonal functions, Orthogonality in complex functions.

Unit–II: Sampling theorem

Graphical and analytical proof for Band Limited Signals, impulse sampling, Natural and Flat top Sampling, Reconstruction of signal from its samples, effect of under sampling – Aliasing, Introduction to Band Pass sampling.

Unit-III: Linear Time Invariant (LTI) System

Linear- nonlinear, Time variant-invariant, casual - non-casual, static-dynamic, stable-unstable, invertible. Convolution sum and convolution integral using graphical methods for different signals (Time domain).

Unit-IV: Cross-Correlation And Auto-Correlation of Functions

Properties of correlation function, Energy density spectrum, Parseval's theorem, Power density spectrum, Relation between auto correlation function and energy/power spectral density function. Relation between convolution and correlation, Detection of periodic signals in the presence of noise by correlation, Extraction of signal from noise by filtering.

Unit –V: Transforms

Concept of region of convergence (ROC) for Laplace transforms, constraints on ROC for various classes of signals, Distinction between Laplace, Fourier and Z transforms. Region of convergence in Z-Transform, constraints on ROC for various classes of signals, Inverse Z-transform, properties of Z-transforms.

Text Books:

1. Signals, Systems & Communications - B.P. Lathi, BS Publications, 2008.
2. Signals and Systems - A.V. Oppenheim, A.S. Willsky and S.H. Nawab, PHI, 2nd Edn, 1996.
3. Signals & Systems- Narayan Iyer and K Satya Prasad, Cenage Publications, 1st Edition 2011.

Reference Books:

1. Signals & Systems - Simon Haykin and Van Veen, Wiley, 2nd Edition, 2017.
2. Principles of Linear Systems and Signals – BP Lathi, Oxford University Press, 2015
3. Signals and Systems – K Raja Rajeswari, B Visweswara Rao, PHI, 2nd Edition 2014
4. Fundamentals of Signals and Systems- Michel J. Robert, MGH International Edition,2008.
5. Signals and Systems – T K Rawat , Oxford University press, 2011

NPTEL Link : https://nptel.ac.in/courses/117/101/117101055/

Semester	IV SEM	L	T	P	C	Course Code
Regulation	V20	3	-	-	3	V20EET08
Name of the Course	Electrical Machines – II					
Branches	EEE					

Course Outcomes:

After successful completion of the course, the student will be able to:

CO No.	Course Outcome	Knowledge Level
CO1	Explain the operation and performance of three phase induction motor	**K2**
CO2	Assess the torque-speed relation, performance of induction motor and induction generator	**K3**
CO3	Explain the torque production mechanism and starting of single phase induction motors	**K2**
CO4	Asses the performance of synchronous generators by determining its voltage regulation	**K3**
CO5	Explain the operation and performance of Synchronous Motors	**K2**

Unit-I: 3-Phase Induction Motors

Construction details of cage and wound rotor machines; Production of rotating magnetic field; Principle of operation; Rotor EMF, Rotor frequency, Rotor Current and p.f. at standstill and during running conditions; Rotor power input; rotor copper losses; Mechanical power developed and their interrelationship; Equivalent circuit; Phasor diagram.

Unit-II: Characteristics, starting and testing methods of Induction Motors

Torque equation; expressions for maximum torque and starting torque; torque-slip characteristics; double cage and deep bar rotors construction; crawling and cogging; speed control of induction motor with V/f method; no-load and blocked rotor tests (construction of circle diagram for predetermination of performance parameters); methods of starting, soft starters; induction generator operation (Qualitative treatment only).

Unit-III: Single Phase Motors

Constructional features and its equivalent circuit; Problem of starting – Double revolving field theory; Starting methods; shaded pole motors; AC Series motor.

Unit-IV: Alternators

Constructional features of non–salient and salient pole type alternator; Armature windings – Distributed and concentrated windings; Distribution, Pitch and Winding factors; E.M.F equation; Improvements of waveform and armature reaction; Voltage regulation by synchronous impedance method, MMF method and Potier triangle method; Phasor diagrams; Two reaction analysis of salient pole machine and phasor diagram; Parallel operation of alternators, Numerical problems.

Unit-VI: Synchronous Motors

Principle and theory of operation of Synchronous Motor; Phasor diagram; Starting torque; Variation of current and power factor with excitation; Synchronous condenser; Mathematical Analysis for power developed; Hunting and its suppression; Methods of starting.

Text Books:

1. Electrical Machines by P.S. Bhimbra, Khanna Publishers , Edition-2,2021
2. Theory & Performance of Electrical Machines by J. B. Guptha. S. K. Kataria & Sons , Edition-2,2013
3. Electrical Machinery Fundamentals by Stephen J Chapman McGraw Hill education 5th edition 2011

Reference Books:

1. Electrical Machines by D. P. Kothari, I .J .Nagarth, McGrawHill Publications, 5th edition,2017
2. Electrical Machines by R. K .Rajput, Lakshmi publications, 5th edition, 2016
3. Electrical Machinery by Abijith Chakrabarthi and Sudhipta Debnath, McGraw Hill education 2015
4. Electric Machines by Mulukutla S. Sarma & Mukeshk .Pathak, CENGAGE Learning.
5. Electric Machinery by A.E.Fitzgerald, Charles kingsley, Stephen D.Umans, TMH

NPTEL Link : https://nptel.ac.in/courses/108/105/108105131/

Semester	IV SEM	L	T	P	C	Course Code
Regulation	V20	3	-	-	3	V20EET09
Name of the Course	Electrical and Electronic Measurements					
Branches	EEE					

Course Outcomes:

After successful completion of the course, the student will be able to:

CO No.	Course Outcome	Knowledge Level
CO1	Identify the proper instrument for measurement of AC or DC voltages and currents	K2
CO2	Choose the suitable instrument for the measurement of power and energy.	K3
CO3	Compute the electrical parameters by using appropriate bridge.	K3
CO4	Calculate different magnetic parameters by using magnetic instruments and Understand the operation of potentiometer.	K3
CO5	Understand the operation of various digital instruments.	K2

Unit-I: Electromechanical Indicating Instruments

Classification of measuring instruments; Construction and principle of operation of PMMC, MI instruments; Extension of instrument ranges using shunts, multipliers; Numerical Problems.

Instrument Transformers: Ratio and Phase angle errors (Derivation & Phasor Diagram) and their applications in the extension of instrument ranges, Numerical Problems.

Unit-II: Power and Energy Measurement

Single phase dynamometer wattmeter (LPF and UPF), expression for deflecting and control torques; Type of P.F. Meters; Single phase induction type energy meter, Driving and braking torques, errors and compensations, testing by phantom loading using R.S.S. meter; Numerical Problems.

Unit-III: Measurement of Parameters

Measurement of Resistance: wheat stone‘s bridge and its Sensitivity; Ohm meter; Kelvin‘s double bridge; Loss of charge method; Earth resistance measurement by fall of potential method and megger.

Measurement of inductance & Q-Factor: Maxwell‘s bridge; Hay‘s bridge; Anderson‘s bridge.

Measurement of capacitance and loss angle: Desauty‘s Bridge; Schering Bridge.

Unit-IV: Magnetic Measurements & Potentiometers

Magnetic Measurements: Constructional details of Flux meter; Determination of B–H Loop: Methods of reversals and Step-by-Step method; Core loss measurements by Maxwell‘s and Campbell‘s Bridges, D.C. & A.C. Crompton‘s potentiometer and their applications.

Unit-V: Electronic Instruments

Introduction; Digital Voltmeters (DVM); Ramp type DVM; Integrating type DVM; Successive-approximation DVM; Q- Meter, Digital frequency meter, Digital Tachometer; Measurement of phase difference & Frequency by using lissajous patterns in CRO; Electronic Multi meter.

Text Books:

1. A course in Electrical& Electronic Measurement and Instrumentation by A. K. Sawhney, Dhapat Rai& Co. 2015
2. Electronic Instruments by H.S. Kalsi, Tata Mc-Graw hill. 7th edition 2017

Reference Books:

1. Electrical and Electronic Measurements and instrumentation by R. K. Rajput, S.Chand. 2016
2. Digital Instrumentation by A.J. Bouwens, Tata Mc-Graw hill.
3. Modern Electronic instrumentation & Measuring instruments by A.D. Heltric & W.C. Copper, Wheeler Publication. 2015
4. Instrument transducers by H.K.P. Neubert, Oxford University press.
5. Electrical Measurements by Forest K. Harris, John Wiley and Sons.
6. **NPTEL Link** : https://nptel.ac.in/courses/108/105/108105153/

Semester	IV SEM	L	T	P	C	Course Code
Regulation	V20	3	-	-	3	V20EET10
Name of the Course	Electrical Power Generation & Transmission					
Branches	EEE					

Course Outcomes:

After successful completion of the course, the student will be able to:

CO No.	Course Outcome	Knowledge Level
CO1	Understand the working of conventional power generating stations	K2
CO2	Calculate various factors of load, insulation resistance and power factor of the cables.	K3
CO3	Compute the resistance, inductance and capacitance of transmission lines	K3
CO4	Determine the various transmission line parameters	K3
CO5	Calculate the corona loss, sag and tension in transmission lines	K3

Unit-I: Power Generating Stations

Introduction to renewable and non-renewable energy sources - general layout of a thermal power plant and its Components-General layout of Nuclear power plant - Nuclear fission and Chain Reaction –General Layout of Hydel power plant and Description of its main components- General Layout of Solar and wind Power plants.

Unit-II: Economic Aspects of Power Generation, Tariffs and Cables

Load curve- load duration and integrated load duration curves- discussion on economic aspects: connected load, maximum demand, and demand factor. Different Tariff methods. Construction of cables, Types of Cables, Calculation of insulation resistance and power factor of the cable.

Unit-III: Transmission Line Parameters

Conductor materials: Types of conductors – Calculation of resistance for solid conductors – Calculation of inductance for single phase– Single and double circuit lines–Concept of GMR and GMD–Symmetrical and asymmetrical conductor configuration with and without transposition–Bundled conductors-Numerical

Problems–Calculation of capacitance for 2 wire– Effect of ground on capacitance – Capacitance calculations for symmetrical and asymmetrical for single phase– Numerical Problems.

Unit-IV: Modeling of Transmission Lines

Classification of Transmission Lines: Short, medium and their model representations –Nominal-T–Nominal-Pie and A, B, C, D Constants for symmetrical and Asymmetrical Networks— Evaluation of A,B,C,D Constants– regulation and efficiency-Numerical problems-Surge Impedance –Surge Impedance loading-Wavelengths and Velocity of Propagation.

Unit-V: Sag and Tension Calculations and Overhead Line Insulators

Skin and Proximity effects – Ferranti effect – Charging Current –Shunt Compensation –Corona – Description of the phenomenon–Factors affecting corona- Sag and Tension calculations with equal and unequal heights of towers–Effect of Wind and Ice on weight of Conductor–Numerical Problems

Text Books:

1. Generation, Distribution and Utilization of Electric Energy by C.L.Wadhawa, New age International (P) Limited, Publishers
2. Thermal Engineering by Rajput, Lakshmi publications
3. Electrical Power Systems by C.L.Wadhwa, 6th Edition, New Age International Publishers.

Reference Books:

1. Text Book on Power System Engineering by M.L.Soni, P.V.Gupta, U.S.Bhatnagar and Chakrabarti, DhanpatRai& Co. Pvt. Ltd
2. A Course in Power Systems by J. B. Gupta, S K Kataria& Sons Publishers. 2013
3. Principles of Power Systems by V.K Mehta and Rohit Mehta, S. Chand Publishers. 2nd Edition 2005
4. Electrical Power Systems by P.S.R. Murthy, B.S.Publications, 2017
5. **NPTEL Link :** https://nptel.ac.in/courses/108/102/108102047/

Semester	IV SEM	L	T	P	C	Course Code
Regulation	V20	0	0	3	1.5	V20EEL05
Name of the Course	Electrical Machines-I Lab					
Branches	EEE					

Course Outcomes:

After successful completion of the course, the student will be able to:

CO No.	Course Outcome	Knowledge Level
CO1	Sketch the magnetizing characteristics of DC shunt generator	K3
CO2	Determine and predetermine the performance of DC machines	K3
CO3	Apply different methods to control the speed of the DC motors	K3
CO4	Assess the performance of transformers	K3
CO5	Convert three phase supply to two phase	K2

Any 10 of the following experiments are to be conducted

1. Magnetization characteristics of DC shunt generator: Determination of critical field resistance and critical speed.
2. Brake test on DC shunt motor. Determination of performance curves.
3. Hopkinson‘s test on DC shunt machines. Predetermination of efficiency.
4. Swinburne‘s test and Predetermination of efficiencies as Generator and Motor.
5. Speed control of DC shunt motor by Field and armature Control.
6. Retardation test on DC shunt motor. Determination of losses at rated speed.
7. Separation of losses in DC shunts motor.
8. OC & SC test on single phase transformer.
9. Sumner‘s test on single phase transformers.
10. Scott connection of transformers.
11. Parallel operation of Single phase Transformers.
12. Separation of core losses of a single phase transformer.
13. Heat run test on a bank of 3 Nos. of single phase Delta connected transformers.

Semester	IV SEM	L	T	P	C	Course Code
Regulation	V20	0	0	3	1.5	V20EEL06
Name of the Course	Electrical Measurements Laboratory					
Branches	EEE					

Course Outcomes:

After successful completion of the course, the student will be able to:

CO No.	Course Outcome	Knowledge Level
CO1	Calibrate voltmeters, ammeters, single phase energy meter	K3
CO2	Measure the electrical parameters using Anderson, Schering& Kelvin's double Bridges.	K5
CO3	Apply various methods to calculate powers and choke coil parameters	K3
CO4	Calibrate dynamometer and LPF Wattmeters	K3
CO5	Measure the Dielectric Strength of transformer oil	K3

Any 10 experiments are to be conducted

1. Calibration and Testing of single phase energy Meter
2. Calibration of PMMC ammeter and voltmeter using Crompton D.C. Potentiometer
3. Calibration of AC voltmeter and measurement of choke parameters using AC Potentiometer in polar form.
4. Calibration of dynamometer wattmeter by using phantom loading.
5. Calibration of LPF wattmeter by using direct loading.
6. Capacitance Measurement using Schering Bridge
7. Inductance Measurement using Anderson Bridge.
8. Measurement of 3 phase power with single wattmeter and using two C.Ts

9. Measurement of single phase Power by using 3 Voltmeter and 3 Ammeter method.
10. Measurement of resistance using Kelvin's double Bridge.
11. Dielectric oil testing using H.T test Kit.
12. Measurement of 3 phase reactive power with single wattmeter for balanced loading.
13. Demonstration of Electronic Meters used by electrical field engineers

Annexure VI

Semester	IV SEM (ECE & ECT); V SEM (EEE)	L	T	P	C	Course Code
Regulation	**V20**	**3**	**-**	**-**	**3**	**V20EET11**
Name of the Course	**Control Systems**					
Branches	**EEE, ECE & ECT**					

Course Outcomes

After successful completion of this course, students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Determine the mathematical modelling of physical systems	(K3)
CO2	Calculation of Time Domain Specification of first and second order systems and understand the effect of Controllers	(K3)
CO3	Investigate the stability of closed loop systems using Routh's stability criterion and root locus method.	(K3)
CO4	Find the stability of control systems using frequency response approaches.	(K3)
CO5	Analyze physical systems using state space approach.	(K4)

Unit – I: Mathematical Modeling of Control Systems

Classification of control systems, Open Loop and closed loop control systems and their differences, Feed-Back Characteristics, transfer function of linear system, Differential equations of electrical networks, Translational and Rotational mechanical systems, Transfer Function of DC Servo motor - AC Servo motor- Synchro, transmitter and receiver - Block diagram algebra – Representation by Signal flow graph - Reduction using Mason's gain formula.

Unit-II: Time Response Analysis

Standard test signals - Time response of first and second order systems - Time domain specifications - Steady state errors and error constants – Effects of various controllers

Unit –III: Stability And Root Locus Technique

The concept of stability – Routh's stability criterion –limitations of Routh's stability – Root locus concept - construction of root loci

Unit–IV: Frequency Response Analysis

Introduction to Frequency domain specifications-Bode diagrams- transfer function from the Bode Diagram-Phase margin and Gain margin-Stability Analysis from Bode Plots, Polar Plots, Nyquist Stability criterion. Effects of various controllers.

Unit–V: State Space Analysis of LTI Systems

Concepts of state, state variables and state model, state space representation of transfer function, Diagonalization- Solving the time invariant state equations- State Transition Matrix and it's Properties – Concepts of Controllability and Observability.

Text Books:

1. Control Systems principles and design, M. Gopal, Tata McGraw Hill education Pvt Ltd., 4th Edition, 2014.
2. Automatic control systems, Benjamin C. Kuo, Prentice Hall of India,2ndEdition, 2014.

Reference Books:

1. Modern Control Engineering, Kotsuhiko Ogata, Prentice Hall of India, 2002.
2. Control Systems, ManikDhanesh N, Cengage Publications, 2012.
3. Control Systems Engineering, I.J.Nagarath and M.Gopal, Newage International Publications, 5th Edition, 2007.
4. Control Systems Engineering, S.Palani, Tata McGraw Hill Publications, 2009.
5. https://nptel.ac.in/courses/107/106/107106081/

Annexure VII

Approved Course Structure of M. Tech EEE for Power Electronics & Power Systems (PE&PS) under V21 Regulation

M. Tech - I Semester							
S.No.	**Course Code**	**Course Title**	**L**	**T**	**P**	**Credits**	**Marks**
9.	V21PET01	Analysis of Power Electronic Converters	3	0	0	3	100
10.	V21PET02	Power System Operation & Control	3	0	0	3	100
11.	V21PET03 V21PET04 V21PET05	Elective – I: 4. Control & Integration of Renewable Energy systems 5. Smart Grid 6. Power Quality	3	0	0	3	100
12.	V21PET06 V21PET07 V21PET08	Elective – II: 4. Electrical Distribution Automation 5. HVDC Transmission 6. Advanced Power System Protection	3	0	0	3	100
13.	V21MBT55	Research Methodology and IPR	2	0	0	2	100
14.	V21PEL01	Power Electronics Simulation Lab	0	0	4	2	100
15.	V21PEL02	Power Systems Lab	0	0	4	2	100
16.		Audit Course – I	2	0	0	0	100
			16	0	8	18	800

M. Tech – II Semester							
S.No.	**Course Code**	**Course Title**	**L**	**T**	**P**	**Credits**	**Marks**
9.	V21PET09	Switched Mode Power Conversion	3	0	0	3	100
10.	V21PET10	Real Time Control of Power Systems	3	0	0	3	100
11.	V21PET11 V21PET12 V21PET13	Elective – III: 4. Electrical Machine Modeling & Analysis 5. Control of Electric Drives 6. Application of Power Converters	3	0	0	3	100
12.	V21PET14 V21PET15 V21PET16	Elective – IV: 4. EHVAC Transmission 5. Flexible AC Transmission Systems 6. Power System Dynamics & Stability	3	0	0	3	100
13.	V21PEP01	Mini Project with Seminar	0	0	4	2	100
14.	V21PEL03	Power Converters Lab	0	0	4	2	100
15.	V21PEL04	Power Systems Simulation Lab	0	0	4	2	100
16.		Audit Course – II	2	0	0	0	100
			14	0	12	18	800

Audit course 1 & 2

8. English for Research Paper Writing
9. Disaster Management
10. Value Education
11. Constitution of India
12. Pedagogy Studies
13. Stress Management by Yoga
14. Personality Development through Life Enlightenment Skills.

M. Tech – III Semester							
S.No.	**Course Code**	**Course Title**	**L**	**T**	**P**	**Credits**	**Marks**
4.	V21PET17 V21PET18 V21PET19	Elective – V: 4. Hybrid Electric Vehicles 5. Soft Computing Techniques in Electrical Engineering 6. MOOCS-1 through NPTEL/ SWAYAM- 12 Week Program related to the programme which is not listed in the course structure	3	0	0	3	100
5.	V21OET01 V21MBT56 V21OET03	Open Elective : 4. Operations Research 5. Cost Management of Engineering Projects 6. MOOCs-2 Through NPTEL /SWAYAM - Any 12 week course on Engineering/ Management/ Mathematics offered by other than parent department	3	0	0	3	100
6.	V21PEP02	Dissertation Phase - I	0	0	20	10	50
			6	0	20	16	250

M. Tech – IV Semester							
S.No.	**Course Code**	**Course Title**	**L**	**T**	**P**	**Credits**	**Marks**
2.	V21PEP03	Dissertation Phase – II	0	0	32	16	100
			0	0	32	16	100

Annexure VIII

Syllabi for the Courses offered in I to IV semesters of M. Tech EEE for Power Electronics & Power Systems (PE&PS) under V21 Regulation

Semester	**I SEM**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V21	3	0	0	3	V21PET01
Name of the Course	Analysis of Power Electronic Converters					
Specialization	Power Electronics & Power systems					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Explain the Static and Dynamic Characteristics of power switching devices.	K2
CO2	Analyze the parameters of AC-DC converters	K4
CO3	Explain the operation of power factor correction converters	K2
CO4	Analyze the operation of three phase inverters with PWM control.	K4
CO5	Understand the principles of operation of multi- level inverters and their applications	K2

UNIT– I : Overview of Switching Devices:

Power MOSFET, IGBT, GTO, GaN devices-static and dynamic characteristics, gate drive circuits for switching devices.

UNIT– II: AC-DC converters:

Single phase fully controlled converters with RL load–Evaluation of input power factor and harmonic factor- Continuous and Discontinuous load current, Power factor improvements, Extinction angle control, symmetrical angle control, PWM control.

Three Phase AC-DC Converters, fully controlled converters feeding RL load with continuous and discontinuous load current, Evaluation of input power factor and harmonic factor-three phase dual converters

UNIT– III: Power Factor Correction Converters:

Single-phase single stage boost power factor corrected rectifier, power circuit principle of operation and steady state- analysis, three phase boost PFC converter.

UNIT– IV : PWM Inverters:

Principle of operation - Voltage control of single phase inverters - sinusoidal PWM– modified PWM – phase displacement Control – Trapezoidal, staircase, stepped, harmonic injection and delta modulation. Voltage Control of Three-Phase Inverters- Sinusoidal PWM- 60^0 PWM- Third Harmonic PWM- Space Vector Modulation- Comparison of PWM Techniques- Three phase current source inverters-Variable dc link inverter.

UNIT– V : Multi level inverters:

Introduction, Multilevel Concept, Types of Multilevel Inverters- Diode-Clamped Multilevel Inverter, Principle of Operation, Features of Diode-Clamped Inverter, Improved Diode-Clamped Inverter- Flying-Capacitors Multilevel Inverter- Principle of Operation, Features of Flying-Capacitors Inverter- Cascaded Multilevel Inverter- Principle of Operation- Features of Cascaded Inverter-Switching Device Currents-DC-Link Capacitor Voltage Balancing- Features of Multilevel Inverters-Comparisons of Multilevel Converters.

Text Books

1. Ned Mohan, Tore M. Undeland, William P. Robbins, “Power Electronics: Converters, Applications, and Design”, John Wiley& Sons, 2nd Edition, 2003.
2. Md. H. Rashid, “Power Electronics” –Pearson Education, 3rd Edition- First Indian Reprint-2008.

Reference Books:

1. Philip T. Krein, “Elements of Power Electronics”, Oxford University press, 2nd Edition, 2015.
2. William Shepherd & Li Zhang-Yes Dee, “Power Converter Circuits”, CRC Press, 1st Edition 2004.
3. https://nptel.ac.in/courses/108/108/108108035/

Semester	I SEM	L	T	P	C	COURSE CODE
Regulation	V21	3	0	0	3	V21PET02
Name of the Course	Power System Operation & Control					
Specialization	Power Electronics & Power systems					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Apply various load flow methods to analyse the system	K3
CO2	Apply various methods to solve unit commitment problem and understand Optimal power flow	K3
CO3	Determine the transfer function of single area load frequency control	K3
CO4	Calculate the frequency deviation for two area load frequency control	K3
CO5	Explain the effect of generation with limited energy supply.	K2

UNIT– I: Load Flow Analysis

Newton Raphson method, Fast Decoupled method, AC-DC load flow – Single and three phase methods

UNIT– II: Unit commitment & Optimal power flow

Unit commitment problem and optimal power flow solution: Unit commitment: Constraints in UCP, UC solution methods. Priority list method, introduction to Dynamic programming Approach.

Optimal power flow: OPF without inequality constraints, inequality constraints on control variables and dependent variables.

UNIT– III: Single area Load Frequency Control:

Necessity of keeping frequency constant. Definition of control area, single area control, Block diagram representation of an isolated Power System, Steady State analysis, Dynamic response-Uncontrolled case. Proportional plus Integral control of single area and its block diagram representation, steady state response.

UNIT– IV : Two area Load Frequency Control:

Load frequency control of two-area system, uncontrolled case and controlled case, tie-line bias control, steady state representation. Optimal two-area LF control-performance Index and optimal parameter adjustment. Load frequency control and Economic dispatch control.

UNIT– V: Generation with limited Energy supply:

Take-of-pay fuel supply contract, composite generation production cost function. Solution by gradient search techniques, hard limits and slack variables, Fuel scheduling by linear programming.

Text Books:

1. A. J. Wood and F. Wollenberg, "Power Generation, Operation and Control", John Wiley & sons Inc., 3rd Edition, 2013.
2. I. J. Nagrath & D. P. Kothari, "Modern Power System Analysis", Tata McGraw Hill Publishing Company ltd, 3rd edition 2007.

Reference Books:

1 P.S.R.Murthy, "Power System operation and Control", 1st Edition, Tata McGraw Hill Publishers, 2008
2 O.I. Elgerd, "Electrical Energy Systems Theory", Tata McGraw-Hill Publishing Company Ltd, 2nd edition, 2007.
3 T. J. E Miller, "Reactive Power Control in Electric Systems", John Wiley & sons, 1982.
4 https://nptel.ac.in/courses/108/101/108101040/

Semester	**I SEM**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V21	3	0	0	3	V21PET03
Name of the Course	Control & Integration of Renewable Energy Systems (Elective -I)					
Specialization	Power Electronics & Power systems					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	**Course Outcome**	**Knowledge Level**
CO1	Understand the fundamental requirements of Grid Integration	K2
CO2	Explain different conventional & non-conventional dynamic energy conversion technologies	K2
CO3	Describe different renewable energy sources and storage devices	K2
CO4	Understand the real & reactive power control techniques with renewable generators	K2
CO5	Develop a model of complete system for standalone/grid connected system	K4

UNIT– I: Introduction:

Electric grid introduction, Supply guarantee and power quality, Stability, Effects of renewable energy penetration into the grid, Boundaries of the actual grid configuration, Consumption models and patterns, static and dynamic energy conversion technologies, interfacing requirements .

UNIT– II: Dynamic Energy Conversion Technologies:

Introduction to different conventional and non-conventional dynamic generation technologies, principle of operation and analysis of reciprocating engines, gas and micro turbines, hydro and wind based generation technologies, control and integrated operation of different dynamic energy conversion devices.

UNIT– III: Static Energy Conversion Technologies:

Introduction to different conventional and non conventional static generation technologies, principle of operation and analysis of fuel cell, photovoltaic based generators, and wind based generation technologies, different storage technologies such as batteries, fly wheels and ultra-capacitors, plug-in-hybrid vehicles, control and integrated operation of different static energy conversion devices.

UNIT– IV: Real and reactive power control:

Control issues and challenges in Diesel, PV, wind and fuel cell based generators, PLL, Modulation Techniques, Dimensioning of filters, Linear and nonlinear controllers, predictive controllers and adaptive controllers, Fault-ride through Capabilities, Load frequency and Voltage Control.

UNIT– V: Integration of different Energy Conversion Technologies:

Resources evaluation and needs, Dimensioning integration systems, Optimized integrated systems, Interfacing requirements, integrated Control of different resources, Distributed versus Centralized Control, Synchro Converters, Grid connected and Islanding Operations, stability and protection issues, load sharing, Cases studies.

Text books:

1. Ali Keyhani Mohammad N. Marwali and Min Dai,“Integration and Control of Renewable Energy in Electric Power System”, John Wiley publishing company, 2010.
2. S. Chowdhury, S. P. Chowdhury, P. Crossley,“Microgrids and Active Distribution Networks”, IET Power Electronics Series, 2012.
3. G.M. Masters,“Renewable and Efficient Electric Power Systems”, IEEE-Wiley Publishers, 2nd edition2013.

References:

1. Quing-Chang Zhong,“Control of Power Inverters in Renewable Energy and Smart Grid Integration”, Wiley-IEEE Press, 1st edition, 2012.
2. BinWu, Yongqiang Lang, Navid Zargari, “Power Conversion and Control of Wind Energy Systems”, Wiley, 1st edition, 2011.

Semester	I SEM	L	T	P	C	COURSE CODE
Regulation	V21	3	0	0	3	V21PET04
Name of the Course	Smart Grid (Elective-I)					
Specialization	Power Electronics & Power systems					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Understand concept of smart grid and its advantages over conventional grid.	K2
CO2	Understand smart metering techniques and measuring techniques	K2
CO3	Understand monitoring, protection techniques and storage systems for smart grids	K2
CO4	Illustrate the concept of Micro Grid and its integration	K2
CO5	Examine different communication technologies that can be used for smart grid	K2

UNIT-I: Introduction to Smart Grid

Evolution of Electric Grid, Concept of Smart Grid, Definitions, Need of Smart Grid, Functions of Smart Grid, Opportunities & Barriers of Smart Grid, Difference between conventional & smart grid. Case study of Smart Grid.

UNIT-II : Smart Grid Technologies: Part 1

Introduction to Smart Meters, Real Time Prizing, Smart Appliances, Automatic Meter Reading (AMR), Outage Management System (OMS), Plug in Hybrid Electric Vehicles (PHEV), Vehicle to Grid, Smart Sensors, Home & Building Automation.

UNIT-III :Smart Grid Technologies: Part 2

Smart Substations, Substation Automation, Feeder Automation. Geographic Information System (GIS), Intelligent Electronic Devices (IED) & their application for monitoring & protection, Smart storage like Battery, SMES, Pumped Hydro, Compressed Air Energy Storage, Wide Area Measurement System (WAMS), Phasor Measurement Unit (PMU).

UNIT-IV : Microgrids and Distributed Energy Resources

Concept of micro grid, need & applications of micro grid, formation of microgrid, Issues of interconnection, protection & control of microgrid. Plastic & Organic solar cells, Thin film solar cells, Variable speed wind generators, fuelcells, microturbines, Captive power plants, Integration of renewable energy sources.

UNIT-V: Information and Communication Technology for Smart Grid

Advanced Metering Infrastructure (AMI), Home Area Network (HAN), Neighborhood Area Network (NAN), Wide Area Network (WAN).

Text Books:

1. Ali Keyhani, Mohammad N. Marwali, Min Dai “Integration of Green and Renewable Energy in Electric Power Systems”, Wiley

2. Clark W. Gellings, “The Smart Grid: Enabling Energy Efficiency and Demand Response”,CRC Press

3. JanakaEkanayake, Nick Jenkins, KithsiriLiyanage, Jianzhong Wu, Akihiko Yokoyama,“Smart Grid: Technology and Applications”, Wiley

4. Jean Claude Sabonnadière, NouredineHadjsaïd, “Smart Grids”, Wiley Blackwell 19

5. Peter S. Fox Penner, “Smart Power: Climate Changes, the Smart Grid, and the Futureof Electric Utilities”, Island Press; 1 edition 8 Jun 2010

6. S. Chowdhury, S. P. Chowdhury, P. Crossley, “Microgrids and Active Distribution Networks.” Institution of Engineering and Technology, 30 Jun 2009

7. Stuart Borlase, “Smart Grids (Power Engineering)”, CRC Press

Reference Books:

1. Andres Carvallo, John Cooper, “The Advanced Smart Grid: Edge Power Driving Sustainability: 1”, Artech House Publishers July 2011

2. James Northcote, Green, Robert G. Wilson “Control and Automation of Electric Power Distribution Systems (Power Engineering)”, CRC Press

3. MladenKezunovic, Mark G. Adamiak, Alexander P. Apostolov, Jeffrey George Gilbert “Substation Automation (Power Electronics and Power Systems)”, Springer

4. R. C. Dugan, Mark F. McGranghan, Surya Santoso, H. Wayne Beaty, “Electrical Power System Quality”, 2nd Edition, McGraw Hill Publication

5. Yang Xiao, “Communication and Networking in Smart Grids”, CRC Press

Semester	I SEM	L	T	P	C	COURSE CODE
Regulation	V21	3	0	0	3	V21PET05
Name of the Course	Power Quality (Elective-I)					
Specialization	Power Electronics & Power systems					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Identify the issues related to power quality in power systems	K2
CO2	Describe the problems of transient and long duration voltage variations in power systems	K2
CO3	Analyze the effects of harmonics and understand different mitigation techniques.	K4
CO4	Identify the importance of custom power devices and their applications	K2
CO5	Choose suitable custom power device to mitigate power quality problem	K2

UNIT– I: Introduction to power quality:

Overview of Power Quality, Concern about the Power Quality, General Classes of Power Quality Problems, Voltage Unbalance, Waveform Distortion, Voltage fluctuation, Power Frequency Variations, Power Quality Terms, Voltage Sags, swells, flicker and Interruptions - Sources of voltage and current interruptions, Nonlinear loads.

UNIT– II: Transient and Long Duration Voltage Variations:

Source of Transient Over Voltages - Principles of Over Voltage Protection, Devices for Over Voltage Protection, Utility Capacitor Switching Transients, Utility Lightning Protection, Load Switching Transient Problems.

Principles of Regulating the Voltage, Device for Voltage Regulation, Utility Voltage Regulator Application, Capacitor for Voltage Regulation, End-user Capacitor Application, Regulating Utility Voltage with Distributed generation

UNIT– III : Harmonic Distortion and solutions:

Voltage vs. Current Distortion, Harmonics vs. Transients – Power System Quantities under Non-sinusoidal Conditions, Harmonic Indices, Sources of harmonics, Locating Sources of Harmonics, System Response Characteristics, Effects of Harmonic Distortion, Inter harmonics, Harmonic Solutions - Harmonic Distortion Evaluation, Devices for Controlling Harmonic Distortion, Harmonic Filter Design, Standards on Harmonics

UNIT– IV: Custom Power Devices:

Custom power and custom power devices, voltage source inverters, reactive power and harmonic compensation devices, compensation of voltage interruptions and current interruptions, static series and shunt compensators, compensation in distribution systems, interaction with distribution equipment, installation considerations.

UNIT– V: Application of custom power devices in power systems:

Static and hybrid Source Transfer Switches, Solid state current limiter - Solid state breaker. P-Q theory – Control of P and Q, Dynamic Voltage Restorer (DVR): Operation and control – Interline Power Flow Controller (IPFC): Operation and control of Unified Power Quality Conditioner (UPQC); Generalized power quality conditioner

Text Books:

1. Dugan R C, McGranaghan M F, Santoso S, and Beaty H W, "Electrical Power Systems Quality",2nd Edition, McGraw-Hill, 2002.
2. Bollen M H J, "Understanding Power Quality Problems: Voltage Sags and Interruptions", 1st Edition, IEEE Press; 2000.
3. Guidebook on Custom Power Devices, Technical Report, Published by EPRI, Nov 2000.
4. Gerard Ledwich, Arindam Ghosh, "Power Quality Enhancement Using Custom Power Devices – Power Electronics and Power Systems", Springer US, 1st edition, 2002.

Reference Books:

1. Kennedy B W, “Power Quality Primer”, 1st Edition, McGraw-Hill, 2000.
2. Arrillaga J and Watson N R, “Power System Harmonics”, John Wiley & Sons, 2nd edition, 2003.
3. W. E. Kazibwe and M. H. Sendaula, “Electric Power Quality control Techniques”, Van Nostrad Reinhold Inc, New York, 1993 ed., 1993.
4. C. Shankaran, “Power Quality”, CRC Press, The electric power engineering series, 2002
5. Franciso C.DE LA Rosa, “Harmonics and Power Systems”, CRC Press (Taylor & Francis), 1st edition, 2006.
6. EwaldF.fuchs, Mohammad A.S. Masoum, “Power Quality in Power systems and Electrical Machines”, Elsevier, 1st edition, 2008.
7. H. Akagiet.al., “Instantaneous Power Theory and Application to Power Conditioning”, IEEE Press series, 2007.
8. Arindam Ghosh and Gerard Ledwich, “Custom Power Devices - An Introduction”, Springer, 1st edition, 2002
9. Yash Pal et.al., “A Review of Compensating Type Custom Power Devices for Power Quality Improvement”, Joint International Conference on Power System Technology and IEEE Power India Conference, 2008. POWERCON 2008.
10. https://nptel.ac.in/courses/108/107/108107157/

Semester	I SEM	L	T	P	C	COURSE CODE
Regulation	V21	3	0	0	3	V21PET06
Name of the Course	Electrical Distribution Automation (Elective-II)					
Specialization	Power Electronics & Power systems					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Understand various factors of distribution system	**K2**
CO2	Construct the distribution substation and feeders	**K3**
CO3	Understand the distribution system protection and its coordination.	**K2**
CO4	Understand the effect of compensation for power factor improvement.	**K2**
CO5	Explain the distribution automation functions	**K2**

UNIT– I: Introduction to Distribution systems:

Introduction, an overview of the role of computers in distribution system planning-Load modeling and characteristics - definition of basic terms like demand factor, utilization factor, load factor, plant factor, diversity factor, coincidence factor, contribution factor and loss factor-Relationship between the load factor and loss factor - Classification of loads (Residential, Commercial, Agricultural and Industrial) and their characteristics.

UNIT– II:Distribution Feeders and Substations:

Design consideration of Distribution feeders: Radial and loop types of primary feeders, voltage levels, and feeder-loading. Design practice of the secondary distribution system. Location of Substations: Rating of a Distribution Substation, service area with ”n" primary feeders. Benefits derived through optimal location of substations.

UNIT– III: **Protective devices and coordination:**

Objectives of distribution system protection, types of common faults and procedure for fault calculation. Protective Devices: Principle of operation of fuses, circuit reclosers, line sectionalizer and circuit breakers. Coordination of protective devices: General coordination procedure; types of coordination.

UNIT– IV: Capacitive compensation for power factor control:

Different types of power capacitors, shunt and series capacitors, effect of shunt capacitors (Fixed and switched), power factor correction, capacitor location. Economic justification. Procedure to determine the best capacitor location. Voltage control: Equipment for voltage control, effect of series capacitors, effect of AVB/AVR, line drop compensation.

UNIT– V: Distribution automation functions:

Electrical system automation, EMS functional scope, DMS functional scope functionality of DMS- Steady state and dynamic performance improvement; Geographic information systems-AM/FM functions and Database management; communication options, supervisory control and data acquisition: SCADA functions and system architecture; Synchro phasors and its application in power systems.

Text Books:

1. Turan Gonen, "Electric Power Distribution System Engineering", CRC Press, 2nd edition, 2008.
2. Juan M. Gers, "Distribution System Analysis and Automation", The Institution of Engineering and Technology, UK, Power and energy series 68, 2014.

Reference Books:

1. A.S. Pabla, "Electric Power Distribution", Tata McGraw-Hill Publishing Company, 4th edition, 1997.
2. V. Kamaraju, "Electrical Distribution", Tata McGraw Hill-8th Edition, 2009.
3. Gorti Ramamurthy "Handbook of Electrical Power Distribution", Universities press, 2009.
4. https://nptel.ac.in/courses/108/107/108107112/

Semester	**I SEM**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V21	3	0	0	3	V21PET07
Name of the Course	HVDC Transmission (Elective-II)					
Specialization	Power Electronics & Power systems					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	**Course Outcome**	**Knowledge Level**
CO1	Understand the various schemes of HVDC transmission	K2
CO2	Explain the operation of static power converters for HVDC transmission	K2
CO3	Describe various control techniques of power converters	K2
CO4	Understand the interaction between HVAC and HVDC system.	K2
CO5	Understand the various protection schemes of HVDC transmission	K2

UNIT– I: Limitation of EHV AC Transmission, Advantages of HVDC:

Technical economical and reliability aspects. HVDC Transmission: General considerations, Power Handling Capabilities of HVDC Lines, Basic Conversion principles, static converter configuration. Types of HVDC links-Apparatus and its purpose

UNIT– II: Static Power Converters:

6-pulse bridge circuit and 12-pulse converters, converter station and Terminal equipment, commutation process, Rectifier and inverter operation, equivalent circuit for converter – special features of converter transformers. Comparison of the performance of diametrical connection with 6-pulse bridge circuit

UNIT– III: Control of HVDC Converters and systems:

Constant current, constant extinction angle and constant Ignition angle control. Individual phase control and equidistant firing angle control, DC power flow control.

Factors responsible for generation of Harmonics voltage and current, harmonics effect of variation of α and μ. Filters, Harmonic elimination.

UNIT– IV: Interaction between HV AC and DC systems:

Voltage interaction, Harmonic instability problems and DC power modulation. Development of DC circuit Breakers, Multi-terminal DC links and systems; series, parallel and series parallel systems, their operation and control.

UNIT– V: Transient over voltages in HV DC systems:

Over voltages due to disturbances on DC side, over voltages due to DC and AC side line faults. Converter faults and protection in HVDC Systems: Converter faults, over current protection - valve group, and DC line protection, circuit breakers. Over voltage protection of converters, surge arresters.

Text Books:

1. S Kamakshaih and V Kamaraju "HVDC Transmission", Tata Mc Graw hill, 2011.
2. K.R.Padiyar, "High Voltage Direct current Transmission", Wiley Eastern Ltd., New Delhi – 1992.

Reference Books:

1. E.W. Kimbark, "Direct current Transmission", Wiley Inter Science – New York, 1st edition, 1971.
2. J.Arillaga, "H.V.D.C.Transmission", Peter Peregrinus ltd., London UK, 1983.
3. Vijay K Sood, "HVDC and FACTS controllers:Applications of static converters in power systems", Springer US, 1st edition, 2004.
4. https://nptel.ac.in/courses/108/104/108104013/

Semester	I SEM	L	T	P	C	COURSE CODE
Regulation	V21	3	0	0	3	V21PET08
Name of the Course	Advanced Power Systems Protection (Elective-II)					
Specialization	Power Electronics & Power systems					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Classify different types of static relays and tools.	K2
CO2	Explain various Amplitude and Phase Comparators	K2
CO3	Describe different types of static over current relays.	K2
CO4	Understand the PILOT Relaying schemes	K2
CO5	Identify suitable Microprocessor based and Numerical relays for power system protection	K2

UNIT– I: Static Relays classification and Tools :

Comparison of Static with Electromagnetic Relays, Basic classification, Level detectors and Amplitude and phase Comparators – Duality – Basic Tools – Schmitt Trigger Circuit, Multi-vibrators, Square wave Generation – Polarity detector – Zero crossing detector – Thyristor and UJT Triggering Circuits. Phase sequence Filters – Speed and reliability of static relays.

UNIT– II: Amplitude and Phase Comparators (2 Input) :

Generalized equations for Amplitude and Phase comparison – Derivation of different characteristics of relays – Rectifier Bridge circulating and opposed voltage type amplitude comparators – Averaging & phase splitting type amplitude comparators – Principle of sampling comparators.

Phase Comparison : Block Spike and phase Splitting Techniques – Transistor Integrating type, phase comparison, Rectifier Bridge Type Comparison – Vector product devices.

UNIT– III: Static over current (OC) relays:

Instantaneous, Definite time, Inverse time OC Relays, static distance relays, static directional relays, static differential relays, measurement of sequence impedances in distance relays, multi input comparators, elliptic & hyperbolic characteristics, switched distance schemes, Impedance characteristics during Faults and Power wings,

UNIT– IV: PILOT Relaying schemes:

Wire pilot protection: circulating current scheme – balanced voltage scheme – translay scheme – half wave comparison scheme - carrier current protection: phase comparison type – carrier aided distance protection – operational comparison of transfer trip and blocking schemes – optical fibre channels.

UNIT– V: Microprocessor based relays and Numerical Protection:

Introduction – over current relays – impedance relay – directional relay – reactance relay.

Numerical Protection: Introduction - numerical relay - numerical relaying algorithms - mann-morrison technique - Differential equation technique and discrete fourier transform technique - numerical over current protection - numerical distance protection.

Text Books:

1. TS MadhavaRao, “Power System Protection with Static Relays”, TMH, 2nd edition, 2017.
2. Badri Ram & D N vishwakarma, “Power system protection & switchgear”, TMH, 22nd reprint, 2007.

Reference Books:

1. A.R. van C.Warrington, “Protective Relays their Theory and Practice, Vol-II”, Springer, 3rd edition, 1978.
2. C R Mason, “The Art & Science of Protective Relaying”, Willey-Blackwell,1966.
3. Kimbark, “Power System Stability”, Vol-II, student edition, Wiley, 2007.
4. C.Christopoulos and A.Wright, “Electrical Power System Protection”, Springer US, 2nd Edition, 1999.
5. BhaveshBhalaja, R.PMaheshwari, NileshG.Chothani “Protection & Switchgear”, Oxford university press, 2nd edition, 2018.
6. https://nptel.ac.in/courses/108/101/108101039/

Semester	I SEM	L	T	P	C	COURSE CODE
Regulation	V21	0	0	4	2	V21PEL01
Name of the Course	Power Electronics Simulation Laboratory					
Specialization	Power Electronics & Power systems					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Analyze the DC-DC converters using small signal model	K4
CO2	Analyze the operation of Multi-level inverters	K4
CO3	Analyze the different PWM techniques for inverters	K4
CO4	Analyze the operation of AC Voltage regulators	K4
CO5	Analyze the operation of AC-DC converters	K4

List of Experiments:

1. Simulation of Buck converter using small signal model.
2. Simulation of Boost converter using small signal model.
3. Simulation of single phase half bridge inverter.
4. Simulation of full bridge inverter using Uni-polar & Bi-polar PWM techniques.
5. Simulation of three phase inverter using sine-triangle PWM.
6. Simulation of three phase inverter using space vector PWM.
7. Simulation of three level three phase NPC inverter.
8. Study of neutral point voltage floating in NPC three level inverter
9. Simulation of 3-level flying capacitor inverter & evaluation of capacitor voltage balanced methods.
10. Simulation of single phase AC voltage regulator.
11. Simulation of three phase AC voltage regulator.
12. Comparison of harmonic profile of two level& three level inverter (FFT analysis).
13. Simulation of 5-level inverter using carrier based PWM methods.
14. Simulation of three phase full converter with RL & RLE loads.
15. Simulation of three-phase dual converter.

Semester	**I SEM**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V21	0	0	4	2	V21PEL02
Name of the Course	Power Systems Laboratory					
Specialization	Power Electronics & Power systems					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	**Course Outcome**	**Knowledge Level**
CO1	Calculate the sequence impedances of 3 phase Transformer and Alternator	K3
CO2	Determine the power Angle Characteristics of 3-phase Alternator with infinite bus bars	K4
CO3	Estimate the performance of long transmission lines	K4
CO4	Determine the ABCD parameters of a transmission line model	K4
CO5	Analyse the Ferranti effect in long transmission line	K4

List of Experiments:

1. Determination of Sequence Impendence of an Alternator by direct method.
2. Determination of Sequence impedance of an Alternator by fault Analysis.
3. Measurement of sequence impedance of a three phase transformer
   (a) application of sequence voltage. (b). using fault analysis.
4. Power angle characteristics of a salient pole Synchronous Machine.
5. Poly-phase connection on three single phase transformers and measurement of phase displacement.
   a. Determination of equivalent circuit of 3-winding Transformer.
6. Measurement of ABCD parameters on transmission line model.
7. Performance of long transmission line without compensation.
8. Study of Ferranti effect in long transmission line.
9. Performance of long transmission line with shunt compensation.

Semester	**II SEM**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V21	3	0	0	3	V21PET09
Name of the Course	Switched Mode Power Conversion					
Specialization	Power Electronics & Power systems					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	**Course Outcome**	**Knowledge Level**
CO1	Explain operation and control of non-isolated switch mode converters.	K2
CO2	Describe operation and control of isolated switch mode converters.	K2
CO3	Understand the operation and control of resonant converters	K2
CO4	Compute control strategies of switching converters	K3
CO5	Explain the operation of switch mode converters based on linearization and small-signal analysis.	K3

UNIT– I: Non-isolated switch mode converters:

Control of DC-DC converters: Buck converters, Boost converters, Buck-Boost converter, CUK Converter, continuous and discontinuous operation, Converter realization with non-ideal components.

UNIT– II: Isolated switched mode converters:

Forwarded converter, flyback converter, push-pull converter, half-bridge converter, full bridge converter.

UNIT– III: Resonant converters:

Basic resonant circuit concepts, series resonant circuits, parallel resonant circuits, zero current switching quasi-resonant buck converter, zero current switching quasi-resonant boost converter, zero voltage switching quasi-resonant buck converter, zero voltage switching quasi-resonant boost converter.

UNIT– IV: Control schemes of switching converters:

Voltage control, Current mode control, control scheme for resonant converters.

Magnetic design consideration: Transformer design, inductor and capacitor design.

UNIT– V: Modeling and Controller design based on linearization:

Formulation of averaged models for buck and boost converters: state space analysis, average circuit models, linearization and small – signal analysis, small-signal models.

Control design based on linearization: Transfer function of converters, control design, large signal issues in voltage-mode and current-mode control.

Text Books:

1. Fundamentals of Power Electronics Third Edition-Erickson, Robert W., Maksimovic, Dragan, Springer, 2011.
2. Power switching converters Third Edition-Simon Ang, Alejandro Oliva, CRC Press, 2010.
3. Elements of Power Electronics Second Edition– Philip T. Krein, Oxford University press, 2014.
4. Design of Magnetic Components for Switched Mode Power Converters First Edition- Umanand, S.P. Bhat, John Wiley & Sons Australia, 1992.

Reference Books:

1. Switching Power Supply Design Third Edition-Abraham I. Pressman, McGraw-Hill Ryerson, Limited, 1991.
2. Power Electronics Second Edition– Issa Batareseh, Jhon Wiley publications, 2004.
3. Power Electronics: converters Applications & Design Third Edition- – Mohan, Undeland, Robbins-Wiley publications,2002.
4. https://nptel.ac.in/courses/108/108/108108036/

Semester	II SEM	L	T	P	C	COURSE CODE
Regulation	V21	3	0	0	3	V21PET10
Name of the Course	Real Time Control of Power Systems					
Specialization	Power Electronics & Power systems					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Classify the state estimation methods and understand the concepts of bad data observability, detection, identification and elimination	K2
CO2	Identify and Recognize the security, contingency and line outages in power system	K2
CO3	Illustrate the need of computer control and SCADA in real time power system	K2
CO4	Understand the concept of voltage stability in real time power systems	K2
CO5	Understand the basic concepts of Synchrophasor Measurement units	K2

UNIT– I: State Estimation:

Different types of State Estimations, Theory of WLS state estimation, sequential and non-sequential methods to process measurements. Bad data Observability, Bad data detection, identification and elimination.

UNIT– II: Security and Contingency Evaluation:

Security concept, Security Analysis and monitoring, Contingency Analysis for Generator and line outages by iterative linear power flow method, Fast Decoupled model, and network sensitivity methods.

UNIT– III: Computer Control of Power Systems:

Need for real time and computer control of power systems, operating states of a power system, SCADA - Supervisory control and Data Acquisition systems implementation considerations, energy control centers, software requirements for implementing the above functions.

UNIT– IV: Voltage Stability:

Voltage collapse, and voltage security, relation of voltage stability to rotor angle stability. Voltage stability analysis Introduction to voltage stability analysis `P-V‟curves and `Q-V‟ curves, voltage stability in mature power systems, long-term voltage stability, power flow analysis for voltage stability, voltage stability static indices.

UNIT– V: Synchrophasor Measurement units:

Introduction, Phasor representation of sinusoids, a generic PMU, GPS, Phasor measurement systems, Communication options for PMUs, Functional requirements of PMUs and PDCs, Phasors for nominal frequency signals, types of frequency excursions in power systems, DFT estimation at off nominal frequency with a nominal frequency clock.

Text Books:

1. John J.Grainger and William D.Stevenson, Jr. First Edition: Power System Analysis, McGraw-Hill, 1994, International Edition
2. Allen J.Wood and Bruce F.Wollenberg Third Edition: Power Generation operation and control, John Wiley & Sons, 2013.
3. A.G.PhadkaandJ.S.Thorp,“SynchronizedPhasorMeasurementsand Their Applications” First Edition,Springer,2008

Reference Books:

1. R.N.Dhar : Computer Aided Power Systems Operation and Analysis First Edition, Tata McGraw Hill, 1982
2. L.P.Singh : Advanced Power System Analysis and Dynamics Fourth Edition, Wiley Eastern Ltd. 2008
3. PrabhaKundur : Power System Stability and Control First Edition, McGraw Hill, 2006
4. P.D.Wasserman : `Neural Computing:Theory and Practice‟Van Nostrand First Edition -Feinhold, New York.

Semester	II SEM	L	T	P	C	COURSE CODE
Regulation	V21	3	0	0	3	V21PET11
Name of the Course	Electrical Machine Modeling and Analysis (Elective –III)					
Specialization	Power Electronics & Power systems					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Analyze Kroon's Primitive Machine	K2
CO2	Develop modeling of dc machine	K3
CO3	Explain linear Transformation	K4
CO4	Apply mathematical modeling concepts to 3-phase Induction machines	K3
CO5	Design control strategies based on dynamic modeling of 3-ph Induction machines and3-phase Synchronous machine	K4

UNIT– I: Basic concepts of Modeling:

Basic two-pole machine representation of Commutator machines, representations of 3-phase synchronous machine with and without damper bars and 3-phase induction machine, Kron"s primitive Machine voltage, current and torque equations.

UNIT– II: DC Machine Modeling:

Mathematical model of separately excited D.C motor – Steady state analysis-transient State analysis-sudden application of inertia load-transfer function of separately excited D.C motor- Mathematical model of D.C Series motor, Shunt motor-Linearization techniques for small perturbations

UNIT– III: Reference frame theory & Modeling of single phase Induction Machines:

Linear transformation-Phase transformation - three phase to two phase transformation (abc to αβ0) and vice-versa, transformation to rotating reference frame, (αβ0 to dqo) and vice versa -Power equivalence-Mathematical modeling of single phase induction machines.

UNIT– IV: Modeling of three phase Induction Machine:

Generalized model in arbitrary reference frame-Derivation of commonly used induction machine models-Synchronously rotating reference frame model, Stator reference frame model-Rotor reference frame model--power equation, electromagnetic torque equation, state space model in induction motor with flux linkages as variables

UNIT– V: Modeling of Synchronous Machine:

Synchronous machine inductances –derivation of voltage equations in the rotor"s dq0 reference frame electromagnetic torque-current in terms of flux linkages-three phase synchronous motor. State space models with flux linkages as variables.

Text Books

1. Analysis of Electric Machinery and Drive Systems, 3rd Edition-Wiley-IEEE Press-Paul Krause, Oleg Wasynczuk, Scott D. Sudhoff, Steven Pekarek, Junr 2013.
2. Electric Motor Drives First Edition- Modeling, Analysis & control -R. Krishnan-Pearson Publications.

Reference Books:

1. Generalized theory of Electrical Machines First edition- Khanna Publishers P. S. Bimbhra, 1985.
2. Dynamic simulation of Electric machinery using MATLAB / Simulink Second Edition–CheeMunOng- Prentice Hall, 2003.
3. Magneto electric devices transducers, transformers and machines-G. R. Slemon First Edition - Wiley in New York, London, 1966
4. https://nptel.ac.in/courses/108/106/108106023/

Semester	**II SEM**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V21	3	0	0	3	V21PET12
Name of the Course	Control of Electric Drives (Elective –III)					
Specialization	Power Electronics & Power systems					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Understand fundamentals of electric drives	K2
CO2	Understand various DC motor drives and control	K2
CO3	Analyze control techniques of synchronous motor drives	K4
CO4	Analyze control techniques for Switched Reluctance Motor	K4
CO5	Understand operation and various control schemes of BLDC motor	K2

Unit I: Fundamentals of Electric Drive:

Electric Drives and its parts, advantages of electric drives Classification of electric drives Speed-torque conventions and multi-quadrant operations, Constant torque and constant power operation, Types of load torque: components, nature and classification

Unit II: DC Motor Drives:

Starting, Braking and Speed Control, Transient analysis of separately excited motor with armature and field control, Energy losses during transient operation, Phase controlled converter fed DC drives, Chopper Control DC drives.

Unit III: Control of Synchronous Motor Drives:

Synchronous motor and its characteristics- Control strategies-Constant torque angle control- power factor control, constant flux control, flux weakening operation, load commutated inverter fed synchronous motor drive, motoring and regeneration, phasor diagrams.

Unit IV: Control of Switched Reluctance Motor Drives:

SRM Structure-Stator Excitation-techniques of sensor less operation-convertor topologies-RM Waveforms-SRM drive design factors-Torque controlled SRM-Torque Ripple-Instantaneous Torque control -using current controllers-flux controllers.

Unit V: Control of BLDC Motor Drives:

Principle of operation of BLDC Machine, Sensing and logic switching scheme, BLDM as Variable Speed Synchronous motor-methods of reducing Torque pulsations -Three-phase full wave Brushless dc motor -Sinusoidal type of Brushless dc motor -current controlled Brushless dc motor Servo drive.

Text Books:

1. Fundamentals of Electrical Drives – G.K. Dubey – Narosa Publications - 1995
2. Power Electronics control of AC motors – MD Murphy & FG Turn Bull Pergman Press -1st edition-1998.
3. Electric Motor Drives Modeling, Analysis & control -R. Krishnan- Pearson Education-4th edition – 2015
4. Brushless permanent magnet and reluctance motor drives- T J E Miller- Oxford university press- 1989

Reference Books:

1. Ned Mohan, T.M. Undeland and William P. Robbins: Power Electronics: Converters, Applications, 3rd Edition, John Wiley & Sons, 2009
2. Modelling, Simulation and control of Electric Drives- M.F Rahman, Sanjeet K. Dwivedi- IET Publiers-1st edition-Oct 2019
3. Power Semiconductor drives- G.K. Dubey-Prentice hall-1989

Semester	II SEM	L	T	P	C	COURSE CODE
Regulation	V21	3	0	0	3	V21PET13
Name of the Course	Applications of Power Converters (Elective –III)					
Specialization	Power Electronics & Power systems					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	understand the inverters for induction heating applications	K2
CO2	understand the power converters for different industrial applications	K2
CO3	understand modeling of high voltage power supplies using the power converters for radar and space applications	K2
CO4	understand modeling of low voltage and high current power supplies using the power converters for microprocessors and computer loads	K2
CO5	understand the applications of DC-DC converters	K2

UNIT– I: Inverters for Induction Heating:

For induction cooking, induction hardening, melting, and welding applications.

UNIT– II: Power Converters for Lighting, pumping and refrigeration Systems:

Electronic ballast, LED power drivers for indoor and outdoor applications. PFC based grid fed LED drivers, PV / battery fed LED drivers. PV fed power supplies for pumping/refrigeration applications.

UNIT– III: **High Voltage Power Supplies:**

Power supplies for X-ray applications - power supplies for radar applications - power supplies for space applications.

UNIT– IV: Low voltage high current power supplies:

Power converters for modern microprocessor and computer loads

UNIT– V: Bi-directional DC-DC (BDC) converters:

Electric traction, automotive Electronics and charge/discharge applications, Line Conditioners and Solar Charge Controllers

Text Books:

1. Ali Emadi, A. Nasiri, and S. B. Bekiarov: Uninterruptible Power Supplies and Active Filters First Edition, CRC Press, 2004.
2. M. Ehsani, Y. Gao, E. G. Sebastien and A. Emadi: Modern Electric, Hybrid Electric and Fuel Cell Vehicles, 1st Edition,CRC Press, 2004.

References Books:

1. William Ribbens: Understanding Automotive Electronics Eight Edition, Newnes, 2017.
2. https://nptel.ac.in/courses/108/107/108107128/

Semester	II SEM	L	T	P	C	COURSE CODE
Regulation	V21	3	0	0	3	V21PET14
Name of the Course	EHVAC Transmission (Elective –IV)					
Specialization	Power Electronics & Power systems					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Determine the transmission line parameters	K3
CO2	Calculate the field effects on EHV and UHV AC lines.	K3
CO3	Determine the corona, RI and audible noise in EHV and UHV lines	K3
CO4	Analyze voltage control and compensation problems in EHV and UHV transmission systems	K4
CO5	Understand reactive power compensation using SVC and TCR	K2

UNIT– I: E.H.V. A.C. Transmission, line trends and preliminary aspects, standard transmission voltages – power handling capacities and line losses – mechanical aspects. Calculation of line resistance and inductance: resistance of conductors, temperature rise of conductor and current carrying capacity. Properties of bundled conductors and geometric mean radius of bundle, inductance of two conductor lines and multi conductor lines, Maxwell‟s coefficient matrix. Line capacitance calculation. Capacitance of two conductor line, and capacitance of multi conductor lines, potential coefficients for bundled conductor lines, sequence inductances and capacitances and diagonalization.

UNIT– II: Calculation of electro static field of AC lines:

Effect of high electrostatic field on biological organisms and human beings. Surface voltage Gradient on conductors, surface gradient on two conductor bundle and cosine law, maximum surface voltage gradient of bundle with more than 3 sub conductors, Mangolt formula.

UNIT– III: Corona:

Corona in EHV lines – corona loss formulae – attenuation of traveling waves due to corona – Audio noise due to corona, its generation, characteristics and limits, measurement of audio noise.

UNIT– IV: Power Frequency voltage control:

Problems at power frequency, generalized constants, No load voltage conditions and charging currents, voltage control using synchronous condenser, cascade connection of components : Shunt and series compensation, sub synchronous resonance in series – capacitor compensated lines

UNIT– V: Reactive power compensating systems:

Introduction, SVC schemes, Harmonics injected into network by TCR, design of filters for suppressing harmonics injected into the system.

Text Books :

1. Extra High Voltage AC Transmission Engineering Fourth Edition– Rakesh Das Begamudre, Wiley Eastern ltd., New Delhi – 2011.
2. EHV Transmission line reference book – Edison Electric Institute (GEC) 1986.
3. https://nptel.ac.in/courses/108/108/108108099/

Semester	**II SEM**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V21	3	0	0	3	V21PET15
Name of the Course	Flexible AC Transmission System (Elective –IV)					
Specialization	Power Electronics & Power systems					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	**Course Outcome**	**Knowledge Level**
CO1	Explain the improvements of transmission system with FACTS	K2
CO2	Illustrate different Types of Static VAr generation systems	K3
CO3	Estimate the effect of static shunt compensation.	K2
CO4	Estimate the effect of static series compensation.	K2
CO5	Explain the principle of operation and various controls of UPFC	K2

UNIT– I: Introduction

FACTS concepts, Transmission interconnections, power flow in an AC System, loading capability limits, Dynamic stability considerations, importance of controllable parameters, basic types of FACTS controllers, benefits from FACTS controllers.

UNIT– II: Static shunt compensation

Basic concept of voltage and current source converters, comparison of current source converters with voltage source converters.

Static shunt compensation : Objectives of shunt compensation, midpoint voltage regulation, voltage instability prevention, improvement of transient stability, Power oscillation damping, methods of controllable VAr generation, variable impedance type static VAr generation, switching converter type VAr generation, hybrid VAr generation.

UNIT– III: SVC and STATCOM

The regulation slope, transfer function and dynamic performance, transient stability enhancement and power oscillation damping, operating point control and summary of compensation control.

UNIT– IV: Static Series compensators

Concept of series capacitive compensation, improvement of transient stability, power oscillation damping, functional requirements. GTO Thyristor controlled series capacitor (GSC), Thyristor switched series capacitor (TSSC), and Thyristor controlled series capacitor (TCSC), control schemes for GSC, TSSC and TCSC.

UNIT– V: Unified Power Flow Controller

Basic operating principle, conventional transmission control capabilities, independent real and reactive power flow control, comparison of the UPFC to series compensators and phase angle regulators. Introduction to Inter line Power Flow Controller (IPFC)

Text Books:

1. Understanding FACTS Devices by N. G. Hingorani and L. Guygi, IEEE Press, 2001

Reference Books:

1. Flexible AC Transmission systems bySang. Y. Hand John. A.T, IEEE Press, 2006
2. HVDC & FACTS Controllers: applications of static converters in power systems by Vijay K. Sood, First Edition- - Springer publishers, 2004.
3. https://nptel.ac.in/courses/108/107/108107114/

Semester	II SEM	L	T	P	C	COURSE CODE
Regulation	V21	3	0	0	3	V21PET16
Name of the Course	Power System Dynamics and Stability (Elective –IV)					
Specialization	Power Electronics & Power systems					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Develop the State space Model of Synchronous Machine	K3
CO2	Analyse the Steady State Stability and Dynamic Stability of Synchronous machine	K4
CO3	Solve the Swing Equation using different methods to obtain the Transient Stability	K3
CO4	Illustrate the Effect of Governing and Excitation systems on Stability	K3
CO5	Discuss Different types of Excitation Systems	K2

UNIT– I: System Dynamics

Synchronous machine model in state space from computer representation for excitation and governor system –modeling of loads and induction machines.

UNIT– II: Steady state stability

steady state stability - steady state stability limit – Dynamics Stability limit – Dynamic stability analysis – State space representation of synchronous machine connected to infinite bus-time response – Stability by eigen value approach.

UNIT– III:Digital Simulation of Transient Stability

Swing equation machine equations – Representation of loads – Alternate cycle solution method – Direct method of solution – Solution Techniques : Modified Euler method – Runge Kutta method – Concept of multi machine stability.

UNIT– IV

Effect of governor action and excite on power system stability effect of saturation, saliency & automatic voltage regulators on stability.

UNIT– V: Excitation Systems

Rotating Self-excited Exciter with direct acting Rheostatic type voltage regulator – Rotating main and Pilot Exciters with Indirect Acting Rheostatic Type Voltage Regulator – Rotating Main Exciter, Rotating Amplifier and Static Voltage Regulator – Static excitation scheme – Brushless excitation system.

Text Books:

1. Power System Stability by Kimbark Vol. I&II, III, Willey.
2. Power System control and stability Third Edition by Anderson and Fund, IEEE Press, 2019.

Reference Books:

1. Power systems stability and control First Edition by PRABHA KUNDUR, TMH, 2006.
2. Computer Applications to Power Systems Twelth Edition–Glenn. W. Stagg& Ahmed. H. El. Abiad, TMH 1987.
3. Computer Applications to Power Systems Third Edition– M.A.Pai, TMH, 2014.
4. Power Systems Analysis & Stability First Edition– S.S.Vadhera, Khanna Publishers, 2005.
5. https://nptel.ac.in/courses/108/101/108101004/

Semester	II SEM	L	T	P	C	COURSE CODE
Regulation	V21	0	0	4	2	V21PEL03
Name of the Course	Power Converters Laboratory					
Specialization	Power Electronics & Power systems					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Find the duty ratio of DC-DC Converters	K3
CO2	Analyze the performance of 1- ϕ AC-DC Controlled rectifiers	K4
CO3	Sketch the characteristics of power semiconductor devices	K3
CO4	Find the modulation index of square wave &SPWM inverters	K3
CO5	Calculate input power factor of 3-ϕ full converter	K3

Any 10 of the following experiments are to be conducted.

List of experiments

1. Study of DC-DC non-isolated converters such as Buck & Boost converter.
2. Study of DC-DC Buck - Boost and Cuk converters.
3. Study of 1-ϕ dual converter.
4. Determination of input p.f. and harmonic factor for 1-ϕ semi- converter and 1- ϕ full-converter (Inductive load)
5. Study of p.f. improvement in 1-ϕ full-converter with symmetric and extinction angle control.
6. Study of 1-ϕ square wave and sinusoidal PWM inverter.
7. Study of 3-ϕ inverter with 120^{o} and 180^{o} mode of operation.
8. Study of 3-ϕ sinusoidal PWM inverter.
9. Study of 3-level NPC inverter.
10. Study of 5-level cascaded H-bridge inverter.
11. Determination of input p.f. and harmonic factor for 3-ϕ full converter (Inductive load).
12. Determination of input p.f. and harmonic factor for 3-ϕ semi converter (Inductive load).
13. Study the characteristics of IGBT, MOSFET& GTO"s.
14. Design of gate drive circuits for IGBT&MOSFET"s.

Semester	**II SEM**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V21	0	0	4	2	V21PEL04
Name of the Course	Power Systems Simulation Laboratory					
Specialization	Power Electronics & Power systems					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	**Course Outcome**	**Knowledge Level**
CO1	Analyze the performance of the various transmission lines at different loading conditions	K4
CO2	Examine the load flow study on distribution systems	K4
CO3	Inspect the Z- and Y-bus matrices for the given power transmission system	K4
CO4	Determine the load flow solution obtained using GS and NR methods	K4
CO5	Analyze the transient stability & load frequency control problem of a power system	K4

Any 10 of the following experiments are to be conducted.

Listof Experiments:

1. Performance analysis of short, medium and long transmission lines
2. Distribution load flow analysis
3. Economic Load Dispatch with & without transmission losses
4. Formation of Y-bus by direct inspection method
5. Formations of Z-bus by building algorithm
6. Load Flow Solution Using Gauss Siedel Method
7. Load Flow Solution Using Newton Raphson Method
8. Symmetrical and Unsymmetrical Fault analysis using Z-bus
9. Transient Stability Analysis using modified Euler"s method.
10. Transient Stability Analysis using modified R-K method
11. Transient Stability Analysis Using Point By Point Method
12. Load Frequency Control of Single Area Control & Two Area Control system with and without controllers.

Semester	**II SEM**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V21	0	0	4	2	V21PEP01
Name of the Course	Mini Project with Seminar					
Specialization	Power Electronics & Power systems					

Syllabus content:

A Student has to select one paper published in any of the IEEE Transactions and simulate the same. The student has to present the progress of the work at the middle of the semester. At the end of the semester, the student has to present the results by explaining the idea of the topic, methodology, finding of the simulations. A Student should also submit a report of the entire work carried out under this course. The end semester presentation must be video recorded and preserved.

Semester	III SEM	L	T	P	C	COURSE CODE
Regulation	V21	3	0	0	3	V21PET17
Name of the Course	Hybrid Electric Vehicles (Elective–V)					
Specialization	Power Electronics & Power systems					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Explain various configurations and basics of HEVs	K2
CO2	Distinguish the concepts and components of various hybrid technologies	K2
CO3	Review the architectures, range extension mechanisms and grid support of PHEVs	K2
CO4	Discuss the PE converters for battery charging and speed control of HEVs	K2
CO5	Illustrate various Energy Storage Technologies	K2

UNIT– I: Introduction

History of hybrid vehicles, architectures of HEVs, series and parallel HEVs, complex HEVs.

UNIT– II: Hybridization of Automobile

Fundamentals of vehicle, components of conventional vehicle and propulsion load; Drive cycles and drive terrain; Concept of electric vehicle and hybrid electric vehicle; Plug-in hybrid vehicle, constituents of PHEV, comparison of HEV and PHEV; Fuel Cell vehicles and its constituents.

UNIT– III: Plug-in Hybrid Electric Vehicle

PHEVs and EREVs blended PHEVs, PHEV Architectures, equivalent electric range of blended PHEVs; Fuel economy of PHEVs, power management of PHEVs, end-of-life battery for electric power grid support, vehicle to grid technology, PHEV battery charging.

UNIT– IV: Power Electronics in HEVs

Rectifiers used in HEVs, voltage ripples; Buck converter used in HEVs, non-isolated bidirectional DC-DC converter, regenerative braking, voltage source inverter, current source inverter, isolated bidirectional DC-DC converter, PWM rectifier in HEVs, EV and PHEV battery chargers.

UNIT– V: Battery and Storage Systems

Energy Storage Parameters; Lead–Acid Batteries; Ultra capacitors; Flywheels - Superconducting Magnetic Storage System; Pumped Hydroelectric Energy Storage; Compressed Air Energy Storage - Storage Heat; Energy Storage as an Economic Resource

Text Books

1. Ali Emadi, Advanced Electric Drive Vehicles, CRC Press, 2014.
2. Iqbal Hussein, Electric and Hybrid Vehicles: Design Fundamentals, CRC Press, 2003.

Reference Books:

1. Mehrdad Ehsani, YimiGao, Sebastian E. Gay, Ali Emadi, Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design, CRC Press, 2004.
2. James Larminie, John Lowry, Electric Vehicle Technology Explained, Wiley, 2003.
3. H. Partab: Modern Electric Traction – Dhanpat Rai & Co, 2007.
4. Pistooa G.,“Power Sources, Models, Sustanability, Infrstructure and the market”, Elsevier2008
5. Mi Chris, MasrurA.and GaoD.W., “Hybrid Electric Vehicle: Principles and Applications with Practical Perspectives” 1995.

Semester	**III SEM**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V21	3	0	0	3	V21PET18
Name of the Course	Soft Computing Techniques in Electrical Engineering (Elective–V)					
Specialization	Power Electronics & Power systems					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	**Course Outcome**	**Knowledge Level**
CO1	Understand the basic of Soft Computing Techniques.	K2
CO2	Recognize an appropriate soft computing methodology for an engineering problem.	K3
CO3	Apply fuzzy logic and reasoning to handle uncertainty while solving engineering problems.	K3
CO4	Analysis of neural network and genetic algorithms to combinatorial optimization problems.	K4
CO5	Design of different problems of optimization in power systems	K5

UNIT– I: Introduction to Soft Computing

Introduction, Definition of Soft Computing Techniques, Importance of Soft Computing, Main Components of Soft Computing: Fuzzy Logic, Artificial Neural Networks, Introduction to Evolutionary Algorithms, Hybrid Intelligent Systems, Single and multi-objective optimization.

UNIT– II: Artificial Neural Network and Applications

Introduction, Artificial Neuron Structure, ANN Learning; Back-Propagation Learning, Properties of Neural Networks, Unsupervised learnings, Hopfield networks, Application of GN Models to Electrical Machine Modeling, Short Term Electrical Load Forecasting Using Generalized Neuron Model, Aircraft Landing Control System Using GN Model.

UNIT– III: Introduction to Fuzzy Logic and Genetic Algorithm

Introduction, Uncertainty and Information, Types of Uncertainty, Introduction of Fuzzy Logic, Fuzzy Set, Operations on Fuzzy Sets, Fuzzy Intersection, Fuzzy Union, Fuzzy Complement, Fuzzy Concentration, Fuzzy Dilation, Fuzzy Intensification, α-Cuts, Characteristics of Fuzzy Sets, Demorgan‟s Law, Fuzzy Cartesian Product, Various Shapes of Fuzzy Membership Functions, Methods of Defining of Membership Functions, Fuzzy Relation, Defuzzification Methods. Introduction to Genetic Algorithm, Crossover, Mutation, Survival of Fittest, Population Size, Evaluation of Fitness Function.

UNIT– IV: Applications of Fuzzy Rule Based System

Introduction, System‟s Modeling and Simulation Using Fuzzy Logic Approach, Selection of Variables, Normalization Range and Number of Linguistic Values, Selection of Shape of Membership Functions for Each Linguistic Value, Selection of Fuzzy Union and intersection Operators, Selection of Defuzzification Method, Power System Stabilizer Using Fuzzy Logic.

UNIT– V: Applications of Soft Computing Techniques to Electrical Engineering

Applications of Artificial Neural Network, Genetic Algorithms, Fuzzy and Hybrid Systems for Power System Applications: voltage stability, Economic load dispatch, Unit commitment, Condition monitoring.

Text Books:

1. Neural Networks: A Comprehensive Foundation – Siman Haykin, IEEE, Press, MacMillan, N.Y. 1994.
2. S. Rajasekaran, G. A. Vijayalakshmi, Neural Networks, Fuzzy logic and Genetic algorithms, PHI publication.
3. Fuzzy logic with Engineering Applications - Timothy J. Ross, McGraw-Hill International Editions.
4. Chaturvedi, Devendra K, Soft Computing Techniques and its Applications in Electrical Engineering, Hardcover ISBN:- 978-3-540-77480-8, Springer.
5. Kalyanmoy Deb, Multi-objective Optimization using Evolutionary Algorithms, Willey Publication.

Reference Books:

1. Soft Computing with Matlab Programming by N.P.Padhy & S.P.Simson, Oxford University Press – 2015
2. Kalyanmoy Deb, Optimization for Engineering Design, PHI publication
3. Kevin Warwick, Arthur Ekwue, Rag Agarwal, Artificial intelligence techniques in power systems. IEE Power Engineering Series-22.
4. Fuzzy Sets and Fuzzy logic: Theory and Applications - George J. Klir and Bo. Yuan, Prentice- Hall of India Private Limited.

Semester	**III SEM**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V21	0	0	20	10	V21PEP02
Name of the Course	DISSERTATION PHASE-I					
Specialization	Power Electronics & Power systems					

Semester	**IV SEM**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V21	0	0	32	16	V21PEP03
Name of the Course	DISSERTATION PHASE-II					
Specialization	Power Electronics & Power systems					

Annexure-V

Sri Vasavi Engineering College (Autonomous)

(Sponsored by Sri Vasavi Educational Society)

(Approved by AICTE, New Delhi & Permanently affiliated to JNTUK, Kakinada)
(Accreted by NBA & NAAC with 'A' Grade, Recognized by UGC Under Section 2(f) & 12(B))
Pedatadepalli, Tadepalligudem, W.G.Dt, A.P-534101

Department of Mechanical Engineering

Date: 28-08-2021

Fifth meeting of BOS in Mechanical Engineering Department along with external members is held on 28/08/2021 at 02.00 PM in online mode through ZOOM meeting app in view of COVID-19 pandemic.

The following members are present.

S. No	Name of the BOS Members
1.	Dr.N. Mohan Rao, Professor &CE, JNTUK,Kakinada
2.	Dr. R.V. Chalam, Professor,NIT,Warangal
3.	Dr. A. Krishnaiah, Professor, Osmania University, Hyderabad
4.	Sri S.S. SubramanyaSastry, Head of Practice QMS Veave Technologies, Banglore, India.
5.	Sri A.Sai Krishna, Alumni, Maruthi Design and Engg. Pvt. Ltd ,Bangalore
6.	Dr. Ch.Rambabu, Professor & I/C Principal, SVEC
7.	Dr. M.V. Ramesh, Chairman & HOD, SVEC
8.	All the BOS internal members

Minutes of meeting

Chairman welcomed all the BOS members and introduced to all the BOS internal members.

Item No. 1: Approval of course structure and syllabi for VII & VIII semesters of B.Tech under V18 Regulations.

- Lab course named Production Drawing Lab (course code. **V18MEL13**), MNC course was changed to credit course and 1.5 credits were given in VII semester.
- The approved course structure and their syllabi is attached in **Annexure-I.**

Item No.2: Approval of list of courses offering under Open Electives - II & III in VII & VIII semesters of B.Tech respectively and their syllabi under V18 Regulations for all other branches.

- The approved courses offering under Open Electives are attached in **Annexure-II.**

Item No. 3: Approval of course structure & syllabi for the courses offered in III & IV semesters B.Tech under V20 Regulation.

- The approved course structure & their syllabi is attached in **Annexure-III.**

Item No. 4: Approval of Course Structure & syllabi of M.Tech-Thermal Engineering programme under V21 regulations.

- Approved by the BOS members **Annexure-IV**.

Chairman (Head –ME)
Head of the Department
Mechanical Engineering
Sri Vasavi Engineering College
TADEPALLIGUDEM-53410

Sri Vasavi Engineering College (Autonomous)

(Sponsored by Sri Vasavi Educational Society)

(Approved by AICTE, New Delhi & Permanently affiliated to JNTUK, Kakinada)
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Pedatadepalli, Tadepalligudem, W.G.Dt, A.P-534101

Department of Mechanical Engineering

Annexure I

Course structure Approved in previous BOS under V18 Regulations

IV B.Tech.

VII Semester						
S.No.	**Course Code**	**Course**	**L**	**T**	**P**	**Credits**
1	**V18MET20**	Automation in manufacturing	3	0	0	3
2	**V18MET21**	Operation Research	3	0	0	3
3		Professional Elective – II	3	0	0	3
4		Professional Elective – III	3	0	0	3
5		Open Elective – II	3	0	0	3
6	**V18MEL12**	Simulation Lab	0	0	3	1.5
7	**V18MEL13**	Production Drawing Lab	0	0	3	1.5
8	**V18MEL14**	Project Work –PART-A	0	0	9	3
			15	**0**	**15**	**21**

Contact hours: 30 Total Credits: 21

VIII Semester						
S.No.	**Course Code**	**Course**	**L**	**T**	**P**	**Credits**
	V18MET28	Automobile Engineering	3	0	0	3
1		Open Elective – III	3	0	0	3
2		/ Professional Elective - IV	3	0	0	3
3		Professional Elective –V	3	0	0	3
4	**V18MEL15**	Project Work – PART-B	0	0	18	9
			12	**0**	**18**	**21**

Contact hours : 30 Total Credits : 21

Professional Elective –II **V18MET22 -** Industrial Engineering and Management **V18MET23 -** Composite Materials **V18MET24 -** Refrigeration & Air Conditioning	**Professional Elective –III** **V18MET25 -**Total Quality Management **V18MET26 -** Finite Element Methods **V18MET27 -** Micro Electro Mechanical Systems (MEMS)
Professional Elective –IV **V18MET31 –** Process Planning & Cost Estimation **V18MET32 -** Non Destructive Evaluation **V18MET33 -** Industrial Hydraulics and Pneumatics	**Professional Elective –V** **V18MET34 -** Computational Fluid Dynamics **V18MET35-** Production Planning and Control **V18MET36 -** Energy Conservation and Management

Open Elective –II **V18MEOE4-** Computer Aided Design **V18MEOE5-** Condition Monitoring & Machine learning	**Open Elective –III** **V18MEOE6-** Power Plant Engineering **V18MEOE7 -** Mechatronics

Detailed syllabi of VII & VIII sem B.Tech., for approval in 5th BOS
Syllabi for the courses offered in VII semester B. Tech under V18 Regulation
for the Academic Year 2021-2022
VII Semester

Semester	VII	L	T	P	C	Course Code
Regulation	V18	3	0	0	3	V18MET20
Name of the Course	Automation in Manufacturing					
Branch	Mechanical Engineering					

Course Outcomes:
After successful completion of the course, the student will be able to

CO1	Understand the basic types, levels, strategies of automation.	K2
CO2	Identify the basic components and their functions of automated production line system.	K2
CO3	Differentiate various automated assembly systems.	K4
CO4	Compute various storage system and transportation requirements of automated systems.	K3
CO5	Apply appropriate process control strategy to an automated system.	K3
CO6	Illustrate the concepts of CIM..	K3

UNIT – I
INTRODUCTION : Facilities — Manual work systems, worker-machine systems and automated systems. Manufacturing support systems, Automation in Production systems — Automated Manufacturing systems, Computerized manufacturing support systems, Manual labour in Production systems, Automation principles and strategies.
UNIT – II
AUTOMATED PRODUCTION LINES : Fundamentals- System configurations, work part transfer mechanisms, Storage buffers, and Control of the production line. Applications — Machining systems and System Design Considerations. Analysis of Transfer lines — Transfer lines with No internal parts storage, Transfer lines with internal storage buffers.
UNIT – III
AUTOMATED ASSEMBLY SYSTEMS : System configurations, Parts delivery at workstations, and applications, quantitative analysis of assembly systems-Parts Delivery System at Workstations, Multi-Station Assembly Machines, Single Station Assembly Machines, Partial Automation.
UNIT – IV
AUTOMATED MATERIAL TRANSPORT & STORAGE SYSTEMS : Automated Material Transport & Storage systems: Automated Guided Vehicle (AGV) Systems, Types and applications, Vehicle Guidance Technology, Vehicle Management and Vehicle safety. Automated Storage/Retrieval Systems (ASRS) and Carousel Storage Systems.

UNIT – V

AUTOMATED INSPECTION SYSTEMS : Quality in Design and manufacturing, inspection principles and strategies, automated inspection, contact Vison-contact, CMM. Manufacturing support systems. Quality function deployment, computer aided process planning, concurrent engineering, shop floor control, just in time and lean production.

UNIT – VI

COMPUTER INTEGRATED MANUFACTURING : The Scope of CAD/CAM and CIM, Computerized elements of a CIM System, Components of CIM, Database for CIM, Planning , Scheduling and Analysis of CIM Systems.

TEXT BOOKS:

1. Nagrath and Mittel, "Robotics and Control", Tata McGraw-Hill, 2003.
2. Mikell P Groover, " Automation, production Systems and Computer Integrated Manufacturing," 3rd Edition, Prentice Hall Inc., New Delhi, 2007.
3. Nanua Singh, "System Approach to Computer Integrated Manufacturing," Wiley & Sons Inc.,
4. CAD CAM: Principles, Practice and Manufacturing Management by Chris Mc Mohan, JimmieBrowne, Pearson edu. (LPE).
5. Automation by Buckinghsm W, Haper& Row Publishers, New York, 1961
6. Automation for Productivity by Luke H.D, John Wiley & Sons, New York, 1972.

REFERENCE BOOKS:

1. P. Radhakrishnan, S, Subrarnanyan and V, Raju, 'CAD/CAM/CIM', New Age International (P) Ltd., New Delhi, 2009.
2. S.R.Deb and Sankha Deb, 'Robotics Technology and Flexible Automation', Tata McGraw Hill,Seconcl Edition, New Delhi, 2010.
3. Peter Corke, 'Robotics, Vision and Control' Fundamental Algorithms in MATLAB', Springer, 2011.
4. Nicholas Odrey, MikellGroover, Roger Nagel, Ashish Dutta, 'Industrial Robotics (SIE): Technology, Programming and Applications', McGraw Hill, 2012.

WEB REFERENCES:

1. https://nptel_acinicourses/108/105/108105063/
2. https://www.automationmag.com/
3. https://www.springer.com/gp/book/9783319771786.
4. https://library.automationdirect.com/industrial-automation-top-10-trends/
5. https://nptel.ac.inicourses/112/102/112102011

Semester	VII	L	T	P	C	Course Code
Regulation	V18	3	0	0	3	V18MET21
Name of the Course	Operation Research					
Branch	Mechanical Engineering					

Course Outcomes:
After successful completion of the course, the student will be able to

CO1	Understand the formulating of LPP and solve LPP by Simplex methods, artificial variables techniques.	K2
CO2	Solve Transportation and assignment problems.	K3
CO3	Explain the concept of Sequencing and replacement of item.	K2
CO4	Understand the concept of queues with single server, solution of games with and without saddle points.	K2
CO5	Apply the concept of inventory models in solving EOQ problems.	K3
CO6	Solve the issues of dynamic programming and simulation.	K3

UNIT – I
HISTORICAL OVERVIEW– Definition and scope– types of operation research models – applications.
LINEAR PROGRAMMING: Problem formulation – graphical solution – simplex method – artificial variables techniques - big-M method, two–phase method.
UNIT – II
TRANSPORTATION PROBLEM: Formulation – optimal solution, unbalanced transportation problem – degeneracy
ASSIGNMENT PROBLEM: Introduction, optimal solution, Traveling Salesman problem.
UNIT – III
SEQUENCING – Introduction – flow **–**shop sequencing – n jobs through two machines – n jobs through three machines
REPLACEMENT: Introduction – replacement of items that deteriorate with time – when money value is not counted and counted – replacement of items that fail completely, group replacement.
UNIT – IV
THEORY OF GAMES: Introduction – mini. max (max. mini) – criterion and optimal strategy – solution of games with saddle points – rectangular games without saddle points – 2 x 2 games – dominance principle – m x 2 & 2 x n games -graphical method.
WAITING LINES: Introduction – single channel – poison arrivals – exponential service times – with infinite population and finite population models
UNIT – V
INVENTORY : Introduction – single item – deterministic models – purchase inventory models with one price break– shortages are not allowed – stochastic models – demand may be discrete variable or continuous variable – instantaneous production. Instantaneous demand and continuous demand and no set up cost.
UNIT – VI
DYNAMIC PROGRAMMING: Introduction – Bellman’s principle of optimality – applications of dynamic programming- capital budgeting problem – shortest path problem .

SIMULATION: Definition – types of simulation models – phases of simulation– applications of simulation – inventory and queuing problems – advantages and disadvantages – simulation languages.

TEXT BOOKS:

1. Operations Research / S.D.Sharma-Kedarnath
2. Operations Research by R. Pannerselvam; Publisher: Prentice Hall International.

REFERENCES:

1. Introduction to O.R/Hiller & Libermann (TMH).
2. Operations Research / A.M.Natarajan, P. Balasubramani, A. Tamilarasi / Pearson Education.
3. Operations Research: Methods & Problems / Maurice Saseini, Arhur Yaspan & Lawrence Friedman.

Semester	**VII**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	**V18**	**3**	**0**	**0**	**3**	**V18MET22**
Name of the Course	**Industrial Engineering and Management** Professional Elective –II					
Branch	**Mechanical Engineering**					

Course Outcomes:

After successful completion of the course, the student will be able to

CO1	Design and conduct experiments, analyze, interpret data and synthesize valid conclusions	K4
CO2	Design a system, component, or process, and synthesize solutions to achieve desired needs	K4
CO3	Use the techniques, skills, and modern engineering tools necessary for engineering practice with appropriate considerations for public health and safety, cultural, societal, and environmental constraints	K3
CO4	Examine effectively within multi-disciplinary teams and understand the fundamental precepts of effective project management	K3
CO5	Understand quality and quality management	K2
CO6	Understand concepts on recourse management	K2

UNIT – I

INTRODUCTION: Definition of industrial engineering (I.E), development, applications, role of an industrial engineer, differences between production management and industrial engineering, quantitative tools of IE and productivity measurement. concepts of management, importance, functions of management, scientific management, Taylor’s principles, theory X and theory Y, Fayol’s principles of management.

UNIT – II

PLANT LAYOUT: Factors governing plant location, types of production layouts, advantages and disadvantages of process layout and product layout, applications, quantitative techniques for optimal design of layouts, plant maintenance, preventive and breakdown maintenance.

UNIT – III

WORK STUDY: Importance, types of production, applications, work study, method study and time study, work sampling, PMTS, micro-motion study, rating techniques, MTM, work factor system, principles of Ergonomics, flow process charts, string diagrams and Therbligs

UNIT – IV

STATISTICAL QUALITY CONTROL: Quality control, Queuing assurance and its importance, SQC, attribute sampling inspection with single and double sampling, Control charts – and R – charts and *S* charts and their applications, numerical examples.

UNIT – V

TOTAL QUALITY MANAGEMENT: zero defect concept, quality circles, implementation, applications, ISO quality systems. six sigma – definition, basic concepts

VALUE ANALYSIS: Value engineering, implementation procedure, enterprise resource planning and supply chain management.

UNIT – VI

RESOURCE MANAGEMENT: Concept of human resource management, personnel management and industrial relations, functions of personnel management, Job-evaluation, its importance and types, merit rating, quantitative methods, wage incentive plans, types.

PROJECT MANAGEMENT (PERT/CPM): Network Analysis, Programme Evaluation and Review Technique (PERT), Critical Path Method (CPM), Identifying critical path, Probability of Completing the project within given time, Project Cost Analysis, Project Crashing. (simple problems).

TEXT BOOKS:

1. Industrial Engineering and management / O.P Khanna/Khanna Publishers.
2. Industrial Engineering and Production Management/Martand Telsang/S.Chand & Company Ltd. New Delhi

REFERENCE BOOKS:

1. Industrial Management / Bhattacharya DK/Vikas publishers
2. Operations Management / J.G Monks/McGrawHill Publishers.
3. Industrial Engineering and Management Science/T.R. Banga,S.C.Sharma, N. K. Agarwal/Khanna Publishers
4. Principles of Management /Koontz O' Donnel/McGraw Hill Publishers.
5. Statistical Quality Control /Gupta/Khanna Publishers
6. Industrial Engineering and Management /NVS Raju/Cengage Publishers

Semester	VII	L	T	P	C	Course Code
Regulation	V18	3	0	0	3	V18MET23
Name of the Course	**Composite Materials** Professional Elective –II					
Branch	**Mechanical Engineering**					

Course Outcomes:
After Successful completion of this course the student will be able to

CO1	Explain the required properties, reinforcements and uses of various composites.	K2
CO2	Explain how common fibers are produced and how the properties of the fibers are related to the internal structure and the interfaces obtained.	K2
CO3	Illustrate the processing techniques for polymer matrix, ceramic matrix and metal matrix composites and list out their properties and applications	K3
CO4	Analyze different ceramic composite materials	K4
CO5	Examine the processing of ceramic matrix composites	K3
CO6	Evaluate mechanical properties of composite materials	K5

UNIT-I

Introduction, Classification of Composite materials based on structure and matrix and reinforcements, Advantages and applications of composites, Functional requirements of reinforcement and matrix materials. Difference between composites and metals &alloys, Properties of composites in comparison with standard materials

UNIT-II

TYPES OF REINFORCEMENTS AND THEIR PROPERTIES: Glass, Carbon, Boron, Aramid, Al_2O_3 and SiC fibers. Nature and manufacture of glass, carbon and aramid fibers, Comparison of fibers. Role of interfaces: Wettability and Bonding, the interface in Composites, Interactions and Types of bonding at the Interface.

UNIT-III

Fabrication of Polymeric Matrix Composites, Structure and properties of Polymeric Matrix Composites, Interface in Polymeric Matrix Composites, Applications,Recycling of PMCs

UNIT-IV

FABRICATION OF METAL MATRIX COMPOSITES (MMC): Solid state fabrication, Liquid state fabrication and In-situ fabrication techniques. Interface in Metal Matrix Composites. Mechanical bonding, Chemical bonding and Interfaces in In-situ Composites. MMC: Properties and Applications.

UNIT -V

FABRICATION OF CERAMIC MATRIX COMPOSITES (CMC): Processing of CMCs: Cold Pressing and Sintering, Hot Pressing, Reaction Bonding Processes, Infiltration, Sol–Gel process. Interface in CMCs. Properties of CMCs, Applications of CMCs.

UNIT -VI

MECHANICAL TESTING OF COMPOSITES AND THEIR CONSTITUENTS: Measurement of Constituent Material Properties Fiber Tests, Neat Resin Matrix Tests, Constituent Volume Fraction Measurement. Measurement of Basic Composite Properties: Tensile Tests, Compressive Tests, Shear Tests, Flexure Tests, Fiber/Matrix Interface Tests.

TEXT BOOKS:

1. Composite Materials – Science & Engineering, K.K. Chawla, Springer-Verlag, New York, 1987.
2. Principles of Composite Material Mechanics, Ronald F. Gibson
3. An Introduction to Composite Materials, Hull, Cambridge, 2nd Edt.1997.

REFERENCE BOOKS:

1. Composites, Engineered Materials Handbook, Vol.1, ASM International, Ohio, 1988.
2. Structure and Properties of Composites, Materials Science and Technology, Vol. 13, VCH, Weinheim, Germany, 1993
3. Composite Materials: Engineering and Science, F.L. Matthews and R.D. Rawlings, Chapman & Hall,London, 1994.

Semester	**VII**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	**V18**	**3**	**0**	**0**	**3**	**V18MET24**
Name of the Course	**Refrigeration & Air Conditioning** Professional Elective –II					
Branch	**Mechanical Engineering**					

Course Outcomes:
After successful completion of the course, the student will be able to

CO1	Apply the concept of refrigeration to various systems.	K3
CO2	Employ the methods to improve performance of vapor compression systems.	K3
CO3	Identify eco-friendly refrigerants and understanding various VCR System Components.	K2
CO4	Describe vapour absorption systems.	K2
CO5	Analyze cooling and heating loads in an air conditioning system.	K4
CO6	Explain various air conditioning systems.	K2

UNIT – I
INTRODUCTION TO REFRIGERATION: Necessity and applications – Unit of refrigeration and C.O.P. –Mechanical refrigeration – Types of ideal cycles of refrigeration.
Air refrigeration: Bell Coleman cycle - Open and Dense air systems – Refrigeration needs of Air crafts-Refrigeration systems used in air crafts and Problems.
UNIT – II
VAPOUR COMPRESSION REFRIGERATION: Working principle and essential components of the plant –simple vapour compression refrigeration cycle – COP – Representation of cycle on T-S and p-h charts – Effect of sub cooling and super heating – Cycle analysis – Actual cycle influence of various parameters on system performance – Use of p-h charts – Problems.
UNIT – III
Refrigerants – Classification – Desirable properties of an ideal refrigerant – Common refrigerants used – Nomenclature of refrigerants.
VCR System Components: Compressors – General classification – comparison – Advantages and Disadvantages. Condensers – Classification – Working Principles. Evaporators – Classification – Working Principles. Expansion devices – Types – Working Principles.
UNIT – IV
VAPOR ABSORPTION SYSTEM: Calculation of maximum COP – description and working of Water-Ammonia Systems, Water-Lithium Bromide System. Principle of operation three fluid absorption system, salient features.
UNIT – V
INTRODUCTION TO AIR CONDITIONING: Psychometric properties & Processes – Characterization of sensible and latent heat loads — Need for ventilation, Consideration of infiltration – Load concepts of RSHF, GSHF- Problems, concept of ESHF and ADP temperature.
Requirements of industrial air conditioning, Air conditioning load calculations.

UNIT – VI

AIR CONDITIONING SYSTEMS: Classification of equipment, Components related to Air-Conditioning Systems- filters, grills and registers, fans and blowers.

TEXT BOOKS:

1. A Course in Refrigeration and Air conditioning, SC Arora & Domkundwar, Dhanpatrai
2. Refrigeration and Air Conditioning, CP Arora, TMH.
3. Refrigeration and Air Conditioning / Manohar Prasad / New Age

REFERENCE BOOKS:

1. Principles of Refrigeration /Dossat / Pearson Education.
2. Basic Refrigeration and Air-Conditioning / Ananthanarayanan / TMH
3. Stoecker, W. F., and Jones, J. W., Refrigeration and Air-Conditioning, McGraw - Hill, New Delhi.
4. Data Book: Refrigerant and Psychrometric Properties - Tables and Charts [SI Units], MathurM. L., and Mehta F. S., Jain Brothers.

Semester	VII	L	T	P	C	Course Code
Regulation	V18	3	0	0	3	V18MET25
Name of the Course	**Total Quality Management** Professional Elective –III					
Branch	**Mechanical Engineering**					

Course Outcomes:
After the completion of this course, the students will be able to

CO1	Understand the importance of significance of quality & to understand the concept of Quality.	K2
CO2	Develop quality improvement teams & to implement Quality Implementation Programs.	K3
CO3	Identify requirements of quality improvement programs & bench marketing	K2
CO4	Apply the tools and techniques of quality management to manufacturing and services processes.	K3
CO5	Apply the concepts of comprehensive quality management and the challenges of putting them into practice.	K3
CO6	Apply the quality management methods for analysing and solving problems of organization.	K3

UNIT – I
INTRODUCTION: The concept of TQM, Quality and Business performance, attitude and involvement of top management, communication, culture and management systems. Management of Process Quality: Definition of quality, Quality Control, a brief history, Product Inspection vs, Process Control, Statistical Quality Control, Control Charts and Acceptance Sampling.

UNIT – II
CUSTOMER FOCUS AND SATISFACTION: The importance of customer satisfaction and loyalty- Crating satisfied customers, Understanding the customer needs, Process Vs. Customer, internal customer conflict, quality focus, Customer Satisfaction, role of Marketing and Sales, Buyer – Supplier relationships. .

UNIT – III
BENCH MARKETING: Evolution of Bench Marketing, meaning of Bench marketing, benefits of bench marketing, the bench marketing process, pitfalls of bench marketing.

UNIT – IV
ORGANIZING FOR TQM: The systems approach, Organizing for quality implementation, making the transition from a traditional to a TQM organizing, Quality Circles. Productivity, Quality and Reengineering:

UNIT – V

THE COST OF QUALITY: Definition of the Cost of Quality, Quality Costs, Measuring Quality Costs, use of Quality Cost Information, Accounting Systems and Quality Management.

UNIT – VI

QUALITY MANAGEMENT SYSTEM (QMS): Introduction to QMS. Universal Standards of Quality: ISO around the world, The ISO9001 ANSI/ASQCQ-Series Standards, benefits of ISO9001 certification, the third party audit, Documentation ISO9001 and services, the cost of certification implementing the system.

TEXT BOOKS:

1. Total Quality Management / Joel E.Ross/Taylor and Franscis Limited
2. Total Quality Management/P.N.Mukherjee/PHI
3. Total Quality Management Paperback / R Kesavan, C Elanchezhian, B Vijaya Ramnath / I K International Publishing House

REFERENCE BOOKS:

1. Beyond TQM / Robert L.Flood
2. Statistical Quality Control / E.L. Grant / McGraw Hill.
3. Total Quality Management- A Practical Approach/H. Lal
4. Quality Management/Kanishka Bedi/Oxford University Press/2011
5. Total Engineering Quality Management/Sunil Sharma/Macmillan

Semester	VII	L	T	P	C	Course Code
Regulation	**V18**	**3**	**0**	**0**	**3**	**V18MET26**
Name of the Course	**Finite Element Methods** Professional Elective – III					
Branch	**Mechanical Engineering**					

Course Outcomes:
After the completion of this course, the students will be able to

CO1	Use the concepts of variational methods and weighted residual methods in FEM.	K3
CO2	Use Finite Element Formulation for solving the problems.	K3
CO3	Solve the problems of Truss elements by FEM.	K3
CO4	Solve the problems of Beam s elements by FEM.	K3
CO5	Use FEM to solve 2D CST problems.	K3
CO6	Analyze finite element method for problems involving dynamics and heat transfer.	K4

UNIT-I
INTRODUCTION TO FINITE ELEMENT METHOD: stress and equilibrium, strain – displacement relations, stress-strain relations, plane stress and plane strain conditions, variational and weighted residual methods, the concept of potential energy, one-dimensional problems.

UNIT – II
FINITE ELEMENT FORMULATION: Discretization of the domain, element shapes, discretization procedures, assembly of stiffness matrix, bandwidth, node numbering, mesh generation, interpolation functions, convergence requirements, Treatment of Boundary conditions, Derivation of element stiffness matrix for Bar elements and problems

UNIT – III
ANALYSIS OF TRUSSES: Finite element modelling, coordinates and shape functions, assembly of global stiffness matrix and load vector, finite element equations, treatment of boundary conditions, stress, strain and support reaction calculations.

UNIT – IV
ANALYSIS OF BEAMS: Derivation of Element stiffness matrix for beam element, derivation of load vector for concentrated and UDL, Problems on Cantilever, simply supported beams with point and uniformly distributed loads.

UNIT-V
CST AND AXISYMMETRIC ELEMENTS: Finite element modelling of two-dimensional stress analysis with constant strain triangles and treatment of boundary conditions, formulation of axisymmetric problems,

HIGHER ORDER AND ISOPARAMETRIC ELEMENTS: One dimensional quadratic and cubic elements in natural coordinates, two dimensional four noded isoparametric elements, numerical integration.

UNIT – VI

STEADY STATE HEAT TRANSFER ANALYSIS: one dimensional analysis of a fin and two dimensional analysis of thin plate, analysis of a uniform shaft subjected to torsion.

DYNAMIC ANALYSIS: Formulation of finite element model, element consistent and lumped mass matrices, evaluation of eigen values and eigen vectors, free vibration analysis.

TEXT BOOKS:

1. The Finite Element Methods in Engineering / S. S Rao / Pergamon.

REFERENCE BOOKS:

1. Finite Element Method with applications in Engineering / YM Desai, Eldho& Shah /Pearson publishers
2. An introduction to Finite Element Method / JN Reddy / McGraw Hill
3. The Finite Element Method for Engineers – Kenneth H. Huebner, Donald L. Dewhirst, Douglas E. Smithand Ted G. Byrom / John Wiley &Sons (ASIA) Pte Ltd.
4. Finite Element Analysis/ P.Seshu
5. Finite Element Methods: Basic Concepts and Applications ByChennakesava R. Alavala
6. Finite Element Analysis: for students & Practicing Engineers / G.LakshmiNarasaiah / BSP Books Pvt.Ltd.

Semester	**VII**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	**V18**	**3**	**0**	**0**	**3**	**V18MET27**
Name of the Course	**Micro Electro Mechanical Systems (MEMS)** Professional Elective – III					
Branch	**Mechanical Engineering**					

Course Outcomes:

After successful completion of the course, the student will be able to

CO1	Understand about the basics of MEMS, Methods of Micro machining.	K2
CO2	Interpret various Mechanical sensors & Actuators	K3
CO3	Illustrate the working principles of various Thermal sensors and Actuators& its applications.	K3
CO4	Differentiate between different types of MOEMS devices	K4
CO5	Illustrate and explain various Magnetic sensors and Actuators & its applications	K3
CO6	Illustrate and explain various micro-fluidic devices & its applications	K3

UNIT – I
INTRODUCTION: Definition of MEMS, MEMS history and development, micro machining, lithography principles & methods, structural and sacrificial materials, thin film deposition, impurity doping, etching, surface micro machining, wafer bonding, LIGA.

UNIT – II
MECHANICAL SENSORS AND ACTUATORS: Principles of sensing and actuation: beam and cantilever, capacitive, piezo electric, strain, pressure, flow, pressure measurement by micro phone, MEMS gyroscopes, shear mode piezo actuator, gripping piezo actuator, Inchworm technology.

UNIT – III
THERMAL SENSORS AND ACTUATORS: Thermal energy basics and heat transfer processes, thermisters, thermo devices, thermo couple, micro machined thermo couple probe, micro hot plate gas sensors, MEMS thermo vessels, pyro electricity, shape memory alloys (SMA).

UNIT – IV
MICRO-OPTO-ELECTRO MECHANICAL SYSTEMS: Principle of MOEMS technology, properties of light, light modulators, beam splitter, micro lens, micro mirrors, digital micro mirror device (DMD), light detectors, grating light valve (GLV), optical switch.

UNIT – V
MAGNETIC SENSORS AND ACTUATORS: Magnetic materials for MEMS and properties, magnetic sensing and detection, magneto resistive sensor, more on hall effect, magneto

diodes, magneto transistor, MEMS magnetic sensor, pressure sensor utilizing MOKE, mag MEMS actuators, by directional micro actuator.

UNIT – VI

MICRO FLUIDIC SYSTEMS: Applications, considerations on micro scale fluid, fluid actuation methods, dielectro phoresis (DEP), electro wetting, electro thermal flow, thermo capillary effect, electro osmosis flow, opto electro wetting (OEW), micro fluid dispenser, micro needle, micro pumps.

TEXT BOOKS:

1. MEMS, Nitaigour Premchand Mahalik, TMH Publishing co.

REFERENCE BOOKS:

1. Foundation of MEMS, Chang Liu, Prentice Hall Ltd.
2. MEMS and NEMS, Sergey Edwrd Lyshevski, CRC Press, Indian Edition.
3. MEMS and Micro Systems: Design and Manufacture, Tai-Ran Hsu, TMH Publishers.
4. Introductory MEMS, Thomas M Adams, Richard A Layton, Springer International Publishers.

Semester	VII	L	T	P	C	Course Code
Regulation	**V18**	**0**	**0**	**3**	**1.5**	**V18MEL12**
Name of the Course	**Simulation Lab**					
Branch	**Mechanical Engineering**					

Course Outcomes:
After successful completion of the course, the student will be able to

CO1	Apply the tools like ANSYS or FLUENT in solving real time problems and day to day problems.	K3
CO2	Develop drawings for various components.	K3
CO3	Practice programming on CNC Machines.	K3

List of experiments:

1. **DRAFTING:** Development of part drawings for various components in the form of orthographic andisometric representation of dimensioning and tolerances scanning and plotting. Study of script, DXE and IGES files.

2. **PART MODELING:** Generation of various 3D models through protrusion, revolve, shell sweep. Creation of various features. Study of parent child relation. Feature based and Boolean based modelling surface and assembly modelling. Study of various standard translators. Design simple components.

3. a) Determinationofdeflectionandstressesin2Dand3Dtrussesandbeams.
   b) Determination of deflections component and principal and Von-mises stresses in plane stress, plane strain and axisymmetric components.
   c) Determination of stresses in 3D and shell structures (at least one example in each case)
   d) Estimation of natural frequencies and mode shapes, Harmonic response of 2D beam.
   e) Steady state heat transfer Analysis of plane and Axisymmetriccomponents.

4. a) Study of various post processors used in NC Machines.
   b) Machining of simple components on NC lathe and Mill by transferring NC Code / from a CAM package. Through RS 232.
   c) Practice on CNC Sinutrain Turning
   d) Practice on CNC Sinutrain Milling
   e) CNC programming forturned components using FANUC Controller
   f) CNC programming for milled components using FANUC Controller
   g) Automated CNC Tool path & G-Code generation using

   Pro/E/MasterCAM**Packages to be provided to cater to drafting, modeling & analysis from the following:**CATIA, Pro-E, I-DEAS, ANSYS, NISA, CAEFEM, Gibbs CAM, Master CAM etc.

Semester	VII	L	T	P	C	Course Code
Regulation	**V18**	**0**	**0**	**3**	**1.5**	**V18MEL13**
Name of the Course	**Production Drawing Lab**					
Branch	**Mechanical Engineering**					

Course Outcomes:
After successful completion of the course, the student will be able to

CO1	Recognise the need of limits, fits and tolerances, and apply the same on part drawings for manufacturing.	K2
CO2	Illusttrate the Geometric Dimensioning and tolerancing, able to apply GD&T to a part drawing.	K3
CO3	Indicate various surface roughness symbols on part drawings for manufacturing.	K2
CO4	Assess the raw material requirements, final cost of the component and heat treatment process.	K3
CO5	Develop skill to produce detailed drawings from assembly drawings.	K3
CO6	Construct press tools, die-casting dies and jigs and fixtures using computer aided design software.	K3

PART-A
LIMITS, FITS AND TOLERANCES: Types of fits, exercises involving selection and interpretation of fits and estimation of limits from tables.
GEOMETRIC DIMENSIONING AND TOLERANCING: Introduction to GD&T ,terminology & basic rules, features and material conditions, maximum material condition, least material condition, regardless of feature's size, datums, datum reference frame, **form tolerances, orientation tolerances, profile tolerances, runout tolerances.**
ADDING GD&T TO A DRAWING/DESIGN – size, location, orientation & form, choosing datums, indication of form and position tolerances on drawings, preparation of bill of material
SURFACE ROUGHNESS AND ITS INDICATIONS: Definition, types of surface roughness indication-Surface roughness obtained from various manufacturing process, recommended surface roughness on mechanical components, heat treatment and surface treatment symbols used on drawings.

PART-B
Drawing of parts from assembly of stuffing box, piercing and blanking die, Die casting die, Box jig, machining fixture with indication of size, tolerance, roughness, form and position tolerances using Computer aided design software.

TEXT BOOKS:
1. Production and Drawing – K.L. Narayana& P. Kannaiah/New Age Publication
2. Tool Engineering & Design_G.R.Nagpal/Khannapublishers,1st edition, Khanna Publishers, 2009
3. MachineDrawingwithAutoCAD-PohitandGhosh,1st edition, Pearso, 2017
4. Geometric dimensioning and tolerancing- James D. Meadows/B.S Publications.

REFERENCE BOOKS:

1. MachineDrawingbyNagpal,1st edition, khanna publishers,2009
2. Machinedrawing,AjeetSingh,2ndedition,TMH,2016
3. Engineering Metrology, R.K. Jain, Khanna Publications.

Syllabi for the courses offered in VIII semester B. Tech under V18 Regulation for the Academic Year 2021-2022

VIII Semester

Semester	VIII	L	T	P	C	Course Code
Regulation	V18	3	0	0	3	V18MET28
Name of the Course	Automobile Engineering					
Branch	Mechanical Engineering					

Course Outcomes:
After successful completion of the course, the student will be able to

CO1	Understand various components in four wheel automobile.	K2
CO2	Differentiate between different types of transmission systems used in automobile.	K4
CO3	Examine steering geometry and steering systems used in automobile.	K3
CO4	Interpret suspension, breaking and electrical systems in automobile.	K3
CO5	Understand various safety systems used in automobile.	K2
CO6	Practice engine service for different components in automobile.	K3

UNIT – I
INTRODUCTION: Components of four wheeler automobile – chassis and body – power unit – power transmission – rear wheel drive, front wheel drive, 4 wheel drive – types of automobile engines, engine construction, turbo charging and super charging – engine lubrication, splash and pressure lubrication systems, oil filters, oil pumps – crank case ventilation – engine service, reboring, decarbonisation, Nitriding of crank shaft.

UNIT – II
TRANSMISSION SYSTEM: Clutches, principle, types, cone clutch, single plate clutch, multi plate clutch, magnetic and centrifugal clutches, fluid fly wheel – gear boxes, types, sliding mesh, construct mesh, synchromesh gear boxes, epicyclic gear box, over drive torque converter. Propeller shaft – Hotch – Kiss drive, Torquetube drive, universal joint, differential rear axles – types – wheels and tyres.

UNIT – III
STEERING SYSTEM: Steering geometry – camber, castor, king pin rake, combined angle toein, center point steering. Types of steering mechanism – Ackerman steering mechanism, Davis steering mechanism, steering gears– types, steering linkages.

UNIT – IV
SUSPENSION SYSTEM: Objects of suspension systems – rigid axle suspension system, torsion bar, shock absorber, Independent suspension system.

BRAKING SYSTEM: Mechanical brake system, hydraulic brake system, master cylinder, wheel cylinder tandem master cylinder requirement of brake fluid, pneumatic and vacuum brakes.
ELECTRICAL SYSTEM: Charging circuit, generator, current – voltage regulator – starting system, bendix drive mechanism solenoid switch, lighting systems, horn, wiper, fuel gauge – oil pressure gauge, engine temperature indicator etc.

UNIT – V
ENGINE SPECIFICATION AND SAFETY SYSTEMS: Introduction- engine specifications with regard to power, speed, torque, no. of cylinders and arrangement, lubrication and cooling etc.
Safety: Introduction, safety systems - seat belt, air bags, bumper, anti lock brake system (ABS), wind shield, suspension sensors, traction control, mirrors, central locking and electric windows, speed control.

UNIT – VI
ENGINE SERVICE: Introduction, service details of engine cylinder head, valves and valve mechanism, piston connecting rod assembly, cylinder block, crank shaft and main bearings, engine reassembly-precautions.

TEXT BOOKS:
1. Automotive Mechanics – Vol. 1 & Vol. 2 / Kirpal Singh/standard publishers
2. Automobile Engineering / William Crouse/TMH Distributors
3. Automobile Engineering/P.S Gill/S.K. Kataria & Sons/New Delhi.

REFERENCE BOOKS:
1. Automotive Engines Theory and Servicing/James D. Halderman and Chase D. Mitchell Jr.,/ Pearson education inc.
2. Automotive Engineering / K Newton, W.Steeds & TK Garrett/SAE
3. Automotive Mechanics: Principles and Practices/ Joseph Heitner/Van Nostrand Reinhold
4. Automobile Engineering / C Srinivasan / Mc Graw Hill

Semester	**VIII**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	**V18**	**3**	**0**	**0**	**3**	**V18MET31**
Name of the Course	**Process Planning & Cost Estimation** Professional Elective – IV					
Branch	**Mechanical Engineering**					

Course Outcomes:
After successful completion of the course, the student will be able to

CO1	Understand the basic concepts of production, steps involved in types of process planning.	K2
CO2	Calculate the process parameters for various production processes.	K3
CO3	Prepare the types of estimates.	K3
CO4	Calculate depreciation cost and explain about different costs.	K3
CO5	Estimate production cost in forging, welding and foundry.	K2
CO6	Determine the machining time of different machining operations.	K4

UNIT – I
INTRODUCTION: Types of production, standardization, simplification, product design and selection-process planning-methods, selection and analysis-steps involved in manual and computer aided process planning-Break even analysis.

UNIT – II

PROCESS PLANNING ACTIVITIES: Calculation of process parameters for various production processes-Selection of jigs & fixtures-Selection quality assurance methods-Set of documents for process planning.

UNIT – III

ESTIMATION AND COSTING: Aim and objective of cost estimation – Functions of estimation – Costing – Importance and aims of costing – Difference between costing and estimation. Types of estimates – Estimation procedure.

UNIT – IV

COST ELEMENTS: Material cost – Determination of material cost, labour cost, Expenses – – Analysis of overhead expenses – Factory expenses, Administrative expenses – Selling and Distributing expenses – Allocation of over head expenses. Cost of product – Illustrative examples Depreciation: Depreciation – Causes of Depreciation – Methods of Depreciation calculation.

UNIT – V
ESTIMATION OF PRODUCTION COST : Estimation in forging shop – Losses in forging – forging cost – Illustrative examples. Estimation in welding shop – Gas cutting – Electric

welding - Illustrative examples. Estimation in foundry shop – Estimation of pattern cost and casting cost - Illustrative examples.

UNIT – VI

MACHINING TIME ESTIMATION: Estimation of Machining Time for Lathe operations – Estimation of Machining Time for Drilling, Boring, Shaping, Planning, Milling and Grinding operations - Illustrative examples.

TEXT BOOKS:

1. M.Adithian and B.S. Pabla, Estimation and Costing, Konark publishers Pvt. Ltd., 1989.
2. A.K.Chitale and R.C.Gupta, Product Design and Manufacturing, Prentice Hall Pvt. Ltd.., 2005

REFERENCE BOOKS :

1. Namua Singh, System Approach to computer integrated Design and Manufacturing, John Wiley & Sons,Inc.,1996.
2. Joseph G Monks, Operation Management, Theory & Problems, McGraw Hill Book Company, 1987.
3. T.R.Banga and S.C.Sharma, Estimations and Costing, Khanna Publishers,1988.
4. G.B.S.Narang and V.Kumar, Production and Costing, Khanna Publishers, 1995.
5. Sinha B.P – Mechanical estimating & costing – Tata McGrawhill publishing co.,1995

Semester	VIII	L	T	P	C	Course Code
Regulation	**V18**	**3**	**0**	**0**	**3**	**V18MET32**
Name of the Course	**Non Destructive Evaluation** Professional Elective – IV					
Branch	**Mechanical Engineering**					

Course Outcomes:
After Successful completion of this course the student will be able to

CO1	Examine the Radiograpic test method	K3
CO2	Examine the Radiograpic test method	K3
CO3	Understand the Radiograpic test method	K2
CO4	Understand the Radiograpic test method	K2
CO5	Examine the Radiograpic test method	K3
CO6	Apply knowledge of non destructive testing methods for the products of railways, automobiles, aircrafts, chemical industries etc.	K3

UNIT – I
Introduction to non-destructive testing, Radiographic test, Sources of X and Gamma Rays and their interaction with Matter, Radiographic equipment, Radiographic Techniques, Safety Aspects of Industrial Radiography.

UNIT – II
ULTRASONIC TEST: Principle of Wave Propagation, Reflection, Refraction, Diffraction, Mode Conversion and Attenuation, Sound Field, Piezo-electric Effect, Ultrasonic Transducers and their Characteristics, Ultrasonic Equipment and Variables Affecting Ultrasonic Test, Ultrasonic Testing, Interpretations and Guidelines for Acceptance, Rejection, Effectiveness and Limitations of Ultrasonic Testing.

UNIT – III
LIQUID PENETRANT TEST: Liquid Penetrant Test, Basic Concepts, Liquid Penetrant System, Test Procedure, Effectiveness and Limitations of Liquid Penetrant Testing.
EDDY CURRENT TEST: Principle of Eddy Current, Eddy Current Test System, Applications of Eddy Current Testing Effectiveness of Eddy Current Testing.

UNIT – IV
MAGNETIC PARTICLE TEST: Magnetic Materials, Magnetization of Materials, Demagnetization of Materials,Principle of Magnetic Particle Test, Magnetic Particle Test Equipment, Magnetic Particle Test Procedure, Standardization and Calibration, Interpretation and Evaluation, Effective Applications and Limitations of the Magnetic Particle Test.

UNIT – V
INFRARED AND THERMAL TESTING: Introduction and fundamentals to infrared and thermal testing, Heat transfer –Active and passive techniques, Lock in and pulse thermography, Contact and non contact thermal inspection methods, Heat sensitive paints and papers, thermally quenched phosphors liquid crystals, techniques for applying liquid crystals, other temperature sensitive coatings, Inspection methods, Infrared radiation and

infrared detectors, thermo mechanical behavior of materials, IR imaging in aerospace applications,electronic components, Honey comb and sandwich structures–Case studies.

UNIT – VI

INDUSTRIAL APPLICATIONS OF NDE: Span of NDE Activities Railways, Nuclear, Non-nuclear and Chemical Industries, Aircraft and Aerospace Industries, Automotive Industries, Offshore Gas and Petroleum Projects, Coal Mining Industry, NDE of pressure vessels, castings, welded constructions.

TEXT BOOKS:

1. Non destructive test and evaluation of Materials/J Prasad, GCK Nair/TMH Publishers
2. Ultrasonic testing of materials/ H Krautkramer/Springer
3. Non destructive testing/Warren, J Mc Gonnagle / Godan and Breach Science publishers
4. Nondestructive evaluation of materials by infrared thermography / X. P. V. Maldague, Springer-Verlag, 1st edition, (1993)

REFERENCE BOOKS:

1. Ultrasonic inspection training for NDT/ E. A. Gingel/Prometheus Press,
2. ASTM Standards, Vol 3.01, Metals and alloys
3. Non-destructive, Hand Book – R. Hamchand

Semester	VIII	L	T	P	C	Course Code
Regulation	**V18**	**3**	**0**	**0**	**3**	**V18MET33**
Name of the Course	**Industrial Hydraulics and Pneumatics** Professional Elective – IV					
Branch	**Mechanical Engineering**					

Course Outcomes:
After Successful completion of this course the student will be able to

CO1	UnderstandthefundamentalsofFluidPowerSystems	K2
CO2	Develop generalconceptsassociatedwithHydraulicactuators and cylinders.	K3
CO3	Identify Hydraulic elements in the design of circuits	K2
CO4	Illustrate various accumulators&intensifiers	K3
CO5	Developtheoperationofpnuematicscircuitsandcomponentstypicallyusedini ndustry.	K3
CO6	Examine the applications of Industrial Hydraulics and Pneumatics.	K3

UNIT–I
FUNDAMENTALSOFFLUIDPOWERSYSTEMS-INTRODUCTION – typesadvantages,disadvantages & applications-fluid characteristics-terminologies used in fluidpower-hydraulicsymbols-hydraulicsystemsandcomponents-sources-pumpingtheory-gear,vane&pistonpumps.

UNIT-II
FLUIDPOWERACTUATORS: Introduction-hydraulicactuators-hydrauliccylinders-types,construction,specificationsandspecialtypes.Hydraulicmotors-workingprinciple-selectioncriteriaforvarioustypes-hydraulicmotorsincircuits-formulae-numericalproblems

UNIT-III
HYDRAULIC ELEMENTS IN THE DESIGN OF CIRCUITS- Introduction-control elements-directioncontrolvalve-checkvalve-pressurecontrolvalve-reliefvalve-throttle valve-temperature & pressure compensation-locations of flow controlvalve

UNIT-IV
ACCUMULATORS&INTENSIFIERS-types,size&functionofaccumulators-application&circuitsofaccumulators-intensifiers-circuit&applications.

UNIT-V
PNEUMATICSYSTEMS-INTRODUCTION-symbolsused-concepts&components-comparison-types&specificationsofcompressors-arrangementofa completepneumaticsystem-compressedairbehaviour-understandingpneumaticcircuits-directioncontrol valves

UNIT-VI

APPLICATIONS- Servo systems-introduction-closed loop, hydro-mechanical andelectro hydraulic – conventional and proportional valves-characteristics ofproportional and servo valves- PLC applications in fluid power – selectedpneumatic / electro pneumatic circuit problems – failure and trouble shootinginfluidpowersystems.

TEXTBOOKS:

1. IntroductiontoHydraulicsandPneumaticsbyS.IlangoandV.Soundararajan,PHI , NewDelhi
2. Appliedhydraulicsandpneumatics-T.SunderSelwyn&R.Jayendiran,Anuradha Publications.

REFERENCEBOOKS:

1. OilHydraulicSystems,S.R.Majumdar,McGrawHillCompanies
2. PneumaticSystems:PrinciplesandMaintenance,Majumdar,McGrawHill

Semester	**VIII**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	**V18**	**3**	**0**	**0**	**3**	**V18MET34**
Name of the Course	**Computational Fluid Dynamics** Professional Elective – V					
Branch	**Mechanical Engineering**					

Course Outcomes:
After Successful completion of this course the student will be able to

CO1	Apply techniques in the numerical solution of fluid equations	K3
CO2	Apply numerical modeling and its role in the field of heat transfer and fluid flow.	K3
CO3	Develop methodologies used in CFD	K3
CO4	Comapre various discretization methods and solving methodologies.	K4
CO5	Apply skills in the actual implementation of CFD methods (e.g. boundary conditions, different numerical schemes etc.	K3
CO6	Apply the finite element methods in the application of CFD analysis to real life engineering designs.	K3

UNIT – I

ELEMENTARY DETAILS IN NUMERICAL TECHNIQUES: Number system and errors, representation of integers, fractions, floating point arithmetic, loss of significance and error propagation, condition and instability, computational methods for error estimation, convergence of sequences.

UNIT – II

APPLIED NUMERICAL METHODS: Solution of a system of simultaneous linear algebraic equations, iterative schemes of matrix inversion, direct methods for matrix inversion, direct methods for banded matrices.

EQUATIONS GOVERNING FLUID FLOW AND HEAT TRANSFER: Introduction, conservation of mass, Newton's second law of motion, expanded forms of navier-stokes equations, conservation of energy principle, special forms of the navier-stokes equations.

UNIT – III

Steady flow, dimensionless form of momentum and energy equations, stokes equation, conservative body force fields, stream function - vorticity formulation. Finite difference applications in heat conduction and convention – heat conduction, steady heat conduction in a rectangular geometry, transient heat conduction, finite difference application in convective heat transfer, closure.

UNIT – IV

Finite differences, discretization, consistency, stability, and fundamentals of fluid flow modeling: introduction, elementary finite difference quotients, implementation aspects of finite-difference equations, consistency, explicit and implicit methods.

UNIT – V

Introduction to first order wave equation, stability of hyperbolic and elliptic equations, fundamentals of fluid flow modeling, conservative property, the upwind scheme

UNIT – VI

FINITE VOLUME METHOD: Approximation of surface integrals, volume integrals, interpolation and differentiation practices, upwind interpolation, linear interpolation and quadratic interpolation.

TEXT BOOKS:

1. Numerical heat transfer and fluid flow / Suhas V. Patankar- Butter-worth Publishers.
2. Computational fluid dynamics - Basics with applications - John. D. Anderson / McGraw Hill.

REFERENCE BOOKS:

1. Computational Fluid Flow and Heat Transfer/ Niyogi, Pearson Publications.
2. Fundamentals of Computational Fluid Dynamics – Tapan K. Sengupta / Universities Press.
3. Computational fluid dynamics, 3rd edition/Wendt/Springer publishers

Semester	VIII	L	T	P	C	Course Code
Regulation	V18	3	0	0	3	V18MET35
Name of the Course	**Production Planning and Control** Professional Elective – V					
Branch	**Mechanical Engineering**					

Course Outcomes:
After Successful completion of this course the student will be able to

CO1	Generalise structure, elements and functions of Production planning and Control.	K2
CO2	Apply the principles of different forecasting methods.	K3
CO3	Analyze principles of different inventory control systems.	K4
CO4	Generalise Routing, its procedure, factors affecting Routing procedure.	K2
CO5	Explain Scheduling methods, Planning and controlling aspects.	K2
CO6	Understand Dispatching procedure, types of follow up, applications of computers in production planning and control.	K2

UNIT – I
Introduction: Definition – objectives and functions of production planning and control – elements of production control – types of production – organization of production planning and control department – internal organization of department.

UNIT – II
Forecasting– importance of forecasting – types of forecasting, their uses – general principles of forecasting – forecasting techniques – qualitative methods and quantitive methods.

UNIT – III
Inventory management– functions of inventories – relevant inventory costs – ABC analysis – VED analysis – EOQ model – Inventory control systems – P–Systems and Q-Systems. Introduction to MRP I, MRP II, ERP, JIT systems.

UNIT – IV
Routing– definition – routing procedure –route sheets – bill of material – factors affecting routing procedure, schedule –definition – difference with loading.

UNIT – V
Scheduling policies– techniques, standard scheduling methods. Line Balancing, aggregate planning, chase planning, expediting.

UNIT – VI
Dispatching– activities of dispatcher – dispatching procedure – follow up – definition – reasons for existence of functions – applications of computers in production planning and control.

TEXT BOOKS:
1. Elements of Production Planning and Control / Samuel Eilon.
2. Manufacturing, Planning and Control, Partik Jonsson Stig-Arne Mattsson, Tata Mc Graw Hill

Semester	VIII	L	T	P	C	Course Code
Regulation	**V18**	**3**	**0**	**0**	**3**	**V18MET36**
Name of the Course	**Energy Conservation and Management** Professional Elective – V					
Branch	**Mechanical Engineering**					

Course Outcomes:
After Successful completion of this course the student will be able to

CO1	Understand the principles of Energy.	K2
CO2	Evaluate thermal Performance.	K5
CO3	Illustrate Energy Conservation Program.	K3
CO4	Predict the Energy Conservation Options	K2
CO5	Recognise the Strategies for Electricity and Management	K2
CO6	Express the Importance and Role of Energy Management	K2

UNIT-I
Energy scenario, Principles of energy conservation, Energy consumption pattern, Resource availability.

UNIT-II
Calculation of thermal performance, calculation of heat loss – heat gain, estimation of annual heating & cooling load factors that influence thermal performance, analysis of existing buildings.

UNIT-III
Organizing for energy conservation program, the energy audit and energy information system, technology for energy conservation, co-generation of process, steam & electricity, computer controlled energy.

UNIT-IV
Commercial options in waste heat recovery equipment, cases of energy studies, energy conservation opportunity, Energy conservation in I. C. Engine.

UNIT-V
Strategies for electricity and management, setting up an energy management programme, electricity saving technique by category of end use, Electrical end use in industries, energy & power management in industry, energy management strategies for industry, demand management.

UNIT-VI
Importance and role of energy management, Energy economics, Payback period, Internal rate of return, life cycle costing.

TEXT BOOKS:

1. Hamies, Energy Auditing and Conservation, Methods, Measurements, Management and Case Study, Hemisphere,Washington, 1980
2. W.F.Kenny, Energy Conservation in Process Industry.
3. Trivedi, P.R, Jolka K.R., Energy Management, Commonwealth Publication, New Delhi, 1997.
4. C.B.Smith, Energy Management Principles, Pergamon Press, New York, 1981.

REFERENCE BOOKS:

1. W.C. Turner, Energy Management, Hand Book.
2. Kreith, Economics of Solar Energy and Conservation Systems, Vol -3.
3. Witte, Larry C, Industrial Energy Management and Utilization, Hemisphere Publishers, Washinton, 1988.

Annexure II

Course offered in OPEN ELECTIVE - II & III in VII & VIII sem B.Tech., under V18 Regulations
VII SEMESTER

Semester	VII	L	T	P	C	Course Code
Regulation	V18	3	0	0	3	V18MEOE4
Name of the Course	**Computer Aided Design** Open Elective – II					
Branch	**Mechanical Engineering**					

Course Outcomes:
After successful completion of the course, the student will be able to

CO1	Explain the basic fundamentals of CAD tools	K2
CO2	Find the characteristics of curves, Representation and continuity requirements	K3
CO3	Illustrate the Geometric Transformations.	K3
CO4	Demonstrate various types of surfaces and Representation.	K3
CO5	Differentiate between the methods of representing Solid Modelling.	K4
CO6	Apply the local and global properties for product development	K3

UNIT – I
CAD Introduction: Need of machine design, use of computer, computer fundamentals, computer aided design process, CAD configuration, and CAD tools, positive and negative points of CAD, CAD and CAM integration.

UNIT – II
DESIGN OF CURVES: Fundamental of Curve Design, Parametric Space of a Curve, Representation, Parametric cubic curve, Blending functions, Truncation, extension, and subdivision, composite curve: continuity requirements .

UNIT – III
GEOMETRIC TRANSFORMATIONS: Translation, Rotation, Scaling Symmetry and Reflection, Homogeneous Transformations. Orthographic Projections, Axonometric Projections, Oblique Projections, Perspective Transformation.

UNIT – IV
DESIGN OF SURFACES: Fundamental of Surface Design, Parametric Space of a Surface, Representation of a Surface patch, sixteen point form, Four Curve Form, Plane.

UNIT – V
SOLID MODELLING: Solid Modelling fundamentals, topology and geometry. Geometric Modelling Method, Constructive Solid Geometry (CSG), Boundary Representation (Brep), Introduction to Wireframe, surface and solid modelling techniques. Introduction CAD data exchange format IGES, STEP

UNIT – VI

GEOMETRIC PROPERTIES: Local and global properties of a curve, Local and global properties of a surface, Global properties of complex solids, Relational properties, intersections. Applications in Product Development and other areas.

REFERENCE BOOKS:

1. Geometric Modeling: Michael E. Mortenson, Third Edition, Industrial Press Inc.2006.
2. Mathematical Elements of Computer Graphics, Rogers and Adams, McGraw Hill. 1994
3. CAD CAM Theory and Prectice: I. Zeid, Tata-McGraw Hill, 2006
4. Computer-Aided Engineering Design, B Sahay and ASaxena, Springer, 2005.
5. Differential Geometry of Curves and Surfaces, Thomas F. Banchoff and Stephen T. Lovett, Thomas Banchoff-Stephen Lovett, 2010.
6. Computational Geometry for Design and Manufacture, I.D. Faux and M.J. Pratt, John Wiley, 1980.
7. Lectures on Classical Differential Geometry, Dirk J. Struick, Addison Wesley, 1980.

Semester	**VII**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	**V18**	**3**	**0**	**0**	**3**	**V18MEOE5**
Name of the Course	**Condition Monitoring and Machine Learning** Open Elective – II					
Branch	**Mechanical Engineering**					

Course Outcomes:
After successful completion of the course, the student will be able to

CO1	Understand various condition monitoring techniques	K2
CO2	Demonstrate the construction and principle of working of sensors for condition monitoring.	K3
CO3	Interpret the concepts of signal processing analysis	K3
CO4	Assess various failure analysis and maintenance.	K3
CO5	Examine the elements of Machine condition monitoring	K3
CO6	Examine the concepts of machine learning systems for signal analysis and fault detection systems	K3

UNIT – I
CONDITION MONITORING TECHNIQUES: Introduction, Condition Monitoring in manufacturing industries; Noise monitoring, Wear and debris Analysis, Thermography, Cracks monitoring, Ultrasonic techniques - Case studies.

UNIT – II
SENSORS FOR CONDITION MONITORING: Accelerometers, strain gauges, eddy current probes, LVDT for measurement of displacement, velocity and acceleration; Temperature transducers, radiation pyrometers and thermal imaging devices.

UNIT – III
SIGNAL PROCESSING: Study of periodic and random signals, probability distribution, statistical properties, auto and cross correlation and power spectral density functions.
SIGNAL ANALYSIS: Time domain and Frequency domain and Time-frequency domain analysis

UNIT – IV
FAILURE ANALYSIS AND MAINTENANCE: Maintenance Principles, Failure mode analysis - Equipment down time analysis – Breakdown analysis - condition based maintenance.

UNIT – V
MACHINE CONDITION MONITORING: Vibration, Acoustic emission and vibro-acoustics signal analysis; intelligent fault detection system, Case studies.

UNIT – VI
MACHINE LEARNING: Vibration, Acoustic emission and vibro-acoustics signal analysis; intelligent fault detection system, Case studies.

TEXT BOOKS:

1. EthemAlpaydin, Introduction to Machine Learning (2010), The MIT Press, Cambridge, London.

REFERENCE BOOKS:

1. K. P. Soman, Data mining theory and practice (2006), Prentice-Hall of India.
2. Amiya RanjanMohanty, Machinery Condition Monitoring: Principles and Practices (2015), CRC Press
3. Mishra, R.C., Pathak, K., Maintenance Engineering and Management (2012), Prentice Hall of India.
4. Clarence W. De Silva, Sensors and Actuators: Control System Instrumentation (2007), CRC Press – Taylor and Francis Group.
5. Boualem Boashash, Time Frequency Signal Analysis and Processing: A Comprehensive Reference (2015), Elsevier.

VIII SEMESTER

Semester	VIII	L	T	P	C	Course Code
Regulation	V18	3	0	0	3	V18MEOE6
Name of the Course	**Power Plant Engineering** Open Elective – III					
Branch	**Mechanical Engineering**					

Course Outcomes:
After successful completion of the course, the student will be able to

CO1	Explain the working and layout of steam power plant and the different systems comprising the plant.	K2
CO2	Outline the working principle of diesel power plant and its layout.	K2
CO3	Illustrate the working and layout of gas turbine power plant and various auxiliaries comprising the plant.	K3
CO4	Construct the working principle and basic components of the hydro electric plants.	K3
CO5	Describe the and basic components and working principle of different reactors of nuclear power plant.	K2
CO6	Outline the power plant economics .	K4

UNIT – I
Introduction to the Sources of Energy.
Steam Power Plant: Plant layout, working of different circuits, coal handling equipment, ash handling systems, overfeed and underfeed fuel beds, types of stokers, dust collectors, cooling towers and feed water treatment.

UNIT – II
Diesel power Plant: IC Engines, types, Plant layout with auxiliaries – fuel supply system, air starting equipment, lubrication and cooling system, super charging.

UNIT – III
Gas Turbine Plant: Introduction, classification, construction, Layout with auxiliaries, Principles ofworking of closed and open cycle gas turbines, combined cycle power plants and comparison.

UNIT – IV
Hydro Electric Power Plant: Water power , hydrological cycle, hydrographs, classification of dams and spill ways.
Hydro Projects and Plant: Classification – typical layouts – plant auxiliaries – plant operation pumped storage plants.

UNIT – V

Nuclear Power Station: Nuclear fuel – breeding and fertile materials, nuclear reactor – reactor operation. Types of reactors and their operation - Pressurized water reactor, boiling water reactor, sodium-graphite reactor, fast breeder reactor. Radiation hazards and shielding, radioactive waste disposal.

UNIT – VI

Power Plant Economics: Capital cost, investment of fixed charges, operating costs, general arrangement of power distribution, load curves, load duration curve, definitions of connected load, maximum demand, demand factor, average load, load factor, diversity factor – related exercises.

TEXT BOOKS:

1. A course in Power Plant Engineering /Arora and Domkundwar/Dhanpatrai& Co.
2. Power Plant Engineering /P.C.Sharma / S.K.Kataria Pub

REFERENCE BOOKS:

1. Power Plant Engineering: P.K.Nag/ TMH.
2. Power station Engineering – M.M.Ei-Wakil / McGrawHill.

Semester	VIII	L	T	P	C	Course Code
Regulation	V18	3	0	0	3	V18MEOE7
Name of the Course	**Mechatronics** Open Elective – III					
Branch	**Mechanical Engineering**					

Course Outcomes:
After successful completion of the course, the student will be able to

CO1	Understand the elements of Mechatronics & levels and explain various types of sensors , transducers and Mechatronics design process	K2
CO2	Sketch and explain various types of solid state devices like Diode, BJT, MOSFET, etc.,	K3
CO3	Illustrate and explain basic principles of Hydraulic, pneumatic, electro hydraulic, electro hydraulic servo actuating systems.	K3
CO4	Illustrate and explain microprocessors, microcontrollers and PLC	K3
CO5	Sketch and explain System interfacing and data acquisition systems.	K3
CO6	Sketch and explain Digital Controllers and Design of mechatronics systems.	K3

UNIT – I
MECHATRONICS SYSTEMS – elements & levels of mechatronics system, Mechatronics design process, system, measurement systems, control systems, advantages and disadvantages of mechatronics systems. Sensors and transducers, types, displacement, velocity, force, acceleration, liquid flow, liquid level, temperature and light sensors.

UNIT– II
SOLID STATE ELECTRONIC DEVICES - PN junction diode, BJT, FET, Analog signal conditioning, operational amplifiers, filters.

UNIT– III
HYDRAULIC AND PNEUMATIC ACTUATING SYSTEMS - Fluid systems, Hydraulic systems, and pneumatic systems, components, control valves, electro-pneumatic, hydro-pneumatic, electro-hydraulic servo systems.

UNIT– IV
DIGITAL ELECTRONICS AND SYSTEMS - Digital logic control, micro processors and micro controllers, programming, programmable logic controllers, PLCs versus computers, application of PLCs for control.

UNIT– V
SYSTEM AND INTERFACING AND DATA ACQUISITION – Data Acquisition Systems, Analog to Digital and Digital to Analog conversions; Digital Signal Processing.

UNIT– VI

DYNAMIC MODELS AND ANALOGIES - System response. Process Controllers – Digital Controllers, Programmable Logic Controllers, Design of mechatronics systems & future trends.

TEXT BOOKS:

1. MECHATRONICS Integrated Mechanical Electronics Systems/KP Ramachandran, GK Vijaya Raghavan & MS Balasundaram/WILEY India Edition

REFERENCE BOOKS:

1. Mechatronics /Smaili A, Mrad F/ Oxford Higher Education, Oxford University Press
2. Mechatronics Source Book / Newton C Braga/Thomson Publications,Chennai.
3. Mechatronics – N. Shanmugam / Anuradha Agencies Publishers.
4. Mechatronics System Design / Devdas shetty/Richard/Thomson.
5. Mechatronics/M.D.Singh/J.G.Joshi/PHI.
6. Mechatronics – Electronic Control Systems in Mechanical and Electrical Engg. 4th Edition / W. Bolton/ Pearson, 2012
7. Mechatronics – Principles and Application / Godfrey C. Onwubolu/Elsevier, Indian print

Annexure – III

Course structure & Syllabi for the courses offered in III & IV semesters B. Tech under V20 Regulations

Course Structure of Mechanical Engineering – V20 Regulation
(For 2020 – 2021 Admitted Batch)

III SEMESTER							
S.No	**Category**	**Course Code**	**Course Title**	**Hours per week**			
				L	**T**	**P**	**C**
1	Basic Science Course / Prof core course	V20MET03	Metallurgy and Material Science	3	0	0	3
2	Engineering Science Course	V20MET04	Mechanics of Solids	3	0	0	3
3	Professional Core Course	V20MET05	Fluid Mechanics with Machine Learning	3	0	0	3
4	Professional Core course	V20MET06	Thermodynamics	3	0	0	3
5	Humanities and Social Sciences		Managerial Economics and Financial Analysis (Under BOS of MBA)	3	0	0	3
6	Professional Core course (LAB)	V20MEL02	Fluid Mechanics & Hydraulic Machines Lab	0	0	3	1.5
7	Professional Core course (LAB)	V20MEL03	Mechanics of Solids & Materials Engineering Lab	0	0	3	1.5
8	Professional Core course (LAB)	V20MEL04	Machine drawing	0	0	3	1.5
9	**Skill oriented course***	V20MESOC1	Certificate course offered by industries/Professional bodies/APSSDC or any other accredited bodies.	**1**	**0**	**2**	**2**
10	Mandatory course		PCS-I (Under BOS of English)	2	0	0	MNC
Total Credits				18	0	11	21.5

Total Contact Hours: 29 Total Credits: 21.5

IV SEMESTER							
S.No	**Category**	**Course Code**	**Course Title**	**Hours per week**			
				L	**T**	**P**	**C**
1	Basic Science course		Probability and Statistics (Under BOS of BSH)	3	0	0	3
2	Professional Core course	V20MET07	Kinematics of Machinery	3	0	0	3
3	Professional Core course	V20MET08	Manufacturing Science with Artificial Intelligence	3	0	0	3
4	Professional Core course	V20MET09	Mechanical measurements and Metrology	3	0	0	3
5	Professional Core course	V20MET10	Applied Thermodynamics	3	0	0	3
6	Engineering Science Course/Prof Core (Interdisciplinary) (LAB)	V20MEL05	Mechanical measurements and Metrology lab	0	0	3	1.5
7	Professional Core course (LAB)	V20MEL06	Manufacturing Process Lab	0	0	3	1.5
8	Professional Core course (LAB)	V20MEL07	Thermal Engineering Lab	0	0	3	1.5
9	**Skill oriented course***	V20MESOC2	Certificate course offered by industries/Professional bodies/APSSDC or any other accredited bodies.	**1**	**0**	**2**	**2**
10	Mandatory course		PCS-II (Under BOS of English)	**2**	**0**	**0**	**MNC**
Total Credits				18	0	11	21.5
Internship 2 months (Mandatory) during summer vacation							

Total Contact Hours: 29 Total Credits: 21.5

Syllabi for the courses offered in III & IV semester B. Tech under V20 Regulation for the Academic Year 2021-2022 III Semester

Semester	III	L	T	P	C	Course Code
Regulation	V20	3	0	0	3	V20MET03
Name of the Course	Metallurgy and Material Science					
Branch	Mechanical Engineering					

Course Outcomes:

	After successful completion of the course, the student willbe able to:	Knowledge Level
CO1	Explain the types of bonds in solids and crystallization of Metals.	K2
CO2	Construct phase diagrams for the study of alloys and phase Transformation reactions.	K2
CO3	Use different ferrous and nonferrous metals based on properties for various applications	K3
CO4	Apply suitable heat treatment process to achieve desired properties of metals andalloys.	K3
CO5	Illustrate the properties and applications of compositesand Ceramic materials and understand the concepts of powder metallurgy.	K2

UNIT – I

INTRODUCTION TO METALLURGY AND MATERIAL SCIENCE: Structure of Metals, Properties of metals,TypesofBondsinSolids,Crystalgeometry–SpaceLattices,Unitcells,Crystal Structure, Miller indices. Imperfections in crystals- Line defects, Point defects, Surface defects. Crystallization of metals, grain, grain boundaries and their properties. Constitution of alloys: Necessity of alloying, types of solid solutions, Hume Rotherys rules.

UNIT – II

EQUILIBRIUM DIAGRAMS: Experimental methods of construction of equilibrium diagrams, phase rule, Isomorphous alloy systems, Lever rule, eutectic systems, peritectic reaction. Transformations in the solid state – allotropy, eutectoid, peritectoid reactions, Study of important binary phase diagrams of Cu-Ni, Al- Si, and Fe-Fe3C.

UNIT – III

FERROUS, NONFERROUS METALS AND THEIR ALLOYS: Production of Iron and steel: Blast furnace, Cupola, Electric furnace and Induction furnace, Types of Cast irons- White, Grey, Malleable and Nodular Cast Irons, Properties and applicationofcastirons,Effectofalloyingelementsonstructureandproperties of steels, Properties and uses of Silicon and Hadfield Manganese steels, High speed steels and Stainless steel. Properties and uses of important non-ferrous metals like Cu, Al, Pb, Sn, Zn. Study of important non-ferrous alloys: Brass & Bronzes, Bearing alloys,Al alloys & Ti alloys.

UNIT – IV

HEAT TREATMENT OF FERROUS AND NON-FERROUS ALLOYS: Types of heat treatment processes, Annealing, normalizing, hardening, tempering, hardenability, surface - hardening methods, TTT diagrams, Age hardening treatment

UNIT – V

ADVANCED MATERIALS: Composites and its classification, methods of manufacturing of composites – stir casting method, hand layup process, filament winding process. Properties and applications of crystalline ceramics, shape memory alloys, Bio materials and nano-materials

POWDER METALLURGY: Introduction, Steps in Powder metallurgy, Powder characterizations, powder compact methods.

TEXT BOOKS:

1. Introduction to Physical Metallurgy/ Sidney H.Avner/ 2nd edition, McGraw Hill Education(India) Private Limited/2016.
2. Materials Science andEngineering/William D Callister (Adapted by R. Bala subramaniam) /Wiley Inida (P) Ltd/ 2007
3. Material Science and Metallurgy/ Dr.V.D.Kodgire/40th edition, Everest Publishing House/2017

REFERENCE BOOKS

1. Materials Science and Engineering/ V. Raghavan /5th Edition) Prentice-Hallof India Pvt. Ltd/2004.
2. Essential of Materials science and engineering /Donald Askeland/2ndedition Thomson/2014
3. Engineering mechanics of Composite Materials/Isaac M.Daniel,Ori Ishai/ 5th edition/Oxford Publications/2015.

Semester	**III**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	**V20**	**3**	**0**	**0**	**3**	**V20MET04**
Name of the Course	**Mechanics of Solids**					
Branch	**Mechanical Engineering**					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge Levels
CO1	Illustrate concept of stress and strain of composite bars.	K3
CO2	Solve shear force and bending moment in beams.	K3
CO3	Calculate flexural and shear stresses in a beam and understand thetorsional rigidity of shaft.	K3
CO4	Analyze the principal stresses in structural members.	K4
CO5	Solve the buckling load capacity of columns, and longitudinal stress and strains in thin cylinders.	K3

UNIT – I
SIMPLE STRESSES & STRAINS: Definitions of stress and strain – types of stresses and strains – Elasticity –Hooke's law–Stress–Strain diagram for Mild steel – working stress- factor of safety-Lateral strain–Poisson's ratio and volumetric strain – Elastic Moduli and the relationship between elastic constants– Bars of varying section – composite bars – temperature stresses.
STRAIN ENERGY: Definition – Resilience – Strain Energy due to gradually applied; suddenly applied and impact loads–simple applications.

UNIT – II
SHEAR FORCE & BENDING MOMENT DIAGRAMS: Definition of beam –Types of beams – concept of SF and BM – SF & BM diagrams for cantilever, Simple support and over hanging beams subject end point loads, Uniform distributed load (UDL), uniformly varying loads– point of contra flexure –Relationship between S.F, BM and rate of loading.

UNIT – III
FLEXURAL STRESSES: Theory of simple Bending – Assumptions–Derivation of Bending equation – Neutral axis – Determination of bending stresses – section modulus of rectangular, Circular sections (Solid and Hollow), I and T channel sections.
DEFLECTION OF BEAMS: Relation between curvature, slope and deflection; Slope and deflection of cantilever, simply supported with point and U.D.L– Macaulay's method.

UNIT – IV
PRINCIPAL STRESSES AND STRAINS: Introduction – stresses on an inclined section of a bar under axial loading - compound stresses - Normal and tangential stresses on an inclined plane for biaxial stresses-Two perpendicular normal stresses–representation of stress on Mohr's circle diagram, Introduction to theories of Failure.

UNIT – V
COLUMNS: Buckling and Stability, Columns with Pinned ends, Columns with other support Conditions, Limitations of Euler's Formula, Rankine's Formula.
THIN CYLINDERS: Thin seamless cylindrical shells– Derivation of formula for longitudinal and circumferential stresses – hoop, longitudinal and volumetric strains – changes in diameter, and volume of thin cylinders.

TEXT BOOKS:

1. Strength of materials/R.K.Bansal/LaxmiPublications5th edition/2017
2. Mechanics of Materials/Gere and Timoshenko,/TMH4thedition/2010
3. Strength of materials/ S.Ramamrutham/Dhanpatrai publishers 1stedition /2016

REFERENCE BOOKS:

1. Solid Mechanics, by Popov/PHIpublications2nd edition/2017.
2. Introduction to Solid Mechanics / Irving H Shames/ 4thedition PEARSON /2014.
3. Strengthofmaterials/Young,D.H.Timoshenko,Stephen/CBSpublishers/2002

Semester	III	L	T	P	C	Course Code
Regulation	V20	3	0	0	3	V20MET05
Name of the Course	Fluid Mechanics with Machine Learning					
Branch	Mechanical Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge Levels
CO1	Explain the concepts of fluid properties and measurement of pressure.	K2
CO2	Describe the types of flows, lines & apply equations of fluid mechanics and its applications.	K3
CO3	Calculate losses and force on different types of vanes.	K3
CO4	Calculate the performance of turbines.	K3
CO5	Calculate the performance of pumps & understand hydraulic systems.	K3

UNIT – I
FLUID STATICS: Dimensions and units-Physical properties of fluids-Density, Specific gravity, Viscosity, Surface tension, Vapour pressure, Capillarity, Bulk modulus. Pressure types-Atmospheric, absolute, gauge and vacuum pressure and measurement of pressure-Piezometer, different types of manometers.

UNIT – II
FLUID KINEMATICS: stream line, path line and steak line and stream line, classification of flows steady &un steady, uniform & non uniform, laminar & turbulent, rotational & irrotational flows-equation of continuity for one dimensional flow and three dimensional flow. Equation of continuity in differential form.
FLUID DYNAMICS: Surface and body forces, Bernouli's equation along a stream line, Momentum equation, application of momentum equation on pipe bend. Measurement of flow: Pitot tube, Venturimeter, Orifice meter.

UNIT – III
CLOSED CONDUIT FLOW: Reynolds experiments, Darcy-Weisbach equation, Major and minor losses, Hydraulic gradient line, Total energy line, Pipes in series and parallel.
BASICS OF TURBO-MACHINERY: Determination of hydrodynamic force of jet on stationary and moving flat, inclined, curved vanes (jet striking at tip and centre), velocity diagrams, work done and efficiency, flow over radial vanes, series of vanes.

UNIT – IV
TURBINES AND PUMPS: Classification of turbines, Pelton wheel, Francis turbine, Kaplan turbine- working proportions, work done, efficiencies. Draft tube-types, functions and efficiency.
CENTRIFUGAL PUMPS: Working, work done, heads, efficiencies, losses.
RECIPROCATING PUMPS: Working, work done, slip, indicator diagrams.

UNIT – V

FUNDAMENTALS OF MACHINE LEARNING: Supervised, semi-supervised and supervised learning.

MACHINE LEARNING FOR FLUID MECHANICS: Introduction, historical developments, challenges and opportunities; concepts of flow modelling and flow optimization & control.

TEXT BOOKS:

1. Hydraulics, Fluid mechanics and Hydraulic machinery – Modi & Seth.
2. Fluid mechanics and Hydraulic machines – R.K. Bansal.
3. Introduction to Fluid mechanics and fluid machines – S.K. Som & G. Biswas. (Tata –Mcgrawhill)
4. Ethem Alpaydin, Introduction to Machine Learning , MIT Press, Prentice Hall of India, Third Edition 2014.

REFERENCE BOOKS:

1. Fluid mechanics and machinery – G. Ramadurgaih (New age international publishers)
2. Fluid mechanics and fluid power engineering – D.S.Kumar (S.K. Kataria and sons)

Semester	III	L	T	P	C	Course Code
Regulation	V20	3	0	0	3	V20MET06
Name of the Course	Thermodynamics					
Branch	Mechanical Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge Levels
CO1	Discuss the basic terms related to work and heat.	K2
CO2	Explain first law of thermodynamics and internal energy.K2	K2
CO3	Apply the second law of thermodynamics to basic thermal systems.	K3
CO4	Analyze various thermodynamic cycles.	K4
CO5	Discuss about pure substance.	K2

UNIT – I

Thermodynamic System, boundary, Surrounding, control volume, Universe, Types of Systems, Macroscopic and Microscopic viewpoints, Concept of Continuum, Thermodynamic Equilibrium, State, Property, Process, Cycle – Reversibility – Quasi – static Process, Irreversible Process, Causes of Irreversibility – Energy in State Work and Heat, Point and Path function. Zeroth law of thermodynamics.

UNIT – II

Joule's Experiments – First law of Thermodynamics –First law applied to a Process – First law applied to a flow system –Energy balance for closed systems-Specific heats at constant volume and pressure - Internal energy and Enthalpy, Some steady flow energy equation applied to Nozzle, Turbine, Compressor and heat exchanger devices, PMM-I, Limitations of the First Law – Thermal Reservoir, Heat Engine, Heat pump, Parameters of performance.

UNIT – III

Second Law of Thermodynamics, Kelvin-Planck and Clausius Statements and their Equivalence / Corollaries, PMM of Second kind, Carnot's principle, Carnot cycle and its specialties, Clasius theorem Clausius Inequality, Entropy, Principle of Entropy Increase, availability and irreversibility(Basic definitions), T-ds relations, Helmholtz and Gibbs functions, Gibbs relations, Maxwell relations, Elementary Treatment of the Third Law of Thermodynamics.

UNIT – IV

THERMODYNAMIC CYCLES: Carnot vapor cycle, ideal Rankine cycle, Rankine reheat cycle, air-standard Otto cycle, air-standard Diesel cycle, air-standard Brayton cycle, vapor-compression refrigeration cycle.

UNIT – V

PURE SUBSTANCES: P-V-T- surfaces, T-S and h-s diagrams, Mollier Charts, Phase Transformations, Triple point and critical point, properties during change of phase, Dryness Fraction, Clausius – Clapeyron Equation.

TEXT BOOKS:

1. Engineering Thermodynamics, PK Nag 5th Edn, TMH,2014.
2. Thermodynamics, An engineering Approach, Y.A. Cengel& M.A. Boles, 7th Edn- McGraw Hill, 2014.
3. Internal Combustion Engine –V Ganeshan.4th edition, TMH, 2016

REFERENCE BOOKS:

1. Engineering Thermodynamics by Y.V.C. Rao, 1st edition, Universities, 2005.
2. A text book of Engineering thermodynamics, R.K Rajput, 4th edition, Lakshmi Publishers, 2010.

Semester	III	L	T	P	C	Course Code
Regulation	V20	0	0	3	1.5	V20MEL02
Name of the Course	Fluid Mechanics & Hydraulic Machines Lab					
Branch	Mechanical Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge Levels
C01	Determine the force exerted by jet, friction factor, loss of head due to sudden contraction.	K3
C02	Examine and Analyze the performance of pumps and turbines.	K3
C03	Calibrate different flow measuring devices.	K3

1. Determination of force exerted by jet on a flat vane.
2. Determination of loss of head due to sudden contraction.
3. Determination of friction factor.
4. Calibration of Venturimeter.
5. Calibration of Orifice meter.
6. Calibration of Turbine flow meter.
7. Analyze the performance of single stage centrifugal pump.
8. Analyze the performance of multi stage centrifugal pump.
9. Analyze the performance of reciprocating pump.
10. Analyze the performance of Pelton wheel.
11. Analyze the performance of Francis turbine.

Semester	III	L	T	P	C	Course Code
Regulation	V20	0	0	3	1.5	V20MEL03
Name of the Course	Mechanics of Solids & Materials Engineering Lab					
Branch	Mechanical Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge Levels
CO1	Assess the Mechanical properties of different metals.	K3
CO2	Examine the micro structures of different Ferrous and non Ferrous metals.	K3
CO3	Identify the effect of heat treatment and cooling rates on the Properties of steels.	K4

NOTE: Any 6 experiments from each section A and B.

A) MECHNICS OF SOLIDS LAB:

1. Direct tension test
2. Bending test
a) Simply supported beam
b) Can til ever beam
3. Torsion test
4. Hardness test
a) Brinell hardness test
b) Rockwell hardness test
5. Test on springs
6. Compression test on cube
7. Impact test
8. Punch shear test

B) METALLURGY LAB:

1. Preparation and study of the Micro Structure of pure metals like Iron, Cu and Al.
2. Preparation and study of the Micro structure of Mild steels, Medium carbon steels, and \high–Csteels.
3. Study of the Micro Structures of Cast Irons.
4. Study of the Micro Structures of Non-Ferrous alloys–Brass and Bronze.
5. Study of the Micro structures of Heat treated steels.
6. Hard enability of steels by Jominy End Quench Test.
7. To find out the hardness of various treated and untreated steels.

REFERENCE BOOKS:

1. Strength of materials, S.S.Bhavikatti Vikas Publications, 4th edition, 2013.
Material Science and Metallurgy, Dr.V.D.Kodagire, Everest Publishing House, 40th Edition, 2017

Semester	III	L	T	P	C	Course Code
Regulation	V20	0	0	3	1.5	V20MEL04
Name of the Course	Machine Drawing					
Branch	Mechanical Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge Levels
CO1	Identify the national and international standards pertaining to machine drawing.	K2
CO2	Illustrate the importance of the linking functional and visualization aspects in the preparation of the part drawings	K3
CO3	Apply limits and tolerances to assemblies and choose appropriate fits for given assemblies.	K3
CO4	Interpret the Machining and surface finish symbols on the component drawings.	K3
CO5	Develop the part or assembly drawings as per the conventions.	K3

INTRODUCTION: (AUTO CAD or any other drafting Software)
Review of graphic interface of the software. Review of basic sketching commands and navigational commands. Starting a new drawing sheet. Sheet sizes. Naming a drawing, Drawing units, grid and snap. Conversion of pictorial views into orthographic projections of simple machine parts (with and without section). Hidden line conventions. Precedence of lines

PART-A

SECTIONS OF SOLIDS: Sections of Pyramids, Prisms, Cubes, Tetrahedrons, Cones and Cylinders resting only on their bases (No problems on axis inclinations, spheres and hollow solids). True shape of sections. Conversion of pictorial views into orthographic projections of simple machine parts. Hidden line conventions. Precedence of lines. Conversion of pictorial views into orthographic projections of simple machine parts (with section planes indicated on the part).

THREAD FORMS: Thread terminology, sectional views of threads. ISO Metric (Internal & External), BSW (Internal & External) square and Acme. Sellers thread, American Standard thread.

FASTENERS: Hexagonal headed bolt and nut with washer (assembly), square headed bolt and nut with washer (assembly) simple assembly using stud bolts with nut and lock nut. Flanged nut, slotted nut, taper and split pin for locking, counter sunk head screw, grub screw, Allen screw.

KEYS: Parallel key, Taper key, Feather key, Gib-head key and Woodruff key.

JOINTS: Cotter joint (socket and spigot), knuckle joint (pin joint) for two rods. Couplings: Split Muff coupling, Protected type flanged coupling, pin (bush) type flexible coupling, and universal coupling (Hooks' Joint)

PART-B

Limits, Fits and Tolerances: Introduction, Fundamental tolerances, Deviations, Methods of placing limit dimensions, machining symbols, types of fits with symbols and applications, geometrical tolerances on drawings. Standards followed in industry.

Assembly Drawings (Any modeling software)

1. Plummer block (Pedestal Bearing)
2. Stuffing box
3. Propeller Blade
4. Spur Gear
5. Tailstock of lathe
6. Machine vice
7. Tool head of shaper

TEXT BOOKS:

1. Machine drawing _ K.L. Narayana, P. Kannaiah& K.Venkata reddy, 1st edition, Radiant, 2016
2. Tool Engineering & Design _ G.R. Nagpal/Khanna publishers, 1st edition, Khanna Publishers,2009
3. Machine Drawing with Auto CAD- Pohit and Ghosh, 1st edition, Pearso, 2017

REFERENCE BOOKS:

1. Machine Drawing by Nagpal,1st edition, khanna publishers, 2009
2. Machine drawing, Ajeet Singh, 2nd edition, TMH, 2016
3. Machine drawing with autocad, Pohit; Goutam, 1st edition, Pearson, 2017.

IV Semester

Semester	IV	L	T	P	C	Course Code
Regulation	V20	3	0	0	3	V20MET07
Name of the Course	Kinematics of Machinery					
Branch	Mechanical Engineering					

Course Outcomes:

	After successful completion of the course, the student willbe able to:	Knowledge Level
CO1	Explain the inversion of the four bar, slider crank and double slider chains.	K2
CO2	Analyze and perform the velocities and accelerations in mechanisms by graphical method.	K4
CO3	Explain the working of copying mechanism, straight line motion mechanisms, steering gears and Hooke's joint.	K2
CO4	Develop the cam profiles for given follower motions.	K3
CO5	Describe tooth profiles for gears, gear trains and compute the velocity ratio and torque in gear trains and calculate various parameters related to belts.	K3

UNIT – I

MECHANISMS : Introduction, terminology, definitions and assumptions, planar, spherical and spatial mechanisms, mobility, classification of mechanisms, kinematic inversion, inversions of four bar chain, slider crank chain and double slider chain, Grashoff's law, mechanical advantage.

UNIT – II

VELOCITY ANALYSIS : Introduction, Absolute and relative motions, Vectors, Addition and subtraction of vectors, Motion of a link, Four-link mechanism, Velocity diagrams, Angular velocity of links, Velocity of rubbing, Slider-crank mechanism, crank and slotted lever mechanism, Instantaneous center, Kennedy's theorem, Locating I-centers, Angular velocity ratio theorem.

ACCELERATION ANALYSIS: Introduction -Acceleration, four-link mechanism, Acceleration of intermediate and offset points, Slider-crank mechanism, Coriolis component, Crank and slotted lever mechanism using graphical method, Klein's Construction.

UNIT – III

LOWER PAIRS: Pantograph, Exact straight line mechanism condition, Peaucellier, Hart Scott-Russel mechanisms. Approximate straight line mechanisms, Grasshopper, Watt, Chebyshev, Robert mechanisms. Steering gears-condition for correct steering, Davis, Ackerman steering gears, Hooke's joint-velocity ratio, angular acceleration of driven shaft, double Hooke's joint.

UNIT – IV

CAMS: Types of cams and followers, types of follower motion, velocity and acceleration diagrams, profile of cams.

UNIT – V

GEARS: Classification of gears, spur gears- terminology, fundamental law of toothed gearing, involute and cycloidal profile, Path of contact, arc of contact, contact ratio, minimum number of teeth, interference and methods of avoiding interference, rubbing velocity.

GEAR TRAINS: Introduction, Types - Simple , compound and reverted gear trains , Epicyclic gear train.

BELT DRIVES: Belt and rope drives, open and crossed belt drives, velocity ratio, slip, material for belts and ropes, crowning of pulleys, ratio of friction tensions, power transmitted, centrifugal effect on belts, maximum power transmitted by a belt, initial tension.

TEXT BOOKS:

1. Theory of Machines/ Rattan SS, Tata McGraw Hill Education Publishers, 4th Edition 2015.
2. Theory of Machines / Beven Thomos / CBS publication, 3rd edition /2005

REFERENCE BOOKS:

1. Theory of Machines / R.K.Bansal/ Laxmi Publications 5th edition /2016
2. Mechanisms of Machines, V Ramamurthy, Narosa publishing House, Reprint ,2019
3. Theory of Machines by R S Khurmi, S Chand Publications, 1st Edition, 2011.
4. Theory of Machines and Mechanisms, Ballaney P, Khanna publications,1st Edition,2011.

Semester	IV	L	T	P	C	Course Code
Regulation	V20	3	0	0	3	V20MET08
Name of the Course	ManufacturingScience with Artificial Intelligence					
Branch	Mechanical Engineering					

Course Outcomes:

	After successful completion of the course, the student willbe able to:	Knowledge Level
CO1	Understandfundamentalsofcasting-patternsandits materials,GatingSystem	K2
CO2	Distinguishvariousweldingprocessesandselectasuitabl eprocessbasedontheapplicationand requirements, explain advanced welding techniques, testing methods	K2
CO3	ExplaintheknowledgeonHotworkingandCold WorkingProcess	K3
CO4	Describe various bulk forming processes, sheet metal formingand processingof plastics.	K2
CO5	Apply the concepts of Artificial intelligence in manufacturing processes.	K3

UNIT – I

CASTING-Stepsinvolvedinmakingacasting, types of sands–Advantageofcastinganditsapplications.
PATTERNSANDPATTERNMAKING–Typesofpatterns–Materialsusedforpatterns,patternallowancesandtheirconstruction, risers, Centrifugal, Die, Investment castings.
PRINCIPLESOFGATING – Gatingratioanddesignof Gatingsystems.
METHODSOFMELTING– Cruciblemeltingandcupolaoperation.
SOLIDIFICATIONOFCASTING–Concept–Solidificationofpuremetalandalloys.

UNIT – II

WELDING: Classification of welding process types of welds and welded joints andtheir characteristics, design of welded joints Gas welding, ARC welding, Forgewelding,resistancewelding,Thermitwelding, InertGaswelding-TIG&MIG,welding, Laserwelding,Soldering&Brazing. weldingdefects, destructivenon-destructivetestingofwelds.

UNIT – III

HOT&COLD WORKING: strain hardening, recovery, re-crystallization and graingrowth,ComparisonofpropertiesofColdandHotworkedparts.
ROLLINGFUNDAMENTALS–Theoryofrolling,typesofRollingmillsandproducts
EXTRUSION OF METALS: Basic extrusion process and its characteristics. Hotextrusionandcoldextrusion-Forwardextrusionandbackward extrusion–ImpactextrusionHydrostaticextrusion
DRAWING–WiredrawingandTubedrawing

UNIT – IV

BULK FORMING PROCESSES: Principles of forging – Tools and dies – Types Forging –Smithforging,DropForging–Rollforging–Forginghammers:Rotary forging – forgingdefects.

SHEETMETALFORMING:StretchForming,DeepDrawing,Coining,Spinning,Blank ingandPiercing–BendingandForming,Stamping dies,SpringBack effect.

PROCESSINGOFPLASTICS:
TypesofPlastics,Properties,applicationsandtheirProcessingmethods&Equipment(blow&injectionmoulding)

UNIT – V

ARTIFICIAL INTELLIGENCE IN MANUFACTURING INDUSTRY: Introduction, developments of Artificial intelligence in manufacturing Industry; Advantages, limitations and applications of Artificial Intelligence in Manufacturing industry- fault diagnosis, Quality inspection, inventory control, industrial safety and maintenance.

TEXT BOOKS:

1. Manufacturing Engineering and Technology/ Kalpakjian, Serope;Steven,SchmidR./ Pearson,1st Edition2013.
2. ManufacturingTechnology/P.N.Rao/TataMcGrawHill,4th Edition2016.
3. Russell, S. and Norvig, P. 2015. Artificial Intelligence - A Modern Approach, 3rd edition, Prentice Hall.

REFERENCE BOOKS

1. ProductionTechnology/R.K.Jain/Khannapublishers,17th edition2004.
2. PrinciplesofMetalCastings/RichardWHeineandRoenthal.McGrawHillEducation, 2ndEdition2017.
3. WeldingProcessandtechnology/Dr.Paramar/KhannaPublishers,3rdEdition.
4. ProductionTechnology/SarmaPC/S.ChandPublications,4th Edition2014.

Semester	IV	L	T	P	C	Course Code
Regulation	V20	3	0	0	3	V20MET09
Name of the Course	Mechanical Measurements and Metrology					
Branch	Mechanical Engineering					

Course Outcomes:

	After successful completion of the course, the student willbe able to:	Knowledge Level
CO1	Discuss the basic concepts of measurement system and Linear measuring Instruments.	K2
CO2	Explain various types of Temperature, Pressure and Flow measuring Instruments.	K2
CO3	Understand the working of Acceleration, Vibration and Strain measuring devices.	K2
CO4	Apply tolerances and fits for selected product quality and explain various Linear, Angular and Optical measuring instruments and their applications	K3
CO5	Explain the measurement of surface finish with various comparators	K2

UNIT – I

BASICCONCEPTS: Introduction,FundamentalMeasuringProcessesandmethods,Generalizedmeasurementsystemanditsfunctionalelements,Performancecharacteristics.

DISPLACEMENT MEASUREMENT: Principle and construction of various transducers – piezo electric, inductive, capacitance, resistance, ionization and photo electric transducers, calibration procedures.

UNIT – II

TEMPERATURE MEASUREMENT: Thermometry, scales of temperature, electrical resistance – thermister, RTD, thermocouple, pyrometers.

PRESSURE MEASUREMENT: Working of Various instruments - dead weight pressure gauge , bourdon pressure gauges, bellows , diaphragm gauges.

FLOW MEASUREMENT- Rota meter, Magnetic, Ultrasonic, hot – wire anemometer, Laser Doppler Anemometer (LDA).

UNIT – III

ACCELERATION AND VIBRATION MEASUREMENT: Principles of seismic instruments – Vibrometer and Accelerometer

STRAIN MEASUREMENTS: Various types of strain measuring instruments – electrical strain gauge – gauge factor – use of resistance strain gauge for measuring bending compressive and tensile strains, strain gauge rosettes.

UNIT – IV

LIMITS AND FITS: Introduction, Normal size, Tolerance limits, Deviations, Allowance,Fitsandtheirtypes–unilateralandbilateraltolerancesystem,holeandshaftbasissystems–interchangeabilityandselectiveassembly.IndianstandardInstitutionsystem.

LINEAR MEASUREMENT: Standards of measurements- line and end standard. Basicprincipleandapplicationsofslipgauges,dialindicatorandmicrometers.
ANGULAR MEASUREMENTS: Bevel protractor – angle slip gauges – sine bar, rollersandspheresusedtodeterminethetapers,Applicationsofangularmeasurement.
OPTICAL MEASURING INSTRUMENTS: Tool maker's microscope and its uses – collimators,opticalprojector–
opticalflatsandtheiruses,interferometer,andthoseapplications.

UNIT – V
SURFACE TEXTURE: Factors effecting surface roughness, reasons for controlling surfacetexture, Differences between surface roughness and surface waviness, Elements of surfacetexture-Numericalassessmentofsurfacefinish–CLA,R,R.M.SValues–Ravalues,andRzvalues. Basic principle of profile meter and Talysurf.ISI symbols forindicationofsurfacefinish,Applicationssurfacetexture.
COMPARATORS: Types– Mechanical,Optical, Electrical and Electronic,PneumaticComparatorsandTheirUses.

TEXT BOOKS:
1. Measurement Systems: Applications & design / D.S Kumar/ Metropolitan/1st/2015
2. Mechanical Measurements / BeckWith, Marangoni, Linehard/ Pearson/6th/2018
3. Engineering Metrology by R.K.Jain / Khanna Publishers

REFERENCE BOOKS
1. Dimensional Metrology, Connie Dotson, Cengage Learning.
2. Engineering Metrology by I.C.Gupta / DhanpatRai Publishers.
3. Precision Engineering in Manufacturing by R.L.Murthy / New Age.
4. Engineering Metrology and Measurements by NV Raghavendra, L Krishna murthy, Oxford publishers.
5. Engineering Metrology by KL Narayana, Scitech publishers.
6. Mechanical and Industrial Measurements / R.K. Jain/ Khanna Publishers/2008
7. Measurement systems: Application and design/Doeblin Earnest. O. Adaptation/ TMH/ 6th edition, 2018

Semester	IV	L	T	P	C	Course Code
Regulation	V20	3	0	0	3	V20MET10
Name of the Course	Applied Thermodynamics					
Branch	Mechanical Engineering					

Course Outcomes:

	After successful completion of the course, the student willbe able to:	Knowledge Level
CO1	Illustrate the working of various IC engines and associated systems such as lubricating system, cooling system, fuel feed system and ignition system.	K2
CO2	Explain the working of boilers and its performance parameters.	K2
CO3	Compute the performance of steam nozzles and steam turbines.	K3
CO4	Analyze the working of steam condensers and their performance parameters.	K4
CO5	Compute the performance of gas turbines.	K3

UNIT – I

I. C. ENGINES: Classification, Working principles of Four & Two stroke engine- SI & CI engines, Valve and Port Timing Diagrams, Engine systems- Carburetor, Fuel injection systems for CI engines, Ignition, Cooling and Lubrication system.

UNIT – II

STEAM BOILERS: Classification, working principles Cochran, Locomotive, Babcock and Wilcox, Benson and Loeffler boiler with sketches, mountings and accessories- working principles, boiler horse power, equivalent evaporation, efficiency and heat balance, Draught: classification, height of chimney for given draught and discharge, condition for maximum discharge, efficiency of chimney.

UNIT – III

STEAM NOZZLES: Applications and Types, Flow through nozzles, Thermodynamic analysis – assumptions -velocity of fluid at nozzle exit, Ideal and actual expansion in a nozzle, velocity coefficient, Condition for maximum discharge, critical pressure ratio, Super saturated flow in nozzles- its effects, Wilson's line.

STEAM TURBINES: Classification, Impulse turbine- mechanical details- velocity diagram- effect of friction- power developed, axial thrust, blade or diagram efficiency- condition for maximum efficiency. Methods to reduce rotor speed-Velocity compounding, Pressure compounding and velocity & pressure Compounding, - Velocity and Pressure variation along the flow – Combined velocity diagram for a velocity compounded impulse turbine.

UNIT – IV

REACTION TURBINE: Mechanical details, principle of operation, thermodynamic analysis of a stage, degree of reaction, velocity diagram, Parson's reaction turbine, condition for maximum efficiency.

STEAM CONDENSERS: Classification of condensers- working principles of Jet, Evaporative and surface condensers, Vacuum and its Measurement, Vacuum efficiency and condenser efficiency, Sources of air leakage and its affects in condensers- Condenser Efficiency, Daltons law of partial pressures, Determination of mass of cooling water.

UNIT – V

GAS TURBINES: Simple gas turbine plant- Ideal cycle, essential components, parameters of performance, actual cycle, regeneration, inter cooling and reheating, closed and open cycles, merits and demerits.

TEXT BOOKS:

1. Engineering Thermodynamics, PK Nag 4th Edn, TMH.
2. Thermodynamics. An engineering Approach with student resources/ DVD. Y.A. Cengel & M.A. Boles/ 8th Edn-McGrawHill/2016.
3. Gas Turbines / V Ganesan/3rd edition, TMH/2016.

REFERENCE BOOKS

1. Thermal Engineering/ R.K.Rajput/4th edition/ Laxmi Publications/2010
2. Applied Thermodynamics-II / R. Yadav./6th edition, Central Publishing House/2016
3. Gas turbines and Propulsive Systems/1st edition, DhanpatRai/2014
4. Tables of the properties of steam and other vapours and temperature-Entropy table by Cecil H Peabody by Forgotten books
5. Steam tables by C.P Kodandaraman – New age International

Semester	IV	L	T	P	C	Course Code
Regulation	V20	0	0	3	1.5	V20MEL05
Name of the Course	Mechanical Measurements and Metrology Lab					
Branch	Mechanical Engineering					

Course Outcomes:

	After successful completion of the course, the student willbe able to:	Knowledge Level
CO1	Experimentandexamineerrorsincalibrationofvariousinstruments	K3
CO2	Explaintheworkingprincipleofmetrologyandmeasuringequipments.	K2
CO3	Computedistance,angleandsurfacefinishbyusingstandardmeasuring equipments	K3

Listof experiments:

METROLOGY

1. Measurementoflength,height anddiameterby verniercalipers,micrometerandheightgauge.
2. Surfaceroughnessmeasurementusingtalysurf.
3. Taperanglemeasurement.
4. Toolmaker'smicroscope.
5. Measurementofboresusingdialboreindicator.
6. Measurementof thicknessof geartoothbyverniertooth caliper.

INSTRUMENTATION&CONTROLSYSTEMSLAB

Listof experiments:

1. StudyandcalibrationofLVDTtransducerfordisplacementmeasurement.
2. Calibrationofpressuregauge.
3. AngularMeasurementusingangularsensor.
4. Measurementofspeedusingopto-couplerpickup.
5. Calibrationofstraingauge.
6. Study&calibrationofresistancetemperaturedetector(RTD)transducerfortemperaturemeasurement.
7. Studyandcalibrationof arota meterforwaterflowmeasurement.
8. Vibrationmeasurementtrainer.

Semester	IV	L	T	P	C	Course Code
Regulation	V20	0	0	3	1.5	V20MEL06
Name of the Course	Manufacturing Process Lab					
Branch	Mechanical Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge Levels
CO 1	DesignandMakeapattern, testthepropertiesofsandandprepareacasting.	K3
CO 2	PerformArcwelding,Spotwelding,TIG,MIGweldingandPlasmaArcCuttingoperations	K3
CO 3	Performblanking,piercing,Drawingandbendingoperations.	K3
CO 4	Operate injection and blow moulding machines to manufactureplasticcomponents	K3

METALCASTING:
PatternDesignandpatternmakingusingwoodturninglathe
SandpropertiestestingforCompressionstrengthandpermeability.Mouldpreparation,meltingandcasting.

WELDING:
ARCWeldingLap,Butt&T-JointSpotWelding–Lap&ButtJoint
TIGWelding-ButtJoint
MIGWelding-ButtJointPlasmaArcCutting

METALFORMING:
Blanking&PiercingoperationbyusingProgressive die

PROCESSINGOFPLASTICS:
InjectionMolding, Blow molding

REFERENCE BOOKS:

1. Productiontechnologylab–collegemanual.
2. ManufacturingEngineeringandTechnology/Kalpakjian, Serope;Steven,Schmid R./Pearson,1st Edition,2013
3. ManufacturingTechnology/P.N.Rao/TMH,4th Edition,2016.

Semester	IV	L	T	P	C	Course Code
Regulation	V20	0	0	3	1.5	V20MEL07
Name of the Course	Thermal Engineering Lab					
Branch	Mechanical Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge Levels
CO1	Evaluate the performance of I.C.Engines.	K4
CO2	Evaluate the performance of compressors.	K4
CO3	Describe the working of Boilers.	K2

1. I.C. Engines valve and port timing diagrams.
2. I.C. Engines performance test and Exhaust emission measurements (4 -stroke diesel engine).
3. I.C. Engines Performance Test for 2 Stroke SI engines
4. Evaluation of engine friction by conducting Morse test on 4-stroke multi cylinder petrol engine.
5. Draw the heat balance sheet for 4- stroke multi cylinder petrol engine.
6. I.C. Engines Retardation Test
7. Economical speed test of an IC engine.
8. Performance test on variable compression ratio engines.
9. Performance test on reciprocating air compressor unit.
10. Dis-assembly / Assembly of Engines
11. Study of Boilers

Annexure – IV

Course structure & Syllabi of P.G Programme for approval under V21 regulations

M.Tech (Thermal Engineering) Programme Course Structure

(With effect from **2021-22** Admitted Batch onwards)

I-SEMESTER

S.No	Course Code	Course	L	T	P	C
1	**V21TET01**	AdvancedFluidMechanics	3	0	0	3
2	**V21TET02**	ComputationalFluidDynamics	3	0	0	3
3		**Program Elective – I**	3	0	0	3
4		**Program Elective – II**	3	0	0	3
5	**V21TEL01**	ComputationalFluidDynamicsLab –I	0	0	3	2
6	**V21TEL02**	ThermalEngineeringLab-I	0	0	3	2
7		ResearchMethodologyAndIPR (Under BOS of MBA)	2	0	0	2
8		Audit course-I (Under BOS of English & MBA)	2	0	0	0
		Total:	**16**	**0**	**6**	**18**

Total Contact Hours = 22

II-SEMESTER

S.No.	Course Code	Course	L	T	P	C
1	**V21TET03**	Advanced Heat and Mass Transfer	3	0	0	3
2	**V21TET04**	Thermal Measurements and Process Controls	3	0	0	3
3		**Program Elective – III**	3	0	0	3
4		**Program Elective -IV**	3	0	0	3
5	**V21TEL03**	Computational Fluid Dynamics Lab–II	0	0	3	2
6	**V21TEL04**	Thermal Engineering Lab-II	0	0	3	2
7	**V21TET05**	Mini Project with Seminar	2	0	0	2
8		Audit course-II (Under BOS of English & MBA)	2	0	0	0
	Total		**16**	**0**	**6**	**18**

Total Contact Hours = 22

List of Audit course I & II

1. English for Research paper writing
2. Disaster Management
3. Value Education
4. Constitution of India
5. Pedagogy Studies
6. Stress management by yoga
7. Personality development through life enlightenment skills

III-SEMESTER

S.No	Course Code	Course	L	T	P	C
1		**Program Elective - V** (OR) **MOOCS-I Through NPTEL** /SWAYAM- 12 week Course related to the program which is not listed in the course structure.	3	0	0	3
2		**Open Elective** 1. Cost Management for Engineering Projects (Under BOS of MBA) 2. Operations Research (Under BOS of Maths) Students are advised to opt for an open elective course of their choice being offered by other Departments of the Institute (OR) **MOOCS-II Through NPTEL** /SWAYAM- Any 12weeek Course in Engineering/ Management certification courses duly approved by the Department.	3	0	0	3
3	**V21TEL05**	Dissertation phase –I	0	0	20	10
	Total		**6**	**0**	**20**	**16**

Total Contact Hours = 26

IV-SEMESTER

S.No.	Course Code	Course	L	T	P	C
1	**V21TEL06**	Dissertation phase –II	0	0	32	16
	Total		**-**	**-**	**32**	**16**

Program Elective –I **V21TEE01 –** AdvancedI.Cengine, Electric &Hybrid Vehicles **V21TEE02 –** GasDynamics **V21TEE03 –** CryogenicEngineering **V21TEE04 –** AdvancedThermodynamics	**Program Elective – II** **V21TEE05 –** GasTurbines **V21TEE06 –** AlternativeFuelTechnologies **V21TEE07 –** EnergyConservationandManagement **V21TEE08 –** TheoryandTechnologyofFuelCells
Program Elective – III **V21TEE09 –** Equipment Design for Thermal Systems **V21TEE10 –** Solar Energy Technologies **V21TEE11 –** Advanced Power Plant Engineering **V21TEE12 –** Combustion, Emissions and Environment	**Program Elective – IV** **V21TEE13 –** Jet Propulsion and Rocket Engineering **V21TEE14 –** Automotive Engineering **V21TEE15 –** Modelling of I.C engines **V21TEE16 –** Renewable Energy Technologies
Program Elective –V **V21TEE17 –** Optimization Techniques and Applications **V21TEE18 –** Design and Analysis of Experiments **V21TEE19 –** Convective Heat Transfer **V21TEE20 –** Extraction of Energy from Waste **V21TEE21–** Advanced Finite Element Methods **(OR)** MOOCS/ NPTEL certification courses	

Total Contact Hours = 32
Total Credits (for all sem) = 68

Syllabi for the courses offered in M. Tech under V21 Regulation for the Academic Year 2021-2022

I Semester

Semester	I	L	T	P	C	Course Code
Regulation	V21	3	0	0	3	V21TET01
Name of the Course	AdvancedFluidMechanics					
Specialization	Thermal Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge Level
CO1	Apply equations of motion for fluid flow and in viscid flow problems	K3
CO2	Analyze fluid flow using Navier stokes equation	K4
CO3	Explain Boundary layer concepts to flow over flat plate	K2
CO4	Analyze turbulent layer equations and internal flow	K4
CO5	Illustrate Compressible flow	K3

UNIT– I

INVISCID FLOW OF INCOMPRESSIBLE FLUIDS: Lagrangian and Eulerain Descriptionsof fluid motion, Path lines, Stream lines, Streak lines, stream tubes – velocity of a fluid particle,typesofflows,Equationsofthreedimensionalcontinuityequation,StreamandVelocitypotentialfunctions.

BASIC LAWS OF FLUID FLOW: Condition for irrotationality, circulation & vorticity Accelerations inCartesystemsnormalandtangentialaccelerations,Euler's,Bernouliequationsin3D–Continuityand Momentum Equations.

UNIT– II

VISCOUS FLOW: Derivation of Navier,Stoke's Equations for viscous compressible flow – Exactsolutions to certain simple cases: Plain Poisoulle flow, Coutte flow with and without pressuregradient, Hagen Poisoulleflow,Blasius solution.

UNIT– III

BOUNDARY LAYER CONCEPTS : Prandtl's contribution toreal fluid flows – Prandtl's boundarylayer theory , Boundary layer thicknessfor flow over a flat plate – Approximate solutions –Creeping motion (Stokes) – Oseen's approximation,Von,Karman momentum integral equationfor laminar boundary layer — Expressions for local and mean drag coefficients for differentvelocityprofiles.

UNIT– IV

INTRODUCTIONTOTURBULENTFLOW: Fundamentalconceptofturbulence–TimeAveragedEquations – Boundary Layer Equations , Prandtl Mixing Length Model , Universal VelocityDistributionLaw:VanDriestModel–Approximatesolutionsfordragcoefficients–MoreRefined Turbulence Models – k,epsilon model , boundary layer separation and form drag –KarmanVortex Trail, Boundarylayer control, liftoncircular cylinders.

INTERNALFLOW:Smoothandroughboundaries– EquationsforVelocityDistributionandfrictional Resistance in smooth and rough Pipes – Roughness of Commercial Pipes – Moody'sdiagram.

UNIT– V

COMPRESSIBLE FLUID FLOW– I: Thermodynamicbasics– Equations ofcontinuity, Momentumand Energy , Acoustic Velocity, Derivation of Equation for Mach Number – Flow Regimes –MachAngle– Mach Cone – Stagnation State.

COMPRESSIBLEFLUIDFLOW–II: AreaVariation,PropertyRelationshipsintermsofMachnumber, Nozzles, Diffusers – Fanno and Releigh Lines, Property Relations – Isothermal Flow inLongDucts– NormalCompressibleShock,ObliqueShock:ExpansionandCompressibleShocks– SupersonicWaveDrag.

TEXTBOOKS:

1. FluidMechanics/L.VictorSteeter/TMH
2. FluidMechanics/ FrankM.White/MGH

REFERENCE BOOKS:

1. FluidMechanics andMachines/ModiandSeth/StandardBookHouse
2. FluidMechanics/CohenandKundu/Elsevier/5th edition
3. FluidMechanics/Potter/CengageLearning
4. FluidMechanics/WilliamSJanna/CRCPress
5. FluidMechanics/Y.ACengelandJ.MCimbala/MGH
6. BoundaryLayerTheory/SchlichtingH/SpringerPublications
7. Dynamics&Theoryand DynamicsofCompressibleFluidFlow/Shapiro.
8. FluidDynamics/WilliamF.Hughes&JohnA.Brighton/TMH
9. FluidMechanics/ K.L Kumar/S Chand &Co.

Semester	I	L	T	P	C	Course Code
Regulation	V21	3	0	0	3	V21TET02
Name of the Course	ComputationalFluidDynamics					
Specialization	Thermal Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge Level
CO1	Explain various finite element formulations/methods	K2
CO2	Apply Hyperbolic equations for non linear problems	K3
CO3	Differentiate formulations of Compressible and incompressible flows	K4
CO4	Differentiate various formulations for 2D & 3D problems	K4
CO5	Illustrate various formulations for steady state and transient problems	K3

UNIT– I

INTRODUCTION: Finite difference method, finite volume method, finite element method,governingequations andboundary conditions.Derivation offinite differenceequations.

SOLUTIONMETHODS:Solutionmethodsofellipticalequations– finitedifferenceformulations,interactive solution methods,directmethod withGaussian elimination.
Parabolic equations, explicit schemes and Von Neumann stability analysis, implicit schemes,alternating direction implicit schemes, approximate factorization, fractional step methods, directmethodwith tridiagonal matrix algorithm.

UNIT– II

HYPERBOLIC EQUATIONS: Explicit schemes and Von Neumann stability analysis, implicitschemes, multi step methods, nonlinear problems, second order one-dimensional wave equations.Burgersequations: Explicit and implicitschemes, Runge-Kutta method.

UNIT– III

FORMULATIONS OF INCOMPRESSIBLE VISCOUS FLOWS: Formulations of incompressible viscous flows by finite difference methods, pressure correction methods, vortexmethods.

TREATMENTOFCOMPRESSIBLEFLOWS:Potentialequation,Eluerequations,Navier-Stokessystemof equations,flow-field,dependentvariationmethods, boundaryconditions.

UNIT– IV

FINITEVOLUMEMETHOD:Finitevolumemethodviafinitedifferencemethod,formulationsfortwo andthree, dimensional problems.

UNIT– V

STANDARDVARIATIONALMETHODS: Linearfluidflowproblems,steadystateproblems,Transient problems.

TEXTBOOKS:
1. Computationalfluiddynamics,T.J.Chung,Cambridge University press, 2002.
2. ComputationalFluidDynamicsby JohnD.Anderson,McGraw Hill BookCompany2017.

REFERENCE BOOKS:
1. Textbookoffluiddynamics,FrankChorlton,CBSPublishers&distributors,1985.
2. Computational Techniques for Fluid Dynamics, Volume 1& 2 by C. A. J. Fletcher, SpringerPublication,2012.

Semester	I	L	T	P	C	Course Code
Regulation	V21	3	0	0	3	V21TEE01
Name of the Course	**AdvancedI.CEngine Electric and HybridVehicles** Program Elective – I					
Specialization	**Thermal Engineering**					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge Level
CO1	Explain static and dynamic effects of gas exchange process	K2
CO2	Illustrate motion of charge inside the cylinder	K3
CO3	Differentiate between the phenomena of combustion in IC engines	K4
CO4	Explain Electric vehicles and types of Batteries	K2
CO5	Analyze Hybrid and Fuel Cell Vehicles	K3

UNIT – I

GAS EXCHANIGING PROCESSES: Inlet and exhaust processes in thefour stroke cycle volumetric efficiency quasi staticeffectscombinedquasistaticanddynamiceffectsvariationwithspeedandvalvearealiftandtiming –flow through valvespoppetvalve geometryand timing flow rateand discharge coefficients,residualgas fraction , exhaust gas flow rate and temperature variation,scavenging in two strokecyclic engines, scavenging parameters andmodels actual scavenging processes , flow throughports, super charging and turbo changing – methods of power boostingbasic relationshipscompressors,turbines wavecompression devices.

UNIT – II

CHARGEMOTIONWITHINTHECYLINDER: Intake Jet Flow, Mean velocity and turbulence characteristics definitionsapplication to enginevelocity data swirl – swirl measurement, swirl generationduring inductionswirl modificationwithin the cylindersquish pre chamber engine flows crevice flows and blowby flows generatedbypiston –cylinder wall interaction.

UNIT – III

COMBUSTIONIN S.IANDC.I ENGINES: Review of normal and abnormal combustion in SI and CI enginecyclic variation in combustionof SI engine , analysis of cylindrical pressure data in SI and CI engine ,MPFI in SI enginescommonrail fuel injection system inCIengines fuel spraybehavior inCIengines.

UNIT – IV

ELECTRICVEHICLES:

Introduction:LimitationsofICEnginesasprimemover,HistoryofEVs,EVsystem,components of EV-DC and AC electric machines: Introduction and basic structure, Electricvehicledrivetrain,advantagesandlimitations,Permanentmagnetandswitchedreluctance motors

BATTERIES: Battery: lead, acid battery, cell discharge and charge operation, construction,advantages of lead, acid battery, Battery parameters: battery capacity, discharge rate, state ofcharge,state ofdischarge, depthof discharge, Technicalcharacteristics, Ragoneplots.

UNIT –V

HYBRIDVECHILES: Configurationsofhybrids,SeriesandParallel,advantagesandlimitations, Hybrid drive trains, sizing of components Initial acceleration, rated vehicle velocity,Maximumvelocityandmaximumgradeability,Hydrogen:Production,Hydrogenstoragesystems,reformers.

FUEL CELL VECHILES: Introduction, Fuel cell characteristics, Thermodynamics of fuelcells,Fuel cell types: emphasis on PEM fuel cell.

TEXTBOOKS:

1. J.B.HeywoodInternalCombustionEngineFundamentals,McGrawHillCo.1988
2. SethLeitmanand BobBrantBuild yourown electricvehicleMcGraw HillCo.2009.
3. F.BarbirPEMFuelCells-TheoryandPractice ElsevierAcademicPress,2005.

REFERENCE BOOKS:

1. W.W.PulkrabekEngineeringFundamentalsofICEngine,PHIPvt.Ltd2002

Semester	I	L	T	P	C	Course Code
Regulation	V21	3	0	0	3	V21TEE02
Name of the Course	**GasDynamics** Program Elective – I					
Specialization	**Thermal Engineering**					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge level
CO1	Explain equations governing compressible flows	K2
CO2	Explain one dimensional compressible flow concepts	K2
CO3	Explain Two dimensional compressible flow concepts	K2
CO4	Illustrate equations governing quasi one dimensional flows	K3
CO5	Illustrate Unsteady wave motions	K3

UNIT – I

BASICCONCEPTS: Introduction tocompressible flow, A briefreview of thermodynamicsandfluidmechanics,Integralformsofconservationequations,Differentialconservationequations, Continuum Postulates, Acoustic speed and Mach number, Governing equations forcompressibleflows.

UNIT – II

ONE-DIMENSIONAL COMPRESSIBLE FLOW: One dimensional flow concept, Isentropicflows, Stagnation/Total conditions, Characteristic speeds of gas dynamics, Dynamic pressure andpressure coefficients, Normal shock waves, Rankine , Hugonoit equations, Rayleigh flow, Fannoflow,Crocco's theorem.

UNIT – III

TWO-DIMENSIONALFLOWS: Obliqueshockwaveanditsgoverningequations,θ,B,Mrelations, The Hodograph and Shock Polar, Supersonic flow over wedges and cones, Mach line,Attached and Detached shock, Reflections and interaction of oblique shock waves, Expansionwaves, Prandtl , Meyer flow and its governing equations, Supersonic flow over convex andconcavecorners, Approximationofcontinuous expansionwaves by discretewaves.

UNIT – IV

QUASI-ONEDIMENSIONALFLOWS: Governingequations,Areavelocityrelations,Isentropic flow through variable, area ducts, convergent, divergent (or De Laval) nozzles, Over,expandedand under,expanded nozzles, Diffusers.

UNIT – V

UNSTEADYWAVEMOTIONS:
Movingnormalshockwaves,Reflectedshockwaves,Physicalfeaturesofwavepropagation,Elementsofacoustictheory,Incidentandreflectedwaves, Shock tube relations, Piston analogy, Incident and reflected expansion waves, Finitecompressionwaves, Shock tube relations.

INTRODUCTION TO EXPERIMENTAL FACILITIES: Subsonic wind tunnels, Supersonicwind tunnels, Shock tunnels, Free, piston shock tunnel, detonation, driven shock tunnels, andExpansiontubes.

TEXTBOOKS:
1. GasDynamicsbyS.MYahya,2017
2. GasDynamicsbyE.RadhaKrishnan,PrenticeHallIndiaLearningPrivateLimited

REFERENCE BOOKS:
1. Fundamentalsof Gas DynamicsbyRobertD. Zucker,JohnWiley&Sons,INC.
2. Dynamics and Thermodynamics of compressible fluid flow (Vol. I, II) by Ascher H.Shapiro.
3. ElementsofGas Dynamics by H.W.LiepmannandA. Roshko,Wiley.
4. FundamentalsofGasDynamics byV. Babu,JohnWiley & Sons.
5. ModernCompressibleFlowbyJohn D.Anderson, Jr./McGraw Hill.

Semester	**I**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	**V21**	**3**	**0**	**0**	**3**	**V21TEE03**
Name of the Course	**CryogenicEngineering** Program Elective – I					
Specialization	**Thermal Engineering**					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge level
CO1	Explain Vapour compression Refrigeration System and its components	K2
CO2	Illustrate Multiple stage Refrigeration system	K3
CO3	Explain concepts of Cryogenics	K2
CO4	Illustrate the applications of Cryogenics	K3
CO5	Explain insulation to low temperatures	K2

UNIT – I

VAPOURCOMPRESSIONREFRIGERATIONSYSTEMS:
Analysis of vapor compression refrigeration cycle,Second law of Thermodynamics, Carnotrefrigerator,VaporCompressionRefrigerationCycle,components,PropertiesofRefrigerants.

UNIT – II

MULTIPLESTAGEREFRIGERATIONSYSTEM:
Introduction,MethodsofimprovingCOPofMultiStageCompressionwithIntercooling,Multistageevaporator System,CascadeRefrigerationSystem,DryiceManufacturing,AutoCascadeSystem, Joule-Thomson Coefficient.

UNIT – III

CRYOGENICS: Liquefactionof air,Lindesystem,Analysis,LiquefactionofNeon,HydrogenandHelium.

UNIT – IV

APPLICATIONOF LOWER TEMPERATURES: Effects on the properties of metal strength, Thermal properties, super conductivity, super fluidity.Applications, such as expansion fitting, cryobiology, cryosurgery, space research, computers ,undergroundpower lines.

UNIT – V

LOWTEMPERATURE INSULATION: Reflective insulation, Evacuated powders, Rigid foams, Super insulation. Cooling by adiabaticde-magnetization,Gasseparationandcryogenicsystems,separationofgases,Rectifyingcolumns,Air separating, singleanddouble columns Air separation plant.Storageandhandlingofcryogenicliquids, Dewarsandothertypesofcontainers.

TEXTBOOKS:
1. Refrigeration&Air,Conditioningby C.P.Arora, TMH,2017
2. CryogenicSystems byR.FBarron, Oxford University Press,1985.

REFERENCEBOOKS:
1. Refrigeration&Air,Conditioning, StoeckerW.F. Jones,J.W.,McGrawHill,2014.
2. Refrigeration&Air, Conditioning, ManoharPrasadNewAge,2018.
3. Refrigeration&Air, Conditioning Domkunduwar,andArora, Dhanpatrai&Sons, 2015.

Semester	I	L	T	P	C	Course Code
Regulation	**V21**	**3**	**0**	**0**	**3**	**V21TEE04**
Name of the Course	**AdvancedThermodynamics** Program Elective – I					
Specialization	**Thermal Engineering**					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge level
CO1	Explain availability and irreversibility	K2
CO2	Explain relations of thermodynamic properties	K2
CO3	Differentiate between properties of mixtures of gases and liquids	K4
CO4	Illustrate equilibrium of vapour and liquid mixtures	K3
CO5	Explain combustion phenomena and reactions involved in combustion	K2

UNIT – I
AVAILABILITY AND IRREVERSIBILITY: Quality ofEnergy, available and unavailableenergy, availability,surroundingswork,reversible workandirreversibility,availabilityinaclosed system, availability in a SSSF process in an open system, second law efficiencies ofprocesses,second lawefficiency ofcycles andexergy balanceequations.

UNIT – II
THERMODYNAMICPROPERTYRELATIONS: HelmholtzandGibbsFunctions,twoMathematicalConditionsforExactDifferentials,MaxwellRelations,ClapeyronEquation,RelationsforChangesinEnthalpy,InternalEnergyandEntropy,SpecificHeatRelations,GeneralizedRelations/ChartsforResidualEnthalpyandEntropy,GibbsFunctionatzeroPressure:AMathematicalAnomaly,Fugacity,FugacityCoefficientandResidualGibbsFunction,TheJoule, ThomsonCoefficientandInversionCurve, Thermodynamicsimilarity.

UNIT – III
NON-REACTING MIXTURES OF GASES AND LIQUIDS: Measures of Composition inMultiComponent Systems.
GASMIXTURES: Mixturesof idealGases,Gas-Vapor Mixtures,Applicationof FirstLaw toPsychometricProcesses,Real Gas Mixtures.
LIQUIDMIXTURES/SOLUTIONS: IdealSolutions,RealSolutions.
THERMODYNAMIC RELATIONS FOR REAL MIXTURES: Partial Properties, Relation for FugacityandFugacity Coefficient in Real Gas Mixtures, Relations for Activity and Activity Coefficient inRealLiquid Mixtures/Solutions.

UNIT – IV
PHASEEQUILIBRIUM: V A P O U R LIQUIDEQUILIBRIUMOFMIXTURES: Phase DiagramsforBinaryMixtures,Vapor,LiquidEquilibriuminIdealSolutions,CriteriaforEquilibrium, Criterion foe phase Equilibrium, Calculation of Standard State Fugacity of

PureComponent,VaporLiquidEquilibriumatLowtoModeratePressures,DeterminationofConstantsof Activity Coefficient Equations, and Enthalpy Calculations.

UNIT – V

CHEMICALREACTIONSANDCOMBUSTION: Thermochemistry,MeasuresofComposition in Chemical Reactions, Application of First Law of Thermodynamics to chemicalReactions, the Combustion Process-Standard Heat/Enthalpy of Combustion, Reactions at actualTemperatures, adiabatic Flame Temperature, Entropy Change of Reacting Systems, ApplicationofsecondLawofThermodynamicstochemicalReactions, chemicalequilibrium-Advancementof Chemical Reactions, Equilibrium Criterion in Chemical Reactions, equilibrium Constant andLawofMass Action,Equilibrium Constant forGas PhaseReactionsin thestandardstate.

TEXTBOOKS:

1. BasicandAppliedThermodynamics,P.K.Nag,TMH,2019.
2. Thermodynamics,J.PHolman,McGrawHill,2017.
3. Thermodynamics, CPArora,McGrawHilleducation(Indiapvtlimited),2016.

REFERENCE BOOKS:

1. Engg.Thermodynamics,PL.Dhar,Elsevier,2008.
2. Thermodynamics,Sonnatag&VanWylen,JohnWiley&Sons,2004.
3. ThermodynamicsforEngineers,Doolittle-Messe, JohnWiley&Sons,2018.
4. Irreversiblethermodynamics,HRDeGroff,
5. ThermalEngineering,Soman,PHI,2011.
6. ThermalEngineering,Rathore,TMH,2010.
7. EngineeringThermodynamics,Chatopadyaya,2010.

Semester	I	L	T	P	C	Course Code
Regulation	V21	3	0	0	3	V21TEE05
Name of the Course	**GasTurbines** Program Elective – II					
Specialization	**Thermal Engineering**					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge level
CO1	Explain turbo machines and cycles used in gas turbines	K2
CO2	Apply the concepts of rotating machines and centrifugal compressors	K3
CO3	Analyze Axial flow compressors and design concepts	K4
CO4	Illustrate Gas turbine combustion systems	K3
CO5	Illustrate Axial and Radial flow turbines	K3

UNIT – I

INTRODUCTION: Review of the fundamentals, Classification of turbo machines, Applicationsofgas turbines.

GAS TURBINE CYCLES FOR SHAFT POWER: Ideal shaft power cycles and their analysis,Practicalshaft powercycles and theiranalysis.

UNIT – II

FUNDAMENTALS OF ROTATING MACHINES: Euler's energy equation, Components ofenergy transfer, Impulse and reaction machines,Degree of reaction, Flow over an airfoil, Liftanddrag.

CENTRIFUGAL COMPRESSORS: Construction and principle of operation, Factors affectingstagepressureratio,Compressibilityeffects,Surgingandchoking,Performance characteristics.

UNIT – III

AXIAL FLOW COMPRESSORS: Construction and principle of operation, Factors affectingstage pressure ratio, Degree of reaction, Three dimensional flow, Design process, Blade design,Stageperformance, Compressibility effects,Off,design performance.

UNIT – IV

GASTURBINECOMBUSTIONSYSTEMS:Operationalrequirements,Factorsaffectingcombustionchamber design,Combustionprocess,Flame stabilization,Combustionchamberperformance,Practical problems, Gas turbine emissions.

UNIT – V

AXIAL AND RADIAL FLOW TURBINES: Construction and operation of axial flow turbines,Vortex theory, Estimation of stage performance, Overall turbine performance, Turbine bladecooling,Radial flow turbines.

TEXTBOOKS:
1. Sarvanamuttoo,H.I.H.,Rogers,G.F.C.andCohen,H.,GasTurbineTheory,7thEdition,Pearson PrenticeHall, 2017.
2. Ganesan, V.,GasTurbines,3rd Edition,TataMcGrawHill,2017.

REFERENCE BOOKS:
1. Dixon,S.L.,FluidMechanicsandThermodynamicsofTurbo machinery,7thEdition,Elsevier,2014.
2. Flack, R.D., Fundamentals of Jet Propulsion with Applications, Cambridge UniversityPress,2011.
3. Yahya, S. M., Turbines, Compressors and Fans, 4th Edition, Tata McGraw Hill, 2017.Lefebvre,A.H.andBallalD.R.,GasTurbineCombustion–AlternativeFuelsandEmissions,CRC Press, 2010

Semester	**I**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	**V21**	**3**	**0**	**0**	**3**	**V21TEE06**
Name of the Course	**AlternativeFuelTechnologies** Program Elective – II					
Specialization	**Thermal Engineering**					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge level
CO1	Explain alternative fuels	K2
CO2	Explain production methods of alternative fuels	K2
CO3	Illustrate performance characteristics of liquid alternative fuels	K3
CO4	Illustrate performance characteristics of gaseous alternative fuels	K3
CO5	Analyze performance characteristics of alternative fuels and methods to improve efficiency	K4

UNIT – I
Fossil fuels and their limitations Engine requirements; Potential alternative liquid and gaseousfuels.

UNIT – II
Methods of production; Properties, safety aspects, handling and distribution of various liquidalternativefuels like alcohols, vegetableoils,Di, methyl and Di, ethyl ether etc.

UNIT – III
Differentwaysofusingalternativeliquidfuelsinengines,performanceandemissioncharacteristics;Conversionofvegetableoilstotheirestersandeffectonengineperformance.

UNIT – IV
Use of gaseous fuels like biogas, LPG, hydrogen, natural gas, producer gas etc. in SI/CI engines;Production,storage, distrbution and safetyaspects of gaseous fuels.

UNIT – V
Different approaches like duel fuel combustion and surface ignition to use alternative fuels inengines; Use of additives to improve the performance with alternative fuels; Hybrid power plantsandfuel cell.

TEXTBOOK:
1. AlternativeFuels:TheFutureofHydrogen,SecondEdition,MichaelFrankHordeski,CRCPress

REFERENCE BOOKS:
1. AlternativeFuelsforTransportation, ASRamadhas,CRCPress
2. Alternative Fuels & Advanced Technology Vehicles: Incentives & Considerations, ThomasHuber,Jack Spera,Nova SciencePublishers

Semester	I	L	T	P	C	Course Code
Regulation	V21	3	0	0	3	V21TEE07
Name of the Course	**EnergyConservationandManagement** Program Elective – II					
Specialization	**Thermal Engineering**					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge level
CO1	Explain the importance of energy conservation and management	K2
CO2	Explain various methods of energy conservation	K2
CO3	Illustrate various methods of energy management	K3
CO4	Illustrate Economic analysis	K3
CO5	Explain standards and laws of energy conservation and management	K2

UNIT – I
Theenergymarket,energyscenario,planning,utilizationpatternandfuturestrategy, Importanceofenergy management.
UNIT – II
ENERGYCONSERVATION: Methodsofenergyconservationandenergyefficiencyforbuildings,air conditioning,heatrecoveryandthermalenergystoragesystemsEnergyconservationin industries, Cogeneration,Combined heating andpower systems.
UNIT – III
ENERGYMANAGEMENT: PrinciplesofEnergyManagement,Energydemandestimation,Organisingand Managing Energy ManagementPrograms, Energy pricing
Energy Audit: Purpose, Methodology with respect to process Industries, Characteristic methodemployedin Certain EnergyIntensiveIndustries
UNIT – IV
ECONOMICANALysis: Scope,CharacterizationofanInvestmentProject
UNIT – V
Relevantinternationalstandardsandlaws.

TEXTBOOK:
1. L.C.Witte,P.S.Schmidt,D.R.Brown,“IndustrialEnergyManagementandUtilization”, HemisphericalPublication, 1988.
2. Callaghan“EnergyConservation”.

REFERENCE BOOKS:
1. D.A.Reeg,“Industrial EnergyConservation”,PergamonPress,1980.
2. T.L.Boyen,“ThermalEnergyRecovery”Wiley,1980
3. L.J.Nagrath, “SystemsModelingandAnalysis”, TataMcGrawHill,1982.
4. W.C.Turner, “EnergyManagementHandbook“,Wiley,NewYork,1982.
5. I.G.C.Dryden,“TheEfficientUseofEnergy“,Butterworth,London,1982.
6. R.Loftnen,VanNostraridReinholdC.“EnergyHandbook”,1978.
7. TERIPublications.
8. WRMurphy,GMcKay“EnergyManagement”

Semester	I	L	T	P	C	Course Code
Regulation	**V21**	**3**	**0**	**0**	**3**	**V21TEE08**
Name of the Course	**TheoryandTechnology ofFuelCells** Program Elective – II					
Specialization	**Thermal Engineering**					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge level
CO1	Explain concepts of Fuel cells	K2
CO2	Explain various models of Fuels cells	K2
CO3	Illustrate Low and High temperature fuel cells	K3
CO4	Determine the production of fuels and design of various fuel cells	K4
CO5	Explain the components of fuel cell system	K2

UNIT – I
INTRODUCTION: Relevance,Principle,variousconfigurations(Alkaline,Acid,ProtonExchange Membrane, direct methanol, molten carbonate and solid oxide fuel cells) fuel cellapplications.Basictheoryofelectrochemistry,electrochemicalenergyconversion,electrochemical techniques, Thermodynamics of fuel cells, Heat and mass transfer in fuel cells,Singlecell characteristics.
UNIT – II
MODELLING: Electrochemical model, Heat and mass transfer model, System thermodynamicmodel.
UNIT – III
LOWANDHIGHTEMPERATUREFUELCELLS: Protonexchangemembranefuelcell(PEMFC)anddirectmethanolfuelcell(DMFC): theirspecialfeaturesandcharacteristics.
Moltencarbonatefuelcell(MCFC)andsolidoxidefuelcell(SOFC)forpowergeneration,theirspecialfeaturesand characteristics.
UNIT – IV
FUELS AND FUEL PROCESSING: Availability, production and characteristics of Hydrogen,fossil fuel – diverted fuels and biomass, diverted fuels. Principles of design of PEMFC, DMFCandSOFC.
UNIT – V
FUELCELLSYSTEM: Materials,component,stack,interconnects,internalandexternalreforming ,system layout, operation and performance.

TEXTBOOKS:
1. Basu,S.(Ed)FuelCellScienceandTechnology,Springer,N.Y.(2007).
2. O'Hayre,R.P.,S. Cha,W.Colella,F. B.Prinz,FuelCell Fundamentals,Wiley,NY(2006).

REFERENCE BOOKS:
1. J.,DickA., FuelCell SystemsExplained, 2ndEd. Wiley,2003.
2. Liu,H., Principlesoffuel cells,Taylor & Francis,N.Y. (2006).
3. Bard,A.J.,L.R.,Faulkner,ElectrochemicalMethods,Wiley,N.Y.(2004)RefBook.
4. M.T.M.Koper(ed.), FuelCellCatalysis, Wiley,Larminie2009.
5. J.O'M.Bockris,A.K.N.Reddy,ModernElectrochemistry,Springer1998.

Semester	I	L	T	P	C	Course Code
Regulation	V21	0	0	3	2	V21TEL01
Name of the Course	ComputationalFluidDynamics Lab – I					
Specialization	Thermal Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge level
CO1	Analyze flow through pipes, Heat exchanger	K4
CO2	Analyze performance characteristics of combustion and air cooler	K4
CO3	Analyze thermal stresses, temperature gradient & Radiation heat transfer in cylinders	K4
CO4	DeterminationofInsulatedWallTemperature, thermal loading of support structure	K4
CO5	Illustrate SolidLiquidPhaseChange	K3

1. AnalysisofTransientstatecompressibleflowthroughpipes
2. PerformanceAnalysisof HeatExchangerDevice
3. CalibrationPerformancecharacteristicsofCombustion
4. EstimationofC.O.PforRefrigerationCycle
5. AnalysisofGascooled Air-Cooler
6. PerformanceofAir-Conditioner
7. ThermalStressesinlong cylinder
8. DeterminationofInsulatedWallTemperature
9. TemperatureGradientacrosssolidCylinder
10. RadiationHeatTransferbetweenConcentricCylinders
11. SolidLiquidPhaseChange
12. ThermalLoadingonSupportstructure

- MATLAB, ANSYS fluent modules: for conducting the simulation experiments.

Semester	I	L	T	P	C	Course Code
Regulation	V21	0	0	3	2	V21TEL02
Name of the Course	THERMALENGINEERINGLAB –I					
Specialization	Thermal Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge level
CO1	Determination of fuel properties	K4
CO2	Investigate the exhaust emissions of IC Engines	K4
CO3	Test the Performance of compressors & IC Engines	K4

1. Abel'sapparatus: Determinationofflashandfire pointsofagivenoilsample
2. RedwoodViscometerNo.1:Determination ofkinematicandabsolute viscositiesofanoilsamplegiven
3. Measurement of Viscosity by Sayboltz's Viscometer.
4. Determination of Calorific Value of fuel.
5. Two-StageReciprocatingAir-Compressor - Determinationofvolumetricefficiencyofthecompressoras afunctionof receiverpressure.
6. I.C. Engines performance test and Exhaust emission measurements (4 -stroke diesel engine)
7. I.C. Engines performance test and Exhaust emission measurements (2-stroke petrol engine)
8. Evaluation of engine friction by conducting Morse test on 4-stroke multi cylinder petrol engine.
9. I.C. Engines heat balance at different loads and show the heat distribution curve.
10. Performance test on variable compression ratio engines.
11. Performance test on Rotary Air Compressor.

II Semester

Semester	II	L	T	P	C	Course Code
Regulation	V21	3	0	0	3	V21TET03
Name of the Course	Advanced Heat and Mass Transfer					
Specialization	Thermal Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge level
CO1	Explain Equations governing heat conduction heat transfer	K2
CO2	Illustrate finite difference methods for heat conduction and convection problems	K3
CO3	Analyze heat and mass transfer in internal and external flows	K4
CO4	Explain concepts related to free convection, boiling & condensation and Heat exchangers	K2
CO5	Explain concepts of Radiation heat transfer and mass transfer.	K2

UNIT – I

BRIEF INTRODUCTION TO DIFFERENT MODES OF HEAT TRANSFER: Conduction: General heat Conduction equation, initial and boundary conditions.

Transient heat conduction: Lumped system analysis, Heisler charts, semi infinite solid,use of shape factors in conduction,2D transient heat conduction, product solutions.

UNIT – II

FINITE DIFFERENCE METHODS FOR CONDUCTION: ID & 2D steady state and simple transient heat conduction problems, implicit and explicit methods.

FORCED CONVECTION: Equations of fluid flow, concepts of continuity, momentum equations, derivation of energy equation, methods to determine heat transfer coefficient: Analytical methods, dimensional analysis and concept of exact solution. Approximate method, ntegral analysis.

UNIT – III

EXTERNAL FLOWS: Flow over a flat plate: Integral method for laminar heat transfer coefficient for different velocity and temperature profiles. Application of empirical relations to variation geometries for laminar and turbulent flows.

INTERNAL FLOWS: Fully developed flow: Integral analysis for laminar heat transfer coefficient, types of flow, constant wall temperature and constant heat flux boundary conditions, hydrodynamic &thermal entry lengths; use of empirical correlations.

UNIT – IV

FREE CONVECTION: Approximate analysis on laminar free convective heat transfer, boussinesque approximation, different geometries, and combined free and forced convection.

BOILING AND CONDENSATION: Boiling curve, correlations, Nusselts theory of film condensation on a vertical plate, assumptions & correlations of film condensation for different geometries.

HEAT EXCHANGERS Types of Heat Exchangers, LMTD and NTU methods

UNIT – V
RADIATION HEAT TRANSFER: Radiant heat exchange in grey, non, grey bodies, with transmitting, Reflecting and absorbing media, specular surfaces, gas radiation, from flames.
MASS TRANSFER: Concepts of mass transfer, diffusion & convective mass transfer analogies, significance of non-dimensional numbers.

TEXT BOOKS:
1. Principles of Heat Transfer / Frank Kreith / Cengage Learning
2. Heat Transfer / Necati Ozisik / TMH

REFERENCE BOOKS:
1. Fundamentals of Heat and Mass Transfer,5th Ed. / Frank P. Incropera/John Wiley
2. Elements of Heat Transfer/E. Radha Krishna/CRC Press/2012
3. Introduction to Heat Transfer/SK Som/PHI
4. Heat Transfer / Nellis& Klein / Cambridge University Press / 2012.
5. Heat Transfer/ P.S. Ghoshdastidar/ Oxford Press
6. Engg. Heat & Mass Transfer/ Sarat K. Das/DhanpatRai
7. Heat Transfer/ P.K.Nag /TMH
8. Heat Transfer / J.P Holman/MGH

Semester	II	L	T	P	C	Course Code
Regulation	V21	3	0	0	3	V21TET04
Name of the Course	Thermal Measurements and Process Controls					
Specialization	Thermal Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge level
CO1	Explain elements of measuring instruments	K2
CO2	Explain flow measuring devices	K2
CO3	Explain temperature measurement methods	K2
CO4	Illustrate various indicating, recording and data acquisition systems	K3
CO5	Analyze various process control systems	K4

UNIT – I

GENERAL CONCEPTS: Fundamental elements of a measuring instruments. Static and dynamic characteristics – errors in instruments – Different methods of measurement and their analysis – Sensing elements and transducers. Measurement of pressure – principles of pressure measurement, static and dynamic pressure, vacuum and high pressure measurement – Measurement of low pressure, Manometers, Calibration methods, Dynamic characteristics, design principles.

UNIT – II

MEASUREMENT OF FLOW: Obstruction meters, variable area meters, Pressure probes, compressible fluid flow measurement, Thermal anemometers, calibration of flow measuring instruments. Introduction to design of flow measuring instruments.

UNIT – III

TEMPERATURE MEASUREMENT: Different principles of Temperature Measurement, use of bimetallic thermometers – Mercury thermometers, Vapor Pressure thermometers, Thermo positive elements, thermocouples in series & parallel, pyrometry, measurement of heat flux, calibration of temperature measuring instruments. Design of temperature measuring instruments.

MEASURMENT OF : Velocity, moisture content , humidity and thermal conductivity .

UNIT – IV

VOLTAGE INDICATING, RECORDING AND DATA ACQUISITION SYSTEMS: Standards and calibration, analog volt meters and potentiometers. Electrical instruments. Digital voltmeters and multimeters. Signal generation. Electro mechanical servo type XT and XY recorders. Thermal array recorders and data acquisition systems. Analog and digital CROs.

Displays and liquid crystals flat panel displays. Displays. Virtual instruments. Magnetic tape and disk recorders/reproducers. Fiber optic sensors.

UNIT – V

PROCESS CONTROL: Introduction and need for process control principles, transfer functions, block diagrams, signal flow graphs, open and closed loop control systems – Analysis of First & Second order systems with examples of mechanical and thermal systems. Control System Evaluation – Stability, steady state regulations, transient regulations.

TEXT BOOK:

1. Measurement System, Application & Design – E.O. Doeblin, MGH

REFERENCE BOOKS:

1. Mechanical and Industrial Measurements – R.K. Jain – Khanna Publishers.
2. Mechanical Measurements – Buck & Beckwith – Pearson.
3. Control Systems, Principles & Design, 2nd Edition – M. Gopal – TMH.
4. Mechanical Measurements – J.P Holman

Semester	**II**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	**V21**	**3**	**0**	**0**	**3**	**V21TEE09**
Name of the Course	**Equipment Design for Thermal Systems** Program Elective – III					
Specialization	**Thermal Engineering**					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge level
CO1	Explain various Heat Exchangers and methods of designing them	K2
CO2	Illustrate design of double pipe heat exchanger	K3
CO3	Demonstrate condensation of vapours	K3
CO4	Explain concepts of vaporizers, evaporators and reboilers	K3
CO5	Outline concepts of designing of direct contact heat exchangers	K4

UNIT – I

CLASSIFICATION OF HEAT EXCHANGERS: Introduction, Recuperation & regeneration, Tabular heat exchangers, Double pipe, shell & tube heat exchanger, Plate heat Exchangers, Gasketedplate heat exchanger. Spiral plate heat exchanger, Lamella heat exchanger, Extended surface heat exchanger, Plate fin and Tabular fin.

BASIC DESIGN METHODS OF HEAT EXCHANGER: Introduction, Basic equations in design, Overall heat transfer coefficient, LMTD method for heat exchanger analysis, Parallel flow, Counter flow. Multipass, cross flow heat exchanger design calculations:

UNIT – II

DOUBLE PIPE HEAT EXCHANGER: Film coefficient for fluids in annulus, fouling factors, Calorific temperature, Average fluid temperature, The calculation of double pipe exchanger, Double pipe exchangers in series parallel arrangements.

Shell & Tube Heat Exchangers: Tube layouts for exchangers, Baffle heat exchangers, Calculation of shell and tube heat exchangers, Shell side film coefficients, Shell side equivalent diameter, The true temperature difference in a 1,2 heat exchanger. Influence of approach temperature on correction factor. Shell side pressure drop, Tube side pressure drop, Analysis of performance of 1,2 heat exchanger and design of shell & tube heat exchangers, Flow arrangements for increased heat recovery, the calculation of 2,4 exchangers.

UNIT – III

CONDENSATION OF SINGLE VAPOURS: Calculation of horizontal condenser, Vertical condenser, De,Super heater condenser, Vertical condenser,sub,Cooler, Horizontal Condenser,Sub cooler, Vertical reflux type condenser. Condensation of steam.

UNIT – IV

VAPORIZERS, EVAPORATORS AND REBOILERS: Vaporizing processes, Forced circulation vaporizing exchanger, Natural circulation vaporizing exchangers, Calculations of a reboiler. Extended Surfaces: Longitudinal fins. Weighted fin efficiency curve, Calculation of a Double pipe fin efficiency curve. Calculation of a double pipe finned exchanger, Calculation of a longitudinal fin shell and tube exchanger.

UNIT – V

DIRECT CONTACT HEAT EXCHANGER: Cooling towers, relation between wet bulb & dew point temperatures, The Lewis number and Classification of cooling towers, Cooling tower internals and the roll of fill, Heat Balance. Heat Transfer by simultaneous diffusion and convection, Analysis of cooling tower requirements, Deign of cooling towers, Determination of the number of diffusion units, Calculation of cooling tower performance.

TEXT BOOK:

1. Process Heat Transfer/D.Q.Kern/ TMH
2. Design of Thermal Systems / Wilbert F. Stoecker / McGrawHill 1. Heat Exchanger Design/
   A.P.Fraas and M.N.Ozisicj/ John Wiely& sons, New York.
3. Cooling Towers / J.D.Gurney and I.A. Cotter/ Maclaren
4. Design & Optimization of Thermal Systems / Yogesh Jaluria / CRC Press

REFERENCE BOOKS:

1. Heat Exchanger Design/ A.P.Fraas and M.N.Ozisicj/ John Wiely& sons, New York.
2. Cooling Towers / J.D.Gurney and I.A. Cotter/ Maclaren
3. Design & Optimization of Thermal Systems / Yogesh Jaluria / CRC Press

Semester	II	L	T	P	C	Course Code
Regulation	V21	3	0	0	3	V21TEE10
Name of the Course	**Solar Energy Technologies** Program Elective – III					
Specialization	**Thermal Engineering**					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge level
CO1	Explain various elements of solar energy systems	K2
CO2	Illustrate the design of solar water heating system	K3
CO3	Illustrate solar energy storage systems	K3
CO4	Explain performance characteristics and energy conversion systems	K2
CO5	Explain economics of solar energy systems	K2

UNIT – I

INTRODUCTION: Solar energy option, specialty and potential – Sun – Earth – Solar radiation, beam and diffuse – measurement – estimation of average solar radiation on horizontal and tilted surfaces – problems – applications.
Capturing solar radiation – physical principles of collection – types – liquid flat plate collectors – construction details – performance analysis – concentrating collection – flat plate collectors with plane reflectors– cylindrical parabolic collectors – Orientation and tracking – Performance Analysis.

UNIT – II

DESIGN OF SOLAR WATER HEATING SYSTEM AND LAYOUT: Power generation – solar central receiver system – Heliostats and Receiver – Heat transport system – solar distributed receiver system – Power cycles, working fluids and prime movers, concentration ratio.

UNIT – III

THERMAL ENERGY STORAGE: Introduction – Need for – Methods of sensible heat storage using solids and liquids – Packed bed storage – Latent heat storage – working principle – construction – application and limitations. Other solar devices – stills, air heaters, dryers, Solar Ponds & Solar Refrigeration, active and passive heating systems.

UNIT – IV

DIRECT ENERGY CONVERSION: Solid, state principles – semiconductors – solar cells – performance – modular construction – applications. conversion efficiencies calculations.

UNIT – V

ECONOMICS: Principles of Economic Analysis – Discounted cash flow – Solar system – life cycle costs – cost benefit analysis and optimization – cost based analysis of water heating and photo voltaic applications.

TEXT BOOK:
1. Principles of solar engineering/ Kreith and Kerider/Taylor and Franscis/2nd edition

REFERENCE BOOKS:
1. Solar energy thermal processes/Duffie and Beckman/John Wiley & Sons
2. Solar energy: Principles of Thermal Collection and Storage/Sukhatme/TMH/2nd edition
3. Solar energy/Garg/TMH
4. Solar energy/Magal/McGraw Hill
5. Solar Thermal Engineering Systems /Tiwari and Suneja/Narosa
6. Power plant Technology/ El Wakil/TMH

Semester	**II**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	**V21**	**3**	**0**	**0**	**3**	**V21TEE11**
Name of the Course	**Adavanced Power Plant Engineering** Program Elective – III					
Specialization	**Thermal Engineering**					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge level
CO1	Explain various components of Steam power plant	K2
CO2	Explain various components of Gas turbine & Hydro power plant	K2
CO3	Explain Nuclear power station and types of reactors	K2
CO4	Illustrate operation of combined power plants	K3
CO5	Outline economics and environmental considerations of power plants	K4

UNIT – I

Introduction to the sources of energy – resources and development of power in India.

STEAM POWER PLANT: Plant layout, working of different circuits, fuel handling equipments, types of coals, coal handling, choice of handling equipment, coal storage, ash handling systems. Combustion: properties of coal – overfeed and underfeed fuel beds, traveling grate stokers, spreader stokers, retort stokers, pulverized fuel burning system and its components, combustion needs and draught system, cyclone furnace, design and construction, dust collectors, cooling towers and heat rejection. corrosion and feed water treatment.

UNIT – II

GAS TURBINE PLANT: Introduction – classification , construction – layout with auxiliaries, combined cycle power plants and comparison. Cogeneration of Power and Process heat. Waste heat recovery systems.

HYDRO PROJECTS AND PLANT: Classification – typical layouts – plant auxiliaries – plant operation pumped storage plants.

UNIT – III

NUCLEAR POWER STATION: Nuclear fuel – breeding and fertile materials – nuclear reactor – reactor operation.

TYPES OF REACTORS: Pressurized water reactor, boiling water reactor, sodium,graphite reactor, fast breeder reactor, homogeneous reactor, gas cooled reactor, radiation hazards and shielding – radioactive waste disposal.

UNIT – IV

COMBINED OPERATIONS OF DIFFERENT POWER PLANTS: Introduction, advantages of combined working, load division between power stations, storage type hydro, electric plant in combination with steam plant, run of river plant in combination with steam plant, pump storage plant in combination with steam or nuclear power plant, co ordination of hydro, electric and gas turbine stations, co ordination of hydro,electric and nuclear power stations, co ordination of different types of power plants.

POWER PLANT INSTRUMENTATION AND CONTROL: Importance of measurement and instrumentation in power plant, measurement of water purity, gas analysis, O2 and CO2 measurements, measurement of smoke and dust, measurement of moisture in carbon dioxide circuit, nuclear measurements.

UNIT – V

POWER PLANT ECONOMICS AND ENVIRONMENTAL CONSIDERATIONS: Capital cost, investment of fixed charges, operating costs, general arrangement of power distribution, load curves, load duration curve, definitions of connected load, maximum demand, demand factor, average load, load factor, diversity factor – related exercises. effluents from power plants and Impact on environment – pollutants and pollution standards – methods of pollution control.

TEXT BOOKS:

1. A course in Power Plant Engineering /Arora and Domkundwar/Dhanpatrai & Co.
2. Power Plant Engineering /P.C.Sharma / S.K.Kataria Pub

REFERENCES BOOKS:

1. Power Plant Engineering: P.K.Nag/ II Edition /TMH.
2. Power station Engineering – ElWakil / McGrawHill.
3. An Introduction to Power Plant Technology / G.D. Rai/Khanna Publishers

Semester	II	L	T	P	C	Course Code
Regulation	V21	3	0	0	3	V21TEE12
Name of the Course	**Combustion, Emissions and Environment** Program Elective – III					
Specialization	**Thermal Engineering**					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge level
CO1	Explain principles of combustion	K2
CO2	Illustrate the combustion phenomena	K3
CO3	Differentiate the laminar and turbulent flame propagation	K4
CO4	Illustrate the measurement and control of pollution	K3
CO5	Explain environmental considerations of pollution	K2

UNIT – I

PRINCIPLES OF COMBUSTION: Chemical composition , Flue gas analysis, dew point of products, Combustion stoichiometry, Chemical kinetics, Rate of reaction, Reaction order, Molecularity, Zeroth, first, second and third order reactions , complex reactions, chain reactions, Theories of reaction Kinetics, General oxidation behavior of HCs.

UNIT – II

THERMODYNAMICS OF COMBUSTION: Enthalpy of formation, heating value of fuel, Adiabatic flame Temperature, Equilibrium composition of gaseous mixtures.

UNIT – III

LAMINAR AND TURBULENT FLAMES PROPAGATION AND STRUCTURE: Flame stability, burning velocity of fuels, Measurement of burning velocity, factors affecting the Burning velocity. Combustion of fuel droplets and sprays, Combustion systems, Pulverized fuel furnaces- fixed, entrained and fluidized bed systems.

UNIT – IV

POLLUTION FORMATION MEASUREMENT AND CONTROL: Causes for Formation of NOx, SOx, COx, Smoke and UBHC. Different methods of measurement of pollutants. Methods of controlling the formation of pollutants, BHARAT and EURO standards of emissions.

UNIT – V

ENVIRONMENTAL CONSIDERATIONS: Air pollution, effects on environment, human health etc. Principal pollutants, Legislative measures, methods of emission control.

TEXT BOOK:
1. Fuels and combustion, Sharma and Chandra Mohan, Tata McGraw Hill, 1984..

REFERENCE BOOKS:
1. Combustion Fundamentals , Roger A strehlow , McGraw Hill.
2. Combustion Engineering and Fuel Technology , Shaha A.K., Oxford and IBH.
3. Principles of Combustion , KannethK.Kuo, Wiley and Sons.
4. Combustion , Samir Sarkar , Mc. Graw Hill, 2009.
5. An Introduction to Combustion , Stephen R. Turns, Mc. Graw Hill International Edition.
6. Combustion Engineering , Gary L. Berman & Kenneth W. Ragland, Mc. Graw Hill

Semester	II	L	T	P	C	Course Code
Regulation	V21	3	0	0	3	V21TEE13
Name of the Course	**Jet Propulsion and Rocket Engineering** Program Elective – III					
Specialization	**Thermal Engineering**					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge level
CO1	Explain Turbo Jet propulsion systems	K2
CO2	Outline the principles and characteristic parameters of jet propulsion and rockets	K4
CO3	Illustrate chemical formulations of combustion products	K2
CO4	Differentiate solid and liquid propellant rocket systems	K4
CO5	Explain Ramjet propellant rocket system	K2

UNIT – I

TURBO JET PROPULSION SYSTEMS: Gas turbine cycle analysis, layout of turbo jet engine. Turbo machinery, compressors and turbines, combustor, blade aerodynamics, engine off design performance analysis.

FLIGHT PERFORMANCE: Forces acting on vehicle, Basic relations of motion, multi stage vehicles.

UNIT – II

PRINCIPLES OF JET PROPULSION AND ROCKETRY: Fundamentals of jet propulsion, Rockets and air breathing jet engines,Classification,turbo jet , turbo fan, turbo prop, rocket (Solid and Liquid propellant rockets) and Ramjet engines.

NOZZLE THEORY AND CHARACTERISTICS PARAMETERS: Theory of one dimensional convergent, divergent nozzles, aerodynamic choking of nozzles and mass flow through a nozzle, nozzle exhaust velocity, thrust, thrust coefficient, Ac / At of a nozzle, Supersonic nozzle shape, non, adapted nozzles, Summerfield criteria, departure from simple analysis, characteristic parameters,1) characteristic velocity, 2) specific impulse 3) total impulse 4) relationship between the characteristic parameters 5) nozzle efficiency, combustion efficiency and overall efficiency.

UNIT – III

AERO THERMO CHEMISTRY OF THE COMBUSTION PRODUCTS: Review of properties of mixture of gases, Gibbs, Dalton laws, Equivalent ratio, enthalpy changes in reactions, heat of reaction and heat of formation, calculation of adiabatic flame temperature and specific impulse, frozen and equilibrium flows.

SOLID PROPULSION SYSTEM: Solid propellants, classification, homogeneous and heterogeneous propellants, double base propellant compositions and manufacturing methods. Composite propellant oxidizers and binders. Effect of binder on propellant properties. Burning rate and burning rate laws, factors influencing the burning rate, methods of determining burning rates.

UNIT – IV

SOLID PROPELLANT ROCKET ENGINE: Internal ballistics, equilibrium motor operation and equilibrium pressure to various parameters. Transient and pseudo equilibrium operation, end burning and burning grains, grain design. Rocket motor hard ware design. Heat transfer considerations in solid rocket motor design. Ignition system, simple pyro devices.

LIQUID ROCKET PROPULSION SYSTEM: Liquid propellants, classification, Mono and Bi propellants, Cryogenic and storage propellants, ignition delay of hypergolic propellants, physical and chemical characteristics of liquid propellant. Liquid propellant rocket engine,system layout, pump and pressure feed systems, feed system components. Design of combustion chamber, characteristic length, constructional features, and chamber wall stresses. Heat transfer and cooling aspects. Uncooled engines, injectors,various types, injection patterns, injector characteristics, and atomization and drop size distribution, propellant tank design.

UNIT – V

RAMJET AND INTEGRAL ROCKET RAMJET PROPULSION SYSTEM: Fuel rich solid propellants, gross thrust, gross thrust coefficient, combustion efficiency of ramjet engine, air intakes and their classification, critical, super critical and sub,critical operation of air intakes, engine intake matching, classification and comparison of Integral Rocket Ramjet (IRR) propulsion systems.

TEXT BOOKS:

1. Mechanics and Dynamics of Propulsion/ Hill and Peterson/John Wiley & Sons
2. Rocket propulsion elements/Sutton/John Wiley & Sons/8th Edition

REFERENCE BOOKS:

1. Gas Turbines/Ganesan /TMH
2. Gas Turbines & Propulsive Systems / Khajuria & Dubey / Dhanpat Rai& Sons
3. Rocket propulsion/Bevere/
4. Jet propulsion /Nicholas Cumpsty/University of Cambridge

Semester	**II**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	**V21**	**3**	**0**	**0**	**3**	**V21TEE14**
Name of the Course	**Automotive Engineering** Program Elective – IV					
Specialization	**Thermal Engineering**					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge level
CO1	Explain classification of automobiles	K2
CO2	Illustrate Fuel, ignition and electrical systems of automobile	K3
CO3	Illustrate Cooling and lubrication systems of automobile	K3
CO4	Illustrate Steering system of automobile	K3
CO5	Explain automation in automobiles	K2

UNIT – I

INTRODUCTION: Overview of the course, Examination and Evaluation patterns, History of Automobiles, Classification of Automobiles.

POWER PLANT: Classification, Engine Terminology, Types of Cycles, working principle of and IC engine, advanced classification of Engines, Multi cylinder engines, Engine balance, firing order.

UNIT – II

FUEL SYSTEM, IGNITION SYSTEM AND ELECTRICAL SYSTEM: spark Ignition engines, Fuel tank, fuel filter, fuel pump, air cleaner/filter, carburetor, direct injection of petrol engines. Compression Ignition engines, Fuel Injection System, air & solid injection system, Pressure charging of engines, super charging and turbo charging, Components of Ignition systems, battery ignition system, magneto ignition system, electronic ignition and ignition timing. Main electrical circuits, generating & stating circuit, lighting system, indicating devices, warning lights, speedometer.

UNIT – III

LUBRICATING SYSTEMS AND COOLING SYSTEMS: Functions & properties of lubricants, methods of lubrication, splash type, pressure type, dry sump, and wet sump & mist lubrication. Oil filters, oil pumps, oil coolers. Characteristics of an effective cooling system, types of cooling system, radiator, thermostat, air cooling & water cooling.

TRANSMISSION, AXLES, CLUTCHES, PROPELLER SHAFTS AND DIFFERENTIAL: Types of gear boxes, functions and types of front and rear axles, types and functions, components of the clutches, fluid couplings, design considerations of Hotchkiss drive torque tube drive, function and parts of differential and traction control.

UNIT – IV

STEERING SYSTEM: Functions of steering mechanism, steering gear box types, wheel geometry. Braking and suspension system: Functions and types of brakes, operation and principle of brakes, constructional and operational classification and parking brake. Types of springs shock observers, objectives and types of suspension system, rear axles suspension, electronic control and proactive suspension system.

WHEELS AND TYRES : Wheel quality, assembly, types of wheels, wheel rims,construction of tyres and tyre specifications.

UNIT – V

AUTOMATION IN AUTOMOBILES: Sensors and actuators, electronic fuel injection system, electronic management system, automatic transmission, electronic transmission control, Antilock Braking System (ABS).

TEXT BOOKS:

1. Joseph Heitner, Automotive Mechanics, CBS publications,2017.
2. Srinivasan. S, Automotive Mechanics, 2nd Edition, Tata McGraw,Hill, 2003

REFERENCE BOOKS:

1. Crouse and Anglin, Automotive Mechanism, 9th Edition. Tata McGraw,Hill, 2003.
2. Jack Erjavec, A Systems Approach to Automotive Technology, Cengage Learning Pub.2009

Semester	II	L	T	P	C	Course Code
Regulation	**V21**	**3**	**0**	**0**	**3**	**V21TEE15**
Name of the Course	**Modelling of IC Engines** Program Elective – IV					
Specialization	**Thermal Engineering**					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge level
CO1	Explain fundamentals of IC Engine modeling	K2
CO2	Analyze thermodynamic combustion models of IC Engines	K4
CO3	Illustrate spray behavior of fuels	K3
CO4	Illustrate modeling of charging system	K3
CO5	Explain mathematical models of SI Engines	K2

UNIT – I

FUNDAMENTALS: Governing equations, Equilibrium charts of combustion chemistry, chemical reaction rates, and approaches of modeling, model building and integration methods, gas exchange through valves, engine and porting geometry, exhaust gas recirculation, valve lift curves.

UNIT – II

THERMODYNAMIC COMBUSTION MODELS OF CI ENGINES: Single zone models, premixed and diffusive combustion models, combustion heat release using wiebe function, wall heat transfer correlations, ignition delay, internal energy estimations, two zone model, application of heat release analysis.

UNIT – III

FUEL SPRAY BEHAVIOR: Fuel injection, spray structure, fuel atomization, droplet turbulence interactions, droplet impingement on walls.

UNIT – IV

MODELING OF CHARGING SYSTEM: Constant pressure and pulse turbo charging, compressor and turbine maps, charge air cooler.

UNIT – V

MATHEMATICAL MODELS OF SI ENGINES: Simulation of Otto cycle at full throttle, part throttle and supercharged conditions. Progressive combustion, Autoignition modeling, single zone models, mass burning rate estimation, SI Engine with stratified charge. Friction in pumping, piston assembly, bearings and valve train etc. friction estimation for warm and warm up engines

REFERENCE BOOKS:

1. Haywood, "I.C. Engines", Mc Graw Hill.
2. Ramos **J** (1989**)** Internal Combustion Engine Modeling**.** Hemisphere Publishing Company
3. C. D. Rakopoulos and E. G. Giakoumis, "Diesel Engine Transient
4. V. Ganeshan, "Internal Combustion Engines", Tata McGraw Hill, New Delhi, 1996.
5. P.A. Lakshminarayanan and Y. V. Aghav, " Modelling Diesel Combustion" Springer, 2010
6. Bernard Challen and Rodica Baranescu, "Diesel Engine Reference Book" Butterworth Heinemann, 1999.

Semester	II	L	T	P	C	Course Code
Regulation	V21	3	0	0	3	V21TEE16
Name of the Course	**Renewable Energy Technologies** Program Elective – IV					
Specialization	**Thermal Engineering**					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge level
CO1	Explain solar energy and its applications	K2
CO2	Explain Geothermal energy and techniques of harnessing it	K2
CO3	Illustrate energy conversion systems and application of hydrogen as fuel	K3
CO4	Illustrate Bio energy systems	K3
CO5	Illustrate Wind and Tidal energy systems	K3

UNIT – I

INTRODUCTION: Energy Scenario, Survey of energy resources. Classification and need for conventional energy resources.

SOLAR ENERGY: Sun , Earth relationship, Basic matter to waste heat energy circuit, Solar Radiation, Attention, Radiation measuring instruments.

SOLAR ENERGY APPLICATIONS: Solar water heating. Space heating, Active and passive heating. Energy storage. Selective surface. Solar stills and ponds, solar refrigeration, Photovoltaic generation.

UNIT – II

GEOTHERMAL ENERGY: Structure of earth, Geothermal Regions, Hot springs. Hot Rocks, Hot Aquifers. Analytical methods to estimate thermal potential. Harnessing techniques, Electricity generating systems.

UNIT – III

DIRECT ENERGY CONVERSION: Nuclear Fusion,Fusion, Fusion reaction, P,P cycle, Carbon cycle, Deuterium cycle, Condition for controlled fusion, Fuel cells and photovoltaic. Thermionic & thermoelectric generation, MHD generator.

HYDROGEN GAS AS FUEL: Production methods, Properties, I.C. Engine applications, Utilization strategy, Performance.

UNIT – IV

BIO,ENERGY: Biomass energy sources. Plant productivity, Biomass wastes, aerobic and Anaerobic bioconversion processes, Raw material and properties of bio,gas, Bio,gas plant technology and status, the energetic and economics of biomass systems, Biomass gasification

UNIT – V

WIND ENERGY: Wind, Beaufort number, Characteristics, Wind energy conversion systems, Types, Betz model. Interference factor. Power coefficient, Torque coefficient and Thrust coefficient, Lift machines and Drag machines. Matching, Electricity generation.

ENERGY FROM OCEANS: Tidal energy, Tides, Diurnal and semi, diurnal nature, Power from tides, Wave Energy, Waves, Theoretical energy available. Calculation of period and phase velocity of waves, Wave power systems, submerged devices. Ocean thermal Energy, Principles, Heat exchangers, Pumping requirements, Practical considerations.

TEXT BOOK:
1. Renewable Energy Resources/ John Twidell& Tony Weir/Taylor & Francis/2nd edition

REFERENCE BOOKS:
1. Renewable Energy Resources, Basic Principles and Applications/ G.N.Tiwari and M.K.Ghosal/ Narosa Publications
2. Biological Energy Resources/ Malcolm Fleischer & Chris Lawis/ E&FN Spon
3. Renewable Energy Sources / G.D Rai /Khanna Publishers

Semester	II	L	T	P	C	Course Code
Regulation	V21	0	0	3	2	V21TEL03
Name of the Course	Computational Fluid Dynamics Lab – II					
Specialization	Thermal Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge level
CO1	Analyze the 3D laminar flow through pipe, internal & external flow and rectangular duct.	K4
CO2	Determine the variation of various parameters of rotor & rotary compressor and various losses in pipe flow due to variation of cross section	K4
CO3	Analyze Steady and transient state analysis of solids	K4
CO4	Analyze structural analysis of rectangular plate with hole and orifice in cylinder	K4
CO5	Analyze structural analysis of pressure and velocity in convergent divergent nozzle	K4

1. Static Structural Analysis of a Rectangular Plate with Circular hole
2. Steady State Analysis of a Composite Slab
3. Analysis of Laminar flow in a 3D Circular Pipe
4. Analysis of Pressure and Velocity in a Convergent Divergent Nozzle
5. Study of Variation of various losses in a sudden contraction in pipes
6. External flow analysis of a Cylinder
7. 3 D analysis of a Rectangular Duct
8. Internal Flow 3D analysis
9. Study of Variation of various parameters in a Rotor
10. Study of Variation of various parameters in a Rotary Compressor
11. Transient State Analysis of a Sphere
12. Analysis of Orifice in a Cylinder

Semester	II	L	T	P	C	Course Code
Regulation	**V21**	**0**	**0**	**3**	**2**	**V21TEL04**
Name of the Course	**Thermal Engineering Lab – II**					
Specialization	**Thermal Engineering**					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge level
CO1	Determination of Heat transfer coefficient in convective heat transfer	K4
CO2	Examine the emissivity of test plate	K4
CO3	Test the performance of heat exchanger, Solar flat plate collector and water cooler	K4

1. CompositeSlab Apparatus:Determinationof theoreticalendexperimentalvalues ofequivalent thermal resistanceofacompositeslab.
2. NaturalConvectionApparatus:Determinationofexperimentaland empiricalvaluesofconvection heat transfer coefficient from a Vertical Heated Cylinder losing heat toquiescentair
3. ForcedConvectionApparatus:Determinationoftheoretical,experimentalandempiricalvalues of convection heat transfer coefficient for internal forced convection through acircularGIpipe
4. Pin-FinApparatus:Determinationoftemperaturedistribution,efficiencyand effectivenessof the fin working in Natural &forcedconvectionenvironment.
5. Emissivity Apparatus: Determination of surface emissivity of a given aluminium testplateat a given absolute temperature.
6. HeatPipeDemonstrator:Demonstrationofnearisothermalcharacteristicexhibitedbyaheatpipein comparison to stainless steeland copper pipes
7. Performance evaluation of Shell and Tube heat exchanger.
8. Determination of COP of water cooler test rig
9. Measurement of Dryness Fraction by using Throttling Calorimeter.
10. Performance evaluation of Solar Flat Plate Collector.
11. Determination of convective heat transfer coefficient in drop wise and film wise condensation.

Syllabi for the courses offered in M. Tech under V21 Regulation
III Semester

Semester	III	L	T	P	C	Course Code
Regulation	V21	3	0	0	3	V21TEE17
Name of the Course	**Optmization Techniques & Applications** Program Elective – V					
Specialization	**Thermal Engineering**					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge level
CO1	Explain various single variable optimization techniques	K2
CO2	Illustrate various multi variable optimization techniques	K3
CO3	Explain various linear programming methods	K2
CO4	Explain various non traditional optimization algorithms	K2
CO5	Analyze various applications of optimization techniques to thermal systems	K4

UNIT – I

SINGLE VARIABLE NON,LINEAR UNCONSTRAINED OPTIMIZATION: One dimensional Optimization methods:, Uni, modal function, elimination methods, Fibonacci method, golden section method, interpolation methods, quadratic & cubic interpolation methods.

UNIT – II

MULTI VARIABLE NON LINEAR UNCONSTRAINED OPTIMIZATION: Direct search method, Univariant method , pattern search methods, Powell's, Hook ,Jeeves, Rosenbrock search methods, gradient methods, gradient of function, steepest decent method, Fletcher Reeves method, variable metric method.

UNIT – III

LINEAR PROGRAMMING: Formulation, Sensitivity analysis. Change in the constraints, cost coefficients, coefficients of the constraints, addition and deletion of variable, constraints. Duality, importance of duality, solution of primal from dual.

UNIT – IV

NON TRADITIONAL OPTIMIZATION ALGORITHMS: Genetics Algorithm, Working Principles, Similarities and Differences between Genetic Algorithm & Traditional Methods. Simulated Annealing, Working Principle, Simple Problems.

UNIT – V

APPLICATIONS TO THERMAL SYSTEMS: Optimal design of heat exchangers, condensers, evaporator and IC Engines.

TEXT BOOKS:
1. Optimization theory & Applications / S.S.Rao / New Age International.
2. Optimization for Engineering Design, Kalyanmoy Deb, PHI

REFERENCE BOOKS:
1. S.D.Sharma / Operations Research
2. Optimization Techniques /Benugundu & Chandraputla / Pearson Asia.
3. Design of Thermal Systems / W.F Stoecker/Mc Graw Hill Education

Semester	III	L	T	P	C	Course Code
Regulation	V21	3	0	0	3	V21TEE18
Name of the Course	**Design and Analysis of Experiments** Program Elective – V					
Specialization	**Thermal Engineering**					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge level
CO1	Explain various strategy of experimentation	K2
CO2	Illustrate various factorial design	K3
CO3	Illustrate various two level factorial design	K3
CO4	Analyze various regression models	K4
CO5	Illustrate the Response surface methods	K3

UNIT – I
STRATEGY OF EXPERIMENTATION: Guidelines for designing experiments, sampling and sampling distributions, hypothesis testing, choice of sample size. Experiments with single factor**:** Analysis of variance, analysis of the fixed effects model, model adequacy checking, sample computer output, regression approach to the analysis of variance.
UNIT – II
FACTORIAL DESIGNS: Principles, advantage of factorials, two-factor factorial design, general factorial design, fitting response curves and surfaces.2k factorial design: 22 design, 23 design, General 2kdesign, single replicate of 2k design.
UNIT – III
TWO-LEVEL FRACTIONAL FACTORIAL DESIGNS: one-half fraction of 2K design, one-quarter fraction of 2K design, blocking replicated 2K factorial design, confounding in 2K factorial design. Three-level and mixed-level factorial design: 3K factorial design, confounding in 3K factorial design, fractional replication of 3K factorial design, factorials with mixed levels.
UNIT – IV
REGRESSION MODELS: Linear regression models, estimation of the parameters, hypothesis testing in multiple regression, confidence intervals in multiple regression, prediction of new response observations, regression model diagnostics.
UNIT – V
RESPONSE SURFACE METHODS: Introduction, method of steepest ascent, analysis of second-order response surface, experimental designs for fitting response surfaces.

TEXT BOOK:
1. D.C. Montgomery, “Design and Analysis of Experiments”, 5th edition, John Wiley and sons, 2009.

REFERENCE BOOKS:
1. D.C. Montgomery,” Introduction to Statistical Quality Control”, 4th edition, John Wiley and sons, 2001.

2. Angela Dean and Daniel Voss, "Design and Analysis of Experiments", Springer, 1999

Semester	III	L	T	P	C	Course Code
Regulation	**V21**	**3**	**0**	**0**	**3**	**V21TEE19**
Name of the Course	**Convective Heat Transfer** Program Elective – V					
Specialization	**Thermal Engineering**					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge level
CO1	Explain free, forced convection and equations governing the phenomena	K2
CO2	Illustrate convection heat transfer in laminar, turbulent flows both internal & external	K3
CO3	Illustrate equations of natural convection laminar flow heat transfer	K3
CO4	Analyze equations of combined convection heat transfer in laminar and turbulent flows	K4
CO5	Explain convection heat transfer in porous media	K3

UNIT – I

Introduction to free, forced combined convection,convective heat transfer coefficient,Application of dimensional analysis to convection,Physical interpretation of dimensionless numbers.

EQUATIONS OF CONVECTIVE HEAT TRANSFER: Continuity, Navier,Strokes equation & energy equation for steady state flows,similarity,Equations for turbulent convective heat transfer,Boundary layer equations for laminar, turbulent flows,Boundary layer integral equations.

UNIT – II

EXTERNAL LAMINAR FORCED CONVECTION: Similarity solution for flow over an isothermal plate,integral equation solutions,Numerical solutions,Viscous dissipation effects on flow over a flat plate.

EXTERNAL TURBULENT FLOWS: Analogy solutions for boundary layer flows,Integral equation solutions,Effects of dissipation on flow over a flat plate.

INTERNAL LAMINAR FLOWS: Fully developed laminar flow in pipe, plane duct & ducts with other cross,sectional shapes,Pipe flow & plane duct flow with developing temperature field,Pipe flows & plane duct flow with developing velocity & temperature fields.

INTERNAL TURBULENT FLOWS: Analogy solutions for fully developed pipe flow –Thermally developing pipe & plane duct flow.

UNIT – III

NATURALCONVECTION: Boussineq approximation,Governingequations,Similarity,Boundary layer equations for free convective laminar flows, Numerical solution of boundary layer equations. Free Convective flows through a vertical channel across a rectangular enclosure,Horizontal enclosure,Turbulent natural convection.

UNIT – IV

COMBINED CONVECTION: Governing parameters & equations,laminar boundary layer flow over an isothermal vertical plate,combined convection over a horizontal plate,correlations for mixed convection,effect of boundary forces on turbulent flows,internal flows , internal mixed convective flows,Fully developed mixed convective flow in a vertical plane channel & in a horizontal duct.

UNIT – V

CONVECTIVE HEAT TRANSFER THROUGH POROUS MEDIA: Area weighted velocity,Darcy flow model, energy equation, boundary layer solutions for 2D forced convection, Fully developed duct flow, Natural convection in porous media, filled enclosures, stability of horizontal porous layers.

TEXT BOOK:

1. Convective Heat & Mass Transfer /Kays& Crawford/TMH

REFERENCE BOOKS:

1. Introduction to Convective Heat Transfer Analysis/ Patrick H. Oosthuigen & David Naylor, MGH.
2. Convection Heat Transfer / Adrian Bejan / Wiley
3. Principles of Convective Heat Transfer / Kaviany, Massoud /Springer

Semester	**III**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	**V21**	**3**	**0**	**0**	**3**	**V21TEE20**
Name of the Course	**Extraction of Energy from Waste** Program Elective – V					
Specialization	**Thermal Engineering**					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge level
CO1	Explain energy from waste, types of waste and energy conversion devices.	K2
CO2	Explain the methods of yield of biomass	K2
CO3	Illustrate various gasifiers of biomass	K3
CO4	Illustration various combustors of biomass	K3
CO5	Explain concepts of biogas technology	K2

UNIT – I

INTRODUCTION TO ENERGY FROM WASTE: Classification of waste as fuel, Agro based, Forest residue, Industrial waste, MSW, Conversion devices, Incinerators, gasifiers, digesters

UNIT – II

BIOMASS PYROLYSIS: Pyrolysis, Types, slow fast, Manufacture of charcoal, Methods Yields and application, Manufacture of pyrolytic oils and gases, yields and applications.

UNIT – III

BIOMASS GASIFICATION: Gasifiers, Fixed bed system, Downdraft and updraft gasifier– Fluidized bed gasifiers, Design, construction and operation, Gasifier burner arrangement for thermal heating, gasifier engine arrangement and electrical power Equilibrium and kinetic consideration in gasifier operation.

UNIT – IV

BIOMASS COMBUSTION: Biomass stoves, Improved chullahs, types, some exotic designs, Fixed bed combustors, Types, inclined grate combustors, Fluidized bed combustors, Design, construction and operation , Operation of all the above biomass combustors.

UNIT – V

BIOGAS: Properties of biogas (Calorific value and composition) , Biogas plant technology and status , Bio energy system , Design and constructional features , Biomass resources and their classification , Biomass conversion processes , Thermo chemical conversion , Direct combustion ,biomass gasification , pyrolysis and liquefaction , biochemical conversion , anaerobic digestion ,Types of biogas Plants, Applications , Alcohol production from biomass, Bio diesel production ,Urban waste to energy conversion , Biomass energy programmed in India.

TEXT BOOKS:

1. Biogas Technology , A Practical Hand Book , Khandelwal, K. C. and Mahdi, S. S., Vol. I & II, Tata McGraw Hill Publishing Co. Ltd., 1983.
2. Biomass Conversion and Technology, C. Y. WereKo-Brobby and E. B. Hagan, John Wiley &Sons, 1996.

REFERENCE BOOKS:

1. Non Conventional Energy, Desai, Ashok V., Wiley Eastern Ltd., 1990.
2. Food, Feed and Fuel from Biomass, Challal, D. S., IBH Publishing Co. Pvt. Ltd., 1991.

Semester	III	L	T	P	C	Course Code
Regulation	V21	3	0	0	3	V21TEE21
Name of the Course	**Advanced Finite Elements Methods** Program Elective – V					
Specialization	**Thermal Engineering**					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge level
CO1	Explain various approaches to finite element formulations	K2
CO2	Illustrate the displacement, stresses of ID elements used in Finite element analysis	K3
CO3	Differentiate various 2D elements used in Finite element analysis	K4
CO4	Illustrate the iso parametric formulation and convergence criteria	K3
CO5	Analyze the various elements in structural analysis	K4

UNIT – I

FORMULATION TECHNIQUES: Methodology, Engineering problems and governing differential equations, finite elements., Variational methods-potential energy method, Raleigh Ritz method, strong and weak forms, Galerkin and weighted residual methods, calculus of variations, Essential and natural boundary conditions.

UNIT – II

ONE-DIMENSIONAL ELEMENTS: Bar, trusses, beams and frames, displacements, stresses and temperature effects.

UNIT – III

TWO DIMENSIONAL PROBLEMS: CST, LST, four nodded and eight nodded rectangular elements, Lagrange basis for triangles and rectangles, serendipity interpolation functions.
Axisymmetric Problems: Axisymmetric formulations, Element matrices, boundary Conditions. Heat Transfer problems: Conduction and convection, examples: - two-Dimensional fin.

UNIT – IV

ISOPARAMETRIC FORMULATION: Concepts, sub parametric, super parametric elements, numerical integration, Requirements for convergence, h-refinement and p-refinement, complete and incomplete interpolation functions, Pascal's triangle, Patch test.

UNIT – V

FINITE ELEMENTS IN STRUCTURAL ANALYSIS: Static and dynamic analysis, eigen value problems, and their solution methods, case studies using commercial finite element packages.

ANALYSIS OF NON LINEAR ELASTIC SYSTEMS: Introduction to nonlinear FEM, Nonlinear elastic analysis, Numerical integration for elastoplasticity.

TEXT BOOK:
1. Finite element methods by Chandrubatla & Belagondu.
2. The Finite Element Method in Engineering By Singiresu S. Rao, 5th Edition, Publisher: Butterworth-Heinemann.

REFERENCE BOOKS:
1. J.N. Reddy, Finite element method in Heat transfer and fluid dynamics, CRC press, 1994
2. Zienckiwicz O.C. & R. L. Taylor, Finite Element Method, McGraw-Hill,1983.
3. K. J. Bathe, Finite element procedures, Prentice-Hall, 1996
4. Finite Element Analysis, P. Seshu, Publisher: PHI Learning Pvt. Ltd., New Delhi, 2012.

Annexure-VI

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SRI VASAVI ENGINEERING COLLEGE (AUTONOMOUS)

(Sponsored by Sri Vasavi Educational Society)
(Approved by **AICTE**, New Delhi & Recognized by **UGC** under section **2(f) & 12(B)**)
(Permanently affiliated to JNTUK, Kakinada, Accredited by **NBA** and **NAAC** with '**A**' Grade)
Pedatadepalli, **TADEPALLIGUDEM – 534 101.**W.G.Dist**.** (**A.P**)

Department of Electronics and Communication Engineering

Date: 04.09.2021

Minutes of the 5th meeting of BOS
(Held on 03.09.2021)

The ECE Department 5thmeeting of Board of Studies (BOS) was conducted through online mode on 03.9.2021 at 11.00 A.M using ZOOM Application with following given link address.
https://us02web.zoom.us/j/83132873142.
Following external members have attended the meeting along with internal faculty members. The ECE HOD, Dr E. KusumaKumari, BOS Chairman headed the meeting.

Details of members attended:

S.N	Name of the BOS Member	Nominee	Address
1.	Dr.E.KusumaKumari	Chair person	Professor & Head, ECE, SVEC
2.	Prof.I. SanthiPrabha	University Nominee	Prof. in ECE Dept., University College of Engg., JNTUK, Kakinada
3.	Prof. NVSN. Sarma	Subject Expert	Director, IIIT Trichy Tiruchirapalli, Tamilnadu.
4.	Prof. M. VenugopalaRao	Subject Expert	Prof., ECE Dept., K.L.University, Vijayawada.
5.	Sri. Sunkavalli Siva Kumar	Alumni Nominee	Sr.Engineer, Qualcomm, Bangalore.
6.	ll Faculty Members in Dept.	Members	ECE Dept., SVEC

The following are the key points discussed in the meeting.

- **Item No.1 : Chairperson, BOS has welcomed all the members and given the Opening Remarks.**

- **Item No.2: Review & Approval of the VII& VIII Sem of B. Tech ECE of V18 Reg.**

  BOS members Reviewed the Course Structure and given Following Suggestions
  - Change the Course title of Radar Systems to Radar Engineering (V18ECT20) in VII semester
  - Change the Professional Elective course title from IoT: Concepts & Applications to IoT: Use cases(V18ECT24) in VII semester.
  - Removal of topic of “Efficiency of Non Matched Filter in the syllabus of Radar Engg. Course(V18ECT20) in VII Semester.
  - Rearrange the syllabus for course titled Optical Communication (V18ECT21) in VII semester.
  - Add One more Text book for the Bio-Medical Instrumentation Course (V18ECT35) in VIII semester.

  The approved course structure & Syllabus for the VII & VIII semesters of B. Tech ECE of V18 regulation was given in**Annexure-01**

- **Item No.3: Review & Approval the List of Open Elective Courses offered by ECE Dept., in VII &VIII Semesters B. Tech ECE of V18 Reg.**

  BOS Members suggested that toChange the Open elective course title in VII Semester “Principles of Wireless, Cellular Mobile Comm. is to “ Principles of Wireless Communication” (V18ECTOE4) and approved the Syllabus.

  Approved List of Courses and Syllabus was given in **Annexure -02**

- **Item No. 4: Review &Approval of the Proposed Course Structure and Syllabi for the III and IV Semester of B. Tech ECE under V20 Regulation.**

- BOS members reviewed and suggested that try to include Machine Learning Topics in Course titled as Skill Oriented Course (V20ECSOC01) in the III and IV Semester of B. Tech ECE under V20 Regulation and approved the Syllabus.
- In the III semester, the Course titled Probability Theory & Stochastic Processes can be approved in the Basic Science BOS meeting. ECE BOS members were accepted to that proposal.
- Approved the Proposed Course Structure and Syllabi for the III and IV Semester of B. Tech ECE under V20 Regulation.

  Approved List of Courses and Syllabus was given in **Annexure-03**

1. **Item No. 5: Approval of List of Courses offered to EEE Department in III Semester of B. Tech EEE under V20 Regulation.**

   BOS members approved the Syllabus and details are given in **Annexure-04**

2. **Item No. 6: Approval of Proposed course structure &syllabi for the courses offered in III & IV semesters of B. Tech ECT under V20 Regulation.**

   BOS members approved the Syllabus and details are given in**Annexure -05**.

3. **Item No. 7: Approval of Proposed course structure and Syllabi for M. Tech Programme with specialization of Embedded Systems & VLSI underV21 Regulations.**

   BOS Members Suggested that to include the MOOCS courses in III semester of the M. Tech Programme, approved the Course Structure and Syllabus. The details are given in **Annexure -06**.

Finally, the chairperson thanked all the BOS members and faculty. The meeting was ended at 12.30 P.M

Dr. E. Kusuma Kumari,
Chairperson, BOS

Annexure-01

Approved Course Structure &Syllabus for VII& VIII Semesters

COURSE STRUCTURE

(For V18 Regulation)

VII Semester

Sl.No.	Course Code	Category	Course Title	Hours per week L	T	P	Credits C
1	V18ECT20	Professional Core Courses	Radar Engineering	3	0	0	3
2	V18ECT21	Professional Core Courses	Optical Communication	3	0	0	3
3	V18ECT22	Professional Core Courses	Digital Image Processing	3	0	0	3
4	V18ECT24 V18ECT25 V18ECT26	Prof. Elective Course	**Prof. Elective 3:** • IOT: Use Cases • CMOS Analog ICDesign • Digital TV Engg.	3	0	0	3
5	V18ECT27 V18ECT28 V18ECT29	Prof. Elective Course	**Prof. Elective 4:** • Low Power IC Design • System On Chip • System Design Through Verilog	3	0	0	3
6	V18ECTOE4 V18ECTOE5 V18ECTOE6	Open Elective Course	**Open Elective-2:** • Principles of Wireless Comm. • Medical Electronics • Concepts of Embedded Systems	3	0	0	3
7	V18ECL11	Professional Core Course Lab	Microwave & Optical Comm. Lab	0	0	2	1
8	V18ECPR01	Main Project	Project	0	0	6	3
			Total	**18**	**0**	**8**	**22**

VIII Semester

Sl.No.	Course Code	Category	Course Title	Hours per week			Credits
				L	T	P	C
1	V18ECT30	Professional Core Course	Cellular Mobile Communication	3	0	0	3
2	V18ECT31 V18ECT32 V18ECT33	Professional Elective Course	**Prof. Elective 5:** • Electronics Measurements & Instrumentation • FPGA Architecture • Principles of Modern Wireless Communication Systems	3	0	0	3
3	V18ECT34 V18ECT35 V18ECT36	Professional Elective Course	**Prof. Elective 6:** • Satellite Communication • Biomedical Instrumentation. • Wireless Sensor Networks	3	0	0	3
4	V18ECTOE7 V18ECTOE8 V18ECTOE9	Open Elective Course	**Open Elective-3:** • Fundamentals of Digital Image & Video Processing • Embedded RTOS • Principles of Digital TV Engg.	3	0	0	3
5	V18ECPR02	Main Project	Project Contd.	0	0	16	8
			TOTAL	**12**	**0**	**16**	**20**

VII-Semester Syllabus

			L	T	P	C
VII Sem.	**Radar Engineering**	**Course Code:V18ECT20**	**3**	**0**	**0**	**3**

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

- CO1: Derive the radar range equation and to solve some analytical problems. **[K2]**
- CO2: Describe the operation of CW and FMCW Radar systems. **[K2]**
- CO3: Illustrate the principle of each and every block of MTI and Pulse Doppler Radar **[K2]**
- CO4: Distinguish the different methods used for tracking targets. **[K2]**
- CO5: Relate the Noise Figure and Noise Temperature in Radar Receivers **[K2]**
- CO6: Explain the various components of radar receiver and its performance. **[K2]**

UNIT–I:

Basics of Radar: Introduction, Maximum Unambiguous Range, simple Radar range Equation, Radar Block Diagram and Operation, Radar Frequencies and Applications.

Radar Equation : Prediction of Range Performance, Minimum Detectable Signal, Receiver Noise, Modified Radar Range Equation, SNR, Probability of Detection, Probability of False Alarm, Integration of Radar Pulses, Radar Cross Section of Targets (simple targets-sphere, cone-sphere), Transmitter Power, PRF and Range Ambiguities, System Losses.

UNIT–II:

CW and Frequency Modulated Radar: Doppler Effect, CW Radar – Block Diagram, Isolation between Transmitter and Receiver, Non-zero IF Receiver, Receiver Bandwidth Requirements, Applications of CW radar.

FM-CW Radar: Range and Doppler Measurement, Block Diagram and Characteristics, FM-CW altimeter, Multiple Frequency CW Radar.

UNIT-III:

MTI and Pulse Doppler Radar: Introduction, Principle, MTI Radar with - Power Amplifier Transmitter and Power Oscillator Transmitter, Delay Line Cancellers – Filter Characteristics, Blind Speeds, Double Cancellation, Nth Cancellation Staggered PRFs. Range Gated Doppler Filters. MTI Radar Parameters, Limitations to MTI Performance, MTI versus Pulse Doppler Radar.

UNIT –IV:

Tracking Radar: Tracking with Radar, Sequential Lobing, Conical Scan, Mono pulse Tracking Radar – Amplitude Comparison Mono pulse (one- and two- coordinates), Phase Comparison Mono pulse, Tracking in Range, Acquisition and Scanning Patterns, Comparison of Trackers.

UNIT –V:

Detection of Radar Signals in Noise: Introduction, Matched Filter Receiver – Response Characteristics and Derivation, Correlation Detection and Cross-correlation Receiver, Matched Filter with Non-white Noise, Noise Figure and Noise Temperature.

UNIT –VI:

Radar Receivers –Displays – types. Duplexers – Branch type and Balanced type, Circulators as Duplexers.

Introduction to Phased Array Antennas – Basic Concepts, Radiation Pattern, Beam Steering and Beam Width changes, Series versus parallel feeds, Applications, Advantages and Limitations.

TEXT BOOKS:

1. Introduction to Radar Systems – Merrill I. Skolnik, TMH Special Indian Edition, 2ndEd., 2007.
2. Radar Principles – Peebles, Jr., P.Z., Wiley, New York, 1998.
3. Microwave & Radar Engineering – G. SasibhushanaRao, Pearson Publications

REFERENCE BOOKS:

1. Introduction to Radar Systems, 3rd edition – M.I. Skolnik, TMH Ed., 2005
2. Microwave & Radar Engineering – M. Kulkarni, Umesh Publications, 3rd edition
3. Radar Engineering – GSN Raju, IK International.

VII Sem.	Optical Communication	Course Code:V18ECT21	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe the overview of optical fiber communication, ray theory transmission and Concepts of modes.**[K2]**
CO2: Explain thoroughly the operation of optical sources, Quantum efficiency and power. **[K2]**
CO3:Classify different types of optical detectors and also explain the operation of optical Receiver.**[K2**
CO4:Illustrate the concept of power launching and power coupling for optical fibers. Discuss splicing techniques and connector losses. **[K3]**
CO5: Explain the types of fiber materials with their properties and fiber losses. **[K2]**
CO6:Construct optical link and becomes familiar with WDM concepts and measurement Techniques.**[K3]**

UNIT I
Introduction - Historical development, the general system, advantages of optical fiber communications. Optical fiber wave guides - Ray theory transmission, Total Internal Reflection, Acceptance angle, Numerical Aperture, Skew rays, Cylindrical fibers- Modes, V-number, Mode coupling, Step Index fibers, Graded Index fibers, Single mode fibers - Cut off wavelength, Mode Field Diameter, Effective Refractive Index, Related problems.

UNIT II
Optical sources-LEDs,Structures, Materials, Quantum efficiency, Power, Modulation, Power bandwidth product. Injection Laser Diodes- Modes, Threshold conditions, Laser diode rate equations, External quantum efficiency, resonant frequencies, Reliability Considerations.

UNIT III
Optical detectors- Physical principles of PIN and APD, Detector response time, Temperature effect on Avalanche gain, Comparison of Photo detectors, Optical receiver operation - Fundamental receiver operation, Digital signal transmission, error sources, Receiver configuration, Digital receiver performance, Probability of Error, Quantum limit, Analog receivers. Relatedproblems.

UNIT IV
Fiber materials - Glass, Halide, Active glass, Chalgenide glass, Plastic optical fibers. Signal Degradation in optical fibers - Attenuation, Absorption, Scattering and Bending losses, Core and Cladding losses, Information capacity determination, Group delay, Types of Dispersion: Material dispersion, Wave-guide dispersion, Polarization-Mode dispersion, Intermodal dispersion, Pulse broadening in Graded index fiber, Related problems.

UNIT V

Source to fiber power launching-Output patterns, Power coupling, Power launching, Equilibrium Numerical Aperture, Lensing Schemes for Coupling, Laser diode to fiber coupling. Fiber to Fiber joints – Mechanical misalignment, Fiber related losses, End face preparation, Fiber Splicing-Splicing techniques, Splicing single mode fibers, Optical fiber Connectors-Connector types, Single mode fiber connectors, Connector return loss, Multimode fiber joints, Singlemode fiber joints.

UNIT VI

Optical system design - Point-to- point links- System considerations, Link power budget, Rise time budget with examples, Line coding in Optical links, Operational Principles of WDM, Measurement of Attenuation and Dispersion, Eye pattern.

TEXT BOOKS:

1. Optical Fiber Communications – Gerd Keiser, McGraw-Hill International edition, 3rd Edition, 2000.
2. Fiber Optic Communication Systems – Govind P. Agarwal, John Wiley, 3rd Edition, 2004.

RERFERENCES:

1. Fiber Optic Communications – D.K. Mynbaev, S.C. Gupta and Lowell L. Scheiner, Pearson Education,2005.
2. Text Book on Optical Fiber Communication and its Applications – S.C.Gupta, PHI, 2005.
3. Fiber Optic Communications – Joseph C. Palais, 4th Edition, Pearson Education, 2004.

VII Sem.	Digital Image Processing	Course Code:V18ECT22	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1. Illustrate the different Transforms Techniques & their use in Image Processing Applications**(K3)**
CO2. Examine Spatial & frequency domain filtering like smoothing & sharpening Operation sonImages **(K4)**
CO3. Analyze Restoration operations/techniques on Images**(K4)**
CO4. Describe the Image compression Techniques and multi-resolution processing on Images**(K3)**
CO5. Analyze morphological operations on Images & Image segmentation**(K4)**
CO6. Illustrate the different color Image Processing Techniques on Images**(K3)**

UNIT-I

Introduction: Introduction to Image Processing, Fundamental steps in digital image processing, components of an image processing system, image sensing and acquisition, image sampling and quantization, some basic relationshipsbetweenpixels, an introductionto themathematicaltools used indigital imageprocessing.

Image Transforms: Need for image transforms, Discrete Fourier transform (DFT) of one variable, Extension tofunctions of two variables, some properties of the 2-D Discrete Fourier transform, Walsh Transform. Hadamard transform, Haar Transform, Slant transform, Discrete Cosine transform, Discrete Sine Transform,Comparison ofdifferent imagetransforms.

UNIT-II

Intensity Transformations and Spatial Filtering: Some basic intensity transformation functions,histogramprocessing,fundamentalsofspatialfiltering,smoothingspatialfilters , and sharpeningspatialfilters.

Filtering in the Frequency Domain: The Basics of filtering in the frequency domain, image Smoothingusingfrequencydomainfilters,Image Sharpeningusing frequencydomain filters, Selective filtering.

UNIT-III

Image Restoration and Reconstruction: A model of the image degradation / Restoration process, Noise models,restoration in the presence of noise only-Spatial Filtering, Periodic Noise Reduction by frequency domain filtering,Linear, Position – Invariant Degradations, Estimating the degradation function, Inverse filtering, Minimum mean square error (Wiener) filtering, geometric mean filter .

UNIT-IV

Image compression: Fundamentals, Basic compression methods: Huffman coding, Arithmeticcoding,LZWcoding,Run-Lengthcoding,Symbol-Basedcoding,Bit-Planecoding,BlockTransformcoding,

Wavelets and Multiresolution Processing: Image pyramids, subband coding, Multiresolution expansions, wavelettransformsin onedimensions &two dimensions, Wavelet coding.

UNIT-V

Image segmentation: Fundamentals, point, line, edge detection, thresholding and region –based segmentation.

MorphologicalImageProcessing: Erosion and dilation, opening and closing, basicmorphologicalalgorithmsforboundaryextraction,thinning,gray scale morphology.

UNIT-VI

Color image processing: color fundamentals, color models, pseudo color image processing, basics of full colorimage processing, color transformations, smoothing and sharpening. Image segmentation based on color, noise in colorimages, colorimagecompression.

TextBooks:

1. R.C.GonzalezandR.E.Woods,DigitalImageProcessing,3rdedition,PrenticeHall,2008.
2. Jayaraman,S.Esakkirajan,andT.Veerakumar,”DigitalImageProcessing”,TataMcGraw-Hill Education,2011.

ReferenceBooks:

1. AnilK.Jain,“FundamentalsofDigitalImageProcessing”,PrenticeHallofIndia,9thEdition,IndianReprint,2002.
2. B.Chanda,D.DuttaMajumder,“Digital ImageProcessingandAnalysis”,PHI,2009.

VII Sem.	IOT: Use Cases (Professional Elective-III)	Course Code:V18ECT24	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

- CO1: Describe M2M and IOT Technologies. **[K2]**
- CO2: Explain the layers and protocols in IOT. **[K2]**
- CO3: Describe various communication technologies used in IOT. **[K2]**
- CO4: Illustrate various hardware components required for IOT applications. **[K2]**
- CO5: Discuss the cloud technologies and their services. **[K2]**
- CO6: Explain the IoT Applications. **[K2]**

UNIT I – INTRODUCTION [1]
Introduction from M2M to IoT - An Architectural Overview, building architecture, Main design principles and needed capabilities, An IoT architecture outline, M2M and IoT Technology Fundamentals - Devices and gateways.

UNIT II – IOT PROTOCOLS [2]
Functionality of Layers in IoT –Study of protocols - Wireless HART, Z-Wave, 6LoWPAN, RPL, CoAP, MQTT.

UNIT III - COMMUNICATION TECHNOLOGIES IN IOT [2, 4]
Study of IoT Connectivity –IEEE 802.15.4,Zigbee, LPWAN, Wi-Fi, Bluetooth, 5G Era.

UNIT IV - SYSTEM HARDWARE [3, 4]
Sensors, Actuators, Radio Frequency Identification, Introduction to Embedded Devices for IoT - RASPBERRY PI, BeagleBone black.

UNIT V – Cloud Computing [3, 4]
Data Collection, Storage and Computing Using a Cloud Platform for IoT Applications/Services, AWS for IoT-Introduction to Amazon EC2.

UNIT VI - IOT APPLICATIONS [2, 3]
Applications - Smart and Connected Cities, Public Safety, Agriculture, and Healthcare.

TEXTBOOKS:
1. “From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence”, Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, StamatisKarnouskos, David Boyle, 1st Edition, Academic Press, 2014.
2. IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things, David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry, and Cisco Press 800 East 96th Street Indianapolis, Indiana 46240 USA.
3. “Internet of Things (A Hands-on- Approach)”, Vijay Madisetti and ArshdeepBahga, 1stEdition, VPT, 2014.

4. Internet of Things - By Raj Kamal, McGraw-Hill Education. Copyright.

REFERENCE BOOKS:

1. From Internet of Things to Smart Cities: Enabling Technologies - edited by Hongjian Sun, Chao Wang, Bashar I. Ahmad, CRC Press -2018.
2. Bernd Scholz-Reiter, Florian Michahelles, “Architecting the Internet of Things”, ISBN 978-3-642-19156-5 e-ISBN 978-3-642-19157-2, Springer.
3. IOT (Internet of Things) Programming: A Simple and Fast Way of Learning IOT, David Etter.

			L	T	P	C
VII Sem.	**CMOS ANALOG IC DESIGN (Professional Elective-III)**	**Course Code:V18ECT25**	**3**	**0**	**0**	**3**

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

- CO1: Describe the Large and Small signal models of different Analog Devices**(K2)**
- CO2: Analyse the various types of current mirrors**.(K3)**
- CO3: Analyse the different types of single stage MOS amplifiers**.(K3)**
- CO4: Describe the Noise modelling of Various Circuit Elements**.(K2**)
- CO5: Illustrate the construction and working of OP-AMP**.(K3)**
- CO6: Illustrate the types of CMOS Comparators **.(K3)**

UNIT -I: Integrated circuit Devices and Modelling

Semiconductors and p-n junction: diodes reverse biased diodes, graded junctions, large signal junction capacitance and forward biased junctions small signal model of forward biased diode

The MOS Transistor**:** symbol for MOS Transistors, basic Operation, and Large signal modelling small signal modelling.

Bi-Polar Transistors: basic Operation, Large signal modelling small signal modelling

UNIT -II: Basic Current Mirrors

Basic CMOS current Mirrors, source Degenerated current mirror, Cascade current Mirror and Wilson Current Mirror, bipolar current mirror and Current mirror with Beta Helper.

UNIT -III: Single Stage Amplifiers

Common source amplifier, Source follower, common gate Amplifier, Cascode Gain stage amplifier and MOS Differential Amplifiers. Frequency response of Amplifiers.

UNIT -IV: Noise Analysis and Modelling

Time Domain Analysis of Noise**:** RMS, SNR, Units of dBm& Noise summation**.**

Frequency Domain Analysis of Noise**:** Noise spectral Density, White Noise, Flicker Noise, Noise filtering & Noise bandwidth**.**

Noise models for circuit elements**:** Resistors, Diodes, Transistors and MOSFETS

UNIT -V: CMOS Operational Amplifiers & Compensation

Block diagram of Op-amp, op-amp gain, frequency response &Slew Rate, op-amp Compensation

UNIT -IV: Comparators

Characterization of Comparator, Two-Stage,Open-Loop Comparators, Other Open-Loop Comparators, Improving the Performance of Open-Loop Comparators, Discrete- Time Comparators.

TEXT BOOKS:

1. Analog Integrated Circuit Design- David A.Johns, Ken Martin, Wiley Student Edn,2013.
2. CMOS Analog Circuit Design - Philip E. Allen and Douglas R. Holberg, Oxford University Press, International Second Edition/Indian Edition,2010.

REFERENCES:

1. Analysis and Design of Analog Integrated Circuits- Paul R. Gray, Paul J. Hurst, S. Lewis and R. G. Meyer, Wiley India, Fifth Edition,2010.
2. Design of Analog CMOS Integrated Circuits- BehzadRazavi, TMH Edition,SecondEdition

VII Sem.	Digital TV Engineering (Professional Elective-III)	Course Code:V18ECT26	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

- CO1: Illustrate the fundamentals of television engineering. **[K2]**
- CO2:Explain the colour TV transmission and reception **[K2]**
- CO3: Compare Digital TV transmission standards **[K4]**
- CO4: Discuss factors affecting system noise and transmission errors **[K2]**
- CO5: Explain the Digital TV transmission and reception. **[K2]**
- CO6: Describe the operation of LCD and Plasma screens **[K2]**

UNIT I

Introduction: TV transmitter and receivers, synchronization

Television Pictures: Geometric form and aspect ratio, image continuity, interlaced scanning, picture resolution

Composite video signal: Horizontal and vertical sync details

TV Signal Transmission: VSB transmission, standard channel BW, TV transmitter

UNIT II

Colour Television: Perception of brightness and colours, additive colour mixing, video signals for colours, luminance signal, colour difference signals, encoding of colour difference signals, formation of chrominance signals, PAL encoder, PAL colour receiver

UNIT III

Digital Television Transmission Standards: ATSC terrestrial transmission standard, vestigial sideband modulation, DVB -T transmission standard, ISDB-T transmission standard, channel allocations, antenna height and power, MPEG-2.

UNIT IV

Performance Objectives for Digital Television: System noise, external noise sources, transmission errors, error vector magnitude, eye pattern, interference, co-channel interference, adjacent channel interference, analog to digital TV, transmitter requirements.

UNIT V

Digital Television: Digital System Hardware, Signal Quantization and Encoding, Digital Satellite Television, Direct to Home Satellite Television, Digital TV Receiver, Merits of Digital TV Receivers

UNIT VI

LCD and Plasma Screens: LCD Technology, LCD Matrix types and operation, LCD Screens for Television, Plasma and conduction of charge, Plasma TV Screens, Plasma Color Receiver, LCD color receiver

Text Books:

1. Modern Television Practice: Transmission, Reception and Applications- R. R.Gulati, 4th
Revised edition, New Age International Publishers.
2. Television and Video Engineering – A.M.Dhake, 2nd Edition, Tata McGraw Hill Publishers.
3. Fundamentals of Digital Television Transmission- Gerald W. Collins, John Wiley & Sons.
4. Television engineering and video systems – R G Gupta, Tata McGraw Hill Publishers.

References

1. Basic Television and Video Systems – Bernard Grob, McGrawHill Publishers.
2. Monochrome and Colour Television - R RGulati, New Age International Publishers.
3. Colour Television, Theory and Practice - S.P.Bali, Tata McGraw-Hill Publishers.

VII Sem.	Low Power IC Design (Professional Elective-IV)	Course Code:V18ECT27	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

- CO1: Explain theneedofLowpowercircuit design **(K2)**.
- CO2: Describe thedifferent architectural approaches **(K2)**.
- CO3: AnalyzeLow-PowerDesignApproaches**(K4).**
- CO4: AnalyzeanddesignLow-VoltageLow-PowerAdders circuits**(K4).**
- CO5: AnalyzeanddesignLow-VoltageLow-PowerMultiplier circuits**(K4).**
- CO6: Analyze and designofLow-Voltage Low-Power Memories**(K4).**

UNIT–I:
Fundamentals: Need for Low Power CircuitDesign,Sources of Power Dissipation–Switching Power Dissipation, Short Circuit Power Dissipation, Leakage Power Dissipation,Glitching Power Dissipation, Short Channel Effects.

UNIT–II:
SupplyVoltageScalingfor LowPower: DeviceFeatureSize Scaling,Constant-FieldScaling, Constant-Voltage Scaling, Architectural-Level Approaches: Parallelism for LowPower, Pipelining for Low Power, Combining Parallelism with Pipelining.
VoltageScalingUsingHigh-LevelTransformations: MultilevelVoltageScalingChallengesinMVSVoltageScalingInterfaces,StaticTimingAnalysisDynamicVoltageandFrequencyScaling.

UNIT-III
Low-PowerDesignApproaches: Low-PowerDesignthroughVoltageScaling VTCMOScircuits,MTCMOScircuits,ArchitecturalLevelApproach–PipeliningandParallelProcessing Approaches. Power Gating, Clock Gating Versus Power Gating, Power-Gating Issues.

UNIT–IV:
Low-Voltage Low-Power Adders: Introduction, Standard Adder Cells, CMOS Adder’sArchitectures – Ripple Carry Adders, Carry Look- Ahead Adders, Carry Select Adders,Carry Save Adders, Low-Voltage Low-Power Design Techniques –Trends of TechnologyandPowerSupplyVoltage.

UNIT-V
Low-Voltage Low-Power Multipliers: Introduction, Overview of Multiplication, Types ofMultiplierArchitectures,BraunMultiplier,Baugh-WooleyMultiplier,IntroductiontoWallace TreeMultiplier.

UNIT–VI:

Low-Voltage Low-Power Memories: Basics of ROM,Low-Power ROM Technology,Future Trend and Development of ROMs, Basics of SRAM, Memory Cell, Pre-charge andEqualization Circuit, Low-Power SRAM Technologies, Basics of DRAM, Self-RefreshCircuit,FutureTrendandDevelopmentofDRAM.

TEXTBOOKS:

1. CMOSDigitalIntegratedCircuits–AnalysisandDesign–Sung-Mo Kang,Yusuf Leblebici, TMH,2011.
2. Low-Voltage,Low-PowerVLSISubsystems–Kiat-SengYeo,KaushikRoy,TMH ProfessionalEngineering,1st edition,2004

REFERENCEBOOKS:

1. IntroductiontoVLSISystems:ALogic,CircuitandSystemPerspective–Ming-BO Lin,CRCPress,2011
2. Low Power CMOS VLSI Circuit Design – Kaushik Roy, Sharat C. Prasad,JohnWiley&Sons,2000.
3. PracticalLowPowerDigitalVLSI Design–GaryK.Yeap,Kluwer AcademicPress,2002.
4. LeakageinNanometerCMOSTechnologies–SivaG.Narendran,AnathaChandrakasan, Springer,2005.

VII Sem.	System on Chip (Professional Elective-IV)	Course Code:V18ECT28	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

- CO1: Describe SOC System Approach, design and its Architecture.**[K2]**
- CO2: Discuss the selection of processor and its microarchitecture for SOC**[K2]**
- CO3: Describe Memory Design for SOC **[K2]**
- CO4: Explain the concepts of bus models and Interconnect Architectures **[K2]**
- CO5: Describe the overview of Zynq SOC**[K2]**
- CO6: Explain the SOC based Applications. **[K2]**

UNIT – I: Introduction to the System Approach: System Architecture, Components of the system, Hardware & Software, Processor Architectures, Memory and Addressing. System level interconnection, an approach for SOC Design, SystemArchitecture and Complexity.

UNIT – II : Processors: Introduction , Processor Selection for SOC, Basic concepts in Processor Architecture, Basic concepts in Processor Micro Architecture, Basic elements in Instruction handling. Buffers: minimizing Pipeline Delays, Branches, More Robust Processors, Vector Processors and Vector Instructions extensions, VLIW Processors, Superscalar Processors.

UNIT – III : Memory Design for SOC: Overview of SOC external memory, Internal Memory, Size, Scratchpads and Cache memory, Cache Organization, Cache data, Write Policies, Strategies for line replacement at miss time, Types of Cache, Split – I, and D – Caches, Multilevel Caches, Virtual to real translation , SOC Memory System, Models of Simple Processor – memory interaction.

UNIT – IV : Interconnect Customization and Configuration: Inter Connect Architectures, Bus: Basic Architectures, SOC Standard Buses , Analytic Bus Models, Using the Bus model, Effects of Bus transactions and contention time. SOC Customization: An overview, Customizing Instruction Processor, Reconfiguration Technologies, Mapping design onto Reconfigurable devices, Instance Specific design, Customizable Soft Processor.

UNIT-V: Zynq system on chip design overview: interfacing and signals, interconnects, Memory and interrupts.

UNIT – VI: Application Studies / Case Studies: SOC Design approach, Design and evaluation - AES algorithms, Image compression – JPEG compression.

TEXT BOOKS:

1. Computer System Design System-on-Chip - Michael J. Flynn and Wayne Luk, Wiely India Pvt. Ltd.
2. Embedded Processing with the ARM Cortex-A9 on the Xilinx Zynq-7000 All Programmable SoC-Louise H. Crockett Ross A. Elliot Martin A. Enderwitz Robert W. Stewart
3. Design of System on a Chip: Devices and Components – Ricardo Reis, 1st Ed., 2004, Springer

REFERENCE BOOKS:

1. Co-Verification of Hardware and Software for ARM System on Chip Design (Embedded Technology) – Jason Andrews – Newnes, BK and CDROM.

2. System on Chip Verification – Methodologies and Techniques – PrakashRashinkar, Peter Paterson and Leena Singh L, 2001, Kluwer Academic Publishers.

			L	T	P	C
VII Sem.	System Design Through VERILOG (Professional Elective-IV)	Course Code:V18ECT29	3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

- CO1: Outline basic concepts of RTL code for digital circuits **K2**
- CO1: Model RTL codes for digital circuit at gate level **K3**
- CO1: Model RTL codes for digital circuit at behavioural level **K3**
- CO1: Model RTL codes for digital circuit at data flow and switch level **K3**
- CO1: Ouline the concepts of task, function and complier directives **K2**
- CO1: Analyze Synthesize of Combinational and Sequential Circuits **K4**

UNIT-I

INTRODUCTIONTOVERILOG:

Verilog as HDL, Levels of design description, concurrency, module, simulation and synthesis, testbench,functional verification,programminglanguageinterface (PLI),simulationand synthesistools.

LANGUAGECONSTRUCTSANDCONVENTIONS:

Introduction,keywords, identifiers, whitespace characters, comments, numbers, strings, logic values, data types,scalarsandvectors,parameters,memory,operators,systemtasks.

UNIT-II

GATELEVELMODELLING:

Introduction, and gate primitive, module structure, other gate primitives, illustrative examples, tristate gates, arrayof instances of primitives, design of Flip flops with gate primitives, delays, strengths and contention resolution, nettypes,designofbasic circuits.

UNIT-III

BEHAVIORALMODELLING:

Introduction,operationsandassignments,initial construct,alwaysconstruct,examples,assignmentswith delays, wait construct, multiple always blocks, designs at behavioral level, blocking and non-blocking assignments, the case statement, if and if else constructs, assign-De assign construct,repeat construct, FOR loop, the disable construct, While loop, Forever loop, parallel blocks, force-release construct,event.

UNIT-IV

DATA FLOWLEVEL MODELLING

Introduction, continuous assignment structures, delays and continuous assignments, assignment to vectors.

SWITCHLEVELMODELLING

Basictransistor switches, CMOS switch, Bidirectional gates and time delays with switch primitives, instantiations withstrengthsanddelays,strengthcontentionwithtriregnets, switch level modeling for NAND, NOR and XOR.

UNIT-V

SYSTEM TASKS, FUNCTIONS, AND COMPILER DIRECTIVES: Introduction, System Tasks and Functions, File based Tasks and Functions, Compiler Directives, Hierarchical Directives, User-defined Primitives (UDP), FSM Design (Moore and Melay Machines).

UNIT-VI

SYNTHESISOFCOMBINATIONAL ANDSEQUENTIAL LOGIC USINGVERILOG: SynthesisofCombinational logic: Net list of structured primitives, a set of continuous assignment statements and level sensitivecyclic behavior with examples, Synthesis of priority structures, exploiting logic don't care conditions.

Synthesis ofsequential logic with latches: Accidental synthesis of latches and Intentional synthesis of latches, Synthesis ofsequentiallogicwithflip-flops,Synthesisofexplicitstatemachines.

TEXTBOOKS:

1. DesignthroughVerilogHDL—T.R.PadmanabhanandB. BalaTripuraSundari, WSE,IEEEPress,2004.
2. AdvancedDigitalDesignwithVerilog HDL—MichaelD.Ciletti,PHI,2005.

REFERENCES:

1. FundamentalsofLogicDesignwithVerilog—Stephen.BrownandZvonkoVranesic,TMH,2005.
2. AVerilogPrimier—J.Bhasker,BSP,2003.

VII Sem.	Microwave & Optical Comm. Lab	Course Code:V18ECL11	L	T	P	C
			0	0	3	1

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1. Sketch the characteristics of various Microwave & Optical sources **(K3)**

CO2. Compute the various Parameters of Microwave & Optical Components **(K3)**

CO3. Measure the radiation pattern of Horn antenna and reflector antenna. **(K5)**

CO4. Analyzea rectangular microstrip patch antenna using HFSS software **(K4)**

Minimum Twelve Experiments to be conducted:

Part – A (Any 7 Experiments):

1. Reflex Klystron Characteristics.
2. Gunn-Diode Characteristics.
3. Attenuation Measurement.
4. Directional Coupler Characteristics.
5. Impedance and Frequency Measurement.
6. Scattering parameters of Circulator.
7. Scattering parameters of Magic Tee.
8. Radiation Pattern of Horn and Parabolic Antennas.
9. Synthesis of Microstrip antennas (Rectangular Structure) Using HFSS.

Part – B (Any 5 Experiments):

10. Characterization of LED.
11. Characterization of Laser Diode.
12. Intensity modulation of Laser output through an optical fiber.
13. Measurement of Data rate for Digital Optical link.
14. Measurement of NA.
15. Measurement of losses for Analog Optical link.

Equipment required for Laboratories:

1. Klystron Power Supply, Klystron mount
2. VSWR Meter
3. Micro Ammeter
4. Multi meter
5. CRO
6. GUNN Power Supply, Pin Modulator
7. Crystal Diode detector
8. Attenuator
9. Frequency Meter
10. Slotted line carriage
11. Probe detector

12. Wave guide shorts
13. SS Tuner
14. Directional Coupler
15. E, H, Magic Tees
16. Circulators, Isolator
17. Matched Loads
18. Pyramidal Horn and Parabolic Antennas
19. Turntable for Antenna Measurements
20. HFSS Software
21. Fiber Optic Analog Trainer based LED
22. Fiber Optic Analog Trainer based laser
23. Fiber Optic Digital Trainer
24. Fiber cables - (Plastic, Glass)

VIII-Semester Syllabus

VIII Sem.	Cellular & Mobile Communication	Course Code:V18ECT30	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Demonstrate the limitations of conventional mobile telephone systems; Understand the concepts of cellular systems. **[K2]**
CO2:Illustrate the concept of frequency Reuse channels, deduce Co- channel Interference reductionfactor **[K2]**
CO3: Understand the frequency management, channel assignment strategies and Antennas in cellular systems.**[K2]**
CO4:DiscusstheconceptsofHandoff,droppedcallsandcellsplitting,Intersystem Handoff. **[K2]**
CO5:Explain theknowledgeaboutGSM architecture and GSM channels,multiple Accessschemes like FDMA,TDMA and CDMA. **[K2]**
CO6: Summarize the concepts of upcoming technologies like 3G, 4G etc. **[K2]**

UNIT-I CELLULAR MOBILE RADIO SYSTEMS: Introduction to Cellular Mobile System, uniqueness of mobile radio environment, operation of cellular systems, consideration of the components of Cellular system, Hexagonal shaped cells, Analog and Digital Cellular systems.

CELLULAR CONCEPTS: Evolution of Cellular systems, Concept of frequency reuse, frequency reuse ratio, Number of channels in a cellular system, Cellular traffic: trunking and blocking, Grade of Service; Cellular structures: macro, micro, pico and femto cells; Cell splitting, Cell sectoring.

UNIT-II INTERFERENCE: Types of interferences, Introduction to Co-Channel Interference, real time Co-Channel interference, Co-Channel measurement, Co-channel Interference Reduction Factor, desired C/I from a normal case in a Omni directional Antenna system, design of Antenna system, antenna parameters and their effects, diversity receiver, non-cochannel interference-different types.

UNIT-III FREQUENCY MANAGEMENT AND CHANNEL ASSIGNMENT: Numbering and grouping, setup access and paging channels, channel assignments to cell sites and mobile units: fixed channel and non-fixed channel assignment, channel sharing and borrowing, overlaid cells. CELL COVERAGE FOR SIGNAL AND TRAFFIC: Signal reflections in flat and hilly terrain, effect of human made structures, phase difference between direct and reflected paths, straight line path loss slope, and general formula for mobile propagation over water and flat open area, near and long distance propagation, antenna height gain, form of a point to point model.

UNIT-IV HANDOFF STRATEGIES Concept of Handoff, types of handoff, handoff initiation, delaying handoff, forced handoff, mobile assigned handoff, intersystem handoff, vehicle locating methods, dropped call rates and their evaluation.

UNIT-V DIGITAL CELLULAR NETWORKS: GSM architecture, GSM channels, multiple access schemes; FDMA, TDMA, CDMA, OFDMA;

UNIT-VI HIGHER GENERATION CELLULAR STANDARDS: 3G System architecture (UMTS) enhancements in 4G standard, Architecture and representative protocols, introduction to 5G.

TEXTBOOKS:

1. Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2rd Edn,
2006.
2. Principles of Mobile Communications – Gordon L. Stuber, Springer International
2ndEdition, 2007.

REFERENCES:

1. Wireless Communications – Theodore. S. Rapport, Pearson education, 2nd Edn, 2002.
2. Wireless and Mobile Communications – Lee McGraw Hills, 3rd Edition, 2006. 3. MobileCellular Communication – G SasibhushanaRao PearsonWireless Communication and Networking – Jon W. Mark and WeihuaZhqung, PHI,
2005.
4. Wireless Communication Technology – R. Blake, Thompson Asia Pvt. Ltd., 2004.

			L	T	P	C
VIII Sem.	**Electronics Measurements & Instrumentation (Professional Elective-V)**	**Course Code:V18ECT31**	**3**	**0**	**0**	**3**

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1. Select the instrument to be used based on the requirements.**[K2]**
CO2. Understand the design of oscilloscopes for different applications.**[K2]**
CO3. Explain different signal generators and analyzers.**[K2]**
CO4. Understand the design of different types of Bridge circuits for different Applications.**[K2]**
CO5. Explain and Design different types of transducers for differentApplications. **[K2]**
CO6. Explain different types of transducers for measurement of Physical parameters. **[K2]**

UNIT-I
Performance characteristics ofinstruments, Static characteristics, Accuracy, Resolution, Precision, Expected value, Error, Sensitivity.Errors in Measurement, Dynamic Characteristics-speed of response, Fidelity, Lag and Dynamicerror. DC Voltmeters- Multi-range, Range extension/Solid state and differential voltmeters, AC voltmeters- multirange, range extension, shunt. Thermocouple type RF ammeter, Ohmmeters series type, and shunt type, Multi-meter for Voltage, Current and resistance measurements.

UNIT-II
Oscilloscopes CRT features, vertical amplifiers, horizontal deflection system, sweep, trigger pulse, delay line, sync selector circuits, simple CRO, triggered sweep CRO, Dual beam CRO, Dual trace oscilloscope, sampling oscilloscope, storage oscilloscope, digital readout oscilloscope, digital storage oscilloscope, Lissajous method of frequency measurement, standard specifications of CRO, Probes for CRO-Active & Passive, attenuator types.

UNIT-III
Signal Generator- fixed and variable, AF oscillators, Standard and AF sine and square wave signal generators, Function Generators, Square pulse, Random noise, sweep, Arbitrary waveform. Wave Analyzers, Harmonic Distortion Analyzers, Spectrum Analyzers, Digital Fourier Analyzers.

UNIT-IV
DC Bridges: Measurement of Resistance-Wheatstone's Bridge, Kelvin's Bridge. AC Bridges: Measurement of inductance- Maxwell's bridge, Hay's bridge, Anderson Bridge. Measurement of capacitance-Schering's Bridge. Measurement of Frequency-Wien Bridge, Errors and precautions in using bridges.Q-meter.

UNIT-V

Transducers- active & passive transducers : Resistance, Capacitance, inductance; Strain gauges, LVDT, Piezo Electric transducers, Resistance Thermometers, Thermocouples, Thermistors, Sensistors.

UNIT-VI

Measurement of physical parameters- Force,Pressure, Velocity, Acceleration, Humidity, Moisture, Proximity, Displacement.Data acquisition systems.

TEXTBOOKS:

1. Electronic Instrumentation, second edition-H.S. Kalsi, Tata McGrawHill,2004.
2. Modern Electronic Instrumentation and Measurement Techniques–A.D. Helfrick and W.D.Cooper, PHI, 5thEdition, 2002.

REFERENCES:

1. Electronic Instrumentation &Measurements- David A. Bell, PHI, 2ndEdition,2003.
2. Electronic Test Instruments, Analog and Digital Measurements-Robert A. Witte, Pearson Education, 2ndEdition, 2004.
3. Electronic Measurements & Instrumentations by K. LalKishore, Pearson Education-2005.
4. Electronic Measurements & Instrumentation by UdayA.Bakshi& Ajay V. Bakshi
Technical Publications

			L	T	P	C
VIII Sem.	**FPGA Architecture (Professional Elective-IV)**	**Course Code:V18ECT32**	**3**	**0**	**0**	**3**

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe Low end programmable devices.**[K2]**
CO2: Explain FPGA basics.**[K2]**
CO3: Comprehend Spartan 6 basics.**[K2]**
CO4: Use Virtex 5 clock sources and FIFO. Comprehend various I/O standards.**[K2]**
CO5: Use Memory, DSP blocks in complex designs. Comprehend SerDes.**[K2]**
CO6: Comprehend JTAG. Distinguish RISC based Soft processors from Xilinx, Aletra.**[K2]**

UNIT-I
DESIGNING WITH PROGRAMMABLE LOGIC DEVICES:
Read only Memories, Programmable logic Arrays (PLA), Programmable Array logic (PAL), Programmable logic Devices (PLD) Skew, setup, hold time.

UNIT-II
DESIGNING WITH FPGA:
Logic implementation options, Technology trends, Simple SRAM programmable FPGA architecture, Xilinx 3000 series FPGAs, Programmable interconnects, Xilinx 4000 series FPGAs, Programming the FPGA.

UNIT-III
SPARTAN 6 ARCHITECUTUTE:
Spartan 6 Device features- 6 input LUT, Slice, Single Port RAM, Dual Port RAM, ROM, Distributed RAM, 32 x 6, 64 x 1, 128 x 1, Distributed RAM timings, Shift Registers, Multiplexers, Interconnect, PLL, DCM, DSP Slice.

UNIT-IV
VIRTEX 5 ARCHITECTURE:
Clock resources-Global clocks, regional clocks, Clock buffer, Clock Gating.Clock Tree, Clock De-skew, True Dual port RAM. Write modes, FIFO architecture, empty flags, almost empty flags, almost fill flags, full flag, cascading FIFOS, connecting FIFOs in parallel, designing Large multiplexer 4xl, 8xl, 16xl. Control impedance, I/O primitives. I/O supported standards, LVDS.

UNIT-V
STARATIX V ARCHITECTURE:
ALM Block diagram, ALM operating modes, ALM in Arithmetic mode, Types of embedded memory, Control clocking, Memory features, Memory modes, DSP block features, operational modes, DSP block architecture in 27 X 27 mode, independent complex multiplier mode, I/O features mixing voltage referenced and non-voltage referenced standard I/O features standards. Dynamic OCT.LVDS SerDes block diagram and features, Differential Receiver Block diagram and features.

UNIT-VI
SOFT PROCESSORS:
JTAG, programming through JTAG, IEEE 1149.1 Boundary scan testing, programmable power technology, Features of Soft processors, Nios-II, Microblaze.

TEXT BOOKS:

1. Charles H Roth Jr "Digital System Design using VHDL", second edition, 2008.
2. Spartan 6 family overview.
3. Virtex 5- User Guide.
4. Staratix V Device Hand Book.
5. Nios-II, Microblaze Features – Altera, Xilinx.

REFERENCES:

1. J. Old Field,R.Dorf, "Field Programmable Gate Arrays", John Wiley & Sons, New York, 1995.
2. S. Trimberger, Edr."Field Programmable Gate Arrays Technology", Kluwer Academic Publications, 1994.
3. Bob Zeidman, "Designing with FPGAs & CPLDs", CMP Books, 2002.

			L	T	P	C
VIII Sem.	**Principles ofModern Wireless Communication Systems (Professional Elective-V)**	**Course Code:V18ECT33**	**3**	**0**	**0**	**3**

Syllabus Details

CO1: Describe how to measure the performance of wireless system, in multipath Environment **[K2]**
CO2:Summarize about Wireless Channel. **[K2]**
CO3:Explain Principle and properties of CDMA. **[K2]**
CO4:Discuss the working and advantages of MIMO wireless communication systems**[K2]**
CO5:Explain the principle and advantages of OFDM system**[K2]**
CO6: Describe of various modern wireless communication technologies**[K2]**

UNIT-I

Principles of Wireless Communication: The wireless communication environment, modelling of wireless systems, system model for narrowband signals, Rayleigh fading wireless channel, BER performance of wireless systems, channel estimation in wireless systems, Diversity in wireless communication, multiple antenna receive model, BER in multiple antenna system, channel estimation in multiple antenna system.

UNIT-II

Wireless Channel: Basics of Wireless Channel Modelling, Maximum Delay Spread, RMS Delay Spread, RMS Delay Based on Average Power Profile, Average Delay Spread in Outdoor Cellular Channels, Coherence Bandwidth in Wireless Communications, Relation between ISI and Coherence Bandwidth.

UNIT-III

Code Division Multiple Access: Fundamentals of CDMA codes, Spreading codes based on Pseudo-Noise sequences, correlation properties of random CDMA spread sequences, Multi-user CDMA, Advantages of CDMA, CDMA near far problem and power control.

UNIT-IV

Multiple Input Multiple Output Wireless Communications: Introduction to MIMO wireless Communications, MIMO System model, MIMO zero forcing (ZF) receiver, MIMO MMSE receiver, Singular Value Decomposition (SVD) of theMIMO channel, MIMO capacity, Asymptotic MIMO capacity, MIMO beam forming.

UNIT-V

Orthogonal Frequency Division Multiplexing: Introduction to OFDM, multicarrier transmission, cyclic prefix in OFDM, BER for OFDM, MIMO-OFDM, effect of frequency offset in OFDM, Peak to Average Power ratio in OFDM, SC-FDMA.

UNIT-VI

Recent advancements in wireless technology: Introduction to 4G LTE, VoLTE, 5G Technology, NOMA and Massive MIMO.

Text Books:

1. Aditya K. Jagannatham, “Principle of Modern Wireless Communication Systems: Theory and practice” 1st Edition, McGrawHill Publication
2 Theodore S. Rappaport, “Wireless Communications: Principles and Practice” Second Edition, Pearson Education

Reference Books:

1. Simon Haykin, MichaleMoher, “Modern Wireless Communications”, Pearson.
2. Xiaodong Wang, H. Vincent Poor, “Wireless Communication Systems: Advanced Techniques for Signal Reception”, Pearson 5 Proakis J.J.,D Wozencraft J.M. and Jacobs I.M., Principles of Communication Engineering, John Wiley

VIII Sem.	Satellite Communication (Professional Elective-VI)	Course Code:V18ECT34	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1. Describe the basic concepts of Satellite Communications & analyze the concepts of
Orbital mechanics & Launchers**(K4)**

CO2.Discuss the major Sub-Systems of a Satellite**(K2)**

CO3.Design the Communication Link for Satellite**(K4)**

CO4.Compare the various Multiple Access Techniques**(K3)**

CO5.Analyze the various sub-systems used in Earth stations & review the different orbits**(K4)**

CO6.Analyze the Satellite Navigation & the Global positioning system **(K4)**

UNIT-I

Introduction: Origin of Satellite Communications, Historical Back-ground, Basic Concepts of Satellite Communications, Frequency allocations for Satellite Services, Applications, Future Trends of Satellite Communication.

Orbital Mechanics and Launchers: Orbital Mechanics, Look Angle determination, Orbital perturbations, Orbit determination, launches and launch vehicles, Orbital effects in communication systems performance.

UNIT-II

Satellite Subsystems: Attitude andorbit control system, telemetry, tracking, Command &monitoring, power systems, communication subsystems, Satellite antenna Equipment reliability and Spacequalification.

UNIT-III

Satellite Link Design: Basic transmission theory, system noise temperature and G/T ratio, Design of down links, up link design, Design of satellite links for specified C/N, System design example.

UNIT-IV

Multiple Access: Frequency division multiple access (FDMA), Intermodulation, Calculation of C/N. Time division Multiple Access (TDMA), Frame structure, Examples. Satellite Switched TDMA Onboard processing, DAMA, Code Division Multiple access (CDMA), Spread spectrum transmission and reception.

UNIT-V

Earth Station Technology: Introduction, Transmitters, Receivers, Antennas, Tracking systems, Terrestrial interface, Primary power test methods.

Low Earth Orbit and Geo-Stationary Satellite Systems: Orbit consideration, coverage and frequency considerations, Delay & Throughput considerations, System considerations, Operational NGSO constellation Designs

UNIT-VI
Satellite Navigation & The Global Positioning System: Radio and Satellite Navigation, GPS Position Location principles, GPS Receivers and codes, Satellite signal acquisition, GPS Navigation Message, GPS signal levels, GPS receiver operation, GPS C/A code accuracy, Differential GPS.

Text Books:

1. Satellite Communications – Timothy Pratt, Charles Bostian& Jeremy Allnutt, WSE, Wiley Publications, 2nd Edition, 2003.
2. Satellite Communications Engineering – Wilbur L. Pritchard, Robert A Nelson & Henri G.Suyderhoud, 2nd Edition, Pearson Publications, 2003.

References:

1. Satellite Communication: Design Principles – M. Richharia, BS Publications, 2nd Edition, 2003.
2. Satellite Communication - D.C Agarwal, Khanna Publications, 5th Ed.
3. Fundamentals of Satellite Communications – K.N. Raja Rao, PHI, 2004
4. Satellite Communications – Dennis Roddy, McGraw Hill, 2nd Edition, 1996.

			L	T	P	C
VIII Sem.	**Bio-Medical Engineering (Professional Elective-VI)**	**Course Code:V18ECT35**	**3**	**0**	**0**	**3**

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

- CO1: Explain the basics concepts of Bio-Medical Instrumentation. **[K2]**
- CO2: Explain the concepts of electrode theory, classification of Electrodes and Transducers used in Bio-Medical Applications.**[K2]**
- CO3: Explainhe Anatomy and Physiology of Cardiovascular system and Illustrate the application of Bio-Medical Instruments to measure the Physiological parameters of Cardiovascular System.**[K2]**
- CO4: Discuss the processing methods in elements used for Patient's Health care & monitoring.**[K2]**
- CO5: Explain the Principles of Diagnostic Techniques and the concepts of Bio-Telemetry.**[K2]**
- CO6: Classify different types of monitors, discuss the principles of recorders and Illustrate the methods of accident preventions i.e. Shock Hazards from different Electrical Equipment.**[K2]**

UNIT-I:

INTRODUCTIONTOBIOMEDICALINSTRUMENTATION: AgeofBiomedicalEngineering, Development of Biomedical Instrumentation, Man Instrumentation System, Components of the Man-InstrumentSystem, Physiological System of the Body, Problems Encountered in Measuring a Living System, Sources ofBioelectric Potentials, Muscle, Bioelectric Potentials, Sources of Bioelectric Potentials, Resting and ActionPotentials,BioelectricPotentials-ECG,EEGandEMG,EvokedResponses.

UNIT-II:

ELECTRODES AND TRANSDUCERS: Introduction, Electrode Theory, Biopotential Electrodes, ExamplesofElectrodes,BasicTransducerPrinciples ,TheTransducerandTransductionPrinciples, Active Transducers, Passive Transducers, Transducers for Biomedical Applications, Pulse Sensors,RespirationSensor, Transducers with Digital Output.

UNIT-III:

CARDIOVASCULAR SYSTEM AND MEASUREMENTS: The Heart and Cardiovascular System, ElectroCardiography, Blood Pressure Measurement, Measurement of Blood Flow and Cardiac Output, Measurement ofHeartSounds, Plethysmography.

MEASUREMENTSINTHERESPIRATORYSYSTEM: ThePhysiologyofTheRespiratorySystem,TestsandInstrumentationfortheMechanicsofBreathing,RespiratoryTherapyEquipment.

UNIT-IV:

PATIENTCAREANDMONITORING: ElementsofIntensive-CareMonitoring,PatientMonitoringDisplays, Diagnosis, Calibration and Repair ability of Patient-Monitoring Equipment, Other Instrumentation forMonitoring Patients, Organization of the Hospitalfor Patient-Care Monitoring, Pacemakers, Defibrillators.

UNIT-V:

DIAGNOSTIC TECHNIQUES AND BIO-TELEMETRY: Principles of Ultrasonic Measurement, UltrasonicImaging,UltrasonicApplicationsofTherapeuticUses,UltrasonicDiagnosis,X-RayandRadio-IsotopeInstrumentations,CATScan,EmissionComputerizedTomography,MRI,IntroductiontoBiotelemetry,Physiological Parameters Adaptable to Biotelemetry, The Components of Biotelemetry System, ImplantableUnits,TelemetryforECGMeasurementsduring Exercise, Telemetryfor EmergencyPatient Monitoring

UNIT-VI:

MONITORS,RECORDERSANDSHOCKHAZARDS:
BiopotentialAmplifiers,Monitors,Recorders,Shock Hazards and Prevention, Physiological Effects and Electrical Current, Shock Hazards from ElectricalEquipment,Methods ofAccident Prevention,IsolatedPowerDistribution System.

TextBooks:

1. "Bio-MedicalElectronicsand Instrumentation", OnkarN.Pandey,RakeshKumar, KatsonBooks.
2. "Bio-MedicalInstrumentation",Cromewell,Wiebell,Pfeiffer

References:

1. "HandBookofBio-MedicalInstrumentation",Khandapur.McGrawHill

2. "IntroductiontoBio-medicalEquipmentTechnology",4thEdition,JosephJ.Carr,JohnM.Brown,Pearson Publications.

VIII Sem.	Wireless Sensor Networks (Professional Elective-VI)	Course Code:V18ECT36	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

- CO1: Explain the concepts of Wireless Sensor Networks, its Architecture. **[K2]**
- CO2: Describe the Networking Technologies. **[K2]**
- CO3: Explain the MAC Protocols. **[K2]**
- CO4: Illustrate the Routing Protocols. **[K2]**
- CO5: Describe the Transport Layer Protocols. **[K2]**
- CO6: Explain the Security Layer Protocols and Applications of WSN. **[K2]**

UNIT-I –Introduction to Wireless Sensor Networks:
Key definitions of sensor networks, Advantages of sensor Networks, Unique constraints and challenges, Driving Applications, Enabling Technologies for Wireless Sensor Networks. Single-Node Architecture - Hardware Components, Energy Consumption of Sensor Nodes, Operating Systems and Execution Environments, Network Architecture - Sensor Network Scenarios, Gateway Concepts.

UNIT-II - Networking Technologies:
Physical Layer and Transceiver Design Considerations, Personal area networks (PANs), hidden node and exposed node problem, Topologies of PANs, MANETsand WANETs.

UNIT-III - MAC Protocols for Wireless Sensor Networks:
Issues in Designing a MAC protocol for Ad Hoc Wireless Networks, Design goals of a MAC Protocol for Ad Hoc Wireless Networks, Classifications of MAC Protocols - Contention - Based Protocols, with reservation Mechanisms, and with Scheduling Mechanisms.

UNIT-IV - Routing Protocols:
Introduction, Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks, Classification of Routing Protocols, Table–Driven Routing Protocols, On – Demand Routing Protocols, Hierarchical Routing Protocols, Proactive Routing.

UNIT-V - Transport Layer Protocols:
Introduction, Issues in Designing a Transport Layer Protocol for Ad Hoc Wireless Networks, Design Goals of a Transport Layer Protocol for Ad Hoc Wireless Networks, Classification of Transport Layer Solutions, TCP Over Ad Hoc Wireless Networks.

UNIT- VI - Security, Platforms & Applications:
Security in Ad Hoc Wireless Networks, Network Security Requirements, Issues and Challenges in Security Provisioning; Sensor Node Hardware – Berkeley Motes, Programming Challenges; Applications - Home Automation, Smart Metering.

TEXT BOOKS:

1. Ad Hoc Wireless Networks: Architectures and Protocols, C. Siva Ram Murthy and B.S.Manoj, 2004, PHI.
2. Wireless Adhoc and Sensor Networks: Protocols, Performance and Control, JagannathanSarangapani, CRC Press.
3. Holger Karl & Andreas Willig, “Protocols and Architectures for Wireless Sensor Networks", John Wiley, 2005.

REFERENCES:

1. Wireless Sensor Networks- Technology, Protocols, and Applications, KazemSohraby, Daniel Minoli, &TaiebZnati, John Wiley, 2007.
2. Wireless Sensor Networks- Information Processing Approach, Feng Zhao & Leonidas J. Guibas, Elsevier, 2007.
3. Adhoc Mobile Wireless Networks: Protocols & Systems, C.K. Toh,1st Ed., Pearson Education.
4. Wireless Sensor Networks - C. S. Raghavendra, Krishna M. Sivalingam, 2004, Springer.
5. Wireless Sensor Networks – S Anandamurugan, Lakshmi Publications.

Annexure- 02

Approved List of Open Elective- II Courses

VII Semester

S.No	Course Code	Name of the Course	Department Offered
1	V18ECTOE4	Principles of Wireless Comm.	Electronics & Communication Engineering
2	V18ECTOE5	Medical Electronics	
3	V18ECTOE6	Concepts of Embedded Systems	
4	V18CSTOE04	Operating Systems	Computer Science Engineering.
5	V18CSTOE05	Artificial Intelligence	
6	V18CSTOE06	Java Programming	
7	V18EEOE4	Non-Conventional Energy Sources	Electrical & Electronics Engineering
8	V18EEOE5	Electrical Engineering Materials	
9	V18EEOE6	Servicing of Electrical Appliances	
10	V18MEOE4	Computer Aided Design	Mechanical Engineering
11	V18MEOE5	Condition Monitoring & Machine learning	
12	V18CEOE03	Environmental Pollution and Control	Civil Engineering
13	V18CEOE04	Disaster Management	

Approved List of Open Elective- III Courses

VIII Semester

S.No	Course Code	Name of the Course	Department Offered
1	V18ECTOE7	Fundamentals of Digital Image & Video Processing	Electronics & Communication Engineering
2	V18ECTOE8	Embedded RTOS	
3	V18ECTOE9	Principles of Digital TV Engg	
4	V18CSTOE07	Software Testing Methodologies	Computer Science Engineering.
5	V18CSTOE08	Cyber Security	
6	V18CSTOE09	Computer Graphics	
7	V18EEOE7	Energy Storage Systems	Electrical & Electronics Engineering
8	V18EEOE8	Basics of Electrical Power Generation	
9	V18EEOE9	Industrial Automation	
10	V18MEOE6	Power Plant Engineering	Mechanical Engineering
11	V18MEOE7	Mechatronics	
12	V18CEOE05	Solid Waste Management	Civil Engineering
13	V18CEOE06	Water Quality and Conservation	

VII Sem.	Principles of Wireless Comm. (Open Elective-II)	Course Code:V18ECTOE4	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Discuss the cellular system evolution of mobile radio systems **[K2]**
CO2:Illustrate the basic cellular concepts. **[K2]**
CO3: Explain the Various Propagation models. **[K2]**
CO4:Discuss the need of modulation, diversity and equalization in cellular & Mobile Communication. **[K2]**
CO5: Demonstrate the knowledgeaboutGSM architecture,multipleaccessschemes like FDMA,TDMA, CDMA. **[K2]**
CO6: Summarize the concepts of upcoming technologies like 3G, 4G etc. **[K2]**

UNIT-I: Introduction of Wireless Communication
History and evolution of mobile radio systems: Types of mobile wireless services/systems-Cellular, WLL, Paging, Satellite systems, Future trends in personal wireless systems.

UNIT-II: Cellular Concepts and System Design Fundamentals
Cellular concept and frequency reuse, channel assignment, handoff strategies, Interference and system capacity, Trunking and GOS, cell splitting,cell sectoring.

UNIT-III: Mobile radio Propagation Models

Radio wave propagation issues in personal wireless systems, Propagation models, Multipath fading, parameters of mobile multipath channels and Antenna systems in mobile radio.

UNIT-IV: Overview analog and digital modulation techniques
Need For Modulation. Different Analog and Digital modulation techniques used in Cellular and mobile communication systems.

UNIT-V DIGITAL CELLULAR NETWORKS: GSM architecture, GSM Services, multiple access schemes; FDMA, TDMA, CDMA, OFDMA;

UNIT-VI Higher Generation Cellular Standards: 3G System architecture (UMTS), 4G System Architecture, Introduction to 5G.

Text Books

1. Theodore S. Rappaport, “wireless communications Principles and Practices”, PHI, 2005
2. Jochen Schiller, “Mobile Communications”, Pearson Education, second edition, 2009.

Reference Book

1. Lee W.C.Y, “Mobile communication Engineering
2. Theory and Applications”, 2/e McGraw-Hill,New York, 2003
3. Andreas F. Molisch, “Wideband Wireless Digital Communication”, Pearson Education 2001.
4. Blake, “Wireless Communication Technologies,” Thomson Delmer, 2003

VII Sem.	Medical Electronics (Open Elective-II)	Course Code:V18ECTOE5	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

- CO1: Explain the basics concepts of Bio-Medical Instrumentation.**[K2]**
- CO2: Explain the concepts of electrode theory, classification of Electrodes and Transducers used in Bio-Medical Applications.**[K2]**
- CO3: Explainthe Anatomy and Physiology of Cardiovascular system and Illustrate the application of Bio-Medical Instruments to measure the Physiological Parameters of Cardiovascular System. **[K2]**
- CO4: Discuss the elements used for Patient's Health care & monitoring.**[K2]**
- CO5: Explain the Principles of Diagnostic Techniques and the concepts of Bio-Telemetry.**[K2]**
- CO6: Classify different types of monitors, discuss the principles of recorders and Illustrate the methods of accident preventions.**[K2]**

UNIT-I:

INTRODUCTIONTOBIOMEDICALINSTRUMENTATION: AgeofBiomedicalEngineering, Development of Biomedical Instrumentation, Man Instrumentation System, Components of the Man-InstrumentSystem, Physiological System of the Body, Problems Encountered in Measuring a Living System, Sources ofBioelectric Potentials, Muscle, Bioelectric Potentials, Sources of Bioelectric Potentials, Resting and ActionPotentials, BioelectricPotentials-ECG,EEGandEMG,

UNIT-II:

ELECTRODES AND TRANSDUCERS: Introduction, Electrode Theory, Biopotential Electrodes, ExamplesofElectrodes,BasicTransducerPrinciples, Active Transducers, Passive Transducers, Transducers for Biomedical Applications, Pulse Sensors,RespirationSensor, Transducers with Digital Output.

UNIT-III:

CARDIOVASCULAR SYSTEM AND MEASUREMENTS: The Heart and Cardiovascular System, ElectroCardiography, Blood Pressure Measurement,

Measurement of Blood Flow and Cardiac Output, Measurement ofHeartSounds, Plethysmography.

UNIT-IV:

PATIENTCAREANDMONITORING: ElementsofIntensive-CareMonitoring,PatientMonitoringDisplays, Diagnosis, Calibration and Repair ability of Patient-Monitoring Equipment, Other Instrumentation forMonitoring Patients, Organization of the Hospitalfor Patient-Care Monitoring, Pacemakers, Defibrillators.

UNIT-V:

DIAGNOSTIC TECHNIQUES AND BIO-TELEMETRY: Principles of Ultrasonic Measurement, UltrasonicImaging,UltrasonicApplicationsofTherapeuticUses,UltrasonicDiagnosis,X-RayandRadio-IsotopeInstrumentations,CATScan,EmissionComputerizedTomography,MRI,IntroductiontoBiotelemetry,Physiological Parameters Adaptable to Biotelemetry, The Components of Biotelemetry System, ImplantableUnits,TelemetryforECGMeasurementsduring Exercise, Telemetryfor EmergencyPatient Monitoring.

UNIT-VI:

MONITORS,RECORDERSANDSHOCKHAZARDS: BiopotentialAmplifiers,Monitors,Recorders,Shock Hazards and Prevention, Physiological Effects and Electrical Current, Shock Hazards from ElectricalEquipment,Methods ofAccident Prevention.

TextBooks:

1. “Bio-MedicalElectronicsand Instrumentation”, OnkarN.Pandey,RakeshKumar,Katson Books.
2. “Bio-MedicalInstrumentation”,Cromewell,Wiebell,Pfeiffer

References:

1. “HandBookofBio-MedicalInstrumentation”, Khandapur. McGrawHill
2. “IntroductiontoBio-MedicalEquipmentTechnology”,4th Edition,JosephJ.Carr,JohnM.Brown,PearsonPublications.

VII Sem.	Concepts of Embedded Systems (Open Elective-II)	Course Code:V18ECTOE6	L	T	P	C
			3	0	0	3

Syllabus Details

COs	Course outcomes
CO1	Describe the Basic Concepts of embedded systems- **(K2).**
CO2	Describe the characteristics of Embedded Systems - **(K2)**
CO3	Explain the Architecture and Pin Description of 8051- **(K2)**
CO4	Explain various Addressing Modes and Instructions of 8051- **(K2)**
CO5	Discuss the various Interrupts , Modes of Timers/Counters in 8051**-(K2)**
CO6	Discuss the fundamentals of RTOS based embedded firmware design - **(K2)**

UNIT-I - INTRODUCTION TO EMBEDDED SYSTEMS:

Introduction to Embedded Systems, Embedded Systems vs. General Computing Systems, Classification of Embedded systems, Major application areas of embedded systems, Purpose of embedded Systems, The Typical embedded system - core of the embedded system, Difference between RISC and CISC, Types of Memories.

UNIT-II - CHARACTERISTICS OF EMBEDDED SYSTEM:

Characteristics of an embedded system,Quality attributes of embedded systems, Application-specific and Domain-Specific examples of an embedded system.

UNIT-III-8051 Micro Controller – Architecture, Pin Description

Introduction, 8051 Architecture, Registers in 8051, Pin Diagram – Description, Parallel I/O Ports and Memory Organization

UNIT-IV - 8051 Micro Controller – Addressing Modes and Instructions:

8051 Addressing Modes, 8051 Instruction Set, Instructions and Sample Programs, Stack Pointer

UNIT-V - 8051 Micro Controller – Interrupts, Timer/ Counter:

Interrupts in 8051, Timers and Counters, Timer/ Counter Modes, Serial Communication – Modes

UNIT-VI- REAL TIME OPERATING SYSTEM:

Operating System basics, Types of operating systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling, Inter Task communication.

Text Books:

1. Embedded Systems-By Shibu.K.V-Tata McGraw Hill Education Private Limited,2013.
2. Micro Controllers [Theory and Applications] – Ajay V Deshmukh – Tata McGraw-Hill Education Private Limited,2012

References:

1. The 8051 Micro Controller- Kenneth Ayala – CENGAGE- 3rd Edition
2. Embedded/Real Time Systems by KVKK Prasad by Dreamtech Publication

VIII Sem.	Fundamentals of Digital Image & Video Processing (Open Elective-III)	Course Code:V18ECTOE7	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

- CO1: Analyse Image transforms for various Image processing operations**(K4)**
- CO2: Examine Spatial & frequency domain filtering like smoothing & sharpening Operations on Images**(K4)**
- CO3: Estimate Image degradation functions and Analyze various Image Restoration
  Techniques on Images**(K4)**
- CO4: Analyze various Image segmentation techniques**(K4)**
- CO5: Describe various Image compression techniques**(K3)**
- CO6: Explain basicconceptsregardingtomotion estimation, videofilteringand Videostandards.**(K2)**

UNIT-I

IMAGEFUNDAMENTALS&TRANSFORMS: Fundamental steps in digital image processing, components of animage processing system, image sensing and acquisition, image sampling and quantization.Twodimensionalorthogonaltransforms:DFT,WHT,Haar transform, DCT and DST

UNIT-II

Intensity Transformations, Spatial Filtering and frequency domain filtering: Some basic intensity transformation functions,histogramprocessing,fundamentalsofspatialfiltering,smoothingspatialfilters,sharpeningspatialfilters, `Image smoothing and sharpening in frequency domain filtering

UNIT-III

IMAGE RESTORATION: Degradation Models, Linear Position –Invariant Degradations, Estimating the degradation function, inverse filtering, Minimum mean square error (Wiener) filtering and geometric mean filter.

UNIT-IV

IMAGESEGMENTATION: Pixelclassification,Bi-levelThresholding,Multi-levelThresholding,AdaptiveThresholding,Spectral& spatialclassification,Edgedetection,Hough transform, Regiongrowing.

UNIT-V

IMAGECOMPRESSION:Compressionmodels,Huffman Coding, Arithmetic coding, Bit plane coding, run lengthcoding,Lossycompression: Transformcoding,Imagecompressionstandards.

UNIT-VI

VIDEO PROCESSING: Representation of Digital Video, Spatio-temporal sampling, MotionEstimation.Video Filtering, Video Compression, Videocodingstandards.

Text Books:

1. R.C.Gonzalez,R.E.Woods,"DigitalImageProcessing",PearsonEducation. 2nd edition,2002
2. M.Tekalp,"DigitalVideoProcessing",Prentice-Hall,1995

Reference Books:

1. AnilK.Jain,"FundamentalsofDigitalImageProcessing",PrenticeHallofIndia,9th Edition,IndianReprint,2002.
2. B.Chanda,D.DuttaMajumder,"Digital ImageProcessingandAnalysis",PHI,2009.
3. Bovik,"HandbookofImage&Videoprocessing",AcademicPress,2000.
4. Khalid Sayood,Introduction to data compression ,third edition, The Morgan Kaufmann publishers,2005

VIII Sem.	Embedded RTOS (Open Elective-III)	Course Code:V18ECTOE8	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

- CO1: Describe the basics of Real time OS. **[K2]**
- CO2: Explain the tasks, Interrupts, Security. **[K2]**
- CO3: Describe the basics of µCOS-II RTOS. **[K2]**
- CO4: Describe the basics of µCOS-II RTOS. **[K2]**
- CO5: Illustrate the mechanism of target image creation and porting. **[K2]**
- CO6: Explain the Application of RTOS. **[K2]**

UNIT-I: Introduction
OS Basics, Task, Process, Threads, Multiprocessing & Multitasking, Process Management, Timer Functions, Event Functions, Memory Management, Device, File and IO Systems Management, Interrupt Routines in RTOS Environment and Handling of Interrupt Source Calls.

UNIT-II: RTOS
Basic Design Using an RTOS, RTOS Task Scheduling Models, Interrupt Latency and Response of the Tasks as Performance Metrics, OS Security Issues. Basic Functions and Types of RTOS.

UNIT-III: RTOS µCOS-II
Introduction, Task Service, Task Scheduling, Memory Allocation, IPC – Semaphore, Mailbox, Queue, Interrupt Handling.

UNIT-IV: RTOS Vx Works
Introduction, Task Service, Task Scheduling, Memory Allocation, IPC – Semaphore, Mailbox, Queue, Interrupt Handling.

UNIT-V: Embedded OS & Target Image Creation
Off-The-Shelf Operating Systems, Embedded OS, Handheld OS, Operating System Software, Target Image Creation for Window XP Embedded, Porting RTOS on a Micro Controller based Development Board.

UNIT-VI: Program Modeling – Case Studies
Case study of embedded system design and coding for an Automatic Chocolate Vending Machine (ACVM) Using µCOS-II RTOS, Case study of digital camera hardware and software architecture, Using RTOS Vx Works, Case Study of Embedded System for an

Adaptive Cruise Control (ACC) System in Car, Case Study of Embedded System of Mobile Phone Software for Key Inputs.

TEXT BOOKS:

1. Shibu K V: "Introduction to Embedded Systems", Tata McGraw Hill Publications, Second Edition.
2. Dr. K.V.K.K. Prasad: "Embedded/Real-Time Systems", Dream Tech Publications, Black pad.
3. Raj Kamal: "Embedded Systems-Architecture, Programming and Design", Tata McGraw Hill Publications, Second Edition.

REFERENCES:

1. Labrosse, "Embedding system building blocks ", CMP publishers.
2. Rob Williams," Real time Systems Development", Butterworth Heinemann Publications.

VIII Sem.	Principles of Digital TV Engineering (Open Elective-III)	Course Code:V18ECTOE9	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1:	Illustrate the fundamentals of television engineering	**[K2]**
CO2:	Explain about TV signal transmission	**[K2]**
CO3:	Explain the colour TV fundamentals	**[K2]**
CO4:	Classify Digital TV transmission standards	**[K2]**
CO5:	Explain the operation of Digital TV receiver	**[K2]**
CO6:	Describe the working of LCD and Plasma screens	**[K2]**

UNIT-I

Introduction: TV transmitter and receivers, synchronization **Television Pictures**: Geometric form and aspect ratio, image continuity, interlaced scanning, picture resolution

UNIT-II

Composite video signal: Horizontal and vertical sync details **TV Signal Transmission:** VSB transmission, standard channel BW, TV transmitter

UNIT-III

Colour Television: Perception of brightness and colours, additive colour mixing, video signals for colours, luminance signal, colour difference signals, encoding of colour difference signals, formation of chrominance signals, PAL encoder, PAL colour receiver

UNIT-IV

Digital Television Transmission Standards: ATSC terrestrial transmission standard, vestigial sideband modulation, DVB -T transmission standard, ISDB-T transmission standard

UNIT-V

Digital Television: Digital Satellite Television, Direct to Home Satellite Television, Digital TV Receiver, Merits of Digital TV Receivers

UNIT-VI

LCD Screens: LCD Technology, LCD Matrix types and operation, LCD Screens for Television, LCD color receiver

Plasma Screens: Plasma and conduction of charge, Plasma TV Screens, Plasma Color Receiver

Text Books:

1. Television engineering and video systems – R G Gupta, Tata McGraw Hill Publishers.
2. Television and Video Engineering – A.M.Dhake, 2nd Edition, Tata McGraw Hill Publishers.
3. Modern Television Practice: Transmission, Reception and Applications- R RGulati, 4th revised edition, New Age International Publishers.
4. Fundamentals of Digital Television Transmission- Gerald W. Collins, John Wiley & Sons.

References

1. Basic Television and Video Systems – Bernard Grob, McGrawHill Publishers.
2. Monochrome and Colour Television - R RGulati, New Age International Publishers.
3. Colour Television, Theory and Practice - S.P.Bali, Tata McGraw-Hill Publishers.

Annexure- 02

Approved List of Open Elective- II Courses

VII Semester

S.No	Course Code	Name of the Course	Department Offered
1	V18ECTOE4	Principles of Wireless Comm.	Electronics & Communication Engineering
2	V18ECTOE5	Medical Electronics	
3	V18ECTOE6	Concepts of Embedded Systems	
4	V18CSTOE04	Operating Systems	Computer Science Engineering.
5	V18CSTOE05	Artificial Intelligence	
6	V18CSTOE06	Java Programming	
7	V18EEOE4	Non-Conventional Energy Sources	Electrical & Electronics Engineering
8	V18EEOE5	Electrical Engineering Materials	
9	V18EEOE6	Servicing of Electrical Appliances	
10	V18MEOE4	Computer Aided Design	Mechanical Engineering
11	V18MEOE5	Condition Monitoring & Machine learning	
12	V18CEOE03	Environmental Pollution and Control	Civil Engineering
13	V18CEOE04	Disaster Management	

Approved List of Open Elective- III Courses

VIII Semester

S.No	Course Code	Name of the Course	Department Offered
1	V18ECTOE7	Fundamentals of Digital Image & Video Processing	Electronics & Communication Engineering
2	V18ECTOE8	Embedded RTOS	
3	V18ECTOE9	Principles of Digital TV Engg	
4	V18CSTOE07	Software Testing Methodologies	Computer Science Engineering.
5	V18CSTOE08	Cyber Security	
6	V18CSTOE09	Computer Graphics	
7	V18EEOE7	Energy Storage Systems	Electrical & Electronics Engineering
8	V18EEOE8	Basics of Electrical Power Generation	
9	V18EEOE9	Industrial Automation	
10	V18MEOE6	Power Plant Engineering	Mechanical Engineering
11	V18MEOE7	Mechatronics	
12	V18CEOE05	Solid Waste Management	Civil Engineering
13	V18CEOE06	Water Quality and Conservation	

VII Sem.	Principles of Wireless Comm. (Open Elective-II)	Course Code:V18ECTOE4	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Discuss the cellular system evolution of mobile radio systems **[K2]**
CO2:Illustrate the basic cellular concepts. **[K2]**
CO3: Explain the Various Propagation models. **[K2]**
CO4:Discuss the need of modulation, diversity and equalization in cellular & Mobile Communication. **[K2]**
CO5: Demonstrate the knowledgeaboutGSM architecture,multipleaccessschemes like FDMA,TDMA, CDMA. **[K2]**
CO6: Summarize the concepts of upcoming technologies like 3G, 4G etc. **[K2]**

UNIT-I:
Introduction of Wireless Communication
History and evolution of mobile radio systems: Types of mobile wireless services/systems-Cellular, WLL, Paging, Satellite systems, Future trends in personal wireless systems.

UNIT-II:
Cellular Concepts and System Design Fundamentals
Cellular concept and frequency reuse, channel assignment, handoff strategies, Interference and system capacity, Trunking and GOS, cell splitting,cell sectoring.

UNIT-III:
Mobile radio Propagation Models

Radio wave propagation issues in personal wireless systems, Propagation models, Multipath fading, parameters of mobile multipath channels and Antenna systems in mobile radio.

UNIT-IV:
Overview analog and digital modulation techniques
Need For Modulation. Different Analog and Digital modulation techniques used in Cellular and mobile communication systems.

UNIT-V

DIGITAL CELLULAR NETWORKS: GSM architecture, GSM Services, multiple access schemes; FDMA, TDMA, CDMA, OFDMA;

UNIT-VI

Higher Generation Cellular Standards: 3G System architecture (UMTS), 4G System Architecture, Introduction to 5G.

Text Books

3. Theodore S. Rappaport, "wireless communications Principles and Practices", PHI, 2005
4. Jochen Schiller, "Mobile Communications", Pearson Education, second edition, 2009.

Reference Book

1. Lee W.C.Y, "Mobile communication Engineering
2. Theory and Applications", 2/e McGraw-Hill,New York, 2003
3. Andreas F. Molisch, "Wideband Wireless Digital Communication", Pearson Education 2001.
4. Blake, "Wireless Communication Technologies," Thomson Delmer, 2003

			L	T	P	C
VII Sem.	**Medical Electronics (Open Elective-II)**	**Course Code:V18ECTOE5**	**3**	**0**	**0**	**3**

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

- CO1: Explain the basics concepts of Bio-Medical Instrumentation.**[K2]**
- CO2: Explain the concepts of electrode theory, classification of Electrodes and Transducers used in Bio-Medical Applications.**[K2]**
- CO3: Explainthe Anatomy and Physiology of Cardiovascular system and Illustrate the application of Bio-Medical Instruments to measure the Physiological Parameters of Cardiovascular System. **[K2]**
- CO4: Discuss the elements used for Patient's Health care & monitoring.**[K2]**
- CO5: Explain the Principles of Diagnostic Techniques and the concepts of Bio-Telemetry.**[K2]**
- CO6: Classify different types of monitors, discuss the principles of recorders and Illustrate the methods of accident preventions.**[K2]**

UNIT-I:

INTRODUCTIONTOBIOMEDICALINSTRUMENTATION: AgeofBiomedicalEngineering, Development of Biomedical Instrumentation, Man Instrumentation System, Components of the Man-InstrumentSystem, Physiological System of the Body, Problems Encountered in Measuring a Living System, Sources ofBioelectric Potentials, Muscle, Bioelectric Potentials, Sources of Bioelectric Potentials, Resting and ActionPotentials, BioelectricPotentials-ECG,EEGandEMG,

UNIT-II:

ELECTRODES AND TRANSDUCERS: Introduction, Electrode Theory, Biopotential Electrodes, ExamplesofElectrodes,BasicTransducerPrinciples, Active Transducers, Passive Transducers, Transducers for Biomedical Applications, Pulse Sensors,RespirationSensor, Transducers with Digital Output.

UNIT-III:

CARDIOVASCULAR SYSTEM AND MEASUREMENTS: The Heart and Cardiovascular System, ElectroCardiography, Blood Pressure Measurement,

Measurement of Blood Flow and Cardiac Output, Measurement ofHeartSounds, Plethysmography.

UNIT-IV:

PATIENTCAREANDMONITORING: ElementsofIntensive-CareMonitoring,PatientMonitoringDisplays, Diagnosis, Calibration and Repair ability of Patient-Monitoring Equipment, Other Instrumentation forMonitoring Patients, Organization of the Hospitalfor Patient-Care Monitoring, Pacemakers, Defibrillators.

UNIT-V:

DIAGNOSTIC TECHNIQUES AND BIO-TELEMETRY: Principles of Ultrasonic Measurement, UltrasonicImaging,UltrasonicApplicationsofTherapeuticUses,UltrasonicDiagnosis,X-RayandRadio-IsotopeInstrumentations,CATScan,EmissionComputerizedTomography,MRI,IntroductiontoBiotelemetry,Physiological Parameters Adaptable to Biotelemetry, The Components of Biotelemetry System, ImplantableUnits,TelemetryforECGMeasurementsduring Exercise, Telemetryfor EmergencyPatient Monitoring.

UNIT-VI:

MONITORS,RECORDERSANDSHOCKHAZARDS: BiopotentialAmplifiers,Monitors,Recorders,Shock Hazards and Prevention, Physiological Effects and Electrical Current, Shock Hazards from ElectricalEquipment,Methods ofAccident Prevention.

TextBooks:

1. “Bio-MedicalElectronicsand Instrumentation”, OnkarN.Pandey,RakeshKumar,Katson Books.
2. “Bio-MedicalInstrumentation”,Cromewell,Wiebell,Pfeiffer

References:

1. “HandBookofBio-MedicalInstrumentation”, Khandapur.McGrawHill
2. “IntroductiontoBio-MedicalEquipmentTechnology”,4th Edition,JosephJ.Carr,JohnM.Brown,PearsonPublications.

			L	T	P	C
VII Sem.	**Concepts of Embedded Systems (Open Elective-II)**	**Course Code:V18ECTOE6**	**3**	**0**	**0**	**3**

Syllabus Details

COs	**Course outcomes**
CO1	Describe the Basic Concepts of embedded systems- **(K2).**
CO2	Describe the characteristics of Embedded Systems - **(K2)**
CO3	Explain the Architecture and Pin Description of 8051- **(K2)**
CO4	Explain various Addressing Modes and Instructions of 8051- **(K2)**
CO5	Discuss the various Interrupts , Modes of Timers/Counters in 8051**-(K2)**
CO6	Discuss the fundamentals of RTOS based embedded firmware design - **(K2)**

UNIT-I - INTRODUCTION TO EMBEDDED SYSTEMS:

Introduction to Embedded Systems, Embedded Systems vs. General Computing Systems, Classification of Embedded systems, Major application areas of embedded systems, Purpose of embedded Systems, The Typical embedded system - core of the embedded system, Difference between RISC and CISC, Types of Memories.

UNIT-II - CHARACTERISTICS OF EMBEDDED SYSTEM:

Characteristics of an embedded system,Qualityattributes of embedded systems, Application-specific and Domain-Specific examples of an embedded system.

UNIT-III-8051 Micro Controller – Architecture, Pin Description

Introduction, 8051 Architecture, Registers in 8051, Pin Diagram – Description, Parallel I/O Ports and Memory Organization

UNIT-IV - 8051 Micro Controller – Addressing Modes and Instructions:

8051 Addressing Modes, 8051 Instruction Set, Instructions and Sample Programs, Stack Pointer

UNIT-V - 8051 Micro Controller – Interrupts, Timer/ Counter:

Interrupts in 8051, Timers and Counters, Timer/ Counter Modes, Serial Communication – Modes

UNIT-VI- REAL TIME OPERATING SYSTEM:

Operating System basics, Types of operating systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling, Inter Task communication.

Text Books:

1. Embedded Systems-By Shibu.K.V-Tata McGraw Hill Education Private Limited, 2013.
2. Micro Controllers [Theory and Applications] – Ajay V Deshmukh – Tata McGraw-Hill Education Private Limited, 2012

References:

1. The 8051 Micro Controller- Kenneth Ayala – CENGAGE- 3rd Edition
2. Embedded/Real Time Systems by KVKK Prasad by Dreamtech Publication

			L	T	P	C
VIII Sem.	**Fundamentals of Digital Image & Video Processing (Open Elective-III)**	**Course Code:V18ECTOE7**	**3**	**0**	**0**	**3**

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

- CO1: Analyse Image transforms for various Image processing operations**(K4)**
- CO2: Examine Spatial & frequency domain filtering like smoothing & sharpening Operations on Images**(K4)**
- CO3: Estimate Image degradation functions and Analyze various Image Restoration
  Techniques on Images**(K4)**
- CO4: Analyze various Image segmentation techniques**(K4)**
- CO5: Describe various Image compression techniques**(K3)**
- CO6: Explain basicconceptsregardingtomotion estimation, videofilteringand Videostandards.**(K2)**

UNIT-I

IMAGEFUNDAMENTALS&TRANSFORMS: Fundamental steps in digital image processing, components of animage processing system, image sensing and acquisition, image sampling and quantization.Twodimensionalorthogonaltransforms:DFT,WHT,Haar transform, DCT and DST

UNIT-II

Intensity Transformations, Spatial Filtering and frequency domain filtering: Some basic intensity transformation functions,histogramprocessing,fundamentalsofspatialfiltering,smoothingspatialfilters,sharpeningspatialfilters, `Image smoothing and sharpening in frequency domain filtering

UNIT-III

IMAGE RESTORATION: Degradation Models, Linear Position –Invariant Degradations, Estimating the degradation function, inverse filtering, Minimum mean square error (Wiener) filtering and geometric mean filter.

UNIT-IV

IMAGESEGMENTATION: Pixelclassification,Bi-levelThresholding,Multi-levelThresholding,AdaptiveThresholding,Spectral& spatialclassification,Edgedetection,Hough transform, Regiongrowing.

UNIT-V

IMAGECOMPRESSION:Compressionmodels,Huffman Coding, Arithmetic coding, Bit plane coding, run lengthcoding,Lossycompression: Transformcoding,Imagecompressionstandards.

UNIT-VI

VIDEO PROCESSING: Representation of Digital Video, Spatio-temporal sampling, MotionEstimation.Video Filtering, Video Compression, Videocodingstandards.

Text Books:

1. R.C.Gonzalez,R.E.Woods,"DigitalImageProcessing",PearsonEducation. 2ndedition,2002
2. M.Tekalp,"DigitalVideoProcessing",Prentice-Hall,1995

Reference Books:

1. AnilK.Jain,"FundamentalsofDigitalImageProcessing",PrenticeHallofIndia,9th Edition,IndianReprint,2002.
2. B.Chanda,D.DuttaMajumder,"Digital ImageProcessingandAnalysis",PHI,2009.
3. Bovik,"HandbookofImage&Videoprocessing",AcademicPress,2000.
4. Khalid Sayood,Introduction to data compression ,third edition, The Morgan Kaufmann publishers,2005

VIII Sem.	Embedded RTOS (Open Elective-III)	Course Code:V18ECTOE8	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

- CO1: Describe the basics of Real time OS. **[K2]**
- CO2: Explain the tasks, Interrupts, Security. **[K2]**
- CO3: Describe the basics of μCOS-II RTOS. **[K2]**
- CO4: Describe the basics of μCOS-II RTOS. **[K2]**
- CO5: Illustrate the mechanism of target image creation and porting. **[K2]**
- CO6: Explain the Application of RTOS. **[K2]**

UNIT-I: Introduction
OS Basics, Task, Process, Threads, Multiprocessing & Multitasking, Process Management, Timer Functions, Event Functions, Memory Management, Device, File and IO Systems Management, Interrupt Routines in RTOS Environment and Handling of Interrupt Source Calls.

UNIT-II: RTOS
Basic Design Using an RTOS, RTOS Task Scheduling Models, Interrupt Latency and Response of the Tasks as Performance Metrics, OS Security Issues. Basic Functions and Types of RTOS.

UNIT-III: RTOS μCOS-II
Introduction, Task Service, Task Scheduling, Memory Allocation, IPC – Semaphore, Mailbox, Queue, Interrupt Handling.

UNIT-IV: RTOS Vx Works
Introduction, Task Service, Task Scheduling, Memory Allocation, IPC – Semaphore, Mailbox, Queue, Interrupt Handling.

UNIT-V: Embedded OS & Target Image Creation
Off-The-Shelf Operating Systems, Embedded OS, Handheld OS, Operating System Software, Target Image Creation for Window XP Embedded, Porting RTOS on a Micro Controller based Development Board.

UNIT-VI: Program Modeling – Case Studies
Case study of embedded system design and coding for an Automatic Chocolate Vending Machine (ACVM) Using μCOS-II RTOS, Case study of digital camera hardware and

software architecture, Using RTOS Vx Works, Case Study of Embedded System for an Adaptive Cruise Control (ACC) System in Car, Case Study of Embedded System of Mobile Phone Software for Key Inputs.

TEXT BOOKS:

1. Shibu K V: “Introduction to Embedded Systems”, Tata McGraw Hill Publications, Second Edition.
2. Dr. K.V.K.K. Prasad: “Embedded/Real-Time Systems”, Dream Tech Publications, Black pad.
3. Raj Kamal: “Embedded Systems-Architecture, Programming and Design”, Tata McGraw Hill Publications, Second Edition.

REFERENCES:

1. Labrosse, “Embedding system building blocks “, CMP publishers.
2. Rob Williams,” Real time Systems Development”, Butterworth Heinemann Publications.

VIII Sem.	Principles of Digital TV Engineering (Open Elective-III)	Course Code:V18ECTOE9	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Illustrate the fundamentals of television engineering **[K2]**

CO2: Explain about TV signal transmission **[K2]**

CO3: Explain the colour TV fundamentals **[K2]**

CO4: Classify Digital TV transmission standards **[K2]**

CO5: Explain the operation of Digital TV receiver **[K2]**

CO6: Describe the working of LCD and Plasma screens **[K2]**

UNIT-I

Introduction: TV transmitter and receivers, synchronization **Television Pictures**: Geometric form and aspect ratio, image continuity, interlaced scanning, picture resolution

UNIT-II

Composite video signal: Horizontal and vertical sync details **TV Signal Transmission:** VSB transmission, standard channel BW, TV transmitter

UNIT-III

Colour Television: Perception of brightness and colours, additive colour mixing, video signals for colours, luminance signal, colour difference signals, encoding of colour difference signals, formation of chrominance signals, PAL encoder, PAL colour receiver

UNIT-IV

Digital Television Transmission Standards: ATSC terrestrial transmission standard, vestigial sideband modulation, DVB -T transmission standard, ISDB-T transmission standard

UNIT-V

Digital Television: Digital Satellite Television, Direct to Home Satellite Television, Digital TV Receiver, Merits of Digital TV Receivers

UNIT-VI

LCD Screens: LCD Technology, LCD Matrix types and operation, LCD Screens for Television, LCD color receiver

Plasma Screens: Plasma and conduction of charge, Plasma TV Screens, Plasma Color Receiver

Text Books:

1. Television engineering and video systems – R G Gupta, Tata McGraw Hill Publishers.
2. Television and Video Engineering – A.M.Dhake, 2nd Edition, Tata McGraw Hill Publishers.
3. Modern Television Practice: Transmission, Reception and Applications- R RGulati, 4th revised edition, New Age International Publishers.
4. Fundamentals of Digital Television Transmission- Gerald W. Collins, John Wiley & Sons.

References

1. Basic Television and Video Systems – Bernard Grob, McGrawHill Publishers.
2. Monochrome and Colour Television - R RGulati, New Age International Publishers.
3. Colour Television, Theory and Practice - S.P.Bali, Tata McGraw-Hill Publishers.

Annexure-03

Approved Course Structure & Syllabus

COURSE STRUCTURE

(For V20 Regulation)

ECE

V20 Regulation

Semester III (Second Year)

Sl. No.	Course Category	Course Code	Course Title	Hours per Week			Credits
1.	Basic Science Courses		Mathematics-III **(M-III)**	3	0	0	3
2.	Professional Core Course	V20ECT02	Electronic Devices, Circuits & Analysis **(EDCA)**	3	0	0	3
3.	Professional Core Courses	V20ECT03	Probability Theory Stochastic Process **(PTSP)**	3	0	0	3
4.	Professional Core Courses	V20ECT04	Network Theory **(NT)**	3	0	0	3
5.	Professional Core Courses	V20ECT05	Signals & Systems **(SS)**	3	0	0	3
6.	Professional Core Courses (LAB)	V20ECL01	Electronic Devices, Circuits & Analysis Lab **(EDCA LAB)**	0	0	3	1.5
7.	Professional Core Courses (LAB)	V20ECL02	Signals & Systems Lab **(SS LAB)**	0	0	3	1.5
8.	Professional Core Courses (LAB)		Data Structures Lab **(DS LAB)**	0	0	3	1.5
9	**Skill Oriented Course***	V20ECSOC01	Certificate course being offered by industries/ professional bodies/ APSSDC or any other accredited bodies	**1**	**0**	**2**	**2**
10	Mandatory Course (AICTE suggested)	V20ENT02	Professional Communication Skills **(PCS-I)**	2	0	0	0
		Total Credits					**21.5**

Semester IV (Second Year)

Sl. No.	Course Category	Course Code	Course Title	Hours			Credits
				L	T	P	
1.	EngineeringScience Courses	V20EET11	Control Systems **(CS)**	3	0	0	3
2.	Basic Science Course/Prof Core Course	V20ECT07	Analog & Digital Communication **(ADC)**	3	0	0	3
3.	Professional Core Courses	V20ECT08	Digital IC Applications **(DICA)**	3	0	0	3
4.	Professional Core Courses	V20ECT09	Electro Magnetic Waves & Transmission Lines **(EMTL)**	3	0	0	3
5.	Humanities and Social Sciences		Managerial Economics & Financial Analysis (**MEFA)**	3	0	0	3
6.	EngineeringScience Courses/Prof Core (Interdisciplinary) (LAB)		Python Programming Lab	0	0	3	1.5
7.	Professional Core Courses (LAB)	V20ECL04	Analog & Digital Communication Lab **(ADC LAB)**	0	0	3	1.5
8.	Professional Core Courses (LAB)	V20ECL05	Digital IC Applications Lab **(DICA LAB)**	0	0	3	1.5
9	**Skill Oriented Course***	V20ECSOC02	Certificate course being offered by industries/ professional bodies/ APSSDC or any other accredited bodies	**1**	**0**	**2**	**2**
10	Mandatory Course (AICTE suggested)	V20ENT03	Professional Communication Skills **(PCS-II)**	2	0	0	0
			Total Credits				**21.5**
	Internship 2 Months (Mandatory) during Summer vacation						
	Honors/Minor Courses (The Hours Distribution can be 3-0-2 or 3-1-0 also)			**4**	0	**0**	**4**

***Skill Oriented Course:**

The Student shall be given an option to choose either the skill courses being offered by the college or to choose a certificate course being offered by industries/ professional bodies/ APSSDC or any other accredited bodies as approved by the concerned BoS.

List of Skill Oriented Courses:

S. No	Name of the Proposed Course
1	PCB Design
2	Programming in Scilab
3	Programming with Arduino
4	Circuit Design & Simulation using Multisim
5	Concepts of Embedded systems
6	Internet of Things
7	Robotics
8	Hands on Graphical Programming Using Labview

III Semester SYLLABUS

III Sem.	Electronic Devices Circuits & Analysis	Course Code:V20ECT02	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of this course, the students will be able to:

- CO1: Explain the formation of p-n Junction, Discuss special semi-conductor Diodes & Explain the working principle of rectifiers with and without filters With relevant expressions and necessary comparisons**[K2]**
- CO2: Understand the construction, principle of operation of transistors, BJT and FET with their V-I characteristics in different configurations.**[K2]**
- CO3: Explain the need of transistor biasing, various biasing techniques for BJT.**[K2]**
- CO4: Analyze small signal low frequency transistor amplifier circuits using BJT In Single & Multistage.**[K2]**
- CO5: Explain the operation & Analysis of Feedback and Power amplifiers.**[K2]**

UNIT-I: Junction diode characteristics: p-n junction diode, energy band diagram of PN junction Diode, current components in PN junction Diode, law of junction, derivation of diode equation, V-I Characteristics, Diode resistance, Diode capacitance. Zener Diode, Breakdown mechanisms, UJT, Construction and characteristics

Rectifiers and Filters: Rectifier Classification, characteristics of rectifiers, Filters-Capacitor filter, Inductor filter, derivation for ripple factor in eachcase.

UNIT- II: Transistor Characteristics: BJT: Junction transistor, transistor current components, Transistor equation,Characteristics of transistor in Common Base, Common Emitter and Common Collector configurations, Early Effect.

FET: Comparison between BJT and FET.FET types, construction, operation, characteristics, MOSFET- types, construction, operation, characteristics.

UNIT- III: Transistor Biasing &Thermal Stabilization

BJT: Need for biasing, operating point, Load line analysis, BJT biasing- methods, fixed bias, collector to base bias, self-bias, Stabilization against variations in VBE, Ic, and β,Stability factors(S, S", S"'),Bias compensation.

UNIT-IV: Small Signal Analysis of BJT

Two port network, Transistor hybrid model, determination of h- parameters, Generalized Analysis of CB, CE and CC amplifiers using exact and approximate analysis,Low frequency analysis of Cascade and Cascode amplifiers.

UNIT-V: Feedback Amplifiers, Oscillators & Power Amplifiers

Feedback principle and concept, types of feedback, classification of amplifiers, feedbacktopologies Generalizedanalysis of Voltage series, current series, voltage shunt, current shunt feedback amplifiers,

Oscillators: Basic concept, Barkhausen criterion, RC oscillators (phase shift, Wien bridge), LC oscillators (Hartley, Colpitts)various classes of operation (Class A, B, AB), power efficiency calculations.

Text Books:

1. Electronic Devices and Circuits- J. Millman, C. Halkias,TMH.
2. Integrated Electronics- Jacob Millman, C. Halkies, C.D.Parikh,TMH.
3. Electronic Circuit Analysis - B.V.Rao, K.R.Rajeswari, P.C.R.Pantulu, K.B.R.Murthy, Pearson Publications

References:

1. Electronic Devices and Circuits Theory – Robert L. Boylestad and Louis Nashelsky, Pearson/Prentice Hall.
2. ElectronicCircuitAnalysisandDesign–Donald A.Neaman,McGrawHill.

III Sem.	Probability Theory & Stochastic Processes	Course Code: V20ECT03	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of this course, the students will be able to:

CO-1: Explain basic concepts of probability theory through Sets and Relative Frequency **(K2)**

CO-2: Explain the concept of a random variable, functions based on random variable like Distribution and density functions (**K2)**

CO-3: Compute the expected value, moments on one random variable **(K3)**

CO-4: Illustrate the concepts of joint distribution & density functions on multiple random Variables**(K3)**

CO-5: Compute the Temporal and Spectral characteristics of stochastic processes **(K3)**

UNIT I PROBABILITY : Probability introduced through Sets and Relative Frequency: Experiments and Sample Spaces, Discrete and Continuous Sample Spaces, Events, Probability Definitions and Axioms, Mathematical Model of Experiments, Probability as a Relative Frequency, Joint Probability, Conditional Probability, Total Probability, Bayes Theorem, Independent Events

UNIT II THE RANDOM VARIABLE: Definition of a random variable, Discrete, continuous and mixed random Variables. Distribution & density functions and its properties of arandom variable.Binomial, Poisson, Uniform, Gaussian, Exponential and Rayleigh random variables.Conditional distribution and density functions and its properties.

UNIT III OPERATION ON ONE RANDOM VARIABLE – EXPECTATIONS : Introduction, expected value of a random variable, function of a random variable, moments about the origin, central moments, variance, characteristic function, moment generating function, transformations of a random variable: Monotonic transformations for a continuous random variable

UNIT IV MULTIPLE RANDOM VARIABLES : Vector random variables, joint distribution function, properties of joint distribution, marginal distribution functions, conditional distribution and density, statistical independence, sum of two random variables, sum of several random variables, central limit theorem: unequal distribution, equal distributions.
OPERATIONS ON MULTIPLE RANDOM VARIABLES: Joint moments about the origin, joint central moments, joint characteristic and moment generating functions.

UNIT V RANDOM PROCESSES – TEMPORAL CHARACTERISTICS: The random process concept, classification of processes, deterministic and nondeterministic processes, distribution and density functions, concept of Stationarity and statistical independence. First-order stationary processes, second-order and wide-sense Stationarity, nth-order and strict-sense Stationarity, time averages and Ergodicity, autocorrelation function and its properties, cross-correlation function and its properties, covariance functions.

SPECTRAL CHARACTERISTICS: The power density spectrum: properties, relationship between power density spectrum and autocorrelation function, the cross-power density spectrum, properties, relationship between cross-power density spectrum and cross-correlation function.

TEXT BOOKS:

1. Probability, Random Variables & Random Signal Principles, Peyton Z. Peebles, TMH,
4th Edition, 2001.
2. Probability, Random Variables and Stochastic Processes, Athanasios Papoulis and S.UnniKrishnaPillai, PHI, 4th Edition, 2002.
3. Probability Theory and Stochastic Processes, Y. Mallikarjuna Reddy, 4th Edition, Universities Press

Reference Books:

1. Probability Theory and Stochastic Processes – B. PrabhakaraRao, BS Publications
2. Probability and Random Processes with Applications to Signal Processing, Henry Stark
And John W. Woods, Pearson Education, 3rd Edition.
3. Schaum's Outline of Probability, Random Variables, and Random Processes.
4. An Introduction to Random Signals and Communication Theory, B.P. Lathi, International Textbook, 1968.
5. Random Process – Ludeman, John Wiley
6. Probability Theory and Random Processes, P. Ramesh Babu, McGrawHill, 2015.

III Sem.	Network Theory	Course Code: V20ECT04	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of this course, the students will be able to:

- CO1: Apply network theorems to solve the electrical circuits. **[K3]**
- CO2: Describe the steady state analysis of RLC circuits. **[K2]**
- CO3: Analyze the resonance circuits. **[K4]**
- CO4: Solve the two port network parameters. **[K3]**
- CO5: Explain RLC transient circuits. **[K2]**

UNIT – I - ELECTRICAL CIRCUITS FUNDEMENTALS AND THEOREMS:
Electric circuits: Network elements classification, Source transformation, Kirchhoff's laws, Mesh analysis and Nodal analysis problem solving with resistances only including dependent sources. **Network theorems:**Thevenin's, Norton's, Milliman's, Reciprocity, Compensation, Substitution, Superposition, Max Power Transfer, - Problem solving using dependent sources also.

UNIT – II - STEADY STATE ANALYSIS OF A.C CIRCUITS
Response to sinusoidal excitation: - pure resistance, pure inductance, pure capacitance, series R-L, R-C, R-L-C circuits, parallel R-L, R-C, R-L-C circuits. Impedance concept, phase angle, problem solving for R-L, R-C and R-L-C circuits using mesh and nodal analysis.

UNIT-III RESONANCE
Series Resonance: resonance frequency, impedance, current, power factor, bandwidth, cutoff frequencies &Q-factor.
Parallel Resonance: resonance frequency, impedance, current, power factor, bandwidth, cutoff frequencies Q-factor.Comparison of series and parallel resonance circuits and solving problems.

UNIT – IV - TWO-PORT NETWORKS
Z-parameters, Y-parameters, Transmission parameters, h-parameters, series connection, Parallel connection, Cascade connection of two port networks. Relationship of two port networks, problem solving

UNIT – V – TRANSIENTS
Initial and final condition in capacitor and inductor, Definition of time constants, R-L, R-C, R-L-C circuits with DC excitation, problem solving using R-L-C elements with DC excitation. Solutions using Laplace transform method.

TEXT BOOKS:
1. Electric Circuit Analysis by Hayt and Kimmarle, TMH.
2. Network Analysis by Van-Valkenberg, PHI.
3. Circuit Theory (Analysis and Synthesis) by ABHIJIT Chakrabarti,DhanpatRai&Co.

REFERENCES:
1. Basic Circuit Analysis by DR Cunninghan, Jaico Publishers.
2. Network Analysis and Filter Design by Chadha, Umesh Publications.

3. Circuits & Network Analysis & Synthesis - A.Sudhakar&Shyam MohanS.Pillai, TMH.

III Sem.	Signals & Systems	Course Code: V20ECT05	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of this course, the students will be able to:

CO1 Classify the signals and various operations on signals.**[K2]**
CO2 Determinethe responseofLTIsystem to any arbitraryinput signal usingconvolution**[K2]**
CO3 Analyze the spectral characteristics of signals using Fourier series and Fourier transforms.**[K3]**
CO4 Apply the various sampling techniques on continuous time signals.**[K3]**
CO5 ApplytheconceptsofLaplacetransform/Z-transformtoanalyzecontinuous-time/discrete-timesignalsincomplexplane. **[K3]**

UNIT-I

SignalsandSystems: Continuous-timeandDiscrete-timesignals,Transformationsoftheindependentvariable,Exponential and Sinusoidal signals, the unit impulse and unitstepfunctions,Continuous-timeandDiscrete-time systems and BasicSystemproperties.

UNIT-II

Linear Time Invariant Systems (LTI systems): Discrete-timeLTIsystems,theconvolutionsum,ContinuoustimeLTIsystems,theconvolutionIntegral,PropertiesofLinearTime-InvariantSystems.

UNIT-III

Fourier series: Fourier series representation of Continuous-time periodic signals, Convergence of the Fourier series, Properties of Continuous time Fourier series.
Fourier transform: Representation of periodic signals: The Continuous-time Fourier transform, The Fourier transform for periodic signals, Properties of the continuous time Fourier transform.

UNIT-IV

Sampling Theorem: Introduction, Sampling theorem for band limited signals-explanation, NY Quist rate, Reconstruction of a signal from its samples using Interpolation, The effect of under sampling: Aliasing, sampling techniques- impulse, natural and flat top sampling.

UNIT-V

Analysis of Continuous time and discrete time signals usingLaplace Transform and Z Transform: The Laplace Transform:The Region of convergence for Laplace transforms, the InverseLaplace transform, Properties of the Laplace transform. TheZ-

Transform:TheRegionofConvergencefortheZ-transform,The InverseZ-transform,Propertiesofthe Z-transform.

TEXT BOOKS:

1. Signals and Systems, A.V. Oppenheim and A.S. Will sky with S. H. Nawab, Second Edition, and PHI Private limited.
2. Signals and Systems, Second Edition, S. Haykin and B. Van Veen, John Wiley & Sons.
3. B.P. Lathi, “Principles of Linear Systems and Signals”, Second Edition, Oxford, 2009.

REFERENCES:

1. R.E.Zeimer, W.H.Tranter and R.D.Fannin, “Signals & Systems - Continuous and Discrete”, Pearson, 2007.
2. John Alan Stuller, “An Introduction to Signals and Systems”, Thomson, 2007. 40.
3. M.J.Roberts, “Signals & Systems Analysis using Transform Methods & MATLAB”, Tata McGraw

III Sem.	Electronic Devices, Circuits & Analysis Lab	Course Code: V20ECL01	L	T	P	C
			0	0	3	1.5

Syllabus Details

Course Outcomes: After Successful completion of this course, the students will be able to:

CO1-Identify,Test and Describe the specifications of various components.**[K2]**

CO2-Interpret the Characteristics of various Semiconductor Devices.**[K2]**

CO3-Sketch the Regulation Characteristics of Zener Diode.**[K3]**

CO4-Examine the Performance of Rectifiers with and without Filters.**[K3]**

CO5-Sketch the Frequency Response of Amplifiers and Compute Bandwidth.**[K3]**

CO6- Construct different RC and LC oscillators using BJT based on theFrequency range.**[K3]**

PART A ELECTRONIC WORKSHOP PRACTICE

1. Identification, Specifications, Testing of R, L, C Components (Colour Codes), Potentiometers, Coils, Gang Condensers, Relays, Bread Boards.
2. Identification, Specifications and Testing of Active Devices, Diodes, BJTs, JFETs, LEDs, UJT.
3. Study and operation of Ammeters, Voltmeters, Transformers,Analog and digital Multimeter,Functiongenerator, Regulated power supply and CRO.

PART B: List of Experiments

1. PN Junction diode characteristics
2. Zener diode characteristics
3. Rectifier (without and with c-filters)
   Part-A Half- wave Rectifier Part-B Full- wave Rectifier
4. BJT characteristics (CB Configuration Input & Output characteristics)
5. BJT characteristics (CE Configuration Input & Output characteristics)
6. FET Characteristics (CS Configuration Drain&Transfer Characteristics
7. BJT-CE Amplifier
8. RC Phase Shift Oscillator
9. Colpit's Oscillator
10. Complementary Symmetry Class B Power Amplifier

Equipment required for EDC&Analysis Laboratory

1. Ammeters (Analog or Digital)
2. Voltmeters (Analog or Digital)
3. Active & Passive Electronic Components
4. Regulated Power supplies
5. Cathode Ray Oscilloscopes
6. Analog/ Digital function Generators
7. Digital multimeter
8. Decade resistance Boxes/Rheostats
9. Bread Boards

III Sem.	Signals & Systems Lab	Course Code: V20ECL02	L	T	P	C
			0	0	3	1.5

Syllabus Details

Course Outcomes: After Successful completion of this course, the students Will be able to:

CO1. Understand basics of MATLAB syntax, functions and programming. **[K2]**

CO2. Describe continuous-time and discrete time signals and systems. **[K2]**

CO3. Analyze the spectral characteristics of signals using Fourier analysis. **[K4]**

CO4. Analyze the systems using Laplace transform and Z-transform. **[K4]**

LIST OF EXPERIMENTS:

1. Basic operations on matrices.

2. Generation on various signals and Sequences (periodic and aperiodic), such as unit impulse,

Unit step, square, saw tooth, triangular, sinusoidal, ramp, sinc.

3. Operations on signals and sequences such as addition, multiplication, scaling, shifting,

Folding, computation of energy and average power.

4. Finding the even and odd parts of signal/sequence and real and imaginary part of signal.

5. Convolution between signals and sequences.

6. Auto correlation and cross correlation between signals and sequences.

7. Verification of linearity and time invariance properties of a given continuous /discrete

System.

8. Computation of unit sample, unit step and sinusoidal response of the given LTI system and verifying its physical Reliability and stability properties.

9. Gibbs phenomenon.

10. Finding the Fourier transform of a given signal and plotting its magnitude and phase

Spectrum.

11. Waveform synthesis using Laplace Transform.

12. Locating the zeros and poles and plotting the pole zero maps in s-plane and z-plane for the Given transfer function.

IV Semester SYLLABUS

IV Sem.	Analog & Digital Communication	Course Code:V20ECT07	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of this course, the students Will be able to:

CO1:Explainthespectralcharacteristics,generationanddetectionTechniques of Amplitude modulation techniques**(K2)**
CO2: Explain the spectral characteristics, generation andDetectiontechniquesofanglemodulationtechniques**(K2)**
CO3:Illustrate different types of noise and predict its effect onAnalogcommunicationSystems.**(K3)**
CO4: Describe the generation and detection methods of various digitalModulationschemes.**(K2)**
CO5: Analyze the concepts of error control coding**(K4).**

UNIT-I

AnalogModulation – Needformodulation, AM, DSB-SC, SSB, VSB - Time domain andfrequencydomaindescription,singletoNE modulation,powerrelations,Generation&Detection techniques, AM Transmitters,AMReceivers-Super-heterodynereceiver,IF,AGC.

UNIT-II

Angle Modulation: Phase and Frequency Modulation, Narrow band and WidebandFM,Carson'srule,IndirectanddirectmethodofFMgeneration,DetectionofFM, Phaselockedloop,ComparisonofFMandAM, FM Transmitters,FMSuper-heterodynereceiver.

UNIT-III

Noise in Analog Communication system: Noise in DSB &SSB system, Noise inAMsystem,NoiseinAngleModulationsystem, Pre-emphasisandde-emphasis.

Pulse Modulation: Time Division Multiplexing, PAM, PWM, PPM-Generation andDetection.

UNIT-IV

DigitalModulationSystems: PulseModulation:Basebandsignals.Samplingprocess;QuantizationProcess;QuantizationNoise;Pulse-CodeModulation;NoiseConsiderationsinPCMSystems; Differential Pulse-Code Modulation,Delta modulation, adaptive delta modulation, Amplitude, phase and frequencyshiftkeyingschemes(ASK,PSK,FSK),introduction toM-arraymodulationschemes, Matchedfilterreceivers and optimumreceiver

UNIT-V

InformationtheoryandErrorcontrolCoding: Measureofinformation, Entropy,Informationrate, Sourcecodingtheorem, Channelcapacity–Shannon-Hartleylaw,controlCodes–Linearcodes,Cycliccodes,ConvolutionCoding-encoder, decoder-Exhaustive search and sequential method.

TEXTBOOKS:

1. SimonHaykinandMichaelMoher,"AnIntroductiontoAnalog&DigitalCommunications",2ndEd.,Wiley,(2007).
2. H Taub& D. Schilling, Gautam Sahe, "Principles of CommunicationSystems",TMH,3rdEdition,(2007).
3. Tomasi,Wayne,"ElectronicsCommunicationSystems-Fundamentalsthroughadvanced",5thEdition,PearsonEducation,2009
4. Lathi,"ModernDigital&AnalogCommunicationsSystems",2e,OxfordUniversity Press
5. R. P. Singh, S. Sapre, "Communication Systems: Analog and Digital",Tata McGraw-Hill,2nd edition.

REFERENCEBOOKS:

1. BruceCarlson,Paul B.Crillyand Janet C.Rutledge, "CommunicationSystems: AnIntroductiontoSignalsandNoiseinElectrical Communications",4thEdition,McGraw-Hill,(2002).
2. SimonHaykin,"CommunicationSystems",4thEdition,John Wiley&Sons,(2001)
3. NevioBenvenuto, Roberto Corvaja, TomasoErseghe, and Nicola Laurenti,"CommunicationSystems:FundamentalsandDesignMethods",John Wiley&Sons,(2006).
4. SamShanmugam.K,"DigitalandAnalogCommunicationSystems",Wileypublisher(2006).

IV Sem.	Digital IC Applications	Course Code:V20ECT08	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of this course, the students Will be able to:

- CO1: Explain the structure of commercially available digital integrated circuit families. **[K2]**
- CO2:Learn the IEEE Standard 1076 Hardware Description Language (VHDL).**[K2]**
- CO3: Model complex digital systems at several levels of abstractions, behavioural, Structural,simulation, synthesis and rapid system prototyping.**[K2]**
- CO4: Analyze and design basic digital circuits with combinatorial and sequential logic Circuitsusing VHDL.**[K2]**
- CO5:Develop Programmable logic devices and memories with relevant ICs.**[K2]**

UNIT-I

Digital Logic Families and Interfacing: Introduction to logic families, CMOS logic, CMOS steady state and dynamic electrical behavior, CMOS logic families. Bipolar logic, transistor-transistor logic, TTL families, CMOS/TTL interfacing, Emitter coupled logic.

UNIT-II

Introduction to VHDL: Design flow, program structure, levels of abstraction, Elements of VHDL: Data types, data objects, operators and identifiers. Packages, Libraries and Bindings, Subprograms.VHDL Programming using structural and data flow modeling.

Behavioral Modeling: Process statement, variable assignment statement, signal assignment statement, wait statement , if statement, case statement ,null statement, loop statement, exit statement, next statement ,assertion statement, Inertial Delay Model, Transport Delay Model, Logic Simulation, Logic Synthesis, Inside a logic Synthesizer.

UNIT-III

Combinational Logic Design: Half adder, Full Adder, Ripple Adder, Binary Adder-Subtractor, Look Ahead Carry Generator, ALU, Decoders, encoders, multiplexers and DE multiplexers, parity circuits, comparators, Barrel Shifter, Simple Floating Point Encoder, Dual Priority Encoder, Design considerations of the above combinational logic circuits with relevant Digital ICs, modeling of above ICs using VHDL.

UNIT-IV

Sequential Logic Design: SSI Latches and flip flops, Shift Registers, Universal Shift Registers, Ring Counter, Johnson Counter, Ripple Counter, Design of Modulus N Synchronous Counters, Design considerations of the above sequential logic circuits with relevant Digital ICs, modelling of above ICs using VHDL.

UNIT-V

Memories:
ROM: Internal structure, 2D-Decoding, Commercial ROM types, timing and applications. Static RAM: Internal structure, SRAM timing, standard synchronous SRAMS. Dynamic RAM: Internal structure, timing, synchronous DRAMs.

Text Books:

1. Digital Design Principles & Practices – John F. Wakerly, PHI/ PearsonEducation Asia, 3rd

Ed., 2005.

2. VHDL Primer – J. Bhasker, Pearson Education/ PHI, 3rd Edition.

References:

1. Fundamentals of Digital Logic with VHDL Design- Stephen Brown, ZvonkoVranesic,

McGrawHill, 3rd Edition.

			L	T	P	C
IV Sem.	**Electro Magnetic Waves & Transmission Lines**	**Course Code:V20ECT09**	**3**	**0**	**0**	**3**

Syllabus Details

Course Outcomes: After Successful completion of this course, the students Will be able to:

CO1:Find static electric field intensity by using various laws of electrostatics. **[K3]**

CO2:Find static magnetic field intensity by using various laws of magneto statics and Develop the Maxwell's equations for time varying fields. **[K3]**

CO3:Calculate the Propagation Characteristics of the EM Waves in different mediums

And find Brewster angle, critical angle and total internal reflection. **[K3]**

CO4:Compute Primary and Secondary constants for a given transmission line. **[K3]**

CO5:Calculate reflection coefficient, VSWR etc. using smith chart. **[K3]**

Prerequisites: Review of Co-ordinate Systems.

UNIT-I: Electrostatics:

Coulomb's Law, Electric Field Intensity, Electric Flux Density, Gauss Law and Applications, Electric Potential, Relation between E and V, Energy Density, Convection and Conduction Currents, Dielectric Constant, Poisson's and Laplace's Equations; Capacitance – Parallel Plate, Coaxial Capacitors, Illustrative Problems.

UNIT-II: Magneto Statics:

Biot-Savart Law, Ampere's Circuital Law and Applications, Magnetic FluxDensity, Magnetic Scalar and VectorPotentials, Forces due to Magnetic Fields, Inductances and MagneticEnergy. Illustrative Problems.

Maxwell's Equations (Time Varying Fields):

Faraday's Law and Transformer EMF, Inconsistency of Ampere's Law and Displacement Current Density, Maxwell's Equations in Different Final Forms and Word Statements. Conditions at a Boundary Surface.

UNIT-III: EM Wave Characteristics:

Wave Equations for Conducting and Perfect Dielectric Media, Uniform Plane Waves – Definition, Relation Between E & H, Sinusoidal Variations, Wave Propagation in Lossy dielectrics, lossless dielectrics, free space, wave propagation in good conductors, Good Dielectrics, skin depth, Polarization & Types, Illustrative Problems.

Reflection and Refraction of Plane Waves – Normal and Oblique Incidences for Perfect Dielectrics, Brewster Angle, Critical Angle and Total Internal Reflection, Surface Impedance. Poynting Vector and Poynting Theorem.Illustrative Problems.

UNIT-IV: Transmission Lines - I:

Types, Applications of Transmission Lines, Equivalent Circuit, Primary & Secondary Constants, Transmission Line Equations for Finite and Infinite Lines, Characteristic Impedance, Propagation Constant, Phase and Group Velocities, , Lossless lines, Distortion less Lines, Illustrative Problems.

UNIT-V: Transmission Lines – II:

Input Impedance Relations, SC and OC Lines, Reflection Coefficient, VSWR. UHF Lines as Circuit Elements; λ/8, λ/4 and λ /2 Lines, Smith Chart – Construction and Applications, Single Stub Matching, Illustrative Problems.

TEXT BOOKS:

1. Elements of Electromagnetic – Matthew N.O. Sadiku, Oxford Univ. Press, 3rd ed., 2001.
2. Electromagnetic Waves and Radiating Systems – E.C. Jordan and K.G. Balmain, PHI,
2nd Edition, 2000.
3. Transmission Lines and Networks – UmeshSinha, SatyaPrakashan (Tech. India Publications), New Delhi, 2001.

REFERENCES:

1. Electromagnetic Fields and Wave Theory –GSN Raju, Pearson Education 2006
2. Engineering Electromagnetics – William H. Hayt Jr. and John A. Buck, TMH, 7th ed., 2006.
3. Electromagnetic Waves andTransmission Lines by Y. Mallikarjuna Reddy, Universities Press

IV Sem.	Analog & Digital Communication Lab	Course Code: V20ECL04	L	T	P	C
			0	0	3	1.5

Syllabus Details

Course Outcomes: After Successful completion of this course, the students Will be able to:

CO-1- Demonstrate the operation of various pulse modulation and demodulation Techniques.**[K3]**
CO-2 -Construct the pre-emphasis and de-emphasis circuits and verify its frequency Response.**[K3]**
CO-3 -Demonstrate the spectrum analysis of modulated signal using spectrum analyser,Operation of AGC and PLL **[K3]**
CO-4- Distinguish the Time division multiplexing and DE multiplexing, Pulse digital Modulation Techniques **[K2]**
CO-5- Distinguish generation and detection of digital modulation techniques **[K2]**
CO-6- Verify the Source encoding and decoding (Huffman Coding) technique and channel Encoding and decoding techniques. **[K3]**

List of Experiments (Twelve experiments to be done)

A. Analog Communications

1. Amplitude Modulation - Mod. &Demod.
2. AM - DSB SC - Mod. &Demod.
3. Spectrum Analysis of Modulated signal using Spectrum Analyser
4. Pre-emphasis & De-emphasis
5. Frequency Modulation - Mod. &Demod, PLL.
6. Sampling Theorem - Pulse Amplitude Modulation - Mod. &Demod.
7. PWM, PPM - Mod. &Demod.

B. Digital Communications

1. Pulse code modulation, Differential pulse code modulation.
2. Delta modulation, Companding.
3. ASK, FSK, PSK.
4. Differential phase shift keying.
5. Source Encoder and Decoder
6. Channel coding-
    i. Linear Block Code-Encoder and Decoder
    ii. Binary Cyclic Code – Encoder and Decoder
    iii. Convolution Code – Encoder and Decoder

IV Sem.	Digital IC Application Lab	Course Code: V20ECL05	L	T	P	C
			0	0	3	1.5

Syllabus Details

Course Outcomes: After Successful completion of this course, the students Will be able to:

CO1: Identify the importance of various tools available in XILINX ISE12.2.**[K2]**
CO2: Develop VHDL/Verilog HDL Source code and perform simulation for various Combinationallogic circuits using XILINX ISE12.2.**[K3]**
CO3: Develop VHDL/Verilog HDL Source code and perform simulation for various Sequential logic circuits using XILINX ISE12.2.**[K3]**

Note: The students are required to design and draw the internal logical structure of the following Digital Integrated Circuits and to develop VHDL/Verilog HDL Source code, perform simulation using relevant simulator and analyse the obtained simulation results using necessary synthesizer.

All the experiments are required to verify and implement the logical operations on the latest FPGA Hardware in the Laboratory.

List of Experiments:

(Minimum of Ten Experiments has to be performed)

1. Realization of Logic Gates
2. Design of Full Adder
3. Design of 3 to 8 Decoder –IC 74138
4. Design of 8 to 3 Encoder (with and without priority)
5. Design of 8 x 1 Multiplexer-IC 74151 and Dual 1x 4 De-multiplexer-IC 74155
6. Design of 4-Bit comparator-IC 7485
7. Design of D-Flip-Flop-IC 7474
8. Design of 4-Bit Ripple Counter.
9. Design of Decade counter –IC 7490
10. Design of Universal Shift register.
11. Design of RAM
12. Design of ALU.

Equipment/Software required:

1. Xilinx Vivado software / Equivalent Industry Standard Software
2. Xilinx Hardware / Equivalent hardware
3. Personal computer system with necessary software to run the programsand Implement.

Annexure-04

V20 Regulation

Semester III (Second Year)

Approved List of Courses offered to EEE Department by ECE Dept.

Sl. No.		Course Code	Course Title	Hours per Week			Credits
1.	Professional Core Course	V20ECT06	Analog Electronics	3	0	0	3
2.	Professional Core Course lab	V20ECL03	Analog Electronics lab	0	0	3	1.5

			L	T	P	C
III Sem.	**Analog Electronics**	**Course Code:V20ECT06**	**3**	**0**	**0**	**3**

Syllabus

Course Outcomes:
After Successful completion of the Course, the student will be able to:

CO-1: Explain the working principle of diode and Diode rectifier circuits with and without Filters.**(K2)**

CO-2: Sketch V-I characteristics of BJT and FET in different configurations (**K3)**

CO-3: Construct wave shaping circuits for various applications **(K3)**

CO-4: Construct circuits for different applications using ICs **(K3)**

CO-5: Explain the operation of Data Converters using IC 741 OP-AMP **(K2)**

UNIT-I Junction Diode Characteristics: p-n junction diode, current components in PN junction Diode, diode current equation, V-I Characteristics, Diode resistances, Breakdown mechanisms, Zener Diode.
Rectifiers: Basic Rectifier setup**,** half wave rectifier, full wave rectifier, bridge rectifier, derivations of characteristics of rectifiers, Filters- Inductor filter, Capacitor filter, derivation for ripple factor in each case, Zener diode as Voltage Regulator.

UNIT-II Transistor Characteristics: BJT: Junction transistor, transistor current components, transistor equation, transistor configurations and characteristics of transistor in Common Base, Common Emitter and Common Collector configurations, punch through/ reach through, transistor as an amplifier.
FET: FET types, construction, operation, characteristics, parameters, MOSFET-types, construction, operation, characteristics, comparison between JFET and MOSFET.

UNIT-III Wave shaping circuits: Response of high pass and low pass RC circuits to step, pulse, Square inputs. High pass RC circuit as differentiator, low pass RC circuit as integrator. Series and shunt clippers, clipping at two independent levels, Positive and Negative Clampers.

UNIT-IV Integrated Circuits and applications: Op-amp Block Diagram, Ideal Op-amp, Equivalent Circuit, Ideal voltage transfer curve, open loop op-amp configurations. Inverting and non-inverting amplifiers, summing, scaling, averaging amplifier, integrator and differentiator, 555 timer functional block diagram, A stable and Monostablemultivibrators.

UNIT-V Data Converters: Weighted resistor DAC, R-2R ladder DAC. Flash Type ADC;counter type ADC, Successive approximation ADC, Dual slope ADC, Specifications of DAC&ADC.

TEXT BOOKS:

1. Integrated Electronics- J. Millman and C.C. Halkias, TMH
2. Electronic Devices and Circuits- Salivahanan, N.Suresh Kumar, A. Vallavaraj, TMH
3. Pulse, Digital and Switching Waveforms - J. Millman and H. Taub, TMH
4. Linear Integrated Circuits – D. Roy Choudhury, 4th edition, New Age International (p) Ltd.
5. Op-Amps & Linear Integrated Circuits - Ramakanth A. Gayakwad,3rd edition, PHI.

REFERENCE BOOKS:

1. Electronic Devices and Circuits Theory – Robert L. Boylestad and Louis Nashelsky,
Pearson/Prentice Hall.
3. Pulse & Digital Circuits-BN Yoga Narasimhan, 2000,SriMaruthi Publishers, Bangalore.
4. Operational Amplifiers & Linear Integrated Circuits –Sanjay Sharma; SKKataria& Sons;2nd Edition,2010

III Sem.	Analog Electronics Lab	Course Code: V20ECL03	L	T	P	C
			0	0	3	1.5

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO-1:Interpret the Characteristics of various semiconductor devices. **(K2)**

CO-2: Examine the Performance of Rectifiers with and without Filters. **(K3)**

CO-3: Construct circuit for linear wave shaping circuits. **(K3)**

CO-4: Construct circuits for verifying linear and nonlinear applications using IC741op-ampAnd IC 555 timer **(K3)**

CO-5:Verify the Characteristics of 4 bit Digital to Analog Converter **(K3)**

List of Experiments: (Any 10 Experiments to be done)

1. PN Junction diode characteristics
2. Rectifiers with and without filters
   Part A: Half Wave Rectifier, Part B: Full Wave Rectifier
3. Zener diode Characteristics
   Part A: V-I characteristics, Part B: Zener diode as Voltage Regulator
4. BJT Characteristics (CE Configuration)
   Part A: Input characteristics, Part B: Input characteristics
5. JFET Characteristics (CS Configuration)
   Part A: Drain characteristics, Part B: Transfer characteristics
6. Linear Wave Shaping
   Part A: High Pass RC Circuit, Part B: Low Pass RC Circuit
7. Non-linear Wave Shaping - Clippers
   Part A: Unbiased Clippers, Part B: Biased Clippers
8. Non-linear Wave Shaping - Clampers
   Part A: Unbiased Clampers, Part B: Biased Clampers
9. Summing, Scaling, Averaging amplifiers using IC 741.
10. Differentiator and Integrator Circuits using IC 741.
11. A stable Multi vibrator using IC 555
12. . 4 bit Digital to Analog to Digital Converter

Annexure-05

Approved Course structure for B. Tech ECT (V20)

COURSE STRUCTURE

(For V20 Regulation)

ECT

V20 Regulation
Semester III (Second Year)

Sl. No.	Course Category	Course Code	Course Title	Hours per Week			Credits
1.	Basic Science Courses		Mathematics-III **(M-III)**	3	0	0	3
2.	Professional Core Course	V20ECT02	Electronic Devices, Circuits & Analysis **(EDCA)**	3	0	0	3
3.	Professional Core Courses	V20ECT03	Probability Theory Stochastic Process **(PTSP)**	3	0	0	3
4.	Professional Core Courses	V20ECT04	Network Theory **(NT)**	3	0	0	3
5.	Professional Core Courses	V20ECT05	Signals & Systems **(SS)**	3	0	0	3
6.	Professional Core Courses (LAB)	V20ECL01	Electronic Devices, Circuits & Analysis Lab **(EDCA LAB)**	0	0	3	1.5
7.	Professional Core Courses (LAB)	V20ECL02	Signals & Systems Lab **(SS LAB)**	0	0	3	1.5
8.	Professional Core Courses (LAB)		Data Structures Lab **(DS LAB)**	0	0	3	1.5
9	**Skill Oriented Course***		Certificate course being offered by industries/ professional bodies/ APSSDC or any other accredited bodies	**1**	**0**	**2**	**2**
10	Mandatory Course (AICTE suggested)	V20ENT02	Professional Communication Skills **(PCS-I)**	2	0	0	0
		Total Credits					**21.5**

Semester IV (Second Year)

Sl. No.	Course Category	Course Code	Course Title	Hours			Credits
				L	T	P	
1.	EngineeringScience Courses	V20EET11	Control Systems **(CS)**	3	0	0	3
2.	Basic Science Course/Prof Core Course	V20ECT07	Analog & Digital Communication **(ADC)**	3	0	0	3
3.	Professional Core Courses	V20ECT08	Digital IC Applications **(DICA)**	3	0	0	3
4.	Professional Core Courses	V20ECT09	Electro Magnetic Waves & Transmission Lines **(EMTL)**	3	0	0	3
5.	Humanities and Social Sciences		Managerial Economics & Financial Analysis (**MEFA)**	3	0	0	3
6.	EngineeringScience Courses/Prof Core (Interdisciplinary) (LAB)		Python Programming Lab	0	0	3	1.5
7.	Professional Core Courses (LAB)	V20ECL04	Analog & Digital Communication Lab **(ADC LAB)**	0	0	3	1.5
8.	Professional Core Courses (LAB)	V20ECL05	Digital IC Applications Lab **(DICA LAB)**	0	0	3	1.5
9	**Skill Oriented Course***		Certificate course being offered by industries/ professional bodies/ APSSDC or any other accredited bodies	**1**	**0**	**2**	**2**
10	Mandatory Course (AICTE suggested)	V20ENT03	Professional Communication Skills **(PCS-II)**	2	0	0	0
			Total Credits				**21.5**
	Internship 2 Months (Mandatory) during Summer vacation						
	Honors/Minor Courses (The Hours Distribution can be 3-0-2 or 3-1-0 also)			**4**	0	**0**	**4**

***Skill Oriented Course:**

The Student shall be given an option to choose either the skill courses being offered by the college or to choose a certificate course being offered by industries/ professional bodies/ APSSDC or any other accredited bodies as approved by the concerned BoS.

List of Skill Oriented Courses:

S. No	Name of the Proposed Course
1	PCB Design
2	Programming in Scilab
3	Programming with Arduino
4	Circuit Design & Simulation using Multisim
5	Concepts of Embedded systems
6	Internet of Things
7	Robotics
8	Hands on Graphical Programming Using Labview

Annexure-06

Approved Course structure & Syllabus for M. Tech (V21)

COURSE STRUCTURE
AND
DETAILED SYLLABUS

For

M. Tech
(Embedded Systems & VLSI)

Academic Year 2021-2022

ELECTRONICS & COMMUNICATION ENGINEERING

BRANCH

SRI VASAVI ENGINEERING COLLEGE
(AUTONOMOUS)

(Sponsored by Sri Vasavi Educational Society)
Approved by AICTE, New Delhi and Permanently Affiliated to JNTUK, Kakinada
Pedatadepalli, **TADEPALLIGUDEM – 534 101,** W.G. Dist., (A.P.)

COURSE STRUCTURE

Course Structure for
M. Tech (Embedded Systems &VLSI) w.e.f A.Y 2021-22

I Semester

Sl. No.	Course Code	Course Name	L	T	P	C
9.	V21ESVT01	System Design through VERILOG	3	-	-	3
10.	V21ESVT02	Embedded Systems Design	3	-	-	3
11.	V21ESVT03 V21ESVT04 V21ESVT05	**ELECTIVE-1** Programming Languages for Embedded Systems Parallel processing System On Chip & Applications	3	-	-	3
12.	V21ESVT06 V21ESVT07 V21ESVT08	**ELECTIVE-II** Digital System Design CPLD & FPGA Architectures & Applications VLSI Signal Processing	3	-	-	3
13.		Research methodology and IPR	2	0	0	2
14.	V21ESVL01	System Design through Verilog Lab	-	-	4	2
15.	V21ESVL02	Embedded Systems Design Lab		-	4	2
16.	Aud. 1	Audit Course 1	2	0	0	0
			16	**0**	**8**	**18**

Total Contact Hours: 24 **Total Credits: 18**

II Semester

Sl. No.	Course Code	Course Name	L	T	P	C
8.	V21ESVT09	Analog and Digital CMOS VLSI Design	3	-	-	3
9.	V21ESVT10	Real Time Operating Systems	3	-	-	3
10.	V21ESVT11 V21ESVT12 V21ESVT13	**ELECTIVE-III** MEMS Technology & Applications Design for Testability Semiconductor Memory Design And Testing	3	-	-	3
11.	V21ESVT14 V21ESVT15 V21ESVT16	**ELECTIVE-IV** Hardware Software Co-Design Embedded Computing Communication Buses and Interfaces	3	-	-	3
12.	V21ESVL03	Analog and Digital CMOS VLSI Design Lab	-	-	4	2
13.	V21ESVL04	Real time Operating Systems Lab		-	4	2
14.	V21ESVL05	Mini project	0	0	4	2
8.	Aud. 2	Audit course 2	2	0	0	MNC
			14	**0**	**12**	**18**

Total Contact Hours: 26 **Total Credits: 18**

III Semester*

Sl. No.	Course Code	Course Name	L	T	P	Credits
4.	V21ESVT17 V21ESVT18 V21ESVT19	1.IOT and its Applications 2.Low Power VLSI Design 3.MOOCs Course	3	0	0	3
5.	V21ESVOE01	1.Operations Research 2.Cost Management of Engineering projects 3. MOOCs Course	3	0	0	3

6.	V21ESVP01	Dissertation phase-I/Industrial Project **(to be continued and evaluated next semester**)	0	0	20	10#
					Total Credits	**16**

#Evaluated and Displayed in IV semester Marks list**.**

*Students going for Industrial project/Thesis will complete these courses through MOOCs

IV Semester

Sl. No.	**Course Code**	**Course Name**	**P.Os**	**Category**	**L**	**T**	**P**	**C**
2.	V21ESVP02	Project/Dissertation phase-II (continued from III semester)			0	0	32	16
							Total Credits	**16**

Total Credits : 66

Audit course 1&2

1. English for Research paper Writing

2. Disaster Management

3. Value Education

4. Constitution of India

5. Pedagogy Studies

6. Stress Management by Yoga

7. Personality Development through Life Enlightenment Skills

I Semester
SYLLABUS

I Sem.	SYSTEM DESIGNTHROUGH VERILOG	Course Code: V21ESVT01	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes:

- CO1: Outline basic concepts of RTL code for digital circuits **[K2]**
- CO2: Model RTL codes for digital circuit at gate and data flow level **[K3]**
- CO3: Model RTL codes for digital circuit at behavioural level **[K3]**
- CO4: Model RTL codes for digital circuit at switch level modelling and outline the concepts of task, function and complier directives **[K3]**
- CO5: Analyze Synthesize of Combinational and Sequential Circuits **[K4]**

UNIT-I

INTRODUCTIONTOVERILOG:

Verilog as HDL, Levels of design description, concurrency, module, simulation and synthesis, testbench, functional verification,programminglanguageinterface (PLI),simulationand synthesistools.

LANGUAGECONSTRUCTSANDCONVENTIONS:

Introduction,keywords, identifiers, whitespace characters, comments, numbers, strings, logic values, data types,scalarsandvectors,parameters,memory,operators,systemtasks.

UNIT-II

GATELEVELMODELLING:

Introduction,AND gate primitive, module structure, other gate primitives, illustrative examples, tristate gates, arrayof instances of primitives, design of Flip flops with gate primitives, delays, strengths and contention resolution, nettypes,designofbasic circuits.

DATA FLOWLEVEL MODELLING

Introduction, continuous assignment structures, delays and continuous assignments, assignment to vectors.

UNIT-III

BEHAVIORALMODELLING:

Introduction,operationsandassignments,initial construct,alwaysconstruct,examples,assignmentswith delays, wait construct, multiple always blocks, designs at behavioral level, blocking and non-blocking assignments, the case statement, if and if else constructs, assign-De assign construct,repeat construct, FOR loop, the disable construct, While loop, Forever loop, parallel blocks, force-release construct,event.

UNIT-IV

SWITCHLEVELMODELLING

Basictransistor switches, CMOS switch, Bidirectional gates and time delays with switch primitives, instantiations withstrengthsanddelays,strengthcontentionwithtriregnets, switch level modeling for NAND, NOR and XOR.

SYSTEM TASKS, FUNCTIONS, AND COMPILER DIRECTIVES: Introduction, System Tasks and Functions, File based Tasks and Functions, Compiler Directives, Hierarchical Directives, User-defined Primitives (UDP), FSM Design (Moore and Melay Machines).

UNIT-V

SYNTHESISOFCOMBINATIONAL ANDSEQUENTIAL LOGIC USINGVERILOG: Synthesisof combinational logic: Net list of structured primitives, a set of continuous assignment statements and level sensitivecyclic behavior with examples, Synthesis of priority structures, Exploiting logic don't care conditions. Synthesis ofsequential logic with latches: Accidental synthesis of latches and Intentional synthesis of latches, Synthesis ofsequentiallogicwithflip-flops,Synthesisofexplicitstatemachines.

TEXTBOOKS:

1. DesignthroughVerilogHDL—T.R.PadmanabhanandB. BalaTripuraSundari,WSE, IEEEPress,2004.
2. AdvancedDigitalDesignwithVerilog HDL—MichaelD.Ciletti,PHI,2005.

REFERENCES:

1. FundamentalsofLogicDesignwithVerilog—Stephen.BrownandZvonkoVranesic,TMH,2005.
2. AVerilogPrimier—J.Bhasker,BSP,2003.

I Sem.	EMBEDDED SYSTEM DESIGN	Course Code: V21ESVT02	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcome:

The student will be able to

- CO1: Illustrate the ARM architecture and its memory management.**(K2)**
- CO2: Describe the ARM instruction set for ARM programming.**(K2)**
- CO3: Describe Thumb instruction set for ARM programming.**(K2)**
- CO4: Explain the basics of ARM Cortex-M3**(K2)**
- CO5: Explain ARM Cortex-M3 interfacing.**(K2)**

UNIT-I:

ARM Architecture ARM Design Philosophy, Registers, PSR, Pipeline, Interrupts and Vector Table, Architecture Revision, ARM Processor Families. Introduction to ARM Cortex.

UNIT-II:

ARM Programming Model-I Instruction Set**:** Data Processing Instructions, Branch, Load, Store Instructions, PSR Instructions, Conditional Instructions.

UNIT-III:

ARM Programming Model-II Thumb Instruction Set**:** Register Usage, Other Branch Instructions, Data Processing Instructions, Single-Register and Multi Register Load-Store Instructions, Stack, Software Interrupt Instructions.

UNIT-IV

Introduction to ARM Cortex-M3 Processor-What Is the ARM Cortex-M3 Processor,Background of ARM and ARM Architecture,Instruction Set Development, The Thumb-2 Technology and Instruction Set Architecture, Cortex-M3 Processor Applications.

Cortex-M3 Basics-Registers, Operation Mode, Exceptions and Interrupts, Vector Tables, Stack Memory Operations, Reset Sequence

UNIT-V

Exceptions, Types, Priority, Vector Tables, Interrupt Inputs and Pending behavior, Fault
Exceptions, Supervisor call and Pendable Service Call, Nested Vectored Interrupt Controller, Basic Interrupt Configuration.

Cortex-M3 Implementation Overview-the Pipeline, A detailed block diagram, Bus Interfaces on the Cortex-M3,Other Interfaces on the Cortex-M3, the External PPB, Typical Connections,Reset Types and Reset Signals.

TEXT BOOKS:

1. ARM Systems Developer's Guides- Designing & Optimizing System Software – Andrew N. Sloss, Dominic Symes, Chris Wright, 2008, Elsevier.
2. The Definitive Guide to the ARM® Cortex-M3 Second Edition-Joseph Yiu
3. ARM System-on-chip Architecture- Stephen Bo Furber - Addison-Wesley, 2000

REFERENCE BOOKS:

1. Embedded Microcomputer Systems, Real Time Interfacing – Jonathan W. Valvano – Brookes / Cole, 1999, Thomas Learning.

			L	T	P	C
I Sem.	**Programming Languages for Embedded Systems (Elective-I)**	**Course Code: V21ESVT03**	**3**	**0**	**0**	**3**

Syllabus Details

Course Outcomes:
At the end of this course, students will be able to

- CO1: Write an embedded C application of moderate complexity.
- CO2: Develop and Analyze algorithms in C++.
- CO3: Differentiate interpreted languages from compiled languages.

UNIT-I: Embedded „C" Programming Bitwise operations, Dynamic memory allocation, OS services.Linked stack and queue, sparsematrices, Binary tree. Interrupt handling in C, Code optimization issues.Embedded Software Development Cycle and Methods (Waterfall, Agile)

UNIT-II: Object Oriented Programming Introduction to procedural, modular, object-oriented and genericprogramming techniques, Limitations of procedural programming, objects, classes, data members,methods, data encapsulation, data abstraction and information hiding, inheritance, polymorphism

UNIT-III: CPP Programming: „cin", „cout", formatting and I/O manipulators, new and deleteoperators, Defining a class, data members and methods, „this" pointer, constructors, destructors, friendfunction, dynamic memory allocation

UNIT-IV: Overloading and Inheritance: Need of operator overloading, overloading the assignment,Overloading using friends, type conversions, single inheritance, base and derived classes, friendClasses, types of inheritance, hybrid inheritance, multiple inheritance, virtual base class,Polymorphism, virtual functions.

UNIT-V: Templates: Function template and class template, member function templates and templatearguments, Exception Handling: syntax for exception handling code: try-catch- throw,Multiple Exceptions.Scripting Languages:

Overview of Scripting Languages – PERL, CGI, VB Script, Java Script.
PERL: Operators, Statements Pattern Matching etc. Data Structures, Modules, Objects, TiedVariables, Inter process Communication Threads, Compilation & Line Interfacing.

Text Books:

1. Michael J. Pont, "Embedded C", Pearson Education, 2nd Edition, 2008
2. Randal L. Schwartz, "Learning Perl", O"Reilly Publications, 6th Edition 2011

Reference Books:

1. A. Michael Berman, "Data structures via C++", Oxford University Press, 2002
2. Robert Sedge wick, "Algorithms in C++", Addison Wesley Publishing Company, 1999
3. Abraham Silberschatz, Peter B, Greg Gagne, "Operating System Concepts", John
Willey& Sons, 2005Kaufmann.

I Sem.	Parallel Processing (Elective I)	Course Code: V21ESVT04	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes:
At the end of this course, students will be able to

- CO1: Identify limitations of different architectures of computer
- CO2: Analysis quantitatively the performance parameters for different Architectures
- CO3: Investigate issues related to compilers and instruction set based on type of Architectures.

UNIT-I: Overview of Parallel Processing and Pipelining, Performance analysis, Scalability

UNIT-II: Principles and implementation of Pipelining, Classification of pipelining processors, Advanced pipelining techniques, Software pipelining

UNIT-III: VLIW processors Case study: Superscalar Architecture- Pentium, Intel Itanium Processor and Ultra SPARC,MIPS on FPGA, Vector and Array Processor, FFT Multiprocessor Architecture

UNIT-IV: Multithreaded Architecture, Multithreaded processors, Latency hiding techniques, Principles of multithreading, Issues and solutions

UNIT-V: Parallel Programming Techniques: Message passing program development, Synchronous and asynchronous message passing, Shared Memory Programming, Data Parallel Programming, Parallel Software Issues. Operating systems for multiprocessors systems customizing applications on parallel processing platforms

Text Books:

1. Kai Hwang, Faye A. Briggs, “Computer Architecture and Parallel Processing”, MGH International Edition
2. Kai Hwang, “Advanced Computer Architecture”, TMH
3. V. Rajaraman, L. Sivaram Murthy, “Parallel Computers”, PHI.

Reference Books:

1. William Stallings, “Computer Organization and Architecture, Designing for Performance“Prentice Hall, Sixth edition
2. Kai Hwang, ZhiweiXu, “Scalable Parallel Computing”, MGH
3. David Harris and Sarah Harris, “Digital Design and Computer Architecture”, Morgan

I Sem.	System on Chip & Applications (Elective I)	Course Code: V21ESVT05	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcome:
The student will be able to

- CO1: Describe SOC System Approach, design and its Architecture –**[K2]**
- CO2: Discuss the selection of processor and its micro architecture for SOC – **[K2]**
- CO3: Discuss Memory Design for SOC –**[K2]**
- CO4: Explain the concepts of bus models and Interconnect Architectures –**[K2]**
- CO5: Explain SOC based Applications –**[K2]**

UNIT-I

Introduction to the System Approach System Architecture, Components of the system, Hardware& Software, Processor Architectures, Memory and Addressing.System level interconnection, an approach for SOC Design, System Architecture and Complexity.

UNIT-II

Processors Introduction , Processor Selection for SOC, Basic concepts in Processor Architecture, Basic concepts in Processor Micro Architecture, Basic elements in Instruction handling. Buffers: minimizing Pipeline Delays, Branches, More Robust Processors, Vector Processors and Vector Instructions extensions, VLIW Processors, Superscalar Processors.

UNIT-III

Memory Design for SOC Overview of SOC external memory, Internal Memory, Size, Scratchpads and Cache memory, Cache Organization, Cache data, Write Policies, Strategies for line replacement at miss time, Types of Cache, Split – I, and D – Caches, Multilevel Caches, Virtual to real translation , SOC Memory System, Models of Simple Processor – memory interaction.

UNIT-IV

Interconnect Customization and Configuration Inter Connect Architectures, Bus: Basic Architectures, SOC Standard Buses, Analytic Bus Models, Using the Bus model, Effects of Bus transactions and contention time. SOC Customization: An overview, Customizing Instruction Processor, Reconfiguration Technologies, Mapping design onto Reconfigurable devices, Instance- Specific design, Customizable Soft Processor, Reconfiguration - overhead analysis and trade-off analysis on reconfigurable Parallelism.

UNIT-V

Application / Case Studies:
Zynq system on chip design – Secure Boot, Analog Data Acquisition, System Monitoring using the Zynq-7000 AP SOC Processing System with the XADC AXI Interface.

Cypress- PSoC4- Architecture, GPIO Pins and its applications - down counter, sine wave Generator using PSOC 4 device.

TEXT BOOKS:

1. Computer System Design System-on-Chip - Michael J. Flynn and Wayne Luk, Wiely India Pvt. Ltd.
2. ARM System on Chip Architecture – Steve Furber –2nd Ed., 2000, Addison Wesley Professional.
3. Embedded Processing with the ARM Cortex-A9 on the Xilinx Zynq-7000 All Programmable SoC-Louise H. Crockett Ross A. Elliot Martin A. Enderwitz Robert W. Stewart
4. Cypress PSoC User Manual

REFERENCE BOOKS:

1. Design of System on a Chip: Devices and Components – Ricardo Reis, 1st Ed., 2004, Springer
2. Co-Verification of Hardware and Software for ARM System on Chip Design (Embedded Technology) – Jason Andrews – Newnes, BK and CDROM.
3. System on Chip Verification – Methodologies and Techniques – PrakashRashinkar, Peter Paterson and Leena Singh L, 2001, Kluwer Academic Publishers.

I Sem.	**Digital System Design (Elective II)**	**Course Code: V21ESVT06**	**L**	**T**	**P**	**C**
			3	**0**	**0**	**3**

Syllabus Details

Course Outcome:

The student will be able to

- CO1: Describe the algorithms for minimization of functions
- CO2: Describe the algorithms for minimization of PLDs.
- CO3: Design large scale digital systems.
- CO4: Discuss the fault model and diagnosis in combinational and sequential Circuits.

UNIT-I: Minimization Procedures and CAMP Algorithm
Review on minimization of switching functions using tabular methods, k-map, QM algorithm, CAMP-I algorithm, Phase-I: Determination of Adjacencies, DA, CSC, SSMs and EPCs, CAMPI algorithm, Phase-II: Passport checking, Determination of SPC, CAMP-II algorithm: Determination of solution cube, Cube based operations, determination of selected cubes are wholly within the given switching function or not, Introduction to cube based algorithms.

UNIT-II: PLA Design, PLA Minimization and Folding Algorithms
Introduction to PLDs, basic configurations and advantages of PLDs, PLA-Introduction, Block diagram of PLA, size of PLA, PLA design aspects, PLA minimization algorithm (IISc algorithm), PLA folding algorithm(COMPACT algorithm)-Illustration of algorithms with suitable examples.

UNIT -III: Design of Large Scale Digital Systems
Algorithmic state machine charts-Introduction, Derivation of SM Charts, Realization of SM Chart, control implementation, control unit design, data processor design, ROM design and PAL design aspects, digital system design approaches using CPLDs, FPGAs and ASICs.

UNIT-IV: Fault Diagnosis in Combinational Circuits
Faults classes and models, fault diagnosis and testing, fault detection test, test generation, testing process, obtaining a minimal complete test set, circuit under test methods- Path sensitization method, Boolean difference method, properties of Boolean differences, Kohavi algorithm, faults in PLAs, DFT schemes, built in self-test.

UNIT-V: Fault Diagnosis in Sequential Circuits

Fault detection and location in sequential circuits, circuit test approach, initial state identification, Haming experiments, synchronizing experiments, machine identification, distinguishing experiment, adaptive distinguishing experiments.

TEXT BOOKS:

1. Logic Design Theory-N. N. Biswas, PHI
2. Switching and Finite Automata Theory-Z. Kohavi, 2nd Edition, 2001, TMH
3. Digital system Design using PLDd-Lala

REFERENCE BOOKS:

1. Fundamentals of Logic Design – Charles H. Roth, 5th Ed., Cengage Learning.
2. Digital Systems Testing and Testable Design – MironAbramovici, Melvin A. Breuer and Arthur D. Friedman- John Wiley & Sons Inc.

			L	T	P	C
I Sem.	**CPLD & FPGA Architectures and Applications (Elective II)**	**Course Code: V21ESVT07**	**3**	**0**	**0**	**3**

Syllabus Details

Course Outcome:

The student will be able to

- CO1: Describe the Programmable Logic Devices
- CO2: Distinguish the various types of Field Programmable Gate Arrays
- CO3: Apply the typical applications on FPGAs

UNIT-I: Introduction to Programmable Logic Devices

Introduction, Simple Programmable Logic Devices – Read Only Memories, Programmable Logic Arrays, Programmable Array Logic, Programmable Logic Devices/Generic Array Logic; Complex Programmable Logic Devices –Architecture of Xilinx Cool Runner XCR3064XL CPLD, CPLD Implementation of a Parallel Adder with Accumulation.

UNIT-II: Field Programmable Gate Arrays

Organization of FPGAs, FPGA Programming Technologies, Programmable Logic Block Architectures, Programmable Interconnects and Programmable I/O blocks in FPGAs, Dedicated Specialized Components of FPGAs and Applications of FPGAs.

UNIT –III: SRAM Programmable FPGAs:

Introduction, Programming Technology, Device Architecture, the Xilinx XC2000, XC3000 and XC4000 Architectures.

UNIT –IV: Anti-Fuse Programmed FPGAs

Introduction, Programming Technology, Device Architecture, theActel ACT1, ACT2 and ACT3 Architectures.

UNIT –V: Design Applications

General Design Issues, Counter Examples, a Fast Video Controller, A Fast DMA Controller and Designing Counters with ACT devices, Designing Adders and Accumulators with the ACT Architecture.

TEXT BOOKS:

1. Field Programmable Gate Array Technology - Stephen M. Trimberger, Springer
International Edition.
2. Digital Systems Design - Charles H. Roth Jr, LizyKurian John, Cengage Learning.

REFERENCE BOOKS:

1. Field Programmable Gate Arrays - John V. Oldfield, Richard C. Dorf, Wiley India.
2. Digital Design Using Field Programmable Gate Arrays - Pak K. Chan/ SamihaMourad, Pearson Low Price Edition.
3. Digital Systems Design with FPGAs and CPLDs - Ian Grout, Elsevier, Newnes.
4. FPGA based System Design - Wayne Wolf, Prentice Hall Modern Semiconductor
Design Series.

I Sem.	VLSI Signal Processing (Elective II)	Course Code:V21ESVT08	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes
On successful completion of the module, students will be able to:

CO1:Ability to modify the existing or new DSP architectures suitable for VLSI.
CO2:Understand the concepts of folding and unfolding algorithms and applications.
CO3:Ability to implement fast convolution algorithms.
CO4:Low power design aspects of processors for signal processing and wireless Applications.

UNIT -I
Introduction to DSP: Typical DSP algorithms, DSP algorithms benefits, Representation of DSPalgorithms Pipelining and Parallel ProcessingIntroduction, Pipelining of FIR Digital filters, Parallel Processing, Pipelining and Parallel Processing forLow Power Retiming Introduction, Definitions and Properties, Solving System of Inequalities, RetimingTechniques

UNIT –II
Folding and Unfolding: Folding- Introduction, Folding Transform, Register minimization Techniques,Register minimization in folded architectures, folding of Multirate systems
Unfolding**-** Introduction, An Algorithm for Unfolding, Properties of Unfolding, critical Path, Unfoldingand Retiming, Applications of Unfolding

UNIT -III
Systolic Architecture Design: Introduction, Systolic Array Design Methodology, FIR Systolic Arrays,Selection of Scheduling Vector, Matrix Multiplication and 2D Systolic Array Design, Systolic Design forSpace Representations contain Delays.

UNIT -IV
Fast Convolution: Introduction – Cook-Toom Algorithm – Winogard algorithm – Iterated Convolution –Cyclic Convolution – Design of Fast Convolution algorithm by Inspection

Unit V: Digital lattice filter structures, bit level arithmetic, architecture, redundant arithmetic.Numerical strength reduction, synchronous, wave and asynchronous pipe lines, lowpower design.Low Power Design: Scaling Vs. Power Consumption, Power Analysis, Power Reduction techniques,Power Estimation Approaches

Text Books:

1. Keshab K. Parthi[A1], VLSI Digital signal processing systems, design and Implementation [A2],Wiley, Inter Science, 1999.
2. Mohammad Isamail and Terri Fiez, Analog VLSI signal and information processing,
McGrawHill, 1994
3. S.Y. Kung, H.J. White House, T. Kailath, VLSI and Modern Signal Processing,
Prentice Hall,1985.

I Sem.	System Design through Verilog Lab	Course Code: V21ESVL01	L	T	P	C
			0	0	4	2

Syllabus Details

COURSE OUTCOMES:

- CO1: Develop the simulation of combinational and sequential circuits using HDL Language.**[K3]**
- CO2: Develop the synthesis of combinational and sequential circuits using HDL Language.**[K3]**
- CO3: Analyze the implemented of digital logics with hardware module kit FPGA **[K4]**

The students are required to design the Verilog codes to perform the following experiments using necessary simulator (Xilinx ISE Simulator) to verify the logic functional operation and to perform the analysis with appropriate synthesizer (Xilinx ISE Synthesizer) and then verify the implemented logic function with hardware kits (FPGA kits).

The students are required to acquire the knowledge in the platform Xilinx by perform at least 10 experiments.

List of Experiments:

1) Logic gates
2) Adder-Subtractor
3) Multiplexer and DE multiplexer
4) Encoder and Decoder
5) ALU
6) Fire detection and control system using Combinational Logic Circuits
7) Flip Flops
8) LFSR
9) Up counter/Down counter
10) Synchronous RAM
11) Pattern detector using Moore/Melay machine
12) Traffic light controller using sequential logic circuit.
13) UART

I Sem.	Embedded Systems Design Lab	Course Code: V21ESVL02	L	T	P	C
			0	0	4	2

Syllabus Details

Course Outcomes:

At the end of the laboratory work, students will be able to:

- **CO1:** Develop applications based on ARM Cortex-M3 processor using Cortex-M3 Development boards on the platform of co-coox and Arduino IDE.-**K3**
- **CO2:** Develop the applications based on DSP C6713 evaluation kits and using Code
  Composer Studio (CCS).-**K3**

List of Assignments:
Part A:

Experiments to be carried out on Cortex-M3 development boards and using GNU Tool chain

1. Blink an LED with software delay, delay generated using the SysTick timer.
2. Control intensity of an LED using PWM implemented in software and hardware.
3. Control an LED using switch by polling method, by interrupt method and flash the LED once every five switch presses.
4. UART Echo Test.
5. Take Analog readings on rotation of rotary potentiometer connected to an ADC channel.
6. Temperature indication on an RGB LED.
7. Mimic light intensity sensed by the light sensor by varying the blinking rate of an LED.
8. Evaluate the various sleep modes by putting core in sleep and deep sleep modes.
9. System reset using watchdog timer in case something goes wrong.
10. Sample sound using a microphone and display sound levels on LEDs.

Part B:
Experiments to be carried out on DSP C6713 evaluation kits and using Code Composer Studio (CCS)

1. To develop a C code to compute Euclidian distance between any two Points.
2. To develop a C code for implementation of convolution operation.
3. To develop a C code to compute FFT.
4. To design and implement filters in C to enhance the features of given input sequence/signal.

Lab Requirements:

1. Coo-coX Software PlatForm.
2. Arduino IDE
3. Code Composer Studio(CCS)

Hardware:

1. The Development kits of ARM-Cortex Boards
2. DSP C6713 evaluation kits
3. Sensors for Interfacing
4. Serial cables, Network Cables and Recommended power Supply for the board.

II Semester SYLLABUS

II Sem.	Analog and Digital CMOS VLSI Design	Course Code: V21ESVT09	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes:
At the end of the laboratory work, students will be able to:

CO1: Describe the concept of MOS structure and physical design of CMOS **(K2)**

CO2: Design the CMOS Inverters and various CMOS combinational logic circuits **(K4)**

CO3: Design the CMOS different Sequential logic circuits **(K4)**

CO4: Describe the concept of modelling of MOS and Analog CMOS Sub-Circuits **(K2)**

CO5: Describe the CMOS Op-Amps & it's Applications. **(K2)**

UNIT-I: **Review of MOS structures and Physical design flow:**
Basic MOS structure and its static behaviour, Quality metrics of a digital design: Cost,Functionality, Robustness, Power, and Delay, Stick diagram and Layout, Wire delay models.Physical design flow: Floor planning, Placement, Routing, CTS, Power analysis and IR drop estimation-static and dynamic.

UNIT-II CMOS INVERTER AND COMBINATIONAL LOGIC:
Inverter: Static CMOS inverter, Switching threshold and noise margin concepts and theirEvaluation, Dynamic behaviour, Power consumption. Combinational logic: Static CMOSdesign, Logic effort, Rationed logic, Pass transistor logic, Dynamic logic, Speed and powerdissipation in dynamic logic, Cascading dynamic gates, CMOS transmission gate logic.

UNIT-III SEQUENTIAL LOGIC:
Static latches and registers, Bi-stability principle, MUX based latches, Static SR flip-flops, Master-slave edge-triggered register, Dynamic latches and registers, Concept of pipelining, Pulse registers, and Non-bistable sequential circuit.

UNIT -IV CMOS MODELING AND ANALOG SUB- CIRCUITS
CMOS Device Modelling - Simple MOS Large-Signal Model, Other Model Parameters,Small-Signal Model for the MOS Transistor, Sub-threshold MOS Model. MOS Switch, MOSDiode, MOS Active Resistor, Current Sinks and Sources, Current Mirrors-Cascode currentMirror and Wilson Current Mirror, Current and Voltage References, Band gap Reference.

UNIT-V CMOS AMPLIFIERS:
Inverters- Active load inverter, current source inverter, push-pull inverter, DifferentialAmplifiers- large signal analysis, small signal analysis, Cascode Amplifiers, CurrentAmplifiers, Output Amplifiers, Design of CMOS Op Amps, Compensation of Op Amps,Design of Two-Stage Op Amps, Power- Supply Rejection Ratio of Two-Stage Op Amps,Cascode Op Amps, Characterization of Comparator, Two-Stage comparator design.

II Sem.	Real Time Operating Systems	Course Code: V21ESVT10	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes
Upon the completion of the course student will be able to

- CO1: Illustrate real time programming concepts.
- CO2: Apply RTOS functions to implement embedded applications
- CO3: Understand fundamentals of design consideration for embedded Applications.

UNIT-I

Introduction to Real-Time Operating Systems - Defining an RTOS, The scheduler, Kernel Objects and services, Key characteristics of an RTOS

Task- Defining a Task, Task States and Scheduling, Typical Task Operations, Typical Task Structure, Synchronization, Communication and Concurrency

UNIT-II

Semaphores - Defining Semaphores, Typical Semaphore Operations, Typical Semaphore Use

Message Queues - Defining Message Queues, Message Queue States, Message Queue Content, Message Queue Storage, Typical Message Queue Operations, Typical Message Queue Use, Pipes, Event Registers, Signals and condition Variables

UNIT-III

Exceptions and Interrupts - Exceptions and Interrupts, Applications of Exceptions and Interrupts, Closer look at exceptions and interrupts, processing general Exceptions, Nature of Spurious Interrupts

Timer and Timer Services - Real-Time clocks and System Clocks, Programmable Interval Timers, Timer Interrupt Service Routines.

I/O Subsystems - I/O concepts, I/O subsystems

UNIT-IV

Memory Management - Dynamic Memory Allocation in Embedded Systems, Fixed-Size Memory management in Embedded Systems, Blocking VS. Non-Blocking Memory Functions, Hardware Memory Management Units

Modularizing an application for concurrency- An outside-in approach to decompose
Applications, Guidelines and Recommendations for Identifying Concurrency, Scheduleability Analysis

UNIT-V

Synchronization and Communication - Synchronization, Communication, Resource Synchronization Methods, Critical section, Common practical design patterns, Specific Solution Design Patterns,

Common Design Problems - Resource Classification, Deadlocks, Priority Inversion.

Text Books

1. Qing Li, Caroline Yao (2003), “Real-Time Concepts for Embedded Systems”, CMP Books.

Reference Books

1. Albert Cheng, (2002), “Real-Time Systems: Scheduling, Analysis and Verification”, WileyInterscience.
2. Hermann Kopetz, (1997), “Real-Time Systems: Design Principles for Distributed EmbeddedApplications”, Kluwer.
3. Insup Lee, Joseph Leung, and Sang Son, (2008) “Handbook of Real-Time Systems”, Chapman andHall.Krishna and Kang G Shin, (2001), “Real-Time Systems”, McGraw Hill.

II Sem.	MEMS Technology and its Applications (Elective-III)	Course Code: V21ESVT11	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcome:
The student will be able to

- CO1: Describe the concepts of MEMS and Microsystems.
- CO2: Describe various possible materials for MEMS based devices.
- CO3: Describe various process steps involved in fabrication of MEMS devices.
- CO4: Describe various micro sensors and micro actuators.
- CO5: Describe various MEMS devices and their applications.

UNIT-I:

MEMS AND MICROSYSTEM
Introduction to MEMS, Microsystems and microelectronics, Multidisciplinary nature of MEMS, Miniaturization and its Benefits, Scaling laws in Miniaturization, MEMS Design Considerations, Advantages of MEMS Technology, Applications of MEMS

UNIT-II:

MATERIALS FOR MEMS
Introduction, Substrates & wafers, Active Substrate Materials, Silicon as a Substrate Material, Silicon Compounds, Piezoelectric Crystals, Polymers, Packaging Materials.

UNIT-III:

MICROFABRICATION
Introduction, Fabrication Process – Wafer processing, Photolithography, Ion implantation, Oxidation, Chemical vapor deposition (CVD), Physical vapor deposition, Deposition by Epitaxy, Etching, Manufacturing Process -Bulk Micromachining, Surface Micromachining and LIGA Process, Packaging technology, System level packaging, single and multichip packaging. Microsystem packaging, interfacingsin Microsystem packaging.

UNIT-IV:

MEMS BASED SENSORS AND ACTUATORS
Introduction, working principles of Microsystem - Micro Sensors, Micro Actuators and MEMS with Micro sensors: Pressure sensors, Temperature sensors, Humidity sensors, Accelerometers, Gyroscopes, Biomedical Sensors, Chemical sensors, MEMS with micro

actuators: Microgrippers, Micromotors, Micro gears and Micropumps. Microfluidics.

UNIT-V:
RF MEMS
RF MEMS devices: Switch parameters- Basics of switching - Mechanical Switches- Electronic switches for RF and microwave applications – Approaches for low-actuation-voltage switches, MEMS based Reconfigurable Antennas, Reconfigurable Filters and Phase shifters.

Textbooks:

1. Tai-Ran Hsu, MEMS and Microsystems: Design, Manufacture, and Nanoscale Engineering, 2nd Edition, John Wiley & Sons, Inc., Hoboken, New Jersey, 2008.
2. Gabriel M Rebeiz, "RF MEMS - Theory Design and Technology", John Wiley, 2004
3. Microsystem Design by Stephen D. Senturia, Springer International, Edition,2010.

Reference Books:

1. Marc Madou, ―Fundamentals of Micro Fabrication‖ CRC Press
2. Mohamed Gad-el-Hak, ―The MEMS Handbook‖, CRC Press
3. Julian W.Gardner, Vijay K.Varadan, Osama O. AwadelKarim, “Micro sensors MEMS and Smart Devices”, John Wiby& sons Ltd., 2001.
4. Iannacci, J. (2013). *Practical guide to RF-MEMS*. John Wiley & Sons.

II Sem.	Design for Testability (Elective-III)	Course Code: V21ESVT12	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcome:

The students will be able to

3. CO1: Interpret the concepts of modelling digital circuits and simulation.
4. CO2: Describe modelling of faults and its testing for SSF.
5. CO3:Explain various techniques of testing.

UNIT-I: Modeling:

Modeling digital circuits at logic level, register level and structural level. Levels of modeling.

Logic Simulation: Types of simulation, delay models, element evaluation, hazard detection, gate level event driven simulation.

UNIT-II: Fault Modeling:

Logic fault models, fault detection and redundancy, fault equivalence and fault location. Single stuck and multiple stuck – fault models. Fault simulation applications, general techniques for combinational circuits.

UNIT-III: Testing for Single Stuck Faults (SSF):

Automated test pattern generation (ATPG/ATG) for SSFs in combinational and sequential circuits, functional testing with specific fault models. Vector simulation – ATPG vectors, formats, compaction and compression, selecting ATPG tool.

UNIT-IV: Design for Testability:

Testability trade-offs techniques. Scan architectures and testing – controllability and observeability, generic boundary scan, fully integrated scan, storage cells for scan design. Board level and system level DFT approaches. Boundary scans standards. Compression techniques – different techniques, syndrome test and signature analysis.

UNIT-V: Built-in-Self-Test (BIST):

BIST concepts and test pattern generation, specific BIST architectures – CSBL, BEST, RTS, LOCST, STUMPS, CBIST, RTD, SST, CATS, CSTP, BILBO. Brief ideas on some advanced BIST concepts and design for self-test at board level.

Reference Books

1. MironAbramovici, Melvin A.Breur, Arthur D.Friedman, Digital Systems Testing and Testable Design, Jaico Publishing House, 2001.
2. Michael L.Bushnell, VishwaniD.Agrawal, Essentials of Electronic Testing, Springer, 2000.
3. Michael D.Ciletti, Modeling, Synthesis, and Rapid Prototyping with the Verilog HDL. Prentice Hall, 1999.

<table>
<tr><td rowspan="2">II Sem.</td><td rowspan="2">Semiconductor Memory Design and Testing (Elective-III)</td><td rowspan="2">Course Code: V21ESVT13</td><td>L</td><td>T</td><td>P</td><td>C</td></tr>
<tr><td>3</td><td>0</td><td>0</td><td>3</td></tr>
</table>

Syllabus Details

Course Outcome:

The students will be able to

13. CO1: Describe concepts of volatile and non-volatile memory technologies.

14. CO2: Discuss the fault modeling and testing memory devices.

15. CO3: Explain the reliability and radiation effects of memory devices.

16. CO4: Describe the advanced memory technologies.

UNIT-I: Random Access Memory Technologies

SRAM – SRAM Cell structures, MOS SRAM Architecture, MOS SRAM cell and peripheral circuit operation, Bipolar SRAM technologies, SOI technology, Advanced SRAM architectures and technologies, Application specific SRAMs, DRAM – DRAM technology development, CMOS DRAM, DRAM cell theory and advanced cell structures, BICMOS DRAM, soft error failure in DRAM, Advanced DRAM design and architecture, Application specific DRAM.

UNIT-II: Non-volatile Memories

Masked ROMs, High density ROM, PROM, Bipolar ROM, CMOS PROMS, EPROM, Floating gate EPROM cell, One time programmable EPROM, EEPROM, EEPROM technology and architecture, Non-volatile SRAM, Flash Memories (EPROM or EEPROM), advanced Flash memory architecture.

UNIT-III: Memory Fault Modeling Testing and Memory Design for Testability and Fault Tolerance

RAM fault modeling, Electrical testing, Pseudo Random testing, Megabit DRAM Testing, nonvolatile memory modeling and testing, IDDQ fault modeling and testing, Application specific memory testing, RAM fault modeling, BIST techniques for memory.

UNIT-IV: Semiconductor Memory Reliability and Radiation Effects

General reliability issues RAM failure modes and mechanism, Non-volatile memory reliability, reliability modeling and failure rate prediction, Design for Reliability, Reliability Test Structures, Reliability Screening and qualification, Radiation effects, Single Event Phenomenon (SEP), Radiation Hardening techniques, Radiation Hardening Process and Design Issues, Radiation Hardened Memory characteristics, Radiation Hardness Assurance and Testing, Radiation. Dosimetry, Water Level Radiation Testing and Test structures.

UNIT-V: Advanced Memory Technologies and High-density Memory Packing Technologies

Ferroelectric RAMs (FRAMs), GaAs FRAMs, Analog memories, magneto resistive RAMs (MRAMs), Experimental memory devices, Memory Hybrids and MCMs (2D), Memory Stacks and MCMs (3D), Memory MCM testing and reliability issues, Memory cards, High Density Memory Packaging Future Directions.

TEXT BOOKS:

1. Semiconductor Memories Technology – Ashok K. Sharma, 2002, Wiley.

2. Advanced Semiconductor Memories – Architecture, Design and Applications - Ashok
K. Sharma- 2002, Wiley.
3. Modern Semiconductor Devices for Integrated Circuits – Chenming C Hu, 1st Ed,
Prentice Hall.

II Sem.	**Hardware Software Co-Design (Elective-IV)**	**Course Code:V21ESVT14**	**L**	**T**	**P**	**C**
			3	**0**	**0**	**3**

Syllabus Details

Course Outcome:

The students will be able to

- CO1: Describe co-design architectures, methods and algorithms.

- CO2: Describe prototyping emulation and target architecture using embedded Systems.
- CO3: Explain the compilation techniques.
- CO4: Distinguish the various design specifications and verifications.
- CO5: Describe the system level specifications and design using languages.

UNIT-I: Co- Design Issues:

Co- Design Models, Architectures, Languages, A Generic Co-design Methodology.

Co- Synthesis Algorithms Hardware software synthesis algorithms: hardware – software partitioning distributed system co-synthesis.

UNIT-II:

Prototyping and Emulation Prototyping and emulation techniques, prototyping and emulation environments, future developments in emulation and prototyping architecture specialization techniques, system communication infrastructure

Target Architectures Architecture Specialization techniques, System Communication infrastructure, target Architecture and Application System classes, Architecture for control dominated systems (8051-Architectures for High performance control), Architecture for Data dominated systems (ADSP21060, TMS320C60) and Mixed Systems.

UNIT-III:

Compilation Techniques and Tools for Embedded Processor Architectures Modern embedded architectures, embedded software development needs, compilation technologies and practical consideration in a compiler development environment.

UNIT-IV:

Design Specification and Verification Design, co-design, the co-design computational model, concurrency coordinating con current computations, interfacing components, design verification, implementation verification, verification tools, interface verification.

UNIT-V:

Languages for System-Level Specification and Design-I System-level specification, design representation for system level synthesis, system level specification languages.

Languages for System-Level Specification and Design-II

Heterogeneous specifications and multi-language co-simulation, the cosyma system and lycos system.

TEXT BOOKS:

1. Hardware / Software Co- Design Principles and Practice – JorgenStaunstrup, Wayne Wolf – 2009, Springer.
2. Hardware / Software Co- Design - Giovanni De Micheli, MariagiovannaSami, 2002, Kluwer Academic Publishers.

REFERENCE BOOKS:

1. A Practical Introduction to Hardware/Software Co-design -Patrick R.Schaumont - 2010 – Springer Publications.

			L	T	P	C
II Sem.	**Embedded Computing (Elective-IV)**	**Course Code:V21ESVT15**	**3**	**0**	**0**	**3**

Syllabus Details

Course Outcome:
The students will be able to

- CO1: Understand the concepts of Linux OS programming –**[K2]**
- CO2: Describe the different software development tools **[K2]**
- CO3: Explain different interfacing modules – **[K2]**
- CO4: Discuss the networking basics –**[K2]**
- CO5: Explain the basic concepts of LPC17xx Microcontroller –**[K2]**

UNIT-I
Programming on Linux Platform:
System Calls, Scheduling, Memory Allocation, Timers, Basics of Embedded Linux, Root File System, Busy Box.
UNIT-II
Introduction to Software Development Tools
GNU GCC,make, gdb, static and dynamic linking, C libraries, compiler options, code optimization switches.
UNIT-III
Interfacing Modules
Sensor and actuator interface, data transfer and control, GSM module interfacing with data processing and display.
UNIT-IV
Networking Basics
Sockets, ports, UDP, TCP/IP, client server model, socket programming.
UNIT-V
LPC 17xx microcontroller- Internal memory, GPIOs, Timers, ADC, UART and other serial interfaces, PWM, RTC, WDT.

TEXT BOOKS:

1. Modern Embedded Computing - Peter Barry and Patrick Crowley, 1st Ed., Elsevier/Morgan Kaufmann, 2012.
2. Linux Application Development - Michael K. Johnson, Erik W. Troan, Adission Wesley, 1998.
3. Assembly Language for x86 Processors by Kip R. Irvine

REFERENCE BOOKS:

1. Operating System Concepts by Abraham Silberschatz, Peter B. Galvin and Greg Gagne.
2. Technical references and user manuals on www.arm.com.
3. The Design of the UNIX Operating System by Maurice J. Bach Prentice-Hall
4. UNIX Network Programming by W. Richard Stevens.

<table>
<tr><td rowspan="2">II Sem.</td><td rowspan="2">Communication Buses and Interfaces (Elective-IV)</td><td rowspan="2">Course Code: V21ESVT16</td><td>L</td><td>T</td><td>P</td><td>C</td></tr>
<tr><td>3</td><td>0</td><td>0</td><td>3</td></tr>
</table>

Syllabus Details

Course Outcomes:
At the end of the course, students will be able to:

- CO1: Select a particular serial bus suitable for a particular application.
- CO2: Develop APIs for configuration, reading and writing data onto serial bus.
- CO3: Design and develop peripherals that can be interfaced to desired serial bus.

UNIT-I
Serial Busses- Cables, Serial busses, serial versus parallel, Data and Control Signal-data frame, data rate, features Limitations and applications of RS232, RS485, I2C , SPI

UNIT-II: CAN
ARCHITECTURE- ISO 11898-2, ISO 11898-3, Data Transmission- ID allocation, Bit timing, Layers- Application layers, Object layer, Transfer layer, Physical layer, Frame formats- Data frame, Remote frame, Error frame, Over load frame, Ack slot, Inter frame spacing, Bit spacing, Applications.

UNIT-III: PCIe
Revision, Configuration space- configuration mechanism, Standardized registers, Bus enumeration, Hardware and Software implementation, Hardware protocols, Applications.

UNIT-IV: USB
Transfer Types- Control transfers, Bulk transfer, Interrupt transfer, isochronous transfer. Enumeration- Device detection, Default state, addressed state, Configured state, enumeration sequencing. Descriptor types and contents- Device descriptor, configuration descriptor, Interface descriptor, Endpoint descriptor, String descriptor.Device driver.

UNIT-V
Data streaming Serial Communication Protocol- Serial Front Panel Data Port(SFPDP) configurations, Flow control, serial FPDP transmission frames, fiber frames and copper cable.

TEXTBOOKS

1. A Comprehensive Guide to controller Area Network – Wilfried Voss, Copperhill Media

Corporation, 2nd Ed., 2005.
2. Serial Port Complete-COM Ports, USB Virtual Com Portsand Ports for Embedded
Systems- JanAxelson, Lakeview Research, 2nd Ed.,

REFERENCES

1. USB Complete – Jan Axelson, Penram Publications.
2. PCI Express Technology – Mike Jackson, Ravi Budruk, Mindshare Press.

II Sem.	Analog and Digital CMOS VLSI Design Lab	Course Code: V21ESVL03	L	T	P	C
			0	0	4	2

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

- CO1 -Analyse the Characteristics of MOS Device **(K3)**
- CO2 -Analyse the basic MOS Amplifiers and current mirrors **(K3)**
- CO3 -Design the various MOS Amplifiers. **(K4)**
- CO4 -Demonstrate various CMOS combinational Digital circuits **(K2)**
- CO5- Demonstrate various CMOS Sequential Digital circuits **(K2)**

The students are required to design and implement the Circuit and Layout of any 10Experiments using CMOS 130nm Technology with Mentor Graphics Tool/Cadence/ Synopsys/Industry Equivalent Standard Software.

List of Experiments:

1. MOS Device Characterization and parametric analysis
2. Common Source Amplifier
3. Common Source Amplifier with source degeneration
5. Simple current mirror
6. Cascade current mirror.
7. Wilson current mirror.
8. Differential Amplifier.

8. Full Adder
9. RS-Latch
10. Clock Divider
11. JK-Flip Flop
12. Synchronous Counter
13. Asynchronous Counter
14. Static RAM Cell

II Sem.	Real Time Operating Systems Lab	Course Code:V21ESVL04	L	T	P	C
			0	0	4	2

Syllabus Details

- The Students are required to write the programs using C-Language according to the Experimentrequirements using RTOS Library Functions and macros ARM-926 developer kits and ARMCortex.
- The following experiments are required to develop the algorithms, flow diagrams, source codeand perform the compilation, execution and implement the same using necessary hardware kitsfor verification. The programs developed for the implementation should be at the level of anembedded system design.
- The students are required to perform at least SIX experiments from Part-I and TWO experimentsfrom Part-II.

List of Experiments:
Part-I:
Experiments using ARM-926 with PERFECT RTOS

1. Register a new command in CLI.
2. Create a new Task.
3. Interrupt handling.
4. Allocate resource using semaphores.
5. Share resource using MUTEX.
6. Avoid deadlock using BANKER"S algorithm.
7. Synchronize two identical threads using MONITOR.
8. Reader'sWrite's Problem for concurrent Tasks.

Part-II
Experiments on ARM-CORTEX processor using any open source RTOS. (Coo-Cox-Software-Platform)

1. Implement the interfacing of display with the ARM- CORTEX processor.
2. Interface ADC and DAC ports with the Input and Output sensitive devices.

3. Simulate the temperature DATA Logger with the SERIAL communication With PC.
4. Implement the developer board as a modem for data communication using Serial port communication between two PC"s.

Lab Requirements:
Software:

- Eclipse IDE for C and C++ (YAGARTO Eclipse IDE), Perfect RTOS Library, COO-COX Software Platform, YAGARTO TOOLS, and TFTP SERVER.
- LINUX Environment for the compilation using Eclipse IDE & Java with latest

Version.
Hardware:

- The development kits of ARM-926 Developer Kits and ARM-Cortex Boards.
- Serial Cables, Network Cables and recommended power supply for the board.

III Semester

SYLLABUS

III Sem.	IoT and its Applications	Course Code: V21ESVT17	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcome: The student will be able to

- CO1: Describe M2M and IOT Technologies. **[K2]**
- CO2: Explain the layers, protocols and communication technologies in IOT. **[K2]**
- CO3: Illustrate various hardware components required for IOT applications**. [K2]**
- CO4: Discuss the cloud technologies and their services. **[K2]**
- CO5: Explain the IoT Applications. **[K2]**

UNIT-I INTRODUCTION [1, 2]
Introduction from M2M to IoT - An Architectural Overview, building architecture, Main design principles and needed capabilities, An IoT architecture outline, M2M and IoT Technology Fundamentals; Sensors, Actuators, RFID, Wireless Sensor Networks, Devices and gateways.

UNIT-II IOT PROTOCOLS & COMMUNICATION TECHNOLOGIES [2, 4]
Functionalityof Layers in IoT, IoT Connectivity – IEEE 802.15.4, Wi-Fi, Bluetooth, Zigbee, LPWAN, 5G.
Study of protocols - 6LoWPAN, CoAP, MQTT.

UNIT-III DESIGN AND DEVELOPMENT [3, 4]
Design Methodology, Embedded computing logic, IoT system building blocks, Raspberry Pi - Board details, sensor/actuator Interface using Python Programming.

UNIT-IV Cloud Computing [3, 4]
Structured Vs. Unstructured Data and Data in Motion Vs. Data in Rest, Role of Machine Learning; Data Collection, Storage and Computing Using a Cloud Platform for IoT Applications/Services, AWS for IoT – Introduction to Amazon EC2.

UNIT-V IOT APPLICATIONS [2, 3]
CASE STUDIES/INDUSTRIAL APPLICATIONS: Case Studies - Home appliances, Smart and Connected Cities, Public Safety, Agriculture, Introduction to Industry 4.0.

TEXTBOOKS:

1. Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, StamatisKarnouskos,
David Boyle, “From Machine-to-Machine to the Internet of Things: Introduction to a New
Age of Intelligence”, 1st Edition, Academic Press, 2014.
2. IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet
Of Things, David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome
Henry and Cisco Press 800 East 96th Street Indianapolis, Indiana 46240 USA
3. Daniel Minoli, “Building the Internet of Things with IPv6 and MIPv6: The Evolving World
Of M2M Communications”, ISBN: 978-1-118- 47347-4, Willy Publications
4. IOT (Internet of Things) Programming: A Simple and Fast Way of Learning IOT by David
Etter(Author)
5. Internet of Things - By Raj Kamal, McGraw-Hill Education. Copyright.

REFERENCE BOOKS:

1. From Internet of Things to Smart Cities: Enabling Technologies - edited by Hongjian
Sun, Chao Wang, Bashar I. Ahmad, CRC Press -2018.
2. Peter Waher, “Learning Internet of Things”, PACKT publishing, BIRMINGHAM

3. Bernd Scholz-Reiter, Florian Michahelles, “Architecting the Internet of Things”, ISBN
978-3-642-19156-5 e-ISBN 978-3-642-19157-2, Springer
4. Vijay Madisetti and ArshdeepBahga, “Internet of Things (A Hands-on-Approach)”, 1st
Edition, VPT, 2014.

<table>
<tr><td rowspan="2">III Sem.</td><td rowspan="2">Low Power VLSI Design</td><td rowspan="2">Course Code: V21ESVT18</td><td>L</td><td>T</td><td>P</td><td>C</td></tr>
<tr><td>3</td><td>0</td><td>0</td><td>3</td></tr>
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Syllabus Details

Course Outcome:

The students will be able to

- CO1: Identify various sources of power consumption
- CO2: Estimate the power consumption sing simulation and probabilistic

Approaches.

- CO3: Discuss low power design at various levels of abstraction.
- CO4: Discuss clock distribution for low power dissipation.

UNIT-I: Introduction

Need for low power VLSI chips, Sources of power dissipation. Emerging Low power approaches. Dynamic dissipation in CMOS, Transistor sizing & gate oxide thickness, Impact of technology Scaling, Technology & Device innovation.

UNIT-II: Power estimation Simulation Power analysis:

SPICE circuit simulators, gate level logic simulation, capacitive power estimation, static state power, gate level capacitance estimation, architecture level analysis, data correlation analysis in DSP systems. Monte Carlo simulation.

Probabilistic power analysis:

Random logic signals, probability & frequency, probabilistic power analysis techniques, signal entropy.

UNIT-III: Low Power Design Circuit level:

Power consumption in circuits. Flip Flops & Latches design, high capacitance nodes, low power digital cells library

Logic level:

Gate reorganization, signal gating, logic encoding, state machine encoding, pre-computation logic

UNIT-IV: Low power Architecture & Systems:

Power & performance management, switching activity reduction, parallel architecture with voltage reduction, flow graph transformation, low power arithmetic components, low power memory design.

UNIT-V: Low power Clock Distribution:

Power dissipation in clock distribution, single driver vs. distributed buffers, Zero skew vs. tolerable skew, chip & package co design of clock network

Algorithm &architectural level methodologies: Introduction, design flow, Algorithmic level analysis & optimization, Architectural level estimation & synthesis.

TEXTBOOKS:

1. Gary K. Yeap, “Practical Low Power Digital VLSI Design”, KAP, 2002
2. Rabaey, Pedram, “Low power design methodologies” Kluwer Academic, 1997

REFERENCES BOOKS:

1. Kaushik Roy, Sharat Prasad, “Low-Power CMOS VLSI Circuit Design” Wiley, 2000

Annexure-VII

SRI VASAVI ENGINEERING COLLEGE (AUTONOMOUS)

(Sponsored by Sri Vasavi Educational Society)

(Approved by AICTE, New Delhi & Permanently affiliated to JNTUK, Kakinada)

(Accredited by NAAC with 'A' Grade ,Recognized by UGC under section 2(f) & 12(B))

Pedatadepalli, **TADEPALLIGUDEM – 534 101.** W.G.Dist**. (A.P)**

Department of Computer Science & Engineering (Accredited by NBA)

Dt: 03.09.2021

The 5th Meeting of Board of Studies in Department of Computer Science and Engineering is held at 02.00 PM on 02-09-2021 through online mode using,

https://us02web.zoom.us/j/86328881824

The following members attended the meeting:

S.No.	Name of the Member	Designation	Role
1.	Dr. D Jaya Kumari	Professor, HoD-CSE, SVEC	Chairperson
2.	Dr.Krishna Mohan Ankala	Professor, UCEK, Kakinada	University Nominee
3.	Dr. R.B.V. Subramanyam	Professor, Department of CSE, NIT Warangal	Academic Expert
4.	Dr. S Pallam Setty	Professor, Department of CSE, Andhra University, Vishakapatnam	Academic Expert
5.	Sri. Srinivasa Raju Vuppalapati	Senior Consultant, MSR IT Services LLP, Hitech City, Hyderabad.	Industry Expert
6.	Mr.EEdala Rambabu	microfocus, Bangalore	Alumni
7.	Sri Ch. Apparao	Technical Director	Invited Member
8.	Dr. V. Venkateswara Rao	Professor	Member
9.	Dr. G Loshma	Professor	Member
10.	Dr. V S Naresh	Professor	Member
11.	Ch. Raja Ramesh	Associate Professor	Member
12.	Dr.K. ShirinBhanu	Associate Professor	Member
13.	A. Leelavathi	Sr. Assistant Professor	Member

14.	D Anjani Suputhri Devi	Sr. Assistant Professor	Member
15.	R. LeelaPhani Kumar	Assistant Professor	Member
16.	D Sasi Rekha	Assistant Professor	Member
17.	B.SriRamya	Assistant Professor	Member
18.	G.Sriram Ganesh	Assistant Professor	Member
19.	N.V.Murali Krishna Raja	Assistant Professor	Member
20.	N. Hiranmayee	Assistant Professor	Member
21.	A Rajesh	Assistant Professor	Member
22.	Y.DivyaVani	Assistant Professor	Member
23.	K Lakshmi Narayana	Assistant Professor	Member
24.	M NageswaraRao	Assistant Professor	Member
25.	B Kiran Kumar	Assistant Professor	Member
26.	D.S L Manikanteswari	Assistant Professor	Member
27.	P Uma Sankar	Assistant Professor	Member
28.	M V V Krishna	Assistant Professor	Member
29.	M. Anantha Lakshmi	Assistant Professor	Member
30.	K Venkatesh	Assistant Professor	Member
31.	M. Satyanarayana Reddy	Assistant Professor	Member
32.	J.N. Chandra Sekhar	Assistant Professor	Member
33.	David Raju. K	Assistant Professor	Member
34.	P Suneetha	Assistant Professor	Member
35.	M Sree Radha Mangamani	Assistant Professor	Member
36.	Ch Hemanandh	Assistant Professor	Member
37.	M Chilaka Rao	Assistant Professor	Member
38.	G V Lakshmi Narayana	Assistant Professor	Member
39.	A Nageswara Rao	Assistant Professor	Member
40.	A NagaJyothi	Assistant Professor	Member
41.	G Prashanthi	Assistant Professor	Member

The following are the Minutes of the Meeting

Item No.1: Welcome note by the Chairperson BOS.

Chairperson BOS extended a formal welcome and introduced the members.

Item No.2: Progress Report of the Department

Chairperson BOS had given the Brief Progress Report of the Department.

Item No.3: Review of Course Structure for VII and VIII Semesters of B.Tech(CSE) Programme under V18 Regulation.

Reviewed the Course Structure of VII & VIII Semesters of B.Tech (CSE) Programme under V18 Regulation**.** The approved Course Structure is given in **Annexure-I.**

Item No.4: Approval of Syllabi for the Proposed Courses offered in VII and VIII Semesters of B.Tech(CSE) Programme under V18 Regulation.

Approved the Syllabi for the courses offered in VII & VIII semesters of B.Tech(CSE) Programme under V18 Regulation and suggested the following changes:

SEM	Course Code	Suggestions	Inclusions / Modifications
VII	V18CST27	In AJWT Course it was suggested that AngularJS need to be replaced by Angular.	AngularJS concepts modified as Angular.

The Modified and Approved Syllabus is given in **Annexure-II.**

Item No.5: Approval of Course Structure for V to VIII Semesters of B.Tech(CST) Programme under V18 Regulation.

Approved Course Structure for VII & VIII Semesters for B.Tech (CST) Programme under V18 Regulation. The approved Course Structure is given in **Annexure-III**.

Item No.6: Approval of Syllabi for Proposed Courses offered in V to VIII Semesters of B.Tech(CST) Programme under V18 Regulation..

Approved the syllabi for the courses offered in V to VIII semesters of B.Tech(CST) Programme under V18 Regulation and suggested the following changes:

SEM	Course Code	Suggestions	Inclusions / Modifications
VII	V18CST27	In AJWT Course it was suggested that AngularJS need to be replaced by Angular.	AngularJS concepts modified as Angular.

The Modified and Approved Syllabus is given in **Annexure-IV.**

Item No.7: Approval of list of Courses offering under Open Elective-II & Open Elective-III in VII and VIII Semesters respectively under V18 Regulation for all other branches and the approval of their Syllabi.

Approved the list of Courses and Syllabi offered under Open Elective-II & Open Elective-III in VII and VIII Semesters respectively under V18 Regulation for all other branches. The approved Courses and Syllabi are given in **Annexure-V.**

Item No.8:Approval of Course Structure for III to VIII Semesters of B.Tech(CSE) and B.Tech(CST) Programme under V20 Regulation.

Reviewed the Course Structure for III to VIII Semesters for B.Tech(CSE) and B.Tech(CST) Programme under V20 Regulation and suggested the following changes:

Suggestions	Inclusions / Modifications
Suggested to include UML Lab in V Semester	Incorporated UML Lab in V Semester and Merged the AI & DM Labs
In Pool of Skill Oriented Courses add Secure DevOps and remove Source Code Management Using Git & Github.	Included Secure DevOps in pool of Skill Oriented Courses.
In Open Elective replace Computer Organization and Architecture course with Some other course.	Replaced the Open Elective Computer Organization and Architecture course with Information Retrieval Systems.

The Modified and Approved Course Structure is given in **Annexure-VI**.

Item No.9: Approval of Syllabi for Proposed Courses offered in III and IV Semesters of B.Tech (CSE) and B.Tech(CST) Programme under V20 Regulation.

Approved the syllabi for the courses offered in III and IV Semesters of B.Tech (CSE) and B.Tech(CST) Programme under V20 Regulation and suggested the following changes:

SEM	Course Code	Suggestions	Inclusions / Modifications
III	V20CSL03	In OOP through C++ Lab add concepts like how to debug and create libraries using GDB	Included GDB Lab Task in OOP through C++ Lab.
IV	V20CST07	In DAA Course add NP Hard & NP	Included Basic

		Complete Introduction Concepts	Concepts of NP-Hard and NP-Complete problems in UNIT-V.

The Modified and Approved Syllabus is given in **Annexure-VII**.

Item No.10: Approval of Proposed Courses and Syllabi for other branches under V20 Regulation.

Approved the Proposed Courses and Syllabi for other branches under V20 Regulation. The approved Courses and Syllabi are given in**Annexure-VIII**.

Item No.11: Approval of Course Structure and Syllabi for I to IV Semesters of M.Tech(CS) Programme under V21 Regulation.

Approved the Course Structure and Syllabi for I to IV Semesters of M.Tech(CS) Programme under V21 Regulation and suggested the following changes:

SEM	Course Code	Suggestions	Inclusions / Modifications
I	V21CTT06 **(Program Elective-II)**	**Advanced Databases:** - Add Graph Databases / neo4j : Real Time Case Studies - Add Time series Databases: Real Time Case Studies.	Included, as per the suggestions given by the BOS Members
I	V21CTT07 **(Program Elective-II)**	**Advanced computer networks:** - Add SDN - Software Defined Networks - Real Time Case Study	Included, as per the suggestions given by the BOS Members

The Modified and Approved Course Structure and Syllabus is given in **Annexure-IX.**

Dr.D Jaya Kumari

Chairperson of BOS

Annexure-I

<table>
<tr><th rowspan="2">S.No.</th><th colspan="8">VII – Semester</th></tr>
<tr><th>Course Code</th><th>Category</th><th>Course</th><th>L</th><th>T</th><th>P</th><th>C</th></tr>
<tr><td>1</td><td>V18CST27</td><td>PCC</td><td>Advanced Java and Web Technologies</td><td>3</td><td>0</td><td>0</td><td>3</td></tr>
<tr><td>2</td><td>V18MBET52</td><td>HSS</td><td>Management Science</td><td>3</td><td>0</td><td>0</td><td>3</td></tr>
<tr><td rowspan="5">3</td><td colspan="7">Elective – III</td></tr>
<tr><td>V18CST28</td><td rowspan="4">PEC</td><td>1. Advanced Operating Systems</td><td rowspan="4">3</td><td rowspan="4">0</td><td rowspan="4">0</td><td rowspan="4">3</td></tr>
<tr><td>V18CST29</td><td>2. Statistics with R Programming</td></tr>
<tr><td>V18CST30</td><td>3. Information Retrieval Systems</td></tr>
<tr><td>V18CST31</td><td>4 Human Computer Interaction</td></tr>
<tr><td rowspan="5">4</td><td colspan="7">Elective – IV</td></tr>
<tr><td>V18CST32</td><td rowspan="4">PEC</td><td>1.Distributed Systems</td><td rowspan="4">3</td><td rowspan="4">0</td><td rowspan="4">0</td><td rowspan="4">3</td></tr>
<tr><td>V18CST33</td><td>2.Scripting Languages</td></tr>
<tr><td>V18CST34</td><td>3.Deep Learning</td></tr>
<tr><td>V18CST35</td><td>4.Social Networks and Semantic Web</td></tr>
<tr><td>5</td><td>Open Elective – II
(Interdisciplinary)</td><td>OEC</td><td>OPE II(1-3)</td><td>3</td><td>0</td><td>0</td><td>3</td></tr>
<tr><td>6</td><td>V18CSL10</td><td>PCC</td><td>Advanced Java and Web Technologies Lab</td><td>0</td><td>0</td><td>2</td><td>1</td></tr>
<tr><td>7</td><td>V18CSP01</td><td>Project</td><td>Project Work (Part-A)</td><td>0</td><td>0</td><td>06</td><td>3</td></tr>
<tr><td colspan="4">Total</td><td>15</td><td>0</td><td>08</td><td>19</td></tr>
</table>

Total Contact Hours: 23

	VIII – Semester						
S.No.	**Course Code**	**Category**	**Course**	**L**	**T**	**P**	**C**
1	**Elective – V**						
	V18CST36	PEC	1. Software Project Management	3	0	0	3
	V18CST37		2. Big Data Analytics				
	V18CST38		3. Soft Computing				
	V18CST39		4. Cloud Computing				
2	**Elective – VI**			3	0	0	3
	V18CST40	PEC	1. Software Architecture and Design Patterns				
	V18CST41		2. Middleware Technologies				
	V18CST42		3. Natural Language Processing				
	V18CST43		4. Cyber Security				
3	**Open Elective – III** (**Interdisciplinary**)	OEC	**OPE III(1-3)**	3	0	0	3
4	V18CSP02	Project	Project Work (Part-B)	0	0	16	8
Total				**9**	**0**	**16**	**17**

Total Contact Hours: 25

Annexure-II

VII Sem	**Advanced Java and Web Technologies**	Course Code: VI8CST27	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Illustrate the basic concepts of HTML and CSS (K2)

CO2: Develop dynamic webpages and validate with java Script. (K3)

CO3: Illustrate Extensible markup language (K2)

CO4: Illustrate the basic concepts of NODE JS and Angular. (K2)

CO5: Build database driven web applications using JSP (K3)

CO6: Develop web applications using PHP and MySQL (K3)

UNIT-I :HTML: Basic Syntax, Standard HTML Document Structure, Basic Text Markup, Images, Hypertext Links, Lists, Tables, Frames Forms.CSS: Cascading style sheets, Levels of Style Sheets, Style Specification Formats, Selector Forms.

UNIT-II: JavaScript & DHTML: Overview of JavaScript, General Syntactic Characteristics, Primitives Operations and Expressions, Screen output and Keyboard Input, Control Statements, Object creation and Modification, Arrays, Functions, Constructors, Pattern Matching using Regular Expressions, Events and Event Handling.

UNIT-III: Working with XML: Introduction, The syntax of XML, XML Document Structure, Document Type Definition (DTD), Namespaces, XML schemas, XSLT, XML Parsers - DOM and SAX.

UNIT-IV: Fundamentals of NODE JS and Angular: Understanding Node.js, Installing Node.js, Working with Node Packages, Creating a Node.js Application, Understanding Angular, Modules, Directives, Data Binding, Dependency Injection, Services, Separation of Responsibilities, Creating a Basic Angular Application.

UNIT-V: Introduction to Servlets & JSP: Introduction to servlets, Life cycle of Servlet, Limitations of servlets, Java Server Pages: JSP Overview, Components of a JSP Page: Directives, comments, Expressions, Scriptlets, Declarations, implicit objects, Database Access, session tracking.

UNIT-VI: PHP Programming: Overview of PHP, General syntactic characteristics, Primitives, operations, Expressions, Output, Control statements, Arrays, Functions, Pattern Matching, Form Handling, Cookies, Session Tracking. PHP with MySQL connectivity.

Text Books:

1. Programming the World Wide Web, 7th Edition, Robet W Sebesta, Pearson, 2013.
2. Node.js, MongoDB and Angular Web Development, 2nd Edition,Brad Dayley Brendan Dayley Caleb Dayley,Pearson Education,2018
3. JSP:The Complete reference,Phil Hanna,The McGraw-Hill Copanies,2001

Reference Books:

1. Web Technologies: HTML, JavaScript, PHP, Java, JSP, XML and AJAX, Black book, Dream Tech.

2. An Introduction to Web Design, Programming, Paul S Wang, Sanda S Katila, Cengage Learning

3. Web Technologies, 1st Edition 7th impression, Uttam K Roy, Oxford, 2012.

VII Sem	Advanced Operating Systems (**Elective – III)**	Course Code: VI8CST28	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe Architectures of Distributed Systems and Distributed Mutual Exclusion. **(K2)**
CO2: Illustrate the concepts of Deadlock Handling Strategies in Distributed Systems. **(K3)**
CO3: Explain the various Resource Management Techniques for Distributed Systems. **(K2)**
CO4: Discuss Fault Tolerance and Fault Recovery concepts in Distributed Systems . **(K2)**
CO5: Interpret the concepts of Cryptography and Data Security in Distributed Systems. **(K3)**
CO6: Describe Multiprocessor Operating System, Process Synchronization, Scheduling. **(K2)**

UNIT I: Architectures of Distributed Systems –System Architecture types - issues in distributed operating systems - communication networks - communication primitives. Distributed Mutual Exclusion - introduction - the classification of mutual exclusion and associated algorithms

UNIT II: Distributed Deadlock Detection -Introduction - deadlock handling strategies in distributed systems - issues in deadlock detection and resolution - control organizations for distributed deadlock detection - centralized and distributed deadlock detection algorithms -hierarchical deadlock detection algorithms.

UNIT III: Distributed Resource Management- Algorithms for implementing DSM - memory coherence and protocols - design issues. Distributed Scheduling - introduction - issues in load distributing - components of a load distributing algorithm - stability - load distributing algorithm – performance comparison - selecting a suitable load sharing algorithm - requirements for load distributing.

UNIT IV: Failure Recovery and Fault tolerance: Introduction- basic concepts - classification of failures - backward and forward error recovery, backward error recovery- recovery in concurrent systems - consistent set of check points - synchronous and asynchronous check pointing and recovery - check pointing for distributed database systems- recovery in replicated distributed databases.

UNIT V: Protection and Security - Preliminaries, the access matrix model and its implementations.-safety in matrix model, advanced models of protection. Data security - cryptography: Model of cryptography, conventional cryptography- modern cryptography, multipleencryptions - authentication in distributed systems.

UNIT VI: Multiprocessor Operating Systems - Basic multiprocessor system architectures - inter connection networks for multiprocessor systems .Multiprocessor Operating System - structures of multiprocessor operating system, operating system design issues- threads- process synchronization and scheduling.

Text Books:

1. Advanced Concepts in Operating Systems: Distributed, Database and Multiprocessor Operating Systems, MukeshSinghal, NiranjanG.Shivaratri,TMH, 2001.

2. Distributed Operating System-Concepts and Design,PradeepK.Sinha ,PHI, 2003.

Reference Books:

1. Modern operating system, Andrew S.Tanenbaum, PHI, 2003

2. Distributed operating system,Andrew S.Tanenbaum,Pearson education, 2003.
3. Operating System Concepts, Abraham Silberschatz; Peter Baer Galvin; Greg Gagne, Seventh Edition, John Wiley & Sons, 2004.

VII Sem	Statistics with R Programming (**Elective – III)**	Course Code: VI8CST29	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Illustrate different data structures in R. **(K2)**
CO2: Demonstrate about control statements and functions in R. **(K3)**
CO3: Compute different mathematical operations using R pre defined functions. **(K3)**

CO4: Construct and edit visualizations with R. **(K3)**
CO5: Identify appropriate statistical tests using R. **(K2)**
CO6: Examine linear and non linear models to create testable hypotheses. **(K3)**

UNIT I: Introduction and Data Structures: Introduction, How to install and run R, R Sessions, Functions, Basic Math, constants, Variables, Expressions, Reserved words in R, Arithmetic, and Boolean Operators and values, Data Types, Vectors, Advanced Data Structures: Data Frames, Lists, Matrices, Arrays, Classes.

UNIT II: Control Statements and Functions in R: R Programming Structures, Control Statements, Loops, – Looping Over Nonvector Sets,- If-Else, Default Values for Argument, return values, Deciding Whether to explicitly call return- returning Complex Objects, Functions are Objects, No Pointers in R, Recursion, A Quick sort Implementation- Extended Example: A Binary Search Tree.

UNIT III: Math and Simulation and Input/output in R: Doing Math and Simulation in R, Math Function, Extended Example Calculating Probability Cumulative Sums and Products-Minima and Maxima- Calculus, Functions for Statistical Distribution, Sorting, Linear Algebra, Operations on Vectors and Matrices, Extended Example: Vector cross Product, Set Operations. **Input /output:** Accessing the Keyboard and Monitor, Reading and writing Files

UNIT IV: Graphics: Graphics, Creating Graphs, The Workhorse of R Base Graphics, the plot() Function ,Customizing Graphs, Saving Graphs to Files.

UNIT V: Probability Distributions and Basic Statistics: Probability Distributions, Normal Distribution- Binomial Distribution- Poisson Distributions Other Distribution, Basic Statistics, Correlation and Covariance, T-Tests,-ANOVA.

UNIT VI: Linear Models in R: Linear Models, Simple Linear Regression, -Multiple Regression Generalized Linear Models, Logistic Regression, - Poisson Regression, Nonlinear Models, Splines- Decision- Random Forests.

Text Books:

1. R for Everyone, Lander, Pearson, 2nd edition 2018.
2. The Art of R Programming, Norman Matloff, Cengage Learning, 2nd edition, 2017.

Reference Books:

1. R Cookbook, PaulTeetor, Oreilly, 2nd edition, 2017.
2. R in Action, Rob Kabacoff, Manning, 3rd edition, 2019.

VII Sem	Information Retrieval Systems (**Elective – III)**	Course Code: VI8CST30	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Identify the basic concepts of information retrieval. **(K2)**
CO2: Describe the Capabilities of IRS, cataloging and indexing. **(K2)**
CO3: Explain the data structures and retrieving documents. **(K2)**
CO4: Describe the difficulty of representing and retrieving documents. **(K2)**
CO5: Explain the latest technologies for describing and searching the web. **(K2)**
CO6: Illustrate searching procedure for user-text and Information System Evaluation. **(K2)**

UNIT I: Introduction: Definition, Objectives, Functional Overview, Relationship to DBMS, Digital libraries and Data Warehouses.

UNIT II: Information Retrieval System Capabilities: Search, Browse, Miscellaneous **Cataloging and Indexing:** Objectives, Indexing Process, Automatic Indexing, Information Extraction.

UNIT III: Data Structures: Introduction, Stemming Algorithms, Inverted file structures, N-gram data structure, PAT data structure, Signature file structure, Hypertext data structure.

UNIT IV:Automatic Indexing: Classes of automatic indexing, Statistical indexing, Natural language, Concept indexing, Hypertext linkages. **Document and Term Clustering:** Introduction, Thesaurus generation, Item clustering, Hierarchy of clusters.

UNIT V: User Search Techniques: Search statements and binding, Similarity measures and ranking, Relevance feedback, Selective dissemination of information search, weighted searches of Boolean systems, Searching the Internet and hypertext. **Information Visualization:** Introduction, Cognition and perception, Information visualization technologies.

UNIT VI: Text Search Algorithms: Introduction, Software text search algorithms, Hardware text search systems. **Information System Evaluation:** Introduction, Measures used in system evaluation, Measurement example – TREC results.

Text Books:

1. Information Storage and Retrieval System: Theory and Implementation, Gerald J. Kowalski, Mark T. Maybury, 2nd edition, 2002, Kluwer Academic Press.

Reference Books:

1. Information Retrieval Data Structures and Algorithms, Frakes, W.B., Ricardo Baeza-Yates Prentice Hall.
2. Information Storage & Retrieval by Robert Korfhage – John Wiley & Sons, Wiley computer publisher, 1997.

VII Sem	Human Computer Interaction (**Elective – III)**	Course Code: VI8CST31	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe the principles and characteristics of GUI. **(K2)**
CO2: Recognize how a computer system may be modified to include human diversity. **(K2)**
CO3: Select an effective style for a specific application. **(K2)**
CO4: Discuss Screen Designing mock-ups and carry out user and expert evaluation of interfaces.**(K2)**
CO5: Explain System Menus & Navigation Schemes. **(K2)**
CO6: Discuss Device and Screen based controls. **(K2)**

UNIT I: The User Interface: Introduction, Importance of the User Interface, Importance and benefits of Good Design History of Human Computer Interface. Characteristics of Graphical and Web User Interface: Graphical User Interface, popularity of graphics, concepts of Direct Manipulation, Graphical System advantage and disadvantage, Characteristics of GUI. Web User Interface, popularity of web, Characteristics of Web Interface, Merging of Graphical Business systems& the Web, Principles of User Interface Design.

UNIT II: The User Interface Design Process: Obstacles and Pitfall in the development Process, Usability, The Design Team, Human Interaction with Computers, Important Human Characteristics in Design, Human Consideration in Design, Human Interaction Speeds, Performance versus Preference, Methods for Gaining and Understanding of Users.

UNIT III: Understanding Business Functions: Business Definitions & Requirement analysis, Determining Business Functions, Design standards or Style Guides, System Training and Documentation.

UNIT IV: Principles of Good Screen Design: Human considerations in screen Design, interface design goals, test for a good design, screen meaning and purpose, Technological considerations in Interface Design.

UNIT V: System Menus and Navigation Schemes: Structure, Functions, Context, Formatting, Phrasing and Selecting, Navigating of Menus, Kinds of Graphical Menus

Windows Interface: Windows characteristic, Components of Window, Windows Presentation Styles, Types of Windows, Window Management, Websystems

UNIT VI: Device and Screen-Based Control: Device based controls, Operable Controls, Text entry/read-Only Controls, Section Controls, Combining Entry/Selection Controls, Other Operable Controls and Presentation Controls, Selecting proper controls

Text Books:

1. “The Essential Guide to User Interface Design”, Wilbert O. Galitz, 2nd edition,2002,Wiley India Edition.
2. Prece, Rogers, “Sharps Interaction Design”, Wiley India.
3. ”Designing the user interfaces”. Ben Shneidermann 3rd Edition, Pearson Education Asia.

.**Reference Books:**

1. “User Interface Design” , SorenLauesen, Pearson Education
2. “Essentials of Interaction Design”, Alan Cooper, Robert Riemann, David Cronin, Wiley
3. ”HumanComputer Interaction”, Alan Dix, Janet Fincay, GreGoryd, Abowd, Russell, Bealg, Pearson Education.

VII Sem	Distributed Systems (**Elective – IV)**	Course Code: VI8CST32	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe distributed system and desired properties of such systems. **(K2)**
CO2: Discuss the theoretical concepts, namely, virtual time and agreement. **(K2)**
CO3: Discuss the basic concepts of distributed systems and Characteristics of IPC protocols. **(K2)**
CO4: Explain the mechanisms such as Remote procedure call (RPC/RMI) and OSS . **(K2)**
CO5: Explain the mechanisms such as file systems and P2P algorithms. **(K2)**
CO6: Discuss the Transactions and Replications in distributed systems. **(K2)**

UNIT I: Characterization of Distributed Systems: Introduction, Examples of Distributed Systems, Resource Sharing and the Web, Challenges. **System Models:** Introduction, Architectural Models- Software Layers, System Architecture, Variations, Interface and Objects, Design Requirements for Distributed Architectures, Fundamental Models- Interaction Model, Failure Model, Security Model.

UNIT II: Time and Global States: Introduction, Clocks Events and Process States, Synchronizing Physical Clocks, Logical Time and Logical Clocks, Global States, Distributed Debugging.

Coordination and Agreement: Introduction, Distributed Mutual Exclusion, Elections, Multicast Communication, Consensus and Related Problems.

UNIT III: Inter process Communication: Introduction, The API for the Internet Protocols- The Characteristics of Inter process communication, Sockets, UDP Datagram Communication, TCP Stream Communication; External Data Representation and Marshalling; Client Server Communication; Group Communication, Case Study: MPI.

UNIT IV:: Remote Invocation: Introduction, Request-reply protocols, Remote Procedure Call, Events and Notifications, **Case Study:** JAVA RMI.. **Operating System Support:** Introduction, The Operating System Layer, Protection, Processes and Threads –Address Space, Creation of a New Process, Threads.

UNIT V: Distributed File Systems: Introduction, File Service Architecture; Peer-to-Peer Systems: Introduction, Napster and its Legacy, Peer-to-Peer Middleware, Routing

Overlays. **Case Study1:** Sun Network File system. **Case Study 2:** The Andrew File System.

UNIT VI: Transactions & Replications: Introduction, System Model and Group Communication, Concurrency Control in Distributed Transactions, Distributed Dead Locks, Transaction Recovery; Replication-Introduction, Passive (Primary) Replication, Active Replication.

Text Books:

1. "Distributed Systems- Concepts and Design", George Coulouris, Jean Dollimore, Tim Kindberg, Fourth Edition, Pearson Publication
2. "Distributed Computing, Principles, Algorithms and Systems", Ajay D Kshemkalyani, MukeshSighal, Cambridge.

Reference Books:

1. "Distributed Systems, Principles and Paradigms", Andrew S. Tanenbaum, Maarten Van Steen, 2d Edition, PHl.
2. "Distributed Systems, An Algorithm Approach," Sukumar Ghosh, Chapman & HalyCRC, Taylor & Fransis Group, 2007.

VII Sem	Scripting Languages (**Elective – IV)**	Course Code: VI8CST33	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Illustrate the concepts of scripting languages. **(K2)**

CO2: Develop Scripting for application using Ruby. **(K3)**

CO3: Explain the concepts of Programming in Perl. **(K2)**

CO4: Construct programs using Perl. **(K3)**

CO5: Describe TCL Scripting and their applications. **(K2)**

CO6: Discuss features of Groovy when compare with other Scripting Languages. **(K2)**

UNIT I: Introduction: Ruby, Rails, the structure and Execution of Ruby Programs, Package Management with RUBYGEMS, Ruby and web: Writing CGI scripts, cookies, Choice of Webservers, SOAP and web services. RubyTk – Simple Tk Application, widgets, Binding events, Canvas, scrolling.

UNIT II: Extending Ruby: Ruby Objects in C, the Jukebox extension, Memory allocation, Ruby TypeSystem, Embedding Ruby to Other Languages, Embedding a Ruby Interpreter.

UNIT III: Introduction to PERL and Scripting: Scripts and Programs, Origin of Scripting, Scripting Today, Characteristics of Scripting Languages, Uses for Scripting Languages, Web Scripting, and the universe of Scripting Languages. PERL- Names and Values, Variables, Scalar Expressions, Control Structures, arrays, list, hashes, strings, pattern and regular expressions, subroutines.

UNIT IV: Advanced Perl: Finer points of looping, pack and unpack, file system, eval, data structures, packages, modules, objects, interfacing to the operating system, Creating Internet ware applications, Dirty Hands Internet Programming, security Issues.

UNIT V:TCL: TCL Structure, syntax, Variables and Data in TCL, Control Flow, Data Structures, input/output, procedures, strings, patterns, files, Advance TCL- eval, source, exec and uplevel commands, Name spaces, trapping errors, event driven programs, making applications internet aware, Nuts and Bolts Internet Programming, Security Issues, C Interface.

UNIT VI: Groovy: Features of Groovy, Environment, Basic Syntax, data types, variables, operators, loops, decision making, methods, File i/o, Optionals , numbers, strings, ranges, lists, maps, date and time, Regular expressions, Exception Handling, OO concepts.

Text Books:

1. The World of Scripting Languages, David Barron, Wiley Publications.
2. Ruby Programming language by David Flanagan and Yukihiro Matsumoto O'Reilly.
3. "Programming Ruby" The Prammatic programmers guide by Dabve Thomas Second edition.

Reference Books:

1. Open Source Web Development with LAMP using Linux, Apache, MySQL, Perl and PHP, J.Lee and B.Ware (Addison Wesley) Pearson Education.
2. Perl by Example, E.Quigley, Pearson Education.
3. Programming Perl, Larry Wall T.Christiansen and J.Orwant, O'Reilly, SPD.
4. Tcl and the Tk Toolkit, Ousterhout, Pearson Education.
5. Pearl Power, J.P. Flynt, Cengage Learning.

VII Sem	Deep Learning (**Elective – IV)**	Course Code: VI8CST34	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Explain the basics of machine learning. **(K2)**

CO2: Demonstrate the working of an artificial neural network. **(K2)**

CO3: Identify various parameters and issues while training a deep neural network. **(K2)**

CO4: Explain the working of convolution neural networks. **(K2)**

CO5: Explain the working of recurrent neural networks. **(K2)**

CO6: Recognize the ways of applying deep learning techniques for complex problem-solving. **(K2)**

UNIT I: Machine Learning Basics: Learning Algorithms, Capacity, Overfitting and Underfitting, Hyper parameters and Validation Sets, Estimators, Bias and Variance, Maximum Likelihood Estimation, Bayesian Statistics, Supervised Learning Algorithms, Unsupervised Learning Algorithms, Stochastic Gradient Descent.

UNIT II: Introduction to Neural Networks: The Basic Architecture of Neural Networks- Single Computational Layer: The Perceptron, Multilayer Neural Networks; Training a Neural Network with Backpropagation, Practical Issues in Neural Network Training-The Problem of Overfitting, The Vanishing and Exploding Gradient Problems, Difficulties in Convergence, Local and Spurious Optima;

UNIT III: Training Deep Neural Networks: Introduction, Backpropagation: Backpropagation with the Computational Graph Abstraction, Dynamic Programming to the Rescue, Backpropagation with Post-Activation Variables and Pre-activation Variables, Setup and Initialization Issues, The Vanishing and Exploding Gradient Problems, Parameter-Specific Learning Rates- AdaGrad, RMSProp, AdaDelta, Adam.

UNIT IV: Convolutional Neural Networks: Introduction, The Basic Structure of a Convolutional Network- Padding, Strides, Typical Settings, The ReLU Layer, Pooling, Fully Connected Layers, The Interleaving Between Layers, Local Response Normalization, Hierarchical Feature Engineering; Training a Convolutional Network- Backpropagating Through Convolutions.

UNIT V: Recurrent Neural Networks: Introduction, The Architecture of Recurrent Neural Networks- Language Modeling Example of RNN, Backpropagation Through Time, Bidirectional Recurrent Networks, Multilayer Recurrent Networks; Long Short-Term Memory (LSTM), Gated Recurrent Units (GRUs).

UNIT VI: Applications Deep Learning: Applications of Convolutional Networks: Content-Based Image Retrieval, Object Localization, Object Detection, Natural Language and Sequence Learning; Application of Recurrent Neural Networks: Application to Automatic Image Captioning, Time-Series Forecasting and Prediction, End-to-End Speech Recognition, Handwriting Recognition.

Text Books:

1. Deep Learning, Ian Goodfellow, Ian Goodfellow, and Aaron Courville, MIT Press.
2. Neural Networks and Deep Learning, Charu C. Aggarwal, Springer.

Reference Books:

1. Neural Networks: A Systematic Introduction, Raúl Rojas, Springer.
2. Introduction to Deep Learning, Eugene Charniak, MIT Press.

			L	T	P	C
VII Sem	Social Networks and semantic web (**Elective – IV)**	Course Code: VI8CST35	3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Demonstrate knowledge by explaining the three different "named" generations of the web. **(K3)**
CO2: Construct a social network. **(K3)**
CO3: Relate knowledge representation methods for semantic web. **(K3)**
CO4: Explain the key aspects of Web Architecture. **(K2)**
CO5: Describe web services and its Applications. **(K2)**
CO6: Develop "Linked Data" Applications using Semantic Web Technologies. **(K3)**

UNIT-I: The Semantic web: Limitations of the current Web, The semantic solution, Development of the Semantic Web, The emergence of the social web.

UNIT-II: Social Network Analysis: What is network analysis? Development of Social Network Analysis, Key concepts and measures in network analysis. Electronic sources for network analysis: Electronic discussion networks, Blogs and online communities, Web-based networks.

UNIT-III: Knowledge Representation on the Semantic Web: Ontologies and their role in the Semantic Web, Ontology languages for the semantic Web.

UNIT-IV: Modeling and Aggregating Social Network Data: State of the art in network data representation, Ontological representation of Social individuals, Ontological representation of social relationships, Aggregating and reasoning with social network data.

UNIT-V: Developing social semantic applications: Building Semantic Web applications with social network features, Flink- the social networks of the Semantic Web community, Open academia: distributed, semantic-based publication management.

UNIT-VI: Evaluation of Web-Based Social Network Extraction: Differences between survey methods and electronic data extraction, context of the empirical study, Data collection, Preparing the data, optimizing goodness of fit, Comparison across methods and networks, Predicting the goodness of fit, Evaluation through analysis.

Text Books:

1. Social Networks and the Semantic Web, PeterMika, Springer,2007.
2. Semantic Web Technologies, Trends and Research in Ontology basedsystems, J.Davies,RudiStuder,PaulWarren,JohnWiley&Sons.

Reference Books:

1. Semantic Web and Semantic Web Services –Liyang Lu Chapman and Hall/CRC Publishers, (Taylor & Francis Group)
2. Information Sharing on the semantic Web – Heiner Stuckenschmidt; Frank Van Harmelen, Springer Publications

<table>
<tr><td rowspan="2">VII Sem</td><td rowspan="2">Advanced Java and Web Technologies Lab</td><td rowspan="2">Course Code: VI8CSL10</td><td>L</td><td>T</td><td>P</td><td>C</td></tr>
<tr><td>0</td><td>0</td><td>2</td><td>1</td></tr>
</table>

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Develop static web pages using HTML, CSS. **(K3)**

CO2: Demonstrate the concepts of JavaScript, DHTML & XML **(K3)**

CO3: Develop Web Applications using JSP. **(K3)**

CO4: Develop dynamic Web Applications using PHP & MySQL. **(K3)**

List of Experiments

1) Design the following static web pages required for an online book store web site:

(a) **HOME PAGE:**

The static home page must contain three **frames**.

Top frame: Logo and the college name and links to Home page, Login page, Registration page, Catalogue page and Cart page (the description of these pages will be given below). Left frame: At least four links for navigation, which will display the catalogue of respective links. For e.g.: When you click the link **"MCA"** the catalogue for MCA Books should be displayed in the Right frame. Right frame: The *pages to the links in the left frame must be loaded here*. Initially this page contains description of the web site

<table>
<tr><td>Logo</td><td colspan="4">Web Site Name</td></tr>
<tr><td>Home</td><td>Login</td><td>Registration</td><td>Catalogue</td><td>Cart</td></tr>
<tr><td>mca
mba
BCA</td><td colspan="4">Description of the Web Site</td></tr>
</table>

(b) **LOGIN PAGE:**

Logo	Web Site Name			
Home	Login	Registration	Catalogue	Cart
MCA MBA BCA	Login : 11a51f0003 Password: ******** Submit Reset			

(c) **CATALOGUE PAGE:**

The catalogue page should contain the details of all the books available in the web site in a table: The details should contain the following:

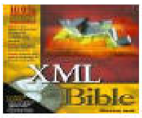
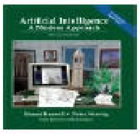
1. Snap shot of Cover Page.

2. Author Name.

3. Publisher.

4. Price.

5. Add to cart button.

Logo	Web Site Name			
Home	Login	Registration	Catalogue	Cart
MCA MBA		Book : XML Bible Author : Winston Publication : Wiely	$ 40.5	Add to cart
BCA		Book : AI Author : S.Russel Publication : Princeton hall	$ 63	Add to cart
		Book : Java 2 Author : Watson Publication : BPB publications	$ 35.5	Add to cart
		Book : HTML in 24 hours Author : Sam Peter Publication : Sam	$ 50	Add to cart

(d). **REGISTRATION PAGE:**

Create a "*registration form* "with the following fields

1) Name (Text field)

2) Password (password field)

3) E-mail id (text field)

4) Phone number (text field)

5) Sex (radio button)

6) Date of birth (3 select boxes) 7) Languages known (check boxes – English, Telugu, Hindi, Tamil)

2) Design a web page using **CSS (C**ascading **S**tyle **S**heets**)** which includes the following: Use different font, styles:

In the style definition you define how each selector should work (font, color etc.).

3) Design a login page and Make use of Events to perform validation using JavaScript.

4) Demonstrate a JavaScript program to perform On Mouse over event.

5) Demonstrate the concept of Mouse events (Ex:ng-click) with the help of Angular JS.

6) Design a simple Angular JS form.

7) Write an XML file which will display the Book information which includes the following:

1) Title of the book

2) Author Name

3) ISBN number

4) Publisher name

5) Edition

6) Price

a) Write a Document Type Definition (DTD) to validate the above XML file.

b) Write a XML Schema Definition (XSD)

8) Create a simple JSP to print the current Date and Time.

9)Create JSP to insert the details of 3 or 4 users using a registration form store these values in the data base and then check the authentication of the user by entering the name and password using a login form.

10) Assume four users user1, user2, user3 and user4 having the passwords pwd1, pwd2, pwd3 and pwd4 respectively. Write a PHP for doing the following.

A)

1. Create a Cookie and add these four user id's and passwords to this Cookie.

2. Read the user id and passwords entered in the Login form (week1) and authenticate with the values (user id and passwords) available in the cookies.

If he is a valid user (i.e., user-name and password match) you should welcome him by name (user-name) else you should display "You are not an authenticated user ".

B) Use init-parameters to do the same.

11) Create a table which should contain at least the following fields: name, password, email id, phone number (these should hold the data from the registration form).

Write a PHP program to connect to that database and extract data from the tables and display them. Experiment with various SQL queries. Insert the details of the users who register with the web site, whenever a new user clicks the submit button in the registration page.

12) Insert the details of the 3 or 4 users who register with the web site by using registration form. Authenticate the user when he submits the login form using the user name and password from the database.

Reference Books:

1. Web Technologies: HTML, JavaScript, PHP, Java, JSP, XML and AJAX, Black book, Dream Tech.

2. An Introduction to Web Design, Programming, Paul S Wang, Sanda S Katila, Cengage Learning

3. Web Technologies, 1st Edition 7th impression, Uttam K Roy, Oxford, 2012.

			L	T	P	C
VIII Sem	Software Project Management (**Elective – V**)	Course Code: VI8CST36	3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe Software Project Management Terminology. **(K2)**
CO2: Explain various Software development process Models and software Life cycle phases. **(K2)**
CO3: Illustrate various Effort Estimation Techniques and activity network models for Software Project Planning. **(K3)**
CO4: Demonstrate Risk Management Concepts and resource allocation. **(K3)**
CO5: Explain the importance of Project monitoring and control for accomplishing project goals.**(K2)**
CO6: Describe Software Quality models. **(K2)**

UNIT I: Introduction to Software Project Management: Software Project versus other types of projects, Activities covered by Software Project Management, Categorizing projects ,Stakeholders, Objectives& goals, what is management. **Project Planning:** Step-wise planning, Identify Project Scope and objectives, Infrastructure, Project Products &deliverables, Project activities, Effort estimation.

UNIT II: Project Approach: Build or buy, **process models**: waterfall model, Prototyping, Incremental delivery model, **Agile methods**: Extreme Programming, Atern method, selecting an appropriate process model. **Lifecycle phases:** Engineering and Production stages, Inception, Elaboration, Construction, Transition phases.

UNIT III: Software effort estimation and Activity planning: Overview of Effort Estimation techniques, Function Point analysis, COCOMO. **Activity planning:** Objectives, Network planning models, forward pass and backward pass, Identify Critical path and activities.

UNIT IV: Risk Management and Resource Allocation: Introduction, Risk and its categories, Identification, Assessment, Risk Planning and management, applying PERT technique. Resource Allocation: Types of Resources, Identifying resource requirements, Resource scheduling.

UNIT V: Project Monitoring and Control: Creating framework for monitoring& control, Collecting Data, Visualizing Progress, Cost monitoring, Earned value Analysis.

UNIT VI: Software Quality: Defining Quality, Importance of quality, ISO 9126, Product Quality Vs Process Quality management. **Process Capability Models:** Capability Maturity Model, Enhancing software Quality.

Text Books:

1. Software Project Management, Bob Hughes & Mike Cotterell, 6th edition, TATA Mcgraw-Hill
2. Software Project Management, Walker Royce 2nd edition, Pearson Education.

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Reference Books:

1. Software Project Management in practice, Pankaj Jalote, 9th edition, Pearson Education.
2. Software Project Management, Joel Henry, 3rd edition, Pearson Education.

VIII Sem	Big Data Analytics (**Elective – V)**	Course Code: VI8CST37	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Discuss the challenges of Big Data using Hadoop. **(K2)**

CO2: Interpret Hadoop's architecture and core components of Hadoop Distributed File System. **(K2)**

CO3: Apply data modelling techniques to large data sets using map reduce programs. **(K3)**

CO4: Describe the Hadoop I/O classes. **(K2)**

CO5: Examine the use of Pig Framework to work with big data. **(K3)**

CO6: Develop a data analytical system using HIVE. **(K3)**

UNIT I: Introduction to Big Data: What is Big Data, Why Big Data is Important, Data Storage and Analysis, Comparison with other systems, Grid Computing. **Introduction to Hadoop:** A brief history of Hadoop, Meet Hadoop Data, Apache Hadoop and the Hadoop Ecosystem.

UNIT II: Working with Big Data & HDFS: Google File System, Hadoop Distributed File System (HDFS) –Building blocks of Hadoop (Namenode, Datanode, Secondary Namenode, JobTracker, and TaskTracker). **Introducing and Configuring Hadoop cluster:** Local distributed mode, Pseudo-distributed mode, Fully Distributed mode, Configuring XML files.

UNIT III: Writing Map Reduce Programs: A Weather Dataset –Data Format, Analyzing Data with UNIX Tools, Analyzing the Data with Hadoop-Map Reduce. **Basic programs of Hadoop Map Reduce:** Driver code,Mapper code, Reducer code, RecordReader, Combiner functions. Map Reduce Types, Input Formatclass Hierarchy, other map reduce examples (word count).

UNIT IV: Hadoop I/O: The Writable Interface, Writable Comparable and Comparators. **Writable Classes:** Writable wrappers for Java primitives, Text & Bytes Writable, NullWritable, ObjectWritable and Generic Writable, Writable collections. **Implementing a Custom Writable:** Implementing a Raw Comparator for speed, Custom comparators

UNIT V: Pig - Hadoop Programming Made Easier: Admiring the Pig Architecture, Going with the Pig Latin Application Flow, Working through the ABCs of Pig Latin, Evaluating Local and Distributed Modes of Running Pig Scripts, Checking out the Pig Script Interfaces, Scripting with Pig Latin.

UNIT VI: Applying Structure to Hadoop Data with Hive: Saying Hello to Hive, Seeing How the Hive is Put Together, Getting Started with Apache Hive, Examining the Hive Clients, Working with Hive Data Types, Creating and Managing Databases and Tables, Seeing How the Hive Data Manipulation Language Works, Querying and Analyzing Data.

Text Books:

1. Hadoop: The Definitive Guide, Tom White, O'Reilly, 3rd Edition, 2012.
2. Hadoop in Action, Chuck Lam, MANNING Publ., 2016.
3. Hadoop for Dummies, Dirk deRoos, Paul C.Zikopoulos, Roman B.Melnyk, Bruce Brown, Rafael Coss, 2014.

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Reference Books:

1. Hadoop in Practice, Alex Holmes, MANNING Publ., 2014.
2. Hadoop Map Reduce Cookbook, Srinath Perera, Thilina Gunarathne, PACKT, 2013.

VIII Sem	Soft Computing (**Elective – V**)	Course Code: VI8CST38	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Discuss about Soft Computing, Requirements and Applications of Soft Computing. **(K2)**
CO2: Discuss about various Supervised and Unsupervised Learning Networks. **(K2)**
CO3: Illustrate various Fuzzy Logic, Fuzzy Sets, Crisp sets, Fuzzification and De-fuzzification Principles. **(K2)**
CO4: Discuss about Fuzzy Arithmetic and Fuzzy measures. **(K2)**
CO5: Discuss about Genetic Algorithms and its Operators. **(K2)**
CO6: Discuss about Various Hybrid Soft Computing Techniques.**(K2)**

UNIT I: Introduction: What is Soft Computing? Difference between Hard and Soft computing, Requirements of Soft computing, Major Areas of Soft Computing, Applications of Soft Computing.

UNIT II: Associative Memory Networks: (Supervised Learning): Introduction, Training Algorithms for Pattern Association, Auto-associative Memory Network, Hetero-associative Memory Network, Bidirectional Associative Memory (BAM),Hopfield Networks, Iterative Auto-associative Memory Networks, Temporal Associative Memory Network. **Unsupervised Learning Networks:** Introduction, Fixed Weight Competitive Nets, Kohonen Self-Organizing Feature Maps, Learning Vector Quantization, Counter propagation Networks, Adaptive Resonance Theory Network.

UNIT III: Introduction to Fuzzy Logic, Classical Sets and Fuzzy Sets: Introduction to Fuzzy Logic, Classical Sets (Crisp Sets), Fuzzy Sets and Operations on Fuzzy sets-Compliment, Intersections, Unions.

Membership Function: Introduction, Features of the Membership Functions, Fuzzification, Methods of Membership Value Assignments. **Defuzzification:** Introduction, Lambda-Cuts for Fuzzy Sets (Alpha-Cuts), Lambda-Cuts for Fuzzy Relations, Defuzzification Methods

UNIT IV: Fuzzy Arithmetic and Fuzzy Measures: Introduction, Fuzzy Arithmetic, Extension Principle, Fuzzy Measures, Measures of Fuzziness, Fuzzy Integrals.

UNIT V: Genetic Algorithm: Introduction to genetic algorithm, operators in genetic algorithm, stopping condition for genetic algorithm flow.

UNIT VI: Hybrid Soft Computing Techniques: Introduction, Neuro-Fuzzy Hybrid Systems, Genetic Neuro-Hybrid Systems.

Text Books:

1. Principles of Soft Computing, S.N. Sivanandam and S.N. Deepa, 3-edition, Wiley India, 2007.
2. "Fuzzy Sets & Fuzzy Logic", G.J. Klir & B. Yuan, PHI, 1995.
3. "An Introduction to Genetic Algorithm", Melanie Mitchell, PHI, 1998.

Reference Books:

1. Neural Networks, Fuzzy Logic and Genetic Algorithms, S. Rajasekaran and G.A.V.Pai, PHI, 2003.

2. Fuzzy Logic with Engineering Applications, Timothy J.Ross, McGraw-Hill, 1997.

3. Neuro-Fuzzy and Soft Computing, J.S.R.Jang, C.T.Sun and E.Mizutani, PHI, 2004, Pearson Education.

VIII Sem	Cloud Computing (**Elective – V)**	Course Code: VI8CST39	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Outline the concepts of cloud computing architecture. **(K2)**
CO2: Describe the Virtualization concepts in different scenarios. **(K2)**
CO3: Explain the best policies for cloud deployment. **(K2)**
CO4: Illustrate the design issues of Cloud computing. **(K2)**
CO5: Illustrate the security and privacy of the data in cloud computing. **(K2)**
CO6: Demonstrate cloud instances in Amazon Web Services. **(K3)**

UNIT I: Introduction to Cloud Computing: Trends in Computing - Distributed Computing, Grid Computing, Cluster Computing, Utility Computing, Cloud Computing, Definition of Cloud Computing, Characteristics, Service Models, Deployment Models, Cloud Service Models Providers, Advantages and Disadvantages of Cloud Computing, Cloud-based Services &Applications.

UNIT II: Cloud Concepts & Technologies: Virtualization and its types, Software Defined Networking, Network Function Virtualization (NFV). **Cloud Services:** Compute Services, Storage Services, Database Services, Application Services

UNIT III: Cloud Application Design: Design Considerations for Cloud Applications, Reference Architectures for Cloud Applications, Cloud Application Design Methodologies: SOA, Cloud Component Model and MVC, Data Storage Approaches.

UNIT IV: Cloud Security: Cloud Security Architecture (CSA), Authentication, Authorization, Identity & Access Management, Data Security, Key Management.

UNIT V: Migrating into a Cloud: Broad Approaches to Migrating into the Cloud, The Seven-Step Model of Migration into a Cloud, Migration Risks and mitigation, Phases of Migrating to Cloud, benefits and risks of Migrating to Cloud.

UNIT VI: SLA Management in Cloud Computing: Service Level Agreements (SLA), Considerations for SLA, SLA Requirements, Types of SLA, Life Cycle of

SLA, SLA Management in Cloud. **Case Study:** Amazon AWS: EC2, Amazon Simple DB, Amazon S3, Amazon Cloud Front and Amazon SQS.

Text Books:

1. Cloud Computing: A Hands-on Approach, ArshdeepBahga, Vijay Madisetti,Universities Press.
2. Cloud Computing: Principles and Paradigms, Rajkumar Buyya, James Broberg, Andrzej Goscinski, Wiley Publication.

Reference Books:

1. Cloud Computing – Web-Based Applications That Change the way you Work and Collaborate Online, Michael Miller, Pearson Education.
2. Cloud Computing: A Practical Approach, Anthony T. Velte, Toby J. Velte, Robert Elsenpeter, McGraw-Hill, (2010).

			L	T	P	C
VIII Sem	Software Architecture & Design Patterns (**Elective – VI**)	Course Code: VI8CST40	3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe Architectural Structures and Quality Attributes. (K2)

CO2: Explain the mechanism of Evaluating Architecture. (K2)

CO3: Demonstrate Creational Patterns. (K3)

CO4: Construct Structural Patterns for a given Scenario. (K3)
CO5. Construct Behavioural Patterns for a given Scenario. (K3)
CO6. Examine various Case Studies in utilizing Software Architectures. (K3)

UNIT-I: Envisioning Architecture The Architecture Business Cycle, What is Software Architecture, Architectural patterns, reference models, reference architectures, architectural structures and views. Creating and Architecture Quality Attributes, Achieving qualities, Designing the Architecture.

UNIT-II: Analyzing Architectures Architecture Evaluation, Architecture design decision making, ATAM, CBAM. Software Product Lines, Software architecture in future.

UNIT-III: Pattern Description, role in solving design problems, Selection and usage.**Creational Patterns**: Abstract factory, Builder, Factory method, Prototype, Singleton.

UNIT-IV:Structural Patterns: Adapter, Bridge, Composite, Decorator, Façade, Flyweight, PROXY.

UNIT-V:Behavioural Patterns: Chain of responsibility, command, Interpreter, iterator, mediator, memento, observer, state, strategy, template method, visitor.

UNIT-VI: Case Studies **A-7E – A case study** in utilizing architectural structures, The **World Wide Web** - a case study in Interoperability, **Air Traffic Control** – a case study in designing for high availability, **Celsius Tech** – a case study in product line development.

Text Books:

1. Software Architecture in Practice, second edition, Len Bass, Paul Clements & Rick Kazman, Pearson Education, 2003.

2. Design Patterns, Erich Gamma, Pearson Education, 1995.

Reference Books:

1. Beyond Software architecture, Luke Hohmann, Addison wesley, 2003.

2. Software architecture, David M. Dikel, David Kane and James R. Wilson, Prentice Hall PTR, 2001

3. Software Design, David Budgen, second edition, Pearson education, 2003

4. Head First Design patterns, Eric Freeman & Elisabeth Freeman, O'REILLY, 2007.

5. Design Patterns in Java, Steven John Metsker & William C. Wake, Pearson education, 2006.

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VIII Sem	Middleware Technologies (**Elective – VI)**	Course Code: VI8CST41	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Illustrate Middleware, E- Business, IT architecture, RPC, RDC. **(K2)**
CO2: Demonstrate Internet Applications and Web services. **(K2)**
CO3: Summarize Technical issues in Middleware. **(K2)**
CO4: Demonstrate the Use of Middleware in Building Distributed Technologies. **(K2)**
CO5: Identify Security Issues with Distributed Applications. **(K3)**
CO6: Apply Appropriate Middleware Technology to Develop Real Time Applications.**(K3)**

UNIT I: Introduction: Moving to e-business, what is IT architecture? Why is this different from what we did before? Rewrite or evolve?, Who develops the architecture?, Early days, Preliminaries, Remote procedure calls, Remote database access, Distributed transaction processing, Message queuing, Message queuing versus distributed transaction processing, what happened to all this technology.

UNIT II: Objects, Components and the Web: Using object middleware, Transactional component middleware- COM+, EJB, Final comments on TCM, Internet Applications. WEB SERVICES: Service concepts, Web services, and Using Web services: A pragmatic approach.

UNIT III: A Technical Summary Of Middleware: Middleware elements- The communications link, The middleware protocol, The programmatic interface, Data presentation, Server control, Naming and directory services, Security, System management, Comments on Web services, Vendor architectures- Vendor platform architectures, Vendor-distributed architectures, Using vendor architectures, Positioning, Strawman for user target architecture, Marketing, Implicit architectures, Middleware interoperability.

UNIT IV: Using Middleware to Build Distributed Applications: What is middleware for? -Support for business processes, Information retrieval, Collaboration, Tiers- The presentation tier, The processing tier, The data tier, Services versus tiers, Architectural choices - Middleware bus architectures, Hub architectures, Web services architectures, Loosely coupled versus tightly coupled.

UNIT V: Security: What security is needed, Traditional distributed system security, Web services security, Architecture and security. **Application Design and It's Architecture :** Problems with today's design approaches, Design up front or as needed?- The role of business rules, Existing systems, Reuse, Silo and monolithic development, The role of architecture, Levels of design, Reconciling design approaches.

UNIT VI: Building an IT Architecture: Case Studies – Providing an integration infrastructure, creating a service-oriented architecture, Developing a new application. What does the future hold? , The key points to remember-Middleware technology alternatives, IT architecture guideline guidelines, Distribute systems technology principals and Distribute systems implementation design.

Text Books:

1. IT Architectures and Middleware: Strategies for Building Large, Integrated Systems, Chris Britton and Peter Eye, 2nd Edition, Pearson Education.

Reference Books:

1. Middleware for Communications, Qusay H. Mahmoud,1st Edition, John Wiley and Sons.
2. Middleware Networks: Concept, Design and Deployment of Internet Infrastructure, Michah Lerner, 1st Edition, Kluwer Academic Publishers.
3. Middleware and Enterprise Integration Technologies, G. Sudha Sadasivam and Radha Shankarmani, 1st edition, Wiley, 2009.

VIII Sem	Natural Language Processing (**Elective – VI)**	Course Code: VI8CST42	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Illustrate the Syntax and semantics and Language models of Natural Language Processors. **(K2)**
CO2: Classify Morphology and Finite State Transducers, Markov Models and Entropy Models. **(K2)**
CO3: Explain about Statistical parsing and probabilistic CFGs. **(K2)**
CO4: Demonstrate semantic analysis. **(K2)**
CO5: Explain Discourse Analysis and Lexical Resources. **(K2)**
CO6: DevelopaStatisticalMethodsforRealWorldApplicationsandexploredeeplearning-basedNLP. **(K3)**

UNIT I: Introduction: Natural Language Processing tasks in syntax,semantics,andpragmatics–Issues–Applications-Theroleofmachinelearning-ProbabilityBasics–Informationtheory–Collocations-N-gram Language Models - Estimating parameters and smoothing - Evaluating language models.

UNIT II: Morphology And Part Of Speech Tagging: Linguistic essentials - Lexical syntax- Morphology and Finite State Transducers - Part of speech Tagging - Rule-Based Part of Speech Tagging - Markov Models - Hidden Markov Models – Transformation based Models - Maximum Entropy Models. Conditional Random Fields.

UNIT III: Syntax Parsing: Syntax Parsing - Grammar formalisms and tree banks - Parsing with Context Free Grammars- Features and Unification-Statistical parsing and probabilisticCFGs(PCFGs)-LexicalizedPCFGs.

UNIT IV: Semantic Analysis: Representing Meaning – Semantic Analysis - Lexical semantics –Word-sense disambiguation- Supervised – Dictionary based and Unsupervised Approaches - Compositional semantics- Semantic Role Labeling and Semantic Parsing – Discourse Analysis.

UNIT V: Discourse Analysis and Lexical Resources: Discourse segmentation, Coherence – Reference Phenomena, Anaphora Resolution using Hobbs and Centering Algorithm – Coreference Resolution – Resources: Porter Stemmer, Lemmatizer, Penn Treebank, Brills Tagger, WordNet, PropBank, FrameNet, Brown Corpus, British National Corpus (BNC).

UNIT VI: NLP Applications: Named entity recognition and relation extraction- IE using sequence labeling-Machine Translation (MT) - Basic issues in MT-Statistical translation-word alignment- phrase-based translation – Question Answering.

Text Books:

1. Daniel Jurafsky and James H. Martin Speech and Language Processing (2nd Edition), Prentice Hall; 2nd edition,2008
2. FoundationsofStatisticalNaturalLanguageProcessingbyChristopherD.Manningand Hinrich Schuetze, MIT Press,1999
3. Steven Bird, Ewan Klein and Edward Loper Natural Language Processing with Python, O'Reilly Media; 1 edition,2009
4. Roland R. Hausser, Foundations of Computational Linguistics: Human-Computer Communication in Natural Language, Paperback, MIT Press,2011

References:

1. Pierre M. Nugues, An Introduction to Language Processing with Perl and Prolog: An Outline of Theories, Implementation, and Application with Special Consideration of English, French, and German (Cognitive Technologies) Softcover reprint,2010
2. James Allen, Natural Language Understanding, Addison Wesley; 2 edition 1994

   NLTK – Natural Language Tool Kit -http://www.nltk.org/

VIII Sem	Cyber Security (**Elective – VI)**	Course Code: VI8CST43	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe about Cybercrimes. **(K2)**
CO2: Explain Cyber criminals and their attacks. **(K2)**
CO3: Illustrate Cybercrimes and security in mobile devices **(K2)**
CO4: Discuss about the Tools and methods used to overcome Cybercrimes. **(K2)**
CO5: Discuss about Cyber Laws and IT Acts. **(K2)**
CO6: Explain about Computer Forensics. **(K2)**

UNIT I: Introduction to Cybercrime: Introduction, Cybercrime: Definition and Origins of the Word, Cybercrime and Information Security Who are Cybercriminals? , Classifications of Cybercrimes, Cybercrime: The Legal Perspectives, Cybercrimes: An Indian Perspective, Cybercrime and the Indian ITA 2000, A Global Perspective on Cybercrimes, Cybercrime Era: Survival Mantra for the Netizens.

UNIT II: Cyber offenses: How Criminals Plan Them –Introduction, How Criminals Plan the Attacks, Social Engineering, Cyber stalking, Cyber cafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector Cloud Computing.

UNIT III: Cybercrime Mobile and Wireless Devices: Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit Card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication Service Security, Attacks on Mobile/CellPhones, Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile, Organizational Security Policies and Measures in Mobile Computing Era, Laptops.

UNIT IV: Tools and Methods Used in Cybercrime: Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Key loggers and Spywares, Virus and Worms, Trojan Horses and Backdoors, Steganography, DoS and DDoS Attacks, SQL Injection, Buffer Overflow, Attacks on Wireless Networks. **Phishing and Identity Theft:** Introduction, Phishing, Identity Theft (ID Theft).

UNIT V: Cybercrimes and Cyber security: The Legal Perspectives, Introduction, Why Do We Need Cyber laws: The Indian Context, The Indian IT Act, Challenges to Indian Law and Cybercrime Scenario in India, Consequences of Not Addressing the Weakness in Information Technology Act, Digital Signatures and the Indian IT Act, Amendments to the Indian IT Act,· Cybercrime and Punishment.

UNIT VI: Understanding Computer Forensics: Introduction, Historical Background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber forensics and Digital Evidence, Forensics Analysis of E-Mail, Digital Forensics Life Cycle, Chain of Custody Concept, Network Forensics, Approaching a Computer Forensics Investigation, Computer Forensics and Steganography, Relevance of the OSI 7 Layer Model to Computer Forensics, Forensics and Social Networking Sites: The Security/Privacy Threats, Computer Forensics from Compliance Perspective, Challenges in Computer Forensics, Special Tools and Techniques, Forensics Auditing, Anti-forensics.

Text Books:

1. Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, NinaGodbole, SunitBelapure, 1stedition, Wiley.

Reference Books:

1. Principles of Information Security, MichealE.Whitman and Herbert J.Mattord, 4th edition, Cengage Learning.
2. Information Security the complete reference, Mark Rhodes, Ousley, 2ndedition, MGH.

Annexure-III

V – Semester							
S.No	**Course Code**		**Course**	**L**	**T**	**P**	**C**
1	V18CST10	PCC	Database Management Systems	3	0	0	3
2	V18CST11	PCC	Computer Networks	3	0	0	3
3	V18CST12	PCC	Operating Systems	3	0	0	3
4	V18CST13	PCC	Design and Analysis of Algorithms	3	0	0	3
5	V18CST14	PCC	Unix Programming	3	0	0	3
6	**Elective – I**						
	V18CST15	PEC	1.Advanced Computer Architecture	3	0	0	3
	V18CST16		**2**.Advanced Data Structures				
	V18CST17		3.Artificial Intelligence				
	V18CST18		4.Computer Graphics				
7	V18MBET53	HSS	Organizational Behavior	3	0	0	3
8	V18CSL06	PCC	Database Management Systems Lab	0	0	3	1.5
9	V18CSL07	PCC	Operating System and Unix Lab	0	0	3	1.5
10	V18ENT05		Professional Communication Skills -III	4	0	0	MNC
11	V18CST62		Technical Skills-III	4	0	0	MNC
Total				**29**	**0**	**6**	**24**

Total Contact Hours: 35

VI – Semester							
S.No.	**Course Code**		**Course**	**L**	**T**	**P**	**C**
1	V18CST19	PCC	Compiler Design	3	0	0	3
2	V18CST20	PCC	Data Mining	3	0	0	3
3	V18CST21	PCC	Object Oriented Analysis and Design through UML	3	0	0	3
4	V18CST22	PCC	Cryptography & Network Security	3	0	0	3
5	**Elective - II**			3	0	0	3
	V18CST23	PEC	1. Software Testing Methodologies				
	V18CST24	PEC	2. Principles of Programming Languages				
	V18CST25	PEC	3. Machine Learning				
	V18CST26	PEC	4. Image Processing				
6	**Open Elective – I (Interdisciplinary)**	**OEC**	**OPE I(1-3)**	3	0	0	3
7	V18CSL08	PCC	Object Oriented Analysis and Design through UML Lab	0	0	3	1.5
8	V18CSL09	PCC	Data Mining Lab	0	0	3	1.5
9	V18CSMPS	**Project**	Mini Project with Seminar	0	0	4	2
10	V18ENT06		Professional Communication Skills -IV	4	0	0	MNC
11	V18CST63		Technical Skills-IV	4	0	0	MNC
			Total	**26**	**0**	**10**	**23**

Total Contact Hours: 36

S.No.	VII – Semester						
	Course Code		**Course**	**L**	**T**	**P**	**C**
1	V18CST27	PCC	Advanced Java and Web Technologies	3	0	0	3
2	V18MBET52	HSS	Management Science	3	0	0	3
3	**Elective – III**						
	V18CST28	PEC	1. Advanced Operating Systems	3	0	0	3
	V18CST29		2. Statistics with R Programming				
	V18CST30		3. Information Retrieval Systems				
	V18CST31		4 Human Computer Interaction				
4	**Elective – IV**						
	V18CST32	**PEC**	1.Distributed Systems	3	0	0	3
	V18CST33		2.Scripting Languages				
	V18CST34		3.Deep Learning				
	V18CST35		4.Social Networks and semantic web				
5	**Open Elective – II (Interdisciplinary)**	**OEC**	**OPE II(1-3)**	3	0	0	3
6	V18CSL10	PCC	Advanced Java and Web Technologies Lab	0	0	2	1
7	V18CSP01	**Project**	Project Work (Part-A)	0	0	10	5
Total				**15**	**0**	**13**	21

Total Contact Hours: 28

	VIII – Semester						
S.No.	**Course Code**		**Course**	**L**	**T**	**P**	**C**
1	**Elective – V**						
	V18CST36	PEC	1. Software Project Management	3	0	0	3
	V18CST37		2. Big Data Analytics				
	V18CST38		3. Soft Computing				
	V18CST39		4. Cloud Computing				
2	**Elective – VI**			3	0	0	3
	V18CST40	PEC	1. Software Architecture and Design Patterns				
	V18CST41		2. Middleware Technologies				
	V18CST42		3. Natural Language Processing				
	V18CST43		4. Cyber Security				
3	**Open Elective – III** **(Interdisciplinary)**	**OEC**	**OPE III(1-3)**	3	0	0	3
4	V18CSP02	**Project**	Project Work (Part-B)	0	0	12	6
Total				**9**	**0**	**12**	**15**

Total Contact Hours: 21

Annexure-IV

V Sem	**Database Management Systems**	Course Code:V18CST10	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Demonstrate Database Systems, various Data Models and Database Architecture. (K2)

CO2: Apply ER Modeling to Design Relational Databases for Real Time Applications. (K3)

CO3: Apply SQL Constructs to Perform Database Operations. (K3)

CO4: Apply Normalization Techniques to Refine Schema. (K3)

CO5: Explain Transaction Management and Concurrency Control. (K2)

CO6: Experiment with various database indexing techniques. (K3)

UNIT-I: An Overview of Database Systems: Managing Data, File Systems verses DBMS, Advantages of DBMS, Data Independence. **Database System Architecture:** Three Levels of Architecture, External Level, Conceptual Level, Internal Level, Structure of DBMS, The Database Management Systems and Client/Server Architecture.

UNIT-II: Database Design: The E/R Models, Database Design and Er Diagrams, Entities, Attributes, Entity Sets, Relationships and Relationship Sets, Conceptual Design with ER Models. **Relational Model:** Integrity Constraints Over Relations, Key Constraints ,Foreign Key Constraints, General Constraints, Relational Algebra-Selection and Projection, Set Operation, Renaming, Joins, Division, Relational Calculus- Tuple Relational Calculus, Domain Relational Calculus.

UNIT-III: SQL Queries, Constraints and Triggers: The Form of Basic SQL Query, Union, Intersect, Except, Nested Queries, Aggregate Operators, Null Values, Complex Integrity Constraints in SQL, Triggers and Active Database.

UNIT-IV: Schema Refinement (Normalization): Purpose of Normalization or Schema Refinement, Concept of Functional Dependency, Normal Forms based on Functional Dependency (1NF, 2NF and 3NF), Concept of Surrogate Key, Boyce-Codd Normal Form (BCNF), Lossless Join and Dependency Preserving Decomposition, Fourth Normal Form(4NF).

UNIT-V:Transaction Management: Transaction, Properties of Transactions, Transaction Log, and Transaction Management with SQL Commit, Rollback and Savepoint. Concurrency Control: Concurrency Control for Lost Updates, Uncommitted Data, Inconsistent Retrievals and the Scheduler. **Concurrency Control with Locking Methods :** Lock Granularity, Lock Types, Two Phase Locking for Ensuring Serializability, Deadlocks, Concurrency Control with Time Stamp Ordering, Transaction Recovery.

UNIT-VI: Storage and Indexing: Overview of Storages and Indexing, Data on External Storage, File Organization and Indexing, Clustered Indexing, Primary and Secondary Indexes, Index Data Structures, Hash based Indexing, Tree based Indexing, Comparison of File Organization

Text Books:

1. **Introduction to Databse Systems, CJ Date,8th Edition, Pearson Education.**
2. **Data base Management Systems, Raghurama Krishnan, Johannes Gehrke, 3rd Edition TATA McGraw Hill.**

Reference Books:

1. **Data base Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition, Course Technology.**
2. **Fundamentals of Database Systems, ElmasriNavrate , 7th Edition, Pearson Education.**
3. **Database Systems - The Complete Book, H G Molina, J D Ullman, J Widom, 2nd Edition, Pearson.**

			L	T	P	C
V Sem	**Computer Networks**	Course Code: V18CST11	3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Discuss fundamentals of network concepts and Reference Models.(K2)

CO2: Discuss Communication media and switching techniques.(K2)

CO3: Demonstrate Error control and protocols.(K3)

CO4: Apply Routing algorithms and congestion control algorithms.(K3)

CO5: Discuss Transport layer services and protocols. (K2)

CO6: Describe Application layer protocols.(K2)

UNIT-I: Introduction: Reference models: The OSI Reference Model- the TCP/IP Reference Model, Examples of Networks: Novell Networks, Arpanet, Internet, Network Topologies WAN, LAN, MAN.

UNIT– II: Physical Layer: Transmission Media, Multiplexing: FDM, WDM and TDM- LAN Technologies, introduction to switching: Circuit Switched Networks, Datagram Networks, and Virtual Circuit Networks.

UNIT–III: Data link layer: Design issues, Framing, Flow control, error control, error detection and correction, CRC, Checksum: idea, one's complement internet checksum, MAC: ALOHA, CSMA. Elementary Data Link Layer protocols: simplex protocol, Simplex stop and wait, Simplex protocol for Noisy Channel. Sliding window protocol: One bit, Go back N, Selective repeat-Stop and wait protocol, HDLC, point to point protocol (PPP).Piggybacking.

UNIT-IV : Network Layer : Network layer design issues- Algorithm shortest path routing, Flooding, Hierarchical routing, Broad cast, Multi cast Routing algorithms-Congestion control and algorithms, Internet Protocol (IP) Addresses, Subnet masking

UNIT–V :Transport Layer: Services, Primitives and sockets, Elements of transport protocols, Internet Transport protocols(TCP,UDP,RPC,RTTP/RTP,RTCP) Segment headers, Primitives, Control, Congestion control, Quality of Service, QoS improving techniques: Leaky Bucket and Token Bucket algorithm.

UNIT–VI: Application layer: DNS, SMTP, POP,FTP HTTP Presentation formatting. Network security: Introduction to Cryptography, Authentication, Basics of Public key and private key cryptography, digital signatures and certificates firewalls and wireless security.

Text Books:

1. Computer Networks — Andrew S Tanenbaum, 4th Edition. Pearson Education/PHI
2. Data Communications and Networks – Behrouz A. Forouzan.Third Edition TMH

References:

1. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition, Pearson Education
2. Understanding communications and Networks, 3rd Edition, W.A. Shay, Thomson

V Sem	**Operating Systems**	Course Code: V18CST12	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe Operating System Services and System Calls (K2).

CO2: Illustrate Process Management Concepts and CPU Scheduling Algorithms (K3).

CO3: Demonstrate Process Synchronization primitives (K3).

CO4: Demonstrate Deadlock Prevention, Avoidance and Detection methods (K3).

CO5: Illustrate Memory Management Techniques and Page Replacement Algorithms (K3).

CO6: Describe File System Concepts and Mass Storage Structures (K2) .

UNIT-I: Introduction: Operating-System Structure, Operating-System Services, User and Operating-System Interface, System Calls, Types of System Calls.

UNIT-II: Process Management: Process Concept, Process Scheduling, Operations on Processes, Interprocess Communication. **Threads:** Overview, Multithreading Models. **CPU Scheduling:** Basic Concepts, Scheduling Criteria, Scheduling Algorithms

UNIT-III : Process Synchronization: The Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Mutex Locks, Semaphores, Classic Problems of Synchronization, Monitors

UNIT-IV: Deadlocks: System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock

UNIT-V: Memory Management Main Memory: Swapping, Contiguous Memory Allocation, Segmentation, Paging, Structure of the Page Table

Virtual Memory: Introduction, Demand Paging, Page Replacement, Allocation of Frames, Thrashing

UNIT-VI:Storage Management: Overview of Mass-Storage Structure, Disk Scheduling, File Concept, Access Methods, Directory and Disk Structure, File-System Mounting, File Allocation Methods

Text Book:

1. Operating System Concepts, AbrahamSilberschatz, ,Peter Baer Galvin,Greg Gagne, 9th Edition, John Wiley and Sons Inc., 2012

Reference Books:

1. Operating Systems – Internals and Design Principles, William Stallings, 7th Edition, Prentice Hall, 2012
2. Modern Operating Systems, Andrew S. Tanenbaum, Third Edition, Addison Wesley,2007

V Sem	Design and Analysis of Algorithms	Course Code: V18CST13	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe asymptotic notation and basic concepts of algorithms (K2).

CO2: Apply divide and conquer paradigm to solve various problems (K3).

CO3: Use greedy technique to solve various problems (K3).

CO4: Apply dynamic programming technique to various problems (K3).

CO5: Employ backtracking technique to various problems (K3).

CO6: Apply branch and bound technique to various problems (K3).

UNIT-I: Introduction: What is an Algorithm, Algorithm Specification-Pseudo code Conventions Recursive Algorithm, Performance Analysis-Space Complexity, Time Complexity, Amortized Complexity, Amortized Complexity, Asymptotic Notation, Practical Complexities, Performance Measurement.

UNIT-II: Divide and Conquer: General Method, Defective Chessboard, Binary Search, Finding the Maximum and Minimum, Merge Sort, Quick Sort-Performance Measurement, Randomized Sorting Algorithms.

UNIT-III: The Greedy Method: The General Method, Knapsack Problem, Job Sequencing with Deadlines, Minimum-cost Spanning Trees-Prim's Algorithm, Kruskal's Algorithms, An Optimal Randomized Algorithm, Optimal Merge Patterns, Single Source Shortest Paths.

UNIT-IV: Dynamic Programming: All Pairs Shortest Paths, Single Source Shortest paths General Weights, Explain Optimal Binary Search Trees, String Edition, 0/1 Knapsack, Reliability Design.

UNIT-V: Backtracking: The General Method, The 8-Queens Problem, Sum of Subsets, Graph Coloring, Hamiltonian Cycles.

UNIT-VI: Branch and Bound: The Method-Least cost (LC) Search, The 15-Puzzle: an Example, Control Abstraction for LC-Search, Bounding, FIFO Branch-and-Bound, LC

Branch and Bound, 0/1 Knapsack Problem-LC Branch-and Bound Solution, FIFO Branch-and-Bound Solution, Traveling Salesperson.

Text Books:

1. Fundamentals of computer algorithms E. Horowitz S. Sahni, University Press

Reference Books:

1. Introduction to Algorithms Thomas H. Cormen, PHI Learning.
2. The Design and Analysis of Computer Algorithms, Alfred V. Aho, John E. Hopcroft, JeffreyD.Ullman.
3. Algorithm Design, Jon Kleinberg, Pearson.

V Sem	**Unix programming**	Course Code: V18CST14	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Illustrate the UNIX basics and the working of the built in commands in Unix (K2).

CO2: Demonstrate the file system and change the permissions associated with files (K2).

CO3: Develop basic programs using shell script (K3).

CO4: Demonstrate the grep family and data transforming programs sed, and awk (K2).

CO5: Construct programs for process system calls (K3).

CO6: Explain the concept of signals and its system call (K2).

UNIT I: Introduction to UNIX: The UNIX Operating System, A brief history of UNIX, The UNIX Architecture, Basic features of UNIX. General Purpose Utilities- cal, date, man, echo, bc, clear, passwd, who, whoami,unameDirectory Handling Commands: pwd, cd, mkdir, rmdir. File Handling Utilities - cat, touch, cp, ls, rm, mv, nl, pg,tar,wc Displaying Commands: more,head,tail, simple filters and commands: cmp, comm., ulink, diff, head, tail, find, cut, paste,sort, uniq, tr, finger. Disk Utilities– du, df, mount, umount.Process Utilities–ps, kill. Networking Utilities– ping, telnet, rlogin, ftp.

UNIT II : THE FILE SYSTEM : Types of Files, Directories and Files, UNIX File System, Absolute and relative pathnames, File Attributes and Permissions ,The File Command - knowing the File Type, Chmod Command- Changing File Permissions, Chown Command- Changing the Owner of a File, Chgrp Command- Changing the Group of a File. Vi editor- editing with vi, moving the cursor, editing, copying and moving text, pattern searching.

UNIT III : Introduction to Shell Programming : Shell Variables-The Export Command-The Profile File a Script Run During Starting-The First Shell Script-The read Command-Positional parameters-The $? Variable knowing the exit Status-More about the Set Command-The Exit Command-Branching Control Structures-Loop Control Structures-The Continue and Break Statement-The Expr Command: Performing Integer Arithmetic-Real Arithmetic in Shell Programs-The here Document(<<)-I/O Redirection, The Sleep Command-Debugging Scripts-The Script Command-The Eval Command-The Exec Command. Command Line Structure - Met characters.

UNIT-IV : Regular Expressions: grep, egrep, fgrep, Sed- line addressing, context addressing, text editing,substitution. **Programming with awk**: syntax of awk programming statement, structure of awk script, variables ,records fields, and special variables, patterns, operators ,simple input files, awk programming- simple awk programming, awk control structures, looping, functions in awk.

UNIT-V: Unix process: What is a process, process structure, process identifiers, starting new process, waiting for a process, zombie process, system call interface for process management - fork, vfork, exit, wait, waitpid, exec system call.

UNIT VI: Signals: Signal functions, unreliable signals, interrupted system calls, kill and raise functions, alarm, pause functions, abort, sleep functions

Text Books:

1. Introduction to Unix and shell programming, M G Venkateshmurthy, Pearson education
2. Advanced programming in the unix environment, W. Richard Stevens, 3rd Edition, Pearson
Education.

References:

1. Unix and shell Programming, B.A. Forouzan& R.F. Giberg, Thomson, First Edition, NewDelhi,

2003.

V Sem	**Advanced Computer Architecture (Elective-I)**	Course Code: V18CST15	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe the basics of quantitative design and analysis (K2).

CO2: Illustrate memory hierarchy schemes (K2).

CO3: Illustrate concepts of Instruction-Level Parallelism (K2).

CO4: Explain concepts of Data-Level Parallelism (K2).

CO5: Explain concepts of Thread-Level Parallelism (K2).

CO6: Describe architectural aspects of Warehouse-Scale Computers (K2).

UNIT I: Fundamentals of Quantitative Design and Analysis: Classes of Computers, Defining Computer Architecture, Designing the Organization and Hardware to Meet Goals and Functional Requirements, Quantitative Principles of Computer Design

UNIT II: Memory Hierarchy Design: Basics of Memory Hierarchies, Advanced Optimizations of Cache Performance, Memory Technology and Optimizations, Virtual Memory and Virtual Machines.

UNIT III : Instruction-Level Parallelism: Concepts and Challenges, Basic Compiler Techniques, Reducing Branch Costs with Advanced Branch Prediction, Overcoming Data Hazards with Dynamic Scheduling, Tomasulo's Approach, Hardware-Based Speculation, Multiple Issue and Static Scheduling

UNIT IV: Data-Level Parallelism: Vector Architecture, VMIPS, Vector Processors, SIMD Instruction Set Extensions for Multimedia

UNIT V: Thread-Level Parallelism: Introduction, Centralized Shared-Memory Architectures-Multiprocessor Cache Coherence, Basic Schemes for Enforcing Coherence, Snooping Coherence Protocols

UNIT VI: Warehouse-Scale Computers: Introduction, Programming Models and Workloads for Warehouse-Scale Computers, Computer Architecture of Warehouse-Scale Computers

Text Book:

1. Computer Architecture: A Quantitative Approach, John L. Hennessy, David A. Patterson, 5th Edition, Morgan Kaufmann, Elsevier.

Reference Books:

1. Advanced Computer Architectures: A Design Space Approach, D Sima, T

Fountain, P Karsuk, 1st Edition, Pearson
2. Advanced Computer Architecture, K Hwang, N Jotwani, 2nd Edition, McGraw-Hill

<table>
<tr><td rowspan="2">V
Sem</td><td rowspan="2">Advanced Data Structures (Elective-I)</td><td rowspan="2">Course Code:
V18CST16</td><td>L</td><td>T</td><td>P</td><td>C</td></tr>
<tr><td>3</td><td>0</td><td>0</td><td>3</td></tr>
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Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Explain external sorting method (K2).

CO2: Discuss pattern matching Algorithms (K2).

CO3: Illustrate various hash functions with appropriate examples (K3).

CO4: Illustrate various priority queues with appropriate examples (K3).

CO5: Construct self balanced tree with appropriate examples (K3).

CO6: Discuss Multiway search trees (K2).

UNIT I: SORTING: Introduction - External Sorting- K-way Merging - Buffer Handling for parallel Operation- Run Generation- Optimal Merging of Runs.

UNIT II: STRING MATCHING ALGORITHMS: The Navi String matching algorithms – The Robin-Krap algorithm – String Matching algorithm using finite automata – The Knuth Morris Pratt algorithm.

UNIT III: SKIP LIST AND HASHING: Dictionaries – ADT- Linear List representation - Skip List representation: Ideal case – Insertion and Deletion –Assigning levels – The struct skip node – The class skip list – complexity of skipList methods. Hash Table Representation: Ideal hashing – Hash functions and tables -Linear probing- Hashing with Chains

UNIT IV: PRIORITY QUEUES (HEAPS) : Definition and Applications – ADT – Linear lists – Heaps : Definition – Max heap and Min heap operations, Applications – Heap Sort – Huffman Codes.

UNIT V: EFFICIENT BINARY SEARCH TREES : Introduction to AVL Trees- Red-Black Trees- Definition- Representation of a Red- Black Tree- Searching a Red-Black Tree- Inserting into a Red Black Tree- Deletion from a Red-Black Tree- Joining Red-Black Trees, Splitting a Red-Black tree – Splay Trees – Introduction – operation – Amortized complexity.

UNIT VI: MULTIWAY SEARCH TREES : ISAM - M-Way Search Trees, Definition and Properties- Searching an M-Way Search Tree, B-Trees, Definition and Properties- search Elements in a B-tree- Insertion into B-Tree- Deletion from a B-Tree- Node Structure.

Text Books:

1. Data Structures, Algorithms and Applications in C++; SartajSahni; UniverstiyPress ; 2nd Edition.

2. Introduction to Algorithms By Thomas H Cormen, Charless E leiserson, Ronald L Rivest and

Cliford Stein PHI publication Third Edition (UNIT – II)

References:

1. Data Structures, a Pseudocode Approach, Richard F Gilberg, BehrouzA Forouzan, Cengage.
2. An Introduction to Data Structures with applications By Jean Paul Trembly and Paul G Sorenson Tata McGraw Hill Second Edition
3. Fundamentals of Data Structures and algorithms by C V Sastry, Rakesh Nayak, Ch. Raja Ramesh, IK Publications, new Delhi.

V Sem	**Artificial Intelligence (Elective-I)**	Course Code: V18CST17	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Illustrate the concept of intelligent systems and current trends in AI. (K2)

CO2: Apply Problem solving, Problem reduction and Game Playing techniques in AI. (K3)

CO3: Illustrate the Logic concepts in AI. (K2)

CO4: Explain the Knowledge representation techniques in AI. (K2)

CO5: Describe Expert systems and their applications. (K2)

CO6: Illustrate Uncertainty Measures. (K2)

UNIT-I: Introduction to Artificial Intelligence: Introduction, history, intelligent systems, foundations of AI, applications, tic-tac-toe game playing, current trends in AI

UNIT-II: Problem solving: State-space Search and Control Strategies: Introduction, General Problem Solving, Characteristics of problem, Exhaustive searches, Heuristic search techniques, Iterative deepening a*, constraint satisfaction

Problem reduction and game playing: Introduction, problem reduction, game playing, alpha beta pruning, two-player perfect information games

UNIT-III:Logic concepts: Introduction, Propositional Calculus, Proportional Logic, Natural Deduction system, Axiomatic system, Semantic tableau system in proportional logic, Resolution Refutation in Propositional logic, Predicate Logic

UNIT-IV: Knowledge representation: Introduction, approaches to Knowledge representation, Knowledge representation using Semantic Networks, Extended Semantic Networks for KR, Knowledge representation using Frames

UNIT-V: Expert Systems and Applications: Introduction phases in building Expert Systems, Expert System versus Traditional Systems, Rule-based Expert Systems, Blackboard systems, Truth maintenance systems, applications of Expert Systems.

UNIT-VI: Uncertainty measure: Probability theory- Introduction, Probability Theory, Bayesian Belief networks, Certainty Factor Theory, Dempster-Shafer theory

Text Book:

1. Artificial Intelligence, Saroj Kaushik, 1st Edition, Cengage Learning.

Reference Books:

1. Artificial Intelligence, Elaine Rich, Kevin Knight, Shivashankar B Nair, 3rd Edition, Tata McGraw Hill Education Private Limited., 2009
2. Artificial Intelligence- A modern Approach, 3rd Edition, Stuart Russel, Peter Norvig, Pearson Education.

V Sem	Computer Graphics (Elective-I)	Course Code: V18CST18	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Understand the applications of computer graphics and learn basic algorithms (K2).
CO2: Analyze the concepts of 2D graphics along with transformation techniques (K3).
CO3: Understand 2D Views of objects and clipping algorithms (K2).
CO4: Illustrate 3D graphics and will get an idea about projections views of objects (K2).

CO5: Determine different visible surface detection methods (K2).
CO6: Understand different animation sequences and Color Models (K2).

UNIT I:Introduction: Application of Computer Graphics, raster scan systems, random scan systems, raster scan display processors. Output Primitives : Points and lines, line drawing algorithms(Bresenham's and DDA Line derivations and algorithms), mid-point circle and ellipse algorithms.

UNIT II: Filled area primitives: Boundary-fill and flood-fill algorithms. **2-D geometrical transforms:** Translation, scaling, rotation, reflection and shear transformations, and homogeneous coordinates, composite transforms.

UNIT III:2-D viewing: The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Cohen-Sutherland, Sutherland – Hodgeman polygon clipping algorithm.

UNIT IV:3-D Geometric transformations: Translation, rotation, scaling, reflection and shear transformations, composite transformations. 3D Viewing pipeline, clipping, projections (Parallel and Perspective). **3-D object representation:** Polygon surfaces, quadric surfaces, spline representation, Bezier curve and B-Spline curves.

Unit V:Visible surface detection methods: Classification, back-face detection, depth-buffer, scan-line, BSPtree methods, area sub-division.

Unit VI:Computer animation: Design of animation sequence, general computer animation functions, raster animation, computer animation languages. **Color Models** – RGB, YIQ, CMY, HSV.

Text Books:

1. Computer Graphics C version, Donald Hearn, M.Pauline Baker, Pearson

2. Computer Graphics, Schaum's outlines", Zhigand xiang,Roy Plastock, 2nd Edition,Tata Mc-Graw Hill.

3. Principles of Computer Graphics, S. Govil-Pai, 1st Edition, Springer International Edtion,2005.

Reference Books:

1. Computer Graphics Principles & practice, 2/e, Foley, VanDam, Feiner, Hughes, Pearson

2. Computer Graphics, Peter, Shirley, CENGAGE

3. Principles of Interactive Computer Graphics, Neuman , Sproul, TMH.

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V Sem	Data Base Management System Lab	Course Code:V18CSL06	L	T	P	C
			0	0	3	1.5

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Build SQL Queries and Constraints (K3).

CO2: Experiment with various Database Indexing Techniques.(K3).

CO3: Construct PL/SQL Cursors and Exceptions (K3).

CO4: Develop application programs using PL/SQL (K3).

CO5: Develop PL/SQL Functions, Procedures, Packages (K3).

CO6: Apply projections and aggregation on collection of MongoDB database (K3).

List of Experiments

Part-A

1. Queries to facilitate acquaintance of Built-In Functions, String Functions, Numeric Functions, Date Functions and Conversion Functions.

2. Queries using operators in SQL

3. Queries to Retrieve and Change Data: Select, Insert, Delete, and Update

4. Queries using Group By, Order By, and Having Clauses

5. Queries on Controlling Data: Commit, Rollback, and Save point

6. Queries to Build Report in SQL *PLUS

7. Queries for Creating, Dropping, and Altering Tables, Views, and Constraints

8. Queries on Joins and Correlated Sub-Queries

9. Queries on Working with Index, Sequence, Synonym, Controlling Access, and Locking Rows for Update, Creating Password and Security features PL/SQL.

10. Write a PL/SQL Code using Basic Variable, Anchored Declarations, and Usage of Assignment Operation.

11. Write a PL/SQL Code Bind and Substitution Variables. Printing in PL/SQL

12. Write a PL/SQL block using SQL and Control Structures in PL/SQL

13. Write a PL/SQL Code using Cursors, Exceptions and Composite Data Types

14. Write a PL/SQL Code using Procedures, Functions, and Packages FORMS

Part-B

1. Install and start MongoDB
2. Create and drop database and collection
3. Insert,update ,delete,query document
4. Projection, limiting records, sorting records and aggregation in MongoDB

Text Books:

1. Oracle Database 11g The Complete Reference by Oracle Press, Kevin Loney
2. Database Systems Using Oracle, Nilesh Shah, 2nd Edition ,PHI.
3. Introduction to SQL, Rick F Vander Lans, 4th Edition, Pearson Education.

Reference Books:

1. Introduction to SQL, Rick F. Vander Lans, 4th Edition, Pearson education.
2. Oracle PL/SQL Interactive Workbook, B. Rosenzweig and E. Silvestrova,2nd Edition, Pearson education.
3. SQL & PL/SQL for Oracle 10 g, Black Book, Dr. P. S. Deshpande, Dream Tech.

V Sem	Operating System and Unix Lab	Course Code: V18CSL07	L	T	P	C
			0	0	3	1.5

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Illustrate CPU scheduling algorithms (K3)

CO2: Apply Bankers Algorithm for Deadlock Avoidance and Deadlock Prevention (K3)

CO3: Use Page replacement algorithms for memory management (K3)

CO4: Demonstrate the basic knowledge of Linux commands and file handling utilities by using Linux shell environment. (K3)

CO5: Experiment with the concept of shell scripting programs. (K3)

CO 6: Illustrate the process of how the parent and child relationships (K3)

List of Experiments:

Part-A: OS Lab

1. Simulate the following CPU scheduling algorithms:
   a) FCFS b) SJF c) Round Robin d) Priority
2. Implement : fork (), wait (), exec() and exit () system calls
3. Simulate Producer and Consumer problem using Semaphores
4. Simulate Bankers Algorithm for Dead Lock Avoidance
5. Simulate Bankers Algorithm for Dead Lock Prevention
6. Simulate the following page replacement algorithms:
   a) FIFO b) LRU c) LFU
7. Simulate the following File allocation strategies:
   a) Sequenced b) Indexed c) Linked

Part-A: UNIX Lab

8. **Study of Unix Commands:** General Purpose Utilities, Directory Handling Commands, File Handling Utilities, Displaying Commands, Filters, Disk Utilities
9. Shell Script to list all of the directory files in a directory.
10. Shell Script to find the factorial of a given number
11. Shell Script to generate a Multiplication table.
12. Shell Script to Perform arithmetic operations
13. Implement an AWK script to count the number of lines in a file that do not contain vowels
14. Design an awk script to find the number of characters, words and lines in a file?
15. Design a C program to create a child process and allow the parent to display

"parent" and the child to display "child" on the screen

16. Demonstration of GDB tool to understand process programme.
17. Design a C program to create a Zombie Process.
18. Design a C program that illustrates how an orphan is created.

Reference Books:

1. Operating System Concepts,AbrahamSilberschatz, ,Peter Baer Galvin,Greg Gagne, 9th Edition, John Wiley and Sons Inc., 2012
2. Operating Systems – Internals and Design Principles, William Stallings, 7th Edition, Prentice Hall, 2012
3. Modern Operating Systems, Andrew S. Tanenbaum, Third Edition, Addison Wesley,2007
4. M G venkateshmurthy Introduction to Unix and shell programming Pearson education
5. W. Richard Stevens, Advanced programming in the unix environment, 3rd Edition,Pearson education.

V Sem	**Technical Skills-III**	Course Code: V18CST62	L	T	P	C
			0	0	4	MNC

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Apply fundamental data structures like List, Stack to solve real work problems in linear time i.e. O(n). (K3)

CO2: Make use of advanced data structures like queue, to solve complex problems in linear time , logarithmic time i.e. O(n) or O(nlogn).(K3)

CO3: Develop programs to solve problems by with the help of searching and sorting techniques. (K3)

CO4: Analyze linked list by comparing with Array List and develop programs to solve optimization Problems. (K4)

CO5: Experiment with types of Linked List to solve complex combinatorial problems. (K3)

CO6: Develop programs to solve complex problems by using combination of stack, Queue and List. (K3)

Data Structures

1. Problem solving using ArrayList
2. Problem solving using LinkedList
3. Problem solving using Stack
4. Problem solving using Queue
5. Problem solving using Searching
6. Problem solving using Sorting

Text Books:

1. Introduction to Algorithms, Second Edition, Thomas H. Cormen Charles E. Leiserson.
2. Data Structures and Algorithms Made Easy: Narasimha Karumanchi .
3. The Algorithm Design Manual, Springer series, Steven Skiena.

VI Sem	**Compiler Design**	Course Code: V18CST19	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe the compilation process and lexical analyzer (K2)
CO2: Construct top down parsing Techniques (K3)
CO3: Construct bottom up parsing techniques (K3)
CO4: Construct syntax directed translation (K3)
CO5: Produce intermediate code generation process and run time environments (K3)
CO6: Explain the code generation process. (K2)

UNIT-I: Introduction: Language Processors, the Structure of a Compiler. Lexical Analysis: The Role of the Lexical Analyzer, Specification of Tokens, Recognition of Tokens and the Lexical-Analyzer Generator Lex.

UNIT-II: Syntax Analysis: Definition of CFG, Lexical Versus Syntactic Analysis, Writing a Grammar- Elimination of Left Recursion, Left Factoring. Top Down Parsing: Recursive Descent Parsing, First and Follow, LL(1) Grammars, Non recursive Predictive Parsing, Error Recovery in Predictive Parsing.

UNIT-III: Bottom-Up Parsing: Bottom Up Parser Classification, Reductions, Handle Pruning, Shift-Reducing, Conflicts During Shift Reduce Parsing. Introduction to LR Parsing: Difference between LR and LL Parsers, Why LR Parsers?, Items and the LR(0) automaton, The LR-Parsing Algorithm, Constructing SLR Parsing Tables

UNIT-IV: More powerful LR parsers: construction of CLR (1), LALR Parsing tables, Comparison of all Bottom Up approaches. Semantic Analysis: Syntax Directed Definitions, Evaluation Orders for SDD's, Applications of SDT.

UNIT-V: Intermediate Code Generation: Variants of Syntax Trees, Three-Address Code, Control Flow, Back-patching. Run-Time Environments: Storage Organization, Stack Allocation of Space, Heap Management.

UNIT-VI: Code Generation: Basic Blocks and Flow Graphs, Optimization of Basic Blocks, Peephole Optimization, Register Allocation and Assignment. Machine-Independent optimizations: The Principal Sources of Optimizations, Introduction to Data-Flow Analysis.

Text Books:
1. Compilers, Principles Techniques and Tools- Alfred V Aho, Monica S Lam, Ravi Sethi, Jeffrey D. Ullman,2nded, Pearson,2007

Reference Books:
1. Principles of compiler design, V. Raghavan, 2nd ed, TMH, 2011
2. Compiler Design, K. Muneeswaran, Oxford

VI Sem	**Data Mining**	Course Code:	L	T	P	C
		V18CST20	3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Explain the concept of Data Mining and its functionalities (K2)

CO2: Discuss various Data Preprocessing Techniques (K3)

CO3: Demonstrate Association Analysis Techniques (K3)

CO4: Illustrate various Classification Techniques (K3)

CO5: Demonstrate Alternative techniques for Classification (K3)

CO6: Use different Clustering techniques to cluster data (K3)

UNIT-I : Introduction: Need for Data Mining, Knowledge Discovery from Data, Kinds of Data mined, Kinds of Patterns mined, Technologies used, Kinds of Applications targeted, Major Issues in Data Mining, Data Objects and Attribute Types, Basic Statistical Descriptions of Data, Measuring Data Similarity and Dissimilarity

UNIT-II: Data Preprocessing: Overview of Data Preprocessing, Data Cleaning, Data Integration, Data Reduction, Data Transformation and Data Discretization

UNIT-III: Mining Frequent Patterns, Associations, and Correlations: Basic Concepts, Frequent Itemset Mining Methods- Apriori Algorithm: Finding Frequent Itemsets by Confined Candidate Generation, Generating Association Rules from Frequent Itemsets, Improving the Efficiency of Apriori, Pattern-Growth Approach for Mining Frequent Itemsets

UNIT-IV: Classification: Basic Concepts, Decision Tree Induction, Attribute Selection Measures, Tree Pruning

UNIT-V: Bayes Classification Methods: Bayes' Theorem, Naive Bayesian Classification. **Bayesian Belief Networks:** Concepts and Mechanisms, Training Bayesian Belief Networks

UNIT-VI: Cluster Analysis: Basic Concepts and Methods, Partitioning Methods, Hierarchical Methods, Density Based Method-DBSCAN

Text Books:

1. Data Mining Concepts and Techniques, Jiawei Han, Micheline Kamber, Jian Pei,3rd Edition, Morgan Kaufmann Publishers

Reference Books:

1. Introduction to Data Mining, Pang-Ning Tan, Michael Steinbach, Vipin Kumar, 1st Edition, Pearson Education.
2. Data Mining and Analysis,Mohammed J Zaki, Wagner Meira JR, 1st Edition ,Cambridge University Press.

VI Sem	Object Oriented Analysis and Design Through UML	Course Code: V18CST21	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Discuss importance of modeling. [K2]

CO2: Describe classes and relationships. [K2]

CO3: Develop class diagrams and object diagrams. [K3]

CO4: Develop Interaction, Use case and Activity Diagrams. [K3]

CO5: Illustrate advanced behavioral modeling. [K3]

CO6: Develop component and deployment diagrams.[K3]

UNIT-I: Introduction to UML: Importance of modeling - Principles of modeling - Object oriented modeling - Conceptual model of the UML – Architecture - Software Development Life Cycle.

UNIT-II: Advanced Structural Modeling: Classes – Relationships - Common Mechanisms and diagrams - Advanced classes - Advanced relationships – Interfaces - Types and Roles – Packages.

UNIT-III: Class & Object Diagrams: Terms, concepts - Modeling techniques for Class Diagrams - Modeling techniques for Object Diagrams.

UNIT-IV: Basic Behavioral Modeling-I: Interactions - Interaction diagrams. **Basic Behavioral Modeling-II:** Use cases - Use case Diagrams - Activity Diagrams.

UNIT-V: Advanced Behavioral Modeling: Events and signals - State machines - Processes and Threads - Time and space - State chart diagrams.

UNIT-VI: Architectural Modeling: Component- Deployment - Component diagrams - Deployment diagrams.

Text Book:

1. The Unified Modeling Language User Guide, Grady Booch, James Rumbaugh, Ivar Jacobson, Pearson Education.

Reference Books:

1. UML 2 Toolkit, Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado, WILEY-Dreamtech India Pvt. Ltd.
2. Fundamentals of Object Oriented Design in UML, Meilir Page-Jones, Pearson Education.
3. Modeling Software Systems Using UML2, Pascal Roques, WILEY-Dreamtech IndiaPvt. Ltd.

<table>
<tr><td rowspan="2">VI
Sem</td><td rowspan="2">Cryptography and Network Security</td><td rowspan="2">Course Code:
V18CST22</td><td>L</td><td>T</td><td>P</td><td>C</td></tr>
<tr><td>3</td><td>0</td><td>0</td><td>3</td></tr>
</table>

<u>Syllabus Details</u>

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1:Describe the fundamentals of networks security, security architecture, threats and vulnerabilities (K2)
CO2: Discuss the mathematical support for both symmetric and asymmetric key cryptography (K2)
CO3: Discuss the concept of developing encryption and decryption algorithms (K2)
CO4: Illustrate various techniques of encryption and message authentication functions (K3)
CO5: Apply various Key management and Distribution techniques and its importance (K3)
CO6: Discuss the Need of Transport level and Email security algorithms (K2)

UNIT-I: Computer Security concepts, security services, and Active vs. Passive attacks, Security mechanisms, OSI Security Architecture, A Model for Network security, Classical Encryption Techniques, Substitution ciphers, Transposition ciphers.

UNIT-II: Introduction to Number Theory, Fermat's and Euler's Theorem, the Chinese Remainder Theorem, Euclidean Algorithm, and Modular Arithmetic.

UNIT-III: Block Ciphers, Data Encryption Standard (DES), Block Cipher Design Principles, Advanced Encryption Standard (AES), Simplified AES, Multiple Encryption and Triple DES, Pseudorandom Number Generators, Pseudorandom Number Generation Using a Block Cipher, Stream Ciphers, RC4.

UNIT-IV: RSA, Diffie-HellmanKeyExchange, Elliptic Curve Cryptography, Message Authentication Code-Message Authentication Functions, Requirements, and Security, HMAC, Hash functions, Secure Hash algorithm,SHA-512.

UNIT-V: Digital Signatures, Digital Signature Standards, Authentication Protocols, Kerberos, Key Management and Distribution, X.509 Digital Certificate, NIST Digital Signature Algorithm.

UNIT-VI: Transport Level Security: Web Security Considerations, Secure Socket Layer, Transport Layer Security. Electronic mail security: Pretty Good Privacy (PGP),S/MIME.

Text Books:

1. "Cryptography and Network Security, Principles and Practices", William Stallings Pearson Education, Sixth Edition.
2. "Network Security Essentials (Applications and Standards)", William Stallings, Pearson Education Fourth Edition.
3. Cryptographyand NetworkSecurity,BehrouzAForouzan,Debdeep Mukhopadhyay,(3e) McGrawHill.

Reference Books:

1. "Network Security – PrivateCommunication in a Public World" Charlie Kaufman, Radia Perlman and Mike Speciner , Pearson/PHI.

VI Sem	**Software Testing Methodologies (Elective-II)**	Course Code: V18CST23	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe Software testing objectives and methodology. (K2)

CO2: Apply various Software testing techniques. (K3)

CO3: Discuss Static testing techniques for software testing. (K2)

CO4: Differentiate software testing and debugging process. (K2)

CO5: Construct test cases by understanding test suite management. (K3)

CO6: Explain modern software testing tools to support software testing. (K2)

UNIT-I: Introduction to Software Testing: Evolution of software Testing, Myths and Facts, Goals of software Testing, Definitions of Testing, Model for Software Testing, Software Testing Terminology, Software Testing Life Cycle.

UNIT-II: Verification and Validation: Verification & Validation Activities, Verification, Verification of Requirements, Verification of High level and low level designs, How to verify code, Validation. **Dynamic Testing I:** Black Box testing techniques: Boundary Value Analysis, Equivalence Class Testing, Decision Table based Testing,

UNIT-III: Dynamic Testing II: White-Box Testing: Need of White-Box Testing, Logic coverage criteria, Basis path testing, Loop testing. **Static Testing:** Inspections, Structured Walkthroughs, Technical reviews.

UNIT-IV: Regression Testing: Progressive Vs Regressive Testing, Regression testability, Objectives of regression testing, When is Regression Testing done? Regression Testing Types, Regression testing techniques. **Debugging:** Debugging process, Techniques, correcting bugs.

UNIT-V: Efficient Test Suite Management: Why does a Test Suite grow, minimizing the Test suite and its benefits, Test suite prioritization, Types of Test case prioritization, Prioritization techniques, measuring the effectiveness of a prioritized Test Suite.

UNIT-VI: Software Quality Management: Software quality concept, Quality control and Quality Assurance, Software Quality metrics. **Automation and Testing Tools:** Need for automation, categorization of Testing tools, selection of testing tools, Overview of some commercial testing tools.

Text Books:

1. Software Testing, Principles and Practices, Naresh Chauhan, 9th Edition, Oxford Publisher.

Reference Books:

1. Software testing techniques - Boris Beizer, 2nd Edition, Dreamtech publisher.
2. Foundations of Software testing, Aditya P Mathur, 2nd ed, Pearson.
3. Software Testing- Yogesh Singh, CAMBRIDGE.

VI Sem	**Principles of Programming Languages (Elective-II)**	Course Code: V18CST24	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe Syntax and Semantics of Programming Languages (K2).

CO2: Illustrate Data, Data Types and basic statements of Programming Languages (K3).

CO3: Explain various sub programming Issues (K2).

CO4: Construct programs using Object Oriented, Concurrency and Event Handling (K3).

CO5: Distinguish Programming Languages, schemes and ML (K2).

CO6: Describe Logic Programming Languages (K2).

UNIT I: SYNTAX AND SEMANTICS: Reasons for studying Programming Languages, Programming Domains, Evolution of programming languages, describing syntax, context free grammars, attribute grammars, describing semantics, lexical analysis, parsing, recursive – decent bottom – up parsing.

UNIT II: DATA TYPES AND BASIC STATEMENTS: Introduction, primitive data types, strings, array types, associative arrays, record types, tuple types , union types, pointers and references, Arithmetic expressions, overloaded operators, type conversions, relational and Boolean expressions, assignment statements , mixed mode assignments, control structures – selection, iterations, branching, guarded Statements.

UNIT III: SUBPROGRAMS AND IMPLEMENTATIONS: Subprograms, design issues, local referencing, parameter passing, overloaded methods, generic methods, design issues for functions, semantics of call and return, implementing simple subprograms, stack and dynamic local variables, nested subprograms, blocks, dynamic scoping.

UNIT IV: OBJECT- ORIENTED PROGRAMMING,EVENT HANDLING: Object Model – Classes, Visibility and Information Hiding, Inheritance, Polymorphism, Abstract Classes, Event Handling- Mouse Clicks, Mouse Motion, Buttons, Labels, Text areas, Combo boxes, Examples.

UNIT V: FUNCTIONAL PROGRAMMING LANGUAGES: Introduction to lambda calculus, fundamentals of functional programming languages, Programming with Scheme, – Programming with ML.

UNIT VI: LOGIC PROGRAMMING LANGUAGES: Introduction to logic and Horn Clauses, logic programming – Programming in Prolog, Prolog Examples-Solving Word Puzzles, Eight Queens Problem.

Text Books:

1. Concepts of Programming Languages, Robert W. Sebesta ,Tenth Edition, Addison Wesley, 2012.
2. Programming Languages, Principles & Paradigms, 2ed, Allen B Tucker, Robert E Noonan, TMH

References:

1. The Scheme programming language, R. Kent Dybvig, Fourth Edition, MIT Press, 2009.
2. Elements of ML programming, Jeffrey D. Ullman, Second Edition, Prentice Hall, 1998.
3. The craft of Prolog, Richard A. O'Keefe MIT Press, 2009.

VI Sem	**Machine Learning (Elective-II)**	Course Code: V18CST25	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Demonstrate basics of Machine Learning. (K2)

CO2: Explain Various Classification Techniques. (K2)

CO3: Explain Tree Based Learning and Ensemble Learning (K2)

CO4: Demonstrate Neural Networks and Multi Layer Perceptrons. (K2)

CO5: Explain Multi Layer Perceptrons and Back Propagation (K2).

CO6: Demonstrate Dimensionality Reduction Techniques (K2).

Unit-I: Introduction:Learning: Machine Learning, Types Of Machine Learning, Supervised Learning, Regression, Classification, The Machine Learning Process. Some Terminology: Weight Space, The Curse Of Dimensionality. Knowing What You Know: Testing Machine Learning Algorithms, Over fitting, Training, Testing, And Validation Sets. Some Basic Statistics: Averages Variance And Covariance, The Bias-Variance Tradeoff.

UNIT II: Classification: The General Problem, Logistic Regression, K-Nearest Neighbor Classifiers, Support Vector Machines. Assessing Performance Of Classifiers: The Confusion Matrix, Accuracy, 0/1 Loss, Sensitivity And Specificity, The Receiver Operator Characteristic (Roc) Curve. Unbalanced Datasets Measurement: Precision, Recall And F1 Score.

UNIT-III:Ensemble Learning : Boosting, Adaboost, Stumping, Bagging , Subbagging, Random Forests.

UNIT-IV: Neural Networks: The Brain And The Neuron, Hebb's Rule, Mcculloch And Pitts Neurons, Limitations Of The Mcculloch And Pitts Neuron Model, Neural Networks, The Perceptron, The Learning Rate, The Bias Input The Perceptron Learning Algorithm, An Example Of Perceptron Learning: Logic Functions Implementation, Linear Separability, Linear Regression, Linear Regression Examples

UNIT-V: The Multi Layer Perceptron(MLP): Going Forwards, Going Backwards(Back Propagation of Errors), The MLP in practice, Examples of using the MLP: Classification and Regression, Deriving Back-Propagation.

UNIT-VI: Dimensionality Reduction: Linear Discriminant Analysis (LDA), Principal Components Analysis (PCA), Relation With The Multi-Layer Perceptron, Kernel PCA, Factor Analysis, Independent Components Analysis (ICA) Locally Linear Embedding.

Text Books:

1. Machine Learning: An Algorithmic Approach.Stephen Marsland, 2nd Edition, CRC Press.

2. A First Course in Machine Learning; Volume in Machine Learning and Pattern Recognition Series –

CRC-Taylor & Francis-Chapman & Hall Rogers S., Girolami M., (2011).

Reference Books:

1. Machine Learning: The art and Science of Algorithms that Make sense of Data. Peter Flach,

Cambridge, First Edition, 2012.

2. Machine Learning: Tom Mitchel, McGraw Hill Learning, 1997

VI Sem	**Image Processing (Elective-II)**	Course Code: V18CST26	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Illustrate the different Transforms Techniques & their use in Image Processing applications (K3).

CO2: Demonstrate Spatial & frequency domain filtering (like smoothing & sharpening operations) on

Images (K3).

CO3: Describe Restoration operations/techniques on Images (K2).

CO4: Demonstrate the Image compression Techniques and multi-resolution processing on Images (K3).

CO5: Illustrate Morphological operations on Images & Image segmentation (K3).

CO6: Illustrate the different color Image Processing Techniques on Images (K3).

UNIT-I : Introduction: Introduction to Image Processing, Fundamental steps in digital image processing, components of an image processing system, image sensing and acquisition, image sampling and quantization, some basic relationships between pixels, an introduction to the mathematical tools used in digital image processing. **Image Transforms:** Need for image transforms, Discrete Fourier transform (DFT) of one variable, Extension to functions of two variables, some properties of the 2-D Discrete Fourier transform, Importance of Phase, Walsh Transform. Hadamard transform, Haar Transform, Slant transform, Discrete Cosine transform.

UNIT-II: Intensity Transformations and Spatial Filtering: Background, Some basic intensity transformation functions, histogram processing, fundamentals of spatial filtering, smoothing spatial filters, sharpening spatial filters. **Filtering in the Frequency Domain:** Preliminary concepts, The Basics of filtering in the frequency domain, image smoothing using frequency domain filters, Image Sharpening using frequency domain filters, Selective filtering.

UNIT-III: Image Restoration and Reconstruction: A model of the image degradation / Restoration process, Noise models, restoration in the presence of noise only-Spatial Filtering, Periodic Noise Reduction by frequency domain filtering, Linear, Position –Invariant Degradations, Estimating the degradation function, Inverse filtering, Minimum mean square error (Wiener) filtering, constrained least squares filtering ,geometric mean filter .

UNIT-IV: Image compression: Fundamentals, Basic compression methods: Huffman coding, Arithmetic coding, LZW coding, Run-Length coding, Bit-Plane coding. **Wavelets and**

Multiresolution Processing: Image pyramids, subband coding, Multiresolution expansions, wavelet transforms in one dimensions & two dimensions, Wavelet coding.

UNIT-V: Image segmentation: Fundamentals, point, line, edge detection, thresholding, region –based segmentation. **Morphological Image Processing:** Preliminaries, Erosion and dilation, opening and closing, basic morphological algorithms for boundary extraction, thinning, gray-scale morphology.

UNIT-VI: Color image processing: color fundamentals, color models, pseudo color image processing, basics of full color image processing, color transformations, smoothing and sharpening. Image segmentation based on color, noise in color images, color image compression.

Text Books:

1. Digital Image Processing, R. C. Gonzalez and R. E. Woods, 3rd edition, Prentice Hall, 2008.

2. Digital Image Processing, Jayaraman, S. Esakkirajan, and T. Veerakumar, Tata McGraw-Hill Education, 2011.

Reference Books:

1. Fundamentals of Digital Image Processing, Anil K.Jain, Prentice Hall of India, 9th Edition, Indian Reprint, 2002.

2. Digital Image Processing and Analysis, B.Chanda, D.Dutta Majumder, PHI, 2009.

<table>
<tr><td rowspan="2">VI Sem</td><td rowspan="2">Object Oriented Analysis and Design Through UML Lab</td><td rowspan="2">Course Code: V18CSL08</td><td>L</td><td>T</td><td>P</td><td>C</td></tr>
<tr><td>0</td><td>0</td><td>3</td><td>1.5</td></tr>
</table>

<u>Syllabus Details</u>

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Develop OOAD and UML concepts to identify Classes, Use Cases and their relationships (K3).

CO2: Develop Class diagrams (K3).

CO3: Develop Use case diagrams (K3).

CO4: Construct Interaction diagrams (K3).

CO5: Develop State chart, Activity diagrams (K3).

CO6: Develop Component and Deployment diagrams (K3).

List of Experiments

1. Draw basic class diagrams to identify and describe key concepts like classes, and their relationships.
2. Draw one or more Use Case diagrams for capturing and representing requirements of the system. Use case diagrams must include template showing description and steps of the Use Case for various scenarios.
3. Draw sequence diagrams OR communication diagrams with advanced notation for system to show objects and their message exchanges.
4. Draw activity diagrams to display either business flows or like flow charts.
5. Develop State chart diagrams.
6. Draw component diagrams assuming that build the system reusing existing components along with a few new ones.
7. Draw deployment diagrams to model the runtime architecture of system.
8. Design Case study on Library Management System
9. Design Case Study on Hospital Management System
10. Case study-Railway Reservation System
11. Design Case study on Library Management System using C4 Model.

Text Books:

1. The Unified Modeling Language User Guide, Grady Booch, James Rumbaugh, Ivar Jacobson, Pearson Education.

. **Reference Books:**

1. UML 2 Toolkit, Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado, WILEY-Dreamtech India Pvt. Ltd.
2. Fundamentals of Object Oriented Design in UML, Meilir Page-Jones, Pearson Education.
3. Modeling Software Systems Using UML2, Pascal Roques, WILEY- Dreamtech India Pvt. Ltd.
4. (https://c4model.com/)

<table>
<tr><td rowspan="2">VI Sem</td><td rowspan="2">Data Mining Lab</td><td rowspan="2">Course Code:V18CSL09</td><td>L</td><td>T</td><td>P</td><td>C</td></tr>
<tr><td>0</td><td>0</td><td>3</td><td>1.5</td></tr>
</table>

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Demonstrate Data Preprocessing techniques.(K3)

CO2: Demonstrate Association Rule Mining techniques.(K3)

CO3: Demonstrate Classification techniques. (K3)

CO4: Demonstrate the Clustering techniques. (K3)

List of Experiments (Using Weka Tool):

1. Demonstrate Data Preprocessing on predefined Weka dataset labor.arff
2. Create a student.arff dataset and Demonstrate Data Preprocessing on it
3. Demonstrate Association rule process on predefined Weka dataset contactlenses.arff using apriori algorithm.
4. Create an employee.arff dataset and demonstrate Association rule process on it using apriori algorithm
5. Demonstrate Classification process on student.arff dataset using j48 algorithm
6. Create a customer.arff dataset and demonstrate Classification process on it using j48 algorithm
7. Demonstrate Classification process on employee.arff dataset using id3 algorithm
8. Demonstrate Classification process on employee.arff dataset using Naïve Bayes algorithm
9. Demonstrate Clustering process on predefined Weka dataset iris.arff using simple k-means algorithm.
10. Demonstrate Clustering process on dataset student.arff using simple k- means algorithm.

Reference Books:

1. Data Mining: Practical Machine Learning Tools and Techniques, Ian H. Witten, Eibe Frank, Mark A. Hall, 3rd Edition, Morgan Kaufmann Publishers

2. Data Mining Concepts and Techniques, Jiawei Han, Micheline Kamber, Jian Pei, 3rd Edition, Morgan Kaufmann Publishers

3. Introduction to Data Mining, Pang-Ning Tan, Michael Steinbach, Vipin Kumar, 1st Edition, Pearson Education Inc.

<table>
<tr><td rowspan="2">I Sem</td><td rowspan="2">Technical Skills-IV</td><td rowspan="2">Course Code: V18CST63</td><td>L</td><td>T</td><td>P</td><td>C</td></tr>
<tr><td>0</td><td>0</td><td>4</td><td>MNC</td></tr>
</table>

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Demonstrate java fundamentals to solve real world computational problems.(K2)

CO2: Illustrate object orientated concepts in solving problems with reusability feature. (K2)

CO3: Apply collections on java to solve complex problems in linear time. (K3)

CO4: Make use of StringBuffer and StringBuilder to solve problems in linear and logarithmic time. (K3)

CO5: Experiment with Object Oriented concepts toreduce complexity of problems.(K3)

CO6: Develop programs to solve robust programs by using Exception Handling. (K3)

Java Programming

1. Problem solving using Control Statements
2. Problem solving using Arrays
3. Problem solving using Strings ,StringBuffer, StringBuilder
4. Problem solving using OOP Concepts
5. Problem solving using Inheritance
6. Problem solving using Polymorphism
7. Problem solving Collections (includes all)
8. Problem solving using Exception Handling

Text Books:

1. Thinking on Java - O'Reilly.
2. Java Complete Reference.
3. Effective Java. Third Edition. Joshua Bloch .

VII Sem	**Advanced Java and Web Technologies**	Course Code: VI8CST27	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Illustrate the basic concepts of HTML and CSS (K2)

CO2: Develop dynamic webpages and validate with java Script. (K3)

CO3: Illustrate the basic concepts of NODE JS and Angular. (K2)

CO4: Illustrate Extensible markup language & AJAX (K2)

CO5: Build database driven web applications using JSP (K3)

CO6: Develop web applications using PHP and MySQL (K3)

UNIT-I :HTML: Basic Syntax, Standard HTML Document Structure, Basic Text Markup, Images, Hypertext Links, Lists, Tables, Frames Forms.**CSS:** Cascading style sheets, Levels of Style Sheets, Style Specification Formats, Selector Forms, Property value forms, Font Properties, List Properties, color, Alignment of Text.

UNIT-II: JavaScript: Overview of JavaScript, General Syntactic Characteristics, Primitives Operations and Expressions, Screen output and Keyboard Input, Control Statements, Object creation and Modification, Arrays, Functions, Constructors, Pattern Matching using Regular Expressions, Events and Event Handling. **DHTML:** Positioning Moving and Changing Elements.

UNIT-III: Fundamentals of NODE JS and Angular : Understanding Node.js, Installing Node.js, Working with Node Packages, Creating a Node.js Application, Understanding Angular, Modules, Directives, Data Binding, Dependency Injection, Services, Separation of Responsibilities, Creating a Basic Angular Application.

UNIT-IV: Working with XML: Introduction, The syntax of XML,XML Document Structure, Document type Definition (DTD), Namespaces, XML schemas, XSLT, XML Processors - DOM and SAX. **AJAX A New Approach**: Overview of AJAX, Basics of AJAX.

UNIT-V: Introduction to Servlets & JSP: Introduction to servlets, Life cycle of Servlet, Limitations of servlets, Java Server Pages: JSP Overview, Components of a JSP Page: Directives, comments, Expressions, Scriptlets , Declarations, implicit objects, Database Access, session tracking.

UNIT-VI: PHP Programming: Overview of PHP, General syntactic characteristics, Primitives, operations, Expressions, Output, Control statements, Arrays, Functions, Pattern Matching, Form Handling, Cookies, Session Tracking. PHP with MySQL connectivity. Integrating PHP and AJAX.

Text Books:

4. Programming the World Wide Web, 7th Edition, Robet W Sebesta, Pearson, 2013.
5. Node.js, MongoDB and Angular Web Development, 2nd Edition,Brad Dayley Brendan Dayley Caleb Dayley,Pearson Education,2018
6. JSP:The Complete reference,Phil Hanna,The McGraw-Hill Copanies,2001

Reference Books:

2. Web Technologies: HTML, JavaScript, PHP, Java, JSP, XML and AJAX, Black book, Dream Tech.

2. An Introduction to Web Design, Programming, Paul S Wang, Sanda S Katila, Cengage

Learning

3. Web Technologies, 1st Edition 7th impression, Uttam K Roy, Oxford, 2012.

<table>
<tr><td rowspan="2">VII Sem</td><td rowspan="2">Advanced Operating Systems
(Elective – III)</td><td rowspan="2">Course Code:
VI8CST28</td><td>L</td><td>T</td><td>P</td><td>C</td></tr>
<tr><td>3</td><td>0</td><td>0</td><td>3</td></tr>
</table>

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe Architectures of Distributed Systems and Distributed Mutual Exclusion. **(K2)**
CO2: Illustrate the concepts of Deadlock Handling Strategies in Distributed Systems. **(K3)**
CO3: Explain the various Resource Management Techniques for Distributed Systems. **(K2)**
CO4: Discuss Fault Tolerance and Fault Recovery concepts in Distributed Systems . **(K2)**
CO5: Interpret the concepts of Cryptography and Data Security in Distributed Systems. **(K3)**
CO6: Describe Multiprocessor Operating System, Process Synchronization, Scheduling. **(K2)**

UNIT I: Architectures of Distributed Systems –System Architecture types - issues in distributed operating systems - communication networks - communication primitives. Distributed Mutual Exclusion - introduction - the classification of mutual exclusion and associated algorithms

UNIT II: Distributed Deadlock Detection -Introduction - deadlock handling strategies in distributed systems - issues in deadlock detection and resolution - control organizations for distributed deadlock detection - centralized and distributed deadlock detection algorithms - hierarchical deadlock detection algorithms.

UNIT III: Distributed Resource Management- Algorithms for implementing DSM - memory coherence and protocols - design issues. Distributed Scheduling - introduction - issues in load distributing - components of a load distributing algorithm - stability - load distributing algorithm – performance comparison - selecting a suitable load sharing algorithm - requirements for load distributing.

UNIT IV: Failure Recovery and Fault tolerance: Introduction- basic concepts - classification of failures - backward and forward error recovery, backward error recovery- recovery in concurrent systems - consistent set of check points - synchronous and asynchronous check pointing and recovery - check pointing for distributed database systems- recovery in replicated distributed databases.

UNIT V: Protection and Security - Preliminaries, the access matrix model and its implementations.-safety in matrix model, advanced models of protection. Data security -

cryptography: Model of cryptography, conventional cryptography- modern cryptography, multipleencryptions - authentication in distributed systems.

UNIT VI: Multiprocessor Operating Systems - Basic multiprocessor system architectures - inter connection networks for multiprocessor systems .Multiprocessor Operating System - structures of multiprocessor operating system, operating system design issues- threads- process synchronization and scheduling.

TEXT BOOKS:

1. Advanced Concepts in Operating Systems: Distributed, Database and Multiprocessor Operating Systems, MukeshSinghal, NiranjanG.Shivaratri,TMH, 2001.

2. Distributed Operating System-Concepts and Design,PradeepK.Sinha ,PHI, 2003.

REFERENCE BOOKS:

1. Modern operating system, Andrew S.Tanenbaum, PHI, 2003

2. Distributed operating system,Andrew S.Tanenbaum,Pearson education, 2003.
3. Operating System Concepts, Abraham Silberschatz; Peter Baer Galvin; Greg Gagne, Seventh Edition, John Wiley & Sons, 2004.

VII Sem	Statistics with R Programming (**Elective – III)**	Course Code: VI8CST29	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Illustrate different data structures in R. **(K2)**
CO2: Demonstrate about control statements and functions in R. **(K3)**
CO3: Compute different mathematical operations using R pre defined functions. **(K3)**

CO4: Construct and edit visualizations with R. **(K3)**
CO5: Identify appropriate statistical tests using R. **(K2)**
CO6: Examine linear and non linear models to create testable hypotheses. **(K3)**

UNIT I: Introduction and Data Structures: Introduction, How to install and run R, R Sessions, Functions, Basic Math, constants, Variables, Expressions, Reserved words in R, Arithmetic, and Boolean Operators and values, Data Types, Vectors, Advanced Data Structures: Data Frames, Lists, Matrices, Arrays, Classes.

UNIT II: Control Statements and Functions in R: R Programming Structures, Control Statements, Loops, – Looping Over Nonvector Sets,- If-Else, Default Values for Argument, return values, Deciding Whether to explicitly call return- returning Complex Objects, Functions are Objects, No Pointers in R, Recursion, A Quick sort Implementation- Extended Example: A Binary Search Tree.

UNIT III: Math and Simulation and Input/output in R: Doing Math and Simulation in R, Math Function, Extended Example Calculating Probability Cumulative Sums and Products-Minima and Maxima- Calculus, Functions for Statistical Distribution, Sorting, Linear Algebra, Operations on Vectors and Matrices, Extended Example: Vector cross Product, Set Operations. **Input /output:** Accessing the Keyboard and Monitor, Reading and writing Files

UNIT IV: Graphics: Graphics, Creating Graphs, The Workhorse of R Base Graphics, the plot() Function ,Customizing Graphs, Saving Graphs to Files.

UNIT V: Probability Distributions and Basic Statistics: Probability Distributions, Normal Distribution- Binomial Distribution- Poisson Distributions Other Distribution, Basic Statistics, Correlation and Covariance, T-Tests,-ANOVA.

UNIT VI: Linear Models in R: Linear Models, Simple Linear Regression, -Multiple Regression Generalized Linear Models, Logistic Regression, - Poisson Regression, Nonlinear Models, Splines- Decision- Random Forests.

TEXT BOOKS:

3. R for Everyone, Lander, Pearson, 2nd edition 2018.
4. The Art of R Programming, Norman Matloff, Cengage Learning, 2nd edition, 2017.

REFERENCE BOOKS:

3. R Cookbook, PaulTeetor, Oreilly, 2nd edition, 2017.
4. R in Action, Rob Kabacoff, Manning, 3rd edition, 2019.

VII Sem	Information Retrieval Systems (**Elective – III**)	Course Code: VI8CST30	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Identify the basic concepts of information retrieval. **(K2)**
CO2: Describe the Capabilities of IRS, cataloging and indexing. **(K2)**
CO3: Explain the data structures and retrieving documents. **(K2)**
CO4: Describe the difficulty of representing and retrieving documents. **(K2)**
CO5: Explain the latest technologies for describing and searching the web.**(K2)**
CO6: Illustrate searching procedure for user-text and Information System Evaluation. **(K2)**

UNIT I: Introduction: Definition, Objectives, Functional Overview, Relationship to DBMS, Digital libraries and Data Warehouses.

UNIT II: Information Retrieval System Capabilities: Search, Browse, Miscellaneous **Cataloging and Indexing:** Objectives, Indexing Process, Automatic Indexing, Information Extraction.

UNIT III: Data Structures: Introduction, Stemming Algorithms, Inverted file structures, N-gram data structure, PAT data structure, Signature file structure, Hypertext data structure.

UNIT IV:Automatic Indexing: Classes of automatic indexing, Statistical indexing, Natural language, Concept indexing, Hypertext linkages. **Document and Term Clustering:** Introduction, Thesaurus generation, Item clustering, Hierarchy of clusters.

UNIT V: User Search Techniques: Search statements and binding, Similarity measures and ranking, Relevance feedback, Selective dissemination of information search, weighted searches of Boolean systems, Searching the Internet and hypertext. **Information Visualization:** Introduction, Cognition and perception, Information visualization technologies.

UNIT VI: Text Search Algorithms: Introduction, Software text search algorithms, Hardware text search systems. **Information System Evaluation:** Introduction, Measures used in system evaluation, Measurement example – TREC results.

Text Books:

2. Information Storage and Retrieval System: Theory and Implementation, Gerald J. Kowalski, Mark T. Maybury, 2nd edition, 2002, Kluwer Academic Press.

Reference Books:

3. Information Retrieval Data Structures and Algorithms, Frakes, W.B., Ricardo Baeza-Yates Prentice Hall.
4. Information Storage & Retrieval by Robert Korfhage – John Wiley & Sons, Wiley computer publisher, 1997.

VII Sem	Human Computer Interaction (**Elective – III)**	Course Code: VI8CST31	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe the principles and characteristics of GUI. **(K2)**
CO2: Recognize how a computer system may be modified to include human diversity. **(K2)**
CO3: Select an effective style for a specific application. **(K2)**
CO4: Discuss Screen Designing mock-ups and carry out user and expert evaluation of interfaces.**(K2)**
CO5: Explain System Menus & Navigation Schemes. **(K2)**
CO6: Discuss Device and Screen based controls. **(K2)**

UNIT I: The User Interface: Introduction, Importance of the User Interface, Importance and benefits of Good Design History of Human Computer Interface. Characteristics of Graphical and Web User Interface: Graphical User Interface, popularity of graphics, concepts of Direct Manipulation, Graphical System advantage and disadvantage, Characteristics of GUI. Web User Interface, popularity of web, Characteristics of Web Interface, Merging of Graphical Business systems& the Web, Principles of User Interface Design.

UNIT II: The User Interface Design Process: Obstacles and Pitfall in the development Process, Usability, The Design Team, Human Interaction with Computers, Important Human Characteristics in Design, Human Consideration in Design, Human Interaction Speeds, Performance versus Preference, Methods for Gaining and Understanding of Users.

UNIT III: Understanding Business Functions: Business Definitions & Requirement analysis, Determining Business Functions, Design standards or Style Guides, System Training and Documentation.

UNIT IV: Principles of Good Screen Design: Human considerations in screen Design, interface design goals, test for a good design, screen meaning and purpose, Technological considerations in Interface Design.

UNIT V: System Menus and Navigation Schemes: Structure, Functions, Context, Formatting, Phrasing and Selecting, Navigating of Menus, Kinds of Graphical Menus Windows Interface: Windows characteristic, Components of Window, Windows Presentation Styles, Types of Windows, Window Management, Websystems

UNIT VI: Device and Screen-Based Control: Device based controls, Operable Controls, Text entry/read-Only Controls, Section Controls, Combining Entry/Selection Controls, Other Operable Controls and Presentation Controls, Selecting proper controls

Text Books:

1. “The Essential Guide to User Interface Design”, Wilbert O. Galitz, 2nd edition,2002,Wiley India Edition.
2. Prece, Rogers, “Sharps Interaction Design”, Wiley India.

3. ”Designing the user interfaces”. Ben Shneidermann 3rd Edition, Pearson Education Asia.

.**Reference Books:**

1. “User Interface Design” , SorenLauesen, Pearson Education
2. “Essentials of Interaction Design”, Alan Cooper, Robert Riemann, David Cronin, Wiley
3. ”HumanComputer Interaction”, Alan Dix, Janet Fincay, GreGoryd, Abowd, Russell, Bealg, Pearson Education.

VII Sem	Distributed Systems (**Elective – IV)**	Course Code: VI8CST32	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe distributed system and desired properties of such systems. **(K2)**
CO2: Discuss the theoretical concepts, namely, virtual time and agreement. **(K2)**
CO3: Discuss the basic concepts of distributed systems and Characteristics of IPC protocols. **(K2)**
CO4: Explain the mechanisms such as Remote procedure call (RPC/RMI) and OSS . **(K2)**
CO5: Explain the mechanisms such as file systems and P2P algorithms. **(K2)**
CO6: Discuss the Transactions and Replications in distributed systems. **(K2)**

UNIT I: Characterization of Distributed Systems: Introduction, Examples of Distributed Systems, Resource Sharing and the Web, Challenges. **System Models:** Introduction, Architectural Models- Software Layers, System Architecture, Variations, Interface and Objects, Design Requirements for Distributed Architectures, Fundamental Models- Interaction Model, Failure Model, Security Model.

UNIT II: Time and Global States: Introduction, Clocks Events and Process States, Synchronizing Physical Clocks, Logical Time and Logical Clocks, Global States, Distributed Debugging.

Coordination and Agreement: Introduction, Distributed Mutual Exclusion, Elections, Multicast Communication, Consensus and Related Problems.

UNIT III: Inter process Communication: Introduction, The API for the Internet Protocols- The Characteristics of Inter process communication, Sockets, UDP Datagram Communication, TCP Stream Communication; External Data Representation and Marshalling; Client Server Communication; Group Communication, Case Study: MPI.

UNIT IV:: Remote Invocation: Introduction, Request-reply protocols, Remote Procedure Call, Events and Notifications, **Case Study:** JAVA RMI.. **Operating System Support:** Introduction, The Operating System Layer, Protection, Processes and Threads –Address Space, Creation of a New Process, Threads.

UNIT V: Distributed File Systems: Introduction, File Service Architecture; Peer-to-Peer Systems: Introduction, Napster and its Legacy, Peer-to-Peer Middleware, Routing Overlays. **Case Study1:** Sun Network File system. **Case Study 2:** The Andrew File System.

UNIT VI: Transactions & Replications: Introduction, System Model and Group Communication, Concurrency Control in Distributed Transactions, Distributed Dead Locks, Transaction Recovery; Replication-Introduction, Passive (Primary) Replication, Active Replication.

Text Books:

1. "Distributed Systems- Concepts and Design", George Coulouris, Jean Dollimore, Tim Kindberg, Fourth Edition, Pearson Publication
2. "Distributed Computing, Principles, Algorithms and Systems", Ajay D Kshemkalyani, MukeshSighal, Cambridge.

Reference Books:

1. "Distributed Systems, Principles and Paradigms", Andrew S. Tanenbaum, Maarten Van Steen, 2d Edition, PHl.
2. "Distributed Systems, An Algorithm Approach," Sukumar Ghosh, Chapman & HalyCRC, Taylor & Fransis Group, 2007.

VII Sem	Scripting Languages (**Elective – IV**)	Course Code: VI8CST33	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Illustrate the concepts of scripting languages. **(K2)**

CO2: Develop Scripting for application using Ruby. **(K3)**

CO3: Explain the concepts of Programming in Perl. **(K2)**

CO4: Construct programs using Perl. **(K3)**

CO5: Describe TCL Scripting and their applications. **(K2)**

CO6: Discuss features of Groovy when compare with other Scripting Languages. **(K2)**

UNIT I: Introduction: Ruby, Rails, the structure and Execution of Ruby Programs, Package Management with RUBYGEMS, Ruby and web: Writing CGI scripts, cookies, Choice of Webservers, SOAP and web services. RubyTk – Simple Tk Application, widgets, Binding events, Canvas, scrolling.

UNIT II: Extending Ruby: Ruby Objects in C, the Jukebox extension, Memory allocation, Ruby TypeSystem, Embedding Ruby to Other Languages, Embedding a Ruby Interpreter.

UNIT III: Introduction to PERL and Scripting: Scripts and Programs, Origin of Scripting, Scripting Today, Characteristics of Scripting Languages, Uses for Scripting Languages, Web Scripting, and the universe of Scripting Languages. PERL- Names and Values, Variables, Scalar Expressions, Control Structures, arrays, list, hashes, strings, pattern and regular expressions, subroutines.

UNIT IV: Advanced Perl: Finer points of looping, pack and unpack, file system, eval, data structures, packages, modules, objects, interfacing to the operating system, Creating Internet ware applications, Dirty Hands Internet Programming, security Issues.

UNIT V:TCL: TCL Structure, syntax, Variables and Data in TCL, Control Flow, Data Structures, input/output, procedures, strings, patterns, files, Advance TCL- eval, source, exec and uplevel commands, Name spaces, trapping errors, event driven programs, making applications internet aware, Nuts and Bolts Internet Programming, Security Issues, C Interface.

UNIT VI: Groovy: Features of Groovy, Environment, Basic Syntax, data types, variables, operators, loops, decision making, methods, File i/o, Optionals , numbers, strings, ranges, lists, maps, date and time, Regular expressions, Exception Handling, OO concepts.

Text Books:

1. The World of Scripting Languages, David Barron, Wiley Publications.

2. Ruby Programming language by David Flanagan and Yukihiro Matsumoto O'Reilly.

3. "Programming Ruby" The Prammatic programmers guide by Dabve Thomas Second edition.

Reference Books:

1. Open Source Web Development with LAMP using Linux, Apache, MySQL, Perl and PHP, J.Lee and

B.Ware (Addison Wesley) Pearson Education.

2. Perl by Example, E.Quigley, Pearson Education.

3. Programming Perl, Larry Wall T.Christiansen and J.Orwant, O'Reilly, SPD.

4. Tcl and the Tk Toolkit, Ousterhout, Pearson Education.

5. Pearl Power, J.P. Flynt, Cengage Learning.

<table>
<tr><td rowspan="2">VII Sem</td><td rowspan="2">Deep Learning
(Elective – IV)</td><td rowspan="2">Course Code:
VI8CST34</td><td>L</td><td>T</td><td>P</td><td>C</td></tr>
<tr><td>3</td><td>0</td><td>0</td><td>3</td></tr>
</table>

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Explain the basics of machine learning. **(K2)**

CO2: Demonstrate the working of an artificial neural network. **(K2)**

CO3: Identify various parameters and issues while training a deep neural network. **(K2)**

CO4: Explain the working of convolution neural networks. **(K2)**

CO5: Explain the working of recurrent neural networks. **(K2)**

CO6: Recognize the ways of applying deep learning techniques for complex problem-solving. **(K2)**

UNIT I: Machine Learning Basics: Learning Algorithms, Capacity, Overfitting and Underfitting, Hyper parameters and Validation Sets, Estimators, Bias and Variance, Maximum Likelihood Estimation, Bayesian Statistics, Supervised Learning Algorithms, Unsupervised Learning Algorithms, Stochastic Gradient Descent.

UNIT II: Introduction to Neural Networks: The Basic Architecture of Neural Networks- Single Computational Layer: The Perceptron, Multilayer Neural Networks; Training a Neural Network with Backpropagation, Practical Issues in Neural Network Training-The Problem of Overfitting, The Vanishing and Exploding Gradient Problems, Difficulties in Convergence, Local and Spurious Optima;

UNIT III: Training Deep Neural Networks: Introduction, Backpropagation: Backpropagation with the Computational Graph Abstraction, Dynamic Programming to the Rescue, Backpropagation with Post-Activation Variables and Pre-activation Variables, Setup and Initialization Issues, The Vanishing and Exploding Gradient Problems, Parameter-Specific Learning Rates- AdaGrad, RMSProp, AdaDelta, Adam.

UNIT IV: Convolutional Neural Networks: Introduction, The Basic Structure of a Convolutional Network- Padding, Strides, Typical Settings, The ReLU Layer, Pooling, Fully Connected Layers, The Interleaving Between Layers, Local Response Normalization, Hierarchical Feature Engineering; Training a Convolutional Network- Backpropagating Through Convolutions.

UNIT V: Recurrent Neural Networks: Introduction, The Architecture of Recurrent Neural Networks- Language Modeling Example of RNN, Backpropagation Through Time, Bidirectional Recurrent Networks, Multilayer Recurrent Networks; Long Short-Term Memory (LSTM), Gated Recurrent Units (GRUs).

UNIT VI: Applications Deep Learning: Applications of Convolutional Networks: Content-Based Image Retrieval, Object Localization, Object Detection, Natural Language and Sequence Learning; Application of Recurrent Neural Networks: Application to Automatic Image Captioning, Time-Series Forecasting and Prediction, End-to-End Speech Recognition, Handwriting Recognition.

Text Books:

1. Deep Learning, Ian Goodfellow, Ian Goodfellow, and Aaron Courville, MIT Press.
2. Neural Networks and Deep Learning, Charu C. Aggarwal, Springer.

Reference Books:

1. Neural Networks: A Systematic Introduction, Raúl Rojas, Springer.
2. Introduction to Deep Learning, Eugene Charniak, MIT Press.

VII Sem	Social Networks and semantic web (**Elective – IV**)	Course Code: VI8CST35	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Demonstrate knowledge by explaining the three different "named" generations of the web. **(K3)**
CO2: Construct a social network. **(K3)**
CO3: Relate knowledge representation methods for semantic web. **(K3)**
CO4: Explain the key aspects of Web Architecture. **(K2)**
CO5: Describe web services and its Applications. **(K2)**
CO6: Develop "Linked Data" Applications using Semantic Web Technologies. **(K3)**

UNIT-I: The Semantic web: Limitations of the current Web, The semantic solution, Development of the Semantic Web, The emergence of the social web.

UNIT-II: Social Network Analysis: What is network analysis? Development of Social Network Analysis, Key concepts and measures in network analysis. Electronic sources for network analysis: Electronic discussion networks, Blogs and online communities, Web-based networks.

UNIT-III: Knowledge Representation on the Semantic Web: Ontologies and their role in the Semantic Web, Ontology languages for the semantic Web.

UNIT-IV: Modeling and Aggregating Social Network Data: State of the art in network data representation, Ontological representation of Social individuals, Ontological representation of social relationships, Aggregating and reasoning with social network data.

UNIT-V: Developing social semantic applications: Building Semantic Web applications with social network features, Flink- the social networks of the Semantic Web community, Open academia: distributed, semantic-based publication management.

UNIT-VI: Evaluation of Web-Based Social Network Extraction: Differences between survey methods and electronic data extraction, context of the empirical study, Data collection, Preparing the data, optimizing goodness of fit, Comparison across methods and networks, Predicting the goodness of fit, Evaluation through analysis.

Text Books:

1. Social Networks and the Semantic Web, PeterMika, Springer,2007.
2. Semantic Web Technologies, Trends and Research in Ontology basedsystems,

J.Davies,RudiStuder,PaulWarren,JohnWiley&Sons.

Reference Books:

1. Semantic Web and Semantic Web Services –Liyang Lu Chapman and Hall/CRC Publishers, (Taylor & Francis Group)
2. Information Sharing on the semantic Web – Heiner Stuckenschmidt; Frank Van Harmelen, Springer Publications

VII Sem	Advanced Java and Web Technologies Lab	Course Code: VI8CSL10	L	T	P	C
			0	0	2	1

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Develop static web pages using HTML, CSS. **(K3)**

CO2: Demonstrate the concepts of JavaScript, DHTML and XML. **(K3)**

CO3: Develop Web Applications using JSP. **(K3)**

CO4: Develop dynamic Web Applications using PHP & MySQL. **(K3)**

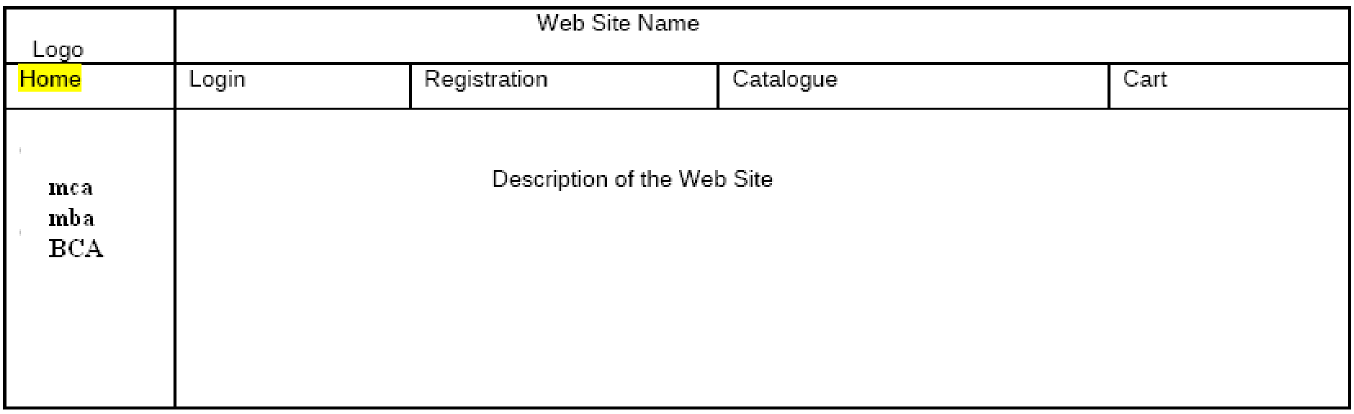
List of Experiments

1) Design the following static web pages required for an online book store web site:

(a) **HOME PAGE:**

The static home page must contain three **frames**.

Top frame: Logo and the college name and links to Home page, Login page, Registration page, Catalogue page and Cart page (the description of these pages will be given below). Left frame: At least four links for navigation, which will display the catalogue of respective links. For e.g.: When you click the link **“MCA”** the catalogue for MCA Books should be displayed in the Right frame. Right frame: The *pages to the links in the left frame must be loaded here.* Initially this page contains description of the web site



(b) **LOGIN PAGE:**

Logo	Web Site Name			
Home	Login	Registration	Catalogue	Cart
MCA MBA BCA	Login : 11a51f0003 Password: ******** Submit Reset			

(c) **CATOLOGUE PAGE:**

The catalogue page should contain the details of all the books available in the web site in a table: The details should contain the following:

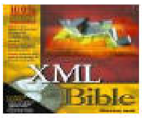
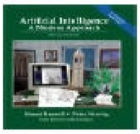
1. Snap shot of Cover Page.

2. Author Name.

3. Publisher.

4. Price.

5. Add to cart button.

Logo	Web Site Name			
Home	Login	Registration	Catalogue	Cart
MCA MBA		Book : XML Bible Author : Winston Publication : Wiely	$ 40.5	Add to cart
BCA		Book : AI Author : S.Russel Publication : Princeton hall	$ 63	Add to cart
		Book : Java 2 Author : Watson Publication : BPB publications	$ 35.5	Add to cart
		Book : HTML in 24 hours Author : Sam Peter Publication : Sam	$ 50	Add to cart

(d). **REGISTRATION PAGE:**

Create a "*registration form* "with the following fields

1) Name (Text field)

2) Password (password field)

3) E-mail id (text field)

4) Phone number (text field)

5) Sex (radio button)

6) Date of birth (3 select boxes) 7) Languages known (check boxes – English, Telugu, Hindi, Tamil)

2) Design a web page using **CSS (C**ascading **S**tyle **S**heets**)** which includes the following: Use different font, styles:

In the style definition you define how each selector should work (font, color etc.).

5) Design a login page and Make use of Events to perform validation using JavaScript.

6) Demonstrate a JavaScript program to perform On Mouse over event.

5) Demonstrate the concept of Mouse events (Ex:ng-click) with the help of Angular JS.

6) Design a simple Angular JS form.

7) Write an XML file which will display the Book information which includes the following:

1) Title of the book

2) Author Name

3) ISBN number

4) Publisher name

5) Edition

6) Price

a) Write a Document Type Definition (DTD) to validate the above XML file.

b) Write a XML Schema Definition (XSD)

8) Create a simple JSP to print the current Date and Time.

9)Create JSP to insert the details of 3 or 4 users using a registration form store these values in the data base and then check the authentication of the user by entering the name and password using a login form.

10) Assume four users user1, user2, user3 and user4 having the passwords pwd1, pwd2, pwd3 and pwd4 respectively. Write a PHP for doing the following.

A)

1. Create a Cookie and add these four user id's and passwords to this Cookie.

2. Read the user id and passwords entered in the Login form (week1) and authenticate with the values (user id and passwords) available in the cookies.

If he is a valid user (i.e., user-name and password match) you should welcome him by name (user-name) else you should display "You are not an authenticated user ".

C) Use init-parameters to do the same.

11) Create a table which should contain at least the following fields: name, password, email id, phone number (these should hold the data from the registration form).

Write a PHP program to connect to that database and extract data from the tables and display them. Experiment with various SQL queries. Insert the details of the users who register with the web site, whenever a new user clicks the submit button in the registration page.

12) Insert the details of the 3 or 4 users who register with the web site by using registration form. Authenticate the user when he submits the login form using the user name and password from the database.

Reference Books:

1. Web Technologies: HTML, JavaScript, PHP, Java, JSP, XML and AJAX, Black book, Dream Tech.
2. An Introduction to Web Design, Programming, Paul S Wang, Sanda S Katila, Cengage Learning
3. Web Technologies, 1st Edition 7th impression, Uttam K Roy, Oxford, 2012.

VIII Sem	Software Project Management (**Elective – V**)	Course Code: VI8CST36	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe Software Project Management Terminology. **(K2)**
CO2: Explain various Software development process Models and software Life cycle phases. **(K2)**
CO3: Illustrate various Effort Estimation Techniques and activity network models for Software Project Planning. **(K3)**
CO4: Demonstrate Risk Management Concepts and resource allocation. **(K3)**
CO5: Explain the importance of Project monitoring and control for accomplishing project goals. **(K2)**
CO6: Describe Software Quality models. **(K2)**

UNIT I: Introduction to Software Project Management: Software Project versus other types of projects, Activities covered by Software Project Management, Categorizing projects ,Stakeholders, Objectives& goals, what is management. **Project Planning:** Step-wise planning, Identify Project Scope and objectives, Infrastructure, Project Products &deliverables, Project activities, Effort estimation.

UNIT II: Project Approach: Build or buy, **process models**: waterfall model, Prototyping, Incremental delivery model, **Agile methods**: Extreme Programming, Atern method, selecting an appropriate process model. **Lifecycle phases:** Engineering and Production stages, Inception, Elaboration, Construction, Transition phases.

UNIT III: Software effort estimation and Activity planning: Overview of Effort Estimation techniques, Function Point analysis, COCOMO. **Activity planning:** Objectives, Network planning models, forward pass and backward pass, Identify Critical path and activities.

UNIT IV: Risk Management and Resource Allocation: Introduction, Risk and its categories, Identification, Assessment, Risk Planning and management, applying PERT technique. Resource Allocation: Types of Resources, Identifying resource requirements, Resource scheduling.

UNIT V: Project Monitoring and Control: Creating framework for monitoring& control, Collecting Data, Visualizing Progress, Cost monitoring, Earned value Analysis.

UNIT VI: Software Quality: Defining Quality, Importance of quality, ISO 9126, Product QualityVs Process Quality management. **Process Capability Models:** Capability Maturity Model, Enhancing software Quality.

Text Books:

1. SoftwareProjectManagement, Bob Hughes & Mike Cotterell, 6th edition, TATA Mcgraw-Hill

2. Software Project Management, WalkerRoyce 2nd edition, Pearson Education.

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Reference Books:

1. Software Project Management in practice, PankajJalote, 9th edition, Pearson Education.

2. Software Project Management, Joel Henry, 3rd edition, Pearson Education.

VIII Sem	Big Data Analytics (**Elective – V**)	Course Code: VI8CST37	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Discuss the challenges of Big Data using Hadoop. **(K2)**

CO2: Interpret Hadoop's architecture and core components of Hadoop Distributed File System. **(K2)**

CO3: Apply data modelling techniques to large data sets using map reduce programs. **(K3)**

CO4: Describe the Hadoop I/O classes. **(K2)**

CO5: Examine the use of Pig Framework to work with big data. **(K3)**

CO6: Develop a data analytical system using HIVE. **(K3)**

UNIT I: Introduction to Big Data: What is Big Data, Why Big Data is Important, Data Storage and Analysis, Comparison with other systems, Grid Computing. **Introduction to Hadoop:** A brief history of Hadoop, Meet Hadoop Data, Apache Hadoop and the Hadoop Ecosystem.

UNIT II: Working with Big Data & HDFS: Google File System, Hadoop Distributed File System (HDFS) –Building blocks of Hadoop (Namenode, Datanode, Secondary Namenode, JobTracker, and TaskTracker). **Introducing and Configuring Hadoop cluster:** Local distributed mode, Pseudo-distributed mode, Fully Distributed mode, Configuring XML files.

UNIT III: Writing Map Reduce Programs: A Weather Dataset –Data Format, Analyzing Data with UNIX Tools, Analyzing the Data with Hadoop-Map Reduce. **Basic programs of Hadoop Map Reduce:** Driver code,Mapper code, Reducer code, RecordReader, Combiner functions. Map Reduce Types, Input Formatclass Hierarchy, other map reduce examples (word count).

UNIT IV: Hadoop I/O: The Writable Interface, Writable Comparable and Comparators. **Writable Classes:** Writable wrappers for Java primitives, Text & Bytes Writable, NullWritable, ObjectWritable and Generic Writable, Writable collections. **Implementing a Custom Writable:** Implementing a Raw Comparator for speed, Custom comparators

UNIT V: Pig - Hadoop Programming Made Easier: Admiring the Pig Architecture, Going with the Pig Latin Application Flow, Working through the ABCs of Pig Latin, Evaluating Local and Distributed Modes of Running Pig Scripts, Checking out the Pig Script Interfaces, Scripting with Pig Latin.

UNIT VI: Applying Structure to Hadoop Data with Hive: Saying Hello to Hive, Seeing How the Hive is Put Together, Getting Started with Apache Hive, Examining the Hive Clients, Working with Hive Data Types, Creating and Managing Databases and Tables, Seeing How the Hive Data Manipulation Language Works, Querying and Analyzing Data.

Text Books:

1. Hadoop: The Definitive Guide, Tom White, O'Reilly, 3rd Edition, 2012.
2. Hadoop in Action, Chuck Lam, MANNING Publ., 2016.
3. Hadoop for Dummies, Dirk deRoos, Paul C.Zikopoulos, Roman B.Melnyk, Bruce Brown, Rafael Coss, 2014.

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Reference Books:

1. Hadoop in Practice, Alex Holmes, MANNING Publ., 2014.
2. Hadoop Map Reduce Cookbook, Srinath Perera, Thilina Gunarathne, PACKT, 2013.

VIII Sem	Soft Computing (**Elective – V**)	Course Code: VI8CST38	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Discuss about Soft Computing, Requirements and Applications of Soft Computing. **(K2)**
CO2: Discuss about various Supervised and Unsupervised Learning Networks. **(K2)**
CO3: Illustrate various Fuzzy Logic, Fuzzy Sets, Crisp sets, Fuzzification and De-fuzzification Principles. **(K2)**
CO4: Discuss about Fuzzy Arithmetic and Fuzzy measures. **(K2)**
CO5: Discuss about Genetic Algorithms and its Operators. **(K2)**
CO6: Discuss about Various Hybrid Soft Computing Techniques. (**K2)**

UNIT I: Introduction: What is Soft Computing? Difference between Hard and Soft computing, Requirements of Soft computing, Major Areas of Soft Computing, Applications of Soft Computing.

UNIT II: Associative Memory Networks: (Supervised Learning): Introduction, Training Algorithms for Pattern Association, Auto-associative Memory Network, Hetero-associative Memory Network, Bidirectional Associative Memory (BAM),Hopfield Networks, Iterative Auto-associative Memory Networks, Temporal Associative Memory Network. **Unsupervised Learning Networks:** Introduction, Fixed Weight Competitive Nets, Kohonen Self-Organizing Feature Maps, Learning Vector Quantization, Counter propagation Networks, Adaptive Resonance Theory Network.

UNIT III: Introduction to Fuzzy Logic, Classical Sets and Fuzzy Sets: Introduction to Fuzzy Logic, Classical Sets (Crisp Sets), Fuzzy Sets and Operations on Fuzzy sets-Compliment, Intersections, Unions.

Membership Function: Introduction, Features of the Membership Functions, Fuzzification, Methods of Membership Value Assignments. **Defuzzification:** Introduction, Lambda-Cuts for Fuzzy Sets (Alpha-Cuts), Lambda-Cuts for Fuzzy Relations, Defuzzification Methods

UNIT IV: Fuzzy Arithmetic and Fuzzy Measures: Introduction, Fuzzy Arithmetic, Extension Principle, Fuzzy Measures, Measures of Fuzziness, Fuzzy Integrals.

UNIT V: Genetic Algorithm: Introduction to genetic algorithm, operators in genetic algorithm, stopping condition for genetic algorithm flow.

UNIT VI: Hybrid Soft Computing Techniques: Introduction, Neuro-Fuzzy Hybrid Systems, Genetic Neuro-Hybrid Systems.

Text Books:

1. Principles of Soft Computing, S.N. Sivanandam and S.N. Deepa, 3-edition, Wiley India, 2007.
2. "Fuzzy Sets & Fuzzy Logic", G.J. Klir & B. Yuan, PHI, 1995.
3. "An Introduction to Genetic Algorithm", Melanie Mitchell, PHI, 1998.

Reference Books:

1. Neural Networks, Fuzzy Logic and Genetic Algorithms, S. Rajasekaran and G.A.V.Pai, PHI, 2003.

2. Fuzzy Logic with Engineering Applications, Timothy J.Ross, McGraw-Hill, 1997.

3. Neuro-Fuzzy and Soft Computing, J.S.R.Jang, C.T.Sun and E.Mizutani, PHI, 2004, Pearson Education.

VIII Sem	Cloud Computing (**Elective – V)**	Course Code: VI8CST39	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Outline the concepts of cloud computing architecture. **(K2)**
CO2: Describe the Virtualization concepts in different scenarios. **(K2)**
CO3: Explain the best policies for cloud deployment. **(K2)**
CO4: Illustrate the design issues of Cloud computing. **(K2)**
CO5: Illustrate the security and privacy of the data in cloud computing. **(K2)**
CO6: Demonstrate cloud instances in Amazon Web Services. **(K3)**

UNIT I: Introduction to Cloud Computing: Trends in Computing - Distributed Computing, Grid Computing, Cluster Computing, Utility Computing, Cloud Computing, Definition of Cloud Computing, Characteristics, Service Models, Deployment Models, Cloud Service Models Providers, Advantages and Disadvantages of Cloud Computing, Cloud-based Services &Applications.

UNIT II: Cloud Concepts & Technologies: Virtualization and its types, Software Defined Networking, Network Function Virtualization (NFV). **Cloud Services:** Compute Services, Storage Services, Database Services, Application Services

UNIT III: Cloud Application Design: Design Considerations for Cloud Applications, Reference Architectures for Cloud Applications, Cloud Application Design Methodologies: SOA, Cloud Component Model and MVC, Data Storage Approaches.

UNIT IV: Cloud Security: Cloud Security Architecture (CSA), Authentication, Authorization, Identity & Access Management, Data Security, Key Management.

UNIT V: Migrating into a Cloud: Broad Approaches to Migrating into the Cloud, The Seven-Step Model of Migration into a Cloud, Migration Risks and mitigation, Phases of Migrating to Cloud, benefits and risks of Migrating to Cloud.

UNIT VI: SLA Management in Cloud Computing: Service Level Agreements (SLA), Considerations for SLA, SLA Requirements, Types of SLA, Life Cycle of SLA, SLA Management in Cloud. **Case Study:** Amazon AWS: EC2, Amazon Simple DB, Amazon S3, Amazon Cloud Front and Amazon SQS.

Text Books:

1. Cloud Computing: A Hands-on Approach, ArshdeepBahga, Vijay Madisetti,Universities Press.

2. Cloud Computing: Principles and Paradigms, Rajkumar Buyya, James Broberg, Andrzej Goscinski, Wiley Publication.

Reference Books:

1. Cloud Computing – Web-Based Applications That Change the way you Work and Collaborate Online, Michael Miller, Pearson Education.
2. Cloud Computing: A Practical Approach, Anthony T. Velte, Toby J. Velte, Robert Elsenpeter, McGraw-Hill, (2010).

VIII Sem	Software Architecture & Design Patterns (**Elective – VI)**	Course Code: VI8CST40	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe Architectural Structures and Quality Attributes. (K2)

CO2: Explain the mechanism of Evaluating Architecture. (K2)

CO3: Demonstrate Creational Patterns. (K3)

CO4: Construct Structural Patterns for a given Scenario. (K3)
CO5. Construct Behavioural Patterns for a given Scenario. (K3)
CO6. Examine various Case Studies in utilizing Software Architectures. (K3)

UNIT-I: Envisioning Architecture The Architecture Business Cycle, What is Software Architecture, Architectural patterns, reference models, reference architectures, architectural structures and views. Creating and Architecture Quality Attributes, Achieving qualities, Designing the Architecture.

UNIT-II: Analyzing Architectures Architecture Evaluation, Architecture design decision making, ATAM, CBAM. Software Product Lines, Software architecture in future.

UNIT-III: Pattern Description, role in solving design problems, Selection and usage.**Creational Patterns**: Abstract factory, Builder, Factory method, Prototype, Singleton.

UNIT-IV:Structural Patterns: Adapter, Bridge, Composite, Decorator, Façade, Flyweight, PROXY.

UNIT-V:Behavioural Patterns: Chain of responsibility, command, Interpreter, iterator, mediator, memento, observer, state, strategy, template method, visitor.

UNIT-VI: Case Studies **A-7E – A case study** in utilizing architectural structures, The **World Wide Web** - a case study in Interoperability, **Air Traffic Control** – a case study in designing for high availability, **Celsius Tech** – a case study in product line development.

Text Books:

1. Software Architecture in Practice, second edition, Len Bass, Paul Clements & Rick Kazman, Pearson Education, 2003.

2. Design Patterns, Erich Gamma, Pearson Education, 1995.

Reference Books:

1. Beyond Software architecture, Luke Hohmann, Addison wesley, 2003.

2. Software architecture, David M. Dikel, David Kane and James R. Wilson, Prentice Hall PTR, 2001

3. Software Design, David Budgen, second edition, Pearson education, 2003

4. Head First Design patterns, Eric Freeman & Elisabeth Freeman, O'REILLY, 2007.

5. Design Patterns in Java, Steven John Metsker & William C. Wake, Pearson education, 2006.

VIII Sem	Middleware Technologies (**Elective – VI**)	Course Code: VI8CST41	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Illustrate Middleware, E- Business, IT architecture, RPC, RDC. **(K2)**
CO2: Demonstrate Internet Applications and Web services. **(K2)**
CO3: Summarize Technical issues in Middleware. **(K2)**
CO4: Demonstrate the Use of Middleware in Building Distributed Technologies. **(K2)**
CO5: Identify Security Issues with Distributed Applications. **(K3)**

CO6: Apply Appropriate Middleware Technology to Develop Real Time Applications.**(K3)**

UNIT I: Introduction: Moving to e-business, what is IT architecture? Why is this different from what we did before? Rewrite or evolve?, Who develops the architecture?, Early days, Preliminaries, Remote procedure calls, Remote database access, Distributed transaction processing, Message queuing, Message queuing versus distributed transaction processing, what happened to all this technology.

UNIT II: Objects, Components and the Web: Using object middleware, Transactional component middleware- COM+, EJB, Final comments on TCM, Internet Applications. WEB SERVICES: Service concepts, Web services, and Using Web services: A pragmatic approach.

UNIT III: A Technical Summary Of Middleware: Middleware elements- The communications link, The middleware protocol, The programmatic interface, Data presentation, Server control, Naming and directory services, Security, System management, Comments on Web services, Vendor architectures- Vendor platform architectures, Vendor-distributed architectures, Using vendor architectures, Positioning, Strawman for user target architecture, Marketing, Implicit architectures, Middleware interoperability.

UNIT IV: Using Middleware to Build Distributed Applications: What is middleware for? - Support for business processes, Information retrieval, Collaboration, Tiers- The presentation tier, The processing tier, The data tier, Services versus tiers, Architectural choices - Middleware bus architectures, Hub architectures, Web services architectures, Loosely coupled versus tightly coupled.

UNIT V: Security: What security is needed, Traditional distributed system security, Web services security, Architecture and security. **Application Design and It's Architecture :** Problems with today's design approaches, Design up front or as needed?- The role of business rules, Existing systems, Reuse, Silo and monolithic development, The role of architecture, Levels of design, Reconciling design approaches.

UNIT VI: Building an IT Architecture: Case Studies – Providing an integration infrastructure, creating a service-oriented architecture, Developing a new application. What does the future hold? , The key points to remember-Middleware technology alternatives, IT architecture guideline guidelines, Distribute systems technology principals and Distribute systems implementation design.

Text Books:

1. IT Architectures and Middleware: Strategies for Building Large, Integrated Systems, Chris Britton and Peter Eye, 2nd Edition, Pearson Education.

Reference Books:

1. Middleware for Communications, Qusay H. Mahmoud, 1st Edition, John Wiley and Sons.
2. Middleware Networks: Concept, Design and Deployment of Internet Infrastructure, Michah Lerner, 1st Edition, Kluwer Academic Publishers.
3. Middleware and Enterprise Integration Technologies, G. Sudha Sadasivam and Radha Shankarmani, 1st edition, Wiley, 2009.

VIII Sem	Natural Language Processing (**Elective – VI**)	Course Code: VI8CST42	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Illustrate the Syntax and semantics and Language models of Natural Language Processors. **(K2)**
CO2: Classify Morphology and Finite State Transducers, Markov Models and Entropy Models. **(K2)**
CO3: Explain about Statistical parsing and probabilistic CFGs. **(K2)**
CO4: Demonstrate semantic analysis. **(K2)**
CO5: Explain Discourse Analysis and Lexical Resources. **(K2)**
CO6: DevelopaStatisticalMethodsforRealWorldApplicationsandexploredeeplearning-basedNLP. **(K3)**

UNIT I: Introduction: Natural Language Processing tasks in syntax,semantics,andpragmatics–Issues–Applications-Theroleofmachinelearning-ProbabilityBasics–Informationtheory–Collocations-N-gram Language Models - Estimating parameters and smoothing - Evaluating language models.

UNIT II: Morphology And Part Of Speech Tagging: Linguistic essentials - Lexical syntax- Morphology and Finite State Transducers - Part of speech Tagging - Rule-Based Part of Speech Tagging - Markov Models - Hidden Markov Models – Transformation based Models - Maximum Entropy Models. Conditional Random Fields.

UNIT III: Syntax Parsing: Syntax Parsing - Grammar formalisms and tree banks - Parsing with Context Free Grammars- Features and Unification-Statistical parsing and probabilisticCFGs(PCFGs)-LexicalizedPCFGs.

UNIT IV: Semantic Analysis: Representing Meaning – Semantic Analysis - Lexical semantics –Word-sense disambiguation- Supervised – Dictionary based and Unsupervised Approaches - Compositional semantics- Semantic Role Labeling and Semantic Parsing – Discourse Analysis.

UNIT V: Discourse Analysis and Lexical Resources: Discourse segmentation, Coherence – Reference Phenomena, Anaphora Resolution using Hobbs and Centering Algorithm – Coreference Resolution – Resources: Porter Stemmer, Lemmatizer, Penn Treebank, Brills Tagger, WordNet, PropBank, FrameNet, Brown Corpus, British National Corpus (BNC).

UNIT VI: NLP Applications: Named entity recognition and relation extraction- IE using sequence labeling-Machine Translation (MT) - Basic issues in MT-Statistical translation-word alignment- phrase-based translation – Question Answering.

Text Books:

1. Daniel Jurafsky and James H. Martin Speech and Language Processing (2nd

Edition), Prentice Hall; 2nd edition,2008
2. FoundationsofStatisticalNaturalLanguageProcessingbyChristopherD.Manningand Hinrich Schuetze, MIT Press,1999
3. Steven Bird, Ewan Klein and Edward Loper Natural Language Processing with Python, O'Reilly Media; 1 edition,2009
4. Roland R. Hausser, Foundations of Computational Linguistics: Human-Computer Communication in Natural Language, Paperback, MIT Press,2011

References:

1. Pierre M. Nugues, An Introduction to Language Processing with Perl and Prolog: An Outline of Theories, Implementation, and Application with Special Consideration of English, French, and German (Cognitive Technologies) Softcover reprint,2010
2. James Allen, Natural Language Understanding, Addison Wesley; 2 edition 1994
    a. NLTK – Natural Language Tool Kit -http://www.nltk.org/

			L	T	P	C
VIII Sem	Cyber Security (**Elective – VI**)	Course Code: VI8CST43	3	0	0	3

<u>Syllabus Details</u>

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe about Cybercrimes. **(K2)**
CO2: Explain Cyber criminals and their attacks. **(K2)**
CO3: Illustrate Cybercrimes and security in mobile devices **(K2)**
CO4: Discuss about the Tools and methods used to overcome Cybercrimes. **(K2)**
CO5: Discuss about Cyber Laws and IT Acts. **(K2)**
CO6: Explain about Computer Forensics. **(K2)**

UNIT I: Introduction to Cybercrime: Introduction, Cybercrime: Definition and Origins of the Word, Cybercrime and Information Security Who are Cybercriminals? , Classifications of Cybercrimes, Cybercrime: The Legal Perspectives, Cybercrimes: An Indian Perspective, Cybercrime and the Indian ITA 2000, A Global Perspective on Cybercrimes, Cybercrime Era: Survival Mantra for the Netizens.

UNIT II: Cyber offenses: How Criminals Plan Them –Introduction, How Criminals Plan the Attacks, Social Engineering, Cyber stalking, Cyber cafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack VectorCloud Computing.

UNIT III: Cybercrime Mobile and Wireless Devices: Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit Card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication Service Security, Attacks on Mobile/CellPhones, Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile, Organizational Security Policies and Measures in Mobile Computing Era, Laptops.

UNIT IV: Tools and Methods Used in Cybercrime: Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Key loggers and Spywares, Virus and Worms, Trojan Horses and Backdoors, Steganography, DoS and DDoSAttacks, SQL Injection, Buffer Overflow, Attacks on Wireless Networks. **Phishing and Identity Theft:** Introduction, Phishing, Identity Theft (ID Theft).

UNIT V: Cybercrimes and Cyber security: The Legal Perspectives, Introduction, Why Do We Need Cyber laws: The Indian Context, The Indian IT Act, Challenges to Indian Law and Cybercrime Scenario in India, Consequences of Not Addressing the Weakness in Information Technology Act, Digital Signatures and the Indian IT Act, Amendments to the Indian IT Act,· Cybercrime and Punishment.

UNIT VI: Understanding Computer Forensics: Introduction, Historical Background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber forensics and Digital Evidence, Forensics Analysis of E-Mail, Digital Forensics Life Cycle, Chain of Custody Concept, Network Forensics, Approaching a Computer Forensics Investigation, Computer Forensics and Steganography, Relevance of the OSI 7 Layer Model to Computer Forensics, Forensics and Social Networking Sites: The Security/Privacy Threats, Computer Forensics from Compliance Perspective, Challenges in Computer Forensics, Special Tools and Techniques, Forensics Auditing, Anti-forensics.

Text Books:

1. Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, NinaGodbole, SunitBelapure, 1st edition, Wiley.

Reference Books:

1. Principles of Information Security, MichealE.Whitman and Herbert J.Mattord, 4th edition, Cengage Learning.
2. Information Security the complete reference, Mark Rhodes, Ousley, 2ndedition, MGH.

Annexure-V

List of Open Elective Courses offered by CSE for Other Branches

SEM	Course Code	Course
Open Elective-II		
VII SEM	V18CSTOE04	1. Operating Systems
	V18CSTOE05	2. Artificial Intelligence
	V18CSTOE06	3. Java Programming
Open Elective-III		
VIII SEM	V18CSTOE07	1.Software Testing Methodologies
	V18CSTOE08	2. Cyber Security
	V18CSTOE09	3. Computer Graphics

VII Sem	Operating Systems **(Open Elective-II)**	Course Code: V18CSTOE04	L	T	P	C
			3	0	0	3

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe Operating System Services and System Calls. **(K2)**

CO2: Illustrate Process Management Concepts and CPU Scheduling Algorithms. **(K3)**

CO3: Demonstrate Process Synchronization primitives. **(K3)**

CO4: Demonstrate Deadlock Prevention, Avoidance and Detection methods. **(K3)**

CO5: Illustrate Memory Management Techniques and Page Replacement Algorithms. **(K3)**

CO6: Describe File System Concepts and Mass Storage Structures. **(K2)**

UNIT-I: Introduction: Operating-System Structure, Operating-System Services, User and Operating-System Interface, System Calls, Types of System Calls.

UNIT-II: Process Management: Process Concept, Process Scheduling, Operations on Processes, Interprocess Communication. **Threads:** Overview, Multithreading Models. **CPU Scheduling:** Basic Concepts, Scheduling Criteria, Scheduling Algorithms

UNIT-III : Process Synchronization: The Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Mutex Locks, Semaphores, Classic Problems of Synchronization, Monitors

UNIT-IV: Deadlocks: System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock

UNIT-V: Memory Management Main Memory: Swapping, Contiguous Memory Allocation, Segmentation, Paging, Structure of the Page Table

Virtual Memory: Introduction, Demand Paging, Page Replacement, Allocation of Frames, Thrashing

UNIT-VI: Storage Management : Overview of Mass-Storage Structure, Disk Scheduling, File Concept, Access Methods, Directory and Disk Structure, File-System Mounting, File Allocation Methods

Text Book:

1. Operating System Concepts, Abraham Silberschatz, ,Peter Baer Galvin,Greg Gagne, 9th Edition, John Wiley and Sons Inc., 2012

Reference Books:

1. Operating Systems – Internals and Design Principles, William Stallings, 7th Edition, Prentice Hall, 2012

2. Modern Operating Systems, Andrew S. Tanenbaum, Third Edition, Addison Wesley,2007

			L	T	P	C
VII Sem	Artificial Intelligence **(Open Elective-II)**	Course Code: V18CSTOE05	3	0	0	3

<u>Syllabus Details</u>

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Illustrate the concept of intelligent systems and current trends in AI. **(K2)**

CO2: Apply Problem solving, Problem reduction and Game Playing techniques in AI. **(K3)**

CO3: Illustrate the Logic concepts in AI. **(K2)**

CO4: Explain the Knowledge representation techniques in AI. **(K2)**

CO5: Describe Expert systems and their applications. **(K2)**

CO6: Illustrate Uncertainty Measures. **(K2)**

UNIT-I: Introduction to Artificial Intelligence: Introduction, history, intelligent systems, foundations of AI, applications, tic-tac-toe game playing, current trends in AI

UNIT-II: Problem solving: State-space Search and Control Strategies: Introduction, General Problem Solving, Characteristics of problem, Exhaustive searches, Heuristic search techniques, Iterative deepening a*, constraint satisfaction

Problem reduction and game playing: Introduction, problem reduction, game playing, alpha beta pruning, two-player perfect information games

UNIT-III:Logic concepts: Introduction, Propositional Calculus, Proportional Logic, Natural Deduction system, Axiomatic system, Semantic tableau system in proportional logic, Resolution Refutation in Propositional logic, Predicate Logic

UNIT-IV: Knowledge representation: Introduction, approaches to Knowledge representation, Knowledge representation using Semantic Networks, Extended Semantic Networks for KR, Knowledge representation using Frames

UNIT-V: Expert Systems and Applications: Introduction phases in building Expert Systems, Expert System versus Traditional Systems, Rule-based Expert Systems, Blackboard systems, Truth maintenance systems, applications of Expert Systems.

UNIT-VI: Uncertainty measure: Probability theory- Introduction, Probability Theory, Bayesian Belief networks, Certainty Factor Theory, Dempster-Shafer theory

Text Book:

Artificial Intelligence, Saroj Kaushik, 1st Edition, Cengage Learning.

Reference Books:

Artificial Intelligence, Elaine Rich, Kevin Knight, Shivashankar B Nair, 3rd Edition, Tata McGraw Hill Education Private Limited., 2009

Artificial Intelligence- A modern Approach, 3rd Edition, Stuart Russel, Peter Norvig, Pearson Education.

VII Sem	**JAVA PROGRAMMING (Open Elective-II)**	Course Code:**V18CSTOE06**	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe Java Virtual Machine and Type casting.(**K2**)
CO2: Demonstrate Concepts like Constructors, Arrays, Nested Classes and Command Line Arguments.(**K3**)
CO3: Implement Concepts of Inheritance and Exception Handling. (**K3**)
CO4: Develop programs on Multi-Threading and Files. (**K3**)
CO5: Demonstrate Applet Programming and AWT Components. (**K3**)
CO6: Describe Event Handling and Swings. (**K3**)

UNIT-I: Introduction to Java: Introduction to Object Oriented Paradigm, Concepts of OOP, Applications of OOP, History of Java, Java Features, JVM, Program Structure. Variables, Primitive Data Types, Constants, Operators, Expressions, Precedence rules and Associativity, Primitive type conversion and Casting, Control Structures.

UNIT-II: Classes and Objects: Classes and objects, Class declaration, Creating objects, Methods, Constructors and Constructor Overloading, Importance of Static Keyword and Examples, this Keyword, Arrays, Command Line Arguments, Nested Classes.

UNIT-III: Inheritance and Exception Handling: Inheritance, super Keyword, final Keyword, Method Overriding and Abstract Class. Interfaces, Creating Packages, Using Packages, Importance of Class path. Exception Handling, Importance of try, catch, throw, throws and finally Block.

UNIT-IV: Multithreading and Files: Introduction, Thread Lifecycle, Creation of Threads, Thread Priorities, Thread Synchronization, Communication between Threads. Reading Data from Files and Writing Data to Files, Random Access Files.

UNIT-V: Applet Programming and AWT: Applet Class, Applet Lifecycle, Applet Programs. Introduction to AWT, Components and Containers, Button, Label, Checkbox, Radio Buttons, List Boxes, Layouts, Menu and Scrollbar.

UNIT-VI: Event Handling and Swings: Event Handling : Event Delegation Model, Sources of Events, Event Listeners, Adapter Classes, InnerClasses. Introduction to Swings.

Text Books:

1. Java Proramming, E.Balagurusamy, 4th Edition , TMH.
2. The complete Reference Java, 8th Edition, Herbert Schildt, TMH.
3. Introduction to java programming ,Y Daniel Liang, 7th Edition, Pearson.

Reference books:

1. Core Java: An Integrated Approach , R Nageswara Rao, 7th Edition, Dream Tech
2. Head First Java , Kathy Sierra and Bert Bates, 2nd Edition O'reilly

VIII Sem	Software Testing Methodologies **(Open Elective-III)**	Course Code: V18CSTOE07	L	T	P	C
			3	0	0	3

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe Software testing objectives and methodology. **(K2)**

CO2: Apply various Software testing techniques. **(K3)**

CO3: Discuss Static testing techniques for software testing. **(K2)**

CO4: Differentiate software testing and debugging process. **(K2)**

CO5: Construct test cases by understanding test suite management. **(K3)**

CO6: Explain modern software testing tools to support software testing. **(K2)**

UNIT-I: Introduction to Software Testing: Evolution of software Testing, Myths and Facts, Goals of software Testing, Definitions of Testing, Model for Software Testing, Software Testing Terminology, Software Testing Life Cycle.

UNIT-II: Verification and Validation: Verification & Validation Activities, Verification, Verification of Requirements, Verification of High level and low level designs, How to verify code, Validation. **Dynamic Testing I:** Black Box testing techniques: Boundary Value Analysis, Equivalence Class Testing, Decision Table based Testing,

UNIT-III: Dynamic Testing II: White-Box Testing: Need of White-Box Testing, Logic coverage criteria, Basis path testing, Loop testing. **Static Testing:** Inspections, Structured Walkthroughs, Technical reviews.

UNIT-IV: Regression Testing: Progressive Vs Regressive Testing, Regression testability, Objectives of regression testing, When is Regression Testing done? Regression Testing Types, Regression testing techniques. **Debugging:** Debugging process, Techniques, correcting bugs.

UNIT-V: Efficient Test Suite Management: Why does a Test Suite grow, minimizing the Test suite and its benefits, Test suite prioritization, Types of Test case prioritization, Prioritization techniques, measuring the effectiveness of a prioritized Test Suite.

UNIT-VI: Software Quality Management: Software quality concept, Quality control and Quality Assurance, Software Quality metrics. **Automation and Testing Tools:** Need for automation, categorization of Testing tools, selection of testing tools, Overview of some commercial testing tools.

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Text Books:

1. Software Testing, Principles and Practices, Naresh Chauhan, 9th Edition, Oxford Publisher.

Reference Books:

1. Software testing techniques - Boris Beizer, 2nd Edition, Dreamtech publisher..
2. Foundations of Software testing, Aditya P Mathur, 2nd ed, Pearson.
3. Software Testing- Yogesh Singh, CAMBRIDGE.

VIII Sem	Cyber Security **(Open Elective – III)**	Course Code: VI8CSTOE08	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe about Cybercrimes. **(K2)**
CO2: Explain Cyber criminals and their attacks. **(K2)**
CO3: Illustrate Cybercrimes and security in mobile devices **(K2)**
CO4: Discuss about the Tools and methods used to overcome Cybercrimes. **(K2)**
CO5: Discuss about Cyber Laws and IT Acts. **(K2)**
CO6: Explain about Computer Forensics. **(K2)**

UNIT I: Introduction to Cybercrime: Introduction, Cybercrime: Definition and Origins of the Word, Cybercrime and Information Security Who are Cybercriminals? , Classifications of Cybercrimes, Cybercrime: The Legal Perspectives, Cybercrimes: An Indian Perspective, Cybercrime and the Indian ITA 2000, A Global Perspective on Cybercrimes, Cybercrime Era: Survival Mantra for the Netizens.

UNIT II: Cyber offenses: How Criminals Plan Them –Introduction, How Criminals Plan the Attacks, Social Engineering, Cyber stalking, Cyber cafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector Cloud Computing.

UNIT III: Cybercrime Mobile and Wireless Devices: Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit Card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication Service Security, Attacks on Mobile/CellPhones, Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile, Organizational Security Policies and Measures in Mobile Computing Era, Laptops.

UNIT IV: Tools and Methods Used in Cybercrime: Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Key loggers and Spywares, Virus and Worms, Trojan Horses and Backdoors, Steganography, DoS and DDoS Attacks, SQL Injection, Buffer Overflow, Attacks on Wireless Networks. **Phishing and Identity Theft:** Introduction, Phishing, Identity Theft (ID Theft).

UNIT V: Cybercrimes and Cyber security: The Legal Perspectives, Introduction, Why Do We Need Cyber laws: The Indian Context, The Indian IT Act, Challenges to Indian Law and Cybercrime Scenario in India, Consequences of Not Addressing the Weakness in Information Technology Act, Digital Signatures and the Indian IT Act, Amendments to the Indian IT Act,· Cybercrime and Punishment.

UNIT VI: Understanding Computer Forensics: Introduction, Historical Background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber forensics and Digital Evidence, Forensics Analysis of E-Mail, Digital Forensics Life Cycle, Chain of Custody Concept, Network Forensics, Approaching a Computer Forensics Investigation, Computer Forensics and Steganography, Relevance of the OSI 7 Layer Model to Computer Forensics, Forensics and Social Networking Sites: The Security/Privacy Threats, Computer Forensics from Compliance Perspective, Challenges in Computer Forensics, Special Tools and Techniques, Forensics Auditing, Anti-forensics.

Text Books:

1. Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, NinaGodbole, SunitBelapure, 1stedition, Wiley.

Reference Books:

1. Principles of Information Security, MichealE.Whitman and Herbert J.Mattord, 4th edition, Cengage Learning.
2. Information Security the complete reference, Mark Rhodes, Ousley, 2ndedition, MGH.

			L	T	P	C
VII Sem	Computer Graphics **(Open Elective-III)**	Course Code: V18CSTOE09	3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Understand the applications of computer graphics and learn basic algorithms. **(K2)**
CO2: Analyze the concepts of 2D graphics along with transformation techniques. **(K3)**
CO3: Understand 2D Views of objects and clipping algorithms. **(K2)**
CO4: Illustrate 3D graphics and will get an idea about projections views of objects. **(K2)**

CO5: Determine different visible surface detection methods. **(K2)**
CO6: Understand different animation sequences and Color Models. **(K2)**

UNIT I:Introduction: Application of Computer Graphics, raster scan systems, random scan systems, raster scan display processors. Output Primitives : Points and lines, line drawing algorithms(Bresenham's and DDA Line derivations and algorithms), mid-point circle and ellipse algorithms.

UNIT II: Filled area primitives: Boundary-fill and flood-fill algorithms. **2-D geometrical transforms:** Translation, scaling, rotation, reflection and shear transformations, and homogeneous coordinates, composite transforms.

UNIT III:2-D viewing: The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Cohen-Sutherland, Sutherland – Hodgeman polygon clipping algorithm.

UNIT IV:3-D Geometric transformations: Translation, rotation, scaling, reflection and shear transformations, composite transformations. 3D Viewing pipeline, clipping, projections (Parallel and Perspective). **3-D object representation:** Polygon surfaces, quadric surfaces, spline representation, Bezier curve and B-Spline curves.

Unit V:Visible surface detection methods: Classification, back-face detection, depth-buffer, scan-line, BSP tree methods, area sub-division.

Unit VI:Computer animation: Design of animation sequence, general computer animation functions, raster animation, computer animation languages. **Color Models** – RGB, YIQ, CMY, HSV.

Text Books:

1. Computer Graphics C version, Donald Hearn, M.Pauline Baker, Pearson

2. Computer Graphics, Schaum's outlines", Zhigand xiang,Roy Plastock, 2nd Edition,Tata Mc-Graw Hill Edition.

3. Principles of Computer Graphics, S. Govil-Pai, 1st Edition, Springer International Edtion,2005.

Reference Books:

1. Computer Graphics Principles & practice, 2/e, Foley, VanDam, Feiner, Hughes, Pearson
2. Computer Graphics, Peter, Shirley, CENGAGE
3. Principles of Interactive Computer Graphics, Neuman , Sproul, TMH.

SRI VASAVI ENGINEERING COLLEGE (Autonomous)

(Permanent Affiliation to JNTUK, Kakinada), PEDATADEPALLI, TADEPALLIGUDEM-534 101

Department of Computer Science and Engineering

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Department of Computer Science and Technology

Annexure-VI

Curricular Components (V20 Regulation)

SEMESTER-III (SECOND YEAR)

S.No.	Course Work-Subject Area	Credits as per AICTE	% of Range as per UGC	APSCHE	Total No.of Credits	% of Credits
1	Humanities and Social Sciences **(HSS)**	12	10-15%	10.5	12	7.5%
2	Basic Sciences **(BSC)**	25	15-20%	21	19.5	12.187%
3	Engineering Sciences **(ESC)**	24	10-20%	24	24	15%
4	Professional Core **(PCC)**	48	25-35%	51	51	31.875%
5	Professional Electives **(PEC)**	18	8-12%	15	15	9.375%
6	Open Electives **(OEC)**	18	5-10%	12	12	7.5%
7	Other (Project, Internship etc.)	15	8-10%	16.5	16.5	10.312%
8	Mandatory Non-Credit Courses**(MNC)**	-	-	Non-Credit	-	
9	Skill Oriented Courses**(SO)**	-		10	10	6.25%
	Total :	**160**		**160**	**160**	

S.No.	Code	Name of the Course		L	T	P	C
1		Managerial Economics and Financial Analysis	HSS	3	-	-	3

2		Mathematical Foundation Of Computer Science	ESC	3	-	-	3
3	V20CST03	OOPs Through C++	PCC	3	-	-	3
4	V20CST04	Data Structures	PCC	3	-	-	3
5	V20CST05	Computer Organization and Architecture	ESC	3	-	-	3
6	V20CSL03	OOPs Through C++ Lab	PCC	-	-	3	1.5
7	V20CSL04	Data Structures Lab	PCC	-	-	3	1.5
8	V20CSL05	Linux Shell Scripting Lab	PCC	-	-	3	1.5
9		**Skill Oriented Course - I**	**SO**	**1**	**0**	**2**	**2**
Total:				**18**	**0**	**11**	**21.5**
10		Professional Communication Skills -I	MNC	2	-	-	0

SEMESTER - IV (SECOND YEAR)

S.No.	Code	Name of the Course		L	T	P	C
1	V20CST07	Design and Analysis of Algorithms	PCC	3	-	-	3
2	V20CST08	Software Engineering	PCC	3	-	-	3
3	V20CST09	Database Management Systems	PCC	3	-	-	3
4	V20CST10	Java Programming	PCC	3	-	-	3
5		Probability and Statistics	BSC	**3**	-	-	**3**
6	V20CSL06	Statistical Visualization using R Lab	BSC	-	-	3	1.5
7	V20CSL07	Database Management Systems Lab	PCC	-	-	3	1.5
8	V20CSL08	Java Programming Lab	PCC	-	-	3	1.5
9		**Skill Oriented Course - II**	SO	1	-	2	2
			Total:	**18**	**0**	**11**	**21.5**
10		Professional Communication Skills - II	**MNC**	**2**	**-**	**-**	**0**
Student have to do Mini Project / Internship (2 Months) during summer							

V SEMESTER (THIRD YEAR)

S.No.	Code	Name of the Course		L	T	P	C
1		Data Mining	PCC	3	-	-	3
2		Operating Systems	PCC	3	-	-	3

3		Artificial Intelligence	PCC	3	-	-	3
4		**Open Elective -I**	OEC /JOE	3	-	-	3
5		**Professional Elective-I** i) Automata and Compiler Design ii) Principles of Programming Languages iii) Information Retrieval Systems iv) Computer Graphics	PEC	**3**	-	-	**3**
6		Data Mining Lab & Artificial Intelligence Lab	PCC	-	-	3	1.5
7		Unified Modeling Language Lab	PCC	-	-	3	1.5
9		**Skill Oriented Course - III**	SO/SS	1	-	2	2
10		Mini Project / Internship*	Internship	-	-	3	1.5
			Total:	**16**	**0**	**11**	**21.5**
11			**MNC**	**2**	**-**	**-**	**0**

*Internship has to be done after IV SEM during summer

VI SEMESTER (THIRD YEAR)

S.No.	Code	Name of the Course		L	T	P	C
1		Computer Networks	PCC	3	-	-	3
2		Machine Learning	PCC	3	-	-	3
3		Web Technologies	PCC	3	-	-	3
4		**Professional Elective-II** i) Software Testing Methodologies ii) Advanced Data Structures iii) Data Science iv) Cloud Computing	PEC	3	-	-	3
5		**Open Elective -II**	OEC /JOE	3	-	-	3
6		Computer Networks Lab	PCC	-	-	3	1.5
7		Web Technologies Lab	PCC	-	-	3	1.5
8		Machine Learning Lab	PCC	-	-	3	1.5
9		**Skill Oriented Course - IV**	SO/SS	**1**	**0**	**2**	**2**
			Total:	**16**	**0**	**11**	**21.5**
Student have to do Mini Project / Internship (2 Months) during summer							

VII SEMESTER(FOURTH YEAR)

S.No.	Code	Name of the Course		L	T	P	C
1		**Professional Elective-III** i) Object Oriented Analysis and Design ii) BigData Analytics iii) Deep Learning iv) Human Computer Interaction	PEC	3	-	-	3
2		**Professional Elective-IV** i) Distributed Systems ii) NoSQL Databases iii) Soft Computing iv) Cryptography &Network Security	PEC	3	-	-	3
3		**Professional Elective-V** i) Software Project Management ii) Scripting Languages iii) Natural Language Processing iv) Social Networks and Semantic Web	PEC	3	-	-	3
4		**Open Elective -III**	OEC /JOE	3	-	-	3
5		**Open Elective -IV**	OEC /JOE	3	-	-	3
6			***HSS**	3	-	-	3

			Elective				
7		**Skill Oriented Course - V**	SO/SS	1	-	1	2
8		Mini Project /Internship*	Internship	-	-	6	3
			Total:	**19**	-	1	**23**
9		Honors/Minors Courses		4	-	-	4
10		MOOCs/Lab related to Honors/Minors Course		-	-	2	2

*Internship has to be done after VI SEM during summer

VIII SEMESTER (FOURTH YEAR)

S.No.	Code	Name of the Course		L	T	P	C
1		Internship/ Industrial Training /Practical training	PRO	-	-	4	2
2		Major Project (6 Months)	PRO			20	10
			Total:	**-**	**-**	**24**	**12**

SKILL ORIENTED COURSES

S.No.	Code	Name of the Course
1	V20CSS01	Mobile Application Development
2	V20CSS02	Mean Stack Technologies
3	V20CSS03	Secure DevOps
4	V20CSS04	AWS Cloud Computing
5	V20CSS05	Web Development using Django
6	V20CSS06	Game Development using Buildbox
7	V20CSS07	Game Programming

PROFESSIONAL ELECTIVE STREAMS

	THREAD 1 Systems and Software Architecture	THREAD 2 Programming / Databases	THREAD 3 Data Science and Machine Learning	THREAD 4 Applications and Networking
Professional	Automata and	Principles of	Information	Computer

Elective-1	Compiler Design	Programming Languages	Retrieval Systems	Graphics
Professional Elective-2	Software Testing Methodologies	Advanced Data Structures	Data Science	Cloud Computing
Professional Elective-3	Object Oriented Analysis and Design	Big Data Analytics	Deep Learning	Human Computer Interaction
Professional Elective-4	Distributed Systems	NoSQL Databases	Soft Computing	Cryptography &Network Security
Professional Elective-5	Software Project Management	Scripting Languages	Natural Language Processing	Social Networks and Semantic web

List of Open Elective Courses for other Branches

	Course Code	Name of the Course
Open Elective -I	V18CSTOE01 V18CSTOE02 V18CSTOE03	i) Python Programming ii) Operating Systems iii) Software Engineering
Open Elective -II	V18CSTOE04 V18CSTOE05 V18CSTOE06	i) Object Oriented Programming through Java ii) Computer Graphics iii) Software Testing Methodologies
Open Elective -III	V18CSTOE07 V18CSTOE08 V18CSTOE09	i) Linux Shell Scripting ii) Computer Networks iii) Cyber Security
Open Elective -IV	V18CSTOE10 V18CSTOE11 V18CSTOE12	i) Database Management Systems ii) Human Computer Interaction iii) Information Retrieval System

Annexure-VII

			L	T	P	C
III Sem	**OOPs Through C++**	**Course Code:** V20CST03	3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Differentiate Procedural Oriented Programming and Object-Oriented Programming. **(K2)**
CO2: Develop programs using Classes and Objects. **(K3)**
CO3: Demonstrate Constructors, destructors & Operator-Overloading. **(K3)**
CO4: Construct Classes using inheritance and Exceptions. **(K3)**
CO5: Demonstrate Files and Generic Programming. **(K3)**

Syllabus

Unit-I: Introduction to Object-Oriented Programming – Programming Paradigms, Data Types, Variables, Constants, Operators,Decision Statements &Control Structures, Arrays, Namespace, Default Arguments, Constant Arguments, Parameter passing techniques, Features of Object-Oriented Programming.

Unit-II: Introduction to Classes and Objects :Defining Classes & Objects, Access specifiers, Scope Resolution Operator, Static Member variables, Static Member Functions, Array of Objects. Inline Functions, Overloading Member Functions, Objects as Function Arguments, Friend Functions, Friend Class, Local Class, Empty Class, Nested Classes, Return by Reference.

Unit-III: Introduction to Constructors: Characteristics, Constructor with Default Arguments, Parameterized Constructors, Overloading Constructors, Copy Constructor, Dynamic Constructors and Destructors, Anonymous Objects. Introduction to operator Overloading, Rules for Overloading Operators, Overloading Unary & Binary Operators, this keyword, Constraint on Increment and Decrement Operators, Overloading with Friend Functions, Type Conversions.

Unit-IV: Inheritance: Base class and Derived class, Single Inheritance, Multiple Inheritance, Multilevel Inheritance, Hierarchical Inheritance, Hybrid Inheritance, Virtual Base Classes, Constructor in Derived Classes. qualifier classes, Significance of Virtual Functions, Early Vs Late Binding, Pure Virtual Functions, Virtual Destructor. **Exception handling:** Principles of Exception Handling, Keywords, Exception Handling Mechanism, Multiple Catch Statements, Catching Multiple Exceptions, Re-throwing Exception.

Unit-V: Files: File Opening Modes, File Stream Classes, I/O manipulators, Classes for File Handling, Sequential Access Files, Random Access Files, Error Handling Functions.
Generic Programming with Templates: Need for Templates, Class Templates, Function Templates, overloading Template Functions. Introduction to Standard Template Library, Sequential Containers & Associative Containers.

Text Books:

1. Programming in C++, Ashok N Kamthane, 2nd Edition, Pearson.
2. C++ How to Program, Paul J. Deitel, Harvey Deitel, 6th edition, PHI publication.

.
Reference Books:

1. Object Oriented Programming C++, Joyce Farrell, Cengage.
2. Mastering C++, Venugopal, Raj Kumar, Ravi Kumar, TMH.
3. The Complete Reference C++, HerbertSchildt, 4th Edition, Mcgraw Hill.
4. Object Oriented Programming With C++, R. Subburaj, Vikas Publishing House.

III Sem	**Data Structures**	Course Code:V20CST04	L	T	P	C
			3	1	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Illustrate the time and space complexities for searching and sorting algorithms. **(K2)**

CO2: Demonstrate linked lists and their applications. **(K3)**

CO3: Demonstrate Stacks and Queues. **(K3)**

CO4: Illustrate basic operations on binary trees. **(K3)**

CO5: Demonstrate Graphs and their applications. **(K3)**

Syllabus

Unit-I: Introduction, searching and sorting: Introduction to Data Structures, Types of Data Structures, Performance Analysis: Space complexity, time complexity, asymptotic notation. **Searching:** Linear, Binary and Fibonacci search. **Sorting**: Bubble sort, Selection sort, Insertion sort, radix sort, quick sort, and merge sort.

Unit-II: Single linked list: Representation of node, operations on single linked list, **Double linked list:** Representation of node, operations on double linked list. **Circular linked List:** Representation of node and its operations.

Unit-III: Stacks: Definition, Stack ADT, array representation, linked list representation, Towers of Hanoi, infix to postfix conversion, expression evaluation. **Queues:** definition, Queue ADT, Array representation, linked list representation, operations on queues, Applications of Queues, Circular Queue.

Unit-IV: Trees:Introduction: Terminology, representation of trees, **Binary trees:** abstract data type, Properties of binary trees, binary tree representation, **Tree Traversals:** Inorder, Preorder, Postorder. **Binary search trees:** Definition, searching BST, insert into BST, delete from a BST, Height of a BST.

Unit-V: Graph: Introduction, definition, types of Graphs, Graph Representation, operations. **Graph Traversal Techniques:** Breadth First Search, Depth First Search **Spanning Trees:** minimum cost spanning tree, Prim's and Kruskal's algorithms, Single source shortest Path and all pair shortest path algorithms.

Text Books:

1. Data Structures, algorithms and applications in C, SartajSahni, Universities press, Second Edition.

2. Fundamentals of Data Structures in C, Ellis Horowitz, SartajSahni and Dinesh Mehta, 2nd Edition, Universities Press (India) Pvt. Ltd.

Reference Books:

1. An Introduction to Data Structures with Application, Jean-Paul Tremblay , Paul Sorenson, Second Edition.
2. Fundamentals of Data Structures and algorithms by C V Sastry, Rakesh Nayak, Ch. Raja Ramesh, IK Publications, new Delhi.
3. Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.
4. Problem solving with C++, The OOP, Fourth edition, W.Savitch, Pearson education.

III Sem	**Computer Organization and Architecture**	Course Code: V20CST05	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Illustrate Basic structure of Computers, Instruction types and their addressing modes. **(K2)**
CO2: Describe the different modes of Input / Output transfer. **(K2)**
CO3: Illustrate different types of Memory. **(K2)**
CO4: Describe the different types of Control Unit techniques. **(K2)**
CO5: Explain the Concepts of Pipelining and Parallel Processing **(K2)**

Syllabus

Unit-I: Introduction: Functional Units, Basic Operational Concepts, Bus Structures.
Instruction Sequencing and Addressing Modes: Instructions and Instruction Sequencing, Addressing modes, Basic Input/output Operations.

Unit-II: Input/output Organization: Accessing Input/output devices, Interrupts-Interrupt Hardware, Enabling and Disabling Interrupts, Handling Multiple Devices, Direct Memory Access, Buses- Synchronous and Asynchronous.

Unit-III: Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory, Associative memory, Cache Memory. (Morris Mano)

Unit-IV: Processing Unit: Fundamental Concepts, Execution of a Complete Instruction, Multiple-Bus Organization, Hardwired Control, Microprogrammed Control-Microinstructions, Microprogram Sequencing.

Unit-V: Pipelining: Basic Concepts, Data Hazards, Instruction Hazards
Parallelism: Parallel processing challenges – Flynn‘s classification – SISD, MIMD, SIMD, SPMD, and Vector Architectures - Hardware multithreading – Multi-core processors and other Shared Memory Multiprocessors - Introduction to Graphics Processing Units, Clusters, Warehouse Scale Computers and other Message-Passing Multiprocessors.

Text Books:

1. Computer Organization, Carl Hamacher, ZvonkoVranesic, SafwatZaky, 5th Edition, McGraw Hill Education.Computer System Architecture, M. Morris Mano, 3rd Edition, Pearson Education..

David A. Patterson and John L. Hennessy, Computer Organization and Design: The Hardware/Software Interface, Fifth Edition, Morgan Kaufmann / Elsevier, 2014.

Reference Books:

1. Computer Organization and Architecture, William Stallings, 10th Edition, Pearson Education.
2. Computer Architecture and Organization, John P. Hayes, 3rd Edition, McGraw Hill Education.

III Sem	**OOPs Through C++ Lab**	Course Code: V20CSL03	L	T	P	C
			0	0	3	1.5

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: DevelopPrograms onClasses and Objects. (K3)

CO2: Demonstrate Constructors, Destructors and Operator-Overloading, Inheritance and Polymorphism. (K3)

CO3: Develop programs to handle Exceptions & Files. (K3)

CO4: Demonstrate Generic Programming. (K3)

LIST OF EXPERIMENTS:

1. Demonstrate how to debug basic programs using GDB compiler.
2. Develop programs on control structures.
3. Construct programs for following concepts.
   a) Default Arguments b) Constant Arguments c)Reference Arguments
4. Construct programs for following concepts.
   a) Classes & Objects b) Inline functions
   c) Static Member functions d) Overloading of Member Functions
5. Develop programs for following concepts.
   a) Objects as Function Arguments b) Friend Functions, Friend class
   c) Local class d) Empty Class& Nested Classes
6. Develop programs for following concepts.
   a) Default constructor b) Constructor with arguments c) Copy constructor
7. Construct programs for following concepts.
   a) Binary b) Unary c) new d) delete
8. Construct programs for following concepts.
   a) Single b) Multilevel c) Hierarchical d) Hybrid
9. Demonstrate the use of Virtual Functions &Virtual Base class.
10. Develop programs to handle following Exceptions.

a) Division-by-zero b) Overflow in an array

11. Develop programs for following file handling operations.

    a) Copying text files b) Displaying the contents of the file

12. Demonstrate Class template and Function Template.
13. Demonstrate Sequential Containers & Associative Containers.

Text Books:

1. Programming in C++, Ashok N Kamthane, 2nd Edition, Pearson.
2. C++ How to Program, Paul J. Deitel, Harvey Deitel, 6th Edition, PHI publication.

<table>
<tr><td rowspan="2">III Sem</td><td rowspan="2">Data Structures Lab</td><td>Course Code:</td><td>L</td><td>T</td><td>P</td><td>C</td></tr>
<tr><td>V20CSL04</td><td>0</td><td>0</td><td>3</td><td>1.5</td></tr>
</table>

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Construct Programs on Sorting and Searching Techniques. **[K3]**

CO2: Illustrate Various Operations On Linked Lists. **[K3]**

CO3: Develop Programs On Stacks, Queues and Their Applications. **[K3]**

CO4: Develop Various Operations on Trees and Graphs **[K3]**

LIST OF EXPERIMENTS:

1. Practice following Sorting Techniques
   (A) Selection Sort (B) Quick Sort (C)Merge Sort
2. Practice following Searching Methods
   (A) Linear Search (B) Binary Search.
3. Develop program for
   Single Linked List and Its Operations. (Create, Insert, Delete, Display)
4. Develop program for Double Linked List and Its Operations.
5. Construct Stack along with their operations using Arrays.
6. Construct Queue along with their operations using Arrays.
7. Develop Circular Queue using Arrays.
8. Construct Queue along with their operations using Single Linked List.
9. Construct Binary Search Tree and Its Operations using double linked list.
10. Demonstrate Depth First Search and Breadth First Search Algorithm.
11. Develop Minimum Spanning Tree using Prim's Algorithm.
12. Develop Minimum Spanning Tree Kruskal's Algorithm.

Text books:

1. Data Structures, algorithms and applications in C++, SartajSahni, Universities press, Second Edition.

2. Fundamentals of Data Structures in C++, Ellis Horowitz, SartajSahni and Dinesh Mehta, 2nd Edition, Universities Press (India) Pvt. Ltd.

Reference Books:

1. An Introduction to Data Structures with Application, Jean-Paul Tremblay , Paul Sorenson, Second Edition.
2. Fundamentals of Data Structures and algorithms by C V Sastry, RakeshNayak, Ch. Raja Ramesh, IK Publications, new Delhi.
3. Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.
4. Problem solving with C++, The OOP, Fourth edition, W.Savitch, Pearson education.

III Sem	**Linux Shell Scripting Lab**	Course Code: V20CSL05	L	T	P	C
			0	0	3	1.5

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Demonstrate the basic knowledge of Linux commands and utilities by using Linux shell environment **(K3)**

CO2: Experiment with the Concept of shell Programming on Files and Directories **(K3)**

CO3: Experiment with the Concept of shell Programming on File Permissions **(K3)**

CO4: Experiment with the Concept of shell Programming on Conditional Statements **(K3)**

CO5: Experiment with the Concept of shell Programming on Looping Statements **(K3)**

LIST OF EXPERIMENTS:

1. Experiment the following Unix Commands:
   a) **General Purpose Utilities:** cal, date,man,who.
   b) **Directory Handling Commands:** pwd,cd,mkdir,rmdir.
   c) **File Handling Utilities:** cat,cp,ls,rm,nl,wc
   d) **Displaying Commands:** head, tail
   e) **Filters:** cmp,comm.,diff,sort,uniq
   f) **Disk Utilities:** du,df
2. Develop a Shell Program to Display all the words which are entered as command line arguments.
3. Develop a shell script that Changes Permissions of files in PWD as rwx for users.
4. Develop a shell script to print the list of all sub directories in the current directory.
5. Develop a Shell Program which receives any year from the keyboard and determine whether the year is leap year or not. If no argument is supplied the current year should be assumed.
6. Develop a shell script which takes two file names as arguments-If their contents are same then delete the second file.
7. Develop a shell script to print the given number in the reversed order.
8. Develop a shell script to print first 25 Fibbonacci numbers.

9. Develop a shell script to print the Prime numbers between the specified range.
10. Develop a shell script to delete all lines containing the word 'unix' in the files supplied as arguments.
11. Develop a shell script Menu driven program which has the following options.

    i) contents of /etc/passwd

    ii) list of users who have currently logged in.

    iii) present working directory. iv) exit.

Text Books:

1. UNIX and Shell Programming: A Textbook, Behrouz A. Forouzan | Richard F. Gilberg, Cengage Learning
2. UNIX : Concepts and Applications, Sumithaba Das, 4th Edition, Tata McGrawHill.
3. Unix & Shell Programming, M.G.Venkatesh Murthy, Pearson Education
4. Unix shells by example,4th Edition Ellie Quigley, Pearson Education.

IV SEM	**Design and Analysis of Algorithms**	Course Code: V20CST07	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: At the end of the Course student will be able to:

CO1: Demonstrate asymptotic notation and divide and conquer technique. **(K3)**
CO2: Use greedy technique to solve various problems. **(K3)**
CO3: Demonstrate dynamic programming technique to various problems. **(K3)**
CO4: Develop algorithms using backtracking technique. **(K3)**
CO5: Demonstrate branch and bound technique to various problems. **(K3)**

Unit-I: Introduction: What is an Algorithm, Algorithm Specification-Pseudo code Conventions Recursive Algorithms, Performance Analysis-Space Complexity, Time Complexity, Asymptotic Notation, Practical Complexities, Performance Measurement.

Divide and Conquer: General Method, Binary Search, Finding the Maximum and Minimum, Merge Sort, Quick Sort-Performance Measurement,

Unit-II: The Greedy Method: The General Method, Knapsack Problem, Job Sequencing with Deadlines, Minimum-cost Spanning Trees-Prim's Algorithm, Kruskal's Algorithms, Optimal Merge Patterns, Single Source Shortest Paths.

Unit-III: Dynamic Programming: All Pairs Shortest Paths, Single Source Shortest paths General Weights, Explain Optimal Binary Search Trees, String Edition, 0/1 Knapsack, Reliability Design.

Unit-IV: Backtracking: The General Method, 8-Queens Problem, Sum of Subsets, Graph Coloring, and Hamiltonian Cycles.

UNIT-V: Branch and Bound: The Method-Least cost (LC) Search, The 15-Puzzle: an Example, Control Abstraction for LC-Search, Bounding, FIFO Branch-and-Bound, LC Branch and Bound, 0/1 Knapsack Problem-LC Branch-and Bound Solution, FIFO Branch-and-Bound Solution, Traveling Salesperson. Basic Concepts of NP-hard and NP-complete problems.

Text Books:

1. Fundamentals of computer algorithms E. Horowitz S. Sahni, University Press.

Reference Books:

1. Introduction to Algorithms Thomas H. Cormen, PHI Learning.

2. The Design and Analysis of Computer Algorithms, Alfred V. Aho, John E. Hopcroft, Jeffrey D.Ullman.

3. Fundamentals of Data Structures and algorithms by C V Sastry, Rakesh Nayak, Ch. Raja Ramesh,

Distributed by WILEY publications, New Delhi.

4. Algorithm Design, Jon Kleinberg, Pearson.

IV Sem	Software Engineering	Course Code:	L	T	P	C
		V20CST08	3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Demonstrate the Software Development life cycle Models. **(K3)**

CO2: Illustrate the Requirements engineering process and SRS document. **(K3)**

CO3: Develop the Software Architecture and Design Modeling. **(K3)**

CO4: Apply the Coding & Testing techniques and Risk management strategies. **(K3)**

CO5: Describe Project estimation techniques and Quality Management& Metrics.**(K2)**

Unit-I: Software and Software Engineering: The Nature of Software, Software Engineering, Software Process, Software Engineering Practice, Software Myths. **Software process models:** Waterfall model, Prototyping, Iterative development, Unified process, RAD model, Spiral model, and agile process.

Unit-II: Software Requirements: Functional and non-functional requirements, User requirements, System requirements, Interface specification, SRS document. **Requirements engineering process:** Feasibility studies, Requirements elicitation and analysis, Requirements validation, Requirements management.

Unit-III: Software Architecture: Role of software architecture, Architecture views, components and connector view, Cohesion and Coupling, documenting architecture design. **Design:** Design concepts, Function-oriented design, object-oriented design, UML diagrams, and Data flow diagram.

Unit-IV: Coding and Testing: Programming principles and guidelines, incrementally developing code. Testing concepts, testing process, Black-box & White-box testing.**Risk management**: Reactive vs. Proactive Risk strategies, Software risks, Risk identification, Risk projection, Risk refinement, RMMM Plan.

Unit-V: Software Project Estimation& Maintenance: Decomposition techniques, Empirical Estimation Models, Maintenance Process, Reengineering, Configuration Management. Metrics for Products & Quality Management: Software Measurement, Metrics for software quality, Quality concepts, Software Reviews, Formal technical reviews, SEI-CMM Model, Six Sigma and ISO 9000 quality standards.

Text Books:

1. Software Engineering, A practitioner's Approach- Roger S.Pressman, 7th Edition, McGrawHill International Edition.
2. Software Engineering- Ian Sommerville, 9th Edition, Pearson education.Software Engineering, A Precise approach, PankajJalote, Wiley

Reference Books:

1. CMMI and Six Sigma: Partners in Process Improvement, Jeannine M. Siviy,M. Lynn Penn, Robert W. Stoddard, 1st edition, Addison Wesley;
2. SoftwareEngineeringprinciplesandpractice,WSJawadekar, 3rdEdition,TMH.

			L	T	P	C
VSem	**DatabaseManagementSystems**	Course Code: V20CST09	3	0	0	3

CourseOutcomes: AfterSuccessfulcompletionoftheCourse,thestudentwillbeableto:

CO1: DescribeDatabasesystems, variousDatamodelsandDatabasearchitecture. (K2)
CO2: Develop variousreal timeapplications using Relational algebra and Relational calculus. (K3)
CO3: Apply various Normalizationtechniquestorefineschema. (K3)
CO4: ExplainTransactionmanagementandConcurrencycontrol. (K2)
CO5: IllustratevariousDatabaseindexingtechniques. (K2)

UNIT-I:An Overview of Database Systems: Managing data, File systems verses DBMS, Advantages of DBMS, Data models, Levels of abstraction in a DBMS, Data independence, Structure of a DBMS, Client/Server Architecture, E.F.Codd Rules.

Database Design: Database design and ER Diagrams, Entities, Attributes, Entity sets, Relationships and Relationship sets, Conceptual design with ER Models.

UNIT-II:Relational Model: Integrity constraints over relations, Key constraints, Foreign key constraints, General constraints, Enforcing integrity constraints, Querying relational data

Relational Algebra: Selection and Projection, set operation, renaming, Joins, Division, Introduction to Views, destroying/altering Tables and Views

Relational Calculus: Tuple Relational Calculus, Domain Relational Calculus.

UNIT-III: SQL Queries, Constraints and Triggers: The Form of Basic SQL Query, Union, Intersect, Except, Nested Queries, Aggregate Operators, Null Values, Complex Integrity Constraints in SQL, Triggers and active data bases.

Schema Refinement (Normalization): Problems caused by redundancy, Decompositions, purpose of Normalizion, Schema refinement, Concept of functional dependency, Normal forms based on functional dependency (1NF, 2NF and 3NF), Concept of Surrogate key, Boyce-Codd Normal Form (BCNF), Lossless Join and Dependency preserving decomposition, Fourth Normal Form(4NF).

UNIT-IV: Transaction Management: Transaction, Properties of Transactions, Transaction Log, and Transaction management with SQL commit, rollback and savepoint.

Concurrency Control: Concurrency Control for Lost updates, Uncommitted data, Inconsistent retrievals and the Scheduler.

Concurrency Control with Locking Methods : Lock granularity, Lock types, Two phase locking for ensuring serializability, Deadlocks, Concurrency control with Time stamp ordering, Transaction recovery.

UNIT-V: Storage and Indexing: Overview of Storages and Indexing, Data on external storage, File organization and indexing, Clustered indexing, Primary and secondary indexes, Index data structures, Hash based indexing, Tree based indexing, Comparison of file organization

Text Books:

1. Database Management Systems, Raghu Ramakrishnan, Johannes Gehrke, 3rd Edition TATA McGraw Hill.
2. An Introduction to Database Systems, C.J Date,A.Kannan,S.J Swamynathan 8th Edition, Pearson Education

Reference Books:

1. Database Systems-Design, Implementation and Management, Peter Rob &Carlos Coronel 7th Edition, Course Technology Inc.
2. Fundamentals of Database Systems, Ramez Elmasri,Shamkant B. Navathe ,7th Edition, Pearson Education.
3. Database Systems - The Complete Book, Hector Garcia- Molina, Jeffry D Ullman, Jennifer Widom, 2nd Edition, Pearson.

IV Sem	**Java Programming**	Course Code: **V20CST08**	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe Java Virtual Machine and Type casting. [K2]

CO2: Demonstrate Concepts like Constructors, Arrays, Nested Classes and Command Line Arguments. [K3]

CO3: Implement Concepts of Inheritance and Exception Handling [K3]

CO4: Develop programs on Multi-Threading and Files [K3]

CO5: Implement Event Handling and Swings. [K3]

Syllabus

UNIT-I: Introduction to Java: Introduction to Object Oriented Paradigm, Concepts of OOP, Applications of OOP, History of Java, Java Features, JVM, Program Structure. Variables, Primitive Data Types, Constants, String class, Primitive type conversion and Casting, Control Structures.

UNIT-II:ClassesandObjects: Classesandobjects,Classdeclaration,Creatingobjects, Methods, Constructors and Constructor Overloading, Importance of Static Keyword and Examples, this Keyword, Arrays, Command Line Arguments, Nested Classes, Garbage Collector.

UNIT-III: Inheritance and Exception Handling: Inheritance, super Keyword, final Keyword, Method Overriding and Abstract Class. Interfaces, Creating Packages, Using Packages, Importance of Class path. Exception Handling, Importance of try, catch, throw, throws and finally Block.

UNIT-IV: Multithreading and Files: Introduction, Thread Lifecycle, Creation of Threads, Thread Priorities, Thread Synchronization, Communication between Threads. Reading Data from Files and Writing Data to Files, Random Access Files.

UNIT-V: Event Handling and Swings: Introduction to AWT and Applets. Swings: Introduction, Components, Button, Label, Checkbox, List Boxes, Menu and Scrollbar, Layout Managers. **Event Handling :** Event Delegation Model, Sources of Events, Event Listeners, Adapter Classes.

Text Books:

1. Java Programming, E. Balagurusamy, 4thEdition, TMH.

2. The complete Reference Java, 8th Edition, Herbert Schildt,TMH.
3. Introduction to java programming, Y Daniel Liang, 7 Edition,Pearson.

Reference books:

1. Core Java: An Integrated Approach , R Nageswara Rao, 7thEdition, Dream Tech
2. Head First Java , Kathy Sierra and Bert Bates, 2nd Edition O'reilly

IV Sem	**Statistical Visualization using R Lab**	Course Code:	L	T	P	C
		V20CSL06	0	0	3	1.5

Syllabus Details

Course Outcomes: At the end of the Course student will be able to:

CO1: Employ math and simulation in R[**K2]**
CO2: Demonstrate various types of data structures in R**[K3]**
CO3: Apply appropriate control structures to solve a particular Programming problem**[K3]**

CO4: Use R to graphically visualize data and results of statistical calculations **[K3]**

LIST OF EXPERIMENTS:

1. Demonstrate the basic math functions in R
2. Demonstrate Vector operations in R
3. Demonstrate Matrix operations in R
4. Demonstrate Array operations in R
5. Demonstrate Data frames in R
6. Demonstrate Lists in R
7. Illustrate the following controls statements in R
   a. if and else b. ifelse c. switch
8. Demonstrate for and while loops in R
9. Demonstrate importing and exporting data using R
10. Illustrate the descriptive statistics using summary() in R
11. Demonstrate the following statistical distribution functions in R:
    a. Normal Distribution
    b. Binomial Distribution
    c. Poisson Distribution
    d. Chi Square Distribution
12. Illustrate the following basic graphics in R:
    a. Bar plots
    b. Pie Charts
    c. Histograms
    d. Kernel density plots
    e. Boxplots
    f. Dotplots
13. Illustrate the Correlation and Covariance analysis using R
14. Illustrate the different types of t-tests using R
15. Illustrate the ANOVA test using R

Text Books:

1. R for Everyone, Jared P Lander, Pearson
2. R in Action,Rob I Kabacoff, Manning

Reference Book:

1. The Art of R Programming, Norman Matloff, No Starch Press

IV Sem	**DataBaseManagementSystemLab**	Course Code:	L	T	P	C
		V20CSL07	0	0	3	1.5

CourseOutcomes: AfterSuccessfulcompletionoftheCourse,thestudentwill beableto:

CO1:	Construct SQLqueries to perform different database operations.	(K3)
CO2:	Experimentwithvarious constraints and DatabaseIndexingTechniques.	(K3)
CO3:	ConstructPL/SQLCursorsandExceptions	(K3)
CO4:	DevelopPL/SQLFunctions,Procedures and Packages	(K3)
CO5:	Applybasic operations oncollectionsofMongo DB database	(K3)

ListofExperiments

Part-A

1. Construct SQL queriestofacilitateacquaintanceofBuilt-In Functions,String Functions, NumericFunctions,DateFunctionsand ConversionFunctions.
2. Construct SQL queriesusingOperators.
3. Construct SQL queriestoRetrieveandChangeData:Select,Insert,Delete,andUpdate
4. Construct SQL queriesusingGroupBy,OrderBy,andHavingClauses.
5. Construct SQL queriesonControllingdata:commit,rollback,and savepoint
6. Construct reportusingSQL*PLUS
7. Construct SQL queriesforCreating,Dropping,and AlteringTables,Views,andConstraints
8. Construct SQL queriesonJoinsandCorrelatedSubqueries
9. DemonstrateIndex,Sequence and Synonym.
10. Demonstrate Controllingaccess,lockingrowsforupdate and securityfeatures.

PL/SQL

11. DemonstrateBasicVariables,AnchoredDeclarations,andUsageofAssignmentOperation Using PL SQL block
12. Demonstrate BindandSubstitutionVariables using PL SQL block
13. Demonstrate ControlStructures in PL SQL
14. Demonstrate Cursors,ExceptionsandCompositeDataTypes in PL SQL.
15. Demonstrate Procedures,Functions,and Packages in PLSQL.

Part-B

1. Demonstrate the installation of Mongo DB database.
2. Demonstrate Creatingand droppingdatabase, collection in Mongodb.
3. Demonstrate Insertion, updation and deletion operations in Mongodb database.
4. Construct queries for Projection,limitingrecords,sortingrecordsandaggregationinMongodb database.

TextBooks:

1. OracleDatabase11gTheCompleteReferencebyOraclePress,Kevin Loney

2. DatabaseSystemsUsingOracle,NileshShah,2ndEdition, PHI.
3. IntroductiontoSQL,RickFVan derLans,4thEdition,PearsonEducation.

ReferenceBooks:

1. OraclePL/SQLInteractiveWorkbook,B.RosenzweigandE.Silvestrova,2ndEdition,Pearsoneducation.
2. SQL&PL/SQLforOracle10 g,BlackBook, Dr.P.S.Deshpande, DreamTech.

IV Sem	Java Programming Lab	Course Code: V20CSL08	L	T	P	C
			0	0	3	1.5

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Demonstrate Programs on Classes, Objects, Constructors and Arrays. **(K3)**

CO2: Demonstrate Inheritance and Exception Handling. **(K3)**

CO3: Implement programs on Multi-Threading and File Handling. **(K3)**

CO4: Implement Event handling using Swings. **(K3)**

List of Experiments

1. Develop programs on Control Structures and Type Conversions in java.
2. Develop programs using various String handling functions
3. Construct programs using the following concepts:
   a) Classes & Objects b) Usage of static c)Constructors
4. Construct programs using the following concepts.
   a) Arrays b) Nested Classes c) Command Line Arguments
5. Construct programs using the following concepts.
   a) Inheritance b) Usage of super c)Method Overriding
6. Construct programs using the following concepts.
   a) Usage of final b) Abstract class c)Interfaces
7. Implement the programs using the concepts
   a) Packages b) Exception Handling.
8. Implement the programs on Multi-Threading.
   a) Multiple Threads on Single Object b) Thread Deadlock
9. Construct a program that shows Inter-thread Communication
10. Construct programs to perform read and write operations on files.
    a) Sequential Files b) Random Access files
11. Develop GUI using Swings.
12. Construct programs on Event Handling using Listener Interfaces.

Text books:

1. The complete Reference Java, 8th Edition, Herbert Schildt, TMH.
2. Introduction to java programming, Y Daniel Liang, 7 Edition, Pearson.

Annexure-VIII

Proposed Courses and Syllabi for other Branches under V20 Regulation

S.No.	Course Code	Course Name
1	V20CSL31	Data Structures Lab
2	V20CSL33	Python Programming Lab
3	V20CSL32	Object-Oriented Programming Through Java Lab

Syllabus Details

	DATA STRUCTURES LAB	Course Code: V20CSL31	L	T	P	C
			0	1	3	1.5
Branch	Common to ECE, EEE,ECT, CIVIL and MECH					

Course Outcomes:

CO1: ConstructSorting and searching methods. (K3)
CO2: Implement programs using Singly Linked Lists, Double Linked List. (K3)
CO3: Construct Basic Data Structures, Stacks, Queues and Applications. (K3)

CO4: construct Binary search tree (K3)
CO5: Implement various graph operations and shortest path algorithm. (K3)

List of Experiments

1. Bubble sort, Insertion sort, Selection sort, Quick sort, Merge sort.

   Programs to implement the following sorting techniques
   a) Selection sort b) Quick sort c) Merge sort

2. Linear search and Binary search.
   Programs to implement the following searching methods
   a) Linear search b) Binary search.

3. Basic Terminology, Classification of Data Structures, Operation on Data Structures. **Arrays**: Representation of arrays - Polynomial representation, Addition of two polynomials.

   A Program to implement addition of two polynomials. (using arrays).

4. single linked list Representation of node, operations on single linked list,
   A Program to implement single linked list and its operations. (create, insert, delete, display, reverse list)

5. **Double linked list**: operations like insert delete and display.
   A Program to implement double linked list and its operations.

6. **Stacks:** Introduction, Array representation, Operations, linked list representation, operation on linked stacks
   A Program to implement stack operations using arrays.
7. **Queues:** Introduction, Array representation, linked list representation, operation on queues, types of queues
   A Program to implement queue operations using arrays.
8. Applications of Stacks
   A Program to convert infix expression to postfix expression.

9. Introduction, Terminology, Representation of Trees, types of trees, **Binary Trees:** Properties of Binary Trees, Tree Traversals. **Binary Search Tree:** Introduction, Creation, insertion, delete, display.

   A Program to implement Binary search Tree and its operations.
10. **Graphs:** Introduction, Terminology, **Graph Traversal techniques**: Depth First Search, Breadth First Search
    A Program to implement graph traversal algorithms (BFS & DFS).

Text Books:

1. Data Structures, algorithms and applications in C++, Sartaj Sahni, Universities press, Second Edition.
2. Fundamentals of Data Structures in C++, Ellis Horowitz, Sartaj Sahni and Dinesh Mehta, 2nd Edition, Universities Press (India) Pvt. Ltd.

Reference Books:

1. An Introduction to Data Structures with Application, Jean-Paul Tremblay , Paul Sorenson, Second Edition.
2. Fundamentals of Data Structures and algorithms by C V Sastry, Rakesh Nayak, Ch. Raja Ramesh, IK Publications, new Delhi.
3. Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.
4. Problem solving with C++, The OOP, Fourth edition, W.Savitch, Pearson education.

	PYTHON PROGRAMMING LAB	Course Code: V20CSL32	L	T	P	C
			0	1	3	1.5
Branch	Common to ECE, EEE,ECT, CIVIL and MECH					

Syllabus Details

1. **Course Outcomes:Upon completion of the course, students will be able to**

   CO1: Demonstrate Basic Python Programs (K3)
   CO2: Construct control structures in python (K3)
   CO3: Demonstrate functions and packages. (K3)
   CO4: Construct python programs using structured data types. (K3)
   CO5: Demonstrate Text Files (K3)

2. **Syllabus**

Basics of python programming: Features of python – History of Python - The Future of Python installation and execution - Data types – Identifiers - variables – type conversions- Literal Constants – Numbers – Strings. I/O statements.Operators and expressions, operator precedence – expression evaluation.

Exercise 1 - Basics
a) A sample Python Script using command prompt, Python Command Line and IDLE
b) A program to purposefully raise an Indentation Error and correct it

Exercise 2 - Operations
a) A program to compute distance between two points taking input from the user (Pythagorean Theorem)
b) A program on add.py that takes 2 numbers as command line arguments and prints its sum.

Decision Control statements: conditional (if), alternative (if-else), chained conditional (if-elif-else); **Iteration:** while loop, for loop, nested for loop, range function, break, continue and pass statements.

Exercise - 3 Control Flow
a) A Program to implement for checking whether the given number is a even number or not.
b) A program to construct reverse the digits of a given number and add it to the original, If the sum is not a palindrome repeat this procedure.
c) A program using a while loop that asks the user for a number, and prints a countdown from that number to zero.

Exercise 4 - Control Flow – Continued

a) A program to construct the following pattern, using a nested for loop.

```
*
* *
```

* * *
* * * *
* * * * *
* * * *
* * *
* *
*

b) By considering the terms in the Fibonacci sequence whose values do not exceed four million, find the sum of the even-valued terms.

Functions and modules : Introduction - Function Definition - Function Call – argument types- Scope and Lifetime - The return statement - More on Defining Functions - Lambda Functions or Anonymous Functions.

Exercise - 5 – Problem Solving using Functions
a) Find mean, median, mode for the given set of numbers passed as arguments to a function
b) Develop a function nearly_equal to test whether two strings are nearly equal. Two strings a and b are nearly equal when a can be generated by a single mutation on b.
c) Develop a Recursive Function to find the Factorial of a given number .
d) Develop function to compute gcd, lcm of two numbers. Each function shouldn't exceed one line.

Lists: list operations, list slices, list methods, mutability, cloning lists, list parameters. **Tuples**: tuple assignment, tuple as return value. **Set:** Set Creation, Set Operations. **Dictionaries**: Creation, operations; comprehension, operations on strings.

Exercise - 6 Structured Data types
a) a program to count the number of strings where the string length is 2 or more and the first and last character are same from a given list of strings.
b) a program to develop unzip a list of tuples into individual lists and convert them into dictionary.

Exercise – 7 Structured Data types Continued
a) A program to count the numbers of characters in the string and store them in a dictionary data structure
b) a program to use split and join methods in the string and trace a birthday with a dictionary data structure.

Documentation Strings- Modules – Packages

Exercise - 8– Modules
a) Install packages requests, flask and explore them using (pip)
b) A program to implement a script that imports requests and fetch content from the page. Eg. (Wiki)
c) Develop a simple script that serves a simple HTTP Response and a simple HTML Page

Introduction - Types of files - Text files - reading and writing files

Exercise - 9 Files
a) a program to count frequency of characters in a given file. Can you use character frequency to tell whether the given file is a Python program file, C program file or a text file?
b) a program to compute the number of characters, words and lines in a file.

Classes, Methods, Constructor, Inheritance, Overriding Methods, Data hiding

Exercise - 10 OOP
a) Class variables and instance variable and illustration of self variable
i) Robot
ii) ATM Machine

Text Books:

1. "Python Programming using problem solving Approach" ReemaThareja, Oxford University Press – 2017.
2. Python with Machine Learning by A.Krishna Mohan, Karunakar & T.Murali Mohan by S. Chand Publisher-2018.

	OBJECT-ORIENTED PROGRAMMING THROUGH JAVA LAB	Course Code: V20CSL33	L	T	P	C
			0	1	3	1.5
Branch	Common to ECE, EEE,ECT, CIVIL and MECH					

Syllabus Details

Course Outcomes: After the completion of this course, students will be able to

CO1: Use code editors and JDK tools to write, compile, and run Java programs.
CO2: Use control statements and arrays while programming.
CO3: Develop programs using classes and objects.
CO4: Use inheritance, interfaces and packages while developing programs in Java.
CO5: Apply exception-handling mechanism.
CO6: Develop multithreaded programs.

Syllabus:

CYCLE–I:Overview of Object-oriented Programming: Introduction to Object-oriented Programming, Principles of Object-oriented Programming Languages, and Applications of OOP.

Introduction to Java: History of Java, Java Features, Java Virtual Machine, Java Program Structure, Literals, Identifiers, Primitive Data types, Variables, Operators and Expressions, Operator Precedence and Associativity, Type Conversion and Casting.

Exercises

a) Develop a Java program to display the default values of all primitive data types of Java.
b) Construct a Java program that calculates the area of a triangle, given the lengths of all three sides.

Area =$\sqrt{(S(S-a)(S-b)(S-c))}$, where S = (a+b+c)/2.

CYCLE– II: Control Statements: Conditional Statements - if, switch; Iteration Statements - while, do-while, for, for-each version of for; Jump Statements - break, continue, return.

Arrays: Introduction to Arrays, Array Declaration and Initialization, One-Dimensional Arrays, Multi-Dimensional Arrays, Basic String Handling.

Exercises

a) Develop a Java program that displays
   i) The roots of a quadratic equation $ax^2+bx+c=0$
   ii) The nature of roots by calculating the discriminate D.
b) N bikers compete in a race such that they drive at a constant speed, which may or may not be the same as the other. To qualify the race, the speed of a racer must be more than the average speed of all N racers. Take as input, the speed of each racer and print back the speed of qualifying racers.
c) Develop a Java program that displays the name of the day, based on the value of day, using the switch statement.
d) Develop a Java program to search for an element in a given list of elements using Linear Search.
e) Develop a Java program to perform multiplication of two matrices.
f) Develop a Java program using StringBuffer to perform various operations on a string.

CYCLE– III: Introduction to Classes and Objects: General Form of a Class, Methods, Declaring Objects using new, Constructors, this Keyword, Understanding static, Method and Constructor Overloading, Using Command-Line Arguments, Garbage Collection.

Exercises

a) Construct a Java program to demonstrate class mechanism - Create a class that contains variables, methods, constructors and invoke those methods inside main().
b) Develop a Java program demonstrating the use of static variables, methods.
c) Develop a Java program demonstrating the use of this keyword.
d) Develop a Java program that implements method overloading.
e) Develop a Java program that implements constructor overloading.
f) Develop a Java program demonstrating the use of command-line arguments.

CYCLE– IV: Inheritance: Access Control, Introduction to Inheritance, Types of Inheritance, Using super, Method Overriding and Dynamic Method Dispatch, Using final, Abstract Classes.
Interfaces: Defining and Implementing Interfaces.**Packages:** Creating Packages, Importing Packages, Importance of CLASSPATH.

Exercises

a) Construct a Java program to demonstrate single inheritance.
b) Construct a Java program to demonstrate multi-level inheritance.
c) Construct a Java program that illustrates the use of super.
d) Develop a Java program that illustrates runtime polymorphism.
e) Develop a Java program that uses an abstract class to find areas of different shapes.
f) Develop a Java program using interfaces. In addition, use interfaces to achieve multiple inheritance.
g) Construct a Java program that creates a user-defined package. Use the package by importing it in another Java program.

CYCLE– V: Exception Handling: Exception-Handling Fundamentals, Using try and catch, Using throw, Using throws and finally, User-defined Exceptions.

Exercises

a) Develop a Java program to demonstrate exception-handling mechanism using try/catch. Use multiple catch clauses.
b) Construct a Java program for illustrating the use of throw.
c) Construct a Java program for illustrating the use of finally.
d) Construct a java program for demonstrating the creation and use of user-defined exceptions.

CYCLE– VI: Multithreading: Introduction to Multithreading, Creation of Threads, Thread Life Cycle, isAlive() and join(), Thread Synchronization, and Interthread Communication.

Exercises

a) Construct a Java program that creates threads by extending Thread class. The first thread displays “Good Morning” every 1 second, the second thread displays “Hello” every 2 seconds and thethird displays “Welcome” every 3 seconds.
b) Use Runnable to develop a Java program for the above problem.
c) Construct a java program illustrating isAlive() and join().

d) Develop a Java program to solve producer consumer problem using thread synchronization.

TEXT BOOKS:

1. Java: The Complete Reference; 8th edition; Herbert Schildt; TMH.
2. Programming in Java;2nd edition; SachinMalhotra, SaurabhChoudhary; Oxford University Press.
3. Core JAVA, An Integrated Approach; Dr. R. Nageswara Rao; Dreamtech Press.

Annexure-IX

COURSE STRUCTUREANDDETAILEDSYLLABUS

COMPUTER SCIENCE

For

M.Tech., COMPUTERSCIENCE

(Applicableforbatchesadmittedfrom 2021-2022)

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SRIVASAVIENGINEERINGCOLLEGE(Autonomous)

(SponsoredbySriVasaviEducationalSociety)

(Approved by AICTE, New Delhi & Permanently affiliated to JNTUK, Kakinada)

(AccreditedbyNAACwithAGrade,RecognizedbyUGC undersection2(f)&12(B))

Pedatadepalli,**TADEPALLIGUDEM – 534101.**W.G.Dist**.(A.P)**

M.Tech(CS)ProgrammeCourse Structure

(Witheffectfrom**2021-22**AdmittedBatchonwards**)**

SEMESTER-I

S.No.	Course Code	Course	L	T	P	C
1	V21CTT01	**Program Core-1** Mathematical Foundations of Computer Science	3	-	-	3
2	V21CTT02	**Program Core-2** Advanced Data Structures	3	-	-	3
3	**Program Elective-I**		3	-	-	3
	V21CTT03	1. Advanced Operating Systems				
	V21CTT04	2. Advanced Computer Architecture				
	V21CTT05	3. Parallel Computing				
4	**Program Elective-II**		3	-	-	3
	V21CTT06	1. Advanced Databases				
	V21CTT07	2. Advanced Computer Networks				
	V21CTT08	3. Object Oriented Software Engineering				
5		Research Methodology and IPR	2	-	-	2
6	V21CTL01	**Laboratory-1** Advanced Data Structures Lab	-	-	4	2
7	**Laboratory-2:** Advanced Computing Lab-1***(Lab programs based on elective taken by student may be offered)***		-	-	4	2
	V21CTL02	Advanced Operating Systems				
	V21CTL03	Parallel Computing				
	V21CTL04	Advanced Computer Networks				
	V21CTL05	Object Oriented Software Engineering				
8		**Audit Course-1***	2	-	-	0
TotalCredits			**16**	**0**	**8**	**18**

Student has to choose any one audit course listed below

SEMESTER-II

S.No.	Course Code	Course	L	T	P	C
1	V21CTT09	**Program Core-3** Web Technologies	3	-	-	3
2	V21CTT10	**Program Core-4** Data Science through Python Programming	3	-	-	3
3	**Program Elective-III**		3	-	-	3
	V21CTT11	1. Machine Learning				
	V21CTT12	2. Ad hoc and Sensor Networks				
	V21CTT13	3. Internet of Things				
4	**Program Elective-IV**		3	-	-	3
	V21CTT14	1. Principles of Cyber Security				
	V21CTT15	2. Cloud Computing				
	V21CTT16	3. Natural Language Processing				
7	V21CTL06	Advanced Web Technologies Lab	-	-	4	2
8	V21CTL07	Data Science Applications with Python Lab	-	-	4	2
9	V21CTM01	Mini Project with Seminar	2	-	-	2
10		**Audit Course-2***	2	0	0	0
TotalCredits			**16**	**0**	**8**	**18**

****Student has to choose any one audit course listed below***

Audit Course 1 & 2:

1. English for Research Paper Writing
2. Disaster Management
3. Value Education
4. Stress Management by Yoga
5. Personality Development through Life Enlightenment Skills
6. Pedagogy Studies

M.Tech(CS)ProgrammeCourseStructure

(Witheffectfrom**2021-22**AdmittedBatchonwards**)**

SEMESTER-III

S.No.	Course Code	Course	L	T	P	C
1	**Program Elective-V**		3	-	-	3
	V21CTT17	1. MOOCS-1 through NPTEL/ SWAYAM12 Week Program related to the programme which is not listed in the course structure				
	V21CTT18	2. Mobile Applications and Development				
	V21CTT19	3. Big Data Analytics				
2	**Open Elective**		3	-	-	3
	V21CTT20	MOOCs-2 Through NPTEL /SWAYAM - Any 12 week course on Engineering/ Management/ Mathematics offered by other than parent department				
		Operations Research				
		Cost Management of Engineering Projects				
3	V21CTP0 1	Dissertation-I/Industrial Project #	-	-	-	10
		TotalCredits				16

#Students going for Industrial Project/Thesis will complete these courses through MOOCs

SEMESTER-IV

S.No.	Course Code	Course	L	T	P	C
1	V21CTP0 2	Dissertation-II	-	-	-	16
		TotalCredits				16

I-I	**Mathematical Foundations of Computer Science**	Course Code: **V21CTT01**	**L**	**T**	**P**	**C**
			3	0	0	3

Course Outcomes: After completion of course, students would be able to

CO1: Demonstrate skills in solving mathematical problems, mathematical principles and logic. (K3)
CO2: Demonstrate the basic concepts associated with set theory, relations, functions and their applications (K3)
CO3: Illustrate algebraic structures and concepts associated with Number Theory and their applications in computer science. (K3)
CO4: Manipulate and consider data numerically by using combinatorics.(K3)
CO5: Solve recurrence relations using various methods apply techniques of graphs for real-time problems(K3)

UNIT I: **Mathematical Logic**-Propositional Calculus: Statements and Notations, Connectives, Well Formed Formulas, Truth Tables, Tautologies, Equivalence of Formulas, Duality Law, Tautological Implications, Normal Forms, Theory of Inference for Statement Calculus, Consistency of Premises, Indirect Method of Proof. Predicate Calculus: Predicative Logic, Statement Functions, Variables and Quantifiers, Free and Bound Variables, Inference Theory for Predicate Calculus.

UNIT II: **Set Theory-**Introduction, Operations on Binary Sets, Principle of Inclusion and Exclusion, *Relations:* Properties of Binary Relations, Relation Matrix and Digraph, Operations on Relations, Partition and Covering, Transitive Closure, Equivalence, Compatibility and Partial Ordering Relations, Hasse Diagrams, *Functions:* Bijective Functions, Composition of Functions, Inverse Functions, Permutation Functions, Recursive Functions, Lattice and its Properties.

UNIT III: **Algebraic Structures and Number Theory-** *Algebraic Structures:* Algebraic Systems, Examples, General Properties, Semi Groups and Monoids, Homomorphism of Semi Groups and Monoids, Group, Subgroup, Abelian Group, Homomorphism, Isomorphism, *Number Theory:* Properties of Integers, Division Theorem, The Greatest Common Divisor, Euclidean Algorithm, Least Common Multiple, Testing for Prime Numbers, The Fundamental Theorem of Arithmetic, Modular Arithmetic (Fermat's Theorem and Euler's Theorem).

UNIT IV: **Combinatorics-** Basic of Counting, Permutations, Permutations with Repetitions, Circular Permutations, Restricted Permutations, Combinations, Restricted Combinations, Generating Functions of Permutations and Combinations, Binomial and Multinomial Coefficients, Binomial and Multinomial Theorems, The Principles of Inclusion–Exclusion, Pigeonhole Principle and its Application.

UNIT V: **Recurrence Relations-**Generating Functions, Function of Sequences, Partial Fractions, Calculating Coefficient of Generating Functions, Recurrence Relations, Formulation as Recurrence Relations, Solving Recurrence Relations by Substitution and Generating Functions, Method of Characteristic Roots, Solving Inhomogeneous Recurrence Relations, **Graph Theory:** Basic Concepts of Graphs, Sub graphs, Matrix Representation of Graphs: Adjacency Matrices, Incidence Matrices, Isomorphic Graphs, Paths and Circuits, Eulerian and Hamiltonian Graphs, Multigraphs, Planar Graphs, Euler's Formula, Graph Colouring and Covering, Chromatic Number, Spanning Trees, Algorithms for Spanning Trees (Problems Only and Theorems without Proofs).

Text Books:

1. Discrete Mathematical Structures with Applications to Computer Science, J.P. Tremblay and P. Manohar, Tata McGraw Hill.
2. Elements of Discrete Mathematics-A Computer Oriented Approach, C. L. Liu and D. P. Mohapatra, 3rd Edition, Tata McGraw Hill.
3. Discrete Mathematics and its Applications with Combinatorics and Graph Theory, K. H. Rosen, 7th Edition, Tata McGraw Hill.

Reference Books:

1. Discrete Mathematics for Computer Scientists and Mathematicians, J. L. Mott, A. Kandel, T. P. Baker, 2nd Edition, Prentice Hall of India.
2. Discrete Mathematical Structures, Bernand Kolman, Robert C. Busby, Sharon Cutler Ross, PHI.
3. Discrete Mathematics, S. K. Chakraborthy and B.K. Sarkar, Oxford, 2011.

I-I	**Advanced Data Structures**	Course Code: **V21CTT02**	**L**	**T**	**P**	**C**
			3	0	0	3

Course Outcomes: After completion of course, students would be able to

CO1: Select appropriate data structures as applied to specified problem definition.(**K2)**

CO2: Apply data structures such as linked list and trees on necessary applications.(**K3)**

CO3: Practice all data structures like stacks, queues, trees, graphs and compare their performance. (**K3)**

CO4: Discuss operations like searching, insertion, deletion and traversing on various data structures.(**K2)**

CO5: Apply data structures into the applications such as binary search trees, AVL, Red black trees. (**K3)**

UNIT I: **Arrays** Abstract Data Types and the C++ Class, The Array as an Abstract Data Type, The Polynomial Abstract Data type, Spares Matrices, Introduction- Sparse Matrix Representation- Transposing a Matrix- Matrix Multiplication, Representation of Arrays. **Stacks And Queues-** Templates in C++, The Stack Abstract Data Type, The Queue Abstract Data Type, Subtyping and Inheritance in C++, Evaluation of Expressions, Expression- Postfix Notation- Infix to Postfix.

UNIT II: **Linked Lists** Single Linked List and Chains, Representing Chains in C++, The Template Class Chain, Circular Lists, Available Space Lists, Linked Stacks and Queues, Polynomials, Equivalence Classes, Sparse Matrices, Doubly Linked Lists, Generalized Lists, Representation of Generalized Lists, **Trees** Introduction, Binary Trees, Binary Tree Traversal and Tree Iterators- Introduction, In order, Preorder, Post order Traversal, Thread Binary Trees, Heaps, Binary Search Trees.

UNIT III: **Graphs** The Graph Abstract Data Type, Elementary Graph Operation, Minimum Cost Spanning Trees, Shortest Paths and Transitive Closure, **Hashing**-Introduction, Static Hashing, Dynamic Hashing.

UNIT IV: **Priority Queues** Binomial heaps, Fibonacci Heaps, Symmetric Min-Max Heaps, **Efficient Binary Search Trees** Optimal Binary Search Trees, AVL trees, Red-Black Trees, Splay Trees.

UNIT V: **Multiyway Search Trees** m-way Search Trees, B- Trees, B+- Trees **Digital Search Trees** Digital Search Trees, Binary Tries and Patricia, Multiway Tries

Text Books:

1. Data structures, Algorithms and Applications in C++, S.Sahni, 2nd edition, Universities Press, Pvt. Ltd.
2. Data structures and Algorithm Analysis in C++, Mark Allen Weiss, Pearson Education. Ltd., Second Edition.
3. Data structures and Algorithms in C++, Michael T.Goodrich, R.Tamassia and Mount, Wiley student edition, John Wiley and Sons.

Reference Books:

1. Data structures and algorithms in C++, 3rd Edition, Adam Drozdek, Thomson
2. Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.
3. Problem solving with C++, The OOP, Fourth edition, W.Savitch, Pearson education.

I-I	**Advanced Operating Systems** (Elective-I)	Course Code: **V21CTT03**	**L**	**T**	**P**	**C**
			3	0	0	3

Course Outcomes: After completion of course, students would be able to

CO1: Explain architectures and issues in Distributed Operating Systems.(K2)

CO2: Illustrate different Distributed Mutual Exclusion Algorithms and Distributed Deadlock Algorithms. (K3)

CO3: Demonstrate Distributed Scheduling Algorithm and Distributed Shared Memory.(K3)

CO4: Apply various Cryptographic Algorithms for the protection of given data.(K3)

CO5: Demonstrate Multiprocessor Scheduling Algorithms and Concurrency Control Algorithms.(K3)

UNIT-I: **Architectures of Distributed Systems**: System Architecture Types, Distributed Operating Systems, Issues in Distributed Operating Systems. **Theoretical Foundations:** Inherent Limitations of a Distributed System, Lamport's Logical clocks, Vector Clocks, Global State, and Termination Detection.

UNIT-II: **Distributed Mutual Exclusion:** The classification of Mutual Exclusion Algorithms, Preliminaries, Non-Token-Based Algorithms, Lamport's Algorithm, The Ricart-Agrawala Algorithm, Token-Based Algorithms, Suzuki-kasami's Broadcast Algorithm, Singhal's Heuristic Algorithm. **Distributed Deadlock Detection:** Resource Vs Communication Deadlocks, A graph– theoretic Model, Deadlock handling strategies in Distributed Systems, Control Organizations for Distributed Deadlock Detection, Centralized Deadlock Detection Algorithms, Distributed Deadlock Detection Algorithms- A Path-Pushing, Edge-Chasing, Hierarchical Deadlock Detection Algorithms. **Agreement protocols**: The System Model, The Byzantine Agreement Problem, The Consensus Problem.

UNIT-III: **Distributed File Systems**: Mechanisms for Building Distributed File Systems, Design Issues. **Distributed Shared Memory**: Algorithms for Implementing DSM, Memory Coherence, Coherence Protocols, Design Issues. **Distributed Scheduling:** Issues in Load Distributing, Components of a Load Distributing Algorithm, Stability, Load Distributing Algorithms, Performance Comparison.

UNIT-IV: **Failure Recovery**: Backward and Forward Error Recovery, Consistent Set of Checkpoints, Synchronous and Asynchronous check Pointing and Recovery. **Fault Tolerance**: Commit Protocols, Non-blocking Commit Protocols, Voting Protocols. **ResourceProtection and Security:** The Access Matrix Model.

Cryptography: Private Key: Data Encryption Standard, Public Key Cryptography.

UNIT-V: **Multiprocessor System Architectures**: Basic Multiprocessor System Architectures, Interconnection Networks for Multiprocessor Systems, Caching, Hypercube Architectures. **Multiprocessor Operating Systems:** Threads, Process Synchronization, Processor Scheduling. **Database Operating Systems:** Concurrence Control Model of Database systems, Problem of Concurrency Control, Distributed Database Systems. **Concurrency Control Algorithms**: Lock Based Algorithms, Timestamp Based Algorithms.

TEXT BOOKS:

1. "Advanced concepts in operating systems: Distributed, Database and multiprocessor operating systems", Mukesh Singhal, Niranjan G.Shivaratri, TMH, 2001.

REFERENCE BOOKS:

1. "Modern operating system", Andrew S.Tanenbaum, PHI, 2003
2. "Distributed operating system-Concepts and design", Pradeep K.Sinha, PHI, 2003.
3. "Distributed operating system", Andrew S.Tanenbaum, Pearson education, 2003.

I-I	**Advanced Computer Architecture** (Elective-I)	Course Code: **V21CTT04**	**L**	**T**	**P**	**C**
			3	0	0	3

Course Outcomes: After completion of course, students would be able to

CO1: Classify the types of computers, and new trends and developments in computer architecture. **(K2)**
CO2: Describe pipelining, instruction set architectures, memory addressing. **(K2)**
CO3: Demonstrate exploiting ILP using dynamic scheduling, multiple issue, and speculation. **(K3)**
CO4: Demonstrate the various techniques to enhance a processors ability to exploit Instruction level parallelism (ILP), and its challenges. **(K3)**
CO5: Illustrate multithreading by using ILP and supporting thread-level parallelism (TLP). **(K3)**

UNIT I: **Fundamentals of Computer Design**-Fundamentals of Computer design, Changing faces of computing and task of computer designer, Technology trends, Cost price and their trends, Measuring and reporting performance, Quantitative principles of computer design, Amdahl's law, Instruction set principles and examples- Introduction, Classifying instruction set- Memory addressing- type and size of operands, Operations in the instruction set.

UNIT II: **Pipelines-** Introduction, Basic RISC instruction set, Simple implementation of RISC instruction set, Classic five stage pipe lined RISC processor, Basic performance issues in pipelining, Pipeline hazards, Reducing pipeline branch penalties, **Memory Hierarchy Design-** Introduction, Review of ABC of cache, Cache performance, Reducing cache miss penalty, Virtual memory.

UNIT III: **Instruction** Level Parallelism the Hardware Approach: Instruction-Level parallelism, Dynamic scheduling, Dynamic scheduling using Tomasulo's approach, Branch prediction, high performance instruction delivery- hardware based speculation.

UNIT IV: ILP Software
Approach Basic compiler level techniques, Static branch prediction, VLIW approach, Exploiting ILP, Parallelism at compile time, Cross cutting issues - Hardware versus Software.

UNIT V: **Multi Processors and Thread Level Parallelism:**
Multi Processors and Thread level Parallelism- Introduction, Characteristics of application domain, Systematic shared memory architecture, Distributed shared– memory architecture, Synchronization, **Inter Connection and Networks-** Introduction, Interconnection network media, Practical issues in interconnecting networks, Examples of inter connection, Cluster, Designing of clusters, **Intel Architecture-** Intel IA-64 ILP in embedded and mobile markets Fallacies and pit falls.

Text Books:

1. JohnL. Hennessy, David A.Patterson –Computer Architecture: A Quantitative Approach, 3rd Edition, An Imprint of Elsevier.

References:

1. John P.Shen and Miikko H.Lipasti – Modern Processor Design: Fundamentals of Super Scalar Processors
2. Computer Architecture and Parallel Processing – Kai Hwang, Faye A.Brigs., MC Graw Hill.
3. Advanced Computer Architecture – A Design Space Approach – Dezso Sima, Terence Fountain, Peter Kacsuk , Pearson Ed

I-I	**Parallel Computing** (Elective-I)	Course Code: **V21CTT05**	**L**	**T**	**P**	**C**
			3	0	0	3

Course Outcomes: After completion of course, students would be able to

CO1: Describe different parallel architectures; inter-connect networks, programming models, and algorithms for common operations such as matrix-vector multiplication. **(K2)**
CO2: Develop an efficient parallel algorithm to solve it. **(K3)**
CO3: Illustrate a parallel algorithm time complexity as a function of the problem size and number of processors. **(K3)**
CO4: Illustrate Matrix Multiplication and Sorting Techniques. **(K3)**
CO5: Explain parallel algorithm using MPI, Open MP, pthreads, or a combination of MPI and Open MP. **(K2)**

UNIT I: **History-** Introduction, Modern Scientific Method, Evolution of Supercomputing, Modem Parallel Computers, Seeking Concurrency, Data Clustering, Programming Parallel Computers. **Parallel Architectures:** Introduction, Interconnection Networks, Processor Arrays, Multiprocessors, Multi computers, Flynn's Taxonomy

UNIT II: **Parallel Algorithm Design-** Introduction, The Task/Channel Model, Foster's Design Methodology, Boundary Value Problem ,Finding the Maximum, The n-Body Problem, Adding Data Input, **Message-Passing Programming-** Introduction, The Message-Passing Model, The Message-Passing Interface , Circuit Satisfiability, Introducing Collective Communication, Benchmarking Parallel Performance.

UNIT III: **The Sieve of Eratosthenes-**Introduction, Sequential Algorithm, Sources of Parallelism, Data Decomposition options, Developing the Paralle1 Algorithm, Analysis of Parallel Sieve Algorithm, Documenting the Parallel Program, Benchmarking, Improvements, **Performance Analysis-** Introduction, Speedup and Efficiency, Amdahl's Law, Gustafson-Barsis's Law, The Karp-Flatt Metric, The Iso-efficiency Metric.

UNIT IV: **Matrix Multiplication,** Introduction, Sequential Matrix Multiplication, Row wise Block-Striped Parallel Algorithm, Cannon's Algorithm, Solving Linear Systems, Back Substitution, Gaussian Elimination, Iterative Methods, **Sorting** Introduction, Quick sort, A Parallel Quick sort Algorithm, Hyper quick sort Algorithm, Parallel Sorting by Regular Sampling.

UNIT V: **Shared-Memory Programming –** Introduction, The Shared-Memory Model, Parallel for Loops, Declaring Private Variables, Critical section, Reductions, Performance Improvements, More General Data Parallelism, Functional Parallelism, **Combining MPI and OpenMP** -Introduction, Conjugate Gradient Method, Jacobi Method.

Text Books:

1. Parallel Programming in C with MPI and OpenMP Michael J, Quinn Oregon State University.

Reference books:

1. Distributed and Cloud Computing: From Parallel Processing to the Internet of Things 1st Edition, Kai Hwang , Jack Dongarra, Geoffrey C. Fox

I-I	**Advanced Databases** (Elective-II)	Course Code: **V21CTT06**	**L**	**T**	**P**	**C**
			3	0	0	3

Course Outcomes: After completion of course, students would be able to

CO1: Explain Distributed Database Process, Architecture, and Design Principles. **(K2)**
CO2: Apply Distributed Query Optimization Techniques and Algorithms. **(K3)**
CO3: Illustrate and apply Concurrency Control and Reliability Techniques. **(K3)**
CO4: Illustrate Need of Complex Data type like ORDBMS and OODBMS. **(K3)**
CO5: Identify Emerging Database Models and case study on Time Series Database. **(K2)**

UNIT I: Database Analysis and Design Techniques: Review of basic Database Concepts, Database Design Methodologies. ER Modeling: Specialization, Generalization, Aggregation, Normalization Theory. Database Implementation using UML: Introduction to UML, Structure diagrams, behavioral diagrams, object oriented analysis, class diagram, Advanced Transaction Processing and Concurrency Control: Transaction Concepts, Concurrency Control: Locking Methods, Time stamping Methods, Optimistic Methods for Concurrency Control, Concurrency Control in Distributed Systems.

UNIT II: Query Compiler: Introduction, parsing, generating logical query plan from parse tree. Query Processing: Physical-Query-plan Operators. Operations: selection, sorting, join, project, set. Query Evaluation: Introduction, Approaches to QE, Transformation of relational expressions in Query optimization, heuristic optimization, cost estimation for various operations, transformation rule.

UNIT III: Distributed Database Centralized DBMS and Distributed DBMS, functions and architecture of a DDBMS, Distributed Data Storage, Transparency issues in DDBMS, Query Processing DDBMS, Distributed transaction Management and Protocols, Distributed Concurrency Control and Deadlock Management.

UNIT IV: Object Oriented Database Limitations of RDBMS, Need of Complex Datatype, Data Definition, ODBMS Fundamentals, issues in OODBMS, Object- oriented database design. Comparison of ORDBMS and OODBMS.

UNIT V: Emerging Database Models, Technologies and Applications Multimedia database-Emergence, difference from other data types, structure, deductive databases, GIS and spatial databases, Knowledge database, Information

Visualization, Wireless Networks and databases, Personal database, Digital libraries, web databases, case studies.

Time Series Database(TSD): Time Series Database, Importance of TSD, TSD Vs Relational DB, RTA and TSD, TSD as stream processing solution.

Text Books:

1. Advanced database management system by RiniChkrabarti and Shibhadra Dasgupta, Dreamtech.
2. Distributed Databases by Ozsu and Valduriez ,Pearson Education.

Reference Books:

1. Fundamentals of Database Systems by Ramez Elmasri, Shamkant Navathe, Pearson Education
2. Database System Concepts by Abraham Silberschatz, Henry F. Korth, S. Sudarshan, Tata McGraw-Hill.
3. https://www.xenonstack.com/insights/time-series-databases-in-real-time-analytics

I-I	**Advanced Computer Networks** (Elective-II)	Course Code: **V21CTT07**	**L**	**T**	**P**	**C**
			3	0	0	3

Course Outcomes: After completion of course, students would be able to

CO1: Describe the functionalities and services provided by the network layer. (K2)

CO2: Apply IP addressing for the given network. (K3)

CO3: Select the transport protocol appropriate for a given application. (K3)

CO4: Discriminate between different types of multimedia communications. (K2)

CO5: Describe the working, types and challenges involved in Adhoc networks & SDN. (K2)

UNIT I: **Network layer-**Network Layer design issues: store-and forward packet switching, services provided transport layers, implementation connection less services, implementation connection oriented services, comparison of virtual – circuit and datagram subnets. **Routing Algorithm** –shortest path routing, flooding, distance vector routing, link state routing, Hierarchical routing, Broadcast routing, Multicasting routing, routing for mobiles Hosts, routing in Adhoc networks, **Congestion control algorithms**-Load shedding, Congestion control in Data gram Subnet.

UNIT II: **IPV4 Address** address space, notations, classful addressing, classless addressing network addressing translation(NAT) , **IPV6 Address** structure address space, **Internetworking** need for network layer internet as a data gram, internet as connection less network. **IPV4** datagram, Fragmentation, checksum, options. **IPV6** Advantages, packet format, extension Headers, Transition form IPV4 to IPV6

UNIT III: **Process to process delivery:** client/server paradigm, multiplexing and demultiplexing, connectionless versus connection oriented services, reliable versus reliable. **UDP:** well known ports for UDP, user data gram, check sum, UDP operation, and uses of UDP **TCP:** TCP services, TCP features, segement, A TCP connection, Flow control, error control, congestion control. **SCTP:** SCTP services SCTP features, packet format, An SCTP association, flow control, error control. **Congestioncontrol**: open loop congestion control, closedloop congestion control, Congestion control in TCP, frame relay, **Quality Of Service**: flow characteristics, flow classes **Techniques To Improve QOS**: scheduling, traffic shaping, resource reservation, admission control.

UNIT IV: **Multimedia-** introduction digital a audio , Audio compression, streaming audio, internet radio, voice over IP, introduction to video, video compression, video on demand, the MBone-the multicast back bone

UNIT V: **Emerging trends Computer Networks- Mobile Ad hoc networks**: applications of Ad hoc networks, challenges and issues in MANETS,MAC layers issues, routing protocols in MANET, transport layer issues, Ad Hoc networks security. **Wireless sensors networks:** WSN functioning, operation system support in sensor

devices, WSN Characteristics, sensor network operation, sensor Architecture: cluster management; **Wireless mesh networks** WMN design, Issues in WMNs;

Software-defined networking (SDN): importance of SDN, working principle of SDN, Benefits of SDN, SDN vs Traditional Networking, Different models of SDN.

Text Books:

1. Data communications and networking 4th edition Behrouz A Fourzan, TMH.
2. Computer networks 4th edition Andrew S Tanenbaum, Pearson.
3. Computer networks, Mayank Dave, CENGAGE.

Reference Books:

1. Computer Networks, A system Approach, 5th ed, Larry L Peterson and Bruce S Davie, Elsevier.
2. https://www.vmware.com/topics/glossary/content/software-defined-networking.

I-I	**Object Oriented Software Engineering** (Elective-II)	Course Code: **V21CTT08**	**L**	**T**	**P**	**C**
			3	**0**	**0**	**3**

Course Outcomes: After completion of course, students would be able to

CO1: Apply the Object Oriented Software-Development Process to design software. (K3)
CO2: Illustrate the Object Oriented Software Architecture & Design patterns. (K3)
CO3: Examine theDesign and Plan software solutions to problems using an object-oriented Testing strategies. (K4)
CO4: Illustrate the Object Oriented metrics for designing the projects. (K3)
CO5: Develop the CASE Tools & Integrated CASE environments for Object Oriented Software. (K3)

UNIT I: Introduction to Software Engineering: Software, Software Crisis, Software Engineering definition, Evolution of Software Engineering Methodologies, Software Engineering Challenges. Software Processes: Software Process, Process Classification, Phased development life cycle, Software Development Process Models- Process, use, applicability and Advantages/limitations.

UNIT II: Object oriented Paradigm, Object oriented Concepts, Classes, Objects, Attributes, Methods and services, Messages, Encapsulation, Inheritance, Polymorphism, Identifying the elements of object model, management of object oriented Software projects, Object Oriented Analysis, Domain Analysis, Generic Components of OOA model,, OOA Process, Object Relationship model, Object Behavior Model, Object Oriented Design: Design for Object- Oriented systems, The Generic components of the OO design model, The System design process, The Object design process, Design Patterns, Object Oriented Programming.

UNIT III: Object Oriented testing: Broadening the view of Testing, Testing of OOA and OOD models, Object-Oriented testing strategies, Test case design for OO software, testing methods applicable at the class level, Interclass test case design

UNIT IV: Technical Metrics for Object Oriented Systems: The Intent of Object Oriented metrics, The distinguishing Characteristics, Metrics for the OO Design model, Class-Oriented metrics, Operation-Oriented Metrics, Metrics foe Object Oriented testing, Metrics for Object Oriented projects

UNIT V: Computer-Aided Software Engineering: What is CASE?, Building blocks for CASE, A taxonomy of CASE tools, Integrated CASE environments, The Integration Architecture, The CASE Repository

Text Books:

1. Object Oriented and Classical Software Engineering, 7/e, Stephen R. Schach, TMH.
2. Object oriented and Classical Software Engineering, Timothy Lethbridge, Robert Laganiere, TMH
3. Software Engineering by Roger S Pressman, Tata McGraw Hill.

Reference Books:

1. Component based Software Engineering: ivica Crnkovic, Springer.

I-I	**Advanced Data Structures Lab**	Course Code: **V21CTL01**	**L**	**T**	**P**	**C**
			0	**0**	**4**	**2**

Course Outcomes: After completion of course, students would be able to

CO1: Develop solutions for a range of problems using object oriented programming. (**K3)**

CO2: Practice complex problems using advanced data structures like arrays, stacks, queues, linked lists, graphs and trees. **(K3)**

CO3: Practice operations like searching, insertion, deletion and traversing on various data structures. (**K3)**

CO4: Apply data structures into the applications such as binary search trees, AVL, Red black trees. (**K3)**

CO5: Differentiate various hash functions. (**K2)**

List of Experiments

Experiment 1:

Develop a program to implement Polynomial additions using Arrays.

Experiment 2:

Develop a program to implement Polynomial additions using linked lists.

Experiment 3:

Develop a program to implement Multi Stack ADT using Arrays with the basic operations as Create(), IsEmpty(), Push(), Pop(), IsFull() with appropriate prototype to a functions.

Experiment 4:

Develop a program to implement Queue ADT using Linked list with the basic functions of Create(), IsEmpty(), Insert(), Delete() and IsFull() with suitable prototype to a functions.

Experiment 5:

Develop a program to transfer data from stack to queue.

Experiment 6:

Develop a program to implement the following ADT using Linked list with the basic functions of Create(), IsEmpty(), Insert(), Delete() and IsFull() with suitable prototype to a functions.

i) Double Ended Queue (Dequeues)
ii) Circular Queues

Experiment 7:

Develop a program to generate the binary tree from the given inorder, preorder and post order traversal.

Experiment 8:

Develop a program to implement insertion, deletion and display operation in Min- Max Heap for the given data as integers.

Experiment 9:

Develop a program for Binary Search Tree to implement following operations:

a) Insertion
b) Deletion
   i. Delete node with only child
   ii. Delete node with both children
c) Finding an element
d) Finding Min element
e) Finding Max element
f) Left child of the given node
g) Right child of the given node
h) Finding the number of nodes, leaves nodes, full nodes, ancestors, descendants

Experiment 10:

Develop a program to implement BFS and DFS for a Graph.

Experiment 11:

Develop a program to implement to generate a min-cost spanning tree

a) Kruskal's algorithm
b) Prim's algorithm

Experiment 12:

Develop a program to store k keys into an array of size n at the location computed using a hash function, loc = key % n, where k<=n and k takes values from [1 to m], m>n. To handle the collisions use the following collision resolution techniques,

a) Linear probing
b) Quadratic probing
c) Double hashing/rehashing

Experiment 13:

Develop a program for AVL Tree to implement following operations: (For nodes as integers)

a) Insertion: Test program for all cases (LL, RR, RL, LR rotation)
b) Deletion: Test Program for all cases (R0, R1, R-1, L0, L1, L-1)
c) Display: using set notation

Experiment 14:

Develop a program to generate the B-tree of order 2-3 for a given list of integers.

Experiment 15:

Develop a program to perform string matching using Boyer-Moore algorithm.

Text Books:

1. Data structures, Algorithms and Applications in C++, S.Sahni, 2nd edition, Universities Press,
   Pvt. Ltd.
2. Data structures and Algorithm Analysis in C++, Mark Allen Weiss, Pearson Education. Ltd.,
   Second Edition.
3. Data structures and Algorithms in C++, Michael T.Goodrich, R.Tamassia and Mount, Wiley
   student edition, John Wiley and Sons.

Reference Books:

1. Data structures and algorithms in C++, 3rd Edition, Adam Drozdek, Thomson
2. Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.
3. Problem solving with C++, The OOP, Fourth edition, W.Savitch, Pearson education.

Advanced Computing Lab-1

NOTE:**Lab programs based on elective taken by student may be offered.**

I-I	Advanced Operating Systems Lab	Course Code: **V21CTL02**	L	T	P	C
			0	**0**	**4**	**2**

Course Outcomes: After completion of course, students would be able to

CO1: Demonstrate deadlock avoidance and detection algorithms in a distributed environment (K3)
CO2: Demonstrate efficient clock synchronization and election algorithms. (K3)
CO3: Describe Client server architecture (K2)

List of Experiments

Experiment 1: **Develop a program to implement Deadlocks through Simulation.**

Experiment 2: **Develop a Case Study of 3 tier client server architecture.**

Experiment 3: **Develop a Case study on Client and RMI Server.**

Experiment 4: **Develop a program to implement any one Election algorithms.**

Experiment 5: **Develop a program to show the software simulation for Clock Synchronization in Distributed System using Lamport's Algorithm.**

Experiment 6: **Develop a program to implement Banker's Algorithm for avoiding Deadlock.**

TEXT BOOKS:

1. "Advanced concepts in operating systems: Distributed, Database and multiprocessor operating systems", Mukesh Singhal, Niranjan G.Shivaratri, TMH, 2001.

REFERENCE BOOKS:

1. "Modern operating system", Andrew S.Tanenbaum, PHI, 2003
2. "Distributed operating system-Concepts and design", Pradeep K.Sinha, PHI, 2003.

3. "Distributed operating system", Andrew S.Tanenbaum, Pearson education, 2003.

I-I	**Parallel Computing Lab**	Course Code: **V21CTL03**	L	T	P	C
			0	**0**	**4**	**2**

Course Outcomes: After completion of course, students would be able to

CO1: Develop an efficient parallel algorithm to solve it. (K3)

CO2: Use parallel algorithm using MPI, OpenMP, pthreads, or a combination of MPI and OpenMP.(K3)

List of Experiments

Experiment 1: Develop a parallel program that computes the sum 1+2+------+ in the following

Manner. Each process I assigns the value i+1 to an integer, and then the processes perform a sum reduction. As a way of double-checking the result, process 0 should also compute and print the value p(p+1)/2.

Experiment 2: Implement A print number is a positive integer evenly divisible by exactly two positive integers: itself and .The first five prime numbers are 2,3,5,7 and 11. Sometimes two consecutive odd numbers are both prime. For example, the odd integers following 3,5 and 11 are all prime numbers. However, the odd integer following 7 is not a prime number. Write a parallel program to determine, for all integers less then 1,000,000, the number of times that two consecutive odd integers are both prime.

Experiment 3: Develop a program implementing the parallel matrix multiplication algorithm.

Experiment 4: Develop a MPI program implementing consecutive gradient.

Experiment 5: Develop a MPI program to implementing Quick sort.

Text Books:

1. Parallel Programming in C with MPI and OpenMP Michael J, Quinn Oregon State University.

Reference books:

2. Distributed and Cloud Computing: From Parallel Processing to the Internet of Things 1st Edition, Kai Hwang , Jack Dongarra, Geoffrey C. Fox

I-I	**Advanced Computer Networks Lab**	Course Code: **V21CTL04**	L	T	P	C
			0	**0**	**4**	**2**

Course Outcomes: After completion of course, students would be able to

CO1: Demonstrate various routing protocols. (K3)

CO2: Develop sub netting and addressing IP. (K3)

CO3: Develop emerging trends and security issues in computer Networks. (K3)

List of Experiments

Experiment 1:

Configuration of IP addressing for a given scenario for a given set of topologies.

Experiment 2:

Configure a DHCP Server to serve contiguous IP addresses to a pool of four IP devices with a default gateway and a default DNS address. Integrate the DHCP server with a BOOTP demon to automatically serve Windows and Linux OS Binaries based on client MAC address.

Experiment 3:

Configure, implement and debug the following: Use open source tools for debugging and diagnostics.

a) ARP/RARP protocols

b) RIP routing protocols

c) BGP routing

d) OSPF routing protocols

e) Static routes (check using netstat)

Text Books:

1. Data communications and networking 4th edition Behrouz A Fourzan, TMH

2. Computer networks 4th edition Andrew S Tanenbaum, Pearson
3. Computer networks, Mayank Dave, CENGAGE

Reference Books:

1. Computer Networks, A system Approach, 5th ed, Larry L Peterson and Bruce S Davie, Elsevier

I-I	Object Oriented Software Engineering Lab	Course Code: V21CTL05	L	T	P	C
			0	**0**	**4**	**2**

Course Outcomes: After completion of course, students would be able to

CO1: Apply software solutions to problems using an object-oriented strategy. **(K3)**

CO2: Construct the object oriented software systems Model using Unified Modeling Language (UML). **(K3)**

List of Experiments

Experiments 1:

Develop the following for the given project

a) Define the problem statement, Software Requirement Specification, entity relationship diagram,

b) Dataflow diagrams for level 0 and level 1,

c) Draw use-case diagram

d) Draw the activity diagram of all use cases.

e) Draw sequence diagram of all use cases

f) Draw collaboration diagram of all use cases, and Assign objects in Sequence diagram to classes and make class diagrams.

Text Books:

1. Object Oriented and Classical Software Engineering, 7/e, Stephen R.

Schach, TMH.

2. Object oriented and Classical Software Engineering, Timothy Lethbridge, Robert Laganiere, TMH
3. Software Engineering by Roger S Pressman, Tata McGraw Hill.

Reference Books:

1. Component based Software Engineering: ivica Crnkovic, Springer.

I-II	**Web Technologies**	Course Code: **V21CTT09**	**L**	**T**	**P**	**C**
			3	0	0	3

Course Outcomes: After completion of course, students would be able to

CO1: Demonstrate the basics of JavaScript. (K3)

CO2: Illustrate the concepts of XML and AJAX. (K3)

CO3: Produce Dynamic web pages with PHP and MySQL. (K3)

CO4: Use PERL to retrieve documents from the web. (K3)

CO5: Describe the fundamentals of RUBY Programming. (K2)

Syllabus:

UNIT-I: **Java script-** The Basic of Java script: Objects, Primitives Operations and Expressions, Screen Output and Keyboard Input, Control Statements, Object Creation and Modification, Arrays, Functions, Constructors, Pattern Matching using Regular Expressions

UNIT-II: **XML-** Document type Definition, XML schemas, Document object model, XSLT, DOM and SAX Approaches, **AJAX A New Approach:** Introduction to AJAX, Integrating PHP and AJAX.

UNIT-III: **PHP Programming- Introducing PHP:** Creating PHP script, Running PHP script. **Working with variables and constants:** Using variables, Using constants, Data types, Operators. **Controlling program flow:** Conditional statements, Control statements, Arrays, functions. Working with forms and Databases such as MySQL.

UNIT-IV: PERL- Introduction to PERL, Operators and if statements, Program design and control structures, Arrays, Hashs and File handling, Regular expressions, Subroutines, Retrieving documents from the web with Perl.

UNIT-V: RUBY: Introduction to Ruby, Variables, types, simple I/O, Control, Arrays, Hashes, Methods, Classes, Iterators, Pattern Matching. Overview of Rails.

TEXT BOOKS:

1. Programming the World Wide Web, Robet W Sebesta, 7ed, Pearson.
2. Web Technologies, Uttam K Roy, Oxford

Reference Book:

1. The Web Warrior Guide to Web Programming, Bai, Ekedahl, Farrelll, Gosselin, Zak, Karparhi, Maclntyre, Morrissey, Cengage.
2. Programming world wide web-Sebesta, Pearson Education, 2007.
3. Core SERVLETS AND JAVA SERVER PAGES VOLUME 1: CORE TECHNOLOGIES

By Marty Hall and Larry Brown Pearson Internet and World Wide Web – How to program by Dietel and Nieto PHI/Pearson Education Asia.

I-II	**Data Science through Python Programming**	Course Code: **V21CTT10**	**L**	**T**	**P**	**C**
			3	**0**	**0**	**3**

Course Outcomes: After completion of course, students would be able to

CO1: Illustrate the python basics and the working of various built-in objects in Python. (K2)

CO2: Describe the process of data collection using python. (K2)

CO3: Manipulate data using Pandas and NumPy libraries of python. (K3)

CO4: Apply various techniques for cleaning and pre-processing the data. (K3)

CO5: Demonstrate data visualization techniques using python matplotlib. (K3)

Syllabus:

UNIT I: **PYTHON Basics and Programming Concepts:** Introducing Python, Types and Operations - Numbers, Strings, Lists, Tuples, Dictionaries, Files, Numeric Types, Dynamic Typing; Statements and Syntax - Assignments, Expressions, Statements, Loops, iterations, comprehensions; Functions - Function Basics, Scopes, Arguments, Advanced Functions; Modules - Module Coding Basics, Module Packages, Advanced Module Topics; Classes and OOP - Class, Operator Overloading, Class Designing; Exceptions and Tools - Exception Basics, Exception Coding Details, Exception Objects, Designing With Exceptions, Parallel System Tools

UNIT II: **GUI Programming:** Graphical User Interface - Python gui development options, Adding Widgets, GUI Coding Techniques, Customizing Widgets; Internet Programming - Network Scripting, Client-Side scripting, Pymailgui client, server-side scripting, Pymailcgi server; Tools and Techniques - databases and persistence, data structures, text and language, python/c integration

UNIT III: **Pandas and NumPy:** Numpy Basics - Fast Element wise array functions, Multidimensional Array, Data Processing using arrays, file i/o with arrays; Pandas - Data Structures, Essential Functionality, Summarizing and Computing Descriptive Statistics, Handling Missing Data, Hierarchical Indexing

UNIT IV: **Data Preprocessing:** Data Loading, Storage, and FileFormats - Reading and Writing data in text format, binary data formats, interacting with html and web apis, interacting with databases; Data Wrangling: Clean, Transform, Merge, Reshape - Combining and Merging Data Sets, Reshaping and Pivoting, Data Transformation, String Manipulation; Data Aggregation and Group Operations – Group by Mechanics, Data Aggregation, Groupby Operations and and Transformations, Pivot Tables and Cross- Tabulation

UNIT V: **Data Visualization:** A Brief matplotlib API Primer, Plotting Functions in pandas, Time Series, Financial and Economic Data Applications

Text Books:

1. Learning Python , O’Reilly, Mark Lutz
2. Programming Python, O’Reilly, Mark Lutz
3. Python For Data Analysis (O’Reilly, Wes Mckinney)

Reference Text Books:

1. Python: The Complete Reference, Martin C. Brown, McGraw Hill Education
2. Head First Python, Paul Barry, O'Reilly

I-II	**Machine Learning** (Elective –III)	Course Code: **V21CTT11**	**L**	**T**	**P**	**C**
			3	0	0	3

Course Outcomes: After completion of course, students would be able to

CO1: Describe Knowledge for Productive use of Machine Learning and Diversity of Data (K2)
CO2: Demonstrate on Supervised and Computational Learning (K3)
CO3: Illustrate on Statistics in learning techniques and Logistic Regression (K3)
CO4: Illustrate on Support Vector Machines and Perceptron Algorithm (K3)
CO5: Construct a Multilayer Perceptron Networks and classification of decision tree (K3)

UNIT-I: **Introduction-**Towards Intelligent Machines, Well posed Problems, Example of Applications in diverse fields, Data Representation, Domain Knowledge for Productive use of Machine Learning, Diversity of Data: Structured / Unstructured, Forms of Learning, Machine Learning and Data Mining, Basic Linear Algebra in Machine Learning Techniques.

UNIT-II: **Supervised Learning-** Rationale and Basics: Learning from Observations, Bias and Why Learning Works: Computational Learning Theory, Occam's Razor Principle and Overfitting Avoidance Heuristic Search in inductive Learning, Estimating Generalization Errors, Metrics for assessing regression, Metris for assessing classification.

UNIT-III: **Statistical Learning-** Machine Learning and Inferential Statistical Analysis, Descriptive Statistics in learning techniques, Bayesian Reasoning: A probabilistic approach to inference, K-Nearest Neighbor Classifier. Discriminant functions and regression functions, Linear Regression with Least Square Error Criterion, Logistic Regression for Classification Tasks, Fisher's Linear Discriminant and Thresholding for Classification, Minimum Description Length Principle.

UNIT-IV: **Support Vector Machines (SVM)-** Introduction, Linear Discriminant Functions for Binary Classification, Perceptron Algorithm, Large Margin Classifier for linearly seperable data, Linear Soft Margin Classifier for Overlapping Classes, Kernel Induced Feature Spaces, Nonlinear Classifier, Regression by Support vector Machines.

Learning with Neural Networks: Towards Cognitive Machine, Neuron Models, Network Architectures, Perceptrons, Linear neuron and the Widrow-Hoff Learning Rule, The error correction delta rule.

UNIT -V: Multilayer Perceptron Networks and error back propagation algorithm, Radial Basis Functions Networks. **Decision Tree Learning**: Introduction, Example of classification decision tree, measures of impurity for evaluating splits in decision trees, ID3, C4.5, and CART decision trees, pruning the tree, strengths and weakness of decision tree approach.

Textbooks:

1. Applied Machine Learning,1e, M.Gopal, Mc Graw Hill Education, 2018

Reference Books

1. Kevin Murphy, Machine Learning: A Probabilistic Perspective, MIT Press, 2012
2. Trevor Hastie, Robert Tibshirani, Jerome Friedman, The Elements of Statistical Learning, Springer 2009 (freely available online)
3. Christopher Bishop, Pattern Recognition and Machine Learning, Springer, 2007.

<table>
<tr><td rowspan="2">I-II</td><td rowspan="2">Ad Hoc & Sensor Networks
(Elective –III)</td><td rowspan="2">Course Code:
V21CTT12</td><td>L</td><td>T</td><td>P</td><td>C</td></tr>
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Course Outcomes: After completion of course, students would be able to

CO1: Explain the Fundamental Concepts and applications of ad hoc and wireless sensor networks (K2)
CO2 : Describe the MAC protocol issues of ad hoc networks (K2)
CO3 : Describe routing protocols for ad hoc wireless networks with respect to TCP design issues (K2)
CO4 : Explain the concepts of network architecture and MAC layer protocol for WSN (K2)
CO5 : Discuss the WSN routing issues by considering QoS measurements (K2)

UNIT I: **Introduction :** Fundamentals of Wireless Communication Technology, The Electromagnetic Spectrum, Radio propagation Mechanisms ,Characteristics of the Wireless channel mobile ad hoc networks (MANETs), **Wireless Sensor Networks (WSNs):** concepts and architectures, Applications of Ad Hoc and Sensor Networks, Design Challenges in Ad hoc and Sensor Networks.

UNIT II: **MAC Protocols For Ad Hoc Wireless Networks:** Issues in designing a MAC Protocol, Issues in Designing a MAC Protocol for Ad Hoc Wireless Networks, Design Goals of a MAC Protocol for Ad Hoc Wireless Networks, Classification of MAC Protocols, Contention based protocols, Contention based protocols with Reservation Mechanisms, Contention based protocols with Scheduling Mechanisms, Multi channel MAC - IEEE 802.11.

UNIT III: **Routing Protocols And Transport Layer In Ad Hoc Wireless Networks**: Routing Protocol: Issues in designing a routing protocol for Ad hoc networks, Classification, proactive routing, reactive routing (on-demand), hybrid routing, Transport Layer protocol for Ad hoc networks, Design Goals of a Transport Layer Protocol for Ad Hoc Wireless Networks, Classification of Transport Layer solutions- TCP over Ad hoc wireless, Network Security, Security in Ad Hoc Wireless Networks, Network Security Requirements.

UNIT IV: **Wireless Sensor Networks (WSNS) And Mac Protocols**: Single node architecture - hardware and software components of a sensor node, **WSN Network architecture:** typical network architectures, data relaying and aggregation strategies, **MAC layer protocols:** self-organizing, Hybrid TDMA/FDMA and CSMA based MAC -IEEE 802.15.4.

UNIT V: **WSN Routing, Localization & Qos:** Issues in WSN routing, OLSR, Localization, Indoor and Sensor Network Localization, absolute and relative localization, triangulation, QOS in WSN, Energy Efficient Design, Synchronization.

Text Books:

1. "Ad Hoc Wireless Networks: Architectures and Protocols ", C. Siva Ram Murthy, and B. S. Manoj, Pearson Education, 2008
2. “Wireless Adhoc and Sensor Networks”, Labiod. H, Wiley, 1st edition-2008
3. “Wireless ad -hoc and sensor Networks: theory and applications”, Li, X, Cambridge University Press, fifth edition-2008.

Reference Books:

1. “Ad Hoc & Sensor Networks: Theory and Applications”, 2nd edition, Carlos De MoraisCordeiro, Dharma Prakash Agrawal ,World Scientific Publishing Company, 2011
2. "Wireless Sensor Networks", Feng Zhao and LeonidesGuibas,Elsevier Publication 2nd edition-2004
3. “Protocols and Architectures for Wireless Sensor Networks”, Holger Karl and Andreas Willig,Wiley, 2005 (soft copy available)
4. “Wireless Sensor Networks Technology, Protocols, and Applications”, KazemSohraby, Daniel Minoli, &TaiebZnati, John Wiley, 2007. (soft copy available)

I-II	**Internet of Things** (Elective –III)	Course Code: **V21CTT13**	**L**	**T**	**P**	**C**
			3	0	0	3

Course Outcomes: After completion of course, students would be able to

CO1: Describe the term 'internet of things' in different contexts. (K2)
CO2: Develop various protocols for IoT. (K3)
CO3: Develop a PoC of an IoT system using Rasperry Pi/Arduino (K3)
CO4: Apply data analytics and use cloud offerings related to IoT. (K3)
CO5: Demonstrate applications of IoT in real time scenario (K3)

UNIT I: **FUNDAMENTALS OF IoT:** Evolution of Internet of Things, Enabling Technologies, IoT Architectures,oneM2M, IoT World Forum (IoTWF) and Alternative IoT models, Simplified IoT Architecture and Core IoT Functional Stack, Fog, Edge and Cloud in IoT, Functional blocks of an IoT ecosystem, Sensors, Actuators, Smart Objects and Connecting Smart Objects

UNIT II: **IoT PROTOCOLS:** IT Access Technologies: Physical and MAC layers, topology and Security of IEEE 802.15.4, 802.15.4g, 802.15.4e, 1901.2a, 802.11ah and Lora WAN, Network Layer: IP versions, Constrained Nodes and Constrained Networks, Optimizing IP for IoT: From 6LoWPAN to 6Lo, Routing over Low Power and Lossy Networks, Application Transport Methods: Supervisory Control and Data Acquisition, Application Layer Protocols: CoAP and MQTT. Bluetooth Smart Connectivity-Overview, Key Versions, BLE-Bluetooth Low Energy Protocol, Low Energy Architecture.

UNIT III: **DESIGN AND DEVELOPMENT:** Design Methodology, Embedded computing logic,Microcontroller, System on Chips, IoT system building blocks, Arduino, Board details, IDE programming, Raspberry Pi, Interfaces and Raspberry Pi with Python Programming.

UNIT IV: **Arm Based Embedded System Design:** ARM Cortex-A class processor, Embedded Devices-ARM Cortex-M Class processor, Networking-Bluetooth Smart Technology **Introduction to embedded systems**: CPUs vs MCU's vs Embedded Systems, Examples, Options for Building Embedded Systems, Features of Embedded Systems, Building Embedded Systems, Building Embedded Systems using MCUs, Introduction to mbedTM Platform

UNIT V: **CASE STUDIES/INDUSTRIAL APPLICATIONS:** Cisco IoT system, IBM Watson IoT platform, Manufacturing, Converged Plant wide Ethernet Model (CPwE), Power Utility Industry, Grid Blocks Reference Model, Smart and Connected Cities: Layered architecture, Smart Lighting, Smart Parking Architecture and Smart Traffic Control.

Text Books:

1. IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things, David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob

Barton and Jerome Henry, Cisco Press, 2017
2. The Definitive Guide to ARM Cortex-M3 and M4 Processors, 3rd Edition, Joseph Yiu

Reference Books:

1. Internet of Things – A hands-on approach, Arshdeep Bahga, Vijay Madisetti, Universities Press, 2015
2. The Internet of Things – Key applications and Protocols, Olivier Hersent, David Boswarthick, Omar Elloumi and Wiley, 2012 (for Unit 2).
3. “From Machine-to-Machine to the Internet of Things – Introduction to a New Age of Intelligence”, Jan Ho¨ ller, Vlasios Tsiatsis, Catherine Mulligan, Stamatis, Karnouskos, Stefan Avesand. David Boyle and Elsevier, 2014.
4. Architecting the Internet of Things, Dieter Uckelmann, Mark Harrison, Michahelles and Florian (Eds), Springer, 2011.
5. Recipes to Begin, Expand, and Enhance Your Projects, 2nd Edition, Michael Margolis, Arduino Cookbook and O’Reilly Media, 2011.
6. Cortex–A series Programmer’s Guide for ARMv7-A by Arm http://infocenter.arm.com/help/index.jsp?topic=/com.arm.doc.den0013d/inde x.htmlc

I-II	**Principles of Cyber Security** (Elective-IV)	Course Code: **V21CTT14**	**L**	**T**	**P**	**C**
			3	0	0	3

Course Outcomes: After completion of course, students would be able to

CO1: Apply cyber security architecture principles. (K3)

CO2: Describe risk management processes and practices (K2).

CO3: Construct cyber security incidents to apply appropriate response (K3)

CO4: Differentiate system and application security threats and vulnerabilities. (K2)

CO5: Identify security tools and hardening techniques. (K1)

UNIT–I: **Introduction to Cyber security-** Cyber security objectives**,** Cyber security roles**,** Differences between Information Security & Cyber security, **Cyber security Principles-**Confidentiality, integrity, &availability Authentication & non- repudiation.

UNIT–II: **Information Security (IS) within Lifecycle Management-**Lifecycle management landscape, Security architecture processes, Security architecture tools, Intermediate lifecycle management concepts, **Risks & Vulnerabilities-**Basics of risk management**,** Operational threat environments**,** Classes of attacks.

UNIT–III: **Incident Response-** Incident categories**,** Incident response Incident recovery, and **Operational security protection**: Digital and data assets, ports and protocols, Protection technologies, Identity and access Management, configuration management.

UNIT–IV: **Threat Detection and Evaluation (DE): Monitoring-** Vulnerability Management, Security Logs and Alerts, Monitoring Tools and Appliances**. Analysis-** Network traffic Analysis, packet capture and analysis .

UNIT–V: **Introduction to backdoor System and security-**Introduction to metasploit, Backdoor, demilitarized zone(DMZ),Digital Signature, Brief study on Hardening of operating system.

Text Books:

1. NASSCOM: Security Analyst Student Hand Book Dec 2015.
2. Information Security Management Principles Updated Edition by David Alexander, Amanda Finch, David Sutton ,Published by BCS, June 2013.

Reference Books:

1. CSX- cyber security fundamentals 2nd edition, Published by ISACA, Cyber security, Network Security, Data Governance Security.

I-II	**Cloud Computing** (Elective –IV)	Course Code: **V21CTT15**	**L**	**T**	**P**	**C**
			3	0	0	3

Course Outcomes: After completion of course, students would be able to

CO1: Interpret the key dimensions of the challenge of Cloud Computing (K2)

CO2: Examine the economics, financial and technological implications for selecting cloud computing for own organization. (K3)

CO3: Explain the financial, technological, and organizational capacity of employer's for actively initiating and installing cloud-based applications (K2)

CO4: Examine the own organizations' needs for capacity building and training in cloud computing- related IT areas. (K3)

CO5: Illustrate Virtualization for Data-Center Automation. (K2)

SYLLABUS:

UNIT I: **Introduction:** Network centric computing, Network centric content, peer-to –peer systems, cloud computing delivery models and services, Ethical issues, Vulnerabilities, Major challenges for cloud computing. **Parallel and Distributed Systems:** Introduction, architecture, distributed systems, communication protocols, logical clocks, message delivery rules, concurrency, model concurrency with Petri Nets.

UNIT II: **Cloud Infrastructure:** At Amazon, The Google Perspective, Microsoft Windows Azure, Open Source Software Platforms, Cloud storage diversity, Inter cloud, energy use and ecological impact, responsibility sharing, user experience, Software licensing, **Cloud Computing:** Applications and Paradigms: Challenges for cloud, existing cloud applications and new opportunities, architectural styles, workflows, The Zookeeper, The Map Reduce Program model, HPC on cloud, biological research.

UNIT III: **Cloud Resource virtualization:** Virtualization, layering and virtualization, virtual machine monitors, virtual machines, virtualization-full and para, performance and security isolation, hardware support for virtualization, Case Study: Xen, vBlades, **Cloud Resource Management and Scheduling**: Policies and Mechanisms, Applications of control theory to task scheduling, Stability of a two-level resource allocation architecture, feedback control based on dynamic thresholds, coordination, resource bundling, scheduling algorithms, fair queuing, start time fair queuing, cloud scheduling subject to deadlines, Scheduling Map Reduce applications, Resource management and dynamic application scaling.

UNIT IV: **Storage Systems:** Evolution of storage technology, storage models, file systems and database, distributed file systems, general parallel file systems. Google file system. Apache Hadoop, Big Table, Megastore (text book 1), Amazon Simple Storage Service(S3) (Text book 2), **Cloud Security:** Cloud security risks, security – a top concern for cloud users, privacy and privacy impact assessment, trust, OS security, Virtual machine security, Security risks.

UNIT V: **Cloud Application Development:** Amazon Web Services : EC2 – instances, connecting clients, security rules, launching, usage of S3 in Java, Installing Simple Notification Service on Ubuntu 10.04, Installing Hadoop on Eclipse, Cloud based simulation of a Distributed trust algorithm, Cloud service for adaptive data streaming (Text Book 1), **Google:** Google App Engine, Google Web Toolkit (Text Book 2), **Microsoft:** Azure Services Platform, Windows live, Exchange Online, Share Point Services, Microsoft Dynamics CRM (Text Book 2).

Text Books:

1. Cloud Computing, Theory and Practice, Dan C Marinescu, MK Elsevier
2. Cloud Computing, A Practical Approach, Anthony T Velte, Toby J Velte, Robert Elsenpeter, TMH

Reference book:

Mastering Cloud Computing, Foundations and Application Programming, Raj Kumar Buyya, Christen vecctiola, S Tammarai selvi, TMH

I-II	**Natural Language Processing** (Elective –IV)	Course Code: **V21CTT16**	**L**	**T**	**P**	**C**
			3	**0**	**0**	**3**

Course Outcomes: After completion of course, students would be able to

CO1: Explain approaches to syntax and semantics in NLP. (K2)
CO2: Demonstrate approaches to discourse, generation, dialogue and summarization within NLP. (K3)
CO3: Explain current methods for statistical approaches to machine translation. (K2)
CO4: Identify machine learning techniques used in NLP, including hidden Markov models and probabilistic (K2)
CO5: Explain context-free grammars, clustering and unsupervised methods, log-linear and discriminative models, and the EM algorithm as applied within NLP (K2)

UNIT-I: **Introduction:** NLP tasks in syntax, semantics, and pragmatics. Applications such as information extraction, question answering, and machine translation. The problem of ambiguity. The role of machine learning. Brief history of the field.

UNIT-II: **N-gram Language Models:** The role of language models, Simple Ngram models. Estimating parameters and smoothing. Evaluating language models. **Part of Speech Tagging and Sequence Labeling:** Lexical syntax. Hidden Markov Models. Maximum Entropy Models. Conditional Random Fields

UNIT-III: **Syntactic parsing:** Grammar formalisms and tree banks. Efficient parsing for context-free grammars (CFGs). Statistical parsing and probabilistic CFGs (PCFGs). Lexicalized PCFGs.

UNIT-IV: **Semantic Analysis:** Lexical semantics and word-sense disambiguation. Compositional semantics. Semantic Role Labeling and Semantic Parsing.

UNIT- V: **Information Extraction (IE) and Machine Translation (MT):** Named entity recognition and relation extraction. IE using sequence labeling. Basic issues in MT. Statistical translation, word alignment, phrase based translation, and synchronous grammars. Dialogues: Turns and utterances, grounding, dialogue acts and structures Natural Language Generation: Introduction to language generation, architecture, discourse planning (text schemata, rhetorical relations).

Text Books:

1. D. Jurafsky & J. H. Martin – “Speech and Language Processing – An introduction to Language processing, Computational Linguistics, and Speech Recognition”, Pearson Education

References:

1. Allen, James. 1995. – “Natural Language Understanding”. Benjamin/ Cummings, 2ed.
2. Bharathi, A., Vineet Chaitanya and Rajeev Sangal. 1995. Natural Language Processing- “A Pananian Perspective”. Prentice Hll India, Eastern Economy Edition.
3. Eugene Cherniak: “Statistical Language Learning”, MIT Press, 1993.
4. Manning, Christopher and Heinrich Schutze. 1999. “Foundations of Statistical Natural Language Processing”. MIT Press.

			L	T	P	C
I-II	**Advanced Web Technologies Lab**	Course Code: **V21CTL06**	**0**	**0**	**4**	**2**

Course Outcomes: After completion of course, students would be able to

CO1: Develop static web pages using HTML, CSS. **(K3)**

CO2: Demonstrate the concepts of JavaScript and DHTML. **(K2)**

CO3: Demonstrate the basic concepts of PHP and JSP. **(K2)**

CO4: Demonstrate the concepts of Extensible markup language & AJAX. **(K2)**

CO5: Develop dynamic Web Applications using PHP & MySQL. **(K3)**

List of Experiments

1. a) Create a Simple HTML home page provides links to move to other pages like hobbies, educational info, personal info etc.
   b) Create a HTML program to illustrate the use of frame and frameset tags of HTML.
   c) Create a HTML Program which use a HTML controls to create a student information form to collect student‘s information like name, address, phone, email, sex, birth date, hobbies etc.
2. a) Create a webpage which displays "Hello World" with font size 20 pixels, bold format, in "Times New Roman" font and green in color using inline CSS, embedded CSS and external CSS.
   b) Create a webpage which displays the class time table and apply the following effects on the table:

   - For the table header apply *blue* as the background color and *white* for the color of the text in the table header.
   - Display *day names* (Mon, Tue etc...) in bold format with the first letter in the day name in uppercase.
   - Display *lunch* slightly in bigger font other than the remaining text.

   c) Create a webpage to manage personal details like name, class, qualifications, photo, address etc., using tables and other suitable HTML tags. Apply the following style information:

   - Display the heading of the page in *Times New Roman* font and with 24px size.
   - Align all the field names like Name, Class, Photo etc to *right* in the table.
   - Apply *light blue* as background color for the left side cells in the table which contains field names like Name, Class etc...
   - Also display your college logo as background image in the top right position of the web page.

d) Create a web page containing two images, where one image overlaps another image by using the *z-index* CSS property.

3. a) Create a HTML Program which demonstrates loops like for loop, do while, while in java script.
   b) Create a HTML Program which demonstrates the use of functions in java script.
   c) Create a HTML Program which demonstrates various events like onclick, ondbclick, onfocus, onblur, onchange, onmouseover, onmouseover, window event, onload, onunload event.
   d) Create a HTML Program to create various functions and sub routines to validate the data entered by user in form.
4. a) Create a program to illustrate the concept of associative array in PHP.
   b) Create PHP program to implement the concept of Session management.
   c) Create a PHP program to display student information in webpage. Student‘s data is stored in My SQL database.

   d) Create a PHP program to insert student information from HTML form. Student‘s data is stored in My SQL database.
5. a) Create a well-formed XML document.
   b) Create a valid XML document using DTD.
   c) Create a valid XML document using XML Schema.
   d) Create a XML document which contains details of cars and display the same as a table using XSLT.
   e) Write a Java program to parse the XML document containing car details using SAX API.

6. a) Create a servlet to display "Hello World" in the browser.
   b) Create a servlet to store email-id as an initialization parameter and print the same email-id by reading the initialization parameter from the web.xml file.
   c) Create a servlet to retrieve name and branch details from a html page and print the same using the servlet.
   e) Create a HTML page which accepts book id, book name and book price and a submit button. When the user clicks the submit button, all the values assigned to the previous text fields must be stored in a session object and the control forwards to another servlet where the values stored in the session are retrieved and displayed.

7. a) Create a JSP page to display "Hello World" in the browser.
   b) Create a JSP page to store email-id as an initialization parameter and print the same email-id by reading the initialization parameter from the web.xml file.
   c) Create a JSP page to retrieve name and branch details from a html page and print the same using a servlet.
   d) Create a HTML page which accepts book id, book name and book price and a submit button. When the user clicks the submit button, all the values assigned to the previous text fields must be stored in a session object and the control forwards to a JSP page where the values stored in the session are retrieved and displayed.

8. Create a HTML page which accepts student regd.no. and prints the results of that student by retrieving the results from the database. Use AJAX to display the "please wait..." while the server is processing the request and print the

result of the student when the server returns the result. Server resource can be either servlet or JSP or PHP

Reference Books:

1. *Java server programming java JavaEE5 Black Book*‖, Kogent Solutions Dreamtech Press, Inc, ISBN-13 9788177228359 ISBN-10 8177228358, 2008.
2. *AJAX black book*‖, new edition, Kogent Solutions Inc, Dreamtech Press, ISBN:10- 81-7722-838-2ISBN:13-978-81-7722-838-063. Jonathan Chaffer, Karl Swedberg, ―*Learning jQuery*‖, 3rd Edition , , ISBN 13: 9781849516549, 2011
3. Chris Bates, *Web Programming- building internet applications*, 2nd edition, WILEY Dreamtech, 2006
4. Patrick Naughton and Herbert Schildt, The *complete Reference Java seventhEdition*,TMH, 2007
5. Hans Bergsten, Java *Server Pages*, SPD O'Reilly, 2000
6. Java Server Programming ,Ivan Bayross and others,The X Team,SPD
7. Web Warrior Guide to Web Programmming-Bai/Ekedaw-Thomas
8. Beginning Web Programming-Jon Duckett WROX.
9. Java Server Pages, Pekowsky, Pearson.
10. Java Script,D.Flanagan,O'Reilly, SPD.

I-II	**Data Science Applications with Python Lab**	Course Code: **V21CTL07**	**L**	**T**	**P**	**C**
			0	**0**	**4**	**2**

Course Outcomes: After completion of course, students would be able to

CO1: Use data science operations like data collection, management and storing. (K3)

CO2: Apply Python programming concepts in data science, including their real-world applications. (K3)

CO3: Develop data collection and management scripts using Python Pandas. (K3)

List of Experiments

Experiment 1:
Develop a Python Program to Find the Sum of the Series: 1 + 1/2 + 1/3 + .. + 1/N

Experiment 2:
Develop a Python Program to Split the array and add the first part to the end

Experiment 3:
Develop a Python Program to Create a List of Tuples with the First Element as the Number and Second Element as the Square of the Number

Experiment 4:
Develop a Python program to count number of vowels using sets in given string

Experiment 5:
Develop a program to implement permutation of a given string using inbuilt function.

Experiment 6:
Develop a python program to sort list of dictionaries by values in Python – Using lambda function.

Experiment 7:
Develop a Python Program for following sorting:
i. Quick Sort ii. Heap Sort

Experiment 8:
Develop a Python Program to Reverse a String Using Recursion

Experiment 9:
Develop a Python Program to Count the Number of Words in a Text File

Experiment 10:
Develop a Python Program to Read the Contents of a File in Reverse Order

Experiment 11:
Develop a program to Merge and Join DataFrames with Pandas in Python

Experiment 12:
Develop a program to implement Merge and Join Data Frames with Python Pandas

Experiment 13:
Develop a Python Program to Append the Contents of One File to Another File

Experiment 14:
Explain how to install and Load CSV files to Python Pandas

Text Books:

1. Learning Python , O’Reilly, Mark Lutz
2. Programming Python, O’Reilly, Mark Lutz
3. Python For Data Analysis (O’Reilly, Wes Mckinney)

II-I	**Mobile Applications and Development** (Elective-V)	Course Code: **V21CTT18**	**L**	**T**	**P**	**C**
			3	**0**	**0**	**3**

Course Outcomes: After completion of course, students would be able to

CO1: Describe Installation and configuration of Android application development tools. (K2)

CO2: Develop applications using services and publishing android applications. (K3)

CO3: Demonstrate Android software development tools. (K3)

CO4: Illustrate debugging programs running on mobile devices. (K2)

CO5: Develop Android applications using server-less database like SQLite. (K3)

Unit I: **Introduction to Android:** The Android 4.1 jelly Bean SDK, Understanding the Android Software Stack, installing the Android SDK, Creating Android Virtual Devices, Creating the First Android Project, Using the Text view Control, Using the Android Emulator, The Android Debug Bridge(ADB), Launching Android Applications on a Handset.

Unit II: **Basic Widgets:** Understanding the Role of Android Application Components, Understanding the Utility of Android API, Overview of the Android Project Files, Understanding Activities, Role of the Android Manifest File, Creating the User Interface, Commonly Used Layouts and Controls, Event Handling, Displaying Messages Through Toast, Creating and Starting an Activity, Using the Edit Text Control, Choosing Options with Checkbox, Choosing Mutually Exclusive Items Using Radio Buttons.

Unit III: **Building Blocks for Android Application Design:** Introduction to Layouts, Linear Layout, Relative Layout, Absolute Layout, Using Image View, Frame Layout, Table Layout, Grid Layout, Adapting to Screen orientation. Utilizing Resources and Media Resources, Creating Values Resources, Using Drawable Resources, Switching States with Toggle Buttons, Creating an Images Switcher Application, Scrolling Through Scroll View, playing Audio, Playing Video, Displaying Progress with Progress Bar, Using Assets.

Unit IV: **Using Selection widgets and Debugging:** Using List View, Using the Spinner control, Using the GridView Control, Creating an Image Gallery Using the ViewPager Control, Using the Debugging Tool: Dalvik Debug Monitor Service(DDMS), Debugging Application, Using the Debug Perspective. Displaying And Fetching Information Using Dialogs and Fragments: What Are Dialogs?, Selecting the Date and Time in One Application, Fragments, Creating Fragments with java Code, Creating Special Fragments

Unit V: **Building Menus and Storing Data:** Creating Interface Menus and Action Bars, Menus and Their Types, Creating Menus Through XML, Creating Menus Through Coding, Applying a Context Menu to a List View, Using the Action Bar, Replacing a Menu with the Action Bar, Creating a Tabbed

Action Bar, Creating a Drop-Down List Action Bar Using Databases: Using the SQLiteOpenHelperclasss, Accessing Databases with the ADB, Creating a Data Entry Form, Communicating with SMS and Emails: Understanding Broadcast Receivers, Using the Notification System, Sending SMS Messages with Java Code, Receiving SMS Messages, Sending Email, Working With Telephony Manager.

Text Books

1. Android Programming by B.M Harwani, Pearson Education, 2013.

References Text Books:

1. Android application Development for Java Programmers, James C Sheusi, Cengage Learning
2. Android In Action by w.Frank Ableson, Robi Sen, Chris King, C. Enrique Ortiz., Dreamtech.
3. Professional Android 4 applications development, Reto Meier, Wiley India, 2012.
4. Beginning Android 4 applications development, Wei- Meng Lee, Wiley India,2013.

<table>
<tr><td rowspan="2">II-
I</td><td rowspan="2">Big Data Analytics (Elective-V)</td><td rowspan="2">Course Code:
V21CTT19</td><td>L</td><td>T</td><td>P</td><td>C</td></tr>
<tr><td>3</td><td>0</td><td>0</td><td>3</td></tr>
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Course Outcomes: After completion of course, students would be able to

CO1: Illustrate big data and its use cases from selected business domains. (K3)
CO2: Interpret and summarize No SQL and Cassandra (K3)
CO3: Discuss the HADOOP and Map Reduce technologies associated with big data analytics and explore on Big Data applications Using Hive. (K2)
CO4: Define the use of Apache Spark, RDDs etc. to work with datasets. (K1)
CO5: Assess real time processing with Spark Streaming. (K3)

Syllabus:

UNIT I: What is big data, why big data, convergence of key trends, unstructured data, industry examples of big data, web analytics, big data and marketing, fraud and big data, risk and big data, credit risk management, big data and algorithmic trading, big data and healthcare, big data in medicine, advertising and big data, big data technologies, introduction to Hadoop, open source technologies, cloud and big data, mobile business intelligence, Crowd sourcing analytics, inter and trans firewall analytics.

UNIT II: Introduction to NoSQL, aggregate data models, aggregates, key-value and document data models, relationships, graph databases, schema less databases, materialized views, distribution models, sharding, master-slave replication, peer- peer replication, sharding and replication, consistency, relaxing consistency, version stamps, Working with Cassandra ,Table creation, loading and reading data.

UNIT III: Data formats, analyzing data with Hadoop, scaling out, Architecture of Hadoop distributed file system (HDFS), fault tolerance ,with data replication, High availability, Data locality , Map Reduce Architecture, Process flow, Java interface, data flow, Hadoop I/O, data integrity, compression, serialization. Introduction to Hive, data types and file formats, HiveQL data definition, HiveQL data manipulation, Logical joins, Window functions, Optimization, Table partitioning, Bucketing, Indexing, Join strategies.

UNIT IV: Apache spark- Advantages over Hadoop, lazy evaluation, In memory processing, DAG, Spark context, Spark Session, RDD, Transformations- Narrow and Wide, Actions, Data frames ,RDD to Data frames, Catalyst optimizer, Data Frame Transformations, Working with Dates and Timestamps, Working with Nulls in Data, Working with Complex Types, Working with JSON, Grouping, Window Functions, Joins, Data Sources, Broadcast Variables, Accumulators, Deploying Spark- On-Premises Cluster Deployments, Cluster Managers- Standalone Mode, Spark on YARN , Spark Logs, The Spark UI- Spark UI History Server, Debugging and Spark First Aid

UNIT V: Spark-Performance Tuning, Stream Processing Fundamentals, Event-Time and State full Processing - Event Time, State full Processing, Windows on Event Time- Tumbling Windows, Handling Late Data with Watermarks, Dropping Duplicates in a Stream, Structured Streaming Basics - Core Concepts, Structured Streaming in Action, Transformations on Streams, Input and Output.

Text Books:

1. Big Data, Big Analytics: Emerging, Michael Minnelli, Michelle Chambers, and Ambiga Dhiraj
2. SPARK: The Definitive Guide, Bill Chambers & Matei Zaharia, O'Reilly, 2018 Edition
3. Business Intelligence and Analytic Trends for Today's Businesses", Wiley, 2013
4. P. J. Sadalage and M. Fowler, "NoSQL Distilled: A Brief Guide to the Emerging World Polyglot Persistence", Addison-Wesley Professional, 2012
5. Tom White, "Hadoop: The Definitive Guide", Third Edition, O'Reilly, 2012

Reference Books:

1. "Hadoop Operations", O'Reilly, Eric Sammer, 2012
2. "Programming Hive", O'Reilly, E. Capriolo, D. Wampler, and J. Rutherglen, 2012
3. "HBase: The Definitive Guide", O'Reilly, Lars George, 2011
4. "Cassandra: The Definitive Guide", O'Reilly, Eben Hewitt, 2010
5. "Programming Pig", O'Reilly, Alan Gates, 2011.

ANNEXURE-IX

MINUTES OF THE 5th BOS OF ENGLISH ON 20-09-2021.

The 5th BOS Meeting of English was held online at 11am, 20-09-2021 using the Zoom link :

https://us02web.zoom.us/j/87068834452?pwd=OHk1WHgvdU5SbTVCREdjeEdXd3lLZz09

MINUTES

- The syllabi of Professional Communication Skills-I{**V20ENT02**} Professional Communication Skills- II {**V20ENT03**}& Professional Communication Skills-III{{**V20ENT04**} for III, IV & V Semesters of B.Tech , was approved by the members of BOS of English.
- The syllabus of Constitution of India (V20ENT11) for B.Tech , was approved by the members of BOS of English.
- The syllabi of Audit Courses for M.Tech students namely, Pedagogy Studies(V21PGENT51**)**, Personality Development through Life Enlightenment Skills (V21PGENT52**)**, Stress Management by Yoga Course(V21PGENT53),English for Research Paper Writing (V21PGENT54**)**, Value Education (V21PGENT55) was approved by the BOS members.
- The members of the BOS suggested renaming the audit course " English for Research Paper Writing" as "Research Paper Writing - Conventions & Structures" if possible.

Members Present

English BOS Members

1. Chairperson of BOS

   Dr. T Sujani, Assoc. Professor of English

   Sri Vasavi Engineering College

2. Dr.D.KesavaRao (Council Nominee)

   Professor of English, NIT Warangal

3. Prof.K.Sree Ramesh (Council Nominee)

Professor of English and Principal, College of Arts and Commerce Adikavi Nannaya University

Rajamahendravarm

4. Dr.Purna Chandra Rao (University Nominee)
Assoc.Professor of English,

PVP Siddhartha Institute of Technology,Vijayawada .

Faculty Present

1. Dr.K. Venkata Rao
2. B.AnandaRao
3. K.V.Rama Rao
4. K.Radha Madhavi
5. Tanuja .Ch
6. Aparanjani.U
7. G.Srinivasa Rao
8. A.Kiranmayee
9. M.Naresh
10. M.Venkata Ramana
11. G.Ch.S.Madhusudhana Rao
12. D.Satish

Annexures of Syllabi

Syllabus for the Regulation Year 2019-2020 (Common to all Branches)

Professional Communication Skills - I

B.Tech IIISemester

S.No	Course Code	Course Name	L	T	P	C
1	V20ENT02	**Professional Communication Skills - I**		3	-	MNC

Students will be able to

CO1: Use vocabulary in regular chores of life with accuracy, make meaningful sentences, and describe people and their traits vividly. (K3)

CO2: Distinguish between places of pilgrimage and holiday spots; describe incidents, things and process; and frame questions, statements and expressions. (K4)

CO3: Demonstrate their knowledge of idioms which are similar to those of native speakers while speaking and writing and use phrases clearly and precisely to articulate their views that compare and contrast indianisms with native expressions and avoid common errors. (K3)

CO 4: Employ the vocabulary of netizens with ease and walk through the letters and emails for effective official correspondence and infer the accurate meaning of the homophones that are often confusing. (K3)

CO5: Summarize their profile; introduce themselves as well as others by incorporating their accomplishments and Sketch stories and anecdotes in an interesting and engaging manner that arouses curiosity of the audience. (K5)

Syllabus

UNIT – I

BUILDING VOCABULARY FOR DAILY ACTIVITIES

NAMES: Things- Kitchen Utensils – Occupation- tools – spices- vegetables –flowers - sciences of study – Professions.

Framing Questions – statements – expressions related to the Vocabulary taught

PEOPLE: Describing people - Physical characteristics,-Mental attributes – various professions

Framing Questions – statements – expressions related to the Vocabulary taught

ACTIVITY: Related to the topics learnt in Unit – 1

No. of hours required - 10

UNIT – II

BUILDING VOCABULARY FOR PLACES, THINGS & PROCESS

PLACES: Describing favourite place – famous place- Places of Pilgrimage

THINGS: Describing a thing- Describe an incident or an event

PROCESS: Describe a process –Recipe – experiment –Entrance test application

Framing Questions – statements – expressions related to the Vocabulary taught

ACTIVITY : Related to the topics learnt in Unit – II

No. of hours required - 10

UNIT – III

NATIVE EXPRESSIONS – Idioms and Phrases – in day to day activities for different occasions - Usage written & spoken –

PHRASES with as—as expressions – used to compare & contrast

COMMON MISTAKES- in spoken & written

INDIANISMS- Most often used expressions – accepted in India – found place in Dictionary

ACTIVITY : Related to the topics learnt in Unit – III

No. of hours required - 10

UNIT -IV

NET VOCABULARY: Acronyms and abbreviations that are most often used

HOMOPHONES : Words often confused – Spelling & Pronunciation

Letter Writing : Formal & Informal- Letters for all occasions

Email Writing : Business mails – project status mails – informative mails

ACTIVITY : Related to the topics learnt in Unit – IV

No. of hours required - 10

UNIT -V

SELF-INTRODUCTION: Basic information - Academic and personal - interests– strengths and weaknesses – goal.

PROFILE BUILDING: Resume writing – CV Building – Types

STORYTELLING WITH CREATIVITY: Reading and Narrating a story – narrating anecdotes

ACTIVITY : Related to the topics learnt in Unit – V

No. of hours required - 10

REFERENCES:

- Lewis Norman, Word Power Made Easy (2008). Goyal Publishers & Distributors Pvt. Ltd.
- Sunita Mishra & C.Muralikrishna, Communication Skills for Engineers (2006). Dorling Kindersley (India) Pvt. Ltd., licensees of Pearson Education in South Asia.
- Chaturvedi PD & Chaturvedi Mukesh, Business Communication (2006). Dorling Kindersley (India) Pvt. Ltd., licensees of Pearson Education in South Asia.
- Joshi Manik, Popular English Idioms and Phrases: English Idiomatic Expressions (2013).
- Joshi Manik, Homonyms, Homophones and Homographs: Vocabulary Building (2014).
- Gupta S.C. A Handbook for Letter Writing (2018).Arihant Publishers
- Lisa McGrimmon, The Resume Writing Guide: A Step-by-Step Workbook for Creating a Winning Resume (2013). CareerChoiceGuide; 2nd edition.
- Sawhney, Clifford. Improve your Word Power (2013). V&S Publishers

Web References: (NET Vocabulary)

- https://www.grammarly.com/blog/texting-abbreviations/
- https://www.slicktext.com/blog/2019/02/text-abbreviations-guide/
- https://www.webopedia.com/reference/text-abbreviations/

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(Accredited by NAAC with 'A' Grade ,Recognized by UGC under section 2(f) & 12(B))

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Syllabus for the Regulation Year 2021-22 (Common to all Branches)

Professional Communication Skills – II

B.Tech IV Semester

S.No	Course Code	Course Name	L	T	P	C
1	V20ENT03	**Professional Communication Skills - II**		2 +2	-	MNC

	After successful completion of the course, students will be able to	Knowledge Level
CO1	Demonstrate grammatical competence, analyze noun and pronoun dispositions, classify various kinds of verbs, adjectives and adverbs and identify errors in sentences; distinguish the subtle meanings of various words in different contexts, recognize similar words as well as words with contrast meanings and use them appropriately. (K3)	K2
CO2	Organize individual words into one whole sentence using new vocabulary and focus on the error analysis of prepositions and conjunctions, build conversations which befit the situations and develop pre-reading strategies to improve comprehension skills. Distinguish and acquire knowledge of using words of the same category in a sentence and learn new words that promote communicative finesse. Find errors in sentences where the modifiers are	K3

	misplaced and put them at the appropriate place, use hit pair words and send an email that is concise and lucid.	
CO3	Recognize the easiest and best possible way of solving problems in the area of Number and Letter Series, Analogy, Classification, Coding & Decoding Symbols, Ranking and Analytical Reasoning.	K4
CO4	Investigate the different types of logics involved in Mirror and Water Images, Logical Reasoning & Arithmetic Reasoning.	K4
CO5	Find the common traps in the questions and errors likely to be made from the concepts of Blood Relations, Directions, Average, Clock and Calendar, Data Sufficiency, Permutations-Combinations and Probability.	K3

UNIT – I

ERROR ANALYSIS: Nouns & Pronouns – Singular & Plural – Kinds of Nouns & Pronouns- Collective Nouns - Personal and Reflexive Pronouns. Subject – Verb agreement. Adjectives – Adverbs – role of modifiers – place of Adjectives– Adverbs of frequency.

VOCABULARY : Word Power Made Easy Sessions 15- 30, Antonyms and Synonyms and One word substitutes

EXPANSION OF PROVERBS: Meaning – interpretation – explanation**.**

UNIT – II

ERROR ANALYSIS: Prepositions - kinds of prepositions –appropriate use - conjunctions –sub- ordinating– coordinating.

ROLE PLAY: Day to day situations - practical approach – real life experiences.

READING COMPREHENSION: Reading as a skill – quick reading - analyzing – answering **-**

Skimming – scanning - summarizing – problem solving.

ERROR ANALYSIS: Parallel grammatical forms – same grammatical structures. Dangling modifiers – misplacement of modifiers – arrangement.

SENTENCE IMPROVEMENT: Better choice – error-free sentences – effective – syntax**.**

EMAIL WRITING: Format – method of exchanging – technicalities.

UNIT – III

Number And Letter Series, Coding & Decoding, Analogy,Classification Ranking. (K1)

Problems of how to find the next number in the series, Finding the missing number and related sums, Sums related to Classification, Sums related to letter series, Relation between number series and letter series, Finding odd one out from groups, Identify the rank in different places.

UNIT-IV

Problems On Ages& Numbers, Mirror And Water Images, Logical Reasoning & Arithmetic Reasoning.(K4)

Definition and concept of Venn Diagram – its applications. statements – Affirmations, Denials and Contradictions. Sums related to Ages & numbers. Problems on ages with different logics. Identifying the images of water and Mirror.

UNIT-V

Blood Relations, Directions, Average, Clock And Calendar, Data Sufficiency, Permutations- Combinations And Probability.(K3)

Deriving the formula to find the angle between hands for the given time, History of calendar-, Finding the day for the given date, Problems related to directions. Difference between words Permutation and Combinations – Various cases - Real Time Scenarios. Concept of Probability – - Conjunctions – Rules & Cases of Probability.

References

1. Verma Shalini. Common Errors In English (2016).S Chand & Company
2. Sharon Weiner Green M.A&Ira K. Wolf Ph.D.Barron's GRE (2015). Barrons Educational Series
3. Paul D.S. Advanced English Grammar with Answers (2007) Published by Cambridge University Press.
4. Work book -1 on Aptitude Prepared by T & P cell, Sri Vasavi Engineering College.
5. Kundan & Tyra. Magical Book on Quicker Maths(2013). Published by Tyra & Kundan
6. Kundan & Tyra.Practice Book on Quicker Maths (2009). Published by Tyra & Kundan
7. R.S. Agarwal.Non Verbal Reasoning.Sultan Chand Publications

Web References

https://www.indiabix.com/

https://www.campusgate.co.in/

https://www.questionpaper.org/

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(Accredited by NAAC with 'A' Grade ,Recognized by UGC under section 2(f) & 12(B))

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Syllabus for the Regulation Year 2021-22 (Common to all Branches)

Professional Communication Skills – III

B.Tech V Semester

S.No	Course Code	Course Name	L	T	P	C
1	V20ENT04	**Professional Communication Skills - III**		2+2	-	MNC

	After successful completion of the course, the students will be able to	Knowledge Level
CO1	Distinguish the subtle meanings of various words in different contexts, recognize similar words as well as words with contrast meanings and use them appropriately. Express writer's tone and relevant ideas using different types of writing skills and prepare resume to showcase skills and accomplishments.Organize thoughts in the discussions and express views without reticence.Develop the ability to write different types of essays in a structured way, maintaining cohesion and logic	**K4**
CO2	Identify the central theme and arrange the scrambled sentences into a meaningful passage.Draft emails with appropriate subject-lines and relevant content.Compare different pairs of words, recognize the relationship between the head words and the options to siphon correct analogy Choose an appropriate word to make a sentence	**K2**

	meaningful.Infer the meaning of the picture by thinking out of the box and speak without inhibitions and face interviews with aplomb.	
CO3	Analyze appropriate methods of logical thinking on Ratio and Proportion, Partnership, LCM and HCF, Number System, Areas & Volumes.	**K4**
CO4	Demonstrate problem solving skills through the concepts of Percentages, Profit and loss, Simple Interest & Compound Interest and Allegation.	**K3**
CO5	Calculate the end results of Cubes, Dice and Data Analysis, Time & Work, Time & Distance, Race & Games.	**K4**

SYLLABUS

UNIT – I

VOCABULARY – MODEL RESUMES &SPEAKING

500 words (PIC-VOC) -Meaning – contextual Usage - Prefix – Suffix – Root words.Resume writing-Model Resume-Introducing different formats-Tailoring resume as per job description. Paragraph writing- Essay writing- Types of Essays- Strategies – Cause and effect signals – support signals – contrast signals. Watch a video and respond

Group Discussion – Types of GD – Dos & Don'ts , JAM , Presentation Skills, Designing Advertisements

UNIT – II

GRAMMAR, WRITING & SPEAKING SKILLS

Tenses – Simple – Continuous – perfect – perfect continuous - voice – Active & Passive -Para jumbles – Strategies – Directional words – central theme-Email writing– Types -- Dos and Don'ts- **VERBAL ABILITY- ANALOGIES- INTERVIEW SKILLS- CREATIVE THINKING**

ANALOGIES: Strategies - Recognize common relationship types. Synonyms – Antonyms - Create a general sentence - Use the correct part of speech - Beware of homonyms.Equalizing the sentences- scrambled sentences. Interview Skills – Personal Interview – Skype Interview – Telephone Interview – Mock Interviews. Creative thinking – Picture Interpretation -Creative writing

UNIT – III

Ratio & Proportion, Partnership, LCM & HCF and Areas & Volumes

Introducing the concept of ratio in three different methods, a method to compute and compare two ratios – The effect of increase or decrease of a quantity on the ratio – The meaning of proportion and Problems related to Ratio and Proportion. Improve problem solving skills through Lcm & Hcf.

UNIT - IV

Percentages, Profit and Loss, Simple and Compound Interest, Allegation & Mixtures

Definition of Simple and Compound Interest. Formulas of Applications – Difference between Simple and Compound interest – Rate of Increase or Decrease Population – Expected values of Maturity. Calculate percentages on different situations, using in profit and loss. Identifying difference between Cost price, Selling Price and Marked Price, Finding Discounts, using the method of allegation.

UNIT – V

Time, Work and Distance, Cubes, Dice and Data Analysis

Men- Days -work –completion- Capability Ratio among Men, Women and Children – Application of time in Pipes and Cistern. Work Progress in positive and negative effects. Relation among Time, Speed and Distance – Concepts of Relative speed and Average Speed – Ideas about Boats and Streams and Races of Games. Calculate the end results of Cubes and Dice.

References

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- ❖ Dr. RS. Agarwal, 2017, A modern approach to verbal & on verbal reasoning, Sultan Chand Publications.

Web References:

- ❖ https://www.indiabix.com/
- ❖ https://www.campusgate.co.in/
- ❖ https://www.questionpaper.org/

SRI VASAVI ENGINEERING COLLEGE (AUTONOMOUS)

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(Approved by AICTE, New Delhi & Permanently affiliated to JNTUK, Kakinada)

(Accredited by NAAC with 'A' Grade ,Recognized by UGC under section 2(f) & 12(B))

Pedatadepalli, TADEPALLIGUDEM – 534 101. W.G.Dist. (A.P)

Syllabus for the Regulation Year 2021-22 (Common to all Branches)

B.Tech ECE,& ECT (III Sem), CSE, CST, & ME (IV Sem), Civil (V Sem)

S.No	Course Code	Course Name	L	T	P	C
1	V20ENT11	**CONSTITUTION OF INDIA**	-	2	-	MNC

COURSE OUTCOMES

	After successful completion of the course, students will be able to	Knowledge Level
CO1	Describe various stages in the composition of the Indian Constitution	K2
CO2	Develop awareness about citizenship- Fundamental rights	K3
CO3	Explain the fundamental duties and build up their civic sense	K2
CO4	Sketch the specific roles of heads of Nation and the functioning of legislative bodies.	K3
CO5	Assess the role of local self-government in strengthening democracy	K3

Syllabus

Unit-I

Constitution of India

a) Preparation of Indian constitution by Constituent Assembly of India.
b) Preamble or Philosophy of the Indian Constitution.
c) Salient features of the Indian constitution.

Unit–II

a) Citizenship in India.
b) Fundamental Rights - their importance & Limitations.

Unit-III

a) Fundamental Duties and their importance.
b) Directive principles of the state policy and their implementation.

Unit-IV

Parliamentary form of Government in India.

1. Union Executive

a) President of India- Powers and functions.
b) Vice-President - Powers and functions.
c) Prime Minister and Council of Minister - Powers and functions.

2. Union Legislature

a) Rajya Sabha – Powers and Functions.
b) Lok Sabha- Powers and Functions.

3. Judiciary – Supreme Court of India - Powers and Functions.

Unit-V

a) Amending Procedure- Important Constitutional Amendments – 42nd, 44 Constitutional Amendment Acts.
b) Local Self–government in India 73rd & 74th Constitutional Amendment Acts.

Reference Books:

1. D D Basu-Introduction to the Constitution of India – 18th Edition. Prentice – Hall of India Private Ltd-New Delhi-1998
2. Granville Austin (1972) the Indian Constitution, Cornerstone of a Nation, Oxford university Press, New Delhi
3. Madhavkhosla (2012) the Indian Constitution, Oxford University Press, New Delhi
4. Granville Austin (1999) Working a Democratic Constitution; A History of the Indian Experience, Oxford University Press, New Delhi
5. Zoya Hasan, Sridharan E and Sudharshan R (Eds) 2002 India's living Constitution, Permanent black, New Delhi
6. Baxi Upendra (1980) the Indian Supreme Court and Politics, Eastern Book Co, Lucknow.

V21PGENT51	PEDAGOGY STUDIES	L	T	P	C
		0	2	0	

COURSE OUTCOMES

	After successful completion of the course, the students will be able to	Knowledge Level
CO1	Identify various theories of learning and recognize Research questions with an overview of methodology and searching.	**K2**
CO2	Review Pedagogical practices used by teacher in both formal and informal classroom and design curriculum	**K2**
CO3	Examine how teacher education and the school curriculum support effective pedagogy along with various pedagogical approaches and theories.	**K3**
CO4	Show peer support for professional development and support from head teacher to develop curriculum and assessment. Find out the barriers involved in learning	**K3**
CO5	Find out the gaps and give directions for research design as per context.	**K3**

AUDIT 1 and 2: PEDAGOGY STUDIES

Units	Content	Hours
1	**Introduction and Methodology:** ● Aims and rationale, Policy background, Conceptual framework and terminology ● Theories of learning, Curriculum, Teacher education. ● Conceptual framework, Research questions. ● Overview of methodology and Searching.	4
2	● Thematic overview: Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries. ● Curriculum, Teacher education.	2
3	● Evidence on the effectiveness of pedagogical practices ● Methodology for the in depth stage: quality assessment of included studies ● How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy? ● Theory of change. ● Strength and nature of the body of evidence for effective pedagogical practices. ● Pedagogic theory and pedagogical approaches. ● Teachers' attitudes and beliefs and Pedagogic strategies.	4
4	● Professional development: alignment with classroom practices and follow-up support ● Peer support	4

	● Support from the head teacher and the community. ● Curriculum and assessment ● Barriers to learning: limited resources and large class sizes	
5	**Research gaps and future directions** ● Research design ● Contexts ● Pedagogy ● Teacher education ● Curriculum and assessment ● Dissemination and research impact	2

Suggested reading

1. Ackers J, Hardman F (2001) Classroom interaction in Kenyan primary schools, Compare, 31 (2): 245-261.
2. Agrawal M (2004) Curricular reform in schools: The importance of evaluation, Journal ofCurriculum Studies, 36 (3): 361-379.
3. Akyeampong K (2003) Teacher training in Ghana - does it count? Multi-site teacher education research project (MUSTER) country report 1. London: DFID.
4. Akyeampong K, Lussier K, Pryor J, Westbrook J (2013) Improving teaching and learning of basic maths and reading in Africa: Does teacher preparation count? International Journal Educational Development, 33 (3): 272–282.
5. Alexander RJ (2001) Culture and pedagogy: International comparisons in primaryeducation. Oxford and Boston: Blackwell.
6. ChavanM(2003)ReadIndia:Amassscale,rapid,„learningtoread‟campaign.
7. www.pratham.org/images/resource%20working%20paper%202.pdf.

1. What pedagogical practices are being used by teachers in formal and informal classrooms in developing countries?
2. What is the evidence on the effectiveness of these pedagogical practices, in what conditions, and with what population of learners?
3. How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy?

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Pedatadepalli, **TADEPALLIGUDEM–534 101.** W.G.Dist**. (A.P)**

Department of Basic Sciences & Humanities

V21PGENT52	PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS	L	T	P	C
		0	2	0	

COURSE OUTCOMES

	After successful completion of the course, the students will be able to	Knowledge Level
CO1	Relate Neetishatakam in developing versatile personality of students.	**K1**
CO2	Employ Bhagavad Gita to lead the nation and mankind to peace and prosperity.	**K3**
CO3	Connect students to Bhagavad Gita in order to develop personality and achieve highest goals in life.	**K4**

Syllabus

Unit	Content		Hours	
1	Neetisatakam-Holistic development of personality		8	
	·	Verses- 19,20,21,22 (wisdom)		
	·	Verses- 29,31,32 (pride & heroism)		

	·	Verses- 26,28,63,65 (virtue)		
	·	Verses- 52,53,59(dont‟s)		
	·	Verses- 71,73,75,78(do‟s)		
2	·	Approach to day to day work and duties.	8	
	·	Shrimad Bhagavad Gita: Chapter 2-Verses 41, 47,48,		
	·	Chapter 3-Verses 13, 21, 27, 35, Chapter 6-Verses 5,13,17, 23, 35,		
	·	Chapter 18-Verses 45, 46, 48.		
3	·	Statements of basic knowledge.	8	
	·	Shrimad Bhagwad Geeta: Chapter2-Verses 56, 62, 68		
	·	Chapter 12 -Verses 13, 14, 15, 16,17, 18		
	·	Personality of Role model. Shrimad Bhagwad Geeta: Chapter2-		
		Verses 17, Chapter 3-Verses 36,37,42,		
	·	Chapter 4-Verses 18, 38,39		
	·	Chapter18 – Verses 37,38,63		

Suggested reading

1. "SrimadBhagavadGita"bySwamiSwarupananda Advaita Ashram (Publication Department), Kolkata

2. Bhartrihari‟s Three Satakam (Niti-sringar-vairagya) by P.Gopinath, Rashtriya Sanskrit Sansthanam, New Delhi.

Course Outcomes

Students will be able to

1. Study of Shrimad-Bhagwad-Geeta will help the student in developing his personality and achieve the highest goal in life

2. The person who has studied Geeta will lead the nation and mankind to peace and prosperityStudy of Neetishatakam will help in developing versatile personality of students

		L	T	P	C
V21PGENT53	**STRESS MANAGEMENT BY YOGA COURSE**	**0**	**2**	**0**	

COURSE OUTCOMES

	After successful completion of the course, the students will be able to	Knowledge Level
CO1	Define 8 parts of Yoga (Ashtanga)	**K1**
CO2	Discuss Yam and Niyam along with Dos and Don'ts in life. Interpret Ahimsa, satya, astheya, brahmacharya and aparigraha along with other concepts.	**K2**
CO3	Practice Asan and Pranayam. Examine various yoga poses and their benefits for mind and body.	**K3**

Syllabus

Unit	**Content**	**Hours**
1	Definitions of Eight parts of yoga. (Ashtanga)	8
2	YamandNiyam.Do`sandDon‟t‟sinlife. i) Ahinsa, satya, astheya, bramhacharya and aparigraha ii) Shaucha, santosh, tapa, swadhyay, ishwarpranidhan	8

3	• Asan and Pranayam 1.Various yog poses and their benefits for mind & body 2.Regularization of breathing techniques and its effects-Types of pranayam	8

Suggested reading			

1. “YogicAsanas for Group Tarining-Part-I”:JanardanSwamiYogabhyasiMandal,Nagpur
2. “Rajayoga or conquering the Internal Nature” by Swami Vivekananda, AdvaitaAshrama (Publication Department), Kolkata

V21PGENT54	ENGLISH FOR RESEARCH PAPER WRITING	L	T	P	C
		0	2	0	

		Knowledge Level
CO1	Present planning and preparation for breaking up long sentences by following word order and structuring paragraphs and sentences to avoid ambiguity and vagueness.	**K1**
CO2	Clarify his/her findings by criticizing, hedging and paraphrasing to avoid plagiarism in writing the sections of the paper.	**K2**
CO3	Construct the ability to review literature, methods, results, discussions and the final check.	**K3**
CO4	Develop the key skills needed to write Title, Abstract, Introduction and Review of literature for a research paper.	**K3**
CO5	Demonstrate the skills needed to write methods, results, the discussion and conclusions for Research Write-ups.	**K3**
CO6	Employ useful phrases that ensure a paper for the first-time publication.	**K3**

<u>COURSE OUTCOMES</u>

Syllabus

Units	Contents	Hours
1	Planning and Preparation, Word Order, Breaking up Long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness.	4
2	Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticising, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts. Introduction	4
3	Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check	4
4	Key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature.	4
5	Skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions.	4
6	Useful phrases, how to ensure paper is as good as it could possibly be the first- time submission.	4

Suggested Studies:

1. Goldbort R (2006) Writing for Science, Yale University Press (available on Google Books)
2. Day R (2006) How to Write and Publish a Scientific Paper, Cambridge University Press
3. Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM. Highman‟sbook.
4. Adrian Wallwork , English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011

V21PGENT55	VALUE EDUCATION	L	T	P	C
		0	2	0	

		Knowledge Level
CO1	Enumerate the societal values and Individual attitudes that lead to value based judgments	**K1**
CO2	Explain the need for value education that incorporates self-discipline, confidence, honesty and patriotism	**K2**
CO3	Develop the inner and external personality that transforms individual into a man of character	**K3**
CO4	Distinguish between character and competence, self-management and good health, mind your mind and self-control	**K4**

Syllabus

Unit		Content	Hours	
1	·	Values and self-development –Social values and individual attitudes.	4	
		Work ethics, Indian vision of humanism.		
	·	Moral and non- moral valuation. Standards and principles.		

	·	Value judgements		
2	·	Importance of cultivation of values.	6	
	·	Sense of duty. Devotion, Self-reliance. Confidence, Concentration.		
		Truthfulness, Cleanliness.		
	·	Honesty, Humanity. Power of faith, National Unity.		
	·	Patriotism.Love for nature ,Discipline		
3	·	Personality and Behavior Development - Soul and Scientific attitude.	6	
		Positive Thinking. Integrity and discipline.		
	·	Punctuality, Love and Kindness.		
	·	Avoid fault Thinking.		
	·	Free from anger, Dignity of labour.		
	·	Universal brotherhood and religious tolerance.		
	·	True friendship.		
	·	Happiness Vs suffering, love for truth.		
	·	Aware of self-destructive habits.		
	·	Association and Cooperation.		
	·	Doing best for saving nature		
4	·	Character and Competence –Holy books vs Blind faith.	6	
	·	Self-management and Good health.		
	·	Science of reincarnation.		
	·	Equality, Nonviolence ,Humility, Role of Women.		
	·	All religions and same message.		
	·	Mind your Mind, Self-control.		
	·	Honesty, Studying effectively		

Suggested reading

1 Chakroborty, S.K. “Values and Ethics for organizations Theory and practice”, Oxford University Press, New Delhi

V21PGENT51	PEDAGOGY STUDIES	L	T	P	C
		0	2	0	

COURSE OUTCOMES

	After successful completion of the course, the students will be able to	Knowledge Level
CO1	Identify various theories of learning and recognize Research questions with an overview of methodology and searching.	**K2**
CO2	Review Pedagogical practices used by teacher in both formal and informal classroom and design curriculum	**K2**
CO3	Examine how teacher education and the school curriculum support effective pedagogy along with various pedagogical approaches and theories.	**K3**
CO4	Show peer support for professional development and support from head teacher to develop curriculum and assessment. Find out the barriers involved in learning	**K3**
CO5	Find out the gaps and give directions for research design as per context.	**K3**

AUDIT 1 and 2: PEDAGOGY STUDIES

Units	Content	Hours
1	**Introduction and Methodology:** ● Aims and rationale, Policy background, Conceptual framework and terminology ● Theories of learning, Curriculum, Teacher education. ● Conceptual framework, Research questions. ● Overview of methodology and Searching.	4
2	● Thematic overview: Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries. ● Curriculum, Teacher education.	2
3	● Evidence on the effectiveness of pedagogical practices ● Methodology for the in depth stage: quality assessment of included studies ● How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy? ● Theory of change. ● Strength and nature of the body of evidence for effective pedagogical practices. ● Pedagogic theory and pedagogical approaches. ● Teachers' attitudes and beliefs and Pedagogic strategies.	4
4	● Professional development: alignment with classroom practices and follow-up support ● Peer support ● Support from the head teacher and the community. ● Curriculum and assessment ● Barriers to learning: limited resources and large class sizes	4
5	**Research gaps and future directions**	2

	• Research design • Contexts • Pedagogy • Teacher education • Curriculum and assessment • Dissemination and research impact	

Suggested reading

1. Ackers J, Hardman F (2001) Classroom interaction in Kenyan primary schools, Compare, 31 (2): 245-261.

2. Agrawal M (2004) Curricular reform in schools: The importance of evaluation, Journal of Curriculum Studies, 36 (3): 361-379.

3. Akyeampong K (2003) Teacher training in Ghana - does it count? Multi-site teacher education research project (MUSTER) country report 1. London: DFID.

4. Akyeampong K, Lussier K, Pryor J, Westbrook J (2013) Improving teaching and learning of basic maths and reading in Africa: Does teacher preparation count? International Journal Educational Development, 33 (3): 272–282.

5. Alexander RJ (2001) Culture and pedagogy: International comparisons in primary education. Oxford and Boston: Blackwell.

6. ChavanM(2003)ReadIndia:Amassscale,rapid,„learningtoread‟campaign.
7. www.pratham.org/images/resource%20working%20paper%202.pdf.

1. What pedagogical practices are being used by teachers in formal and informal classrooms in developing countries?

2. What is the evidence on the effectiveness of these pedagogical practices, in what conditions, and with what population of learners?

3. How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy?

V21PGENT52	**PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS**	**L**	**T**	**P**	**C**
		0	**2**	**0**	

COURSE OUTCOMES

	After successful completion of the course, the students will be able to	Knowledge Level
CO1	Relate Neetishatakam in developing versatile personality of students.	**K1**
CO2	Employ Bhagavad Gita to lead the nation and mankind to peace and prosperity.	**K3**
CO3	Connect students to Bhagavad Gita in order to develop personality and achieve highest goals in life.	**K4**

Syllabus

Unit	Content		Hours
1	Neetisatakam-Holistic development of personality		8
	·	Verses- 19,20,21,22 (wisdom)	
	·	Verses- 29,31,32 (pride & heroism)	
	·	Verses- 26,28,63,65 (virtue)	
	·	Verses- 52,53,59(dont"s)	
		Verses- 71,73,75,78(do"s)	

	·			
2	·	Approach to day to day work and duties.	8	
	·	Shrimad Bhagavad Gita: Chapter 2-Verses 41, 47,48,		
	·	Chapter 3-Verses 13, 21, 27, 35, Chapter 6-Verses 5,13,17, 23, 35,		
	·	Chapter 18-Verses 45, 46, 48.		
3	·	Statements of basic knowledge.	8	
	·	Shrimad Bhagwad Geeta: Chapter2-Verses 56, 62, 68		
	·	Chapter 12 -Verses 13, 14, 15, 16,17, 18		
	·	Personality of Role model. Shrimad Bhagwad Geeta: Chapter2-		
		Verses 17, Chapter 3-Verses 36,37,42,		
	·	Chapter 4-Verses 18, 38,39		
	·	Chapter18 – Verses 37,38,63		

Suggested reading

1. "SrimadBhagavadGita"bySwamiSwarupananda Advaita Ashram (Publication Department), Kolkata

2. Bhartrihari‟s Three Satakam (Niti-sringar-vairagya) by P.Gopinath, Rashtriya Sanskrit Sansthanam, New Delhi.

Course Outcomes

Students will be able to

1. Study of Shrimad-Bhagwad-Geeta will help the student in developing his personality and achieve the highest goal in life
2. The person who has studied Geeta will lead the nation and mankind to peace and prosperityStudy of Neetishatakam will help in developing versatile personality of students

		L	T	P	C
V21PGENT53	**STRESS MANAGEMENT BY YOGA COURSE**	**0**	**2**	**0**	

COURSE OUTCOMES

	After successful completion of the course, the students will be able to	Knowledge Level
CO1	Define 8 parts of Yoga (Ashtanga)	**K1**
CO2	Discuss Yam and Niyam along with Dos and Don'ts in life. Interpret Ahimsa, satya, astheya, brahmacharya and aparigraha along with other concepts.	**K2**
CO3	Practice Asan and Pranayam. Examine various yoga poses and their benefits for mind and body.	**K3**

Syllabus

Unit	Content	Hours
1	· Definitions of Eight parts of yoga. (Ashtanga)	8
2	YamandNiyam.Do`sandDon‟t‟sinlife. i) Ahinsa, satya, astheya, bramhacharya and aparigraha ii) Shaucha, santosh, tapa, swadhyay, ishwarpranidhan	8
3	• Asan and Pranayam	8

	1.Various yog poses and their benefits for mind & body 2.Regularization of breathing techniques and its effects-Types of pranayam	

Suggested reading			

1. "YogicAsanas for Group Tarining-Part-I":JanardanSwamiYogabhyasiMandal,Nagpur
2. "Rajayoga or conquering the Internal Nature" by Swami Vivekananda, AdvaitaAshrama (Publication Department), Kolkata

V21PGENT54	ENGLISH FOR RESEARCH PAPER WRITING	L	T	P	C
		0	2	0	

		Knowledge Level
CO1	Present planning and preparation for breaking up long sentences by following word order and structuring paragraphs and sentences to avoid ambiguity and vagueness.	**K1**
CO2	Clarify his/her findings by criticizing, hedging and paraphrasing to avoid plagiarism in writing the sections of the paper.	**K2**
CO3	Construct the ability to review literature, methods, results, discussions and the final check.	**K3**
CO4	Develop the key skills needed to write Title, Abstract, Introduction and Review of literature for a research paper.	**K3**
CO5	Demonstrate the skills needed to write methods, results, the discussion and conclusions for Research Write-ups.	**K3**
CO6	Employ useful phrases that ensure a paper for the first-time publication.	**K3**

COURSE OUTCOMES

Syllabus

Units	Contents	Hours
1	Planning and Preparation, Word Order, Breaking up Long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness.	4
2	Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticising, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts. Introduction	4
3	Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check	4
4	Key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature.	4
5	Skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions.	4
6	Useful phrases, how to ensure paper is as good as it could possibly be the first- time submission.	4

Suggested Studies:

1. Goldbort R (2006) Writing for Science, Yale University Press (available on Google Books)
2. Day R (2006) How to Write and Publish a Scientific Paper, Cambridge University Press
3. Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM. Highman‟sbook.
4. Adrian Wallwork , English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011

V21PGENT55	VALUE EDUCATION	L	T	P	C
		0	2	0	

		Knowledge Level
CO1	Enumerate the societal values and Individual attitudes that lead to value based judgments	**K1**
CO2	Explain the need for value education that incorporates self-discipline, confidence, honesty and patriotism	**K2**
CO3	Develop the inner and external personality that transforms individual into a man of character	**K3**
CO4	Distinguish between character and competence, self-management and good health, mind your mind and self-control	**K4**

Syllabus

Unit		Content	Hours
1	·	Values and self-development –Social values and individual attitudes.	4
		Work ethics, Indian vision of humanism.	
	·	Moral and non- moral valuation. Standards and principles.	
	·	Value judgements	

2	·	Importance of cultivation of values.	6	
	·	Sense of duty. Devotion, Self-reliance. Confidence, Concentration.		
	·	Truthfulness, Cleanliness.		
		Honesty, Humanity. Power of faith, National Unity.		
	·	Patriotism.Love for nature ,Discipline		
3	·	Personality and Behavior Development - Soul and Scientific attitude.	6	
	·	Positive Thinking. Integrity and discipline.		
		Punctuality, Love and Kindness.		
	·	Avoid fault Thinking.		
	·	Free from anger, Dignity of labour.		
	·	Universal brotherhood and religious tolerance.		
	·	True friendship.		
	·	Happiness Vs suffering, love for truth.		
	·	Aware of self-destructive habits.		
	·	Association and Cooperation.		
	·	Doing best for saving nature		
4	·	Character and Competence –Holy books vs Blind faith.	6	
	·	Self-management and Good health.		
	·	Science of reincarnation.		
	·	Equality, Nonviolence ,Humility, Role of Women.		
	·	All religions and same message.		
	·	Mind your Mind, Self-control.		
	·	Honesty, Studying effectively		

Suggested reading

1 Chakroborty, S.K. “Values and Ethics for organizations Theory and practice”, OxfordUniversity Press, New Delhi

Annexure-X

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Department of Management Studies (MBA)

Minutes of the 4th Board of Studies meeting of Management Studies held on 01-09-2021

The following are the members who attended for the meeting.

S.No	Name of the member	Designation	
1	Dr.G.V.Subba Raju	Professor Sri Vasavi Engg.College	Chairman BOS
2	Prof. B. Amarnath	Former Professor, Department of Management Studies Sri Venkateswara University. Tirupathi.	Council Nominee
3	Dr.J.N.V.Raghu Ram	Associate Professor, Department of Technology &Management, VIT, Vellore	Council Nominee
4	Sri. P.S.Varma	Former D G M, Coromandel International Limited, Kakinada	Industry expert
5	Sri Satyanarayana Ruttala	Senior Manager, Ericsson India Global Services Pvt., Ltd., Bangalore	Alumni
Department of Management Studies, Sri Vasavi Engineering College members			
6	D. Naveen Kumar	Asst. Professor& HOD	Member
7	Dr. S. Krishna Murthy Naidu	Associate Professor	Member
8	D.Satyanarayana	Sr. Asst.Professor	Member
9	Dr.K.Rambabu	Asst. Professor	Member
10	K.Vinay Kumar	Asst. Professor	Member
11	T.Dileep	Asst. Professor	Member
12	K.Pavan Kumar	Asst. Professor	Member
13	K.Suji	Asst. Professor	Member
14	B.Aruna	Asst. Professor	Member
15	P.Bharath Kumar	Asst. Professor	Member
16	K.Murali Krishna	Asst. Professor	Member

17	P.Devi	Asst. Professor	Member
18	Dr.K.Pulla Rao	Asst. Professor	Member
19	K.Lalitha Bhavani	Asst. Professor	Member

The Chairman of the BOS Extended a formal welcome to the members and handed over the proceedings to the Head of the Department.

Minutes of the 4th BOS Meeting

Item No.1:

- **Reviewed and approved the MBA Course Structure under V21 Regulations.**

  The Chairman of BOS proposed the New course structure under V21 Regulations for the Academic year 2021-22. After considering the suggestions made by all BOS members the course structure was modified accordingly and was approved by BOS. The approved course structure was enclosed under Annexure-1

Item No.2:

- **Reviewed and approved the syllabi for the Courses offered in 1st and 2nd Semesters under V21 Regulations.**

  The Chairman of BOS proposed the New Syllabi under V21 Regulations for the Academic year 2021-22. After considering the suggestions made by all BOS members the Syllabi was modified accordingly and was approved by BOS. The approved Syllabi was enclosed under Annexure-2

Item No.3:

- **To design and approve the Syllabus for Managerial Economics and Financial Analysis for Engineering Branches under V20 Regulations.**

  The Syllabi of Managerial Economics and Financial Analysisunder V20 Regulations has been approved by BOS. The approved Syllabi was enclosed under Annexure-3

Item No.4:

- **To design and approve the syllabus for Cost Management of Engineering Projects and Research Methodology and IPR for M.Tech Courses under V21 Regulations.**
  The Syllabi of Cost Management of Engineering Projects and Research Methodology and IPR under V21 Regulations has been approved by BOS. The approved Syllabi was enclosed under Annexure-4

Item No.5:

- **Review of MBA Results**
  The semester wise result of MBA 2018 admitted batch (All semesters) and the results of MBA 2019 admitted batch (1,2 & 3 Semesters) were presented before the BOS and they expressed their satisfaction towards the progress report. The details are attached under Annexure-5.

SRI VASAVI ENGINEERING COLLEGE (Autonomous)

(Sponsored by Sri Vasavi Educational Society; Regd. No: 898/2000)
(Approved by AICTE, New Delhi & Permanently affiliated to JNTUK,Kakinada)
(Accredited by NAAC with 'A' Grade, Recognized by UGC under section 2(f) & 12(B))
Pedatadepalli, TADEPALLIGUDEM – 534 101, W.G. Dist, (A.P.)

Department of Management Studies (MBA)

Course Structure MBA (Regular) – V21 Regulations

(Effective for the students admitted into first year from the Academic Year 2021-2022)

Semester-I

SNo	Course Code	Course	L	P	C	I	E	TM
1	V21MBT01	Management Theory & Organizational Behaviour	4	--	4	30	70	100
2	V21MBT02	Managerial Economics	4	--	4	30	70	100
3	V21MBT03	Accounting for Managers	4	--	4	30	70	100
4	V21MBT04	Legal & Business Environment	4	--	4	30	70	100
5	V21MBT05	Business Communication	4	--	4	30	70	100
6	V21MBT06	Quantitative Analysis for Business Decisions	4	--	4	30	70	100
7	V21MBL01	Business Communication & Soft Skills Lab	---	4	2	20	30	50
		TOTAL	24	4	26	200	450	650

Semester-II

SNo	Course Code	Course	L	P	C	I	E	TM
1	V21MBT07	Financial Management	4	--	4	30	70	100
2	V21MBT08	Human Resource Management	4	--	4	30	70	100
3	V21MBT09	Marketing Management	4	--	4	30	70	100
4	V21MBT10	Production and Operations Management	4	--	4	30	70	100
5	V21MBT11	Business Research & Statistical Analysis	4	--	4	30	70	100
6	V21MBT12	Business Ethics & Corporate Governance	4	--	4	30	70	100
7	V21MBT13	Entrepreneurship Development	4	--	4	30	70	100
8	V21MBL02	IT Lab		4	2	20	30	50
		TOTAL	28	4	30	230	520	750

Semester-III

SNo	Course Code	Course	L	P	C	I	E	TM
1	V21MBT14	Business Policy & Corporate Strategy	4	--	4	30	70	100
I		**Marketing Specialization-1**						
1		Elective-1	4	--	3	30	70	100
2		Elective-2	4	--	3	30	70	100
3		Elective-3	4	--	3	30	70	100
II		**Finance Specialization-2**						
1		Elective-1	4	--	3	30	70	100
2		Elective-2	4	--	3	30	70	100
3		Elective-3	4	--	3	30	70	100
III		**HRM Specialization-3**						
1		Elective-1	4	--	3	30	70	100
2		Elective-2	4	--	3	30	70	100
3		Elective-3	4	--	3	30	70	100
		TOTAL	28	--	22	210	490	700

Semester-IV

SNo	Course Code	Course	L	P	C	I	E	TM
1	V21MBT24	Logistics & Supply Chain Management	4	--	4	30	70	100
I		**Marketing Specialization-1**						
1		Elective-4	4	--	3	30	70	100
2		Elective-5	4	--	3	30	70	100
3		Elective-6	4	--	3	30	70	100
II		**Finance Specialization-2**						
1		Elective-4	4	--	3	30	70	100
2		Elective-5	4	--	3	30	70	100
3		Elective-6	4	--	3	30	70	100
III		**HRM Specialization-3**						
1		Elective-4	4	--	3	30	70	100
2		Elective-5	4	--	3	30	70	100
3		Elective-6	4	--	3	30	70	100
	V21MBP02	Industrial Project & Viva voce	--	--	6	40	60	100
		TOTAL	28	--	28	250	550	800
		GRAND TOTAL	**108**	**08**	**106**	**890**	**2010**	**2900**

L-LECTURE HOURS, P-PRACTICAL HOURS, C-CREDITS, I-INTERNAL MARKS, E-EXTERNAL MARKS, TM-TOTAL MARKS

Dual Specialization:

The Specialization papers will be offered in the areas of Marketing, Finance, and Human Resource Management (HRM). The students should choose any **Two** of the listed Specialization areasin the beginning of the third semester of MBA. Specialization will be offeredsubject to a minimum of 20 students.

Semester-III

Specialization I: Marketing

S.No.	*Course Code*	*Course*
1	V21MBT15	Consumer Behavior
2	V21MBT16	Retail Management
3	V21MBT17	Digital & Social Media Marketing

Specialization II: Finance

S.No.	*Course Code*	*Course*
1	V21MBT18	Security Analysis & Portfolio Management
2	V21MBT19	Banking & Insurance Management
3	V21MBT20	Business Taxation & Planning

Specialization III: HRM

S.No.	*Course Code*	*Course*
1	V21MBT21	Labour Welfare & Legislations
2	V21MBT22	Performance Evaluation & Compensation Management
3	V21MBT23	Strategic Human Resource Management

Semester-IV

Specialization I: Marketing

S.No.	*Course Code*	*Course*
4	V21MBT25	Sales and Distribution Management
5	V21MBT26	Services Marketing
6	V21MBT27	Advertising & Brand Management

Specialization II: Finance

S.No.	*Course Code*	*Course*
4	V21MBT28	Financial Derivatives
5	V21MBT29	Financial Markets & Services
6	V21MBT30	Advanced Management Accounting

Specialization III: HRM

S.No.	*Course Code*	*Course*
4	V21MBT31	Human Resource Metrics & Analytics
5	V21MBT32	Management of Industrial Relations

6 V21MBT33 International Human Resource Management

MBA Syllabus

MBA: First Year - First semester

V21MBT01:MANAGEMENT THEORY & ORGANIZATIONAL BEHAVIOUR

(Effective for the students admitted into first year from the Academic Year 2021-2022)

L	T	P	C
4	0	0	4

Course Outcomes:

Students are able to....

1. Understand the fundamentals of management and develop holistic perspective towards an organization. (K1)
2. Construct the models of decision making and controlling in an organizational context. (K2)
3. Describe various dimensions of individual behavior. (K1)
4. Identify the dynamics of group and also emerge as a good team member.(K2)
5. Demonstrate their leadership qualities and understand the culture of an organization. (K3)
6. Apply Managerial concepts for solving Business Management problems.(K3)

****

Unit-I:

Role of Management – Concept – Significance – Functions – Principles of Management - Patterns of Management: Scientific – Behavioral – Systems – Contingency

Unit-II:

Decision Making and Controlling – Process – Techniques. Planning – Process – Problems- Making it Effective. Controlling - System of Controlling – Controlling Techniques – Making Controlling Effective.

Unit-III:

Organizational Behavior – Introduction to OB – Organizing Process – Departmentation Types – Making Organizing Effective - Understanding Individual Behavior – Perception – Learning – Personality Types – Johari window- Transactional Analysis

Unit-IV:

Group Dynamics and Motivation – Benefits of Groups – Types of Groups – Group Formation and Development, Motivation – Concept of Motivation -

Motivational Theories of Maslow, Herzberg, David Mc Clelland, and Porter and Lawler

Unit-V:
Leadership and Organizational Culture and Climate: Leadership – Theories of Leadership - Managerial Grid – Transactional vs. Transformational Leadership – Qualities of good Leader, Change Management – Conflict Management.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. Essentials of Management- An International Perspective, 8th Edition, Koontz & Werich, TMH
2. Management: Text & Cases, 2nd Edition, Satya Raju & Parthasarthy ,PHI
3. Business Organization and Principles of Management, A. Roy, TMH
4. Management, Text & Cases, V.S. P. Rao &Harikrishna, Excel Books,2009
5. Mgmt. Concept & Strategies, Chandan, Vikas Publications
6. Management Science, Rao, Scitech
7. Principal & Practice of Management. Ghanekar, EPH,2005
8. Principal & Practice of Management, Amrita Singh, EPH
9. Organizational Behavior, Stephen P. Robbins,16th Edition, Pearson Education.
10. Organizational Behaviour,4th Edition, S.S.Khanka, S.Chand,2002
11. Organizational Behavior 1st Edition, Mishra .M.N ,Vikas Publishing
12. Organizational behavior, Pierce Gardner, Cengage, Weihrich&Aryasri, TMH,2009.
13. Organizational Behaviour, Subbarao P, Third Revised Edition, Himalaya Publishing House,2017.
14. Organizational Behaviour, Sarma, Jaico Publications,2009.

MBA: First Year - First semester

V21MBT02: MANAGERIAL ECONOMICS

(Effective for the students admitted into first year from the Academic Year 2021-2022)

L	T	P	C
4	0	0	4

Course Outcomes:

Students are able to....

1. Describe the concepts of Managerial economics in managerial decision making. (K1)
2. Infer the relationship between Price, demand & supply and determine changes in market equilibrium. (K2)
3. Explain the relationship between inputs and productivity using various production functions and their applicability in real world business. (K2)
4. Describe various cost structures and determine the relationship between costs and output in short and long run. (K2)
5. Describe the profit maximizing price and output in various competitive markets in short and long run. (K2)
6. Interpret problems related to Micro Economics and Business by studying practical cases. (K3)

****

UNIT 1:
Introduction to Managerial Economics: Definition, Nature and Scope, Relationship with other areas in Economics, The role of managerial economist. Concept of opportunity cost, Incremental
concept, time perspective, Risk & uncertainty.

UNIT 2:
Demand Analysis: Elasticity of demand, types and significance of Elasticity of Demand - Measurement of price Elasticity of Demand – law of Supply, Elasticity of Supply -Need for Demand forecasting, forecasting techniques.

UNIT 3:
Production Analysis: Production function, Marginal Rate of Technical Substitution, Production function with one/two variables, Cobb-Douglas Production Function, Returns to Scale and Laws of returns.

UNIT 4:
Cost and Revenue Analysis: Cost concepts, determinants of cost, cost – output relationship in the short run and long run – Modern development in cost theory –Envelop shaped long run curve-Total, Average and Marginal cost and revenue curves– Cost - Volume – Profit analysis

UNIT 5:
Market Structure and Pricing practices: Features and Types of different Markets – Price- Output
determination in Perfect competition, Monopoly, Monopolistic competition and Oligopoly both in the long run and short run. Pricing methods in practice –- Managerial Theories of a firm. .

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References

1. Paul, Koushil: "**Managerial Economics**", Cengage Learning, New Delhi,
2. Siddiqui S A,Siddiqui A S: "**Managerial Economics**", and Financial Analysis", New Age International Publishers, New Delhi, 2008.
3. Vanita Agarwal: "**Managerial Economics**", Pearson, New Delhi, 2013.
4. Dominick Salvatore: "**Managerial Economics**", Oxford University Press, New Delhi,2010.
5. D.L. Ahuja: "**Managerial Economics**", S. Chand & Company ltd,New Delhi-55.
6. O'Sullivan, Sheffrin, Perez "Micro Economics: Principles, Applications and Tools", Pearson Education.
7. Mithani D M: "**Managerial Economics**", Himalaya Publishing House, Mumbai, 2008.
8. Atmanand: "**Managerial Economics**", Excel Publications. New Delhi, 2012.
9. Varshney, R.L and Maheswari, K L: "**Managerial Economics**", Sultan Chand and Sons, New Delhi, 2002.
10. Narayanan Nadar E, Vijayan S: "**Managerial Economics**", PHI Private Limited, New Delhi,2009.

MBA: First Year - First semester

V21MBT03: ACCOUNTING FOR MANAGERS

(Effective for the students admitted into first year from the Academic Year 2021-2022)

L	T	P	C
4	0	0	4

Course Outcomes:

Students are able to....

1. Understand Nature, objectives and principles of financial accounting. (K1)
2. Prepare the financial statements of organization. (K3)
3. Apply various tools to analysis the financial position of the organization. (K3)
4. Describe the fundamental concepts of cost accounting which help the organization in decision making. (K2)
5. Quote the contemporary practices in the area of financial accounting. (K1)
6. Interpret problems related to Accountancy by studying practical cases. (K3)

****

Unit-I:

Introduction to Financial Accounting: Definition – Nature – Scope - Objectives – Users of Accounting Information – Accounting Principles: Concepts and Conventions – Accounting Standards. **Branches of Accounting:** Financial Accounting – Cost Accounting – Management Accounting.

Unit-II:

Accounting Cycle & Preparation of Financial Statements: Book keeping, **Double Entry System, Classification of Accounts – Journal – ledger and Trial Balance preparation**. Capital and Revenue Expenditure. **Preparation** of Final Accounts: Trading, profit and loss account and Balance Sheet – Straight line and diminishing balance methods of depreciation. (Simple Problems)

Unit-III:

Financial Statement Analysis: Comparative - Common size, Trend Analysis, Ratio Analysis – Funds Flow Statement Analysis – Cash Flow Statement Analysis (Simple problems)

Unit-IV:

Cost Accounting for Managerial Decisions: Meaning of Cost, Costing, cost accounting, Classification of Costs, Elements of Cost and Preparation of Cost Sheet. Marginal Costing: Break Even Analysis (Simple problems)

Unit–V:

Contemporary Developments in Accounting: Window Dressing, Methods of Window dressing, **Ethical issues in preparation of accounts.** Human Resource Accounting - Responsibility Accounting – Reporting to Management (Theory) – Automation of accounting function

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. G .Prasad& V. Chandra Sekhara Rao, Accounting for managers, jai Bharat publications.
2. Jelsy Joseph Kuppapally – Accounting for Managers – PHI (2008).
3. I.M. Pandey: Management Accounting, Third Revised Edition, Vikas Publishing House. New Delhi.
4. Jawaharlal, Accounting for Management, Himalaya, Mumbai,2012
5. Khan and Jain, Management Accounting, 5th Edition, Tata Mc Graw Hill, Delhi.
6. Gupta R.L. and Radhaswamy M: Advanced Accountancy, Sultan Chand Publications-2014.
7. Maheswari S.N: Advanced Accountancy, 5th Edition, Vikas Publishing House. New Delhi.
8. Grewal T.S. Introduction to Accountancy, 2009, S Chand Publishers

MBA: First Year - First semester

V21MBT04: LEGAL AND BUSINESS ENVIRONMENT

(Effective for the students admitted into first year from the Academic Year 2021-2022)

L	T	P	C
4	0	0	4

Course Outcomes:

Students are able to....

1. Describe the basic concept of Business & its influencing factors. (K2)
2. Understand the implications of various policies and Acts pertaining to Business . (K2)
3. Recognize various sections under IC and NI ACT. (K2)
4. Identify various sections under sale of goods Act. (K2)
5. Understand the insights related to company and Partnership Act. (K2)
6. Interpret problems related to Business by studying practical cases. (K3)

****

Unit-I:

Introduction: Concept of Business Environment-Definition-Characteristics-Micro and Macro Environmental factors. Role of WTO, World Bank and IMF in world trade.

Unit-II:

Economic & Business Environment: Industrial Policy, 1991; Liberalisation, Privatisation and Globalisation- Foreign Trade policy –Consumer Protection Act; Consumer Rights and redressal Mechanism; Disinvestment and privatization of PSUs, Industrial sickness in India .

Unit-III:

Legal Environment: Indian Contract Act, 1872 – Classification of contracts - Essentials of valid contract – Breach of contract and remedies. Negotiable Instruments Act, 1881 – Kinds of Negotiable Instruments – Presentation and discharge of Negotiable Instruments.

Unit-IV:

Sales of Goods Act: Distinction between Sales and Agreement to Sell – Conditions and Warranties – Performance of Contract of Sale –Transfer of Ownership – Rights of an Unpaid Seller..

Unit-V:

Company and Partnership Act: Company Act 2013: Nature and Types of Companies – Formation – Memorandum of Association- Articles of Association –Kinds of Shares –Duties of Directors-Winding up. Indian partnership Act 1932 – Duties and Rights of partners – Dissolution.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. Dutt, Ruddar& KPM Sundaram, Indian Economy, S. Chand & Co. New Delhi,2016
2. Misra&Puri, Indian Economy, Himalaya Publishing House, Delhi,2015
3. Ahuja, H. L., Economic Environment of Business,7th Edition, S. Chand & Co, New Delhi
4. Adhikari,M., Economic Environment of Business, Sultan Chand & Sons, Delhi,2012
5. Fernando, A. C., Business Environment, Pearson, Delhi,2016
6. Ashwathappa, K, Essentials of Business Environment, Himalaya, Delhi,2018.
7. The Economic Times, Financial Express, Business Standard, Dailies

MBA: First Year - First semester

V21MBT05: BUSINESS COMMUNICATION

(Effective for the students admitted into first year from the Academic Year 2021-2022)

L	T	P	C
4	0	0	4

Course Outcomes:

Students are able to….

1. Understand the communication process, importance and its classification. (K2)
2. Classify among various organizational communication models. (K2)
3. Identify various influencing factors of interpersonal communication. (K2)
4. Apply various business writing skills. (K3)
5. Prepare reports for different occasions. (K3)
6. Interpret problems related to Communication by studying practical cases. (K3)

****

UNIT 1:
Role of Communication in Business: Objective of Communication – The Process of Human Communication – Media of Communication - Written Communication - Oral Communication – Visual Communication - Audio Visual Communication – Silence - Developing Listening Skills – Improving Non-verbal communication skills – Cross Cultural Communication – problems and challenges.

UNIT 2:
Managing Organization Communication: Formal and Informal Communication - intrapersonal
Communication – Models for Inter Personal Communication - Exchange Theory, Johari Window and Transactional Analysis.

UNIT 3:
Motivational factors to influence Interpersonal Communication: Inter-Personal communication – Role of Emotion in Inter Personal Communication – Communication Styles – Barriers to Communication – gateways to Effective Interpersonal Communication.

UNIT 4:
Business Writing Skills: Significance of Business Correspondence – Preparing agenda for meetings, recording minutes of meeting, Letter Writing (Employment

related correspondence, Correspondence with Govt./Authorities, Office Orders, Enquiries and Replies), Press release, Writing CV - Telephone Communication – email and SMS etiquette.

UNIT 5:

Report Writing – Meaning and Significance-Structure of Reports - Negative, Persuasive and Special Reporting: Informal Report – Proposals, Formal Reports. Techniques of Presentation – Types of Presentation.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1) C.S.G. Krishnamacharyulu and Lalitha Rama Krishnan, Business Communication, Himalaya Publishing House, Mumbai,2016.
2) Urmila Rani and S. M. Roy, Business Communication, Himalaya Publishing House.
3) Nirmala Sing, Business Communication, Deep and Deep Publications Pvt. Ltd..
4) R. K. Madhukar, Business Communication, VIKAS Publications,2018.
5) Business and Professional Communication, Texas Aandm. Sage Publications ,2017
6) The Basics of Communication, Steve Duck, Sage Publications,2012
7) Professional Speaking Skills, Aruna koneru, Oxford University Press,2015
8) English Grammar, RajeevanKaral, Oxford University Press
9) Spoken English, Sabina Pillai, Oxford University Press,2016.

MBA: First Year - First semester

V21MBT06: QUANTITATIVE ANALYSIS FOR BUSINESS DECISIONS

(Effective for the students admitted into first year from the Academic Year 2021-2022)

L	T	P	C
4	0	0	4

Course Outcomes:

Students are able to….

1. Recall their basic knowledge of statistics, probability and probability distributions. (K1)
2. Interpret decisions making process and familiar with various supporting tools for decision making. (K2)
3. Apply Linear Programming models for various managerial problems. (K3)
4. Employ organizational resources using Transportation and Assignment models. Formulate strategies using Game theory. (K3)
5. Apply project management techniques like PERT and CPM. (K3)
6. Interpret problems related to practical assignments. (K3)

****

UNIT 1:
Basic Measures of Central Tendency – Measures of Dispersion –Simple Correlation and Regression analysis - Concept of Probability- Probability Rules – Joint and Marginal Probability – Baye'sTheorem- Probability Distributions-Binomial, Poisson, Normal and Probability Distributions.

UNIT 2:
Introduction to Operations Research. Decision Theory: Steps involved in Decision Making, different environments in which decisions are made, Criteria for Decision Making, Decision making under uncertainty, Decision making under conditions of Risk-Utility as a decision criterion, Decision trees, Graphic displays of the decision making process.

UNIT 3:
Linear Programming: Formation of mathematical modeling, Graphical method, the Simplex Method; Justification, interpretation of Significance of All Elements in the Simplex Tableau. (Simple problems).

UNIT 4:
Transportation, Assignment Models & Game theory: Definition and application of the transportation model, solution of the transportation problem, the Assignment Model, Traveling Salesman Problem. Game Theory: Introduction –

Two Person Zero-Sum Games, Pure Strategies, Games with Saddle Point, Mixed strategies, Rules of Dominance, Solution Methods of Games without Saddle point – Algebraic, matrix and arithmetic methods.

UNIT 5:

Network Analysis: Concepts of PERT & CPM.- Importance and Differences – Procedure for Drawing networks – identifying critical path – probability of completing the project within given time - project crashing –optimum cost and optimum duration..

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References

1. N.D.Vohra: "***Quantitative Techniques in Management***", Tata-McGraw Hill Private Limited, New Delhi, 2011.
2. J. K. Sharma, "***Operations Research: Theory and Applications***", Macmillan Gupta S.P:"***Statistical Methods***", S. Chand and Sons, New Delhi,
3. Anand Sharma: "**Quantitative Techniques for Business decision Making**", HimalayaPublishers, New Delhi,2012;
4. D P Apte: "***Operation Research and Quantitative Techniques***", Excel Publication, New Delhi,2013
5. Hamdy, A.Taha: "***Operations Research: An Introduction***", Prentice-Hall of India, New Delhi2003.
6. Anderson: "**Quantitative Methods for Business**", Cengage Learning, New Delhi 2013
7. Sancheti, Dc & VK Kapoor, "**Business Mathematics**", S Chand and Sons, New Delhi

MBA: First Year - First semester

V21MBL01:BUSINESSCOMMUNICATIONANDSOFTSKILLSLAB

(Effective for the students admitted into first year from the Academic Year 2021-2022)

L	T	P	C
0	0	4	2

Course Outcomes:

Students are able to....

1. Infer the core functioning of a Team and basic flow of communication. (K2)
2. Identify the key gestures and postures of an Individual. (K2)
3. Prepare Business correspondence letters and can prepare reports. (K3)
4. Present a topic before gatherings. (K1)
5. Interpret the importance of basic soft skills in practical context. (K3)

Unit – I

Communication and Team work: Objectives of Communication-Process of Communication- Types of communication; Team work – stages of team formation

LAB: LISTENING AND SPEAKING SKILLS- Conversational skills (formal and informal) – group discussion. Listening to lectures, discussions, talk shows, news programmes, dialogues from TV/radio/Ted talk/Podcast – watching videos on interesting events on YouTube.(Presenting before the class). Team games.

Unit – II

Non verbal communication and Body Language: Kinesics, Proxemics, handshakes, appropriate body language and mannerisms for interviews: business etiquettes- across different cultures.

LAB: Understanding Body Language Aspects and presenting oneself to an interviewer, Proper handshakes.

Unit – III

Written communication: mechanics of writing, report writing- business correspondence-business letter format- Meetings and managing meetings- Resume writing-Formats and Skills.

LAB: Writing job applications – cover letter – resume – emails – letters – memos – reports – blogs – writing for publications.

Unit- IV

Presentation skills: prerequisites of effective presentation, format of presentation; Assertiveness –strategies of assertive behavior; Communication skills for group discussion and interviews, Interview Techniques.

LAB: Designing presentations and enhancing presentation skills.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. Mallika Nawal: ―Business Communication‖, Cengage Learning, New Delhi, 2012.
2. Edwin A. Gerloff, Jerry C. Wofford, Robert Cummins Organisational communication: The key stone to managerial effectiveness.
3. Meenakshi Rama: ―Business Communication‖, Oxford University Press, NewDelhi
4. C.S.G. Krishnamacharyulu and Dr. Lalitha Ramakrishnan, Business Communication, Himalaya Publishing House, Mumbai
5. Paul Turner: ―Organisational Communication‖, JAICO Publishing House, New Delhi.
6. SathyaSwaroopDebasish, Bhagaban Das‖―Business Communication‖, PHIPrivate Limited, New Delhi, 2009.
7. R.K.Madhukar: ―Business Communication‖, Vikas Publishing House, New Delhi, 2012.
8. Kelly M Quintanilla, Shawn T.Wahl:―Business and Professional Communication‖, SAGE,New Delhi, 2012.
9. Sangita Mehta, NeetyKaushish: ―Business Communication‖, University Science Press, New Delhi, 2010.
10. Anjali Ghanekar: ―Business Communication Skills‖, Everest Publishing House, New Delhi,2011

MBA: First Year - Second semester
V21MBT07:FINANCIAL MANAGEMENT

(Effective for the students admitted into first year from the Academic Year 2021-2022)

L	T	P	C
4	0	0	4

Course Outcomes:

Students are able to....

1. Understood the fundamental concepts of financial Management. (K2)
2. Construct optimal capital structure by identification of financial sources and evaluating cost of capital. (K2)
3. Identify long term investment projects by applying capital budgeting techniques. (K2)
4. Understood the concept of dividend decisions and able to measure the dividend. (K2)
5. Apply the concepts of working capital, cash, and receivables management. (K3)
6. Interpret problems related to Business Finance by studying practical cases.(K3)

****

UNIT 1:
Financial Management: Concept - Nature and Scope - Evolution of financial Management objectives of financial Management - Profit maximization- Wealth maximization and EPS maximization – Major decisions of financial manager Challenges of Financial manager in contemporary scenario.

UNIT-II
Financing Decisions: Sources of finance - Concept of leverages - Operating, Financial and combined leverages - financial effects of leverages –EBIT – EPS analysis. Cost of Capital: Marginal vs Weighted Average Cost of Capital – Theories of Capital Structure.

UNIT -III
Investment Decisions: Concept and Techniques of Time Value of Money – Nature and Significance of Investment Decision – Estimation of Cash flows – Capital Budgeting Process – Techniques of Investment Appraisal – Discounting and Non Discounting Methods.

UNIT-IV

Dividend Decisions: Meaning and Significance – Major forms of dividends – Theories of Dividends – Determinants of Dividend – Dividend Policy and Models of Dividend valuation (Walter& Gordon models) – Bonus Shares –Stock Splits – Dividend policies of Indian Corporate.

UNIT-V

Liquidity Decisions: Meaning - Classification and Significance of Working Capital – Components of Working Capital – Factors determining the Working Capital – Estimating Working Capital requirement – Cash Management Models – Accounts Receivables –Credit Policies.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. P.Vijaya Kumar, P.S. Ravindra, Kiran Kumar, "Financial Management", Himalaya Publishing House PVT Ltd, 2014.
2. Rajiv Srivastava, Anil Misra: "**Financial Management**", Oxford University Press, New Delhi,2012
3. Brigham,E.F: "**Financial Management Theory and Practice**", Cengae Learning, New Delhi, 2013
4. Prasanna Chandra: "**Financial Management Theory and Practice**", Tata McGrawHill 2011.
5. I.M. Pandey: "**Financial Management",** Vikas Publishers, New Delhi, 2013.
6. RM Srivastava, Financial Management, Himalaya Publishing house, 4th edition.
7. Khan and Jain: Financial Management, Tata McGraw Hill, New Delhi,
8. Pradip Kumar Sinha: "**Financial Management**", Excel Books, New Delhi, 2009.
9. Vyuptakesh Sharan: "**Fundamentals Financial Management**", Pearson, New Delhi, 2012.

MBA: First Year - Second semester

V21MBT08:HUMAN RESOURCE MANAGEMENT

(Effective for the students admitted into first year from the Academic Year 2021-2022)

L	T	P	C
4	0	0	4

Course Outcomes:

Students are able to....

1. Understand the fundamentals of HRM with a global perspective. (K2)
2. Estimate the type and number of personnel required to the organization in future by considering the demand and supply of manpower. (K2)
3. Apply various methods of performance evaluation to assess the performance of employees. (K3)
4. Identify the compensation system that conforms to the legal framework. (K2)
5. Understand the functionality of trade unions and also have ability to balance between work and life. (K2)
6. Interpret problems related to Human Resources by studying practical cases. (K3)

****

UNIT 1:
HRM: Significance - Definition and Functions – evolution of HRM- Principles - Ethical Aspects
of HRM- - HR policies, Strategies to increase firm performance - Role and position of HR department - HRM at global perspective challenges – cross-cultural problems – emerging trends in HRM.

UNIT 2:
Investment perspectives of HRM: HR Planning – Demand and Supply forecasting- Recruitment and Selection- Sources of recruitment - Tests and Interview Techniques – Training and Development – Methods and techniques – Training evaluation - retention - Job Analysis –job description and specifications - Management development - HRD concepts.

UNIT 3:
Performance Evaluation: Importance – Methods – Traditional and Modern methods – Latest trends in performance appraisal - Career Development and Counseling- Compensation, Concepts
and Principles- Influencing Factors-.

UNIT 4:

Wage and Salary Administration: Concept- Wage Structure- Wage and Salary Policies- Legal
Frame Work- Determinants of Payment of Wages- Wage Differentials - Job Evaluation- Incentive Payment Systems. Welfare management: Nature and concepts – statutoryand non-statutory welfare measures – incentive mechanisms-Fringe Benefits-ESOPs - Current Trends in Compensation-Methods of Payments - compensation mechanisms at international level

UNIT 5:

Managing Industrial Relations: Trade Unions - Employee Participation Schemes-Collective Bargaining–Grievances and disputes resolution mechanisms – Safety at work – nature and importance – work hazards – safety mechanisms-Quality of Work Life (QWL).

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References

1. K Aswathappa: "***Human Resource and Personnel Management***", Tata McGraw Hill, New Delhi, 2013
2. N.Sambasiva Rao and Dr. Nirmal Kumar: "**Human Resource Management and Industrial Relations**", Himalaya Publishing House, Mumbai
3. Mathis, Jackson,Tripathy:"***Human Resource Management:Asouth-Asin Perspective***", Cengage Learning, New Delhi, 2013
4. Subba Rao P: "***Personnel and Human Resource Management-Text and Cases***", Himalaya Publications, Mumbai, 2013.
5. Madhurima Lall, Sakina Qasim Zasidi: "**Human Resource Management**", Excel Books, New Delhi, 2010

MBA: First Year - Second semester

V21MBT09:MARKETING MANAGEMENT

(Effective for the students admitted into first year from the Academic Year 2021-2022)

L	T	P	C
4	0	0	4

Course Outcomes:

Students are able to….

1. Understand the Basic marketing concepts. (K1)
2. Classify between the market Segmentation and Positioning strategies. (K2)
3. Identify various pricing methods and pricing strategies.(K2)
4. Demonstrate the various communication tools in marketing.(K3)
5. Estimate the distribution Strategies required for effective marketing chain.(K2)
6. Apply marketing concepts in solving marketing problems of organizations. (K3)

****

UNIT -I

Introduction to Marketing: Needs - Wants – Demands - Products - Exchange - Transactions - Concept of Market and Marketing and Marketing Mix - Production Concept- Product Concept - Sales and Marketing Concept - Societal Marketing Concept-Green Marketing concept - Indian Marketing Environment.

UNIT -II

Market Segmentation, Targeting and Positioning: Identification of Market Segments - Consumer and Institutional/corporate Clientele - Segmenting Consumer Markets - Segmentation Basis – Evaluation and Selection of Target Markets – Positioning significance - Developing and Communicating a Positioning Strategy.

UNIT -III

Product and Pricing Aspects: Product – Product Mix - Product Life cycle - Branding- Pricing- Objectives of Pricing - Methods of Pricing - Selecting the Final price - Adopting price - Initiating the price cuts - Imitating price increases- Responding to Competitor‘s price changes.

UNIT -IV

Marketing Communication: Communication Process – Communication Mix – Integrated Marketing Communication - Managing Advertising Sales Promotion - Public relations and Direct Marketing - Sales force– Determining the Sales Force Size - Sales force Compensation.

UNIT -V

Distribution, Marketing Organization and Control: Channels of Distribution- Intensive, Selective and Exclusive Distribution- Organizing the Marketing Department - Marketing Implementation - Control of Marketing Performance - Annual Plan Control - Profitability Control - Efficiency Control - Strategic Control.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References

1. Phillip Kotler: ―Marketing Management ―, Pearson Publishers, New Delhi, 2013.
2. Rajan Saxena: ―Marketing Management‖, Tata McGraw Hill, New Delhi, 2012.
3. V S Ramaswamy & S Namakumari, Marketing Management Global Perspective Indian Context 4th Edition, Mac Millan Publishers 2009.
4. Tapan K Panda: "Marketing Management‖, Excel Books, New Delhi, 2012
5. Paul Baines, Chris Fill, Kelly Page Adapted by Sinha K: ―Marketing‖, Oxford University Press, Chennai, 2013

MBA: First Year - Second semester

V21MBT10:PRODUCTION & OPERATIONS MANAGEMENT

(Effective for the students admitted into first year from the Academic Year 2021-2022)

L	T	P	C
4	0	0	4

Course Outcomes:

Students are able to....

1) Understand theevolution and fundamental concepts of production and operations management. (K2)
2) Understand the production planning and control strategies. (K2)
3) Assess the concepts of Waste Management, Quality Assurance, Quality Circles and application of various Statistical Quality Control techniques. (K3)
4) Understand basic concepts of Quality Improvement tools like six sigma, ISO 9000-2000 clauses and coverage and factors effecting Productivity. (K2)
5) Apply various stores management and Inventory Control techniques. (K3)
6) Interpret problems related to Operations Management by studying practical cases. (K3)

****

UNIT 1:

Introduction: Overview & Definition of Production and Operations Management- Nature and Scope of Production and Operations Management- Historical Evolution –Role & responsibilities of the production manager - Types of Manufacturing Processes.

UNIT 2:

Production Planning and Control: Stages in PPC – Gantt – PPC in Mass, Batch, and Job Order

Manufacturing- Aggregate planning and Master Scheduling, MRP, CRP. Maintenance management & Industrial Safety. Plant Location & Layout Planning- Factors influencing location - types of layouts. Capacity Planning – Optimal Production Strategies: Scheduling and Sequencing of Operations. Work Design: Method Study and Work Measurement – Work Sampling.

UNIT 3:
Managing of Work Environment: –Automation --Technology Management – Waste Management. Quality Assurance and Quality Circles – Statistical Quality Control –Control Charts for Variables- Average, Range and Control charts for Attributes. Acceptance Sampling Plans.

UNIT 4:
Quality Improvement: Basic concepts of quality, dimensions of quality, Juran's quality trilogy,
Deming's 14 principles, Quality improvement and cost reduction, ISO 9000-2000 clauses & coverage. Six Sigma, Productivity –factors affecting productivity, measurement & improvements
in productivity - new product development and design - stages & techniques. Total Productive Maintenance (TPM).

UNIT 5:
Stores Management: Purchase functions and Procedure - Objectives of Stores Management – Requirements for efficient-Management of Stores – safety stock-Different Systems of Inventory Control-Inventory control techniques- EOQ, ABC, VED and FNSD analysis-JIT, VMI

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References

1. Panner Selvem: "**Production and Operation Management**", Prentice Hall of India, NewDelhi, 2012.
2. K.Aswathappa, K. Shridhara: "**Production & Operation Management**", Himalaya Publishing House, New Delhi, 2012
3. Ajay K Garg: "**Production and Operation Management**", TMH, New Delhi,2012
4. Deepak Kumar Battacharya: "**Production & Operation Management**", University Press, New Delhi, 2012
5. AlanMuhlemann, JohnOakland,jasti Katyayani: "**Production and Operation Management**", Pearson, New Delhi,2013
6. O.P.Khanna, " Industrial Engineering and Management" Dhanpad Rai Publications

MBA: First Year - Second semester

V21MBT11: BUSINESS RESEARCH & STATSTICAL ANALYSIS

(Effective for the students admitted into first year from the Academic Year 2021-2022)

L	T	P	C
4	0	0	4

Course Outcomes:

Students are able to....

1. Understand the concept of research, research process in detail. (K1)
2. Understand various scaling techniques and research report preparation process. (K2)
3. Apply various statistical tools to test hypothesis. (K3)
4. Describe Bivariate and Multivariate analysis concepts. (K2)
5. Apply SPSS for Hypothesis testing. (K3)
6. Interpret problems related to Business Research by studying practical cases. (K3)

****

UNIT 1:

Introduction: Nature and Importance of research, the role of business research, Research process, types of research, Defining Research Problem. Research Design –Types of Research design-Sampling and Sampling Design – Sampling Methods –Probability and Non probability sampling.Discussion on primary data and secondary data, tools and techniques of collecting data. Methods of collecting data-Designing of Questionnaire.

UNIT 2:

Measurement and Scaling – Nominal Scale – Ordinal Scale –Interval Scale – Ratio Scale – Guttman Scale – Likert Scale – Schematic Differential Scale. Editing – Coding – Classification of Data – Tabulation and Graphic representation of data.

UNIT 3:

Data Analysis: Formulation of hypothesis-types of hypothesis- Null and Alternate - Type I and Type II errors, Large Sample Vs Small Sample; Procedure for testing of Hypothesis –parametric tests ; Z tests – One mean – Two mean – one Proportion – Two Proportion tests, t- distribution tests – One mean, Two mean & paired tests.

UNIT 4:
F- test and ANOVA – Calculation of F Value - one way (Completely Randomized Design) and two ways tests (Randomized Block Design) - Chi - Square tests - Goodness of fit- test for Independence of attributes – Concepts of Bivariate and Multivariate analysis.

UNIT 5:

Research Report Writing: Structure and components of Research reports, Types of reports, characteristics of good report. Format & common content's in reports. Preparation & Presentation of reports. Introduction to basics of SPSS

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References

1. Navdeep and Guptha : "**Statistical Techniques & Research Methodology**", Kalyani Publishers
2. Willam G.Zikmund, Adhkari: "***Business Research Methods***", Cengage Learning, New Delhi, 2013.
3. S.Shajahan: "***Research Methods for management***", JAICO Publishing House, New Delhi, 2009.
4. UWE FLICK: "**Introducing *Research Methodology***", SAGE, New Delhi,2012.
5. Cooper R.Donald and Schindler S. Pamela: "***Business Research Methods***", 9/e, Tata MCGraw Hill, New Delhi.
6. M.V.Kulkarni: "**Research Methodology**" , Everest Publishing House, New Delhi, 2010.
7. Sachdeva: "***Business Research Methods***", Himalaya Publishing House, Mumbai, 2011.
8. Ranjit Kumar: "**Research Methodology",** Pearson,New Delhi,2012.
9. Deepak Chawla , Neena Sondhi: "**Research Methodology, Concepts and Cases**" Vikas Publishing House, New Delhi, 2011.
10. Alan Bryman, Emma Bell: "**Business Research Methods**", Oxford University Press, New Delhi, 2011.

MBA: First Year - Second semester

V21MBT12: BUSINESS ETHICS & CORPORATE GOVERNANCE

(Effective for the students admitted into first year from the Academic Year 2021-2022)

L	T	P	C
4	0	0	4

COURSE OUTCOMES:

Students are able to....

1. Understand the importance of ethics and ethical practices at work place. (K2)
2. Recall various factors influencing Business ethics in India. Also get understanding of various scams. (K1)
3. Understand the ethical practices in functional areas such as Marketing, Hrm & Finance. (K2)
4. Understand the overview of corporate governance in India. (K2)
5. Report various governance issues related to Directors and Auditors. (K2)
6. Interpret problems related to Business Ethics by studying practical cases. (K3)

****

UNIT 1:
Importance of Business Ethics: Values and Ethics- Business Ethics and Law – Ethics in Work Place – Ethical Decision Making- Theories of Business Ethics – Management and Ethics- Indian Ethical Traditions.

UNIT 2:
Impact of Globalization on Indian Business Ethics: Reasons for Unethical Practices among Indian companies – Development of Indian Capital Markets – Various studies on Ethical Attitudes of Managers Major Indian Scams.

UNIT 3:
Ethics in Marketing, HRM and Finance: Product safety and Pricing-Ethical responsibility in Product- Advertising and Target Marketing Ethics of sales, advertising and product placement and Consumer Autonomy. Ethics in HRM & Finance – HR related ethical issues - Institutional Culture – Frauds in Banks - Measures against Bank Frauds – Frauds in Insurance sector.

UNIT 4:
Corporate Governance: An overview – Theory and Practice of Governance- Indian model of Governance- Good Corporate Governance – Land marks in emergence of Governance OECD Principles – Sarbanes-Oxley Act 2002- SEBI Initiatives.

UNIT 5:

Corporate Governance Indian Scenario: Role of Government in Ensuring Corporate Governance – Governance issues relating to Board of Directors – Duties and responsibilities of Auditors – Governance under limited competition – Role of Media – Corporate Governance in Developing and Transiting Economies.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. S.K.Mandal: "Ethics in Business and Corporate Governance", TMH, New Delhi, 2012.
2. Marianne M Jennings: "Cases in Business Ethics", Cengage Learning, New Delhi,2012.
3. S.Prabhakaran: "Business Ethics and Corporate Governance", Excel Books, New Delhi, 2011.
4. N.Balasubramanyam: "A Case Book on Corporate Governance and Stewardship",TMH., New Delhi, 2011.
5. A.C.Fernando: "Business Ethics and Corporate Governance", Pearson Publishers, New Delhi, 2013.

MBA: First Year - Second semester
V21MBT13: ENTREPRENEURSHIP DEVELOPMENT
(Effective for the students admitted into first year from the Academic Year 2021-2022)

L	T	P	C
4	0	0	4

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO1: Understand the foundations of Entrepreneurship and its importance. (K1)

CO2: Develop viable business ideas and understand entrepreneurial eco system. (K3)

CO3: Develop new projects and preparation of detailed project report. (K3)

CO4: Understand the importance of MSME's in the economic development of a nation. (K2)

CO5: Identify various sources of Entrepreneurial support organizations. (K2)

CO6: Interpret problems related to Entrepreneurs by studying practical cases. (K3)

UNIT 1

Entrepreneurship: Importance and growth - Characteristics and Qualities of Entrepreneur- Role of Entrepreneurship, Ethics and Social Responsibilities. Women Entrepreneurship: Role & Importance, Problems of Women Entrepreneurs, Opportunities for women entrepreneurs – corporate entrepreneurship – mobility of entrepreneur – entrepreneurial motivation.

UNIT2

Innovation: Sources of business idea-Idea generation- Ideal validation- idea screening process- market sizing techniques- innovation and creativity for aspiring entrepreneurs- incubation- startup eco system

UNIT 3

Planning and Evaluation of Projects: Growth of Firm – Project identification and selection - Factors inducing growth- - Project Feasibility Study – Elements of a project report- preparation of DPR. Post Planning of Project-Project Planning and Control.

UNIT 4

Small and Micro Enterprises: Importance, definition of Tiny, Micro, Small and medium scale units – policies and their support to MSMEs - growth and growth strategies – registration process of MSME- MSMED Act 2006.

UNIT 5

Institutional Support to Entrepreneur and MSMEs: Role of Government - Role of SIDBI, - Central Government Institutions – SIDO, NSIC, EDII, AISSIB, DST. State Government Institutions - DIC, TCOs, Commercial Banks.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References

1. Arya Kumar: “Entrepreneurship”, Pearson, Publishing House, New Delhi,2012.
2. VSP Rao, Kuratko: “Entrepreneurship’, Cengage Learning, NewDelhi,
3. K.Ramachandran: “Entrepreneurship Development”, TMH, New Delhi, 2012
4. B.Janakiram, M Rizwana: “Entrepreneurship Development” Excel Books, New Delhi,2011 Rajeev Roy: “Entrepreneurship”, Oxford University Press, NewDelhi,2012
5. P.C.Shejwalkar: “Entrepreneurship Development”, Everest Publishing House, NewDelhi, 2011

MBA: First Year - First semester

V21MBL02:INFORMATION TECHNOLOGY LAB (100% Lab)

(Effective for the students admitted into first year from the Academic Year 2021-2022)

L	T	P	C
0	0	4	2

Course Outcomes:

Students are able to...

1. **P**repare various office reports using MS-Office. (K3)
2. **U**nderstand the basics of SPSS and descriptive and inferential Statistical techniques using SPSS (K2)
3. Employ math and simulation in R (K3

UNIT-I:

Introduction to MS-Office: Introduction to various softwares used in business & their significance in the currentbusiness environment. Introduction to MS Office and its application in preparation of reports.

UNIT-II:

Introduction to SPSS: Overview of SPSS:Mouse and keyboard processing, frequently used dialog boxes, Editing output, Printing results, Creating and editing a data file. Managing Data:Listing cases, replacing missing values, computing new variables, recording variables, exploring data, selecting cases, sorting cases, Merging files.

Graphs & Frequencies: Creating and editing graphs and charts -Frequencies, bar charts, histograms, percentiles.

Descriptive Statistics: Measures of central tendency, variability, deviation from normality, size and stability. Cross Tabulation and chi-square analysis, The means Procedure. Bivariate Correlation: Bivariate Correlation, Partial Correlations and the correlation matrix.

UNIT-III:

R Programming:

1. Demonstrate Vector, Matrix & Array operations in R, Demonstrate Data frames and Lists in R
2. Illustrate 'if and else', 'if else', & 'switch' control statements in R
3. Demonstrate 'for and while loops', 'Importing and exporting data' in R
4. Illustrate the descriptive statistics using summary() in R
5. Illustrate Bar Plots, Pie Charts & Histograms using R

Text Books:

1. Shelly, Cashman: "Microsoft copies 2007", Cengage Learning, New Delhi. 2012
2. Oracle Database 11g The Complete Reference by Oracle Press, Kevin Loney
3. R for Everyone, Jared P Lander, Pearson
4. R in Action,Rob I Kabacoff, Manning

References

1. Shelly, Cashman: "Microsoft copies 2007", Cengage Learning, New Delhi. 2012

Annexure-XII

Amendments to UG V18 Academic regulations

1. **As per V18 regulations vide item no:7.3:**

   A student shall be promoted from II year (IV Semester) to III year (V Semester) if he/she earns 50% of the total credits specified up to and including IV semester examinations.

   This is amended as follows
   No minimum credits required for promotion from IV semester to V semester, for the academic year 2021-2022 only, as a special case due to COVID-19.

2. **Proposed changes for internal evaluations of IV semester and VI semester UG students during academic year 2020-2021.**

   Comprehensive Test: The Comprehensive examination is conducted for 60 marks and scaled down to 10 marks covering the total syllabus.

   Comprehensive marks will be awarded based up on the performance in Mid-I & Mid-II examinations-Best out of II Mid exams will be scaled down to 10 marks.

Minutes of the Sixth Academic Council Meeting held on 05/02/2022 at 10:30 A.M. through online mode.

Sri Vasavi Engineering College (Autonomous)

(Sponsored by Sri Vasavi Educational Society)

(Approved by AICTE, New Delhi & Permanently affiliated to JNTUK, Kakinada)

(Accreted by NBA & NAAC with 'A' Grade)

Pedatadepalli, Tadepalligudem, W.G.Dt, A.P-534101

Sixth Meeting of the Academic Council was held on **05/02/2022 at 10.30 A.M**. through online mode

Meeting Link :
https://us04web.zoom.us/j/71535337133?pwd=3bnT_iRFVtQ4Eh9cELsDGSb2_jEU75.1

Meeting ID: 715 3533 7133

Passcode: ad9pfz

Members Present & Approved the minutes

S.No	Name & Designation	Role	Signature
1.	Dr.Guduru VNSR Ratnakara Rao Principal	Chairman	
2.	Prof.KVSG Murali Krishna DAP, JNTUK	Member	
3.	Prof.B.Bala Krishna DE,JNTUK	Member	
4.	Prof A.M.Prasad Prof. of ECE,UCEK,JNTUK	Member	
5.	Prof.P.Siva Pullaiah Nominee of BOG	Member	
6.	Prof.S.R.K.Reddy Gudlavelleru Engg.College	Member	
7.	Sri B.V.Raghavaiah Director (Retd.), CPRI, Bhopal	Member	
8.	Dr. N.S.C. Babu Executive Director, SETS	Member	
9.	Dr. G.Radha Krishnan HOD, CE	Member	
10.	Dr.D.Sudha Rani HOD, EEE	Member	
11.	Dr.M.V.Ramesh HOD, ME	Member	

12.	Dr.E.Kusuma Kumari HOD, ECE	Member	
13.	Dr.D.Jaya Kumari HOD, CSE	Member	
14.	Dr.G.V.Subba Raju Professor, MBA	Member	
15.	Sri.N.Rajasekhar HOD, BS&H	Member	
16.	Dr. T. Sujani Section Head, English	Member	
17.	Dr. K.Jagadeesh Section Head, Physics	Member	
18.	Smt S S V Sumalatha Section Head, Chemistry	Member	
19.	Sri.K.N.H.Srinivas Assoc.Prof., ECE	Member	
20.	Dr.J.Srihari Rao Former Director	Member	
21.	Sri P N V GopalaKrishna Head Placements	Invited Member	
22.	Sri Ch V S R Gopala Krishna Controller of Examinations	Invited Member	
23.	Sri Ch Apparao Director Technical	Invited Member	
24.	Dr.Ch.Rambabu Dean (SA)	Member Secretary	

Members Absent

1. Sri Lokam Prasad, CEO,Miracle Software Systems Member

Sri Vasavi Engineering College (Autonomous)

(Sponsored by Sri Vasavi Educational Society)

(Approved by AICTE, New Delhi & Permanently affiliated to JNTUK, Kakinada)

(Accreted by NBA & NAAC with 'A' Grade)

Pedatadepalli, Tadepalligudem, W.G.Dt, A.P-534101

Sixth Meeting of Academic Council

Minutes of the sixth academic council meeting held on 05/02/2002.

Item No.1: Welcoming the members.

Principal **Prof.Guduru VNSR Ratnakara Rao** welcomed the members and chaired the meeting.

Item No.2: Review the progress of the institute

Principal presented the progress of the institute since last council meeting and appreciated by all the members of the committee.

Item No.3: Approve the minutes of the previous meeting.

The council approved the minutes of meeting held on 07/01/2021. The details are given in **Annexure-I** (Page no.07)

Item No.4:

a. Approve V21 regulations for the award of M.Tech degree.
The approved V21 regulations for M.Tech students admitted from 2021-22 academic year are given in **Annexure-II(a).**(Page no.16)

b. Approve course structure for Various Specializations of M.Tech programme under V21 Regulations.
The approved course structure of various specializations of M.Tech are given in **Annexure-II(b).** **(**Page no.27)

c. Approve V21 regulations & course structure for the award of MBA degree.
The approved V21 regualtions for MBA degree admitted from 2021-22 academic year and approved course structure are given in **Annexure-II(c).** **(**Page no.42)

Item No.5: Approve the minutes of the meeting of BOS of various departments.

a. Minutes of 4th BOS meeting of Civil Engineering Department. (Details are given in **Annexure-III**) **(**Page no.58)

b. Minutes of 5th BOS meeting of Electrical & Electronics Engineering. (Details are given in **Annexure-IV**) **(**Page no.203)

c. Minutes of 5th BOS meeting of Mechanical Engineering.(Details are given in **Annexure-V**) **(**Page no.327)

d. Minutes of 5th BOS meeting of Electronics & Communiction Engineering. (Details are given in **Annexure-VI)** **(**Page no.449)

e. Minutes of 5th BOS meeting Computer Science and Engineering. (Details are given in **Annexure-VII**) **(**Page no.579)

f. Minutes of 5th BOS meeting of Mathematics.
(Details are given in **Annexure-VIII)** **(**Page no.807)

g. Minutes of 5th BOS meeting of English.
(Details are given in **Annexure-IX**) **(**Page no.832)

h. Minutes of 4th BOS meeting of MBA.
(Details are given in **Annexure-X)** **(**Page no.871)

The council approved the minutes of meeting of BOS of various departments.

Item No.6: Approve the minutes of Results committee.

The committee reviewed the minutes of result committee meetings held from last council meeting and approved. The details are given in **Annexure-XI** **(**Page no.914)

Item No.7: Amendments to **UG V18 Academic Regulations**

The proposed ammendments are approved by the council, given in **Annexure-XII** **(**Page no.958)

Item No.8: Nominate BOS members for **AI & ML.**

The approved list of BOS members which is already communicated to members of academic council on 11th November 2021 is given in **Annexure-XIII.(**Page no.959)

Item No.9: Minutes of 1st meeting **CSE (AI) and AI&ML.**

The committee approved the minutes of BOS of CSE (AI) and AI&ML.Details are given in **Annexure-XIV.** **(**Page no.960)

Item No.10: Any other item with the permission of the chair.

a. List of eligible students to award MBA degree admitted in 2018 and 2019.

The council approved the students eligible to to award MBA degree admitted in 2018 & 2019. Detals are given in **Annexure-XV(a).** (Page no.981)

b. List of eligible students to award M.Tech degree admitted in 2018 and 2019.

   The council approved the students eligible to to award M.Tech degree admitted in 2018 & 2019. Detals are given in **Annexure-XV(b).** (Page no.984)

The meeting concluded with vote of thanks by the member secretary

Annexure-I

Action taken report on the Minutes of the Fifth Academic Council Meeting held on 07/01/2021.

Item No.1: Welcoming the members.

Principal **Prof. Guduru VNSR Ratnakara Rao** welcomed the members and chaired the meeting.

Item No.2: To approve the minutes of the previous meeting.

The council approved the action taken report presented.

Item No.3: Approval of the minutes of the meeting of joint BOS held on 26/12/2020.

The council approved the minutes of joint BOS meeting held on 26/12/2020.

Item No.4: To approve the minutes of the meeting of BOS of various departments.

The council approved the minutes of the meeting of BOS of Various Departments.

Item No.5: To approve M.Tech & MBA students results (2018 Admitted Batch).

The council approved the results of M.Tech & MBA students(2018 Admitted Batch).

Item No.6: Replacement and Extension of BOS members to another term

(Two Years). The council approved to continue the existing council nominee BOS members for another term(two years)

Item No.7: Any other item with the permission of the chair.

The Council reviewed and approved the Results of IV Semester (2018 admitted batch) and II Semester (2019 admitted batch).

As per the directions of university authorities common academic regulations for all autonomous colleges of JNTUK is followed for the B.Tech programme is followed for the batches admitted from 2020-2021. The detail regulations are already communicated to all the council members on 5th of June 2021 through emails. The detailed regulations are as follows

AUTONOMOUS COLLEGES OF JNTUK

COMMON ACADEMIC REGULATIONS (R20) FOR B. TECH PROGRAMME

(Applicable for from the Academic Year 2020-21)

1. Award of B. Tech. Degree

(a) A student will be declared eligible for the award of B. Tech. Degree if he fulfils the following academic regulations:
(i) A student shall be declared eligible for the award of B. Tech Degree, if he pursues a course of study in not less than four and not more than eight academic years. After eight academic years from the year of their admission, he/she shall **forfeit** their seat in B. Tech course and their admission stands cancelled.
(ii) The candidate shall register for 160 credits and secure all the 160 credits.
(b) The medium of instruction for the entire under graduate programme in Engineering & Technology will be in **English** only.

2. Programme Pattern:

a) Total duration of the of B. Tech (Regular) Programme is four academic years
b) Each Academic year of study is divided into **Two Semesters**.
c) Minimum number of instruction days in each semester is 90.
d) Grade points, based on percentage of marks awarded for each course will form the basis for calculation of SGPA (Semester Grade Point Average) and CGPA (Cumulative Grade Point Average).
e) The total credits for the Programme is 160.
f) Three week induction program is mandatory for all first year UG students and shall be conducted as per AICTE/UGC/APSCHE guidelines.
g) Student is introduced to "Choice Based Credit System (CBCS)".
h) A pool of interdisciplinary and job-oriented mandatory skill courses which are relevant to the industry are integrated into the curriculum of concerned branch of engineering (total five skill courses: two basic level skill courses, one on soft skills and other two on advanced level skill courses)
i) A student has to register for all courses in a semester.
j) All the registered credits will be considered for the calculation of final CGPA.
k) Each semester has - 'Continuous Internal Evaluation (CIE)' and 'Semester End Examination (SEE)'. Choice Based Credit System (CBCS) and Credit Based Semester System (CBSS) as indicated by UGC and course structure as suggested by AICTE are followed.
l) A 10 months industry/field mandatory internship, both industry and social, during the summer vacation and also in the final semester to acquire the skills required for job and make engineering graduates to connect with the needs of the industry and society at large.
m) All the students shall be mandatorily registered for NCC, NSS activities and Community Service Project as per the Government and University norms.
n) Each college shall assign a faculty advisor/mentor after admission to each student or group of students from same department to provide guidance in courses registration/career growth/placements/opportunities for higher studies/GATE/other competitive exams etc.

3. Registration for Courses:

a) In each semester a student shall mandatorily register courses which he/she wishes to pursue within a week from the starting of the class work with the advice of Head of the Department and mentor of the student of the concerned department of the college.

b) If any student wishes to withdraw the registration of the course, he/she shall submit a letter to the Principal of the college through the Head of the Department and mentor within fifteen days.

c) The concerned college shall thoroughly verify and upload the data/courses registered by each student in the university examination center within 20 days. The Principal of the concerned college shall ensure that there no wrong registration courses by the student. The university registration portal will be closed after 20 days.

4. (a) Award of B. Tech. Degree: A student will be declared eligible for the award of B. Tech. Degree if he fulfills the following academic regulations:

i. A student shall be declared eligible for award of the B. Tech Degree, if he pursues a course of study in not less than four and not more than eight academic years. After eight academic years from the year of their admission, he/she shall **forfeit** their seat in B. Tech course and their admission stands cancelled.

ii. The student shall register for 160 credits and must secure all the 160 credits.

iii. All students shall mandatorily register for the courses like Environmental Sciences, Universal Human Values, Ethics, Indian Constitution, Essence of Indian Traditional Knowledge etc., shall be included in the curriculum as non-credit mandatory courses. Environmental Sciences is to be offered compulsorily as mandatory course for all branches. A student has to secure at least 40% of the marks allotted in the internal evaluation for passing the course and shall maintain 75% of attendance in the course.

iv. All students shall mandatorily register for NCC/NSS activities and will be required to participate in an activity specified by NSS officer during second and third semesters. Grade shall be awarded as Satisfactory or Unsatisfactory in the mark sheet on the basis of participation, attendance, performance and behavior. If a student gets an unsatisfactory Grade, he/she shall repeat the above activity in the subsequent years, in order to complete the degree requirements.

v. Credits are defined as per AICTE norms.

(b) Award of B. Tech. (Honor)/B. Tech. (Minor)**:** B. Tech. with Honors or a B. Tech. with a Minor will be awarded if the student earns 20 additional credits are acquired as per the regulations/guidelines. The regulations/guidelines are separately provided. Registering for an Honors/Minor is optional.

5. Attendance Requirements

a) A student is eligible to write the University examinations if he acquires a minimum of 40% in each subject and 75% of attendance in aggregate of all the subjects.

b) Condonation of shortage of attendance in aggregate up to 10% (65% and above, and below 75%) may be granted by the College Academic Committee. However, this condonation concession is applicable only to any two semesters during the entire programme.

c) Shortage of Attendance below 65% in aggregate shall not be condoned.

d) A student who is short of attendance in a semester may seek re-admission into that semester when offered within 4 weeks from the date of commencement of class work.

e) Students whose shortage of attendance is not condoned in any semester are not eligible to write their end semester examination of that class.

f) A stipulated fee of Rs. 500/- in the concerned semester shall be payable towards condonation of shortage of attendance. Students availing condonation on medical ground shall produce a medical certificate issued by the competitive authority.

g) A student will be promoted to the next semester if he satisfies the (i) attendance requirement of the present semester and (ii) minimum required credits.

h) If any candidate fulfills the attendance requirement in the present semester, he shall not be eligible for readmission into the same class.

i) For induction programme attendance shall be maintained as per AICTE norms.

j) For non-credit mandatory courses the students shall maintain the attendance similar to credit courses

6. Evaluation-Distribution and Weightage of marks

(i) Paper setting and evaluation of the answer scripts shall be done as per the procedures laid down by the University Examination section from time to time.

(ii) To maintain the quality, external examiners and question paper setters shall be selected from reputed institutes like IISc, IITs, IIITs, IISERs, NITs and Universities.

(iii) For non-credit mandatory courses, like Environmental Sciences, Universal Human Values, Ethics, Indian Constitution, Essence of Indian Traditional Knowledge, the student has to secure 40% of the marks allotted in the internal evaluation for passing the course. No marks or letter grade shall be allotted for all mandatory non-credit courses.

(iv) A student is deemed to have satisfied the minimum academic requirements if he has earned the credits allotted to each theory/practical design/drawing subject/ project etc by securing not less than 35% of marks in the end semester exam and minimum 40% of marks in the sum total of the internal marks and end semester examination marks together.

(v) Distribution and Weightage of marks:

The assessment of the student's performance in each course will be as per the details given:

S. No	Components	Internal	External	Total
1	Theory	30	70	100
2	Engineering Graphics/Design/Drawing	30	70	100
3	Practical	15	35	50
4	Mini Project/Internship/Industrial Training/ Skill Development programmes/Research Project	- -	50	50
5	Project Work	60	140	200

(vi) Continuous Internal Theory Evaluation:

a) For theory subjects, during a semester, there shall be two mid-term examinations. Each mid-term examination consists of (i) one online objective examination (20 multiple choice questions) for 10 marks for a duration of 20 minutes (ii) one descriptive examination (3 full questions for 5 marks each) for 15 marks for a duration of 90 minutes and (iii) one assignment for marks. All the internal exams shall be conducted as per university norms from first 50% of the syllabi.

b) In the similar lines, the second online, descriptive examinations assignment shall be conducted on the rest of the 50% syllabus.

c) The total marks secured by the student in each mid-term examination are evaluated for 30 marks. The first mid marks (Mid-1) consisting of marks of online objective examination, descriptive examination and assignment shall be submitted to the University examination section within one week after completion of first mid examination.

d) The mid marks submitted to the University examination section shall be displayed in the concerned college notice boards for the benefit of the students.

e) If any discrepancy found in the submitted Mid-1 marks, it shall be brought to the notice of university examination section within one week from the submission.

f) Second mid marks (Mid-2) consisting of marks of online objective examination, descriptive examination and assignment shall also be submitted to University examination section within one week after completion of second mid examination and it shall be displayed in the notice boards. If any discrepancy found in the submitted mid-2 marks, it shall be brought to the notice of university examination section within one week from the submission.

g) Internal marks can be calculated with 80% weightage for better of the two mids and 20% Weightage for other mid exam.

Example:

Mid-1 marks = Marks secured in (online examination-1+descriptive examination 1+one assignment-1)

Mid-2 marks = Marks secured in (online examination-2+descriptive examination-2+one assignment-2)

Final internal Marks = (Best of (Mid-1/Mid-2) marks x 0.8+ Least of (Mid-1/Mid-2) marks x 0.2)

h) With the above criteria, university examination section will send mid marks of all courses in consolidated form to all the concerned colleges and same shall be displayed in the concerned college notice boards. If any discrepancy found, it shall be brought to the notice of university examination section through proper channel within one week with all proofs. Discrepancies brought after the given deadline will not be entertained under any circumstances.

(vii) Semester End Theory Examinations Evaluation:

a) The semester end examinations will be conducted university examination section for 70 marks consists of five questions carrying 14 marks each. Each of these questions is from one unit and may contain sub-questions. For each question there will be an “either” “or” choice, which means that there will be two questions from each unit and the student should answer either of the two questions.

b) For practical courses there shall be continuous evaluation during the semester for 15 internal marks and 35 end examination marks. The internal 15 marks shall be awarded as follows: day to day work - 5 marks, Record-5 marks and the remaining 5 marks to be awarded by conducting an internal laboratory test. The end examination shall be conducted by the teacher concerned and external examiner appointed.

c) For the courses having design and / or drawing, (such as Engineering Graphics, Engineering Drawing, Machine Drawing) and estimation, the distribution shall be 30 marks for internal evaluation (15 marks for continuous Assessment (day–to–day work) and 15 marks for internal tests) and 70 marks for end examination. There shall be two internal tests in a Semester for 15 marks each and final marks can be calculated with 80% weightage for better of the two tests and 20% weightage for other test and these are to be added to the marks obtained in day to day work.

d) Evaluation of the summer internships: It shall be completed in collaboration with local industries, Govt. Organizations, construction agencies, Industries, Hydel and thermal power projects and also in software MNCs in the area of concerned specialization of the UG programme. Students shall pursue this course during summer vacation just before its offering as per course structure. The minimum duration of this course is at least 6 weeks. The student shall register for the course as per course structure after commencement of academic year. A supervisor/mentor/advisor has to be allotted to guide the students for taking up the summer internship. The supervisor shall monitor the attendance of the students while taking up the internship. Attendance requirements are as per the norms of the University. After successful completion, students shall submit a summer internship technical report to the concerned department and appear for an oral presentation before the departmental committee consists of an external examiner; Head of the Department; supervisor of the internship and a senior faculty member of the department. A certificate from industry/skill development center shall be included in the report. The report and the oral presentation shall carry 40% and 60% weightages respectively. It shall be evaluated for 50 external marks at the end of the semester. There shall be no internal marks for Summer Internship. A student shall secure minimum 40% of marks for successful completion. In case, if a student fails, he/she shall reappear as and when semester supplementary examinations are conducted by the University.

e) The job oriented skill courses may be registered at the college or at any accredited external agency. A student shall submit a record/report on the on the list skills learned. If the student completes job oriented skill course at external agency, a certificate from the agency shall be included in the report. The course will be evaluated at the end of the semester for 50 marks (record: 15 marks and viva-voce: 35 marks) along with laboratory end examinations in the presence of external and internal examiner (course instructor or mentor). There are no internal marks for the job oriented skill courses.

f) Mandatory Course (M.C): Environmental Sciences, Universal Human Values, Ethics, Indian Constitution, Essence of Indian Traditional Knowledge etc non-credit (zero credits) mandatory courses. Environmental Sciences shall be offered compulsorily as mandatory course for all branches. A minimum of 75% attendance is mandatory in these courses. There shall be an external examination for 70 marks and it shall be conducted by the college internally. Two internal examinations shall be conducted for 30 marks and a student has to secure at least 40% of the marks for passing the course. There is no online internal exam for mandatory courses. No marks or letter grade shall be printed in the transcripts for all mandatory non-credit courses, but only Completed (Y)/Not-completed (N) will be specified.

g) **Procedure for Conduct and Evaluation of MOOC:** There shall be a Discipline Centric Elective Course through Massive Open Online Course (MOOC) as Program Elective course. The student shall register for the course (Minimum of 12 weeks) offered by SWAYAM/NPTEL through online with the approval of Head of the Department. The Head of the Department shall appoint one mentor for each of the MOOC courses offered. The student needs to register the course in the SWAYAM/NPTEL portal. During the course, the mentor monitors the student's assignment submissions given by SWAYAM/NPTEL. The student needs to submit all the assignments given and needs to take final exam at the proctor center. The student needs to earn a certificate by passing the exam. The student will be awarded the credits given in curriculum only by submission of the certificate. In case if student does not pass courses registered through SWAYAM/NPTEL, the same or alternative equivalent course may be registered again through SWAYAM/NPTEL in the next semester with the recommendation of HOD and shall be pass.

h) ***Major Project*** (Project - Project work, seminar and internship in industry):

In the final semester, the student should mandatorily register and undergo internship and in parallel he/she should work on a project with well-defined objectives. At the end of the semester the candidate shall submit an internship completion certificate and a project report. A student shall also be permitted to submit project report on the work carried out during the internship. The project report shall be evaluated with an external examiner.

Evaluation: The total marks for project work 200 marks and distribution shall be 60 marks for internal and 140 marks for external evaluation. The supervisor assesses the student for 30 marks (Report: 15 marks, Seminar: 15 marks). At the end of the semester, all projects shall be showcased at the department for the benefit of all students and staff and the same is to be evaluated by the departmental Project Review Committee consisting of supervisor, a senior faculty and HOD for 30 marks. The external evaluation of Project Work is a Viva-Voce Examination conducted in the presence of internal examiner and external examiner and is evaluated for 140 marks.

7. Results Declaration:

(i) Before results declaration, an academic council meeting shall be conducted and results shall be placed before the academic council for approval.

(ii) With the approval of academic council, the results shall be submitted to the University to get the approval from Honorable Vice-Chancellor.

(iii) The University may normalize the result, if required, before declaration of the result (Guidelines for normalization will be provided separately)

(iv) A copy of approved results in a CD shall be submitted to the University examination Center.

8. Academic Audit: Academic audit in each semester will be conducted as per norms.

9. Recounting or Re-evaluation of Marks in the End Semester Examination: A student can request for recounting of revaluation of his/her answer book on payment of a prescribed fee as per university norms.

10. Supplementary Examinations: A student who has failed to secure the required credits can appear for a supplementary examination, as per the schedule announced by the University.

11. Malpractices in Examinations: Disciplinary action shall be taken in case of malpractices during Mid/End examinations as per the rules framed by the University.

12. Promotion Rules

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item no.5 for promotion to higherclasses

a) A student shall be promoted from first year to second year if he fulfills the minimum attendance requirement as per University norm.

b) A student will be promoted from II year to III year if he fulfills the academic requirement of 40% of credits up to either II year I-Semester or II year II-Semester from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in II year II semester.

c) A student shall be promoted from III year to IV year if he fulfills the academic requirements of 40% of the credits up to either III year I semester or III year II semester from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in III year II semester.

13. Course Pattern

a) The entire course of study is for four academic years; all years are on semester pattern.

b) A student eligible to appear for the end semester examination in a course, but absent from it or has failed in the end semester examination, may write the exam in that course when conducted next.

c) When a student is detained for lack of credits / shortage of attendance, he may be re-admitted into the same semester/year in which he has been detained. However, the academic regulations under which he was first admitted shall continue to be applicable to him.

14. Earning of Credit:

A student shall be considered to have completed a course successfully and earned the credits if he/she secures an acceptable letter grade in the range A+ to E as given below. Letter grade 'F' in any course implies failure of the student in that course and no credits earned. Absent is also treated as no credits earned. For project same % percentages will be followed for grading.

Marks Range Theory (Max – 100)	**Marks Range Lab (Max – 50)**	**Level**	**Letter Grade**	**Grade Point**
≥ 90	≥ 45	Outstanding	A+	10
≥80 to <89	≥40 to <44	Excellent	A	9
≥70 to <79	≥35 to <39	Very Good	B	8
≥60 to <69	≥30 to <34	Good	C	7
≥50 to <59	≥25 to <29	Fair	D	6
≥40 to <49	≥20 to <24	Satisfactory	E	5
<40	<20	Fail	F	0
-		Absent	AB	0

15. Award of Class

After a student has satisfied the requirements prescribed for the completion of the program and is eligible for the award of B. Tech. Degree, he shall be placed in one of the following four classes:

Class Awarded	CGPA to be secured	Remarks
First Class with Distinction	≥ 7.75 (Without any supplementary appearance)	From the CGPA secured from 160 Credits
First Class	≥ 6.75	
Second Class	≥ 5.75 to < 6.75	
Pass Class	≥ 5.00 to < 5.75	

16. Minimum Instruction Days

The minimum instruction days for each semester shall be 90 working days. There shall be no branch transfers after the completion of the admission process. There shall be no transfer from one college/stream to another within the Constituent Colleges and Units of Jawaharlal Nehru Technological University Kakinada.

17. Withholding of Results

If the student is involved in indiscipline/malpractices/court cases, the result of the student will be withheld.

18. Transitory Regulations

a) Discontinued or detained candidates are eligible for re-admission as and when next offered.
b) The re-admitted candidate will be governed by the rules & regulations under which the candidate has been admitted.
c) (i) In case of transferred students from other Universities, credits shall be transferred to JNTUK as per the academic regulations and course structure of JNTUK.
d) The students seeking transfer to colleges affiliated to JNTUK from various other Universities / Institutions have to obtain the credits of any equivalent courses as prescribed by JNTUK. In addition, the transferred candidates have to pass the failed courses at the earlier Institute with already obtained internal/sessional marks to be conducted by JNTUK.

19. Gap – Year

Gap Year concept of Student Entrepreneur in Residence shall be introduced and outstanding students who wish to pursue entrepreneurship are allowed to take a break of one year at any time after I/II/III year to pursue entrepreneurship full time. This period shall be counted for the maximum time for graduation. An evaluation committee at university level shall be constituted to evaluate the proposal submitted by the student and the committee shall decide on permitting the student for availing the Gap Year.

20. General

a) Wherever the words “he”, “him”, “his”, occur in the regulations, they include “she”, “her”, “hers”.
b) The academic regulation should be read as a whole for the purpose of any interpretation.
c) In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Vice- Chancellor is final.
d) The University may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the University.

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ACADEMIC REGULATIONS (R19) FOR B. TECH. (LATERAL ENTRY SCHEME)

Applicable for the students admitted into II year B. Tech. from the Academic Year 2020-21 onwards

1. **Award of B. Tech. Degree**

A student will be declared eligible for the award of B. Tech. Degree if he fulfills the following academic regulations:

a) A student shall be declared eligible for the award of the B. Tech Degree, if he pursues a course of study in not less than three academic years and not more than six academic years. After six academic years from the year of their admission, he/she shall **forfeit** their seat in B. Tech course and their admission stands cancelled.
b) The candidate shall register for 121 credits and secure all the 121 credits.

2. The attendance regulations of B. Tech. (Regular) shall be applicable to B.Tech (lateral entry).

3. **Promotion Rules**
A student shall be promoted from second year to third year if he fulfills the minimum attendance requirement.

A student shall be promoted from III year to IV year if he fulfills the academic requirements of 40% of the credits up to either III year I semester or III year II semester from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in III year II semester.

4. **Award of Class**
After a student has satisfied the requirement prescribed for the completion of the program and is eligible for the award of B. Tech. Degree, he shall be placed in one of the following four classes:

Class Awarded	CGPA to be secured	Remarks
First Class with Distinction	≥ 7.75 (Without any supplementary appearance)	From the CGPA secured from 121 Credits from II Year to IV Year
First Class	≥ 6.75	
Second Class	≥ 5.75 to < 6.75	
Pass Class	≥ 5.00 to < 5.75	

The Grades secured, Grade points and Credits obtained will be shown separately in the memorandum of marks.

5. All the other regulations as applicable to **B. Tech. 4-year degree course (Regular) will hold good for B. Tech. (Lateral Entry Scheme)**

Annexure-II(a)

ACADEMIC REGULATIONS V21 FOR M. Tech DEGREE COURSE

(Applicable for the batch of students admitted from the Academic Year **2021-2022)**

Applicable for the students of M. Tech (Regular) programme from the Academic Year 2020-21 onwards. The M. Tech Degree from Sri Vasavi Engineering college, Tadepalligudem shall be conferred on candidates by the affiliaty university who are admitted to the program and who fulfill all the requirements for the award of the Degree.

1.0 ELIGIBILITY FOR ADMISSIONS

Admission to the above program shall be made subject to eligibility, qualification and specialization as prescribed by the University/ State Government from time to time.

Admissions shall be made on the basis of merit/rank obtained by the candidates at the qualifying Entrance Test conducted by the University or on the basis of any other order of merit as approved by the University/ State Government, subject to reservations as laid down by the Govt. from time to time.

2.0 AWARD OF M. Tech DEGREE

2.1 A student shall be declared eligible for the award of the M. Tech Degree, if he pursues program of study in not less than two and not more than four academic years.

2.2 The student shall register for all 68 credits and secure all the 68 credits.

2.3 The minimum instruction days in each semester are 90.

3.0 PROGRAMME OF STUDY

The following specializations are offered at present for the M. Tech Programme of study.

CE	M.Tech. – CIVIL(Structural Engineering)
EEE	M.Tech- Power Electronics and Power Systems
ME	M.Tech- Thermal Engineering
ECE	M.Tech- Embedded System & VLSI
CSE	M.Tech- Computer Science

and any other course as approved by AICTE/ University from time to time.

4.0 **ATTENDANCE**

4.1 A student shall be eligible to appear for examinations if he acquires a minimum of 75% of attendance in aggregate of all the courses, and with minimum 50% in each and every course including practicals.

4.2 Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester shall be granted by the College Academic Committee.

4.3 Shortage of Attendance **below** 65% in aggregate shall not be condoned.

4.4 Students whose shortage of attendance is not condoned in any semester are not eligible to write their end semester examination of that semester.

4.5 A prescribed fee shall be payable towards condonation of shortage of attendance.

4.6 A student shall not be promoted to the next semester unless, he satisfies the attendance requirement of the present semester, as applicable. They may seek re-admission into that semester when offered next. If any candidate fulfills the attendance requirement in the present semester, he shall not be eligible for re-admission into the same class.

5.0 EVALUATION

The performance of the candidate in each semester shall be evaluated course-wise, with a maximum of 100 marks for theory and practical, on the basis of InternalEvaluation and End Semester Examination.

5.1 For the theory courses 70 marks shall be awarded based on the performance in the End Semester Examination and 30 marks shall be awarded based on the continuous Internal Evaluation. The internal evaluation shall be made based on the **average** of the marks secured in the two Mid Term-Examinations conducted-one in the middle of the Semester and the other immediately after the completion of instruction. Each mid term examination shall be conducted for a total duration of 120 minutes with 3 questions (without choice) each for 10 marks. End semester examination is conducted for 70 marks for all FIVE (5) questions (one question from one unit) to be answered (either or).

5.2 For practical courses, 70 marks shall be awarded based on the performance in the End Semester Examinations and 30 marks shall be awarded based on the day-to-day performance as Internal Marks. The internal evaluation based on the day to day work-10 marks, record- 10 marks and the remaining 10 marks to be awarded by conducting an internal laboratory test. The end examination shall be conducted by the examiners, with a breakup marks of Procedure-20, Experimentation-20, Results-20, Viva-voce-10.

5.3 For Mini Project with Seminar, a student under the supervision of a faculty member, shall collect the literature on a topic and critically review the literature and submit it to the department in a report form and shall make an oral presentation before the Project Review Committee consisting of Head of the Department, supervisor/mentor and two other senior faculty members of the department. For Mini Project with Seminar, there will be only internal evaluation for 50 marks. A candidate has to secure a minimum of 50% of marksto be declared successful.

5.4 A candidate shall be deemed to have secured the minimum academic requirement in a course if he secures a minimum of 40% of marks in the End semester Examination and a minimum aggregate of 50% of the total marks in the End Semester Examination and Internal Evaluation taken together.

5.5 In case the candidate does not secure the minimum academic requirement in any course (as specified in 5.4) he has to re-appear for the End semester Examination in that course. A candidate shall be given **one** chance to re-register for each course provided the internal marks secured by a candidate **are less than 50% and has failed in the end examination.** In such a case, the candidate must re-register for the course(s) and secure the required minimum attendance. The candidate's attendance in the re-registered course(s) shall be calculated separately to decide upon his eligibility for writing the end examination in those course(s). In the event of the student taking another chance, his internal marks and end examination marks obtained in the previous attempt shall stands cancelled. For re- registration the candidates have to apply to the college by paying the requisite fees and get approval before the start of the semester in which re-registration is required.

5.6 In case the candidate secures less than the required attendance in any re-registered course(s), he shall not be permitted to write the End Examination in that course. He shallagain re-register the course when next offered.

5.7 Laboratory examination for M. Tech. courses must be conducted with two Examiners, one of them being the Laboratory Class Teacher and the second examiner shall be appointed by the principal from the panel of examiners submitted by the respective department.

6.0 EVALUATION OF PROJECT/DISSERTATION WORK

Every candidate shall be required to submit a thesis or dissertation on a topic approved by the Project Review Committee.

6.1 The work on the project shall be initiated at the beginning of the II year and the duration of the project is two semesters. A candidate is permitted to submit Project Thesis only after successful completion of theory and practical course with the approval of PRC not earlier than 40 weeks from the date of registration of the project work. The candidate has to pass all the theory and practical courses before submission of the Thesis.

6.2 A Project Review Committee (PRC) shall be constituted with Head of the Department and two other senior faculty members in the department.

6.3 Registration of Dissertation/Project Work: A candidate is permitted to register for the project work after satisfying the attendance requirement of all the courses, both theory and practical upto 2nd semester

6.4 After satisfying 6.3, a candidate has to submit, in consultation with his project supervisor, the title, objective and plan of action of his project work for approval. The student can initiate the Project work, only after obtaining the approval from the Project Review Committee (PRC).

6.5 If a candidate wishes to change his supervisor or topic of the project, he can do so with the approval of the Project Review Committee (PRC). However, the PRC shall examine whether or not the change of topic/supervisor leads to a major change of his initial plans of project proposal. If yes, his date of registration for the project work will be taken as the date on which the change of Supervisor or topic as the case may be applied.

6.6 Continuous assessment of Dissertation-I and Dissertation-II during the Semester(s) will be monitored by the PRC.

6.7 A candidate shall submit his status report in two stages to the PRC, at least with a gap of3 months between them.

6.8 At the end of the III semester project phase-1 is evaluated for 50 marks by the committee casting of HOD, supervisor and external examiner appointed by principal.

6.9 Three copies of the Project Thesis certified by the supervisor shall be submitted to the department.

6.10 The thesis shall be adjudicated by one examiner selected by the principal. For this, the HOD of the department shall submit a panel of 5 examiners, eminent in that field, with the help of the guide concerned.

6.11 The Head of the Department shall coordinate and make arrangements for the conduct of Viva-Voce examination.

6.12 If the report of the examiner is favorable, Viva-Voce examination shall be conducted by a board consisting of the Supervisor, Head of the Department and the examiner who adjudicated the Thesis. The Board shall jointly evaluate the candidate's work for a maximum of 100 marks.

6.13 If the report of the examiner is not favourable, the candidate shall revise and resubmit the Thesis, in the time frame as decided by the PRC. If the report of the examiner is unfavorable again, the thesis shall be summarily rejected. The candidate has to re- register for the project and complete the project within the stipulated time after taking the approval from the principal.

6.14 If the report of the Viva-Voce is unsatisfactory (ie, < 50 marks), the candidate shall retake the Viva-Voce examination only after three months. If he fails to get a satisfactory report at the second Viva-Voce examination, the candidate has to re-register for the project and complete the project within the stipulated time after taking the approval from the University.

7.0 **Supplementary Examinations**

Supplementary examinations will be conducted twice in a year at the end of odd and even semester.

8.0 **Revaluation**

Recounting of marks in the end semester examinations

8.1 As per the notification issued by the controller of examinations, the students can submit the application for revaluation, along with the requisite fee receipt for revaluation of his/her answer script(s) of the theory course(s), if he /she is not satisfied with the marks obtained.

8.2 The Controller of examinations shall arrange for re-evaluate the answer script(s).

8.3 A new Examiner, other than the first examiner, shall re-evaluate the answer script(s).
8.4 Better marks out of the two shall be taken into consideration.
8.5 If the difference of marks between the two valuations is more than 15%, the answer script will be referred to third valuation. The average of nearest two marks will be awarded.

9.0 Cumulative Grade Point Average (CGPA)

Marks RangeTheory/ Laboratory (Max – 100)	LetterGrade	Level	Grade Point
≥ 90%	O	Outstanding	10
≥80 to <90%	S	Excellent	9
≥70 to <80%	A	Very Good	8
≥60 to <70%	B	Good	7
≥50 to <60%	C	Satisfactory	6
<50%	F	Fail	0
		Absent	0

Computation of SGPA

- The following procedure will be adopted to compute the Semester Grade Point Average(SGPA) and Cumulative Grade Point Average(CGPA):

The **SGPA** is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergoneby a student, i.e SGPA (Si) = $\sum$ (Ci X Gi) / $\sum$ Ci

- Where Ci is the number of credits of the ith course and Gi is the grade point scored by the student in the ith course.

Computation of CGPA

- The **CGPA** is also calculated in the same manner taking into account all the courses undergone by a student over all the semester of a Programme, i.e.
- **CGPA = $\sum$ (Ci X Si) / $\sum$ Ci**
- Where Si is the SGPA of the i^{th} semester and Ci is the total number of credits in that semester.
- The SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.
- Equivalent Percentage = (CGPA – 0.75) x 10

10.0 AWARD OF DEGREE AND CLASS

After a student has satisfied the requirements prescribed for the completion of the program and is eligible for the award of M. Tech. Degree he shall be placed in one of the following four classes:

	CGPA to be secured	
First Class with Distinction	≥ 7.75	From the CGPA secured from68 Credits.
First Class	≥ 6.75	
Second Class	≥ 5.75 to < 6.75	
Pass Class	≥ 4.75 to < 5.75	

The Grades secured, Grade points and Credits obtained will be shown separately in the memorandum of marks.

11.0 WITHHOLDING OF RESULTS

If the student is involved in indiscipline/malpractices/court cases, the result of the student will be withheld.

12.0 TRANSITORY REGULATIONS (for V21)

12.1 When a student gets detained due to academic regulations and rejoins the college to complete the programme. However, the academic regulations under which he/she was first admitted shall continue to be applicable to him/her.

12.2 When a student discontinues for some time and rejoins the college to complete the programme. However, the academic regulations under which he/she was first admitted shall continue to be applicable to him/her.

13.0 GENERAL

13.1 Wherever the words “he”, “him”, “his”, occur in the regulations, they include “she”,“her”, “hers”.

13.2 The academic regulation should be read as a whole for the purpose of any interpretation.

13.3 In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Vice-Chancellor is final.

13.4 The University may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the University.

MALPRACTICES RULES

DISCIPLINARY ACTION FOR / IMPROPER CONDUCT IN EXAMINATIONS

	Nature of Malpractices/Improper conduct	**Punishment**
	If the candidate:	
1. (a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the course of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that course only.
(b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hallin respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.

2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled and sent to the University.
3.	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.
4.	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted

		for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject.
6.	Refuses to obey the orders of the Chief Superintendent/Assistant – Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.

7	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.
9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them.

10.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year.
11.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year examinations.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the University for further action to award suitable punishment.	

Annexure-II(b)

COURSE STRUCTURE PROPOSED FOR M.Tech (Structural Engineering)

(From 2021 – 2022 Admitted Batch) – V21 Regulation

I SEMESTER

S.No	Course Code	Course Name	L	T	P	C
1	V21STET01	Theory of Elasticity	3	0	0	3
2	V21STET02	Structural Dynamics	3	0	0	3
3	V21STET03 V21MAT01 V21STET04	Elective I 1. Matrix Analysis of Structures 2. Analytical & Numerical Methods for Structural Engineering (Bos of Maths) 3. Design of RCC Foundations	3	0	0	3
4	V21STET05 V21STET06 V21STET07	Elective II 1. Bridge Engineering 2. Repair and Rehabilitation of Structures 3. Structural Optimization	3	0	0	3
5	V21STET08	Advanced Concrete Technology	2	0	0	2
6	V21STEL01	Advanced Concrete Technology Laboratory	0	0	4	2
7	V21STEL02	Advanced Structural Engineering Laboratory	0	0	4	2
8		Audit Course -1	2	0	0	0
Total			16	0	8	18

Total Contact Hours : 24
Total Credits : 18

II SEMESTER

S.No	Course Code	Course Name	L	T	P	C
1	V21STET09	Finite Element Methods in Structural Engineering	3	0	0	3
2	V21STET10	Stability of Structures	3	0	0	3
3	V21STET11 V21STET12 V21STET13	Elective III 1. Theory of Plates and Shells 2. Advanced Steel Design 3. Analysis of Offshore Structures	3	0	0	3
4	V21STET14 V21STET15 V21STET16	Elective IV 1. Earthquake Resistant Design ofBuildings 2. Precast and Prefabricated Structures 3. Earth Retaining Structures	3	0	0	3
5	V21STET17	Advanced Reinforced Concrete Design	2	0	0	2
6	V21STEL03	Structural Design laboratory	0	0	4	2
7	V21STEP01	Mini Project With Seminar	0	0	4	2
8		Audit Course -2	2	0	0	0
Total			16	0	8	18

Total Contact Hours : 24
Total Credits : 18

Audit course 1 & 2

1. English for Research Paper Writing - V21PGENT54(BOS English)
2. Disaster Management (BOS of CIVIL) - V21STEAC1
3. Value Education (BOS English) - V21PGENT55
4. Constitution of India (BOS English) - V21PGENT56
5. Pedagogy Studies (BOS English) - V21PGENT51
6. Personality Development through Life Enlightenment Skills (BOS English) - V21PGENT52
7. Stress Management by Yoga - V21PGENT53

III SEMESTER

S.No	Course Code	Course Name	L	T	P	C
1	V21STET18 V21STET19 V21STET20	Elective III/ MOOCS*/NPTEL* 1. Design of Prestressed Concrete Structures 2. Structural Health Monitoring 3. Industrial Structures 4. MOOCS-1 through NPTEL/SWAYAM 12 Week Programme related to the programme which is not listed in the course structure	3	0	0	3
2	V21MAT02 V21MBT56	Open Elective / MOOCS*/NPTEL* 1. Operational Research (BOS of Maths) 2. Cost Management for Engineering Projects (BOS of MBA) 3. MOOCS-2 through NPTEL/SWAYAM 12 Week Programme related to the programme which is not listed in the course structure	3	0	0	3
3	V21STEP02	Project Phase I	0	0	20	1 0
Total			6	0	20	16

Total Contact Hours: 26
Total Credits : 16

IV SEMESTER

S.No	Course Code	Course Name	L	T	P	C
1	V21STEP03	Project Phase II	0	0	32	16
Total			0	0	32	16

Total Contact Hours: 32
Total Credits : 16

Course Structure of M. Tech EEE for Power Electronics & Power Systems (PE&PS) under V21 Regulation

M. Tech - I Semester							
S.No.	**Course Code**	**Course Title**	**L**	**T**	**P**	**Credits**	**Marks**
1.	V21PET01	Analysis of Power Electronic Converters	3	0	0	3	100
2.	V21PET02	Power System Operation & Control	3	0	0	3	100
3.	V21PET03 V21PET04 V21PET05	Elective – I: 1. Control & Integration of Renewable Energy systems 2. Smart Grid 3. Power Quality	3	0	0	3	100
4.	V21PET06 V21PET07 V21PET08	Elective – II: 1. Electrical Distribution Automation 2. HVDC Transmission 3. Advanced Power System Protection	3	0	0	3	100
5.	V21MBT55	Research Methodology and IPR	2	0	0	2	100
6.	V21PEL01	Power Electronics Simulation Lab	0	0	4	2	100
7.	V21PEL02	Power Systems Lab	0	0	4	2	100
8.		Audit Course – I	2	0	0	0	100
			16	0	8	18	800

M. Tech – II Semester							
S.No.	**Course Code**	**Course Title**	**L**	**T**	**P**	**Credits**	**Marks**
1.	V21PET09	Switched Mode Power Conversion	3	0	0	3	100
2.	V21PET10	Real Time Control of Power Systems	3	0	0	3	100
3.	V21PET11 V21PET12 V21PET13	Elective – III: 1. Electrical Machine Modeling & Analysis 2. Controlled Drives 3. Application of Power Converters	3	0	0	3	100
4.	V21PET14 V21PET15 V21PET16	Elective – IV: 1. EHVAC Transmission 2. Flexible AC vvvTransmission Systems 3. Power System Dynamics & Stability	3	0	0	3	100
5.	V21PEP01	Mini Project with Seminar	0	0	4	2	100
6.	V21PEL03	Power Converters Lab	0	0	4	2	100
7.	V21PEL04	Power Systems Simulation Lab	0	0	4	2	100
8.		Audit Course – II	2	0	0	0	100
			14	0	12	18	800

Audit course 1 & 2

1. English for Research Paper Writing - V21PGENT54(BOS English)
2. Disaster Management (BOS of CIVIL) - V21STEAC1
3. Value Education (BOS English) - V21PGENT55
4. Constitution of India (BOS English) - V21PGENT56
5. Pedagogy Studies (BOS English) - V21PGENT51
6. Personality Development through Life Enlightenment Skills (BOS English) - V21PGENT52
7. Stress Management by Yoga - V21PGENT53

M. Tech – III Semester							
S.No.	**Course Code**	**Course Title**	**L**	**T**	**P**	**Credits**	**Marks**
1.	V21PET17 V21PET18	Elective – V: 1. Hybrid Electric Vehicles 2. Soft Computing Techniques 3. MOOCS-1 through NPTEL/ SWAYAM- 12 Week Program related to the programme which is not listed in the course structure	3	0	0	3	100
2.	V21MAT02 V21MBT56	Open Elective : 1. Operations Research 2. Cost Management of Engineering Projects 3. MOOCs-2 Through NPTEL /SWAYAM - Any 12 week course on Engineering/ Management/ Mathematics offered by other than parent department	3	0	0	3	100
3.	V21PEP02	Dissertation Phase - I	0	0	20	10	50
			6	0	20	16	250

M. Tech – IV Semester							
S.No.	**Course Code**	**Course Title**	**L**	**T**	**P**	**Credits**	**Marks**
1.	V21PEP03	Dissertation Phase – II	0	0	32	16	100
			0	0	32	16	100

M.Tech-Mechanical(Thermal Engineering)
Programme Course Structure

(With effect from 2021-22 Admitted Batch onwards)

I-SEMESTER

S.No	Course Code	Course	L	T	P	C
1	**V21TET01**	Advanced Fluid Mechanics	3	0	0	3
2	**V21TET02**	Computational Fluid Dynamics	3	0	0	3
3		**Program Elective – I**	3	0	0	3
4		**Program Elective – II**	3	0	0	3
5	**V21TEL01**	Computational Fluid Dynamics Lab –I	0	0	3	2
6	**V21TEL02**	Thermal Engineering Lab-I	0	0	3	2
7	**V21MBT55**	Research Methodology And IPR (Under BOS of MBA)	2	0	0	2
8		Audit course-I (Under BOS of English & MBA)	2	0	0	0
		Total:	**16**	**0**	**6**	**18**

Total Contact Hours = 22

II-SEMESTER

S.No.	Course Code	Course	L	T	P	C
1	**V21TET03**	Advanced Heat and Mass Transfer	3	0	0	3
2	**V21TET04**	Thermal Measurements and Process Controls	3	0	0	3
3		**Program Elective – III**	3	0	0	3
4		**Program Elective -IV**	3	0	0	3
5	**V21TEL03**	Computational Fluid Dynamics Lab–II	0	0	3	2
6	**V21TEL04**	Thermal Engineering Lab-II	0	0	3	2
7	**V21TET05**	Mini Project with Seminar	2	0	0	2
8		Audit course-II (Under BOS of English & MBA)	2	0	0	0
	Total		**16**	**0**	**6**	**18**

Total Contact Hours = 22

List of Audit course I & II

1. English for Research Paper Writing - V21PGENT54(BOS English)
2. Disaster Management (BOS of CIVIL) - V21STEAC1
3. Value Education (BOS English) - V21PGENT55
4. Constitution of India (BOS English) - V21PGENT56
5. Pedagogy Studies (BOS English) - V21PGENT51
6. Personality Development through Life Enlightenment Skills (BOS English) - V21PGENT52
7. Stress Management by Yoga - V21PGENT53

III-SEMESTER

S.No	Course Code	Course	L	T	P	C
1		**Program Elective - V** (OR) **MOOCS-I Through NPTEL** /SWAYAM- 12 week Course related to the program which is not listed in the course structure.	3	0	0	3
2		**Open Elective** 1. Cost Management for Engineering Projects (Under BOS of MBA) 2. Operations Research (Under BOS of Maths) Students are advised to opt for an open elective course of their choice being offered by other Departments of the Institute (OR) **MOOCS-II Through NPTEL** /SWAYAM- Any 12weeek Course in Engineering/ Management certification courses duly approved by the Department.	3	0	0	3
3	**V21TEL05**	Dissertation phase –I	0	0	20	10
		Total	**6**	**0**	**20**	**16**

Total Contact Hours = 26

IV-SEMESTER

S.No.	Course Code	Course	L	T	P	C
1	**V21TEL06**	Dissertation phase –II	0	0	32	16
		Total	**-**	**-**	**32**	**16**

Total Contact Hours = 32
Total Credits (for all sem) = 68

Program Elective –I **V21TEE01 –** Advanced I.C engine, Electric & Hybrid Vehicles **V21TEE02 –** Gas Dynamics **V21TEE03 –** Cryogenic Engineering **V21TEE04 –** Advanced Thermodynamics	**Program Elective – II** **V21TEE05 –** Gas Turbines **V21TEE06 –** Alternative Fuel Technologies **V21TEE07 –** Energy Conservation and Management **V21TEE08 –** Theory and Technology of Fuel Cells
Program Elective – III **V21TEE09 –** Equipment Design for Thermal Systems **V21TEE10 –** Solar Energy Technologies **V21TEE11 –** Advanced Power Plant Engineering **V21TEE12 –** Combustion, Emissions and Environment	**Program Elective – IV** **V21TEE13 –** Jet Propulsion and Rocket Engineering **V21TEE14 –** Automotive Engineering **V21TEE15 –** Modelling of I.C engines **V21TEE16 –** Renewable Energy Technologies

Program Elective –V

V21TEE17 – Optimization Techniques and Applications
V21TEE18 – Design and Analysis of Experiments
V21TEE19 – Convective Heat Transfer
V21TEE20 – Extraction of Energy from Waste
V21TEE21 – Advanced Finite Element Methods

(OR)

MOOCS/ NPTEL certification courses

Course Structure for
M. Tech (Embedded Systems &VLSI) w.e.f A.Y 2021-22
I Semester

Sl. No.	Course Code	Course Name	L	T	P	C
1.	V21ESVT01	System Design through VERILOG	3	-	-	3
2.	V21ESVT02	Embedded Systems Design	3	-	-	3
3.	V21ESVT03 V21ESVT04 V21ESVT05	**ELECTIVE-1** Programming Languages for Embedded Systems Parallel processing System On Chip & Applications	3	-	-	3
4.	V21ESVT06 V21ESVT07 V21ESVT08	**ELECTIVE-II** Digital System Design CPLD & FPGA Architectures And Applications VLSI Signal Processing	3	-	-	3
5.	V21MBT55	Research methodology and IPR	2	0	0	2
6.	V21ESVL01	System Design through Verilog Lab	-	-	4	2
7.	V21ESVL02	Embedded Systems Design Lab		-	4	2
8.	Aud. 1	Audit Course 1	2	0	0	0
			16	**0**	**8**	**18**

Total Contact Hours: 24 **Total Credits: 18**

II Semester

Sl. No.	Course Code	Course Name	L	T	P	C
1.	V21ESVT09	Analog and Digital CMOS VLSI Design	3	-	-	3
2.	V21ESVT10	Real Time Operating Systems	3	-	-	3
3.	V21ESVT11 V21ESVT12 V21ESVT13	**ELECTIVE-III** MEMS Technology & Applications Design for Testability Semiconductor Memory Design And Testing	3	-	-	3
4.	V21ESVT14 V21ESVT15 V21ESVT16	**ELECTIVE-IV** Hardware Software Co-Design Embedded Computing Communication Buses and Interfaces	3	-	-	3
5.	V21ESVL03	Analog and Digital CMOS VLSI Design Lab	-	-	4	2
6.	V21ESVL04	Real time Operating Systems Lab		-	4	2
7.	V21ESVL05	Mini project	0	0	4	2
8.	Aud. 2	Audit course 2	2	0	0	MNC
			14	**0**	**12**	**18**

Total Contact Hours: 26 **Total Credits: 18**

III Semester

Sl. No.	Course Code	Course Name	L	T	P	Credits
1.	V21ESVT17 V21ESVT18	1.IOT and its Applications 2.Low Power VLSI Design 3.MOOCs Course	3	0	0	3
2.	V21MAT02 V21MBT56	1.Operations Research 2.Cost Management of Engineering projects 3. MOOCs Course	3	0	0	3
3.	V21ESVP01	Dissertation phase-I/Industrial Project **(to be continued and evaluated next semester**)	0	0	20	10#
					Total Credits	**16**

Evaluated and Displayed in IV semester Marks list**.**

*Students going for Industrial project/Thesis will complete these courses through MOOCs

IV Semester

Sl. No.	Course Code	Course Name	P.Os	Category	L	T	P	C
1.	V21ESVP02	Project/Dissertation phase-II (continued from III semester)			0	0	32	16
							Total Credits	**16**

Total Credits : 66

Audit course 1&2

1. English for Research Paper Writing - V21PGENT54(BOS English)
2. Disaster Management (BOS of CIVIL) - V21STEAC1
3. Value Education (BOS English) - V21PGENT55
4. Constitution of India (BOS English) - V21PGENT56
5. Pedagogy Studies (BOS English) - V21PGENT51
6. Personality Development through Life Enlightenment Skills (BOS English) - V21PGENT52
7. Stress Management by Yoga - V21PGENT53

M.Tech-CSE(CS) Programme Course Structure

(With effect from **2021-22** Admitted Batch onwards**)**

SEMESTER-I

S.No.	Course Code	Course	L	T	P	C
1	V21CTT01	**Program Core-1** Mathematical Foundations of Computer Science	3	-	-	3
2	V21CTT02	**Program Core-2** Advanced Data Structures	3	-	-	3
3	**Program Elective-I**		3	-	-	3
	V21CTT03	1. Advanced Operating Systems				
	V21CTT04	2. Advanced Computer Architecture				
	V21CTT05	3. Parallel Computing				
4	**Program Elective-II**		3	-	-	3
	V21CTT06	1. Advanced Databases				
	V21CTT07	2. Advanced Computer Networks				
	V21CTT08	3. Object Oriented Software Engineering				
5		Research Methodology and IPR	2	-	-	2
6	V21CTL01	**Laboratory-1** Advanced Data Structures Lab	-	-	4	2
7	**Laboratory-2:** Advanced Computing Lab-1*(**Lab programs based on elective taken by student may be offered)***		-	-	4	2
	V21CTL02	Advanced Operating Systems				
	V21CTL03	Parallel Computing				
	V21CTL04	Advanced Computer Networks				
	V21CTL05	Object Oriented Software Engineering				
8		**Audit Course-1***	2	-	-	0
Total Credits			**16**	**0**	**8**	**18**

Student has to choose any one audit course listed below

SEMESTER-II

S.No.	Course Code	Course	L	T	P	C
1	V21CTT09	**Program Core-3** Web Technologies	3	-	-	3
2	V21CTT10	**Program Core-4** Data Science through Python Programming	3	-	-	3
3	**Program Elective-III**		3	-	-	3
	V21CTT11	1. Machine Learning				
	V21CTT12	2. Ad hoc and Sensor Networks				
	V21CTT13	3. Internet of Things				
4	**Program Elective-IV**		3	-	-	3
	V21CTT14	1. Principles of Cyber Security				
	V21CTT15	2. Cloud Computing				
	V21CTT16	3. Natural Language Processing				
7	V21CTL06	Advanced Web Technologies Lab	-	-	4	2
8	V21CTL07	Data Science Applications with Python Lab	-	-	4	2
9	V21CTM01	Mini Project with Seminar	2	-	-	2
10		**Audit Course-2***	2	0	0	0
Total Credits			**16**	**0**	**8**	**18**

**Student has to choose any one audit course listed below.*

Audit Course 1 & 2:

1. English for Research Paper Writing - V21PGENT54(BOS English)
2. Disaster Management (BOS of CIVIL) - V21STEAC1
3. Value Education (BOS English) - V21PGENT55
4. Constitution of India (BOS English) - V21PGENT56
5. Pedagogy Studies (BOS English) - V21PGENT51
6. Personality Development through Life Enlightenment Skills (BOS English) - V21PGENT52
7. Stress Management by Yoga - V21PGENT53

SEMESTER-III

S.No.	Course Code	Course	L	T	P	C
1	**Program Elective-V**		3	-	-	3
		1. MOOCS-1 through NPTEL/ SWAYAM12 Week Program related to the programme which is not listed in the course structure				
	V21CTT18	2. Mobile Applications and Development				
	V21CTT19	3. Big Data Analytics				
2	**Open Elective**		3	-	-	3
		MOOCs-2 Through NPTEL /SWAYAM - Any 12 week course on Engineering/ Management/ Mathematics offered by other than parent department				
	V21MAT02	Operations Research				
	V21MBT55	Cost Management of Engineering Projects				
3	V21CTP01	Dissertation-I/Industrial Project #	-	-	-	10
Total Credits						16

#Students going for Industrial Project/Thesis will complete these courses through MOOCs

SEMESTER-IV

S.No.	Course Code	Course	L	T	P	C
1	V21CTP02	Dissertation-II	-	-	-	16
Total Credits						16

Annexure-II(c)

ACADEMIC RULES & REGULATIONS (V21) FOR MBA

Applicable for the batch of students admitted from the Academic Year **2021-2022**

ACADEMIC REGULATIONS V21 FOR MBA PROGRAMME

Applicable for the students of MBA (Regular) Course from the Academic Year 2021-22 onwards. The MBA Degree of Sri Vasavi Engineering College, Tadepalligudem shall be conferred on candidates who are admitted to the program and who fulfil all the requirements for the award of the Degree.

1.0 ELIGIBILITY FOR ADMISSIONS

Admission to the above program shall be made subject to eligibility, qualification and specialization as prescribed by the University/ State Government from time to time.

Admissions shall be made on the basis of merit/rank obtained by the candidates at the qualifying Entrance Test conducted by the University or on the basis of any other order of merit as approved by the University/ State Government, subject to reservations as laid down by the Govt. from time to time.

2.0 AWARD OF MBA DEGREE

2.1 A student shall be declared eligible for the award of the MBA Degree, if he pursues a course of study in not less than two and not more than four academic years.

2.2 The student shall register for all 106 credits and secure all the 106 credits.

2.3 The minimum instruction days in each semester are 90.

3.0 ATTENDANCE

3.1 A student shall be eligible to write end examinations if he acquires a minimum of 75% of attendance in aggregate of all the courses, and with minimum 50% in each and every course including practicals.

3.2 Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester shall be granted by the College Academic Committee.

3.3 Shortage of Attendance **below** 65% in aggregate shall not be condoned and not eligible to write their end semester examination of that class.

3.4 Students whose shortage of attendance is not condoned in any semester are not eligible to write their end semester examination of that class.

3.5 A prescribed fee shall be payable towards condonation of shortage of attendance.

3.6 A student shall not be promoted to the next semester unless, he satisfies the attendance requirement of the present semester, as applicable. They may seek re-admission into that semester when offered next. If any candidate fulfills the attendance requirement in the present semester, he shall not be eligible for re-admission into the same class.

4.0 Examination and Scheme of Evaluation

The distribution of marks for internal and external examinations shall be evaluated course -wise as follows:

Sl.No.	Component	Internal	External	Total
1	Theory	30	70	100
2	Laboratory	20	30	50
3	Project & viva-voce	40	60	100

4.1 Internal assessment

i) 30 marks for internal assessment. 10 marks are based on the sum of average of **two mid-term** seminar/presentation and 20 marks are based on **average** of **two mid-term examinations**.

ii) 10 marks for presentation (5 marks are for report content and 5 marks are for presentation)

iii) Each mid-term examination is conducted for 20 marks with two hours duration. Each mid-term examination consists of four questions, each for 5 marks. All questions need to be answered.

iv) The final marks are the sum of average of two mid-term examinations for 20 marks and the sum of average of **two mid-term** seminar/presentation for 10marks.

4.2 External Assessment

The semester end examination shall be conducted for a duration of three hours with A, B & C sections (Section A consists of 5 questions out of which Three questions are to be answered. Each question carries 5 marks, Section B consists of 5 eassy questions with internal choice, each for 8 marks & Section C case study for 15 marks) All Sections are to be answered.

4.3 Laboratory Course

i) For practical courses distribution shall be 20 marks for internal evaluation and 30 marks for the end semester examinations. There shall be continuous evaluation by the internal course teacher during the semester for 20 internal marks. Out of 20 marks for internal, 10 marks shall be for lab record and 10 marks shall be evaluated by conducting an internal test conducted at the end of semester.

ii) End semester laboratory examination shall be conducted for 30 marks with two examiners, one of them being the Laboratory Class Teacher and second examiner shall be appointed by the Principal.

5.0 EVALUATION OF PROJECT WORK:

5.1 **A Project Review Committee** (PRC) will be constituted with Head of the Department, and two other senior faculty members of the department.

5.2 **Registration of Project work**: A Candidate is permitted to register for the project work after satisfying the attendance requirement up to II semester.

5.3 Every candidate shall work on projects approved by the PRC.

5.4 A student has to undergo practical training for a period of 5 weeks in a Corporate Enterprise (as a part of the project) after the Second Semester. In training period, the candidates should work on a specific problem related to the elective course.

At the end of practical training, the student should submit a certificate obtained from the organization.

The student should prepare a Project Report under the supervision of a guide from the faculty of management of the college. However, the students who prepare Project Report in the area of systems can also work under the guidance of a Faculty member from Computer Science Department.

5.5 The progress of the project work shall be periodically reviewed by PRC. The PRC shall authorize/approve change of guide/topic/title as deemed fit. A student shall submit status report in line with the recommended project calendar as approved by PRC. Three copies of Project dissertation certified by the Project Supervisor shall be submitted to the College.

5.6 The project is evaluated for 100 Marks at the end of IV Semester. A student shall engage a minimum of 2 hours per week in III and IV semester in consolidating the data, report writing, results & analysis, conclusions etc. Evaluation shall comprise of internal and external assessment.

Internal: 40 Marks

External: 60 Marks

Out of a total of 100 Marks for the Project and viva voce 40 Marks shall be for internal evaluation and 60 Marks for the end semester project and viva voce. The internal evaluation shall be made by the departmental committee on the basis of the two seminars given by the student on the topic of his/her dissertation. The end semester project and viva voce shall be adjudicated by one external examiner selected from a panel of 5 examiners outside the college. For this Head of the department shall submit a 5 member panel who are eminent in the field of study.

5.7 An internal departmental committee consisting of HOD, Supervisor and one senior faculty shall monitor the progress of the project work.

5.8 The project and viva voce examination shall be conducted by a board consisting of External examiner, HOD and Supervisor. A Candidate shall be allowed to take project and viva voce examination after fulfilling the attendance requirements.

5.9 The Candidate should secure minimum 40% marks in External assessment of project and viva voce. If the candidate fails to secure minimum 50% of marks in project internal and End semester project and viva voce together, the candidate should retake the project and viva voce examination after three months. If he fails to get minimum marks at the second project and viva voce examination, he will not be eligible for the award of the degree, unless the candidate is asked to revise and resubmit. If the candidate fails to secure minimum marks again, the project shall be summarily rejected.

6.0 Course Pattern

a) The entire course of study is for two academic years (four semesters); all the years are in semester pattern

b) A student eligible to appear for the end semester examination in a course, but absent from it or has failed in the end semester examination, may write the exam in that course as and when college conducted next.

c) When a student has shortage of attendance, he/she may be re-admitted into the same semester/year in which he has been detained. However, the academic regulations under which he was **first admitted** shall continue to be applicable to him.

7.0 Criteria for passing a course and award of grades

a) Criteria for passing a course

i) A Candidate shall be declared to have passed in individual theory/laboratory/project and viva voce if he secures a minimum of 50% aggregate marks (internal & semester end examination marks put together), course to a minimum of 40% marks in the semester end examination.

ii) In case the candidate does not secure the minimum academic requirement in any course (as specified in (i) above) he/she has to re-appear for the end semester examination in that course. A candidate shall be given **one** chance to re-register for each course provided the internal marks secured by a candidate **are less than 50% and has failed in the end examination**. In such a case, the candidate must re-register for the course (s) and secure the required minimum attendance. The attendance in the re-registered course (s) shall be calculated separately to decide upon his eligibility for writing the end examination in those course (s). In the event of the student taking another chance, his internal marks and end examination marks obtained in the previous attempt shall **stands cancelled**. For re-registration the candidates have to apply to the Dean Academics by paying the requisite fees and get approval from College before start of semester in which re-registration is sought.

iii) In case the candidate secures less than the required attendance in any re-registered course (s), he shall not be permitted to write the End Examination in that course. He shall again re-register the course when next offered.

b) Award of grades: Method of awarding grade point and grade in each course based on his performance is given below.

Marks Range Theory / Laboratory/ Project and viva -voce (Max-100)	Letter Grade	Level	Grade Point
≥ 90%	O	Out standing	10
≥80 to <90%	S	Excellent	9
≥70 to <80%	A	Very Good	8
≥60 to <70%	B	Good	7
≥50 to <60%	C	Satisfactory	6
<50	F	Fail	0
	AB	Absent	0

c) **Computation of Cumulative and Semester Grade Point Averages**

Computation of SGPA

- The following procedure is to be adopted to compute the Semester Grade PointAverage(SGPA) and Cumulative Grade Point Average(CGPA):

- The **SGPA** is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses under gone by a student, i.e
  SGPA (Si) = ∑ (Ci X Gi) / ∑ Ci

- Where Ci is the number of credits of the ith course and Gi is the grade point scored by thestudent in the ith course.

Computation of CGPA

- The **CGPA** is also calculated in the same manner taking into account all the coursesundergone by a student over all the semester of a Programme, i.e. CGPA = ∑ (Ci X Si) / ∑ Ci
- Where Si is the SGPA of the i^{th} semester and Ci is the total number of credits in thatsemester.
- The SGPA and CGPA shall be rounded off to 2 decimal points and reported in thetranscripts.
- Equivalent Percentage = (CGPA – 0.75) x 10

8.0 AWARD OF DEGREE AND CLASS

After a student has satisfied the requirements prescribed for the completion of the program and is eligible for the award of MBA Degree he shall be placed in one of the following three classes:

	CGPA to be secured	
First Class with Distinction	≥ 7.75	**From the CGPA secured from 106 Credits.**
First Class	≥ 6.75	
Second Class	≥ 5.75 to < 6.75	
Pass Class	≥ 4.75 to < 5.75	

The Grades secured, Grade points and Credits obtained will be shown separately in the memorandum of marks.

9.0 WITHHOLDING OF RESULTS

If the student is involved in indiscipline/malpractices/court cases, the result of the student will be withheld.

10.0 Supplementary Examinations

i) Supplementary examinations will be conducted twice in a year at the end of odd and even semesters.
ii) Semester end supplementary examinations shall be conducted till next regulation comes into force for that semester after the conduct of the last set of regular examinations under the present regulation.
iii) Thereafter, supplementary examinations will be conducted in the equivalent courses as decided by the Board of Studies concerned.

11.0 Revaluation

Recounting of marks in the end semester examinations, A student can request for revaluation ofhis /her answer book on payment of a prescribed fee.

12.0 TRANSITORY REGULATIONS (for V21)

12.1 When a student gets detained due to academic regulations and rejoins the college to complete the programme.However, the academic regulations under which he/she was first admitted shall continue to be applicable to him/her.

12.2 When a student discontinues for some time and rejoins the college to complete the programme. However, the academic regulations under which he/she was first admitted shall continue to be applicable to him/her.

13.0 GENERAL

13.1 Wherever the words “he”, “him”, “his”, occur in the regulations, they include “she”, “her”, “hers”.
13.2 The academic regulation should be read as a whole for the purpose of any interpretation.
13.3 In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Chairman of the Academic Council is final.
13.4 The College may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the College.

MALPRACTICES RULES

DISCIPLINARY ACTION FOR / IMPROPER CONDUCT IN EXAMINATIONS

	Nature of Malpractices/Improper conduct	Punishment
	If the candidate:	
1. (a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager,palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only.
(b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year.The Hall Ticket of the candidate is to be cancelled and sent to the University.

3.	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.
4.	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject.

6.	Refuses to obey the orders of the Chief Superintendent/Assistant – Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that

		semester/year. The candidate is also debarred and forfeits the seat.
9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them.
10.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year.
11.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year examinations.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the University for further action to award suitable punishment.	

Course Structure MBA (Regular)

(Effective for the students admitted into first year from the Academic Year 2021-2022)

Semester-I

SNo	Course Code	Course	L	P	C	I	E	TM
1	V21MBT01	Management Theory & Organizational Behaviour	4	--	4	30	70	100
2	V21MBT02	Managerial Economics	4	--	4	30	70	100
3	V21MBT03	Accounting for Managers	4	--	4	30	70	100
4	V21MBT04	Legal & Business Environment	4	--	4	30	70	100
5	V21MBT05	Business Communication	4	--	4	30	70	100
6	V21MBT06	Quantitative Analysis for Business Decisions	4	--	4	30	70	100
7	V21MBL01	IT-LAB	---	4	2	20	30	50
8	V21MBL02	Business Communication & Soft Skills Lab	---	4	2	20	30	50
		TOTAL	24	8	28	220	480	700

Semester-II

SNo	Course Code	Course	L	P	C	I	E	TM
1	V21MBT07	Financial Management	4	--	4	30	70	100
2	V21MBT08	Human Resource Management	4	--	4	30	70	100
3	V21MBT09	Marketing Management	4	--	4	30	70	100
4	V21MBT10	Production and Operations Management	4	--	4	30	70	100
5	V21MBT11	Business Research & Statistical Analysis	4	--	4	30	70	100
6	V21MBT12	Business Ethics & Corporate Governance	4	--	4	30	70	100
7	V21MBT13	Entrepreneurship Development	4	--	4	30	70	100
		TOTAL	28	--	28	210	490	700

Semester-III

SNo	Course Code	Course	L	P	C	I	E	TM
1	V21MBT14	Business Policy & Corporate Strategy	4	--	4	30	70	100
I		**Marketing Specialization-1**						
1		Elective-1	4	--	3	30	70	100
2		Elective-2	4	--	3	30	70	100
3		Elective-3	4	--	3	30	70	100
II		**Finance Specialization-2**						
1		Elective-1	4	--	3	30	70	100
2		Elective-2	4	--	3	30	70	100
3		Elective-3	4	--	3	30	70	100
III		**HRM Specialization-3**						
1		Elective-1	4	--	3	30	70	100
2		Elective-2	4	--	3	30	70	100
3		Elective-3	4	--	3	30	70	100
		TOTAL	28	--	22	210	490	700

Semester-IV

SNo	Course Code	Course	L	P	C	I	E	TM
1	V21MBT24	Logistics & Supply Chain Management	4	--	4	30	70	100
I		**Marketing Specialization-1**						
1		Elective-4	4	--	3	30	70	100
2		Elective-5	4	--	3	30	70	100
3		Elective-6	4	--	3	30	70	100
II		**Finance Specialization-2**						
1		Elective-4	4	--	3	30	70	100
2		Elective-5	4	--	3	30	70	100
3		Elective-6	4	--	3	30	70	100
III		**HRM Specialization-3**						
1		Elective-4	4	--	3	30	70	100
2		Elective-5	4	--	3	30	70	100
3		Elective-6	4	--	3	30	70	100
	V21MBP02	Industrial Project & Viva voce	--	--	6	40	60	100
		TOTAL	28	--	28	250	550	800
		GRAND TOTAL	**108**	**08**	**106**	**890**	**2010**	**2900**

L-LECTURE HOURS, P-PRACTICAL HOURS, C-CREDITS, I-INTERNAL MARKS, E-EXTERNAL MARKS, TM-TOTAL MARKS

Dual Specialization:

The Specialization papers will be offered in the areas of Marketing, Finance, and Human Resource Management (HRM). The students should choose any **Two** of the listed Specialization areas in the beginning of the third semester of MBA. Specialization will be offered subject to a minimum of 20 students.

Semester-III

Specialization I: Marketing

S.No.	***Course Code***	***Course***
1	V21MBT15	Consumer Behavior
2	V21MBT16	Retail Management
3	V21MBT17	Digital & Social Media Marketing

Specialization II: Finance

S.No.	***Course Code***	***Course***
1	V21MBT18	Security Analysis & Portfolio Management
2	V21MBT19	Banking & Insurance Management
3	V21MBT20	Advance Management Accounting

Specialization III: HRM

S.No.	***Course Code***	***Course***
1	V21MBT21	Leadership & Change Management
2	V21MBT22	Performance Evaluation & Compensation Management
3	V21MBT23	Strategic Human Resource Management

Semester-IV

Specialization I: Marketing

S.No.	***Course Code***	***Course***
4	V21MBT25	Sales and Distribution Management
5	V21MBT26	Services Marketing
6	V21MBT27	Advertising & Brand Management

Specialization II: Finance

S.No.	***Course Code***	***Course***
4	V21MBT28	Financial Derivatives
5	V21MBT29	Financial Markets & Services
6	V21MBT30	Business Taxation & Planning

Specialization III: HRM

S.No.	Course Code	Course
4	V21MBT31	Human Resource Metrics & Analytics
5	V21MBT32	Management of Industrial Relations
6	V21MBT33	Labour Welfare & Legislations

Annexure-III

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SRI VASAVI ENGINEERING COLLEGE (AUTONOMOUS)

(Sponsored by Sri Vasavi Educational Society)

Approved by AICTE, New Delhi and Permanently Affiliated to JNTUK, Kakinada

Pedatadepalli, **TADEPALLIGUDEM – 534 101,** W.G. Dist, (A.P.)

Department of Civil Engineering

Dt: 30.08.2021

Fourth BOS Meeting of Civil Engineering Department is held in online mode on 28.08.2021 at 10:30 AM with the following members were present.

Sl.No	Name	Position
1	Dr.G.Radhakrishnan	Chairperson
2	Dr.G.V.R.Prasada Raju	Member
3	Dr.C.B.Kameswara Rao	Member
4	Dr.M.Kumar	Member
5	Mr.T.Raj kumar	Member
6	Mr.T Naga Seshu Babu	Faculty of CE
7	Mr.A Sudheer	Faculty of CE
8	Mr.B Hema Sundar	Faculty of CE
9	Mr.J Pavan Kumar	Faculty of CE

Minutes of the BOS Meeting:

The following points have been suggested/discussed by the committee in BOS meeting and the same has been approved.

1. The proposed course structure and syllabus of VII & VIII semesters V18 Regulation is approved given in **Annexure – CE – I**
2. The list of courses mentioned below have to be offer under open elective in VII & VIII semesters of B.Tech under V18 Regulation for other branches

Open Elective - II	VII Sem	1. Environmental Pollution and Control 2. Disaster Management
Open Elective - III	VIII Sem	1. Solid Waste Management 2. Water Quality and Conservation

The detailed syllabus of above courses is given in the **Annexure – CE – II**

3. The proposed course structure and syllabus of III & IV semesters V20 Regulation is approved is given in **Annexure – CE – III**
4. The comment made by Dr.C.B.Kameswara Rao in the course structure of III & IV semester under Skill Oriented Course which includes Parent Institution in addition to Industries/Professional bodies/APSSDC and other accredited bodies.
5. Approval of course structure and syllabus for I to IV semester of M.Tech CIVIL (Structural Engineering) under V 21 regulations.
   The approved course structure and syllabus is given in **Annexure – CE – IV**
6. Approval of syllabus for Audit Course (Diaster Management V21STEAC1) offered in I& II semester M.Tech .
   The approved course structure and syllabus is given in **Annexure – CE – V**
7. Few comments made by Dr.C.B.Kameswara Rao in the course structure and syllabus of I to IV semesters of V21 Regulation M.Tech Structural Engineering were acknowledged, approved and suitable modification have to be made.
8. **Comments**
   a) Advanced Reinforced Concrete Design course in I semester is elective it could be made mandatory.
   b) The course **Theory of Plates and Shells** & **Stability of Structures** could be interchanged from Elective to mandatory.
   c) Computer Aided Design Laboratory & **Structural Design Laboratory** courses are similar and both could be joined as one laboratory only.

   Modifications have to be made by making **Advanced Reinforced Concrete Design** as mandatory in II semester. New course **Structural Optimization** is included in I Semester II Elective.

   Theory of Plates and Shells have to be made elective and **Stability of Structures** have to be made as mandatory course. **Computer Aided Design Laboratory & Structural Design Laboratory** have to be joined as one Laboratory only.

CHAIRPERSON OF BOS

ANNEXURE – CE- I

COURSE STRUCTURE APPROVED IN PREVIOURS BOS MEETINGS

(For 2018 – 2019 Admitted Batch) - V18 Regulation

I SEMESTER

S.No	Course Code	Course Name	L	T	P	C
1	V18ENT01	English – I	2	-	-	MNC
2	V18MAT01	Engineering Mathematics – I	3	1	-	4
3	V18CHT01	Engineering Chemistry	3	1	-	4
4	V18CST01	Programming in C for problem solving	3	-	-	3
5	V18MET01	Engineering Graphics	1	-	3	2.5
6	V18ENL01	English Communication Skills Lab – I	-	-	2	MNC
7	V18CSL01	Programming lab in C for problem solving	-	-	3	1.5
8	V18CHL01	Engineering Chemistry Lab	-	-	3	1.5
Total			12	2	11	16.5

Total Contact Hours : 25
Total Credits : 16.5

II SEMESTER

S.No	Course Code	Course Name	L	T	P	C
1	V18ENT02	English – II	2	-	-	2
2	V18MAT02	Engineering Mathematics – II	3	1	-	4
3	V18PHT01	Optics and Waves	3	1	-	4
4	VI8MET03	Engineering Mechanics	3	1	-	4
5	V18ENL02	English Communication Skills Lab – II	-	-	2	1
6	V18CEL01	Computer aided Civil Engineering Drawing Lab	-	-	3	1.5
7	V18PHL01	Optics and Waves Lab	-	-	3	1.5
8	VI8MELO1	Engineering and IT Workshop	-	-	3	1.5
Total			11	3	11	19.5

Total Contact Hours: 25

Total Credits: 19.5

III SEMESTER

S.No	Course Code	Course Title	Hours per week			Credits
			L	T	P	C
1	V18CET04	Strength of Materials-I	3	1	0	4
2	V18CET36	Building Materials Planning & Construction	3	1	0	4
3	V18CET10	Introduction to Fluid Mechanics	3	1	0	4
4	V18CET35	Principles of Environmental Science & Engineering	2	0	0	2
5	V18MAT04	Probability & Statistics	3	1	0	4
6	VI8EET01	Basic Electrical and Electronics Engineering	3	1	0	4
7	V18CEL02	Material Testing Lab	0	0	3	1.5
8	VI8EEL01	Basic Electrical and Electronics Engineering Lab	0	0	2	1
9	V18ENT03	Professional Communication Skills -I	3	0	0	0
Total			20	3	6	24.5

Total Contact Hours: 29

Total Credits: 24.5

IV SEMESTER

S.No	Course Code	Course Title	Hours per week			Credits
			L	T	P	C
1	V18CET13	Strength of Materials-II	3	0	0	3
2	V18CET08	Engineering Geology	2	0	0	2
3	V18CET09	Concrete Technology	3	1	0	4
4	V18CET14	Hydraulic Engineering	3	1	0	4
5	V18CET11	Surveying and Geomatics	2	1	0	3
6	V18MBT51	Managerial Economics & Financial Analysis	3	0	0	3
7	V18CEL03	Concrete Technology Lab	0	0	3	1.5
8	V18CEL04	Surveying Lab	0	0	3	1.5
9	V18CEL05	Fluid Mechanics And Hydraulic Machinery Lab	0	0	3	1.5
10	V18CEL06	Engineering Geology Lab	0	0	2	1
11	V18ENT04	Professional Communication Skills -II	3	0	0	0
Total			17	4	11	24.5

Total Contact Hours: 32

Total Credits: 24.5

V SEMESTER

S.No	Course Code	Course Title	Hours per week			Credits
			L	T	P	C
1	V18CET15	Structural Analysis-I	3	0	0	3
2	V18CET16	Geotechnical Engineering-I	3	0	0	3
3	V18CET17	Hydrology & Water Resources Engineering	3	0	0	3
4	V18CET18	Design of Reinforced Concrete Structures	3	0	0	3
5	V18CET19	Transportation Engineering-I	3	0	0	3
6	V18CET33	Remote Sensing And Geographical Information System	2	0	0	2
7	V18CEL07	Transportation Engineering Lab	0	0	3	1.5
8	V18CEL08	Geotechnical Engineering Lab	0	0	3	1.5
9	V18ENT11	Constitution of India	2	-	-	0
10	V18ENT05	Professional Communication Skills -III	4	0	0	0
Total			23	0	6	20

Total Contact Hours: 29

Total Credits: 20

VI SEMESTER

S.No	Course Code	Course Title	Hours per week			Credits
			L	T	P	C
1	V18CET20	Structural Analysis - II	3	0	0	3
2	V18CET21	Geotechnical Engineering – II	3	0	0	3
3	V18CET22	Design of Steel Structures	3	0	0	3
4	V18CET23	Transportation Engineering – II	3	0	0	3
5	V18CET24	Environmental Engineering - I	3	0	0	3
6		Open Elective I	3	0	0	3
7	V18CEL09	Environmental Engineering Lab	0	0	3	1.5
	V18CEL10	CAD & GIS Lab	0	0	3	1.5
8	V18ENT06	Professional Communication Skills – IV	4	0	0	0
Total			22	0	6	21

Total Contact Hours: 28

Total Credits: 21

VII SEMESTER

S.No	Course Code	Course Title	Hours per week			Credits
			L	T	P	C
1	V18CET26	Elective-II	3	0	0	3
2	V18CET27	Elective-III	3	0	0	3
3	V18CET28	Open Elective-II Suggested (Metro Systems & Engineering) See Annexure-I	3	0	0	3
4	V18CEL10	Project work part - A (Project work, seminar and internship in industry or at appropriate work place)	0	0	12	6
Total			9	0	12	15

Total Contact Hours: 21

VIII SEMESTER

S.No	Course Code	Course Title	Hours per week			Credits
			L	T	P	C
1	V18CET29	Elective-IV	3	0	0	3
2	V18CET30	Elective-V	2	0	0	2
3	V18CET31	Prestressed Concrete	3	0	0	3
4	V18CET32	Applications of Remote Sensing and GIS in Civil Engineering	2	0	0	2
5	V18CEL11	Project work part - B (Continued from VII Semester, Project work, seminar and internship in industry or at appropriate work place	0	0	13	6.5
Total			10	0	13	16.5

Total Contact Hours: 23

Total Credits - 160

COURSE STRUCTURE PROPOSED FOR APPROVAL IN 4th BOS MEETING

VII SEMESTER

S.No	Course Code	Course Title	Hours per week			Credits
			L	T	P	C
1	V18CET25	Estimation, Specification and Contracts	3	0	0	3
2	V18CET26	Environmental Engineering - II	3	0	0	3
3	V18CET27 V18CET28 V18CET29 V18CET30 V18CET31	Professional Elective Course – 1 1. Pavement Analysis and Design 2. Air Pollution and Control 3. Irrigation Engineering 4. Bridge Engineering 5. Advanced Foundation Engineering	3	0	0	3
3	V18CET32 V18CET34 V18CET37 V18CET38 V18CET39	Professional Elective Course – 2 1. Traffic Engineering & Management 2. Construction Project Planning & Systems 3. Solid Waste Management 4. Ground Water Development 5. Earthquake Engineering	3	0	0	3
4		Open Elective Course – 2	3	0	0	3
6	V18CEPWA	Project Work Part - A	0	0	6	3
Total			15	0	6	18

Total Contact Hours: 21

Total Credits: 18

VIII SEMESTER

S.No	Course Code	Course Title	Hours per week			Credits
			L	T	P	C
1	V18CET40 V18CET41 V18CET42 V18CET43 V18CET44	Professional Elective Course – 3 1. Highway Construction and Management 2. Repair and Rehabilitation of Structures 3. Rural Water Supply and onsite sanitation Systems. 4. Pre stressed Concrete 5. Engineering with Geo-synthetics	3	0	0	3
2	V18CET45 V18CET46 V18CET47 V18CET48 V18CET49	Professional Elective Course – 4 1. Urban Hydrology and Hydraulics 2. Environmental Impact Assessment and Management 3. Advanced Concrete Technology 4. Finite Element Methods 5. Ground Improvement Techniques	3	0	0	3
3		Open Elective Course – 3	3	0	0	3
4	V18CEPWB	Project Work Part - B	0	0	14	7
Total			9	0	14	16

Total Contact Hours: 23

Total Credits: 16

SYLLABI OF VII & VIII SEMESTER OF B.TECH COURSES FOR THE

ACADEMIC YEAR 2021-2022

VII SEMESTER – SYLLABUS

Year/Sem	**VII Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V18	3	0	0	3	V18CET25
Name of the Course	**ESTIMATION, SPECIFICATION & CONTRACTS**					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of this course the student will be able to

- Explain to student for understanding different construction works and can estimate approximate cost required for a building (K2)
- Develop the student to a position for finding the cost of various building components (K3)
- Illustrate the calculation of quantities for earthwork of roads and canals to students (K3)
- Discuss to students about contracts and their types ,value a property(K2)
- Describe the students in calculating the approximate costs of building using various techniques(K2)
- Demonstrate the students in determining the quantities of different components of buildings(K3)

SYLLABUS

UNIT I

Introduction: General items of work in Building – Standard Units Principles of working out quantities for detailed and abstract estimates.

UNIT II

Rate Analysis: Working out data for various items of work over head and contigent charges.

UNIT III

Earthwork: Introduction to earthwork, Lead and lift, Earthwork volume calculation by mid-sectional area method, Mean sectional area method, Trapezoidal rule, Prismoidal rule estimation of quantities for canals

UNIT IV

Contracts: Types of contracts – Contract Documents – Conditions of contract, Valuation of buildings- Standard specifications for different items of building construction.

UNIT V

Approximate estimation of building: Introduction to approximate estimation of building, Advantages of estimating building by approximate estimation- Types of approximate estimation –problems on approximate estimation

UNIT VI

Detailed Estimation of Buildings: Estimation of quantities for one roomed building, two roomed building.

Text Books:

1. Estimating and Costing' by B.N. Dutta, UBS publishers, 2000.
2. Civil Engineering Contracts and Estimates' by B. S. Patil, Universities Press (India) Pvt.Ltd. Hyd.
3. Construction Planning and Technology' by Rajiv Gupta, CBS Publishers & Distributors Pvt.Ltd. New Delhi.
4 Estimating and Costing' by G.S. Birdie.

References:

1. 1'Standard Schedule of rates and standard data book' by public works department.
2. IS 1200 (Parts I to XXV-1974/ Method of Measurement of Building & Civil Engg Works – B.I.S.)
3. 'Estimation, Costing and Specifications' by M. Chakraborthi; Laxmi publications.
4. National Building Code

Year/Sem	VII Sem	L	T	P	C	COURSE CODE
Regulation	V18	3	0	0	3	V18CET26
Name of the Course	**ENVIRONMENTAL ENGINEERING-II**					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of this course, the students will be able to:

- Estimate the sewage and storm water flow and design the sewerage system (K3)
- Relate the appropriate pumps in the sewerage systems (K3)
- Analyze sewage quality and design suitable primary treatment units (K3)
- Employ the secondary treatment units (K3)
- Employ miscellaneous treatment units (K3)
- Identify suitable disposable method with respect to effluent standards.(K2)

SYLLABUS

UNIT I

Introduction: Sanitation – Systems of sanitation – relative merits & demerits – collection and conveyance of waste water – sewerage – classification of sewerage systems- Estimation of sewage flow and storm water drainage – fluctuations – types of sewers - Hydraulics of sewers and storm drains– design of sewers – appurtenances in sewerage – cleaning and ventilation of sewers

UNIT II

Pumping of Wastewater: Pumping stations – location – components– types of pumps and their suitability with regard to wastewaters – Problems in sewage pumping.

House Plumbing: Systems of plumbing-sanitary fittings and other accessories–one pipe and two pipe systems – Design of building drainage

UNIT III

Characteristics and Treatment of sewage: Sampling and analysis of wastewater - Physical, Chemical and Biological Examination-Measurement of BOD and COD - BOD equations

Primary treatment of sewage - Screens-grit chambers-grease traps–floatation–sedimentation – design of preliminary and primary treatment units.

UNIT IV

Secondary Treatment: Aerobic and anaerobic treatment process-comparison. Suspended growth process: Activated Sludge Process, principles, designs, and operational problems, modifications of Activated Sludge Processes, Oxidation ponds, Aerated Lagoons, Fluidized bed reactors.

Attached Growth Process: Trickling Filters–mechanism of impurities removal- classification–design-operation and maintenance problems, Rotating Biological Contactors.

UNIT V

Miscellaneous Treatment Methods: Nitrification and Denitrification – Removal of Phosphates –UASB–Membrane reactors-Integrated fixed film reactors. Anaerobic Processes: Septic Tanks and Imhoff tanks- working Principles and Design–Reuse and disposal of septic tank effluent.

UNIT VI

Sludge Management: Characteristics-SVI, handling and treatment of sludge-thickening – anaerobic digestion of sludge, Sludge Drying Beds. Centrifuge.

Disposal of sewage: Methods of disposal – disposal into water bodies-Oxygen Sag Curve-Disposal into sea, disposal on land- sewage sickness.

Text Books:

1. Wastewater Engineering Treatment and Reuse, Metcalf & Eddy, Tata McGraw-Hill edition.
2. Industrial Water and Wastewater Management, K.V.S.G. Murali Krishna.
3. Elements of Environmental Engineering, K. N. Duggal, S. Chand & Company Ltd. New Delhi, 2012.

References:

1. Environmental Engineering, Howard S. Peavy, Donald R. Rowe, Teorge George Tchobanoglus – Mc-Graw-Hill Book Company, New Delhi, 1985
2. Wastewater Treatment for Pollution Control and Reuse, Soli. J Arceivala, Sham R Asolekar, Mc-GrawHill, NewDelhi; 3rd Edition
3. Environmental Engineering –II: Sewage disposal and Air Pollution Engineering, Garg, S. K., Khanna Publishers
4. Sewage treatment and disposal, P. N. Modi & Sethi.
5. Environmental Engineering, Ruth F. Weiner and Robin Matthews – 4th Edition Elsevier, 2003
6. Environmental Engineering, D. Srinivasan, PHI Learning Private Limited, New Delhi, 2011.

Year/Sem	VII Sem	L	T	P	C	COURSE CODE
Regulation	V18	3	0	0	3	V18CET27
Name of the Course	PAVEMENT ANALYSIS AND DESIGN					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of this course the student will be able to

- Understand the factors influencing the design methodologies.(K2)
- Analyze stresses and strains in a flexible pavement using multi-layered elastic theory (K3)
- Analyze stresses and strains in a rigid pavement using Westergaard's theory (K3)
- Design a flexible pavement using IRC, Asphalt Institute, and AASHTO methods (K3)
- Design a rigid pavement using IRC, and AASHTO methods (K3)
- Design of joints, Dowel & tie bars.(K3)

SYLLABUS

UNIT I

Factors Affecting Flexible Pavement Design: Variables Considered in Pavement Design, Types of Pavements, Functions of Individual Layers, EAL and ESWL Concepts, Traffic Analysis: ADT, AADT, Truck Factor, Growth Factor, Lane Distributions & Vehicle Damage Factors, Effect of Transient & Moving Loads.

UNIT II

Factors Affecting Rigid Pavement Design : Rigid pavement layers**,** Classification of Axle Types of Rigid Chassis and Articulated Commercial Vehicles, Legal Axle and Gross Weights on Single and Multiple Units, Tire Pressure, Contact Pressure,

UNIT III

Stresses in Flexible Pavement: Vehicle-Pavement Interaction: Transient, Random & Damping Vibrations, Steady State of Vibration, Experiments on Vibration, Stress Inducing Factors in Flexible and Rigid pavements; Stress In Flexible Pavements: Visco-Elastic Theory and Assumptions, Layered Systems Concepts, Stress Solutions for One, Two and Three Layered Systems, Fundamental Design Concepts;.

UNIT IV

Stresses in Rigid Pavements: Westergaard's Theory and Assumptions, Stresses due to Curling, Stresses and Deflections due to Loading, Frictional Stresses, and Stresses in Dowel Bars & Tie Bars

UNIT V

Design of Flexible Pavements: Factors effecting Design. Deflection studies in Flexible Pavements. Present Serviceability Index.IRC guidelines for Flexible Pavements. Pavement Performance and methods- AASHTO and Asphalt Institute Method. Need for Overlays, Overlays design methods for Flexible and Rigid pavements.

UNIT VI

Design of Rigid Pavements: Factors effecting Design – Wheel load & its repetition, subgrade strength & proportion, strength of concrete- modulus of elasticity. Reinforcement in slab. Design of joints. Design of Dowel bars. Design of Tie bars. IRC and AASHTO methods of Rigid Pavement design.

Text Books:

1. Principles of Pavement Design, Yoder.J. &Witzorac Mathew, W. John Wiley & Sons Inc
2. Pavement Analysis & Design, Yang H. Huang, Prentice Hall Inc.
3. AASHTO Pavement Design Guide (1993)

References:

1. Design of Functional Pavements, Nai C. Yang, McGraw Hill Publications
2. Concrete Pavements, AF Stock, Elsevier, Applied Science Publishers.
3. Pavement and Surfacing for Highway & Airports, Micheal Sargious, Applied Science Publishers Limited.
4. IRC: 37 & 58 Codes for Flexible and Rigid Pavements Design.

Year/Sem	VII Sem	L	T	P	C	COURSE CODE
Regulation	V18	3	0	0	3	V18CET28
Name of the Course	**AIR POLLUTION AND CONTROL**					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of this course, the students will be able to:

- Understand the ambient air quality based on the analysis of air pollutants
- employ particulate and gaseous control measures for an industry
- Illustrate the plume behavior in a prevailing environmental condition
- Estimate carbon credits for various day to day activities
- operate air pollution gases methods(K3)
- Classify the air pollution controlling methods(K4)

SYLLABUS

UNIT I

Air Pollution: Sampling and analysis of air pollutants, conversion of ppm into µg/m3. Definition of terms related to air pollution and control - secondary pollutants – Indoor air pollution – Ozone holes and Climate Change and its impact - Carbon Trade.

UNIT II

Thermodynamics and Kinetics of Air-pollution: Applications in the removal of gases like SOx, NOx, CO and HC - Air-fuel ratio- Computation and Control of products of combustion, Automobile pollution. Odour pollution control, Flares.

UNIT III

Meteorology and Air Pollution: Properties of atmosphere: Heat, Pressure, Wind forces, Moisture and relative Humidity, Lapse Rates - Influence of Terrain and Meteorological phenomena on plume behaviour and Air Quality - Wind rose diagrams and Isopleths Plume Rise Models

UNIT IV

Ambient Air Quality Management: Monitoring of SPM - RPM SO2; NOx and CO - Stack Monitoring for flue gases - Micro-meteorological monitoring – Noise Monitoring - Weather Station. Emission Standards- Gaussian Model for Plume Dispersion

UNIT V

Air Pollution Control: Control of particulates – Control at Sources, Process Changes, Equipment modifications, Design and operation of control Equipments – Settling Chambers, Cyclone separators –Fabric filters– Scrubbers, Electrostatic precipitators

UNIT VI

Air Pollution Control Methods: Control of NOx and SOx emissions – Environmental friendly fuels - In-plant Control Measures, process changes, methods of removal and recycling. Environmental criteria for setting industries and green belts.

Text Books:

1. Air Pollution and Control, K.V.S.G. Murali Krishna, Laxmi Publications, New Delhi, 2015

2. Air Pollution, M. N. Rao and H. V. N. Rao, Tata McGraw Hill Company.

3. Environmental Science and Engineering by J.G. Henry and G.W. Heinke – Pearson Education.

References:

1. An Introduction to Air pollution, R. K. Trivedy and P.K. Goel, B.S. Publications.

2. Air Pollution by Wark and Warner - Harper & Row, New York.

Year/Sem	VII Sem	L	T	P	C	COURSE CODE
Regulation	V18	3	0	0	3	V18CET29
Name of the Course	**IRRIGATION ENGINEERING**					
Branch	CIVIL ENGINEERING					

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:

- Explain the importance, type and quality of Irrigation Water (K2)
- Estimate the Irrigation water requirements (K2)
- Asses different parameters needed for the design of irrigation canal networks (K3)
- Asses different irrigation canal structures (K3)
- Asses different diversion head works (K3)
- Assess the stability of gravity and earth dams (K3)

SYLLABUS

UNIT I

Introduction: Definition – Importance of Irrigation in India – Advantages and Dis advantages – Types of Irrigation – Quality of Irrigation water- Different types techniques used for water distribution in field.

UNIT II

Irrigation and Water Requirement of Crops: Different types of crops and crop seasons- Soil, water and plant relationship- Irrigation efficiencies-Consumptive use –Estimation of consumptive use-Crop water requirement-Duty and Delta-Factors affecting duty-Depth and Frequency of Irrigation-Water logging and Drainage-crop rotation.

UNIT III

Canals: Classification-Alluvial and Non Alluvial canals-Design of non-erodible canals-Different command areas-Methods of economic section and maximum permissible velocity-Design of erodible canals-Kennedy's silt theory and Lacey's regime theory.

UNIT IV

Canal structures: Falls-Types and location- Design principle of Sarda type wall and straight glacis wall

Regulators: Head and cross regulators –design principles

Cross Drainage works: Design principles of aqueduct- siphon aqueduct- super passage

Outlets: Types-proportionality-sensitivity and flexibility

UNIT V

Diversion Head Works: Types of diversion head works-Weirs and Barrages-Layout of diversion head works-components- causes and failures of weirs on permeable foundations-Bligh's creep theory-Khosla's theory-exit gradient.

UNIT VI

Reservoir planning: Site selection-zones of storage-yield and storage capacity of reservoir and reservoir sedimentation-Types of dams- selection of type of dam-selection of site for a dam.

Gravity Dams: Forces acting on gravity dam-causes of failure of gravity dam-elementary profile and practical profile of gravity dam-limiting height of dam-stability analysis-drainage galleries-grouting.

Earthen Dams: Types of earthen dams-causes of failure-criteria for safe design-seepage-measures of control of seepage filters.

Text Books:

1. Irrigation Engineering and Hydraulic structures, Santosh Kumar Garg, Khanna Publishers.
2. Irrigation and Water power Engineering, B.C. Punmia, Pande B.B. Lal, Ashok Kumar Jain, Arun Kumar Jain, Lakshmi Publications Ltd.
3. Water resources and Irrigation engineering by Sri Krishna publications.

References:

1. Irrigation and Water Resources Engineering, Asawa G L (2013), New Age International Publishers.
2. Irrigation Water Resources and Water Power Engineering, Modi P N (2011), Standard book House, New Delhi.
3. Irrigation and Drainage Engineering" by Peter Waller and Muluneh Yitayew

Year/Sem	**VII Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V18	3	0	0	3	V18CET30
Name of the Course	**BRIDGE ENGINEERING**					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion the course the student will be able to

- Generalize different types of Bridges with diagrams and Loading standards (K2)
- Asses the moments in the girders (K3)
- Illustrate different sub structural works of bridges (K3)
- Illustrate different parameters of Well Foundations (K3)
- Report the effectiveness of different Bearings of a Bridge (K2)
- Generalize the suspension bridge and cable stayed bridge (K2)

SYLLABUS

UNIT I

Introduction: Bridges- Types- Slab bridges, T Beam, Arch bridges, Cable Stayed bridges, prestressed concrete bridges, Truss Bridges, Culverts, - Nomenclature- Selection of Bridge Site- Economical span- Abutments pier and end connections- types of foundations- Open, Pile, Well Foundations, Bearings – Types- Introduction to Loading standards- Railway and IRC Loading

UNIT II

T-Beam Bridge: Pigeaud's method for computation of slab moments; Courbon's method for computation of moments in girders; Design of simply supported T-beam bridge.

UNIT III

Sub Structure for Bridges: Pier and abutment caps; Materials for piers and abutments, Design of pier; Design of abutment; Backfill behind abutment; approach slab.

UNIT IV

Foundations For Bridges: scour at abutments and piers; Grip length; Types of foundations; Design of well foundation.

Box Culverts: Loading – Analysis and Design- Reinforcement detailing

UNIT V

Bearings for Bridges: Importance of bearings; bearings for slab bridge; bearings for girder bridges; Expansion bearings; Fixed bearings; Design of elastomeric pad bearing.

UNIT VI

Cable Supported Bridge: Different types of cable supported bridge, difference between suspension bridge and cable stayed bridge. Different components and factors considered for design of a) suspension bridge, b) cable stayed bridge.

Text Books:

1. Essentials of Bridge Engineering by Dr. Johnson Victor; Oxford & IBH publishing Co. Pvt.Ltd
2. Cable supported bridges, concepts and design by N J Gimsing. John Willey and Sons
3. Design of Bridges, N. Krishna Raju, Tata McGraw Hill

References:

1. Design of Bridge Structures by T. R Jagadeesh, M.A Jayaram, Prentice Hall of India Pvt. Ltd.
2. Design of Concrete Bridges, Aswini, Vazirani, Ratwani
3. Bridge Engineering by S.Ponnuswamy

Year/Sem	VII Sem	L	T	P	C	COURSE CODE
Regulation	V18	3	0	0	3	V18CET31
Name of the Course	**ADVANCED FOUNDATION ENGINEERING**					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of this course, the student will be able to

- Illustrate the safe bearing capacity of footings subjected to different types of loading on varied soil strata using different methods (K3)
- Compute the settlements of foundations using advanced methods (K3)
- Employ different techniques for proportioning of foundations laid on different soils strata (K3)
- Assess the forces acting on Earth Retaining Structures using different Earth Pressure Theories (K3)
- Predict the load carrying capacity, pull-out capacity, negative skin friction of piles and their settlements (K3)
- Interpret different foundation practices in expansive soils (K3)

SYLLABUS

UNIT I

Bearing capacity of Foundation susing general bearing capacity equation–Meyerhof's, Brinch Hansen's and Vesic's methods-Bearing capacity of Layered Soils:Strong layer over weak layer, Weak layer on strong layer – Bearing capacity of foundations on at opof slope– Bearing capacity of foundations at theedge of the slope.

UNIT II

Settlement analysis: Immediate settlement of footings resting on granular soils –Schmertmann& Hartman method – De Beer and Martens method - Immediate settlement inclays–Janbu'smethod–correction for consolidation settlement using Skempton and Bjerrum's method – Correction for construction period

UNIT III

Mat foundations – Purpose and types of isolated and combined footings – Mats/Rafts – Proportioning of footings – Ultimate bearing capacity of mat foundations – allowable bearing capacity of mats founded in clays and granular soils– compensated rafts.

UNIT IV
Earth-retaining structures – cantilever sheet piles – anchored bulkheads – fixed and free earth support methods – design of anchors – braced excavations – function of different components– forces in ties – stability against bottom heave.

UNIT V
Pile foundations – single pile versus group of piles – load-carrying capacity of pile groups – negative skin friction (NSF) -settlement of pile groups in sands and clays – laterally loaded piles in granular soils – Reese and Matlock method – laterally loaded piles in cohesive soils– Davisson and Gill method – Broms'analysis.

UNIT VI
Foundationsinexpansivesoils–definitionsofswellpotentialandswellingpressure – determination of free swell index – factors affecting swell potential and swelling pressure – foundation practices – sand cushion method – CNS layer - drilled piers and belled piers– under-reamed piles – moisture control methods.

Text Books:
1. Principles of Foundation Engineering, B M Das, CENTAG Learning
2. Soil Mechanics and Foundation Engineering, V N S Murthy, CBS Publishers
3. Basic and applied soil mechanics by Gopal Ranjan and ASR Rao, New Age Publishers

References:
1. Foundation Analysis and Design, J.E.Bowles, JohnWiley
2. Foundation Design, W.C.Teng, PrenticeHallPublishers
3. Analysis and Design of Foundations and Retaining Structures by Prakash S edited by Saritha Prakashan

Year/Sem	**VII Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation / Year	V18 / 2021-2022	3	0	0	3	V18CET32
Name of the Course	**TRAFFIC ENGINEERING & MANAGEMENT**					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of the course the student will be able to:

- Understand basics principles of Traffic Engineering(K2)
- Analyze parking data and model accidents(K3)
- Determine capacity and LOS(K3)
- Design of Signalized systems at congested intersections(K3)
- Design of interchanges and Rotary Intersections(K3)
- To provide engineering techniques to achieve Safe and efficient movement of people
  and goods on roadways(K2)

SYLLABUS

UNIT I

Traffic Studies (Part- I) : Basic principles of Traffic, Volume, Speed and Density; Definitions and their interrelationships; Traffic Volume studies - Objectives, Methods of Volume counts, Presentation of Volume Data; Speed studies- Types of Speeds, Objectives, Methods of speed studies, Statistical Methods for speed data Analysis, Presentation of speed data. Delay Studies; Head ways and Gap Studies - Headway and Gap acceptance, Origin and Destination Studies.

UNIT II

Traffic Studies (Part-II) : Parking Studies: parameters of parking, definitions, Parking inventory study, Parking survey by Patrolling method; Analysis of Parking Survey data; Accident studies - Causative factors of Road accidents, Accident data collection: Accident analysis and modeling; Road Safety Auditing, Measures to increaseRoadsafety.

UNIT III

Capacity and LOS Analysis: Introduction to Traffic capacity, Analysis concepts, Level of Service, Basic definitions, Factors affecting Capacity and LOS, Capacity of Urban/Rural Highway, With or without access control, Basic freeway segments - Service flow rate of LOS, Lane width or Lateral clearance adjustment; Heavy vehicle adjustment; Driver population adjustment.

UNIT IV

Signal Designing: Fixed Time signals, Determination of Optimum Cycle length and Signal setting for Fixed Time signals, Warrants for Signals, Time Plan Design for Pre-Timed Control- Lane group analysis, Saturation flow rate, and Adjustment factors, Uniform and Incremental Delay, Vehicle Actuated Signals, Signal Coordination.

UNIT V

Design of Intersections: Rotary Design, Weaving angles, Entry width, Exit Radius, Capacity of Rotary, Types of interchanges, Implementation.

UNIT VI

Transportation System Management: Measures for Improving vehicular flow – one way Streets, Signal Improvement, Transit Stop Relocation, Parking Management, Reversible lanes- Reducing Peak Period Traffic - Strategies for working hours, Congestion Pricing, Differential Toll Policies.

Text Books:

1. Traffic Engineering and Transportation Planning – L.R. Kadiyali, Khanna Publishers
2. Principles of Highways Engineering and Traffic Analysis - Fred Mannering & Walter Kilareski, John Wiley & Sons Publication.
3. Transportation Engineering - An Introduction - C. Jotin Khisty, Prentice Hall Publication.

References:

1. Fundamentals of Transportation Engineering - C. S. Papacostas, Prentice Hall India.
2. Traffic Engineering - Theory & Practice - Louis J. Pignataro, Prentice Hall Publication.
3. Traffic Engineering by Roger P. Roess, William R. Mc. Shane, Elena S. Prassas , Prentice Hall, 1977.
4. Relevant IRC Codes

Year/Sem	**VII Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V18	3	0	0	3	V18CET33
Name of the Course	**CONSTRUCTION PROJECT PLANNING & SYSTEMS**					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of this course the student will be able to

- Identify the importance of Project Manager, Project Planning & scheduling and different charts (K3)
- Solve the networks by using different network analysis methods such as PERT & CPM (K2)
- Discuss the functioning of various Construction equipment & Earthwork equipment (K2)
- Discuss the functioning of various Hoisting equipment (K2)
- Discuss the methods of production of Aggregate products and concreting (K2)
- Describe the Quality control, Safety Engineering and construction techniques (K2)

SYLLABUS

UNIT I

Introduction: Construction project management and its relevance – qualities of a project manager – project planning – coordination –scheduling - monitoring – bar charts – milestone charts

UNIT II

PERT & CPM: Project Evaluation and Review Technique – Critical Path Method – Applications- cost analysis - updating – crashing for optimum cost – crashing for optimum resources – allocation of resources

UNIT III

Construction & Earthwork equipment: Economical considerations – earthwork equipment – Trucks and handling equipment – rear dump trucks – capacities of trucks and handling equipment – calculation of truck production – compaction equipment – types of compaction rollers.

UNIT IV

Hoisting Equipment: Hoists – cranes – tractors - bulldozers – graders – scrapers– draglines - clamshell buckets

UNIT V

Concreting Equipment: Crushers – jaw crushers – gyratory crushers – impact crushers – selection of crushing equipment - screening of aggregate – concrete mixers – mixing and placing of concrete – consolidating and finishing

UNIT VI

Construction methods: Earthwork – piling – placing of concrete – form work – fabrication and erection – quality control and safety engineering

Text Books:

1. Construction Engineering and Management by Dr. S. Seetharaman, Umesh Publications.
2. Project planning and control with PERT and CPM by Dr. B. C. Punmia and K.K. Khandelwal, Laxmi Publications (P) Ltd.
3. Construction planning, Equipment and Methods by Peurifoy and Schexnayder, Shapira,TataMc.Grawhill.

References:

1. Construction project management theory and practice by Kumar NeerajJha, Pearson.
2. Construction Technology by Subir K. Sarkar and SubhajitSaraswati, Oxford University press.

Year/Sem	**VII Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V18	3	0	0	3	V18CET34
Name of the Course	**SOLID WASTE MANAGEMENT**					
Branch	CIVIL ENGINEERING					

Course Outcomes:
Upon successful completion of this course, the students will be able to

- Generalize Solid Waste and its management (K2)
- Assess different elements for managing Solid Waste (K3)
- Employ different methods for transfer and transport of solid waste (K3)
- Employ different methods for Separation and Transformation of Solid waste (K3)
- Organize different methods for processing and treatment of municipal solid waste (K3)
- Identify suitable disposal methods with respect to solid waste (K2)

SYLLABUS

UNIT I

Introduction to Solid Waste Management: Goals and objectives of solid waste management, Classification of Solid Waste – Factors Influencing generation of solid waste – sampling and characterization –Future changes in waste composition, major legislation, monitoring responsibilities.

UNIT II

Basic Elements In Solid Waste Management: Elements and their inter relationship – principles of solid waste management- onsite handling, storage and processing of solid waste Collection of Solid Waste: Types and methods of waste collection systems, analysis of collection system – optimization of collection routes.

UNIT III

Transfer and Transport: Need for transfer operation, compaction of solid waste – transport means and methods, transfer station types and design requirements.

UNIT IV

Separation and Transformation of Solid Waste: Unit operations used for separation and transformation: shredding – materials separation and recovery, source reduction and waste minimization.

UNIT V

Processing and Treatment: Processing of solid waste – Waste transformation through combustion and composting, anaerobic methods for materials recovery and treatment – Energy recovery – biogas generation and cleaning– Incinerators.

UNIT VI

Disposal of Solid Waste: Methods of Disposal, Landfills: Site selection, design and operation, drainage and leachate collection systems –designated waste landfill remediation.

Text Books:

1. George Techobanoglous "Integrated Solid Waste Management", McGraw Hill Publication, 1993
2. Gerard Kiely " Environmental Engineering", McGraw Hill Publication, 2007
3. J Glynn Henry,. Gary W.Heinke "Environmental Science and Engineering", Prentice-Hall of India Pvt Ltd, 1996

References:

1. Vesilind, P.A., Worrell, W., Reinhart, D. "Solid Waste Engineering", Cenage learning, New Delhi, 2004
2. Charles A. Wentz; "Hazardous Waste Management", McGraw Hill Publication, 1995.
3. Mackenzie L Davis, David A.Cornwell :Introduction to Environmental Engineering" McGraw Hill Publication, 2017

Year/Sem	**VII Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V18	3	0	0	3	V18CET35
Name of the Course	**GROUND WATER DEVELOPMENT**					
Branch	CIVIL ENGINEERING					

Course Outcomes

At the end of the course the student will be able to

- Analyse radial flow towards wells in confined and unconfined aquifers (K3)
- Design wells and understand the construction practices (K5)
- Construct the wells and development of ground water (K2)
- Determine the process of artificial recharge for increasing groundwater potential (K4)
- Employ different geo physical methods to explore ground water (K3)
- Apply appropriate measures for groundwater management (K3)

SYLLABUS

UNIT I

Introduction: Groundwater in the hydrologic cycle, groundwater occurrence, aquifer parameters and their determination, general groundwater flow equation.

Well Hydraulics Steady radial flow and unsteady radial flow to a well in confined and unconfined aquifers, Theis solution, Jocob and Chow's methods, Leaky aquifers.

UNIT II

Well Design: Water well design-well diameter, well depth, well screen-screen length, slot size, screen diameter and screen selection, design of collector wells, infiltration gallery.

UNIT III

Well Construction and Development: Water wells, drilling methods-rotary drilling, percussion drilling, well construction-installation of well screens-pull-back method, open- hole, bail- down and wash-down methods, well development-mechanical surging using compressed air, high velocity jetting of water, over pumping and back washing, well completion, well disinfection, well maintenance.

UNIT IV

Artificial Recharge: Concept of artificial recharge of groundwater, recharge methods-basin, stream-channel, ditch and furrow, flooding and recharge well methods, recharge mounds and induced recharge

Saline Water Intrusion: Occurrence of saline water intrusion, Ghyben-Herzberg relation, Shape of interface, control of saline water intrusion.

UNIT V

Geophysics: Surface methods of exploration of groundwater – Electrical resistivity and Seismic refraction methods, Sub-surface methods – Geophysical logging and resistivity logging. Aerial Photogrammetry applications.

UNIT VI

Groundwater Modeling and Management: Basic principles of groundwater modelling- Analog models-viscous fluid models and membrane models, digital models-Finite difference and finite element models, Concepts of groundwater management, basin management by conjunctive use-case studies.

Text Books:

1. Groundwater, Raghunath H M, New Age International Publishers, 2005.
2. Groundwater Hydrology, Todd D. K., Wiley India Pvt Ltd., 2014.
3. Groundwater Hydrology, Todd D K and L W Mays, CBS Publications, 2005.

References:

1. Groundwater Assessment and Management, Karanth K R, Tata McGraw Hill Publishing Co., 1987.
2. Groundwater Hydrology, Bouwer H, McGraw Hill Book Company, 1978.
3. Groundwater Systems Planning and Management, Willis R and W.W.G. Yeh, Prentice Hall Inc., 1986.
4. Groundwater Resources Evaluation, Walton W C, McGraw Hill Book Company,1978.

Year/Sem	**VII Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V18	3	0	0	3	V18CET36
Name of the Course	**EARTHQUAKE ENGINEERING**					
Branch	CIVIL ENGINEERING					

Course Outcomes

At the end of the course the student will be able to

- Differentiate types of lodes and it's characteristic(K2)
- Recognize foundations of many basic engineering concepts related earthquake engineering(K2)
- Examine the strong ground motion and seismic hazard(K3)
- Assess the frequency of wave propagation in different mediums(K3)
- Find the behavior of structures during earthquake and earthquake resistant Features of structure(K3)
- Relate the properties of liquefaction and soil improvement for remediation of seismic hazards(K3)

SYLLABUS

UNIT I

Introduction to Dynamic Loads: Static Load v/s Dynamic Load, Types of Dynamic forces, Force Control and Displacement Control.

UNIT II

Seismology and Earthquakes: Introduction, Seismic Hazards, seismic waves, internal structure of earth, Continental drift and plate tectonics, faults, elastics rebound theory, geometric notations, location of earthquakes, size of earthquakes.

UNIT III

Strong Ground Motion: Strong ground motion measurement, ground motion parameters, estimation of ground motion parameters.

Seismic Hazard Analysis: Identification and Evaluation of Earthquake Sources, deterministic seismic hazard analysis, probabilistic seismic hazard analysis.

UNIT IV

Wave Propagation: Waves in unbounded media, waves in a semi – infinite body, waves in a layered media, attenuation of stress waves.

Artificial Ground Motion Generation: Modification of actual ground motion records, time –domain generation, frequency domain generation.

UNIT V

Behavior of Structures: During Earthquake and Earthquake Resistant Features of Structure Inertia forces in structures, Behavior of Masonry Structures, Behavior of RC Structures

UNIT VI

Liquefaction: Flow liquefaction, cyclic mobility, evaluation of liquefaction hazards, liquefaction susceptibility, initiation of liquefaction, effects of liquefaction.

Soil Improvement for Remediation of Seismic Hazards: Densification techniques, Reinforcement Techniques, Grouting and Mixing techniques, Drainage techniques.

Text Books:

1. Earthquake Resistant Design of Structures By Pankaj Agarwal & Manish Shrikhande, PHI Publications
2. S. K. Duggal; Earthquake Resistance Design of Structures; Oxford University Press, New Delhi.
3. K. Chopra; Dynamics of Structures, Pearson, New Delhi
4. Park & Pauly; Behavior of R.C Structures
5. Geotechnical Earthquake Engineering by Steven L. Kramer, prentice Hall

Reference Books:

1. IS: 1893 (Part-I) 2002, Criteria for Earthquake Resistant Design General Provision to Building.
2. S: 13920 (1993), Code of Practice for Ductile Detailing of RC Structures
3. IS: 4326 (1993), Code of Practice for Earthquake Resistant Design and Construction of Buildings
4. IS: 13827 (1993), Improving Earthquake Resistance of Earthen Buildings
5. IS: 13828 (1993), Guide lines for Improving Earthquake Resistance of low Strength Masonry Buildings.
6. S S Rao; Mechanical Vibration; Pearson, New Delhi.

VIII SEMESTER – SYLLABUS

Year/Sem	VIII Sem	L	T	P	C	COURSE CODE
Regulation / Year	V18 / 2021-2022	3	0	0	3	V18CET37
Name of the Course	HIGHWAY CONSTRUCTION & MANAGEMENT					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon the successful completion of course students will be able to

- Understand the concepts of PMS and evaluate strategies for pavement maintenance (K2)
- Evaluate the pavements based on the functional and structural characteristics(K3)
- Understand constructions of Construction methods of Base, Subbase, Shoulders and drains(K2)
- Understand constructions of bituminous pavements(K2)
- Understand the concepts of construction of cement concrete pavements(K2)
- Evaluate the concepts of maintenance of cement concrete pavements(K3)

SYLLABUS

UNIT I

Pavement management system: Components of PMS and their activities; Major steps in implementing PMS; Inputs; Design, Construction and Maintenance; Rehabilitation and Feedback systems; Examples of HDM and RTIM packages; Highway financing; Fund generation; Evaluating alternate strategies and Decision criteria ; Pavement Maintenance Management Components of Maintenance Management and Related Activities – Network and Project Level Analysis; Prioritization Techniques and Formulation of Maintenance Strategies.

UNIT II

Pavement Inventories, Quality Control and Evaluation: Serviceability Concepts; Visual Rating; Pavement Serviceability Index; Roughness Measurements; Distress Modes – Cracking Rutting Etc; Pavement Deflection – Different Methods and BBD, Skid Resistance, Roughness, Safety – Aspects; Inventory System. Causes of Deterioration, Traffic and Environmental Factors, Pavement Performance Modeling Approaches and Methods of Maintaining WBM, Bitumen and Cement Concrete Roads, Quality Assurance; Quality Control – ISO 9000, Sampling Techniques – Tolerances and Controls related to Profile and Compaction.

UNIT III

Construction of Base, Subbase, Shoulders and Drain: Roadway and Drain Excavation, Excavation and Blasting, Embankment Construction, Construction of Gravel Base, Cement Stabilised Sub- Bases, WBM Bases, Wet Mix Construction; Crushed Cement Bases, Shoulder Construction; Drainage Surface, Turfing Sand Drains; Sand Wicks; Rope Drains, Geo- Textile Drainage; Preloading Techniques.

UNIT IV Bituminous Construction: Preparation and Laying of Tack Coat; Bituminous Macadam, Penetration Macadam, Built up Spray Grout, Open Graded Premix, Mix Seal, Semi-Dense Asphalt Concrete-Interface Treatments and Overlay Construction, IRC Specifications.

UNIT V Cement Concrete pavement Construction: Cement Concrete Pavement Analysis - Construction of Cement Roads, Manual, and Mechanical Methods, Joints in Concrete and Reinforced Concrete Pavement and Overlay Construction.

UNIT VI Bituminous and Cement Concrete pavement Maintenance: Repair of surface layer, Base layer, sub base layer, Sub grade. Maintenance of Concrete slab, Dry Lean concrete sub base layer and Subgrade in concrete pavement.

Text Books :

1. Highway Engineering, Khanna S. K., Justo C. E. G and Veeraragavan A, Nem Chand Bros., Roorkee.
2. Principles of Highway Engineering, Kadiyali L. R, Khanna Publishers, New Delhi.
3. MORTH - Specifications.

References:

1. Principles of Transportation Engineering, Partha Chakroborthy and Animesh Das PHI Learning Private Limited, Delhi.
2. Transportation Engineering - An Introduction, JotinKhisty C, Prentice Hall, Englewood Cliffs, New Jersey.
3. Transportation Engineering and Planning, Papacostas C.S. and P.D. Prevedouros,Prentice Hall of India Pvt.Ltd; New Delhi.

Year/Sem	VIII Sem	L	T	P	C	COURSE CODE
Regulation	V18	3	0	0	3	V18CET38
Name of the Course	REPAIR AND REHABILITATION OF STRUCTURES					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon the successful completion of course students will be able to

- Develop various maintenance and repair strategies(K2)
- Evaluate the existing buildings through field investigations(K2)
- Understand and use the different techniques for structural rehabilitation(K2)
- To assess damage to structures and various repair techniques(K2)
- To understand the importance of maintenance of structures(K2)
- Understand the importance of advanced concretes mixes(K2)

SYLLABUS

UNIT I

Introduction: Deterioration of Structures – Distress in Structures – Causes and Prevention. Mechanism of Damage – Types of Damage.

UNIT II

Non Destructive Testing: Corrosion of Steel Reinforcement – Causes – Mechanism and Prevention. Damage of Structures due to Fire – Fire Rating of Structures – Inspection and Testing – Symptoms and Diagnosis of Distress – Damage assessment

UNIT III

Materials for repair and rehabilitation: Admixtures- types of admixtures- purposes of using admixtures- chemical composition- Natural admixtures- Fibres- wraps- Glass and Carbon fibre wraps- Steel Plates

UNIT IV

Strengthening and stabilization: Techniques- design considerations-Beam shear capacity strengthening- Shear Transfer strengthening-stress reduction techniques- Column strengthening-flexural strengthening- Connection stabilization and strengthening, Crack stabilization

UNIT V

Fibre reinforced concrete: Properties of constituent materials- Mix proportions, mixing and casting methods-Mechanical properties of fiber reinforced concrete- applications of fibre reinforced concretes-Light weight concrete- properties of light weight concrete- No fines concrete- design of light weight concrete- Flyash concrete-Introduction- classification of flyash-properties and reaction mechanism of flyash- Properties of flyash concrete in fresh state and hardened state-Durability of flyash concretes.

UNIT VI

High performance concretes: Introduction- Development of high performance concretes- Materials of high performance concretes- Properties of high performance concretes- Self Consolidating concrete-properties-qualifications.

Text Books:

1. Maintenance and Repair of Civil Structures, B.L. Gupta and Amit Gupta, Standard

   Publications.
2. Concrete Technology by A.R. Santa Kumar, Oxford University press
3. Concrete technology by Neville and J J Brooks, Pearson publications, 2nd edition

References:

1. Concrete technology by M S Shetty, S. Chand publications (2006).
2. Defects and Deterioration in Buildings, EF & N Spon, London
3. Non-Destructive Evaluation of Concrete Structures by Bungey – Surrey University Press
4. Concrete Repair and Maintenance Illustrated, RS Means Company Inc W.H.Ranso, (1981)
5. Building Failures: Diagnosis and Avoidance, EF & N Spon, London, B.A. Richardson, (1991)

Year/Sem	VIII Sem	L	T	P	C	COURSE CODE
Regulation	V18	3	0	0	3	V18CET39
Name of the Course	RURAL WATER SUPPLY AND ONSITE SANITATION SYSTEMS					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon the successful completion of course students will be able to

- Relate various approaches for planning the water supply systems in rural areas (K3)
- Apply suitable methods of water treatment for rural areas(K3)
- Develop distribution system in rural areas (K3)
- Apply the sanitary engineering concept and principals(K3)
- Apply the different public sanitation methods in rural areas(K3)
- Apply different solid waste methods in rural areas(K3)

SYLLABUS

UNIT I

Concept of environmental and scope of sanitation in rural areas: Magnitude of problem of water supply and sanitation – population to be covered and difficulties National policy. Various approaches for planning of water supply systems in rural areas. Selection and development of preferred sources of water, springs, wells and infiltration galleries, collection of raw water from surface source.

UNIT II

Specific problems: Specific problems in rural water supply and treatment e.g. iron, manganese, fluorides etc. Low cost treatment, appropriate technology for water supply and sanitation. Improvised method and compact system of treatment of surface and ground waters such as MB settlers, slow and sand filter, chlorine diffusion cartridge etc. Water supply through spot sources, hand pumps, open dug –well.

UNIT III

Planning of distribution system in rural areas: Water supply during fairs, festivals and emergencies. Treatment and disposal of wastewater/sewage. Various method of collection and disposal of night soil.

UNIT IV

On site sanitation system and community latrines: Simple wastewater treatment system for rural areas and small communities such as stabilization ponds, septic tanks, soakage pits etc.

UNIT V

Industrial Hygiene And Sanitation: Occupational Hazards- Schools- Public Buildings- Hospitals- Eating establishments- Swimming pools – leanliness and maintenance and comfort- Industrial plant sanitation

UNIT VI

Solids Waste: Collection, Transfer, Transport and deposit of solid waste management, composting, land filling.

Text Books:

1. Low cost on site sanitation option, Hoffman & Heijno Occasional Nov.1981 paper no.

2. 21, P.O. Box 5500 2280 HM Rijswijk, the Netherlands offices, J.C. Mokeniaan, 5

3. Rijswijk (the Haque). Wagner, E.G. and Lanoik, J.N. water supply for rural areas and Small Communities, Geneva: W.H.O.1959.

References:

1. Manual of water supply and treatment, 3rd edition, CPHEEO, GOI, New Delhi.
2. Vesilind, P.A., Worrell, W., Reinhart, D. “Solid Waste Engineering”, Cenage learning, New Delhi, 2004

Year/Sem	**VIII Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V18	3	0	0	3	V18CET40
Name of the Course	**PRESTRESSED CONCRETE**					
Branch	CIVIL ENGINEERING					

COURSE OUTCOMES:

Upon the successful completion of course students will be able to

- Generalize the basic concepts of prestressed concrete (K2)
- Compute prestress and bending stresses (K3)
- Estimate effective prestress including the short- and long-term losses (K2)
- Analyze and design prestressed concrete beams under flexure (K4)
- Analyze and design prestressed concrete beams under Shear and torsion (K4)
- Generalize the end zone of prestressed concrete members (K2)

SYLLABUS

UNIT I

Introduction: Basic concepts of prestressing; Need for High strength steel and High strength concrete. Terminology; Advantages and Applications of Prestressed Concretes. Materials For Prestressed Concrete: High strength concrete; High tensile steel.

UNIT II

Prestressing Systems: Prestressing Systems- Introduction, Tensioning devices, Pre-tensioning Systems, Post tensioning Systems

Analysis of Prestress and Bending Stresses: Basic assumptions; Analysis of prestress; Resultant stresses at a section; Pressure (Thrust) line and internal resisting couple; Concept of Load balancing.

UNIT III

Losses of Prestress: Nature of losses of prestress; Loss due to elastic deformation of concrete, shrinkage of concrete, creep of concrete, relaxation of stress in steel, friction and anchorage slip; Total losses allowed for in design.

UNIT IV

Deflections of Prestressed Concrete Members: Importance of control of deflections; Factors influencing deflections; Short term deflections of un-cracked members; Effect of tendon profile on deflections.

Limit State of Collapse: Flexural Strength of Prestressed Concrete Sections: Ultimate flexural strength of rectangular sections and T-sections using simplified IS code recommendations.

UNIT V

Limit State of Collapse: Shear Resistance of Prestressed Concrete Members: Shear and principal stresses; Shear- IS Code recommendations: Ultimate shear resistance of prestressed concrete members; Design of shear reinforcement.

Torsional Resistance of Prestressed Concrete Members: Design of reinforcements for torsion, shear and bending.

UNIT VI

Design of End Blocks: Transmission of prestress in pretensioned members; Transmission length; Anchorage stress in post tensioned members; Bearing stress and bursting tensile force stresses in end blocks-Methods. IS Code provision for the design of end block reinforcement.

Text Books: (supplemented with IS: 1343)

1. Prestressed Concrete by N. Krishna Raju; Tata Mc.Graw - Hill Publishing Company Limited, New Delhi.
2. Pre-stressed Concrete- P. Dayarathnam: Oxford and IBH Publishing Co.
3. Prestressed Concrete, S. Ramamrutham

References:

1. Prestressed concrete by N. Rajagopalan; Narosa Publishing House.
2. Design of pre-stressed concrete structures- T.Y. Lin and Ned H. Burns - John Wiley & Sons, New York.
3. Fundamental of pre-stressed concrete- N.C. Sinha & S.K. Roy
4. Prestressed Concrete, T. Y. Lin & Burns, Wiley Publications

Year/Sem	VIII Sem	L	T	P	C	COURSE CODE
Regulation	V18	3	0	0	3	V18CET41
Name of the Course	**ENGINEERING WITH GEO-SYNTHETICS**					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of this course, the students will be able to

- Relate the need and demand of geo-synthetic materials in the field of geotechnical construction works (K3)
- Employ various parameters related to the use and application of geotextiles, geogrids (K3)
- Examine the use and field testing of geo-synthetics in road construction (K3)
- Design reinforced earth retaining walls with strip, sheet and gird reinforcement (K5)
- Distinguish survivability requirements of geo-composites and could design geowebs, geocells, and moisture barriers and natural geotextiles etc. (K4)
- Employ other methods to use the natural geotextiles like jute fibres, coir, bamboo and their combination (K3)

SYLLABUS

UNIT I

Geosynthetics: Introduction to Geosynthetics – Basic description – Polymeric materials– Uses and Applications. Properties of Geotextiles – Geogrids – Geomembranes – Geocomposites.

UNIT-II

Geotextiles: Design criteria for Separation – Reinforcement – Stabilization – Filtration – Drainage and Moisture barriers.

Geogrids: Designing for Reinforcement – Stabilization – Designing Gabions – Construction methods.

UNIT-III

Use of Geosynthetics in Roads: Geosynthetics in road ways- applications role of subgrade conditions-design criteria-survivability-application in paved roads.

UNIT-IV

Reinforced Earth Retaining Walls: Components - External stability – Internal stability-Design of reinforced earth walls with strip, sheet and grid reinforcement.

UNIT-V

Geomembranes: Pond Liners – Covers for Reservoirs – Canal Liners – Landfill Liners– Caps and closures, moisture barriers.

Geocomposites: An added advantage – Geocomposites in Separation – Reinforcement – Filtration – Geocomposites as Geowebs and Geocells.

UNIT-VI

Natural Geotextiles: Natural fibres as geotextiles- factors governing the use jute fibres-coir geotextiles-bamboo/timber-combination of geotextiles.

Text Books:

1. Designing with Geosynthetics by Robert M. Koerner, Prantice Hall, Eaglewood Cliffs, NJ.

2. An Introduction to Soil Reinforcement and Geosynthetics' by G.L.Sivakumar Babu

(2009), Universities Press (India) Pvt. Ltd.

3. Engineering with Geosynthetics', by G. Venkatappa Rao and GVS Suryanarayana Raju –

Tata McGraw Hill Publishing Company Limited – New Delhi.

References:

1. 'Construction and Geotechnical Engineering using Synthetic Fabries' by Robert M.

Koerner and Josoph P. Welsh. John Willey and Sons, New York.

2. 'Foundation Analysis and Design' by J.E. Bowles McGraw Hill Publications.

Year/Sem	**VIII Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V18	3	0	0	3	V18CET42
Name of the Course	**URBAN HYDROLOGY & HYDRAULICS**					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of this course, the students will be able to

- Generalize the effect of urbanization on hydrological cycle (K2)
- Develop intensity duration frequency curves for urban drainage systems (K3)
- Calculate runoff parameters in urban drainage system (K3)
- Develop design storms to size the various components of drainage systems (K3)
- Apply best management practices to manage urban flooding (K3)
- Prepare master drainage plan for an urbanized area (K3)

SYLLABUS

UNIT I

Introduction: Urbanization and its effect on water cycle – urban hydrologic cycle – Trends in urbanization – Effect of urbanization on hydrology

UNIT II

Precipitation Analysis: Importance of short duration of rainfall and runoff data, methods of estimation of time of concentration for design of urban drainage systems, Intensity-Duration -Frequency (IDF) curves, design storms for urban drainage systems.

UNIT III

Approaches to urban drainage: Time of concentration, peak flow estimation approaches, rational method, NRCS curve number approach, runoff quantity and quality, wastewater and storm water reuse, major and minor systems.

UNIT IV

Elements of drainage systems: Open channel, underground drains, appurtenances, pumping, source control.

UNIT V

Analysis and Management: Storm water drainage structures, design of storm water network- Best Management Practices–detention and retention facilities, swales, constructed wetlands, models available for storm water management.

UNIT VI

Master drainage plans: Issues to be concentrated upon – typical urban drainage master plan, interrelation between water resources investigation and urban planning processes, planning objectives, comprehensive planning, use of models in planning.

Text Books:

1. Manual on Drainage in Urbanised area, Geiger W. F., J Marsalek, W. J. Rawls and F.C. Zuidema, (1987 - 2 volumes), UNESCO,

2. Urban Hydrology, Hall M J (1984), Elsevier Applied Science Publisher.

3. Hydrology – Quantity and Quality Analysis, Wanielista M P and Eaglin (1997), Wiley and Sons

4. Urban Hydrology, Hydraulics and Storm water Quality: Engineering Applications and Computer Modelling, Akan A.O and R.L. Houghtalen (2006), Wiley International.

References:

1. Storm water Detention for Drainage, Stahre P and Urbonas B (1990), Water Quality and CSO Management, Prentice Hall.

2. Urban water cycle processes and interactions, Marsalek et.al. (2006), Publication No. 78, UNESCO, Paris (http://www.bvsde.paho.org/bvsacd/cd63/149460E.pdf)

3. Frontiers in Urban Water Management – Deadlock or Hope, by Maksimovic C and J A Tejada-Guibert (2001), IWA Publishing

Year/Sem	**VIII Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V18	3	0	0	3	V18CET43
Name of the Course	**ENVIRONMENTAL IMPACT ASSESSMENT AND MANAGEMENT**					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of the course, the student will be able to

- Prepare EMP, EIS, and EIA report (K3)
- Select the an appropriate EIA methodologies (K2)
- Assess the Impact of development activities and land use (K3)
- Employ in procuring the natural resources for assessing the environment (K3)
- Assess the ecosystem (K3)
- Develop the EIA notifications and reports (K3)

SYLLABUS

UNIT I

Basic concept of EIA: Elements of EIA-factors affecting EIA-Initial environmental Examination-life cycle analysis preparation of Environmental Base map-Classification of environmental parameters role of stakeholders in the EIA preparation stages in EIA

UNIT II

E I A Methodologies: introduction, Criteria for the selection of EIA Methodology, E I A methods, Ad-hoc methods, matrix methods, Network method Environmental Media Quality Index method, overlay methods, cost/benefit Analysis – EIS and EMP

UNIT III

Impact of Developmental Activities and Land use: Introduction and Methodology for the assessment of soil and ground water, Delineation of study area, Identification of actives- application of remote sensing and GIS for EIA.

UNIT IV

Procurement of natural resources: Procurement of relevant soil quality, Impact prediction, Assessment of Impact significance, Identification and Incorporation of mitigation measures - E I A with reference to surface water, Air and Biological environment: Methodology for the assessment of Impacts on surface water environment, generalized approach for assessment of Air pollution Impact.

UNIT V

Assessment of ecosystem: Assessment of Impact of development Activities on Vegetation and wildlife, environmental Impact of Deforestation. Environmental Risk Assessment and Risk management in EIA: Risk assessment and treatment of uncertainty-key stages in performing an Environmental Risk Assessment advantages of Environmental Risk Assessment

UNIT VI

EIA notification: EIA notification by Ministry of Environment and Forest (Govt. of India): Provisions in the EIA notification, procedure for environmental clearance, and procedure for conducting environmental impact assessment report- evaluation of EIA report. Environmental legislation objectives, evaluation of Audit data and preparation of Audit report. Post Audit activities, Concept of ISO and ISO 14000. Case studies and preparation of Environmental Impact assessment statement for various Industries.

Text Books:

1. Environmental Impact Assessment, Canter Larry W., McGraw-Hill education Edi (1996)

2. Environmental Impact Assessment Methodologies, Y.Anjaneyulu, B. S. Publication, Sultan Bazar, Hyderabad.

3. Environmental Impact Assessment and Management, B B Hosetti, A.Kumar, Daya Publishing House (2014)

References:

1. Environmental Science and Engineering, J. Glynn and Gary W. Hein Ke PrenticeHall Publishers

2. Environmental Science and Engineering, Suresh K. Dhaneja, S. K. ,Katania & Sons Publication., New Delhi.

3. Environmental Pollution and Control, H. S. Bhatia, Galgotia Publication (P) Ltd, Delhi

Year/Sem	**VIII Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V18	3	0	0	3	V18CET44
Name of the Course	**ADVANCED CONCRETE TECHNOLOGY**					
Branch	CIVIL ENGINEERING					

Course Outcomes

Upon successful completion of course the students will be able to

- Relate material characteristics and their influence on microstructure of concrete(K3)
- Predict concrete behavior based on its durability properties(K3)
- Illustrate proportioning of different types of concrete mixes for required fresh and hardened properties using professional codes(K3)
- Select a suitable type of concrete based on specific application(K3)
- Employ suitable concreting methods to place the concrete based on requirement(K3)
- Illustrate different types of concrete tests for hardened properties(K3)

SYLLABUS

UNIT I

Ingredients of Concrete: Cement –chemical composition and their importance, hydration of cement, types of cement. Testing of cement.
Fine aggregate: Functions, requirement, Alternatives to River sand, M-sand introduction and manufacturing.
Coarse aggregate: Importance of size, shape and texture. Grading and blending of aggregate. Testing on aggregate, requirement. Recycled aggregates Water – qualities of water.
Chemical admixtures: Plasticizers, accelerators, retarders and air entraining agents. Mineral admixtures – Pozzolanic and cementitious materials, Fly ash, GGBS, silica fumes, Metakaolin and rice huskash.

UNIT II
Durability of Concrete: Durability, Transport mechanism of fluids and gases in concrete, cracking in concrete - corrosion and carbonation induced cracking, Alkali Aggregate Reaction, degradation by freeze and thaw, chloride attack, sulphate and sea water attack (marine conditions). Hot and cold weather concreting.

UNIT III

Concrete Mix Design: Design of concrete mixes by IS code method - ACI method Design of high strength concrete mixes, design of fly-ash cement concrete mixes, design of high density concrete mixes.

UNIT IV

Special Concrete: Lightweight concrete, autoclaved aerated concrete, no-fines concrete, lightweight aggregate concrete and foamed concrete, High strength concrete, refractory concrete, high density and radiation-shielding concrete, polymer concrete, fibre-reinforced concrete, mortars, renders, recycled concrete, Ferro Cement, Self Compacting Concrete.

UNIT V

Special processes and technology for particular types of structure: Sprayed concrete, underwater concrete, grouts, grouting and grouted concrete, mass concrete, slip form construction, pumped concrete, concrete for liquid retaining structures, vacuum process

UNIT VI

Testing of Concrete: Test methods: Analysis of fresh concrete, Accelerated testing methods, Tests on hardened concrete, Core cutting and testing, partially destructive testing, Non-destructive testing of concrete structure

Text Books:

1. Neville, A.M., Properties of Concrete, Pearson Education Asia (P) Ltd, England, 2000.
2. Concrete Technology, Gambhir M.L, Tata McGraw Hill
3. Concrete Technology, M.S.Shetty, S.Chand& Company New Delhi
4. Concrete microstructure, properties & materials, P.KumarMehata, Paulo & J.M. Monteiro,
5. Light Weight Concrete, Short &Kenniburg, Asia Publishing House, Bombay

References:

1. N. V. Nayak, A. K. Jain Handbook on Advanced Concrete Technology, ISBN: 978-81-8487-186-9
2. Job Thomas, "Concrete Technology", CENGAGE Learning,2015.
3. IS 4926 (2003): Code of Practice Ready-Mixed Concrete [CED 2: Cement and Concrete] Criteria for RMC Production Control, Basic Level Certification for Production Control of Ready Mixed Concrete BMTPC.
4. Specification and Guidelines for Self-Compacting Concrete, EFNARC, Association House.

Year/Sem	VIII Sem	L	T	P	C	COURSE CODE
Regulation	V18	3	0	0	3	V18CET45
Name of the Course	FINITE ELEMENT METHOD					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of the course, the student will be able to

- Apprise the students about the basics of the Finite Element Technique(K2)
- Describe the finite element method, identify different types of finite elements and apply to respective engineering problems(K3)
- Analyze one dimensional solid elements of various engineering problems(K3)
- Illustrate frame structures of various engineering problems (K3).
- Analyze 2-D and 3-D engineering problems using finite element method(K3)
- Examine finite element for elastic stability, fluid mechanics and dynamic analysis (K3)

SYLLABUS

UNIT I

Introduction to Finite Element Analysis: Basic Concepts of Finite Element Analysis - Introduction to Elasticity -Steps in Finite Element Analysis

UNIT II

Finite Element Formulation Techniques: Virtual Work and Variational Principle -Galerkin Method- Finite Element Method: Displacement Approach - Stiffness Matrix and Boundary Conditions

UNIT III

Element Properties: Natural Coordinates -Triangular Elements - Rectangular Elements - Lagrange and Serendipity Elements -Solid Elements - Isoparametric Formulation -Stiffness Matrix of Isoparametric Elements - Numerical Integration: One Dimensional - Numerical Integration: Two and Three Dimensional- Worked out Examples

UNIT IV

Analysis of Frame Structures: Stiffness of Truss Members -Analysis of Truss -Stiffness of Beam Members - Finite Element Analysis of Continuous Beam - Plane Frame Analysis - Analysis of Grid and Space Frame

UNIT V

FEM for Two and Three Dimensional Solids: Constant Strain Triangle - Linear Strain Triangle - Rectangular Elements - Numerical Evaluation of Element Stiffness - Computation of Stresses, Geometric Nonlinearity and Static Condensation - Axisymmetric Element - Finite Element Formulation of Axisymmetric Element - Finite Element Formulation for 3 Dimensional-Elements Worked out Examples

UNIT VI

Additional Applications of FEM: Finite Elements for Elastic Stability - Finite Elements in Fluid Mechanics - Dynamic Analysis

Text Books:

1. Introduction to Finite Elements in Engineering, Tirupati R. Chandrupatla, Ashok D. Belgundu, PHI publications.

2. A first course in the Finite Element Method, Dary L. Logan, Thomson Publications.

3. The Finite Element Method- Zinkiewicz, O.C. and Taylor, R.L , Oxford .

4. Finite Element Analysis Theory and Programming- Krishnamoorthy, C.S, Tata McGraw-Hill Education.

References:

1. Concepts and applications of Finite Element Analysis, Robert D. Cook, Michael E Plesha, John Wiley & sons Publication.

2. Introduction to Finite Element Method, Desai & Abel CBS Publication.

3. Introduction to Finite Element Method- P.N. Godbole, I K International Publishing House Pvt. Ltd.

4. The Finite Element Method in Engineering- S.S. Rao, Butterworth-Heinemann;

5. An Introduction to Finite Element Method- Reddy, J. N., McGraw-Hill Education

Year/Sem	**VIII**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V18	3	0	0	3	V18CET46
Name of the Course	**GROUND IMPROVEMENT TECHNIQUES**					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of this course. the student will be able to

- To make the student appreciate the need for different ground improvement methods adopted for improving the properties of remoulded and in-situ soils (K2)
- The student should be in a position to understand the importance of dewatering and different dewatering techniques (K3)
- The student should be in a position to know the importance of stabilization of soils and types of stabilizations (K3)
- To make the student understand how the reinforced earth technology and soil nailing can obviate the problems posed by the conventional retaining walls (K3)
- To enable the students to know how geotextiles and geosynthetics can be used to improve the engineering performance of soils (K2)
- To make the student learn the concepts, purpose and effects of grouting (K2)

SYLLABUS

UNIT I

In situ densification methods: In situ densification of granular soils-vibration at ground surface and at depth, impact at ground and at depth – in situ densification of cohesive soils – pre loading – vertical drains – sand drains and geo drains – stone columns.

UNIT II

Dewatering: Sumps and interceptor ditches – single and multi stage well points – vacuum well points – horizontal wells– electro osmosis

UNIT III

Stabilization of soils: Methods of soil stabilization – mechanical – cement – lime – bitumen and polymer stabilization – use of industrial wastes like fly ash and granulated blast furnace slag.

UNIT IV

Reinforced earth: Principles – components of reinforced earth –stability checks – soil nailing

UNIT V

Geosynthetics: Geotextiles – types – functions, properties and applications – geogrids , geomembranes and gabions – properties and applications.

UNIT VI

Grouting: Objectives of grouting – grouts and their applications – methods of grouting – stage of grouting.

Text Books:

1. Ground Improvement Techniques, Purushotham Raj, Laxmi Publications, New Delhi.
2. Ground Improvement Techniques, Nihar Ranjan Patro, Vikas Publishing House (p) limited , New Delhi.
3. An introduction to Soil Reinforcement and Geosynthetics, G. L. Siva Kumar Babu, Universities Press.

References:

1. Ground Improvement, M.P.Moseley, Blackie Academic and Professional, USA
2. Designing with Geosynethetics, R. M Koerner, Prentice Hall
3. Engineering Principles of Ground Modification by Manfred R. Hausmann,McGraw-Hill Inc.,

ANNEXURE – CE- II

COURSES OFFERED UNDER OPEN ELECTIVE IN VII & VIII SEMESTER TO OTHER BRANCHES

Open Elective 2	VII Sem	3. Environmental Pollution and Control 4. Disaster Management	V18CEOE03 V18CEOE04
Open Elective 3	VIII Sem	3. Solid Waste Management 4. Water Quality and Conservation	V18CEOE05 V18CEOE06

Year/Sem	**VII**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V18	3	0	0	3	V18CEOE03
Name of the Course	**ENVIRONMENTAL POLLUTION AND CONTROL**					
Branch	Common to all except Civil Engineering					

Course Outcomes:

Upon successful completion of this course the student will be able to

- Describe about air pollution and its control methods to students(K2)
- Develop the student to understand about industrial wastewater and ways to control it (K3)
- Describe student to understand about solid waste and methods to control it(K2)
- Express to student about importance of Environmental sanitation(K2)
- Prepare student to understand about Hazardous waste and ways to control it(K3)
- Illustrate the importance of Sustainable development to student(K3)

SYLLABUS
UNIT I
Air Pollution: Air pollution Control Methods–Particulate control devices – Methods of Controlling Gaseous Emissions – Air quality standards.Noise Pollution: Noise standards, Measurement and control methods –Reducing residential and industrial noise – ISO14000.

UNIT II

Industrial wastewater Management: – Strategies for pollution control - Volume and Strength reduction – Neutralization – Equalization – Proportioning – Common Effluent Treatment Plants - Recirculation of industrial wastes – Effluent standards.

UNIT III

Solid Waste Management: solid waste characteristics – basics of on-site handling and collection – separation and processing – Incineration Composting-Solid waste disposal methods – fundamentals of Land filling.

UNIT IV

Environmental Sanitation: Environmental Sanitation Methods for Hostels and Hotels, Hospitals, Swimming pools and public bathing places, social gatherings (melas and fares), Schools and Institutions, Rural Sanitation-low cost waste disposal methods.

UNIT V

Hazardous Waste: Characterization - Nuclear waste – Biomedical wastes – Electronic wastes - Chemical wastes – Treatment and management of hazardous waste-Disposal and Control methods.

UNIT VI

Sustainable Development: Definition- elements of sustainable developments-Indicators of sustainable development- Sustainability Strategies- Barriers to Sustainability–Industrialization and sustainable development – Cleaner production in achieving sustainability- sustainable development.

Text Books:

1. Environmental Engineering, by Ruth F. Weiner and Robin Matthews – 4th Edition Elesevier, 2003.
2. Environmental Science and Engineering by J.G. Henry and G.W. Heinke – Pearson Education.
3. Environmental Engineering by Mackenzie L Davis & David A Cornwell. McGraw Hill Publishing.

References:

1. Air Pollution and Control by M.N. Rao & H.N. Rao
2. Solid Waste Management by K. Sasi Kumar, S.A. Gopi Krishna. PHI New Delhi.
3. Environmental Engineering by Gerard Kiley, Tata McGraw Hill.
4. Environmental Sanitation by KVSG Murali Krishna, Reem Publications, New Delhi.
5. Industrial Water Pollution Control by Nemerow Jr., McGraw Hill Publishing.
6. Unit Operations and Processes in Environmental Engineering by Reynolds. Richard – Cengage Learning.
7. Environmental Engineering by D. Srinivasan, PHI Learning Private Limited, New Delhi, 2011.
8. Environmental Engineering – Howard S. Peavy, Donald R. Rowe,Teorge George Tchobanoglus – Mc-Graw-Hill Book Company,New Delhi, 1985.

Year/Sem	**VII Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V18	3	0	0	3	V18CEOE04
Name of the Course	**DISASTER MANAGEMENT**					
Branch	Common to all except Civil Engineering					

Course Outcomes:

Upon successful completion of this course the student will be able to

- Describe to student to have a idea on different natural hazards and disaster management (K2)
- Develop the student to understand manmade disaster and their management (K3)
- Prepare the student in such a way inorder to understand building codes and vulnerability of disaster (K3)
- Illustrate to student about role of technology in disaster management (K2)
- Assess the importance of education and community preparedness in disaster management to student (K3)
- Classify the multi-sectional issues caused by disaster to student (K2)

SYLLABUS

UNIT I

Natural Hazards and Disaster Management: Introduction of DM Disaster Management cycle – Five priorities for action- Case study methods of the following: floods, droughts – Earthquakes – global warming, cyclones & Tsunamis – Post Tsunami hazards along the Indian coast – landslides.

UNIT II

Man Made Disastar And Their Management Along With Case Study Methods Of The Following: Fire hazards – transport hazard dynamics – solid waste management – post disaster – bio terrotirism - rail and air craft's accidents-Management of these disasters

UNIT III

Risk And Vulnerability: – Building codes and land use planning – social vulnerability – environmental vulnerability -Financial management of disaster.

UNIT IV

Role Of Technology In Disaster Managements: Disaster management for infra structures, taxonomy of infra structure - mitigation programme for earth quakes –geospatial information in agriculture drought assessment-multimedia technology in disaster risk management and training-transformable indigenous knowledge in disaster reduction.

UNIT V

Education And Community Preparedness: Education in disaster risk reduction-Essentials of school disaster education-Community capacity and disaster resilience-Community based disaster recovery -Community based disaster management and social capital-Designing resilience- building.

UNIT VI

Multi-sectional Issues: Impact of disaster on poverty and deprivation-Climate change adaptation and human health -Exposure , health hazards and environmental risk-Forest management and disaster risk reduction - The Red cross and red crescent movement.

Text Books:

1. Disaster Management – Global Challenges and Local Solutions' by Rajib shah & R R Krishnamurthy(2009),Universities press.
2. Disaster Science & Management' by Tushar Bhattacharya, Tata McGraw Hill Education Pvt. Ltd., New Delhi.
3. Disaster Management – Future Challenges and Opportunities' by Jagbir Singh (2007), I K International Publishing House Pvt. Ltd.

Reference Books:

1. 'Disaster Management' edited by H K Gupta (2003), Universities press.
2. Natural Hazards and Disaster Management, Vulnerability and Mitigation by RB Singh
3. Disaster Management by Harish K.Gupta

Year/Sem	**VIII Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V18	3	0	0	3	V18CEOE05
Name of the Course	**SOLID WASTE MANAGEMENT**					
Branch	Common to all except Civil Engineering					

Course Outcomes:
Upon successful completion of this course, the students will be able to

- Generalize Solid Waste and its management(K2)
- Assess different elements for managing Solid Waste(K3)
- Employ different methods for transfer and transport of solid waste(K3)
- Employ different methods for Separation and Transformation of Solid waste(K3)
- Organize different methods for processing and treatment of municipal solid waste(K3)
- Identify suitable disposal methods with respect to solid waste(K2)

SYLLABUS

UNIT I

Introduction to Solid Waste Management: Goals and objectives of solid waste management, Classification of Solid Waste – Factors Influencing generation of solid waste – sampling and characterization –Future changes in waste composition, major legislation, monitoring responsibilities.

UNIT II

Basic Elements In Solid Waste Management: Elements and their inter relationship – principles of solid waste management- onsite handling, storage and processing of solid waste Collection of Solid Waste: Types and methods of waste collection systems, analysis of collection system – optimization of collection routes.

UNIT III

Transfer and Transport: Need for transfer operation, compaction of solid waste – transport means and methods, transfer station types and design requirements.

UNIT IV

Separation and Transformation of Solid Waste: Unit operations used for separation and transformation: shredding – materials separation and recovery, source reduction and waste minimization.

UNIT V

Processing and Treatment: Processing of solid waste – Waste transformation through combustion and composting, anaerobic methods for materials recovery and treatment – Energy recovery – biogas generation and cleaning– Incinerators.

UNIT VI

Disposal of Solid Waste: Methods of Disposal, Landfills: Site selection, design and operation, drainage and leachate collection systems –designated waste landfill remediation.

Text Books:

1. George Techobanoglous "Integrated Solid Waste Management", McGraw Hill Publication, 1993
2. Gerard Kiely " Environmental Engineering", McGraw Hill Publication, 2007
3. J Glynn Henry,. Gary W.Heinke "Environmental Science and Engineering", Prentice-Hall of India Pvt Ltd, 1996

References:

1. Vesilind, P.A., Worrell, W., Reinhart, D. "Solid Waste Engineering", Cenage learning, New Delhi, 2004
2. Charles A. Wentz; "Hazardous Waste Management", McGraw Hill Publication, 1995.
3. Mackenzie L Davis, David A.Cornwell :Introduction to Environmental Engineering" McGraw Hill Publication, 2017

Year/Sem	VIII Sem	L	T	P	C	COURSE CODE
Regulation Year	V18 / 2021-2022	3	0	0	3	V18CEOE06
Name of the Course	WATER QUALITY AND CONSERVATION SYSTEMS					
Branch	Common to all except Civil Engineering					

Course Outcomes:
Upon successful completion of the course, the student will be able to

- Describe the Engineering Hydrology and application (K2)
- Assess the importance and necessity of water supply systems (K3)
- Relate different sources of surface and ground water (K3)
- Predict the quality of water in reference to IS and WHO standards (K3)
- Design of plumbing and sanitary fittings (K3)
- Employ different conservation techniques (K3)

SYLLABUS

UNIT I
Introduction to Hydrology: Engineering hydrology, applications, Hydrologic cycle, evaporation, evapotranspiration, precipitation, run off, infiltration, hydrological data-sources

UNIT II

Sources of Water: Surface water, Lakes, Rivers, Reservoirs, comparison of sources with reference to quality, quantity and other considerations.

Groundwater, types of water bearing formations, springs, Wells and Infiltration galleries, Yields from infiltration galleries.

UNIT III

Importance and Necessity: Protected Water Supply systems, Flow chart of public water supply system, Water borne diseases. Estimation of water usages in different purpose.

UNIT IV

Quality and Analysis of Water: Characteristics of water–Physical, Chemical and Biological-Analysis of Water – Physical, Chemical and Biological characteristics. Comparison of sources with reference to quality- I.S. Drinking water quality standards and WHO guidelines for drinking water.

UNIT V

Plumbing Systems: Systems of plumbing-types of pipes and sanitary fittings and other accessories–one pipe andtwo pipe systems – Design parameters and factors.

UNIT VI

Water conservation: importance and necessity, objectives, systems-rainwater harvesting, recharge pits, watershed.

Text Books:

1. Environmental Engineering – Howard S. Peavy, Donald R. Rowe, Teorge George Tchobanoglus – Mc-Graw-Hill Book Company, New Delhi, 1985
2. Elements of Environmental Engineering, K. N. Duggal, S. Chand & Company Ltd. New Delhi, 2012.
3. Water Supply and Sanitary Engineering – G. S. Birdie and J. S. Birdie

References:

1. Water Supply Engineering – P. N. Modi.
2. Water Supply Engineering – B. C. Punmia
3. Water Supply and Sanitary Engineering – G. S. Birdie and J. S. Birdie

ANNEXURE – CE-III

COURSE STRUCTURE APPROVED IN 2nd JOINT BOS MEETING

(For 2020 – 2021 Admitted Batch) – V20 Regulation

I SEMESTER

S.No	Course Code	Course Title	Hours per week			Credits
			L	T	P	
1	V20MAT01	Linear Algebra and Differential Equations	3	0	0	3
2	V20PHT01	Engineering Physics	3	0	0	3
3	V20ENT01	English for Professional Enhancement	3	0	0	3
4	V20MEL01	Engineering Graphics	1	0	4	3
5	V20CST01	Programming in C for problem solving	3	0	0	3
6	V20ENL01	Hone Your Communications Skills Lab-I	0	0	3	1.5
7	V20PHL01	Engineering Physics Lab	0	0	3	1.5
8	V20CSL01	Programming lab in C for problem solving	0	0	3	1.5
9	V20CHT02	Environmental Studies	2	0	0	-
		Total	15	0	13	19.5

Total Contact Hours : 28 Total Credits : 19.5

II SEMESTER

S.No	Course Code	Course Title	Hours per week L	T	P	Credits
1	V20MAT02	Numerical Methods and Vector Calculus	3	0	0	3
2	V20CHT01	Engineering Chemistry	3	0	0	3
3	V20MET01	Engineering Mechanics	3	0	0	3
4	V20EET02	Basic Electrical and Electronics Engineering	3	0	0	3
5	V20MEL02	Engineering Workshop	1	0	4	3
6	V20EEL02	Basic Electrical and Electronics Engineering Lab	0	0	3	1.5
7	V20CHL01	Engineering Chemistry Lab	0	0	3	1.5
8	V20ENL02	Hone Your Communications Skills Lab-II	0	0	3	1.5
		Total	13	0	13	19.5

Total Contact Hours : 26 Total Credits : 19.5

COURSE STRUCTURE PROPOSED FOR APPROVAL IN 4th BOS MEETING

III SEMESTER

S.No	Course Code	Course Title	Hours per week			Credits
			L	T	P	
1	V20MAT04	Probability & Statistics (BOS of Maths)	3	0	0	3
2	V20CET01	Strength of Materials	3	0	0	3
3	V20CET02	Fluid Mechanics & Hydraulics	3	0	0	3
4	V20CET03	Surveying and Geomatics	3	0	0	3
5	V20CET04	Building Materials & Concrete Technology	3	0	0	3
6	V20CEL01	Strength of Materials Lab	0	0	3	1.5
7	V20CEL02	Surveying Lab	0	0	3	1.5
8	V20CEL03	Concrete Technology Lab	0	0	3	1.5
9	V20CESOC1	Skill Oriented Course (Certificate course offered by Parent Institution / Industries / Professional Bodies/APSSDC or any other accredited bodies)	1	0	2	2
10	V20ENT02	Professional Communication Skills-I (MNC) (BOS of Eng)	2	0	0	0
		Total	18	0	11	21.5

Total Contact Hours : 29

Total Credits : 21.5

IV SEMESTER

S.No	Course Code	Course Title	Hours per week			Credits
			L	T	P	
1	V20CET05	Engineering Geology	3	0	0	3
2	V20CET06	Structural Analysis - I	3	0	0	3
3	V20CET07	Water Resources Engineering	3	0	0	3
4	V20CET08	Transportation Engineering	3	0	0	3
5	V20MBT51	Managerial Economics Financial Analysis (BOS of MBA)	3	0	0	3
6	V20CEL04	Engineering Geology Lab	0	0	3	1.5
7	V20CEL05	FM & Hydraulic Machinery Lab	0	0	3	1.5
8	V20CEL06	Transportation Engineering Lab	0	0	3	1.5
9	V20CESOC2	Skill Oriented Course (Certificate course offered by Parent Institution/ Industries/ Professional Bodies/APSSDC or any other accredited bodies)	1	0	2	2
10	V20ENT03	Professional Communication Skills-II (MNC) (BOS of Eng)	2	0	0	0
		Total	18	0	11	21.5

Total Contact Hours : 29

Total Credits : 21.5

List of Skill Oriented Courses(V20 Regulation)

S.No	Course Title
1	Advanced C
2	Total Station
3	2D Drafting & 3D Modeling
4	Python Programming
5	Building Planning and Drawing

Internship for 2 months/Mini Project is mandatory during summer vacation and is evaluated in V semester.

V SEMESTER

S.No	Course Code	Course Title	Hours per week			Credits
			L	T	P	
1		Structural Analysis - II	3	0	0	3
2		Geotechnical Engineering	3	0	0	3
3		Design of Reinforced Concrete Structures	3	0	0	3
4		Professional Elective Course I	3	0	0	3
5		Open Elective Course I	2	0	2	3
6		Geotechnical Engineering Lab	0	0	3	1.5
7		Building Planning & Drawing Lab	0	0	3	1.5
8		Skill Advanced Course	1	0	2	2
9		Mandatory Course	2	0	0	0
10		Summer Internship	0	0	0	1.5
		Total	17	0	10	21.5

Total Contact Hours: 27 Total Credits: 21.5

VI SEMESTER

S.No	Course Code	Course Title	Hours per week			Credits
			L	T	P	
1		Design of Steel Structures	3	0	0	3
2		Foundation Engineering	3	0	0	3
3		Environmental Engineering	3	0	0	3
4		Professional Elective Course - II	3	0	0	3
5		Open Elective Course - II	2	0	2	3
6		Environmental Engineering Lab	0	0	3	1.5
7		CAD & GIS Lab	0	0	3	1.5
8		Professional Core Courses Lab	0	0	3	1.5
9		Skill Advanced Course / Soft skill course	1	0	2	2
10		Mandatory Course	2	0	0	0
		Total	17	0	13	21.5

Total Contact Hours: 30

Total Credits: 21.5

Internship 2 months/Mini Project is mandatory during summer vacation and is evaluated in VII semester.

VII SEMESTER

S.No	Course Code	Course Title	Hours per week			Credits
			L	T	P	
1		Professional Elective Course III	3	0	0	3
2		Professional Elective Course IV	3	0	0	3
3		Professional Elective Course V	3	0	0	3
4		Open Elective Course III	2	0	2	3
5		Open Elective Course IV	2	0	2	3
6		Humanities and Social Science Elective	3	0	0	3
7		Skill Advanced Course	1	0	2	2
8		Summer Internship	0	0	0	3
		Total	17	0	6	23

Total Contact Hours: 23

Total Credits: 23

VIII SEMESTER

S.No	Course Code	Course Title	Hours per week			Credits
			L	T	P	
1		Project	0	0	0	12
		Total	0	0	0	12

Total Contact Hours: 0

Total Credits: 12

SYLLABI OF III & IV SEMESTERS OF B.TECH V20 REGULATION

ACADEMIC YEAR 2021-2022

III SEMESTER – SYLLABUS

Year/Sem	**III Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	3	0	0	3	V20CET01
Name of the Course	**STRENGTH OF MATERIALS**					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon completion of the course, the student will be able to

- Understand the basic materials behavior under the influence of different external loading conditions and the support conditions (K2)
- Draw the diagrams indicating the variation of the key performance features like bending moment and shear forces (K3)
- Understand bending concepts and calculation of section modulus and for determination of stresses developed in the beams and torsion (K3)
- Understand the basic concepts of Principal stresses developed in a member when it is subjected to stresses along different axes and design the sections (K2)
- Asses stresses in different engineering applications like columns and struts subjected to different loading conditions (K3)

SYLLABUS

UNIT I

Simple Stresses ,Strains and Strain Energy: Elasticity and plasticity –Types of stresses and strains – Hooke‘s law – stress – strain diagram for mild steel – Workingstress – Factor of safety – Lateral strain, Poisson‘s ratio and volumetric strain – Elasticmoduli and the relationship between them – Bars of varying section – composite bars –Temperature stresses. Strain Energy – Resilience – Gradual, sudden, impact and shock loadings – simple applications.

UNIT II

Shear Force and Bending Moment: Definition of beam – Types of beams – Concept of shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, uniformly distributed loads, uniformly varying loads and combination of these loads – Point of contra flexure – Relation between S.F., B.M and rate of loading at a section of a beam

Deflection of Beams: Bending into a circular arc – slope, deflection and radius of curvature – Differential equation for the elastic line of a beam – Double integration and Macaulay‘s methods – Determination of slope and deflection for cantilever and simply supported beams subjected to point loads, - U.D.L. Uniformly varying load. Mohr‘s theorems – Moment area method – application to simple cases.

UNIT III

Flexural Stresses: Theory of simple bending – Assumptions – Derivation of bending equation: M/I = f/y = E/R, Neutral axis – Determination bending stresses – section modulus of rectangular and circular sections (Solid and Hollow), I, T, Angle and Channel sections – Design of simple beam sections.

Shear Stresses: Derivation of formula – Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T angle sections, built up beams, shear centre Torsion- Derivation of torsion equation and its assumptions.

UNIT-IV

Principal Stresses and Strains: Introduction – Stresses on an inclined section of a bar under axial loading – compound stresses – Normal and tangential stresses on an inclined plane for biaxial stresses – Two perpendicular normal stresses accompanied by a state of simple shear – Mohr’s circle of stresses – Principal stresses and strains – Analytical and graphical solutions. Theories of failures: Various Theories of failures such as Maximum Principal stress theory –Maximum Principal Strain Theory – Maximum shear stress theory – Maximum strain energy theory –Maximum shear strain energy theory.

UNIT-V

Columns and Struts: Introduction – Types of columns – Short, medium and long columns –Axially loaded compression members – Crushing load – Euler’s theorem for long columns –assumptions – derivation of Euler’s critical load formulae for various end conditions – Equivalent length of a column – Slenderness ratio –Euler’ critical stress – Limitations of Euler’ theory – Rankine– Gordon formula – Long columns subjected to eccentric loading – Secant formula –Empirical formulae – Straight line formula – Prof. Perry’ formula.

Text Books:

1. Mechanics of Materials- R. C. Hibbler, Pearson; 10 edition (January 15, 2016)
2. Strength of materials -S. S. Bhavakatti, Vikas Publishing House; Fourth edition (2013)
3. Strength of Materials -R. K. Rajput, S. Chand Publishing (6th Edition) (2015)
4. Strength of Materials - R.K Bansal,Laxmi Publications; Sixth edition (2018)

References:

1. Fundamentals of Solid Mechanics M.L. Gambhir, PHI Learning Pvt. Ltd., New Delhi. (1 December 2009)
2. Introduction to Strength of Material by U.C. Jindal, Pearson Education; Second edition (28 September 2017)
3. Strength of materials by R. Subramanian, Oxford university press, New Delhi, third edition (15 June 2016)

Year/Sem	III Sem	L	T	P	C	COURSE CODE
Regulation	V20	3	0	0	3	V20CET02
Name of the Course	**FLUID MECHANICS & HYDRAULICS**					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon completion of the course, the student will be able to

- Understand the physical properties of fluids and their influences on fluid motion (K2)
- Calculate the forces acting on plane and curved surfaces and solve fluid flow problems in kinematics and dynamics (K3)
- Solve various laminar and turbulent flow problems (K2)
- Solve uniform and non uniform open channel flow problems (K2)
- Estimate the impact of jet on plane and curved surfaces using momentum Principle (K2)

SYLLABUS

UNIT I

Introduction and Hydrostatics: Dimensions and units – Physical properties of fluid specific gravity, viscosity, surface tension, vapor pressure and their influences on fluid motion - pressure at a point, Pascal‘s law, hydrostatic law, atmospheric, gauge and vacuum pressure, measurement of pressure - pressure gauges, Manometers: Differential Manometers- Hydrostatic forces on submerged plane - Horizontal, Vertical, Center of pressure, derivations and problems.

UNIT II

Fluid Kinematics and Dynamics: Description of fluid flow - Stream line, path line and streak lines and stream tube - Classification of flows: Steady, unsteady, uniform, non-uniform, laminar, turbulent, rotational and irrotational flows - Surface and body forces - Euler and Bernoulli’s equations for flow

UNIT III

Closed Conduit and Measurement of Flow: Laws of Fluid friction-Darcy’s equation-Minor losses-pipes in series, pipes in parallel, Pipe network problem- variation friction factor with Reynolds’s number- Pitottube,Venturi meter and Orifice meter - flow over rectangular, triangular and trapezoidal notches.

UNIT IV

Uniform Flow and Non Uniform Flow: Types of flows - Type of channels - Chezy's, manning's and Bazin formulae for uniform flow - Most Economical sections - Critical flow: Specific energy-critical depth computation of critical depth critical, sub-critical and super critical flows - Dynamic equation for G.V.F., Mild, Critical, Steep, horizontal and adverse slopes, surface profiles - direct step method - Rapidly varied flow, hydraulic jump, energy dissipation.

UNIT V

Hydraulic Similitude and Momentum Principles: Dimensional analysis-Buckingham's-Pi theorem - study of hydraulic models-Geometric, Kinematic and Dynamic similarities-dimension less numbers, model laws-Hydrodynamic force of jets on stationary and moving flat-inclined and curved vanes-jet striking centrally and at tip- velocity triangles at inlet and outlet-expressions for work done and efficiency

Textbooks:

1. Hydraulics and Fluid Mechanics including Hydraulic Machines by Dr. P.N.Modiand Dr.S.N.Seth, Standard Book house, Rajsons Pvt.Ltd.,21stEdition.
2. A text book of Fluid Mechanics and Hydraulic Machines by Dr.R.K.Bansal,Laxmi Publications(P)Ltd.,NewDelhi,10thEdition,2018.
3. A text book of Fluid mechanics and Hydraulic machines by Er. R.K.Rajput, S.Chand&company,6thEdition,2016

References:

1. Introduction to Fluid Mechanics and Fluid Machines by S.K.Som, G.Biswas, Suman Chakraborthy, McGraw Hill Education, 3rd Edition,2017.
2. Fluid Mechanics by A.K.Mohanty, Prentice Hall of India Pvt. Ltd., NewDelhi,2nd Edition,1994.
3. Fluid Mechanics and Hydraulic Machines by K.Subramanya, McGraw Hill Education,1st Edition,2010.

Year/Sem	III Sem	L	T	P	C	COURSE CODE
Regulation	V20	3	0	0	3	V20CET03
Name of the Course	SURVEYING AND GEOMATICS					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of this course, the students will be able to

- Demonstrate the basic surveying skills (K2)
- Computation of bearings by various surveying instruments (K3)
- Perform different methods of leveling (K3)
- Compute various data required for various methods of surveying (K3)
- Compute area and volume quantities by different methods (K3)

SYLLABUS

UNIT I

Introduction: Definition-Uses of surveying- overview of plane surveying (chain, Compass and plane table), Objectives, Principles and classifications – Errors in survey Measurements

UNIT II

Compass survey and traversing: Electronic distance measurements (EDM)- principles of electro optical EDM-Errors and corrections to linear measurements- Compass survey-Meridians, Azimuths and Bearings, declination, computation of angle. Traversing-Purpose-types of traverse- traverse computation-traverse adjustments-Introduction omitted measurements

UNIT III

Leveling, contouring and Curves: Concept and Terminology, Leveling Instrument and their Temporary and permanent adjustments- method of leveling. Characteristics and Uses of contours- methods of conducting contour surveys.Types of curves, design and setting out – simple and compound curves

UNIT IV

Theodolite Surveying: principles-uses and adjustments – temporary and permanent, measurement of horizontal and vertical angles. Principles of Electronic Theodolite – Introduction to Trigonometrically leveling,. Tachometric Surveying: Stadia and tangential methods of Tacheometry. Distance and-Elevation formulae for Staff vertical position

UNIT V

Computation of Areas and Volumes: Area from field notes, computation ofareas along irregular boundaries and area consisting of regular boundaries. Embankments and cutting for a level section and two level sections with and without transverse slopes, determination of the capacity of reservoir, volume of barrow pits.

Geomatics: Introduction, Total Station and Global positioning system, Electromagnetic spectrum, Visual image interpretation, Digital image processing

Text Books:

1. Surveying, Vol No.1, 2 &3, B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain –
2. Laxmi Publications Ltd, New Delhi,seventeenth edition (2016)
3. 2 Text book of Surveying, S.K. Duggal (Vol No. 1&2), Tata McGraw Hill Publishing
4. Co. Ltd. New Delhi.Fourth edition (1 July 2017)
5. Text book of Surveying, Arora (Vol No. 1&2), STANDARD BOOK HOUSE SINCE 1960; Edition: Year-2015 edition (2015)
6. Anji Reddy, M., Remote sensing and geographical information system,BS Publications/BSP Books (2012)

References:

1. Text book of Surveying, C. Venkataramaiah, universities Press (India) Pvt. Ltd. (12 January 2011)
2. Surveying and levelling, R. Subramanian, Oxford University Press; 2 edition (30 June 2012)

Year/Sem	III Sem	L	T	P	C	COURSE CODE
Regulation	V20	3	0	0	3	V20CET04
Name of the Course	BUILDING MATERIALS & CONCRETE TECHNOLOGY					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon completion of the course, the student will be able to

- Discuss the basic concepts of building materials (K2)
- Distinguish the basic ingredients of concrete and their role in the production of concrete and its behavior in the field (K2)
- Apply fundamental knowledge in the fresh concrete (K3)
- Apply fundamental knowledge in the hardened properties of concrete and factors (K3)
- Find test on hardened concrete and properties, evaluate the ingredients of concrete through lab test results and design the concrete mix by BIS method (K3)

SYLLABUS

Unit I (Stones, Bricks, Tiles, Wood and Paints)

Stones: Classification of Stones – Properties of stones in structural requirements

Bricks: Composition of good brick earth, Various methods of manufacturing of bricks

Tiles: Characteristics of good tile – Manufacturing methods, Types of tiles

Wood: Structure – Properties – Seasoning of timber – Classification of various types of woods used in buildings – Defects in timber

Paints: White washing and distempering, Constituents of paint – Types of paints – Painting of new and old wood – Varnish

Unit II (Aggregates, Cement and Admixtures)

Aggregates: Classification of aggregate, Bond, Strength and other mechanical properties of aggregate, Physical properties of aggregate, bulking of sand, Deleterious substance in aggregate, Soundness of aggregate, Alkali-Aggregate reaction – Thermal properties, Sieve analysis – Fineness modulus – Grading curves – Grading of fine and coarse aggregates as per relevant IS code, Maximum aggregate size

Portland Cement: Chemical composition, Hydration, Structure of hydrated cement – Setting of cement, Fineness of cement, Tests for physical properties

– Different grades of cements **Supplementary cementitious materials:** Fly ash, GGBS, Silica fume, Rice husk ash, Calcinated ash (Basic properties and their contribution to concrete strength)

Admixtures: Mineral and Chemical admixtures

Unit III (Fresh Concrete)

Manufacture of concrete: Mixing and vibration of concrete, Workability – Segregation and bleeding – Factors affecting workability, Measurement of workability by different tests, Effect of time and temperature on workability – Quality of mixing water, Ready mix concrete, Shotcrete

Unit IV (Hardened Concrete)

Water / Cement ratio: Abram's law, Gel space ratio, Nature of strength of concrete – Maturity concept, Strength in tension and compression – Properties of Hardened Concrete (Elasticity, Creep, Shrinkage, Poisson's ratio, Water absorption, Permeability, etc.), Relating between compression and tensile strength, Curing

Unit V (Testing of Hardened Concrete, Mix Design)

Testing of Hardened Concrete: Factors affecting properties of Hardened concrete, Compression tests, Tension tests, Flexure tests, Non-destructive testing methods – Codal provisions for NDT – Rebound hammer and UPV method.

Mix Design: Factors in the choice of mix proportions – Quality Control of concrete -Acceptance criteria – Concepts Proportioning of concrete mixes by various methods – BIS method of mix design.

Text Books:

1. "Concrete Technology" by M. S. Shetty - S. Chand & Co., 2004
2. "Engineering Materials" by Rangwala S C, (36th edition), Anand Charotar Publishing
   House
3. "Concrete Technology" by Shantha Kumar – Oxford Publications

Reference Books:

1. "Building Materials" by S. K. Duggal, New Age International Publications
2. "Building Materials" by P. C. Verghese, PHI learning (P) Ltd., 2009
3. "Properties of Concrete" by A. M. Neville – Pearson – 4th edition

Year/Sem	III Sem	L	T	P	C	COURSE CODE
Regulation	V20	0	0	3	1.5	V20CEL01
Name of the Course	STRENGTH OF MATERIALS LAB					
Branch	CIVIL ENGINEERING					

Course outcomes:

Upon completion of the course, the student will be able to

- Identify the engineering properties of materials in the laboratory
- Assess torsion test to determine elastic constants
- Assess spring test to determine elastic constants
- Assess flexural test to determine elastic constants
- Determine hardness of metals
- Determine Impact strength of metals

List of Experiments

1. Tension test on Steel bar
2. Bending test on (Steel / Wood) Cantilever beam.
3. Bending test on simple support beam.
4. Torsion test
5. Hardness test
6. Spring test
7. Compression test on wood or concrete
8. Impact test
9. Shear test
10. Verification of Maxwell‘s Reciprocal theorem on beams.
11. Continuous beam – deflection test.

List of Major Equipment:

1. UTM for conducting tension test on rods
2. Steel beam for flexure test
3. Wooden beam for flexure test
4. Torsion testing machine
5. Brinnell‘s / Rock well‘s hardness testing machine
6. Setup for spring tests
7. Compression testing machine
8. Izod Impact machine
9. Shear testing machine
10. Beam setup for Maxwell‘s theorem verification.
11. Continuous beam setup

Year/Sem	**III Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	0	0	3	1.5	V20CEL02
Name of the Course	**SURVEYING LAB**					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon completion of the course, the student will be able to

- Use different Survey instruments to collect filed data
- Calculate distances, levels and angles from collected data
- Transfer points on ground to drawing sheet
- Interpret survey data to compute areas and volumes by using different methods
- Prepare profile of land from the collected survey data

List of experiments:

1. Survey by chain survey of road profile with offsets in case of road widening.
2. Finding the area of the given boundary using compass (Closed Traverse)
3. Plane table survey; finding the area of a given boundary by the method of Radiation
4. Plane table survey; finding the area of a given boundary by the method of intersection.
5. Fly leveling : Height of the instrument method (differential leveling)
6. Fly leveling: Rise and Fall method.
7. Theodolite Survey: Determining the Horizontal and Vertical Angles by the method of repetition method.
8. Theodolite Survey: Finding the distance between two inaccessible points.
9. One Exercise on Curve setting.
10. One Exercise on contours.
11. Determination of area using total station
12. Determination distance between two inaccessible points.
13. Introduction to GPS.

References:

1. Surveying Vol No.1, 2 &3 by Dr.B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain –Laxmi Publications, seventeenth edition (2016), New Delhi.
2. Text book of Surveying by S.K. Duggal (Vol No. 1&2), McGraw Hill Education; Fourth edition (1 July 2017), New Delhi.
3. Text book of Surveying,Dr.K.R.Arora (Vol No. 1&2), STANDARD BOOK HOUSE SINCE 1960; Edition: Year-2015 edition (2015), Delhi.

Year/Sem	III Sem	L	T	P	C	COURSE CODE
Regulation	V20	0	0	3	1.5	V20CEL03
Name of the Course	CONCRETE TECHNOLOGY LAB					
Branch	CIVIL ENGINEERING					

Course outcomes:

Upon completion of the course, the student will be able to

- Find some properties of cement by consistency, fineness, setting times, specific gravity, soundness and compressive strength.
- Determine the workability of cement concrete by compaction factor, slump and Vee – Bee tests.
- Determine properties of self-compacting concrete by Slump cone, V funnel, L Box
- Determine the specific gravity of coarse aggregate and fine aggregate by Sieve analysis.
- Determine the flakiness and elongation index of coarse aggregates.
- Determine the bulking of sand.
- Understand the non-destructive testing procedures on concrete

I. Tests on Cement

1. Normal Consistency and fineness of cement.
2. Initial setting time and final setting time of cement.
3. Specific gravity of cement
4. Soundness of cement.
5. Compressive strength of cement.

II. Tests on Aggregate

1. Sieve Analysis and gradation chairs
2. Bulking of sand.
3. Bulk and compact densities of fine and coarse aggregates

III. Tests on Fresh Concrete

1. Slump test
2. Compact factor test
3. Vee-bee Test
4. Flow Table Test

Tests on Self Compacting Concrete

1. Slump cone
2. V funnel
3. L Box

IV. Tests on hardened concrete

1. Compression test on cubes & Cylinders
2. Flexure test
3. Splitting Tensile Test
4. Modulus of Elasticity

V. Non Destructive tests of concrete

1. Rebound hammer
2. Ultrasound pulse Velocity (UPV)

Text Books:

1. Concrete Technology, M. S. Shetty. – S. Chand & Company

References:

1. Concrete Technology, M.L. Gambhir. – Tata Mc. Graw Hill Publishers, New Delhi.

Codes for reference:

1. IS: 4031 – chemical analysis and tests on cement.
2. IS 650:1991 –Standards and testing
3. IS 383:1970- Specification for coarse & fine aggregate
4. IS 2386 (Part III) 1963- Methods of test for aggregate for specific gravity, density, voids, absorption & bulking
5. IS 516:1959- Specification for compressive strength, Flexural strength
6. IS 5816:1999-Method of test for splitting tensile strength of concrete.
7. IS 13311(Part 1):1992 Methods of non-destructive testing of concrete: Part 1 Ultrasonic pulse velocity.
8. IS 13311(Part 2):1992 Methods of non-destructive testing of concrete: Part 2 Rebound hammer.
9. IS 6461(Part 7):1973 Glossary of terms relating to cement concrete: Part 7 Mixing, laying, compaction, curing and other construction aspects.

IV SEMESTER – SYLLABUS

Year/Sem	**IV Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	3	0	0	3	V20CET05
Name of the Course	**ENGINEERING GEOLOGY**					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of this course, the students will be able to

- Relate the features of geological agents (K3)
- Employ different techniques to identify different types of minerals and rocks (K3)
- Interpret hazard zonaation with reference to secondary structures (K3)
- Review earthquakes and landslides and their resulting subsidence (K3)
- Examine the engineering geological conditions of the strata and its suitability to major projects like Dams, Tunnels and Reservoirs etc. (K3)

SYLLABUS

UNIT I

Introduction: Branches of geology, Importance of geology in Civil engineering with case studies. Physical Geology: Geological processes, Weathering, Erosion and Civil engineering importance of weathering and Erosion

UNIT II

Mineralogy: Definition of mineral, Importance of study of minerals, Significance of different physical properties in mineral identification, Study of physical properties, Structure and chemical composition of common rock forming and economic minerals viz. Feldspar, Quartz, Olivine, Augite, Hornblende, Muscovite, Biotite, Asbestos, Apatite , Kyanite, Garnet, Beryl, Talc, Calcite, Dolomite, Pyrite, Hematite, Magnetite, Galena, Graphite, Magnesite, Bauxite and Clay minerals Petrology: Introduction, Civil Engineering importance of petrology, Definition of Rock, Rock cycle, Geological Classification of rocks Igneous Rocks: Forms, Structures and textures of igneous rocks, Megascopic description and civil engineering uses of Granite, Basalt, Dolerite, Pegmatite and Charnockite Sedimentary Rocks: Formation, Structures and textures of sedimentary rocks, Megascopic description and civil engineering uses of Laterite, Conglomerate, Sand stone, Lime stone and Shale Metamorphic Rocks: Types of metamorphism, Structures and textures of metamorphic rocks, Megascopic Description and Civil engineering uses of Gneiss, Schist, Quartzite, Marble and Slate

UNIT III

Structural Geology: Introduction, Out crop, Strike and dip, Causes for development of secondary structures, Classification of Structures associated with Folds, Faults, Joints, Unconformities and their Civil engineering importance

UNIT IV

Earthquakes: Classification and causes, Intensity and magnitude and their measuring scales, Effects of earthquakes, Seismic belts, Civil Engineering considerations in seismic areas, Seismic zones of India Land Slides: Classification, Causes and effects, Preventive measures of landslides Ground water: Introduction, Classification of rocks based on porosity and permeability, Types of aquifers, Effects of groundwater over draft

Geophysics: Importance of Geophysical methods, Classification, Principles of Geophysical study by Gravity method, Magnetic method, Electrical methods, Seismic methods, Radiometric method and Electrical resistivity, Seismic refraction methods

UNIT V

Dams & Reservoirs: Types of Dams, Geological considerations for the selection of dam sites, Stages of investigation, Case histories of few dam failures, Geology of few Indian dam sites

Tunnels: Purpose of Tunneling, Geological considerations for tunneling, Effects of tunneling, Over break, Geology of some tunnel sites

Textbooks:

1. A text Book of Engineering Geology by N. Chenna Kesavulu, Macmillan India Ltd., Delhi, second edition, 2009.
2. Principles of Engineering Geology by K M Bangar, Standard Publishers and Distributers, 2009.
3. Principles of Engineering Geology- K Gokhale, B. S. Publication, Revised Edition, 2010.

Reference Books:

1. Fundamentals of Engineering Geology, F.G.Bell, published by Butterworth-Heinemann, 1983.
2. Principles of Engineering Geology and Geotechnics by D P Krynine and W R Judd, CBS Publishers & Distribution, first edition, 2005.
3. Engineering Geology for Civil Engineers by D. Venkata Reddy, Oxford & IBM Publishing Company Pvt. Ltd., New Delhi, second edition, 2017.
4. Engineering and General Geology by Parbin Singh, Published by S. K. Kataria & Sons, New Delhi, 2013.
5. Engineering Geology and Rock Mechanics by Dr B.P.Varma, Khanna Publishers, Delhi, 1998.

Year/Sem	**IV Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	3	0	0	3	V20CET06
Name of the Course	**STRUCTURAL ANALYSIS-I**					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon completion of the course, the student will be able to

- Illustrate Shear Force, Bending Moment and Deflection of Propped Cantilevers for different fixity conditions (K3)
- Calculate Shear Force, Bending Moment and Deflections of fixed beams for different fixity conditions (K3)
- Calculate Shear Force, Bending Moment and Deflections of Continuous beams for different fixity conditions (K3)
- Understand the concepts of Energy Theorems (K2)
- Assess Maximum Shear Force, Bending Moment and Deflections at a given section when loads of varying spans are passing over truss (K3)

SYLLABUS

UNIT I

Propped Cantilevers: Analysis of propped cantilevers-shear force and bending moment diagrams-Deflection of propped cantilevers..

UNIT II

Fixed Beams: Introduction to statically indeterminate beams with U. D. load, central point load, eccentric point load, number of point loads, uniformly varying load, couple and combination of loads - shear force and Bending moment diagrams-Deflection of fixed beams including effect of sinking of support, effect of rotation of a support.

UNIT III

Continuous Beams: Introduction-Clapeyron's theorem of three moments-Analysis of continuous beams with constant moment of inertia with one or both ends fixed continuous beams with overhang, continuous beams with different moment of inertia for different spans Effects of sinking of supports-shear force and bending moment diagrams.

UNIT IV

Energy Theorems: Introduction-Strain energy in linear elastic system, expression of strain energy due to axial load, bending moment and shear forces - Castigliano's first theorem Deflections of simple beams and pin jointed trusses.

UNIT V

Moving Loads And Influence Lines: Introduction, influence line diagrams, influence line diagrams for simply supported beams, cantilever beams, overhanging beams, double overhanging beams, balanced cantilever beams, girder supporting floor beams, use of influence line diagrams, maximum SF and BM values for moving loads, Train of concentrated loads

Text Books:

1. Basic Structural Analysis, C. S. Reddy Tata Mc.Graw-Hill, New Delhi.
2. Analysis of Structures by T.S. Thandavamoorthy, Oxford University Press, New Delhi.
3. Analysis of Structures- Vol. I and II, V. N. Vazirani and M. M. Ratwani, Khanna Publishers, New Delhi.
4. Structural Analysis - Vol. I and II,S.S.Bhavikatti,Vikas Publishing House,New Delhi.

References:

1. Theory of Structures, B. C Punmia, A. K Jain & Arun K. Jain, Lakshmi Publications.
2. Theory of Structures, R.S. Khurmi, S. Chand Publishers.
3. Structural analysis by R.C. Hibbeler, Pearson, New Delhi.
4. Structural Analysis-I, Hemanth Patel, Yogesh Patel, Synergy Knowledgeware, Mumbai 5. Structural Analysis I Analysis of Statically Determinate Structures, P. N. Chandramouli. Yesdee Publishing Pvt Limited, Chennai

Year/Sem	IV Sem	L	T	P	C	COURSE CODE
Regulation	V20	3	0	0	3	V20CET07
Name of the Course	WATER RESOURCES ENGINEERING					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of this course the student will be able to

- Calculate average rainfall and check consistency, continuity of rainfall (K3)
- Estimate the different components of the hydrologic cycle (K2)
- Compute the runoff of a catchment using Hydrographs (K3)
- Compute the flood frequency, design flood, flood routing (K3)
- Discuss the concepts of groundwater movement and well hydraulics (K2)

SYLLABUS

UNIT I

Introduction: Engineering hydrology and its applications, Hydrologic cycle, hydrological

Data - sources of data. Precipitation: Types and forms, measurement, rain gauge network, presentation of rainfall data, average rainfall, continuity and consistency of rainfall data, frequency of rainfall, Intensity-Duration-Frequency (IDF) curves, Depth-Area-Duration (DAD) curves, Probable Maximum Precipitation (PMP), design storm.

UNIT II

Abstractions from Precipitation: Initial abstractions. Evaporation: factors affecting, measurement, reduction Evapotranspiration: factors affecting, measurement, control Infiltration: factors affecting, Infiltration capacity curve, measurement, infiltration indices.

UNIT III

Runoff: Catchment characteristics, Factors affecting runoff, components, computation empirical formulae, tables and curves, stream gauging, rating curve, flow mass curve and flow duration curve. Hydrograph analysis: Components of hydrograph, separation of base flow, effective rainfall hyetograph and direct runoff hydrograph, unit hydrograph, assumptions, derivation of unit hydrograph, unit hydrographs of different durations, principle of superposition and S-hydrograph methods, limitations and applications of unit hydrograph, synthetic unit hydrograph.

UNIT IV

Floods: Causes and effects, frequency analysis- Gumbel's and Log-Pearson type III distribution methods, Standard Project Flood (SPF) and Probable Maximum Flood (MPF), flood control methods and management. Flood Routing: Hydrologic routing, channel and reservoir routing- Muskingum and Puls methods of routing.

UNIT V

Groundwater: Occurrence, types of aquifers, aquifer parameters, porosity, specific yield, permeability, transmissivity and storage coefficient, types of wells, Darcy's law, Dupuit's equation- steady radial flow to wells in confined and unconfined aquifers, yield of a open well-recuperation test.

Textbooks:

1. "Engineering Hydrology", Subramanya K., Tata Mc Graw-Hill Education Pvt. Ltd, New Delhi, 2013.
2. "Engineering Hydrology", Jayarami Reddy P., Laxmi Publications Pvt. Ltd., New Delhi, (2013)
3. "Applied hydrology", Chow V.T., D.R Maidment and L.W. Mays, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2011.

References:

1. "Water Resources Engineering", Mays L.W, Wiley India Pvt. Ltd, 2013.
2. "Hydrology", Raghunath. H.M., New Age International Publishers, 2010.
3. "Engineering Hydrology - Principles and Practice" Ponce V.M., Prentice Hall International,1994.
4. "Hydrology and Water Resources Engineering", Patra K.C., Narosa Publications, 2011.
5. "Engineering Hydrology", Ojha C.S., Berndtsson P.R and Bhunya. P., Oxford University Press,

Year/Sem	**IV Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	3	0	0	3	V20CET08
Name of the Course	TRANSPORTATION ENGINEERING					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of this course the student will be able to

- Design highway geometric elements for the decided alignment through engineering surveys (K3)
- Analyze and design of flexible, rigid pavements and examine pavement construction activities and also conduct quality control at site (K3)
- Analyze and design of traffic infrastructure facilities and evaluate pavement condition to suggest remedial measures (K3)
- Analyze the Railway Track Geometric Elements (K3)
- Analyze and design geometric elements of Airport Runway and Taxiway and classify the various components of Dock & Harbors (K3)

SYLLABUS

UNIT I

Highway Alignment and Geometric Design: Historical development of roads– Highway development in India –Different Road Development Plan– Highway Alignment–Factors affecting Alignment– Engineering Surveys. Highway Geometric Design: Importance of Geometric Design– Factors– Highway Cross Section Elements–Sight Distance Elements–Design of Horizontal Alignment–Design of Vertical alignment.

UNIT II

Design of Pavements and Highway Construction: Types of pavement– Components of pavement–Flexible Pavements – Design factors – Flexible Pavement Design Methods– Mechanistic method, Rigid Pavements– Design Considerations– wheel load stresses– Temperature stresses–Design of slabs– IRC method of rigid pavements–Highway Construction–Types of Highway Construction – Earthwork – Stabilization of soils–Construction of Bituminous Pavements –Construction of Cement Concrete Pavements

UNIT III

Highway Maintenance and Traffic Infrastructure Design: Pavement Failures – Pavement Condition Survey–Maintenance of Highways– Pavement evaluation– Strengthening of existing pavements– Traffic Engineering – Basic Parameters of Traffic– Volume,– Speed– Density- Volume Studies Speed Studies– spot speed– speed & delay studies, Parking Studies, Condition Diagram and Collision Diagrams-–PCU Factors –Capacity and LOS of Highways – Road Traffic Signs –Road markings – Types of Intersections– At-Grade Intersections–Design of Traffic Signals– Webster Method .

UNIT IV

Railway Engineering : Permanent way – Components and their functions – Rail joints – Welding of Rails – Creep of Rails – Rail fixtures & Fastenings – Geometric Design of Railway Track: Gradients- Grade Compensation- Cant and Negative Super elevation- Cant Deficiency –Degree of Curve , Layout of Railway stations and yards – Signals – Interlocking –Track layouts –Turnouts – Layout of Turnout – Crossings –Diamond crossing – Scissors crossing. Signal Objectives – Classification – Fixed signals – Stop signals – Signaling systems

UNIT V

Airport Planning and Docks Harbors: Airport Master plan – Airport site selection – Air craft characteristics –Airport classification – Runway orientation – Wind rose diagram – Runway length – Taxiway – Terminal area. Docks Harbors: Layout of Port components – Functions –Classification of Ports – Site selection – Natural Phenomenon – Tides, Winds, Waves, Currents – Drift – Navigational aids.

Textbooks

1. Highway Engineering, Khanna S. K., Justo C. E. G and Veeraragavan A, Nem Chand Bros.,Roorkee.
2. Traffic Engineering and Transportation Planning, Kadiyali L. R, Khanna Publishers, New Delhi.
3. Railway Engineering, Satish Chandra and Agarwal M. M., Oxford University Press, New Delhi.
4. Airport Engineering, Khanna & Arora, Nemchand Bros, New Delhi.
5. Docks and Harbor Engineering, Bindra S.P., Dhanpathi Rai & Sons, New Delhi.

References

1. Principles of Transportation Engineering, Partha Chakroborthy and Animesh Das, PHI Learning Private Limited, Delhi.
2. Principles of Highway Engineering, Kadiyali L. R, Khanna Publishers, New Delhi
3. Transportation Engineering - An Introduction, Jotin Khisty C, Prentice Hall, Englewood Cliffs, New Jersey.
4. Railway Engineering, Saxena & Arora, Dhanpat Rai, New Delhi.
5. Airport Engineering Planning & Design, Subhash C. Saxena, CB Publishers, New Delhi.
6. Transportation Engineering, Railways, Airports, Docks & Harbors, Srinivasa Kumar R, University Press, Hyderabad.

IRC CODES

- IRC 37–2018: Guidelines for the Design of Flexible Pavements, Indian Road Congress Publications, New Delhi.
- IRC58–2015: Guidelines for the Design of Plain Jointed Rigid Pavements for Highways, Indian Road Congress Publications, New Delhi.
- MORTH - Specifications for Road and Bridge works, Indian Road Congress Publication, New Delhi, Latest Edition.

Year/Sem	IV Sem	L	T	P	C	COURSE CODE
Regulation	V20	0	0	3	1.5	V20CEL04
Name of the Course	**ENGINEERING GEOLOGY LAB**					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon completion of the course, the student will be able to

- Understand the importance of geology in civil engineering
- Identify the geological process of any region to carry civil engineering works
- Evaluate the formation and properties of minerals, rocks and soil
- Develop the ability to prepare geological maps and sections to interpret site conditions

List of Experiments

1. Physical properties of minerals and their megascopic identification
2. Rock forming minerals: Quartz group, Feldspar group, Garnet group, Mica group, Talc, Chlorite, Olivine, Kyanite, Asbestos, Tourmelene, Calcite, Gypsum etc.
3. Ore forming minerals: Magnetite, Hematite, Pyrite, Pyralusite, Graphite, Chromite etc.
4. Megascopic description and identification of rocks
5. Igneous rocks: Granite, Pegmatite, Gabbro, Dolerite, Syenite, Granite Poryphery, Basalt, etc.
6. Sedimentary rocks: Sand stone, Ferrugineous sand stone, Lime stone, Shale, Laterite, Conglamorate, etc.
7. Metamorphic rocks: Biotite, Granite Gneiss, Slate, Muscovite & Biotiteschist, Marble, Khondalite, etc.
8. Interpretation and drawing of sections for geological maps showing tilted beds, faults, unconformities etc.
9. Simple Structural Geology problems
10. Bore hole data
11. Strength of the rock using laboratory tests
12. Field work to identify Minerals and Rocks, Geomorphology and Structural Geology

References:

1. Applied Engineering Geology Practicals by M T Maruthesha Reddy, New Age International Publishers, Second Edition, 2007.
2. Foundations of Engineering Geology by F G Bell, B S Publications, first edition, 2005.

Year/Sem	IV Sem	L	T	P	C	COURSE CODE

Regulation	V20	0	0	3	1.5	V20CEL05
Name of the Course	**FLUID MECHANICS & HYDRAULIC MACHINERY LAB**					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon completion of the course, the student will be able to

- Employ the basic principles of Fluid mechanics to assess discharge with different devices and different losses in a pipe line (K3)
- Calculate the performance parameters of Reciprocating and Centrifugal pumps (K3)
- Calculate the performance parameters of different types of turbines (K3)

List of Experiments

1. Determination of friction factor for the given pipe line.
2. Determination of loss of head due to sudden contraction.
3. Determination of force exerted by a jet on a vane.
4. Calibration of Venturimeter.
5. Calibration of Orificemeter.
6. Calibration of Turbine flow meter.
7. Determination of performance parameters of Reciprocating pump.
8. Determination of performance parameters of Single stage Centrifugal pump.
9. Determination of performance parameters of Multi stage Centrifugal pump.
10. Determination of performance parameters of Pelton wheel.
11. Determination of performance parameters of Francis Turbine.
12. Determination of performance parameters of Kaplan Turbine.

Add On Experiments:

1. Determination of loss of head due to sudden expansion.
2. Verification of Bernoulli‘s theorem.

References:

1. Fluid Mechanics and Fluid Machines lab – College lab manual.
2. Hydraulics And Fluid Mechanics Including Hydraulics Machines (In Si Units)
   – Modi & Seth,20th edition, Standard publishers, 2015.

Year/Sem	**IV Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	0	0	3	1.5	V20CEL06
Name of the Course	**TRANSPORTATION ENGINEERING LAB**					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of this course, the student will be able to

- Assess the suitability of different materials for the road construction (K3)
- Examine the given bitumen samples and judge their suitability for road construction (K3)
- Find the Optimum Bitumen content for the Bituminous mix (K3)
- Develop the gradation of Bituminous mix for stability and flow properties (K3)

List of Experiments

I. Road Aggregates:

1. Aggregate Crushing value
2. Aggregate Impact Test.
3. Specific Gravity and Water Absorption.
4. Abrasion Test.
5. Shape tests

II. Bituminous Materials:

6. Penetration Test.
7. Ductility Test.
8. Softening Point Test.
9. Flash and fire point tests.
10. Viscosity Test.

III. Bituminous Mix:

11. Marshall Stability test.

List of Equipment

1. Apparatus for aggregate crushing test.
2. Aggregate Impact testing machine

3. Pycnometers.
4. Los angles Abrasion test machine
5. Length and elongation gauges
6. Bitumen penetration test setup.
7. Bitumen Ductility test setup.
8. Ring and ball apparatus
9. Flash and Fire Apparatus
10. Viscometer.
11. Marshal Stability apparatus.

References:

1. "Highway Material Testing Manual", S.K. Khanna, C.E.G Justo and A.Veeraraghavan, Neam Chan Brothers New Chand Publications, New Delhi.
2. IRC Codes of Practice
3. Asphalt Institute of American Manuals
4. Code of Practice of B.I.S.

ANNEXURE – CE-IV

COURSE STRUCTURE PROPOSED FOR M.Tech (Structural Engineering)

(For 2021 – 2022 Admitted Batch) – V21 Regulation

I SEMESTER

S.No	Course Code	Course Name	L	T	P	C
1	V21STET01	Theory of Elasticity	3	0	0	3
2	V21STET02	Structural Dynamics	3	0	0	3
3	V21STET03 V21MAT01 V21STET04	Elective I 1. Matrix Analysis of Structures 2. Analytical & Numerical Methods for Structural Engineering (Bos of Maths) 3. Design of RCC Foundations	3	0	0	3
4	V21STET05 V21STET06 V21STET07	Elective II 1. Bridge Engineering 2. Repair and Rehabilitation of Structures 3. Structural Optimization	3	0	0	3
5	V21STET08	Advanced Concrete Technology	2	0	0	2
6	V21STEL01	Advanced Concrete Technology Laboratory	0	0	4	2
7	V21STEL02	Advanced Structural Engineering Laboratory	0	0	4	2
8		Audit Course -1	2	0	0	0
Total			16	0	8	18

Total Contact Hours : 24

Total Credits : 18

II SEMESTER

S.No	Course Code	Course Name	L	T	P	C
1	V21STET09	Finite Element Methods in Structural Engineering	3	0	0	3
2	V21STET10	Stability of Structures	3	0	0	3
3	V21STET11 V21STET12 V21STET13	Elective III 1. Theory of Plates and Shells 2. Advanced Steel Design 3. Analysis of Offshore Structures	3	0	0	3
4	V21STET14 V21STET15 V21STET16	Elective IV 1. Earthquake Resistant Design of Buildings 2. Precast and Prefabricated Structures 3. Earth Retaining Structures	3	0	0	3
5	V21STET17	Advanced Reinforced Concrete Design	2	0	0	2
6	V21STEL03	Structural Design laboratory	0	0	4	2
7	V21STEP01	Mini Project With Seminar	0	0	4	2
8		Audit Course -2	2	0	0	0
Total			16	0	8	18

Total Contact Hours : 24

Total Credits : 18

Audit course 1 & 2

1. English for Research Paper Writing - V21PGENT54(BOS English)
2. Disaster Management (BOS of CIVIL) - V21STEAC1
3. Value Education (BOS English) - V21PGENT55
4. Constitution of India (BOS English) - V21PGENT56
5. Pedagogy Studies (BOS English) - V21PGENT51
6. Personality Development through Life Enlightenment Skills (BOS English) - V21PGENT52
7. Stress Management by Yoga - V21PGENT53

III SEMESTER

S.No	Course Code	Course Name	L	T	P	C
1	V21STET18 V21STET19 V21STET20	Elective III/ MOOCS*/NPTEL* 1. Design of Prestressed Concrete Structures 2. Structural Health Monitoring 3. Industrial Structures 4. MOOCS-1 through NPTEL/SWAYAM 12 Week Programme related to the programme which is not listed in the course structure	3	0	0	3
2	V21MAT02 V21MBT56	Open Elective / MOOCS*/NPTEL* 1. Operational Research (BOS of Maths) 2. Cost Management of Engineering Projects (BOS of MBA) 3. MOOCS-2 through NPTEL/SWAYAM 12 Week Programme related to the programme which is not listed in the course structure	3	0	0	3
3	V21STEP02	Project Phase I	0	0	20	1 0
Total			6	0	20	16

Total Contact Hours: 26

Total Credits : 16

IV SEMESTER

S.No	Course Code	Course Name	L	T	P	C
1	V21STEP03	Project Phase II	0	0	32	16
Total			0	0	32	16

Total Contact Hours: 32

Total Credits : 16

SYLLABI PROPOSED FOR M.Tech
(Structural Engineering)

I SEMESTER – SYLLABUS

Year/Sem	I Sem	L	T	P	C	COURSE CODE
Regulation / Year	V21 / 2021-2022	3	0	0	3	V21STET01
Name of the Course	THEORY OF ELASTICITY					
Branch	STRUCTURAL ENGINEERING					

Course Outcomes:

Upon successful completion of this course, the students will be able to

- Relate the stress and deformation and how to determine the components of the stress and strain tensors (K3)
- Apply the conditions of compatibility and equations of equilibrium (K3)
- Employ the mechanical characteristics of materials, constitutive equations and generalized Hook law (K3)
- Use the equilibrium equations stated by the displacements and compatibility conditions stated by stresses (K3)
- Develop index notation of equations, tensor and matrix notation and define state of plane stress, state of plane strain (K3)

SYLLABUS

UNIT I

Elasticity – Notation for forces and stresses – components of stresses and strains – Hooke's Law - Plane Stress – Plane strain – Differential Equations of equilibrium – Boundary conditions – Compatibility equations Stress function – Boundary Conditions.

UNIT II

Two dimensional problems in rectangular co-ordinates – Solution by polynomials – Saint Venant's principle – Determination of displacements – Bending of simple beams – Application of Fourier series for two dimensional problems for gravity loading.

UNIT III

Two dimensional problems in polar coordinates - General equations in polar coordinates – Stress distribution for problems having symmetrical about an axis - Strain components in polar co-ordinates– Displacements for symmetrical stress distributions - Stresses for plates with circular holes subjected to far field tension – stress concentration factor.

UNIT IV

Analysis of stress and strain in three dimension - Principal stresses – Stress ellipsoid and stress director surface – Determination of principal stresses - Maximum shear stress – Homogeneous Deformation – General Theorems - Differential equations of equilibrium – Conditions of compatibility– Equations of equilibrium in terms of displacements – Principle of superposition – Uniqueness of solution –Reciprocal theorem.

UNIT V

Torsion of Prismatic bars – Bars with elliptical cross section – Other elementary solution – Membrane analogy – Torsion of rectangular bars – Solution of Torsional problems by energy method.

Text Books:

1. 1.Theory of Elasticity- Stephen Timoshenko & J. N. Goodier, Mc.Grawhill Publishers
2. Advanced Mechanics of Solids L.S. Srinath, McGraw Hill Publishers
3. Theory of Elasticity By A.I. Lurie

References:

1. Elasticity: Theory, Applications and Numeric Martin H. Sadd, Wiley Publishers
2. Theory of Elasticity -Sadhu Singh 3rd Edition, Khanna Publishers.
3. An Introduction to the Theory of Elasticity
4. By R. J. Atkin, N. Fox · 2005, Dover Publications

Year/Sem	I Sem	L	T	P	C	COURSE CODE
Regulation	V21	3	0	0	3	V21STET02
Name of the Course	**STRUCTURAL DYNAMICS**					
Branch	STRUCTURAL ENGINEERING					

Course Outcomes:

Upon successful completion of this course, the students will be able to

- Asses the behavior of structures subjected to dynamic loads Harmonic excitation and earthquake load(K3)
- Demonstrate the behavior and response of SDOF structures with various dynamic loading. (K3)
- Illustrate the response of structural systems to dynamic loads and Realize the behavior and response of linear and nonlinear SDOF and MDOF structures with various dynamic loading. (K3)
- Develop the ability to find out suitable solution for continuous system of various beams with different end conditions. (K3)
- Interpret the analysis of building subject to earthquake by various methods. (K3)

SYLLABUS

UNIT I

Theory of vibrations: Introduction - Elements of vibratory system - Degrees of Freedom - Continuous System - Lumped mass idealization - Oscillatory motion - Simple Harmonic motion - Victorian representation of S.H.M. - Free vibrations of single degree of freedom system - undamped and damped vibrations - critical damping - Logarithmic decrement - Forced vibration of SDOF systems - Harmonic excitation - Vibration Isolation -Dynamic magnification factor – Phase angle.

UNIT II

Introduction to Structural Dynamics: Fundamental objectives of dynamic analysis -Types of prescribed loading - Methods of discretization - Formulation of equations of motion by different methods – Direct equilibration using Newton's law of motion / D'Alembert's Principle, Principle of virtual work and Hamilton principle.

Single Degree of Freedom Systems : Formulation and solution of the equation of motion – Free vibration response - Response to Harmonic, Periodic, Impulsive and general dynamic loadings - Duhamel integral.

UNIT III

Multi Degree of Freedom Systems: Selection of the degrees of Freedom - Evaluation of structural property matrices - Formulation of the MDOF equations of motion -Undamped free vibrations - Solutions of Eigen value problem for natural frequencies and mode shapes - Analysis of Dynamic response – Normal co-ordinates - Uncoupled equations of motion - Orthogonal properties of normal modes - Mode superposition procedure.

UNIT IV

Practical Vibration Analysis: Introduction - Stodola method - Fundamental mode analysis - Analysis of second and higher modes - Holzer method - Basic procedure.

Continuous Systems: Introduction - Flexural vibrations of beams - Elementary case – Derivation of governing differential equation of motion - Analysis of undamped free vibrations of beams in flexure - Natural frequencies and mode-shapes of simple beams with different end conditions - Principles of application to continuous beams.

UNIT V

Introduction to Earthquake Analysis: Deterministic Earthquake Response: Systems on Rigid Foundations -Types of Earthquake Excitations – Lumped SDOF Elastic Systems, Translational Excitations -Generalized coordinate - SDOF Elastic Systems, Translational Excitations, Linear Static Method – Analysis for obtaining response of multi storied RC Building.

Text Books:

1. Structural Dynamics Anil K Chopra, 4edition, Prentice Hall Publishers
2. Structural Dynamics Theory & Computation – Mario Paz, CBS Publishes and Distributors
3. Elementary Structural Dynamics- V.K. Manika Selvam, Dhanpat Rai Publishers

References:

1. Dynamics of Structures by Clough & Penzien 3e, Computers & Structures Inc.
2. Theory of Vibration -William T Thomson, Springer Science.
3. Mechanical Vibrations- S. S. Rao, 5e, Pearson Publications.
4. Structural Dynamics of Earthquake Engineering - Theory and Application using Mathematica and Matlab- S. Rajasekharan.

Year/Sem	I Sem	L	T	P	C	COURSE CODE
Regulation	V21	3	0	0	3	V21STET03
Name of the Course	MATRIX ANALYSIS OF STRUCTURES					
Branch	STRUCTURAL ENGINEERING					

Course Outcomes:

Upon successful completion of this course, the students will be able to

- Assess the structural analysis of determinate and indeterminate structures using classical compatibility methods, such as method of consistent displacements, force and equilibrium Methods (K3)
- Solve multiple degree of freedom two- and three-dimensional problems involving trusses, beams, frames and plane stress (K3)
- Asses the analysis of grid element by stiffness method (K3)
- Discuss the band width, loads at joints and their support displacement (K2)
- Complete analysis of plane frames with and without side sway by various approaches. (K3)

SYLLABUS

UNIT I

Introduction of matrix methods of analysis – Static and kinematic indeterminacy – Degree of freedom– Structure idealization-stiffness and flexibility methods – Suitability: Element stiffness matrix for truss element, beam element and Torsional element- Element force -displacement equations.

UNIT II

Stiffness method – Element and global stiffness equation – coordinate transformation and global assembly – structure stiffness matrix equation – analysis of simple pin jointed trusses – continuous beams – rigid jointed plane frames

UNIT III

Stiffness method for Grid elements – development of stiffness matrix – coordinate transformation. Examples of grid problems – tapered and curved beams

UNIT IV

Additional topics in stiffness methods – discussion of band width – semi band width – static condensation – sub structuring –Loads between joints-Support displacements- inertial and thermal stresses-Beams on elastic foundation by stiffness method.

UNIT V

Analysis of plane frame - continuous beams with and without settlement - plane frame including side sway single storey, single – bay and gable frame by flexibility method using system approach.

Text Books:

1. Matrix analysis of structures, Robert E Sennet- Prentice Hall-Englewood cliffs,New Jercy.
2. Advanced structural analysis, P. Dayaratnam, Tata McGraw hill publishing company limited.
3. Structural Analysis Matrix Approach - Pandit and Gupta, Mc Graw Hill Education

References:

1. Indeterminate Structural analysis, C.K Wang, Amazon Publications
2. Analysis of Tall buildings by force – displacement – Method M. Smolira Mc. Graw Hill.
3. Foundation Analysis and design, J.E. Bowls, Amazon Publications.
4. Matrix Analysis of Framed Structures -William Weaver, Jr.James M. Gere, Van Nostrand Reinhold, Newyork.
5. Matrix Methods of Structural Analysis Madhu B.Kanchi, Wiley Publications.
6. Indeterminate Structural Analysis by K. U. Muthu, IK International Publishing house.

Year/Sem	I Sem	L	T	P	C	COURSE CODE
Regulation	V21	3	0	0	3	V21MAT01
Name of the Course	**ANALYTICAL& NUMERICAL METHODS FOR STRUCTURAL ENGINEERING**					
Branch	STRUCTURAL ENGINEERING					

Course Outcomes:

Upon successful completion of this course, the students will be able to

- Calculate of Laplace transform methods on heat conduction problems (K3)
- Apply the principles and techniques of Elliptic Equations-Laplace equation (K3)
- Develop the principles and techniques of Integral Equations (K3)
- Adopt the principles and techniques of Finite Difference and their Applications (K3)
- Apply the principles and techniques of Numerical Integration (K3)

SYLLABUS

UNIT I

Transform Methods- Laplace transform methods for one-dimensional wave equation - Displacements in a long string - Longitudinal vibration of an elastic bar - Fourier transforms methods for one-dimensional heat conduction problems in infinite and semi-infinite rod

UNIT II

Elliptic Equations-Laplace equation - Properties of harmonic functions - Fourier transform methods for Laplace equation-Calculus Of Variations-Variation and its properties - Euler's equation - Functionals dependent on first and higher order derivatives - Functionals dependent on functions of several independent variables - Some applications - Direct methods - Ritz and Kantorovich methods

UNIT III

Integral Equations- Fredholm and Volterra integral equations - Relation between differential and integral equations - Green's function -Fredholm equation with separable kernel - Iterative method for solving equations of second kind

UNIT IV

Finite Difference and their Applications: Introduction- Differentiation formulas by Interpolating parabolas – Backward and forward and central differences- Derivation of Differentiation formulas using Taylor series- Boundary conditions- Beam deflection – Solution of characteristic value problems - Richardson's extrapolation - Use of unevenly spaced pivotal points- Integration formulae by interpolating parabolas- Numerical solution to spatial differential equations – Application to Simply Supported Beams, Columns & rectangular Plates.

UNIT V

Numerical Differentiation: Difference methods based on undetermined coefficients- optimum choice of step length– Partial differentiation.

Numerical Integration: Method based on interpolation-method based on undetermined coefficient – Gauss – Lagrange interpolation method- Radaua integration method- composite integration method – Double integration using Trapezoidal and Simpson's method – New Marks Method and Application to Beams – Calculations of Slopes & Deflections.

Textbooks:

1. Introduction to Partial Differential Equations, Sankar Rao. K, PHI, New Delhi, 1995
2. Numerical Methods For Scientific and Engineering Computations. M. K. Jain- S. R. K. Iyengar – R. K. Jain, New Age International (p) Ltd., Publishers.
3. Numerical Methods for Engineering Problems N. Krishna Raju, K.U. Muthu Macmillan Publishers

References:

1. Differential Equations and Calculus of Variations Elsgolts. L, Mir Publishers, Moscow, 1966
2. Fundamentals of Mathematical Statistics Gupta. S.C, & Kapoor. V.K, Sultan Chand & Sons, Reprint 1999.
3. Higher Engineering Maths for Engg. And Sciences Venkataraman. M. K, National Publishing Company, Chennai
4. Elements of Partial Differential Equations, Sneddon. I.N, Mc Graw Hill, 1986
5. Computer based numerical analysis by Dr. M. Shanta Kumar, Khanna Book publishers New Delhi

Year/Sem	I Sem	L	T	P	C	COURSE CODE
Regulation	V21	3	0	0	3	V21STET04
Name of the Course	DESIGN OF RCC FOUNDATIONS (Elective-I)					
Branch	STRUCTURAL ENGINEERING					

Course Outcomes:

Upon successful completion of this course, the students will be able to

- Attain the perception of site investigation to select suitable type of foundation based on soil category (K3)
- Capable of ensuring design concepts of shallow foundation (K3)
- Can be efficient in selecting suitable type of pile for different soil stratum and in evaluation of group capacity by formulation (K3)
- Design different types of well foundation (K3)
- Explain the properties of soil and mechanism of suitable foundation (K3)

SYLLABUS

UNIT I

Foundation Structures & Design of Centrally Loaded Isolated Footings and Column Pedestals – Introduction, Rigid and Flexible Foundations, Loads and their Effects, Design Requirements, Geotechnical Design, Empirical and Exact Methods of Analysis of foundations, Design Loads for Foundations, Recommended Approach to Structural Design of Foundations.

Introduction, General Procedure for Design, Design of Square Footing of Uniform Depth (Pad Footing), Design of sloped Rectangular Footings, Design Procedure, Detailing of Steel, Design of Rectangular Pad Footings, Design of Plain Concrete Footings, Design of Pedestals, Design Calculation for Pedestals.

UNIT II

Wall Footings – Introduction Simple Plain Concrete Wall Footings, Reinforced Concrete Continuous Strip Wall Footings, Design of continuous Strip Wall Footings, Design for Longitudinal Steel, R.C. T Beam Footings in Shrinkable Soils, Foundations of Partition Wall in Ground Floors, Summary.

Strip Footings Under Several Columns – Introduction, Design Procedure for Equally loaded and Equally Spaced Columns, Analysis of Continuous Strip Footing for Unsymmetrical Loading, Analysis of Strip Footing with Unsymmetrical Loads, Detailing of Members.

UNIT III

Raft Foundations – Introduction, Rigid and Flexible Foundations, common Types of Rafts, Deflection Requirements of Beams and Slabs in Rafts, General considerations in Design of Rigid Rafts, Types of Loadings and Choice of Rafts, Record of Contact Pressures Measured Under Rafts, Modern Theoretical Analysis.

Design of Flat Slab Rafts-Mat Foundations – Introduction, Components of Flat Slabs, Preliminary Planning of Flat Slab Rafts, Analysis of Flat Slab by Direct Design Method, Method of Analysis, Values for Longitudinal Distribution and Transverse, Redistribution, Shear in Flat Slabs, Bending of Columns in flat Slabs, Limitations of Direct Design Method for Mats, Detailing of Steel, Design of Edge Beam in Flat Slabs.

Beam and Slab Rafts – Introduction, Planning of the Raft, Action of the Raft, Approximate Dimensioning of the Raft, Design of the Beam and Slab Raft under Uniform Pressure, Structural Analysis for the Main Slab, Design of Secondary and Main Beams, Analysis by Winkler Model, Detailing of Steel.

UNIT IV

Combined Piled Raft Foundations (CPRF) – Introduction, Types and uses of Piled Rafts, , Interaction of Pile and Raft, Ultimate Capacity and Settlement of Piles, Estimation of Settlement of Raft in Soils, Allowable Maximum and Differential Settlement in Buildings, Design of CPRF System, conceptual Method of Design, Conceptual Method of Analysis, Distribution of Piles in the Rafts, Theoretical Methods of Analysis.

Circular and Annular Rafts – Introduction, Positioning of chimney Load on Annular Raft, Forces Acting on Annular Rafts, Pressures Under Dead Load and Moment, Methods of Analysis, Conventional Analysis of Annular Rafts, Analysis of Ring Beams Under circular Layout of Columns, Analysis of Ring Beam Transmitting Column Load to Annular Rafts, Detailing of Annular Raft Under Columns of a Circular Water Tank.

UNIT V

Under-reamed Pile Foundations – Introduction, Safe Loads on Under-reamed Piles, Design of Under-reamed Pile Foundation for Load Bearing Walls of Buildings, Design of Grade Beams, Design of Under-reamed Piles Under Columns of Buildings, Use of Under-reamed Piles for Expansive Soils.

Design of cantilever and Basement Retaining Walls – Introduction, Earth Pressure and Rigid Walls, Calculation of Earth Pressure on Retaining Walls, Design of Rigid Walls, Design of Ordinary R.C. cantilever Walls, Design of cantilever Walls without Toe, Design of Basement Walls, Calculation of Earth Pressures in Clays, Design of Free Standing Basement Walls.

Text Books:

1. Design of Reinforced Concrete Foundations by P. C Varghese, PHI Learning Private Limited., New Delhi.
2. Krishnaraju.N " Design of Reinforced Concrete Structurres", CBS Publishers & Distributors Pvt. Ltd., New Delhi.
3. Design of Reinforced Concrete Structures by N. Subramaniam- Oxford University.

References:

1. Reinforced Concrete Design by Unnikrishna Pillai and Devdas Menon, Tata Mc Graw Hill.
2. Ramachandra, "Limit state Design of Concrete Structures" Standard Book House, New Delhi.
3. IS 456 (2000): Plain and Reinforced Concrete - Code of Practice.

Year/Sem	I Sem	L	T	P	C	COURSE CODE
Regulation	V21	3	0	0	3	V21STET05
Name of the Course	**BRIDGE ENGINEERING**					
Branch	STRUCTURAL ENGINEERING					

Course Outcomes:

Upon successful completion of this course, the students will be able to

- Illustrate the different types of loads and stresses acting on various bridges (K3)
- Asses the various methodologies to analyses the bridges and also interpret the specifications of bridge super structure (K3)
- Demonstrate the box culverts and its design (K3)
- Develop the knowledge on design of plate girder bridges (K3)
- Illustrate the different types of bearings, abutments, piers and various types of foundations for Bridges (K3)

SYLLABUS

UNIT I

Concrete Bridges: Introduction-Types of Bridges-Economic span length-Types of loading-Dead load-live load-Impact Effect-Centrifugal force-wind loads-Lateral loads-Longitudinal forces- Seismic loads- Frictional resistance of expansion bearings-Secondary Stresses-Temperature Effect-Erection Forces and effects-Width of roadway and footway-General Design Requirements.

UNIT II

Design of Girders & Slabs: Pigeaud's Method Design of longitudinal girders-Guyon-Messonet method- Hendry Jaegar method- Courbon's theory. (Ref: IRC-21), voided slabs.

Super Structure: Slab bridge- Wheel load on slab- effective width method-slabs supported on two edges- cantilever slabs- dispersion length- Design of interior panel of slab- T-Beam bridges.

UNIT III

Box Culverts: Single Cell Box Culvert – Design Loads, Design Moments, Shears and Thrusts. Design of Critical sections.

UNIT IV

Plate Girder Bridges: Elements of plate girder and their design-web-flange-intermediate stiffener- vertical stiffeners- bearing stiffener-design problem

UNIT V

Sub structure: Abutments- Stability analysis of abutments- piers- loads on piers – Analysis of piers- Design problem(Ref: IRC-13, IRC-21, IRC-78)- Pipe culvert- Flow pattern in pipe culvers- culvert alignment-culvert entrance structure- Hydraulic design and structural design of pipe culverts-reinforcements in pipes .(Ref: IRC: SP-13)

Text Books:

1. 1.Design of Bridges by N. Krishna Raju CBS Publishers and Distributors
2. Bridge Engineering by S. Ponnuswamy, Mc Grawhill Publications
3. 3.Essentials of Bridge Engineering- Jhonson Victor D, 7e, Oxford IBH Publications

References:

1. Bridge Deck Behavior- E.C. Hambly 2e- CRC Press
2. Concrete Bridge Design and Practice- V.K. Raina, Tata McGraw- Hill Publishing Company Limited
3. IRC 6- 2016 Standard Specifications and Code of Practice for Road bridges
4. IRC 112-2011 Code of Practice for Concrete Road Bridges.

Year/Sem	**I Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation / Year	V21 / 2021-2022	3	0	0	3	V21STET06
Name of the Course	**REPAIR AND REHABILITATION OF STRUCTURES**					
Branch	STRUCTURAL ENGINEERING					

Course Outcomes:
Upon successful completion of this course, the students will be able to

- Recognize the mechanisms of degradation of concrete structures and to design durable concrete structures. (K2)
- Describe and suggest repair strategies for deteriorated concrete structures including repairing with composites. (K2)
- Develop the methods of strengthening methods for concrete structures. (K3)
- Demonstrate the fiber reinforced concrete and its properties. (K3)
- Examine the structural member's strength by high performance concrete. (K3)

SYLLABUS

UNIT I

Materials for repair and rehabilitation: Admixtures- types of admixtures-purposes of using admixtures- chemical composition- Natural admixtures- Fibres- wraps- Glass and Carbon fibre wraps- Steel Plates-Non destructive evaluation: Importance- Concrete behavior under corrosion, disintegrated mechanisms- moisture effects and thermal effects – Visual investigation- Acoustical emission methods- Corrosion activity measurement- chloride content – Depth of carbonation- Impact echo methods- Ultrasound pulse velocity methods- Pull out tests.

UNIT II

Strengthening and stabilization: Techniques- design considerations-Beam shear capacity strengthening- Shear Transfer strengthening-stress reduction techniques- Column strengthening- flexural strengthening- Connection stabilization and strengthening, Crack stabilization.

UNIT III

Bonded installation techniques: Externally bonded FRP- Wet layup sheet, bolted plate, near surface mounted FRP, fundamental debonding mechanisms-intermediate crack debonding- CDC debonding- plate end debonding- strengthening of floor of structures

UNIT IV

Fibre reinforced concrete: Properties of constituent materials- Mix proportions, mixing and casting methods-Mechanical properties of fiber reinforced concrete- applications of fibre reinforced concretes-Lightweight concrete- properties of light weight concrete- No fines concrete- design of light weight concrete- Fly ash concrete-Introduction- classification of Fly ash- properties and reaction mechanism of fly ash- Properties of fly ash concrete in fresh state and hardened state- Durability of fly ash concretes

UNIT V

High performance concretes: Introduction- Development of high-performance concretes- Materials of high-performance concretes- Properties of high-performance concretes- Self Consolidating concrete- properties- qualifications.

Textbooks:

1. Maintenance Repair Rehabilitation & Minor works of Buildings- P.C. Varghese, PHI Publications
2. Repair and Rehabilitation of Concrete Structures – P.I. Modi, C.N. Patel, PHI Publications
3. Rehabilitation of Concrete Structures- B. Vidivelli, Standard Publishers Distributors
4. Concrete Bridge Practice Construction Maintenance & Rehabilitation- V.K. Raina, Shroff Publishers and Distributors.

References:

1. Concrete Technology Theory and Practice- M.S. Shetty, S Chand and Company
2. Concrete Repair and Maintenance illustrated- Peter H Emmons
3. Concrete Chemical Theory and Applications- Santa Kumar A.R. Indian Society for
Construction Engineering and Technology, Madras
4. Handbook on Repair and Rehabilitation of RC Buildings published by CPWD, Delhi

Year/Sem	**I Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V21	3	0	0	3	V21STET07
Name of the Course	**STRUCTURAL OPTIMIZATION**					
Branch	STRUCTURAL ENGINEERING					

Course Outcomes:

Upon successful completion of this course, the students will be able to

- Study the optimization methodologies applied to structural engineering
- Solve some continuous structural optimization problems using calculus of variations.
- Have sufficient knowledge on various optimization techniques like, non-linear programming, geometric and dynamic
- Describe numerical algorithms and linear programming suitable for structural optimization problems.
- Use and describe quadratic and dynamic programming .

SYLLABUS

UNIT I
Introduction: Need and scope for optimization – statements of optimization problems Objective function and its surface design variables- constraints and constraint surface Classification of optimization problems (various functions continuous, discontinuous and discrete) and function behavior (monotonic and unimodal)

UNIT II
Classical optimization techniques: Differential calculus method, multi variable optimization by method of constrained variation and Lagrange multipliers (generalized problem) Khun-Tucker conditions of optimality -Fully stressed design and optimality criterion based algorithms introduction, characteristics of fully stressed design theoretical basis-examples

UNIT III
Non-Liner programming: Unconstrained minimization- Fibonacci, golden search, Quadratic and cubic interpolation methods for a one dimensional minimization and univariate method, Powel's method, Newton's method and Davidon Fletcher Powell's method for multivariable optimization- Constrained minimization- Cutting plane method- Zoutendjik's method- penalty function methods

UNIT IV
Linear programming: Definitions and theorems- Simplex method-Duality in Linear programming- Plastic analysis and Minimum weight design and rigid frame

UNIT V

Introduction to quadratic programming: Geometric programming- and dynamic programming Design of beams and frames using dynamic programming technique

Text books:

1. Iyengar.N.G.R and Gupta.S.K, “Structural Design Optimization”, Affiliated East West Press Ltd, New Delhi, 1997 .
2. Rao,S.S. “Optimization theory and applications”, Wiley Eastern (P) Ltd., 1984
3. Spunt, “Optimization in Structural Design”, Civil Engineering and Engineering Mechanics Services, Prentice-Hall, New Jersey 1971.
4. Uri Krish, “Optimum Structural Design”, McGraw Hill Book Co. 1981

References:

1. G. Hadley,"Linear programming", Narosa Publishing House, New Delhi, 1990.
2. H.A. Taha,"Operations Research:An Introduction", 5th Edition, Macmillan, New York, 1992.
3. K. Deb,"Optimization for Engineering DesignAlgorithms and Examples",Prentice-Hall of India Pvt. Ltd., New Delhi, 1995.
4. K.Srinivasa Raju and D. Nagesh Kumar, "Multicriterion Analysis in Engineering and Management",PHI Learning Pvt. Ltd., New Delhi, India, ISBN 978-81-203-3976-7, pp.28

Year/Sem	I Sem	L	T	P	C	COURSE CODE
Regulation	V21	2	0	0	2	V21STET08
Name of the Course	ADVANCED CONCRETE TECHNOLOGY					
Branch	STRUCTURAL ENGINEERING					

Course Outcomes:

Upon successful completion of this course, the students will be able to

- Explain the materials of concrete and its chemical proportions (K2)
- Describe the fresh and hardened properties of concrete (K2)
- Explain high strength and high-performance concrete manufacturing process and its properties (K2)
- Develop the special concrete and enhance the durability properties (K3)
- Describe the formwork considerations used in designs (K2)

SYLLABUS
UNIT I

Concrete Making Materials: Cement – Bogus Compounds – Hydration Process – Types of Cement – Aggregates – Gradation Charts – Combined Aggregate – Alkali Silica Reaction – Admixtures – Chemical and Mineral Admixtures - Bureau of Indian Standards (BIS) Provisions.

UNIT II

Fresh And Hardened Concrete: Fresh Concrete – workability tests on Concrete – Setting Times of Fresh Concrete – Segregation and bleeding.

Hardened Concrete: Abrams Law, Gel space ratios, Maturity concept – Stress strain Behaviour– Creep and Shrinkage – Durability Tests on Concrete – Non-Destructive Testing of Concrete. BIS Provisions**.**

UNIT III

High Strength Concrete – Microstructure – Manufacturing and Properties – Design of HSC Using Erintroy Shaklok method – Ultra High Strength Concrete.

High Performance Concrete – Requirements and Properties of High-Performance Concrete – Design Considerations. BIS Provisions.

UNIT IV

Special Concretes: Self Compacting concrete, Polymer Concrete, Fibre Reinforced Concrete – Reactive Powder Concrete – Requirements and Guidelines – Advantages and Applications.

Concrete Mix Design: Quality Control – Quality Assurance – Quality Audit - Mix Design Method – BIS Method – IS.10262 – 2019 Concrete Mix proportion guidelines. DOE Method– Light Weight Concrete, Self-Compacting Concrete.

UNIT V

Form work – materials – structural requests – form work systems – connections – specifications – design of form work – shores – removal for forms - shores – reshoring – failure of form work**.**

Text Books:

1. Properties of Concrete by A. M. Neville, ELBS publications Oct 1996.
2. Concrete Technology by A. R. Santhakumar, 2nd Edition, Oxford University Press.
3. Concrete Technology by M.S. Shetty, S.Chand & Co 2009.

References:

1. Concrete: Micro Structure, Properties and Materials by P. K. Mehta and P. J. Monteiro,. Mc. Graw-Hill Publishing Company Ltd. New Delhi
2. Design of Concrete Mixes by N. Krishna Raju, CBS Publications, 2000.
3. Special Structural concretes by Rafat Siddique, Galgotia Publications 2000.
4. IS 10262-2009: Concrete Mix Proportioning - Guidelines.

Year/Sem	I Sem	L	T	P	C	COURSE CODE
Regulation	V21	0	0	4	2	V21SEL01
Name of the Course	**ADVANCED CONCRETE TECHNOLOGY LABORATORY**					
Branch	STRUCTURAL ENGINEERING					

Course Outcomes:

Upon successful completion of this course, the students will be able to

- Develop relation between Water / Cement Ratios Vs Workability, Water / Cement Ratios Vs Strength in concrete.
- Develop strength and workability relation between fine aggregate, coarse aggregates.
- Calculate Strain measurement in concrete.
- Assess concrete properties by using Non destructive testing methods.
- Find properties of Self compaction concrete by using L Box , J Box , U box and Slump tests

SYLLABUS

List of Experiments:

1. Study on Water / Cement Ratios Vs Workability of different concretes
2. Study on Water / Cement Ratios Vs Strength of different concretes
3. Study of variation of Coarse Aggregate to Fine Aggregates on Workability
4. Study of variation of Coarse Aggregate to Fine Aggregates on Strength
5. Strain measurement - Electrical resistance strain gauges
6. Non destructive testing- Impact Hammer test, UPV test
7. Qualifications tests on Self compaction concrete- L Box , J Box , U box and Slump tests

NOTE: **A minimum of five experiments from the above set have to be conducted.**

Year/Sem	**I Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V21	0	0	4	2	V21SEL02
Name of the Course	**ADVANCED STRUCTURAL ENGINEERING LABORATORY**					
Branch	STRUCTURAL ENGINEERING					

Course Outcomes:

Upon successful completion of this course, the students will be able to

- Conduct various laboratory tests on Cement, Aggregates
- Know strain measurement
- Non destructive testing
- Chemical analysis on concrete and Aggregate and Sand

List of Experiments:

1. Study on Deflection and Cracks on a Under Reinforced Over Reinforced and Balanced Sections
2. Study on Performance of RCC Beams designed for Bending and failing in Shear
3. Study on Performance of RCC Beams designed for Shear and failing in Bending
4. Study on Performance of RCC One way slabs
5. Study on Performance of RCC Two way slabs with simply supported edge conditions
6. Study on Performance of RCC Two way slabs with fixed edge conditions
7. Calculation of Young's Modulus of Elasticity of Concrete
8. Extraction and Study of Concrete Core samples from pavements

NOTE : **A minimum of five experiments from the above set have to be conducted as demonstration to entire class..**

II SEMESTER – SYLLABUS

Year/Sem	II Sem	L	T	P	C	COURSE CODE
Regulation	V21	3	0	0	3	V21STET09
Name of the Course	FINITE ELEMENT METHODS IN STRUCTURAL ENGINEERING					
Branch	STRUCTURAL ENGINEERING					

Course Outcomes:

Upon successful completion of this course, the students will be able to

- Compute principle of potential energy of an elastic body (K3)
- Calculate the stiffness matrices of truss element (K3)
- Calculate the stiffness matrices of beam elements (K3)
- Interpret displacements, strains and stress resultants (K3)
- Formulate the shape functions for element (K3)

SYLLABUS

UNIT I

Introduction: Review of stiffness method- Principle of Stationary potential energy- Potential energy of an elastic body- Rayleigh-Ritz method of functional approximation - variational approaches -weighted residual methods

UNIT II

Finite Element formulation of truss element: Stiffness matrix- properties of stiffness matrix – Selection of approximate displacement functions- solution of a plane truss- transformation matrix and stiffness matrix for a 3-D truss- Inclined and skewed supports-Galerkin’s method for 1-D truss – Computation of stress in a truss element.

UNIT III

Finite element formulation of Beam elements: Beam stiffness- assemblage of beam stiffness matrix- Examples of beam analysis for concentrated and distributed loading-Galerkin’s method - 2-D Arbitrarily oriented beam element – inclined and skewed supports –rigid plane frame examples.

UNIT IV

Finite element formulation: Plane stress, plane strain and axi-symmetric problems- Derivation of CST and LST stiffness matrix and equations- treatment of body and surface forces-Finite Element solution for plane stress and axi-symmetric problems- comparison of CST and LST elements – convergence of solution- interpretation of stresses.

UNIT V

Iso-parametric Formulation: Iso-parametric bar element- plane bilinear Iso-parametric element – quadratic plane element - shape functions, evaluation of stiffness matrix, consistent nodal load vector - Gauss quadrature- appropriate order of quadrature – element and mesh instabilities – spurious zero energy modes, stress computation- patch test.

Text Books:

1. A first course in the Finite Element Method – Daryl L. Logan, Thomson Publications.
2. Concepts and applications of Finite Element Analysis – Robert D. Cook, Michael E Plesha, John Wiley & Sons Publications
3. Fundamental Finite Element Analysis and Applications: with Mathematica and Matlab Computations, Bhatti, M.A. Wiley Publications
4. A first course in the Finite Element Method, Dary L. Logan, Thomson Publications.

References:

1. Introduction to Finite Elements in Engineering- Tirupati R. Chandrupatla, Ashok D.Belgunda, PHI publications.
2. Finite Element Methods (For Structural Engineers) Wail N Rifaie, Ashok K Govil, New Age International (P) Limited.
3. Introduction to Finite Element Method, Desai & Abel CBS Publication.
4. An Introduction to Finite Element Method- Reddy, J. N., McGraw-Hill Education.

Year/Sem	II Sem	L	T	P	C	COURSE CODE

Regulation	V21	3	0	0	3	V21STET10
Name of the Course	**STABILITY OF STRUCTURES**					
Branch	STRUCTURAL ENGINEERING					

Course Outcomes:

Upon successful completion of this course, the students will be able to

- Develop differential equation based on loading and end conditions of beam column (K3)
- Illustrate and work out the elastic buckling using various methodologies (K3)
- Illustrate and work out the in-elastic buckling using various methodologies (K3)
- Assess the torsional buckling behaviour of pure and non uniform torsion of thin walled bars (K3)
- Illustrate and work out the lateral buckling of various cross sections (K3)

SYLLABUS

UNIT I

Beam columns: Differential equation for beam columns – Beams column with concentrated loads – continuous lateral load – couples – Beam column with built in ends – continuous beams with axial load – application of Trigonometric series – Determination of allowable stresses

UNIT II

Elastic buckling of bars: Elastic buckling of straight columns – Effect of shear stress on buckling – Eccentrically and laterally loaded columns –Sway & Non Sway mode - Energy methods – Buckling of a bar on elastic foundation – Buckling of bar with intermediate compressive forces and distributed axial loads – Buckling of bars with change in cross section – Effect of shear force on critical load – Built up columns – Effect of Initial curvature on bars – Buckling of frames – Sway & Non Sway mode

UNIT III

In-elastic buckling: Buckling of straight bars – Double modulus theory Tangent modulus theory. Experiments and design formulae: Experiments on columns – Critical stress diagram – Empirical formulae of design – various end conditions – Design of columns based on buckling. Mathematical Treatment of stability problems: Buckling problem orthogonality relation – Ritz method –Stiffness method and formulation of Geometric stiffness matrix-Applications to simple frames

UNIT IV

Torsional Buckling: Pure torsion of thin walled bars of open cross section – Non uniform torsion of thin walled bars of open cross section - Torsional buckling – Buckling of Torsion and Flexure

UNIT V

Lateral Buckling of simply supported Beams: Beams of rectangular cross section subjected for pure bending, Buckling of I Section subjected to pure bending

Text Books:

1. Theory of Stability of Structures by Alexander ChaJes.
2. Theory of Elastic Stability by S. P. Timshenko & J.M. Gere-Mc Graw Hill Publications
3. Theory of Elastic Stability by Manikaselvam

References:

1. Fundamentals of Structural Stability by George J Smith & Dewey H. Hodges, Elsevier Publications
2. Elastic Stability of Structural Elements, N.G.R. Iyengar Macmillan Publications
3. Structural stability of Steel, Theodore v. Galambos & andrea e. Surovek

Year/Sem	II Sem	L	T	P	C	COURSE CODE
Regulation	V21	3	0	0	3	V21STET11
Name of the Course	THEORY OF PLATES AND SHELLS					
Branch	STRUCTURAL ENGINEERING					

Course Outcomes:

Upon successful completion of this course, the students will be able to

- Analyze Navier's solution, Levy's solution and solve for the rectangular and square plates (K3)
- Analyze circular plates with various boundary conditions (K3)
- Practice on the finite difference method of solving plate problems(K3)
- Develop the potential energy principle and find the solution of rectangular plates for various loadings(K3)
- Identify the behavior of folded plates and shells.(K3)

SYLLABUS

UNIT I

Rectangular Plates: Derivation of governing differential equation for plate– in plane bending and transverse bending effects - Plates under various loading conditions like concentrated, uniformly distributed load and hydrostatic pressure. Navier and Levy's type of solutions for various boundary condition.

UNIT II

Circular plates: Symmetrically loaded, circular plates under various loading conditions, annular plates.

UNIT III

Shells: Introduction to Shells- Single and double curvature- Equations of Equilibrium of shells. Derivation of stress resultants, Principles of membrane theory and bending theory

UNIT IV

Cylindrical Shells: Derivation of the governing DKJ equation for bending theory, details of Schorer's theory. Application to the analysis and design of short and long shells. Use of ASCE Manual coefficients for the design.

UNIT V

Beam theory of cylindrical shells: Beam and arch action. Design of diaphragms - Geometry analysis and design of elliptic Paraboloid, Conoidal and Hyperbolic Paraboloid shapes by membrane theory.

Text Books:

1. Theory of Plates and Shells 2e –S. Timoshenko and S. Woinowsky Krieger, McGraw-Hill book company, INC, New York.
2. Reinforced Concrete Shells and Folded Plates by P.C. Varghese, Prentice Hall India Publications
3. Analysis of Thin Concrete Shells by K. Chandrasekhara, New Age International (P) Ltd

References:

1. Theory and Analysis of Elastic Plates and Shells by J. N. Reddy, CRS Press
2. A Text Book of Shell Analysis – Bairagi, K, Khanna Publisher, New Delhi.
3. Design and Construction of Concrete Shell Roofs – Ramaswamy, G.S, Mc Graw Hill, New York

Year/Sem	II Sem	L	T	P	C	COURSE CODE
Regulation	V21	3	0	0	3	V21STET12
Name of the Course	ADVANCED STEEL DESIGN					
Branch	STRUCTURAL ENGINEERING					

Course Outcomes:

Upon successful completion of this course, the students will be able to

- Examine the simple connection used in various joints and design of connection (K3)
- Assess the plastic analysis to different beams based on their considerations (K3)
- Illustrate the eccentric and moment connection on various structural members (K3)
- Develop and analyse the industrial buildings subjected to transverse and lateral loading (K3)
- Complete the design of steel truss girder bridges and strengthening measures to girders (K3)

SYLLABUS

UNIT I

Simple Connections – Riveted, Bolted Pinned And Welded Connections: Riveted Connections – Bolted Connections –Load Transfer Mechanism – Failure of Bolted Joints – Specifications for Bolted Joints – Bearing – Type Connections – Tensile Strength of Plate – Strength and Efficiency of the Joint – Combined Shear and Tension – Slip-Critical connections – Prying Action – Combined Shear and Tension for Slip-Critical Connections. Design of Groove Welds - Design of Fillet Welds – Design of Intermittent Fillet Welds – Failure of Welds.

UNIT II

Plastic Analysis: Introduction – Plastic Theory – Plastic neutral Axis plastic moment, Elastic & Plastic Section moduli - shape factors plastic Hinge – Fundamental condition conditions in plastic analysis, methods of plastic analysis – collapse load – simply supported, propped cantilever beam, fixed beams continuous beams, portal frame single bay single storey portal frame at different level subjected to vertical and horizontal loads.

UNIT III

Eccentric and Moment Connections: Introduction – Beams – Column Connections – Connections Subjected to Eccentric Shear – Bolted Framed Connections –Bolted Seat Connections – Bolted Bracket Connections. Bolted Moment Connections – Welded Framed Connections- Welded Bracket Connections – Moment Resistant Connections.

UNIT IV

Analysis and Design of Industrial Buildings: Dead loads, live loads and wind loads on roofs. Design wind speed and pressure, wind pressure on roofs; wind effect on cladding and louvers; Design of angular roof truss, tubular truss, truss for a railway platform. Design of purlins for roofs, design of built up purlins, design of knee braced trusses and stanchions. Design of bracings.

UNIT V

Design af Steel Truss Girder Bridges: Types of truss bridges, component parts of a truss bridge, economic Proportions of trusses, self weight of truss girders, design of bridge Compression members, tension members; wind load on truss girder Bridges; wind effect on top lateral bracing; bottom lateral bracing; portal Bracing; sway bracing Design of Lacing.

Text Books:

1. Limit State Design of Steel Structures S.K. Duggal Mc Graw Hill Education Private Ltd. New Delhi.
2. Design of steel structures by N. Subramanian, Oxford University Press
3. Design Steel Structures Volume-II, Ramachandra & Vivendra Gehlot, Scientific Publishes Journals Department.

References:

1. Design of Steel Structures. P. Dayaratnam, S. Chand, Edition 2011-12.
2. Design of Steel Structures Galyord & Gaylord, Tata Mc Graw Hill, Education, Edition 2012.
3. Indian Standard Code – IS – 800-2007.
4. Indian Standard Code – IS – 875 – Part III - 2015

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Year/Sem	**II Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V21	3	0	0	3	V21STET13
Name of the Course	**ANALYSIS OF OFFSHORE STRUCTURES**					
Branch	STRUCTURAL ENGINEERING					

Course Outcomes:

Upon successful completion of this course, the students will be able to

- Illustrate different types of offshore structures. (K3)
- Calculation of Conservation mass and momentum. (K3)
- Assess the Wave force estimation on small bodies. (K3)
- Assess the Wave force estimation on long bodies. (K3)
- Compute Static and dynamic analysis of fixed offshore structures. (K3)

SYLLABUS

UNIT I

Introduction: Types of offshore structures, Concept of fixed, compliant and floating structures, Law of floatation, fluid pressure and centre of pressure, estimation of centre of gravity, hydrostatic particulars, stability criteria of floating bodies, and motions of a floating body.

UNIT II

Dynamics and Kinematics : Conservation mass and momentum, Euler equation, Bernoullis Equation, Potential flow, Classification of waves, small amplitude or Linear Airy's theory, dispersion relationship, water particle kinematics, wave energy.

UNIT III

Wave force on small bodies: Estimation - Morison equation, Estimation of wave force on a vertical cylinder, Force due to current, Effect of marine growth on vertical cylinders.

UNIT IV

Wave force on large bodies: Froude-krylov theory, Diffraction theory.

UNIT V

Static and dynamic analysis of fixed offshore structures.

Text Books:

1. Graff, W. J., Introduction to Offshore Structures, Gulf Publ. Co.1981.
2. Dawson, T. H., Offshore Structural Engineering, Prentice Hall, 1983.
3. McClelland, B & Reifel, M. D., Planning & Design of fixed Offshore Platforms, Van Nostrand, 1986.

References:

1. API RP 2A., Planning, Designing and Constructing Fixed Offshore Platforms, API.
2. Hand book of offshore Engineering, Vol I, Subrata Chakrabarti, Offshore Structure Analysis, Inc., Plainfield, Illinois, USA.
3. Dynamic Analysis and Design of Offshore Structures 2015th Edition, by Srinivasan Chandrasekaran

Year/Sem	**II Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V21	3	0	0	3	V21STET14
Name of the Course	**EARTHQUAKE RESISTANT DESIGN OF BUILDINGS**					
Branch	STRUCTURAL ENGINEERING					

Course Outcomes:

Upon successful completion of this course, the students will be able to

- Demonstrate the fundamentals of seismology and basic earthquake mechanisms, tectonics types of ground motion, magnitude and propagation of ground motion. (K3)
- Assess the seismic design concepts of various moment resisting frames and their ductility behaviour (K3)
- Compute the earthquake load on various building frames and study on ductile behavior of building frames (K3)
- Assess the Cyclic loading behavior of RC, steel and pre- stressed concrete elements (K3)
- Illustrate the methods of Retrofitting and restoration of buildings subjected to damage due to earthquakes (K3)

SYLLABUS

UNIT I

Engineering seismology: Rebound theory – plate tectonics – seismic waves - earthquake size and various scales – local site effects – Indian seismicity – seismic zones of India – theory of vibrations – near ground and far ground rotation and their effects

UNIT II

Seismic design concepts: EQ load on simple building – load path – floor and roof diaphragms – seismic resistant building architecture – plan configuration – vertical configuration – pounding effects – mass and stiffness irregularities – torsion in structural system- Provision of seismic code (IS 1893 & 13920) – Building system – frames – shear wall – braced frames – layout design of Moment Resisting Frames(MRF) – ductility of MRF – Infill wall – Non-structural elements

UNIT III

Calculation of EQ load: 3D modeling of building systems and analysis (theory only) Design and ductile detailing of Beams and columns of frames Concept of strong column weak beams, Design and ductile detailing of shear walls.

UNIT IV

Cyclic loading behavior of RC, steel and pre- stressed concrete elements: modern concepts- Base isolation – Adaptive systems – case studies

UNIT V

Retrofitting and restoration of buildings subjected to damage due to earthquakes- effects of earthquakes – factors related to building damages due to earthquake- methods of seismic retrofitting- restoration of buildings

Text Books:

1. Earthquake Resistant Design of Structures Pankaj Agarwal and Manish ShriKhande, Prentice Hall of India, 2007, New Delhi.
2. Earthquake Resistant Design of Structures- S.K. Duggal, Oxford Publications.
3. Seismic design of reinforced concrete and masonry buildings by Paulay and Priestley .

References:

1. Earthquake Resistant Design and Risk Reduction- David Dowrick
2. IS 4326 -1998: Earthquake Resistant Design and Construction of Buildings
3. IS 1893 (Part 1 to 5)- 2016: General Provisions and Building
4. IS 4928–1993: Code of practice for Earthquake Resistant Design and Construction of Buildings
5. IS 13920-2016: Code of Practice for Ductile Detailing of Reinforced Concrete Structures subjected to Seismic Forces
6. IS 13935-1993: Guidelines for Repair and Seismic Strengthening of Building

Year/Sem	**II Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V21	3	0	0	3	V21STET15
Name of the Course	**PRECAST AND PREFABRICATED STRUCTURES**					
Branch	STRUCTURAL ENGINEERING					

Course Outcomes

Upon successful completion of this course, the students will be able to

- Explain impotence of prefabrication and Principles of Prefabrication. (K3)
- Find Prefabricated Load Carrying Members. (K3)
- Assess Joints for different structural connections. (K3)
- Analyze the production technology of prefabrication. (K3)
- Design and detailing of precast UNIT for factories. (K3)

SYLLABUS

UNIT I

Introduction to prefabrication: General Principles of Prefabrication - Comparison with monolithic construction, types of prefabrication, site and plant prefabrication, economy of prefabrication, modular coordination, standardization – Materials – Modular coordination – Systems – Production – Transportation – Erection.

UNIT II

Prefabricated Members: Load Carrying Capacity - Planning for components of prefabricated structures, disuniting of structures, design of simple rectangular beams and I-beams, handling and erection stresses, elimination of erection stresses, beams, columns, symmetric frames. Behaviour of structural components – Large panel constructions – Construction of roof and floor slabs – Wall panels – Columns – Shear walls..

UNIT III

Joints: Joints for different structural connections, effective sealing of joints for water proofing, provisions for non-structural fastenings, expansion joints in precast construction.

UNIT IV

Production Technology: Choice of production setup, manufacturing methods, stationary and mobile production, planning of production setup, storage of precast elements, dimensional tolerances, acceleration of concrete hardening. Hoisting Technology - Equipment for hoisting and erection, techniques for erection of different types of members like beams, slabs, wall panels and columns, vacuum lifting pads.

UNIT V

Designing and detailing of precast: For factory structures, purlins, principal rafters, roof trusses, lattice girders, gable frames, singe span single storied simple frames, single storied buildings, slabs, beams and columns. Progressive collapse – Code provisions – Equivalent design loads for considering abnormal effects such as earthquakes, cyclones, etc., - Importance of avoidance of progressive collapse.

Text Books:

1. Precast Concrete Structures- Kim S Elliott, CRC Press
2. CBRI, Building materials and components, India, 1990
3. Gerostiza C.Z., Hendrikson C. and Rehat D.R., Knowledge based process planning for construction and manufacturing, Academic Press Inc., 1994

References:

1. Structural design manual, Precast concrete connection details, Society for the studies in the use of precast concrete, Netherland Betor Verlag, 1978.
2. Mokk. L, (1964), Prefabricated Concrete for Industrial and Public Structures, Publishing House of the Hungarian Academy of Sciences, Budapest.
3. Koncz T., Manual of precast concrete construction, Vols. I, II and III, Bauverlag, GMBH, 1971.

Year/Sem	II Sem	L	T	P	C	COURSE CODE
Regulation	V21	3	0	0	3	V21STET16
Name of the Course	EARTH RETAINING STRUCTURES					
Branch	STRUCTURAL ENGINEERING					

Course Outcomes:

Upon successful completion of this course, the students will be able to

- Compute the lateral earth pressures associated with different earth systems (K3)
- Assess the failure criterion and stability requirements in selecting the most technically appropriate type of retaining wall (K3)
- Employ different techniques to design a sheet pile structure considering both external and internal stability (K3)
- Apply the knowledge of reinforced earth in the designing the earth retaining systems (K3)
- Relate different methods in analyzing the stability of braced cuts and cofferdams (K3)

SYLLABUS

UNIT I

Earth pressures: Different types and their coefficients; Classical Theories of Earth pressure – Rankine's and Coulomb's Theories for Active and Passive earth pressure; Computation of Lateral Earth Pressure in Homogeneous and Layered soils; Graphical solutions for Coulomb's Theory in active and passive conditions.

UNIT II

Retaining walls: Types, Type of Failures of Retaining Walls – Stability requirements –Drainage behind Retaining walls – Provision of Joints – Relief Shells.

UNIT III

Sheet Pile Structures: Types of Sheet piles – Cantilever sheet piles in sands and clays – Anchored sheet piles – Free earth and Fixed earth support methods – Rowe's moment reduction method – Location of anchors and Design of Anchorage system.

UNIT IV

Soil reinforcement: Reinforced earth - Different components – their functions – Design principles of reinforced earth retaining walls.

UNIT V

Braced cuts and Cofferdams: Lateral Pressure in Braced cuts – Design of Various Components of a Braced cut – Stability of Braced cuts – Bottom Heave in cuts. – Types of cofferdam, suitability, merits and demerits – Design of single – wall cofferdams and their stability aspects – TVA method and Cummins' methods.

Text Books:

1. Principles of Foundation Engineering by Braja M Das, Cengage Learning
2. Foundation analysis and design by Bowles, J.E., McGraw Hill
3. Soil Mechanics in Engineering Practice – Terzaghi, K and Ralph B. Peck, John Wiley & Sons.

References:

1. Earth Pressure and Earth Retaining Structures by Chris RI Clayton, Rick I woods, Andrew J Bond and Jarbas Milititsky, CRC Press, Taylor and Francis Group, New York.
2. Analysis and Design of Foundations and Retaining Structures, Samsher Prakash
3. Gopal Ranjan and Swami Saran, Saritha Prakashan Publishers, New Delhi.
4. NPTEL course materials on Geo-synthetics and Earth Retaining Structures

Year/Sem	I Sem	L	T	P	C	COURSE CODE
Regulation	V21	2	0	0	2	V21STET17
Name of the Course	**ADVANCED REINFORCED CONCRETE DESIGN**					
Branch	STRUCTURAL ENGINEERING					

Course Outcomes:

Upon successful completion of this course, the students will be able to

- Explain the limit state method provisions in analysis of structures (K2)
- Apply the yield line method to analyze slab (K3)
- Develop the designs to flat slabs and ribbed slabs (K3)
- Explain the design steps involved in deep beams, corbel design procedure (K2)
- Interpret the Design method of slender and eccentric column (K3)

SYLLABUS

UNIT I

Limit Analysis of R C Structures: Rotation of a plastic hinge, Redistribution of moments, moment rotation characteristics of RC member, I.S. code provisions, loading pattern, Bending Moment Envelop, Application for Fixed Beams and Continuous Beams.

UNIT II

Yield line analysis for slabs: Yield line criterion – Virtual work and equilibrium methods of analysis – For square circular, Rectangular, Triangular and Hexagonal with simple andcontinuous end conditions.

UNIT III

Ribbed slabs: Analysis of the Slabs for Moment and Shears, Ultimate Moment of Resistance, Design for shear, Deflection, Arrangement of Reinforcements.

UNIT IV

Design of Reinforced Concrete Deep Beams & Corbels: Steps of Designing Deep Beams, Design by IS 456. Checking for Local Failures, Detailing of Deep Beams, Analysis of Forces in a Corbels, Design of Procedure of Corbels, Design of Nibs. Detailing of reinforcement.

UNIT V

Design of Slender Columns – Slenderness limits, Methods of Design of Slender Columns, Additional Moment Method, Procedure for Design of Slender Columns. Detailing of reinforcement.

Text Books:

1. Advanced Reinforced Concrete Design, by P.C. Varghese Prentice Hall India Limited
2. Design of Reinforced Concrete Structures by N.Subramanian, Oxford University Press.
3. Reinforced Concrete Design, by S. Unnikrishna Pillai & Devdas Menon Tata Mc.Graw-Hill Publishing Company Ltd. New Delhi 2010.

References:

1. Limit State Theory and Design of Reinforced Concrete S. R. Karve and V.L Shah. Standard Publishers
2. Reinforced concrete structural elements – behavior, Analysis and design by P. Purushotham, Tata Mc.Graw-Hill, 1994.
3. Design of concrete structures – Arthus H. Nilson, David Darwin, and Chorles W. Dolar, Tata Mc. Graw-Hill, 3rd Edition, 2005.
4. Reinforced Concrete design by Kennath Leet, Tata Mc. Graw-Hill International, editions, 2nd edition, 1991.

Year/Sem	II Sem	L	T	P	C	COURSE CODE
Regulation	V21	0	0	4	2	V21SEL03
Name of the Course	STRUCTURAL DESIGN LABORATORY					
Branch	STRUCTURAL ENGINEERING					

Course Outcomes:

Upon successful completion of this course, the students will be able to

- Develop Computer Programs for Analysis and Design of various Structural Elements
- Use different Structural Engineering software's to solve various civil Engineering programs

SYLLABUS

1. Analysis and Design of reinforced concrete multistoried building
2. Analysis of plane and space truss
3. Analysis of plane and space frame
4. Wind analysis on tall structure
5. Analysis of Cylindrical shell
6. Dynamic Analysis of Multistory structure Analysis and Design using STADD, STADD FOUNDATION, ETABS, ANSYS

NOTE: A minimum of four from the above set have to be conducted.

References:

1. Computer aided design laboratory (Civil Engineering) by Shesha Prakash and Suresh.S

III SEMESTER – SYLLABUS

Year/Sem	III Sem	L	T	P	C	COURSE CODE
Regulation / Year	V21 / 2021-2022	3	0	0	3	V21STET18
Name of the Course	**DESIGN OF PRESTRESSED CONCRETE STRUCTURES**					
Branch	STRUCTURAL ENGINEERING					

Course Outcomes:

Upon successful completion of this course, the students will be able to

- Compute the Analysis of prestress , losses in prestress and Anchorage slip (K3)
- Deflections of prestressed concrete members (K3)
- Employ types and advantages and analysis of composite sections (K3)
- Apply the knowledge of prestressed concrete slabs (K3)
- Analyze continuity beams in prestressed concrete structures (K3)

SYLLABUS

UNIT I

Introduction – Prestressing Systems – Pretensioning Systems – Postensioning Systems – High Strength Steel and Concrete - Analysis of Prestress - Resultant Stresses at a Section – Pressure Line or Thrust Line – Concept of Load Balancing - Losses of Prestress – Loss Due to Elastic Deformation of Concrete – Shrinkage of Concrete – Creep – Relaxation of Stress in Steel – Friction – Anchorage Slip.

UNIT II

Deflections Of Prestressed Concrete Members: Importance of Control of Deflections – Factors Influencing Deflection – Short-term Deflections of Uncracked Members – Prediction of Long-time Deflections – Deflections of Cracked Members – Requirements of IS 1343-2012. Ultimate Flexural Strength of Beams: Introduction, Flexural theory using first principles – Simplified Methods – Ultimate Moment of Resistance of untensioned Steel.

UNIT III

Composite Constructions: Introduction, Advantages, Types of Composite Construction, Analysis of Composite beams- Differential shrinkage- Ultimate Flexural and shear strength of composite sections- Deflection of Composite Beams. Design of Composite sections.

UNIT IV

Prestressed Concrete Slabs: Types Of Prestressed Concrete Floor Slabs- Design of Prestressed Concrete One Way and Two Way Slabs. Prestressed Concrete Pipes and Poles : Circular prestressing- Types of Prestressed Concrete Pipes- Design of Prestressed Concrete Pipes - Prestressed Concrete Poles.

UNIT V

Continuous Beams: Advantage of Continuous Members – Effect of Prestressing Indeterminate Structures – Methods of Achieving Continuity – Methods of Analysis of Secondary Moments – Concordant Cable Profile – Guyon's Theorem. Redistribution of moments in a continuous beam. Anchorage Zone Stresses in Beams : Introduction, Stress distribution in End Block – Anchorage zone stresses –Magnel's method- Guyon's Method - Anchorage zone Reinforcement.

Text Books:

1. Prestressed Concrete, by N. Krishna Raju, Mc Graw Hill Publishers – fourth edition
2. Prestressed Concrete by K. U.Muthu, PHI Learning Pvt Limited - 18 January 2016
3. Design of Prestressed Concrete by S.S.Bhavikatti – 1 January 2019

References:

1. 1 Prestressed Concrete Analysis and Design, Antone E. Naaman, Techno Press 3000
2. Design of Prestressed Concrete- T. Y. Lin, Ned H. Burns
3. 3 Wiley Publications 3. Design of prestressed Concrete by E.G. Nawy

Year/Sem	**III Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V21	3	0	0	3	V21STET19
Name of the Course	**STRUCTURAL HEALTH MONITORING**					
Branch	STRUCTURAL ENGINEERING					

Course Outcomes:

Upon successful completion of this course, the students will be able to

- Assess the structural health by investigation and regular maintenance (K3)
- Employ various measures for monitoring structural health (K3)
- Employ various Investigations for monitoring structural audit (K3)
- Discover the dynamic field testing (K3)
- Apply the knowledge of Repairing and rehabilitation of structures (K3)

SYLLABUS

UNIT I

Structural Health: Factors affecting Health of Structures, Causes of Distress, Regular Maintenance Structural Audit: Assessment of Health of Structure, Collapse and Investigation, Investigation Management, SHM Procedures.

UNIT II

Structural Health Monitoring: Concept, Various Measures, Structural Safety in Alteration.

UNIT III

Structural Audit: Assessment of Health of Structure, Collapse and Investigation, Investigation Management, SHM Procedures.

UNIT IV

Dynamic Field Testing: Types of Dynamic Field Test, Stress History Data, Dynamic Response Methods, Hardware for Remote Data Acquisition Systems, Remote Structural Health Monitoring.

UNIT V

Introduction to Repairs and Rehabilitations of Structures: Case Studies (Site Visits), Piezo– electric materials and other smart materials, electro–mechanical impedance (EMI) technique, adaptations of EMI technique.

Text Books:

1. Structural Health Monitoring, Daniel Balageas, Claus Peter Fritzen, Alfredo Güemes, John Wiley and Sons, 2006.
2. Health Monitoring of Structural Materials and Components Methods with Applications, Douglas E Adams, John Wiley and Sons, 2007.
3. Structural Health Monitoring by Daniel Balageas, Claus-peter fritzen and Alfredo Guemes

References:

1. Structural Health Monitoring and Intelligent Infrastructure, Vol1, J. P. Ou, H. Li and Z. D. Duan, Taylor and Francis Group, London, UK, 2006.
2. Structural Health Monitoring with Wafer Active Sensors, Victor Giurglutiu, Academic Press Inc, 2007.
3. Advances in Condition Monitoring and Structural Health Monitoring: WCCM by Len Gelman .et.al.

Year/Sem	**III Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V21	3	0	0	3	V21STET20
Name of the Course	**INDUSTRIAL STRUCTURES**					
Branch	STRUCTURAL ENGINEERING					

Course Outcomes:

Upon successful completion of this course, the students will be able to

- functional requirements of structural systems for various industries (K3)
- Get an idea about the materials used and design of industrial structural elements (K3)
- Pre Engineered Buildings (K3)
- Realize the basic concepts and design of power plant structures (K3)
- Design power transmission structures (K3)

SYLLABUS

UNIT I

Planning and functional requirements- classification of industries and industrial structures- planning for layout- requirements regarding lighting ventilation and fire safety- protection against noise and vibrations.

UNIT II

Industrial buildings- roofs for industrial buildings (Steel) - design of gantry girder- design of corbels and nibs- machine foundations

UNIT III

Design of Pre Engineered Buildings

UNIT IV

Power plant structures- Bunkers and silos- chimney and cooling towers- Nuclear containment structures

UNIT V

Power transmission structures- transmission line towers- tower foundations- testing towers

Text books:

1. Machine Foundations by P. Srinivasulu and C. V. Vaidyanathan, Structural Engineering Research Center - 1 July 2017
2. Tall Chimneys- Design and Construction by S. N. Manohar Tata Mc Grawhill Publishing Company -
3. The Design & Construction of Industrial Buildings by Moritz Kahn

References:

1. Transmission Line Structures by S. S. Murthy and A. R. Santakumar McGraw Hill
2. SP 32: 1986, Handbook on functional requirements of Industrial buildings 3. Design of steel structures by N. Subramanian
3. The Architect's Studio Companion: Rules of Thumb for Preliminary Design by Edward Allen

Year/Sem	III Sem	L	T	P	C	COURSE CODE
Regulation	V21	3	0	0	3	V21MBT56
Name of the Course	COST MANAGEMENT OF ENGINEERING PROJECTS					
Branch	STRUCTURAL ENGINEERING					

Course Outcomes:

Upon successful completion of this course, the students will be able to

- Understand the cost management process and various costs involved in a project (K2)
- Understand various aspects of a project and related processes. (K2)
- Analyze the concepts of Break even and CVP analysis. (K3)
- Demonstrate quality management techniques besides budgeting strategies (K2)
- Apply quantitative techniques for cost management (K4)

SYLLABUS

UNIT I

Introduction and Overview of the Strategic Cost Management Process: Cost concepts in decision-making; relevant cost, Differential cost, Marginal cost, Incremental cost and Opportunity cost. Objectives of Costing System; Creation of a Database for operational control; Provision of data for Decision-Making.

UNIT II

Project Management: Meaning, Different types of projects.

Various stages of project execution: conception to commissioning, Project execution as a conglomeration of technical and nontechnical activities, Detailed Engineering activities, Pre project execution, main clearances and documents.

Project team: Role of each member, Importance of Project site. Project contracts: Types and its contents. CPM & PERT Techniques.

UNIT III

Cost Behavior and Profit Planning: Marginal Costing, Distinction between Marginal Costing and Absorption Costing; Break-even Analysis, Cost-Volume-Profit Analysis, Standard Costing and Variance Analysis.

UNIT IV

Quality management and Budgeting strategies: Pareto Analysis, Target costing, Life Cycle Costing, Just-in-time approach, Material Requirement Planning, Enterprise Resource Planning, Total Quality Management and Theory of constraints. Activity-Based Cost Management, Bench Marking; Balanced Score Card and Value-Chain Analysis. **Budgetary Control**; Flexible Budgets; Performance budgets; Zero-based budgets. Measurement of Divisional profitability pricing & decisions including transfer pricing.

UNIT V

Quantitative techniques for cost management, Linear Programming, Transportation problems, Assignment problems, Simulation, Learning Curve Theory

Reference Books:

1. Cost Accounting A Managerial Emphasis, Prentice Hall of India, New Delhi
2. Charles T. Horngren and George Foster, Advanced Management Accounting
3. Robert S Kaplan Anthony A. Alkinson, Management & Cost Accounting
4. Ashish K. Bhattacharya, Principles & Practices of Cost Accounting A. H. Wheeler publisher
5. N.D. Vohra, Quantitative Techniques in Management, Tata McGraw Hill Book Co. Ltd.

ANNEXURE – CE- V

AUDIT COURSES OFFERED IN I & II SEMESTER

Audit course	I & II Sem	Disaster Management	V21STEAC1

Year/Sem		**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation Year	V21 / 2021-2022	3	0	0	3	V21STEAC1
Name of the Course	**DISASTER MANAGEMENT**					
Branch	Common to all					

Course Outcomes:

Upon successful completion of this course the student will be able to

- Describe to student to have a idea on different natural hazards and disaster management (K2)
- Develop the student to understand manmade disaster and their management (K3)
- Prepare the student in such a way inorder to understand building codes and vulnerability of disaster (K3)
- Illustrate to student about role of technology in disaster management (K2)
- Assess the importance of education and community preparedness in disaster management to student (K3)

SYLLABUS

UNIT I

Natural Hazards and Disaster Management: Introduction of DM Disaster Management cycle – Five priorities for action- Case study methods of the following: floods, droughts – Earthquakes – global warming, cyclones & Tsunamis – Post Tsunami hazards along the Indian coast – landslides.

UNIT II

Man Made Disastar And Their Management Along With Case Study Methods Of The Following: Fire hazards – transport hazard dynamics – solid waste management – post disaster – bio terrotirism - rail and air craft's accidents-Management of these disasters

UNIT III

Risk And Vulnerability: – Building codes and land use planning – social vulnerability – environmental vulnerability -Financial management of disaster.

UNIT IV

Role Of Technology In Disaster Managements: Disaster management for infra structures, taxonomy of infra structure - mitigation programme for earth quakes –geospatial information in agriculture drought assessment-multimedia technology in disaster risk management and training-transformable indigenous knowledge in disaster reduction.

UNIT V

Education And Community Preparedness: Education in disaster risk reduction-Essentials of school disaster education-Community capacity and disaster resilience-Community based disaster recovery -Community based disaster management and social capital-Designing resilience- building.

Text Books:

1. Disaster Management – Global Challenges and Local Solutions' by Rajib shah & R R Krishnamurthy(2009),Universities press.
2. Disaster Science & Management' by Tushar Bhattacharya, Tata McGraw Hill Education Pvt. Ltd., New Delhi.
3. Disaster Management – Future Challenges and Opportunities' by Jagbir Singh (2007), I K International Publishing House Pvt. Ltd.

Reference Books:

1. 'Disaster Management' edited by H K Gupta (2003), Universities press.
2. Natural Hazards and Disaster Management, Vulnerability and Mitigation by RB Singh
3. Disaster Management by Harish K.Gupta

Annexure-IV

SRI VASAVI ENGINEERING COLLEGE

(AUTONOMOUS)

(Sponsored by Sri Vasavi Educational Society)
(Approved by AICTE, New Delhi &Recognized by UGC under section 2(f) & 12(B))
(Permanently affiliated to JNTUK, Kakinada, Accredited by NBA and NAAC with 'A' Grade)
Pedatadepalli, **TADEPALLIGUDEM–534 101.**W.G.Dist**. (A.P)**

Department of Electrical & Electronics Engineering

Date: 07-09-2021

The fifth meeting of Board of Studies in Department of Electrical and Electronics Engineering is held at 11.00 AM on 03-09-2021 though online mode using gotomeeting tool (Meeting ID: 954129285).

The following members are attended the meeting.

S.No.	Name	Designation	Role
1.	Dr. Sudha Rani Donepudi	Professor, Head, Dept. of EEE, SVEC, Pedatadepalli.	Chairperson
2.	Dr. R. SrinivasaRao	Professor, Dept. of EEE, UCEK, JNTUK, Kakinada	Subject Expert Nominated By V.C.
3.	Dr. M. Sydulu	Professor, Dept. of EE, NITW, Warangal	Subject Expert Nominated By A.C.
4.	Dr. Y.P. Obulesu	Professor, School of EE, VIT, Vellore	Subject Expert Nominated By A.C.
5.	Er. B.N.V.R.C. Suresh Kumar	Retired AGM, PGCI, Hyderabad	Industry Expert Nominated By A.C
6.	Er. Ch. Vinay Kumar	Assistant Engineer, EHT Lines, APTRANSCO, Eluru.	Alumni
7.	Dr. Ch. Rambabu	Professor	Member
8.	U. Chandra Rao	Sr. Asst. Professor	Member
9.	N. Sri Harish	Asst. Professor	Member
10.	K Ramesh Babu	Asst. Professor	Member
11.	M.T.V. L Ravi Kumar	Asst. Professor	Member
12.	V. Rama Narayana	Asst. Professor	Member
13.	G Madhu Sagar Babu	Asst. Professor	Member
14.	A Uma Siva Naga Prasad	Asst. Professor	Member
15.	K. Venkata Reddy	Asst. Professor	Member

16.	K Amarendra	Asst. Professor	Member
17.	Mr. V.S. Aditya	Asst. Professor	Member
18.	Pradeep Vejju	Asst. Professor	Member
19.	Ch Srinivas	Asst. Professor	Member

The following are the minutes of the meeting

Item No. 1: Welcome note by the Chairperson BOS

The HOD extended a formal welcome and introduced the members.

Item No. 2: Progress Report of the Department

Chairperson BOS had given the Brief on Progress Report of the Department.

Item No. 3: Review of course structure for VII & VIII semesters of B. Tech EEE under V18 Regulation.

Reviewed and approved the course structure of VII & VIII semesters of B.Tech-EEE Programme under V18 Regulation.

The details of the approved course structure for VII & VIII semesters of UG (B.Tech) Programme (EEE) under V18 Regulation are given in **Annexure– EE-I**

Item No. 4: Approval of syllabi for the courses offered in VII & VIII semesters B. Tech EEE under V18 Regulation.

Approved the syllabi for the courses offered in VII & VIII semesters B. Tech EEE under V18 Regulation.

The approved syllabi for the courses offered in VII and VIII semesters of B.Tech EEE of under V18 Regulation is attached in **Annexure– EE-II**

Item No. 5: Approval of list of courses offering under Open Elective- II & III in VII & VIII semester B. Tech respectively under V18 Regulation for all other branches and the approval of their detailed syllabi.

Approved the list of courses and syllabi for the courses offered as Open Electives in VII and VIII semesters B. Tech for all other branches under V18 Regulation and the details are given in **Annexure– EE-III**

Item No. 6: Approval of course structure for III & IV semesters of B. Tech EEE under V20 Regulation.

Approved the course structure of III & IV semesters of B.Tech-EEE Programme under V20 Regulation with the following modifications.

SEM	Suggestions	Inclusions / Modifications
III & IV Skill Oriented Courses (SOC)	Suggested to add Raspberry-pi, Arduino, and E-CAD	Included Arduino Board and E-CAD into pool of SOC at second year level and Raspberry-pi will be included at third year level

The details of the approved course structure for III & IV semesters of UG (B.Tech) Programme (EEE) under V20 Regulation are given in **Annexure– EE-IV**

Item No. 7: Approval of syllabi for the courses offered in III & IV semesters of B. Tech EEE under V20 Regulation.

Approved the syllabi for the courses offered in III & IV semesters B. Tech EEE under V20 Regulation with the following suggestions/modifications.

SEM	Course Code	Course Title	Suggestions	Inclusions / Modifications
III	V20EET04	Electrical Circuit Analysis-II	Replace Network Synthesis Unit with Filters	Replaced Network Synthesis Unit with Filters
IV	V20EET10	Electrical Power Generation & Transmission	Add introduction level of Renewable Sources in Unit-I	Included Introduction to Renewable Energy Sources, Solar and wind Power plant Layouts.
IV	V20EEL06	Electrical Measurements Laboratory	Add demonstration of new electronic meters available for field electrical engineers	Included demonstration of electronic meters as an experiment

The approved syllabi for the courses offered in III and IV semesters of B. Tech EEE of under V20 Regulation is attached in **Annexure– EE-V**

Item No. 8: Approval of syllabi for the courses offered in III & IV semesters for other branches of B. Tech under V20 Regulation.

Approved the syllabus for the course offered in IV semesters B. Tech ECE under V20 Regulation and is given in **Annexure– EE-VI**

Item No. 9: Approval of course structure for I to IV semesters of M. Tech Power Electronics and Power Systems (PE&PS) under V21 Regulation.

Approved the proposed course structure from I to IV semesters M. Tech Power Electronics and Power Systems (PE&PS) under V21 Regulation with following suggestions/modifications.

SEM	Suggestions	Inclusions / Modifications
I	Advanced Digital Signal Processing Course (Course Code: V21PET04) in Elective –I can be replaced with Smart Grid	Advanced Digital Signal Processing Course (Course Code: V21PET04) is replaced with Smart Grid (Course Code: V21PET04)
II	DSP Controlled Drives course (Course code: V21PET12) in Elective-III can be changed as Control of Electric Drives	DSP Controlled Drives course (Course code: V21PET12) in Elective-III is modified as Control of Electric Drives (Course code: V21PET12)
III	In Elective-III, Optimization Techniques (Course code: V21PET18) and Artificial Intelligent Techniques (Course code: V21PET19) can combine together as a Soft Computing Techniques	Optimization Techniques (Course code: V21PET18) is merged with Artificial Intelligent Techniques (Course code: V21PET19) and renamed as Soft Computing Techniques in Electrical Engineering (Course code: V21PET18)

The approved course structure from I to IV semesters M. Tech Power Electronics and Power Systems (PE&PS) under V21 Regulation is given in **Annexure– EE-VII**

Item No. 10: Approval of syllabi for the courses offered form I to IV semesters of M. Tech Power Electronics and Power Systems (PE&PS) under V21 Regulation.

Approved the syllabi for various courses offered from I to IV semesters of M. Tech Power Electronics and Power Systems (PE&PS) under V21 Regulation with the following modifications.

SEM	Course Code	Course Title	Suggestions	Inclusions / Modifications

I	V21PET02	Power System Operation & Control	Included Load Flow Analysis	Load Flow Analysis is added in the syllabus

The approved syllabi for various courses offered from I to IV semesters of M. Tech Power Electronics and Power Systems (PE&PS) under V21 Regulation is given in **Annexure– EE-VIII**

Dr. Sudha Rani Donepudi

(BOS Chairperson)

Annexure- EE-I

Approved Course Structure of VII and VIII Semesters

under V18 Regulation

VII Semester						
S.No.	**Course Code**	**Name of the Course**	**L**	**T**	**P**	**Credits**
1.	V18EET26	Power System Operation and Control	3	-	-	3
2.	V18EET27	AI Techniques for Power Systems	3	-	-	3
3.	V18EET28 V18EET29 V18EET30 V18EET31	Professional Elective - III Power Quality High Voltage Engineering Modelling and Simulation of Power Electronics Flexible AC Transmission Systems	3		-	3
4.	V18EET32 V18EET33 V18EET34 V18EET35	Professional Elective – IV Modern Control Theory Smart Grid Electrical Machine Modelling Analysis Control of Grid Connected PV and Wind Energy Systems	3	-	-	3
5.		Open Elective – II	3	-	-	3
6.	V18EEL10	Power Systems Laboratory	-	-	2	1
7.	V18EEP01	Project Part – A	-	-	6	3
		Total Contact Hours(23)	**15**	**0**	**8**	**20**
VIII Semester						
S.No.	**Course Code**	**Name of the Course**	**L**	**T**	**P**	**Credits**
1.	V18EET36 V18EET37 V18EET38 V18EET39	Professional Elective - V Electrical Distribution Systems Digital Signal Processing Digital Control Systems Electrical and Hybrid Vehicles	3	-	-	3
2.	V18EET40 V18EET41 V18EET42 V18EET43	Professional Elective – VI Power Systems Reforms Energy Storage and Battery Management Switched Mode Power Converters Electrical Machine Design	3	-	-	3
3.		Open Elective – III	3	-	-	3
4.	V18EEP02	Project Part - B	-	-	18	9
		Total Contact Hours(27)	**9**	**0**	**18**	**18**

- Internship/Industrial Training certificate must be submitted on or before last instruction day of VII Semester, otherwise his/her Semester End Examination results will not be declared.
- Certification Course certificate must be submitted on or before last instruction day of VII Semester, otherwise his/her Semester End Examination results will not be declared.

Annexure- EE-II

Syllabi for the Courses offered in VII & VIII Semesters B. Tech EEE Under V18 Regulation

Semester	VII SEM	L	T	P	C	Course Code
Regulation	V18	3	-	-	3	V18EET26
Name of the Course	Power System Operation and Control					
Branches	EEE					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Analyze the optimal scheduling of power generating thermal units	K4
CO2	Compute optimal hydro and thermal scheduling.	K3
CO3	Predict the optimal unit commitment problem	K3
CO4	Calculate the transfer function of single area and two area load frequency control.	K4
CO5	Evaluate the steady state response of single area load control with PI controller.	K5
CO6	Assess the reactive power control and compensation of transmission lines.	K3

UNIT–I: ECONOMIC OPERATION OF POWER SYSTEMS

Optimal operation of Generators in Thermal power stations, Heat rate curve, Cost Curve, Incremental fuel and Production costs, Input–output characteristics, Optimum generation allocation with line losses neglected, Optimum generation allocation including the effect of transmission line losses, Loss Coefficients, General transmission line loss formula.

UNIT–II: HYDROTHERMAL SCHEDULING

Optimal scheduling of Hydrothermal System: Hydroelectric power plant models, Scheduling problems, Short term hydrothermal scheduling problem.

UNIT–III: UNIT COMMITMENT

Optimal unit commitment problem, Need for unit commitment, Constraints in unit commitment, Cost function formulation, Solution methods, Priority ordering, Dynamic programming.

UNIT–IV: LOAD FREQUENCY CONTROL-I

Modeling of steam turbine, Generator, Mathematical modeling of speed governing system– Transfer function – Modeling of Hydro turbine –Necessity of keeping frequency constant–Definitions of Control area – Single area control system – Block diagram representation of an isolated power system – Steady state analysis – Dynamic response – Uncontrolled case. Proportional plus Integral control of single area and its block diagram representation – Steady state response.

UNIT–V: LOAD FREQUENCY CONTROL-II

Block diagram development of Load Frequency Control of two area system uncontrolled
case and controlled case. Tie-line bias control. Load Frequency Control and Economic
dispatch control.

UNIT–VI: REACTIVE POWER CONTROL

Overview of Reactive Power control – Reactive Power compensation in transmission systems– Advantages and disadvantages of different types of compensating equipment for transmission systems – Load compensation – Specifications of load compensator –
Uncompensated and compensated transmission lines: Shunt and series compensation – Need for FACTS controllers.

TEXT BOOKS:

1. Electric Energy Systems Theory – by O. I. Elgerd, Tata Mc Graw–hill Publishing Company Ltd., Second edition. 2017
2. Power System stability & control, Prabha Kundur, TMH ,First Edition 2006.
3. Modern Power System Analysis – by I. J. Nagrath & D. P. Kothari Tata Mc Graw – Hill Publishing Company Ltd, 2nd edition Energy management by Paul o’ Callaghan, Mc–Graw Hill Bookcompany–1st edition, 1998.

REFERENCE BOOKS:

1. Power System Analysis and Design by J. Duncan Glover and M.S. Sarma, THOMPSON, 6rd Edition2019.
2. Power System Analysis by Grainger and Stevenson, Tata McGraw Hill2017.
3. **https://nptel.ac.in/courses/108/101/108101040/**

Semester	**VII SEM**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	**V18**	**3**	**-**	**-**	**3**	**V18EET27**
Name of the Course	**AI Techniques for Power Systems**					
Branches	**EEE**					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	**Course Outcome**	**Knowledge Level**
CO1	Understand fundamentals concepts of artificial neural networks.	K2
CO2	Understand concepts of different algorithms ANN paradigms.	K2
CO3	Understand fundamentals of fuzzy set properties and membership functions.	K2
CO4	Understand the concept of evolutionary techniques operation.	K2
CO5	Understand fundamentals of optimization techniques.	K2
CO6	Apply optimization techniques to power system applications.	K4

UNIT-I: ARTIFICIAL INTELLIGENCE

Artificial Neural Networks (ANN) – definition and fundamental concepts – Biological neural networks – Artificial neuron – activation functions – setting of weights – typical architectures – biases and thresholds – learning/training laws and algorithms.

UNIT-II: ANN PARADIGMS

ADALINE – feed forward networks – Back Propagation algorithm-Radial Basis Function (RBF) network- Hopfield Neural Network.

UNIT- III: CLASSICAL AND FUZZY SETS

Introduction to classical sets- properties, Operations and relations; Fuzzy sets, Membership, Operations, Properties, Fuzzy relations, Membership functions.

UNIT-IV: EVOLUTIONARY TECHNIQUES

Introduction-concepts of genetic algorithms: Initialization-Selection-Genetic operators, Mutation- Evolutionary programming-Evolutionary techniques.

UNIT-V: FUNDMENTALS OF OPTIMIZATION

Classification of optimization problems-Unconstrained and Constrained optimization- Particle swarm optimization.

UNIT-VI: APPLICATIONS OF AI

PSO based Economic load dispatch without losses, Load flow, and Load frequency control: Single area system using ANN.

TEXT BOOKS:

1. Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications by Rajasekharan and pai – PHI Publication, 2011.
2. Fuzzy logic with Fuzzy Applications – T.J Ross – Mc Graw Hill Inc, 1997.
3. NP Padhy, Artificial Intelligence and Intelligent Systems, Oxford University Press, 1st Edition, 2005.

REFERENCE BOOKS:

1. Goldberg D.E. “Genetic Algorithms in Search Optimization & Machine Learning”, 13th Edition Addition Wesley Co., New York 1996.
2. D.P.Kothari and J.S.Dhillon, “Power System Optimization”, 2ndEdition, PHI learning private limited, 2010
3. **https://nptel.ac.in/content/storage2/courses/109101003/downloads/Lecture-notes/Lecture-19-20-21.pdf**

Semester	VII SEM	L	T	P	C	Course Code
Regulation	**V18**	**3**	**-**	**-**	**3**	**V18EET28**
Name of the Course	**Power Quality (Professional Elective – III)**					
Branches	**EEE**					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Explain different types of power quality phenomena	**K2**
CO2	Illustrate sources for voltage sag, voltage swell, interruption, transients, long duration over voltages & harmonics in a power system	**K3**
CO3	Describe power quality terms & study power quality standards	**K2**
CO4	Discuss principle of voltage regulation & power factor improvement methods	**K2**
CO5	Assess the relationship between distributed generation & power quality	**K3**
CO6	Discuss the power quality monitoring concepts & the usage of measuring instruments	**K2**

UNIT–I: INTRODUCTION

Overview of power quality – Concern about the power quality – General classes of power quality and voltage quality problems – Transients – Long–duration voltage variations – Short–duration voltage variations – Voltage unbalance – Waveform distortion – Voltage fluctuation – Power frequency variations.

UNIT–II: VOLTAGE IMPERFECTIONS IN POWER SYSTEMS

Power quality terms – Voltage sags – Voltage swells and interruptions – Sources of voltage sag, swell and interruptions – Nonlinear loads – IEEE and IEC standards. Source of transient over voltages – Principles of over voltage protection – Devices for over voltage protection – Utility capacitor switching transients.

UNIT–III: VOLTAGE REGULATION AND POWER FACTOR IMPROVEMENT

Principles of regulating the voltage – Device for voltage regulation – Utility voltage
regulator application – Capacitor for voltage regulation – End–user capacitor application – Regulating utility voltage with distributed resources – Flicker – Power factor penalty – Static VAR compensations for power factor improvement.

UNIT– IV: HARMONIC DISTORTION AND SOLUTIONS

Voltage distortion vs. Current distortion – Harmonics vs. Transients – Harmonic indices – Sources of harmonics – Effect of harmonic distortion – Impact of capacitors, transformers, motors and meters – Point of common coupling – Passive and active filtering – Numerical problems.

UNIT–V: DISTRIBUTED GENERATION AND POWER QUALITY

Resurgence of distributed generation – DG technologies – Interface to the utility system – Power quality issues and operating conflicts – DG on low voltage distribution networks.

UNIT–VI: MONITORING AND INSTRUMENTATION

Power quality monitoring and considerations – Historical perspective of PQ measuring instruments – PQ measurement equipment – Assessment of PQ measuring data – Application of intelligent systems – PQ monitoring standards.

TEXTBOOKS:

1. Electrical Power Systems Quality, Dugan R C, Mc Granaghan M F, Santoso S, and Beaty H W, Second Edition, McGraw–Hill, 2012, 3rdedition.
2. Electric power quality problems –M. H. J. Bollen IEEE series-Wiley Indiapublications,2011.

REFERENCE BOOKS:

1. Power Quality Primer, Kennedy B W, First Edition, McGraw–Hill,2000.
2. Understanding Power Quality Problems: Voltage Sags and Interruptions, Bollen M HJ, First Edition, IEEE Press;2000.
3. Power System Harmonics, Arrillaga J and Watson N R, Second Edition, John Wiley & Sons,2003.
4. Power Quality C. shankaran, CRC Press,2001
5. Power Quality in Power systems and Electrical Machines–Ewald F. fuchs, Mohammad A. S. Masoum–Elsevier.2nd edition 2015
6. **https://nptel.ac.in/courses/108/106/108106025/**

Semester	**VII SEM**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	**V18**	**3**	**-**	**-**	**3**	**V18EET29**
Name of the Course	**High Voltage Engineering (Professional Elective – III)**					
Branches	**EEE**					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	**Course Outcome**	**Knowledge Level**
CO1	Describe the electric field stress on different configuration of electrodes.	K2
CO2	Understand the breakdown phenomena in various dielectric materials.	K2
CO3	Illustrate the generation of high DC, AC and Impulse voltages and Currents.	K2
CO4	Explain various methods available for measurement of high DC, AC and Impulse voltages and currents.	K2
CO5	Describe different methods for measuring DC Resistivity, Dielectric Constant, Loss Factor & explain the phenomena of Partial Discharge.	K2
CO6	Illustrate the testing techniques for various equipment's used in High Voltage Engineering.	K2

UNIT–I: INTRODUCTION TO HIGH VOLTAGE TECHNOLOGY

Electric Field Stresses – Uniform and non–uniform field configuration of electrodes – Estimation and control of electric Stress – Numerical methods for electric field computation.

UNIT–II: BREAK DOWN PHENOMENON IN GASEOUS, LIQUID AND SOLID INSULATION

Gases as insulating media – Collision process – Ionization process – Townsend's criteria of breakdown in gases – Paschen's law – Liquid as Insulator – Pure and commercial liquids – Breakdown in pure and commercial liquid – Intrinsic breakdown – Electromechanical breakdown – Thermal breakdown –Breakdown of solid dielectrics, composite dielectrics used in practice.

UNIT–III: GENERATION OF HIGH VOLTAGES AND HIGH CURRENTS

Generation of High DC voltages – Generation of High Alternating Voltages – Generation of Impulse Voltages and Currents – Tripping and Control of Impulse Generators.

UNIT–IV: MEASUREMENT OF HIGH VOLTAGES AND HIGH CURRENTS

Measurement of High - Direct Current Voltages, AC and Impulse Voltages; Measurement of High – DC, AC and Impulse Currents.

UNIT–V: NON–DESTRUCTIVE TESTING OF MATERIAL AND ELECTRICAL APPARATUS

Measurement of DC Resistivity – Measurement of Dielectric Constant and Loss Factor – Partial Discharge Measurements.

UNIT–VI: High Voltage Testing of Electrical Apparatus

Testing of Insulators and Bushings – Testing of Isolators and Circuit Breakers – Testing of Cables – Testing of Transformers – Testing of Surge Diverters – Radio Interference Measurements.

TEXT BOOKS:

1. High Voltage Engineering: Fundamentals by E.Kuffel, W.S.Zaengl, J.Kuffel by Elsevier, 2nd Edition,2000.
2. High Voltage Engineering and Technology by Ryan, IET Publishers.3rd Edition,2013.

REFERENCE BOOKS:

1. High Voltage Engineering by M.S.Naidu and V. Kamaraju – TMH Publications, 4th Edition2009
2. High Voltage Engineering by C.L.Wadhwa, New Age Internationals (P) Limited, 1997.
3. High Voltage Insulation Engineering by Ravindra Arora, Wolfgang Mosch, New Age International (P)Limited, 1995.
4. **https://nptel.ac.in/courses/108/104/108104048/**

Semester	VIISEM	L	T	P	C	Course Code
Regulation	V18	3	-	-	3	V18EET30
Name of the Course	Modelling and Simulation of Power Electronics (Professional Elective – III)					
Branches	EEE					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Understand the background activities i.e. numerical solution used in the simulation software.	**K3**
CO2	Describe the transient analysis in circuit simulation	**K2**
CO3	Explain the concepts of simulation of power electronic converters	**K2**
CO4	Compute properties of switching functions in single and parallel switch	**K3**
CO5	Express mathematical modelling of different converters	**K2**
CO6	Develop state space averaging technique and Hybrid Modelling for DC-DC converter	**K3**

UNIT-I: INTRODUCTION

Challenges in computer simulation – Simulation process–mechanics of simulation, Solution techniques for time domain analysis-Equation solvers, circuit-oriented simulators.

UNIT-II: SIMULATION OF POWER ELECTRONIC CONVERTERS-1

MNA and ST Approaches- Nodal Analysis, Modified Nodal Analysis, The Spare Tableau Approach, Nonlinear Circuits - The Newton Raphson Method, Computation Time, Convergence Issues, Nonlinear Circuit Equations, Introduction to Transient Simulation-Introduction, Discretization of Time, Transient Analysis, Accuracy and Stability, Explicit and Implicit Schemes, Methods for Transient Simulation - FE, BE and TRZ, Transient Analysis in Circuit Simulation, Equivalent Circuit Approach: RC Circuit,

UNIT- III: SIMULATION OF POWER ELECTRONIC CONVERTERS– II

Buck Converter; Some Practical Aspects: Undamped Oscillations, Ringing, Global Error in Switching Circuits, Round-off Error, Assessment of Accuracy,SingularMatrixProblem,Trapezoidalintegration,M&Nmethodforsimulatingpowerelectronicconverters(with buck converter as are presentative example).

UNIT-IV: SWITCHINGFUNCTION

Introduction, Application of the switching function technique, Properties of the switching function, Voltage-Current relations in switched circuits - Single Switch, Parallel Switch, Pulse Width Modulation- Unipolar, PWM Signal of a composite function, bipolar square wave modulation.

UNIT-V: MATHEMATICAL MODELING OF CONVERTERS

Mathematical Modeling of Buck Converter, Modeling using switching function-buck converter, Rectifier,3-phase VSI inverter, matrix converter, m-phase rectifier. PWM rectifier topologies, modeling of power electronic converters-PWM rectifier in different frames-abc, alpha-beta and d-q.

UNIT-VI: MODELING, SIMULATION OF SWITCHING CONVERTERS WITH STATE SPACE AVERAGING, HYBRID MODEL

State space approach, averaging method, State Space Averaging Technique–Modeling AND linearization of converter transfer function-Hybrid Modeling for DC-DC converter.

TEXT BOOKS:

1. M. B. Patil, V. Ramnarayanan, V. T. Ranganathan: *Simulation of Power Electronic Converters*, 1st ed., Narosa Publishers, 2010

REFERENCE BOOKS:

1. Ned Mohan, Undeland and Robbins, “Power Electronics: Converters, Design and control”-3rd ed., John Wiley 2009.
2. https://nptel.ac.in/courses/108/106/108106023/

Semester	VII SEM	L	T	P	C	Course Code
Regulation	**V18**	**3**	**-**	**-**	**3**	**V18EET31**
Name of the Course	**Flexible AC Transmission Systems (Professional Elective – III)**					
Branches	**EEE**					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Determine power flow control in transmission lines by using FACTS controllers.	**K3**
CO2	Explain operation and control of voltage source converter.	**K2**
CO3	Discuss compensation methods to improve stability and reduce power oscillations in the transmission lines.	**K2**
CO4	Explain the method of shunt compensation by using static VAR compensators.	**K2**
CO5	Appreciate the methods of compensations by using series compensators..	**K3**
CO6	Explain the operation of two modern power electronic controllers (Unified Power Quality Conditioner and Interline Power Flow Controller)	**K2**

UNIT-I: FACTS CONCEPTS

Introduction to FACTS: Transmission interconnections power flow in an AC system, loading capability limits, Dynamic stability considerations, importance of controllable parameters basic types of FACTS controllers, benefits from FACTS controllers.

UNIT-II: VOLTAGE SOURCE CONVERTERS

Single & three phase full wave bridge converters, Three level voltage source converter, pulse width modulation, basic concept of current source converters, and comparison of current source converters with voltage source converters

UNIT- III: STATIC SHUNT COMPENSATION

Objectives of shunt compensation: mid-point voltage regulation, voltage instability prevention, improvement of transient stability, Power oscillation damping, Methods of controllable VAR generation, variable impedance type static VAR generators switching converter type VAR generators, hybrid VAR generators.

UNIT-IV: STATICSHUNT COMPENSATION-2

Thyristor Switched Capacitor (TSC)– Thyristor Switched Capacitor – Thyristor Switched Reactor (TSC–TCR). Static VAR compensator (SVC) and Static Compensator (STATCOM): The regulation and slope transfer function and dynamic performance – Transient stability enhancement and power oscillation damping– Operating point control and summary of compensation control.

UNIT-V: SERIESCOMPENSATORS

Static series compensators: Concept of series capacitive compensation Improvement of transient stability – Power oscillation damping – Functional requirements. GTO thyristor controlled Series Capacitor (GSC) – Thyristor Switched Series Capacitor (TSSC) and Thyristor Controlled Series Capacitor (TCSC).

UNIT-VI: COMBINED CONTROLLERS

Schematic and basic operating principles of unified power flow controller (UPFC) and Interline power flow controller (IPFC) – Application of these controllers on transmission lines.

TEXT BOOKS:

1. Understanding FACTS” N. G. Hingorani and L. Guygi, IEEE Press. Indian Edition is available:—Standard Publications, 2001.
2. Thyristor-based FACTS Controllers for Electrical Transmission Systems, by R. Mohan Mathur and Rajiv K. Varma, Wiley, 2002.

REFERENCE BOOKS:

1. Zhang, Xiao-Ping, Rehtanz, Christian, Pal, Bikash “Flexible AC Transmission Systems: Modeling and Control”, Springer, 2012.
2. Yong-Hua Song, Allan Johns, “Flexible AC Transmission Systems”, IET, 1999.
3. **https://nptel.ac.in/courses/108/107/108107114/**

Semester	VII SEM	L	T	P	C	Course Code
Regulation	V18	3	-	-	3	V18EET32
Name of the Course	Modern Control Theory (Professional Elective – IV)					
Branches	EEE					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Describe and analyse systems in state space model	K2
CO2	Model a system in various canonical forms	K3
CO3	Design a controller and observer using state feedback	K4
CO4	Analyse non-linear system using describing functions	K3
CO5	Analyse non-linear system using Phase plane analysis	K3
CO6	Analyse non-linear system using Lypanov method	K3

UNIT – I: STATE VARIABLE DESCRIPTION
Concept of State – State Equations for Linear Continuous time Models-Non uniqueness of state model – State diagrams for continuous time state models – Solution of state equations – State transmission matrix.

UNIT – II: CONTROLLABILITY AND OBSERVABILITY
Tests for controllability and observability for continuous time systems – Time varying case, minimum energy control, time invariant case, Principle of Duality, Controllability and observability of state models in Jordan canonical form and other canonical forms.

UNIT – III: MODAL CONTROL
Effect of state feedback on controllability and observability, Design of State Feedback Control through Pole placement. Full order observer and reduced order observer.

UNIT – IV: DESCRIBING FUNCTION ANALYSIS
Introduction to nonlinear systems, Types of nonlinearities, Concepts of describing functions, Derivation of describing functions for Dead zone, Saturation, backlash, relay with dead zone and Hysteresis – Jump Resonance.

UNIT-V: PHASE-PLANE ANALYSIS

Introduction to phase-plane analysis, Method of Isoclines for Constructing Trajectories, Singular points, Phase-plane analysis of nonlinear control systems.

UNIT-VI: STABILITY ANALYSIS

Stability in the sense of Lyapunov. Lyapunov‘s stability and Lypanov‘s instability theorems. Direct method of Lypanov for the Linear and Nonlinear continuous time autonomous systems.

TEXT BOOKS:

1. Modern Control System Theory – by M. Gopal, New Age International Publishers, 2nd edition, 1996.
2. Systems and Control by Stainslaw H. Zak, Oxford Press, 2003.

REFERENCE BOOKS:

1. Modern Control Engineering – by K. Ogata, Prentice Hall of India, 3rd edition, 1998.
2. Control Systems Engineering by I.J. Nagrath and M.Gopal, New Age International (P) Ltd. 2007.
3. Digital Control and State Variable Methods – by M. Gopal, Tata Mc Graw-Hill companies, 1997.
4. https://nptel.ac.in/courses/108/103/108103007/

Semester	**VII SEM**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	**V18**	**4**	**-**	**-**	**3**	**V18EET33**
Name of the Course	**Smart Grid (Professional Elective – IV)**					
Branches	**EEE**					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	**Course Outcome**	**Knowledge Level**
CO1	Understand concept of smart grid and its advantages over conventional grid.	**K2**
CO2	Explain the architecture of smart Grid	**K2**
CO3	Illustrate the concept of Micro Grid and its integration	**K3**
CO4	Understand smart metering techniques and measuring techniques	**K2**
CO5	Examine different communication technologies that can be used for smart grid	**K3**
CO6	Identify the power quality problems associated with smart grid	**K2**

UNIT –I: INTRODUCTION TO SMART GRID

Introduction to Smart Grid - Need of Smart Grid, Working definitions of Smart Grid and Associated Concepts – Smart Grid Functions – Traditional Power Grid and Smart Grid – New Technologies for Smart Grid – Advantages — Key Challenges for Smart Grid.

UNIT—II: SMART GRID ARCHITECTURE

Components and Architecture of Smart Grid Design – Review of the proposed architectures for Smart Grid-Geographic Information System(GIS)-The fundamental components of Smart Grid designs – Transmission Automation – Sub-Station Automation -Distribution Automation – Feeder Automation, Renewable Integration

UNIT-III: DISTRIBUTION GENERATION

Introduction-necessity of DG– Concept of micro grid-Issues of interconnection-protection & control of micro grid – Storage Technologies – Smart Storages, Battery, SMES– Economic Issues.

UNIT-IV: SMART METERS

Introduction to smart Meters-Phasor Measurement Unit (PMU)-Wide Area Measurement Systems (WAMS). Intelligent Electronic Devices (IED) & their application for monitoring & protection

UNIT-V: INFORMATION AND COMMUNICATION TECHNOLOGY FOR SMART GRID

Advanced Metering infrastructure (AMI) drivers and benefits-AMI protocols-Standards and initiatives-AMI needs in the smart grid, Home Area Network (HAN), Wide Area Network (WAN)

UNIT – VI: POWER QUALITY MANAGEMENT IN SMART GRID

Introduction, Power Quality, Power Quality Issues of Grid Connected Renewable Energy Sources, Load Frequency Control (LFC) and Voltage Control in Micro Grid System – Reactive Power Control in Smart Grid- Web based Power Quality Monitoring- Permanent Power Quality Monitoring Equipment-Power Quality Audit.

TEXT BOOKS:

1. James Momoh, “Smart Grid :Fundamentals of Design and Analysis”-Wiley, IEEE Press,2012
2. Ali Keyhani, Mohammad N. Marwali, Min Dai ―Integration of Green and Renewable Energy in Electric Power Systems‖, Wiley2010.
3. JanakaEkanayake, KithsiriLiyanage, Jianzhong.Wu, AkihikoYokoyama, Nick Jenkins,“Smart Grid: Technology and Applications”- Wiley, 2012.
4. A.G. Phadke and J.S. Thorp, “Synchronized Phasor Measurements and their Applications”, Springer Edition, 2010

REFERENCE BOOKS:

1. Yang Xiao, “Communication and Networking in Smart Grids”, CRC Press 2012.
2. Wiley Blackwell 3.Peter S. Fox Penner, “Smart Power: Climate Changes, the Smart Grid, and the Future of Electric Utilities”, Island Press; 1 edition 8 Jun 2010.
3. Stuart Borlase, “Smart Grids (Power Engineering)”, CRC Press2015.
4. https://nptel.ac.in/courses/108/107/108107113/

Semester	VII SEM	L	T	P	C	Course Code
Regulation	V18	3	-	-	3	V18EET34
Name of the Course	Electrical Machine Modelling & Analysis (Professional Elective – IV)					
Branches	EEE					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Analyze Kroon's Primitive Machine	K2
CO2	Develop modeling of dc machine	K3
CO3	Explain linear Transformation	K4
CO4	Apply mathematical modeling concepts to 3-phase Induction machines	K3
CO5	Design control strategies based on dynamic modeling of 3-ph Induction machines and3-phase Synchronous machine	K4
CO6	Analyze BLDC Machine and switched reluctance machine based on Mathematical modeling of BLDCM and SRM	K4

UNIT – I: BASIC CONCEPTS OF MODELING

Basic Two-pole Machine representation of Commutator machines, 3-phase synchronous machine with and without damper bars and 3-phase induction machine, Kron's primitive Machine-voltage, current and Torque equations.

UNIT – II: DC MACHINE MODELING

Mathematical model of separately excited D.C motor – Steady State analysis- Transient State analysis- Sudden application of Inertia Load-Transfer function of separately excited D.C Motor- Mathematical model of D.C Series motor, Shunt motor

UNIT- III: REFERENCE FRAME THEORY & MODELING OF SINGLE PHASE INDUCTION MACHINES

Linear transformation-Phase transformation - three phase to two phase transformation (abc to dq0) and two phase to three phase transformation dq0 to abc -Power equivalence- Mathematical modeling of single phase induction machines.

UNIT – IV: MODELING OF THREE PHASE INDUCTION MACHINE

Generalized model in arbitrary reference frame-Electromagnetic torque-Derivation of commonly used Induction machine models- Stator reference frame model-Rotor reference frame model-Synchronously rotating reference frame model-state space model with flux linkages as variables.

UNIT –V: MODELING OF SYNCHRONOUS MACHINE

Synchronous machine inductances–voltage equations in the rotor's dq0 reference frame electromagnetic torque- current in terms of flux linkages-three synchronous machine model.

UNIT –VI: MODELING OF SPECIAL MACHINES

Modeling of PM Synchronous motor, modeling of BLDC motor, modeling of Switched Reluctance motor.

TEXT BOOKS:

1. Generalized theory of Electrical Machinery–P. S. Bimbra - Khanna Publishers.- 6th Edition 2017.
2. Electric Motor Drives-Modeling, Analysis & control- R. Krishnan-Pearson Publications-1st edition- 2002.

REFERENCE BOOKS:

1. Analysis of Electrical Machinery and Drive systems– P. C. Krause, Oleg Wasynczuk, Scott D. Sudhoff – Second Edition-IEEE Press2002.
2. Dynamic simulation of Electric machinery using Matlab / Simulink – Chee Mun Ong - PHI.1997.
3. Modern Power Electronics and AC Drives-B. K. Bose –PHI2001.
4. https://nptel.ac.in/courses/108/106/108106023/

Semester	VII SEM	L	T	P	C	Course Code
Regulation	V18	3	-	-	3	V18EET35
Name of the Course	Control of Grid Connected Converters for PV and Wind Energy Systems (Professional Elective – IV)					
Branches	EEE					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Understand the basic requirements of grid for connecting PV and WT converters.	K2
CO2	Describe various grid synchronization techniques for single phase power converters.	K2
CO3	Describe various grid synchronization techniques for three phase power converters.	K2
CO4	Illustrate various filter topologies and control techniques for grid connected converters.	K2
CO5	Explain different MPPT Control Methods and limitations of standard MPPT.	K2
CO6	Illustrate the control of grid converter for renewable energy interface	K2

UNIT–I: GRID REQUIREMENT FOR PV AND WT SYSTEM

Introduction, International Regulations, Response to Abnormal Grid Conditions, Power Quality. Grid Code Evolution for WT system, Frequency and Voltage Deviation under Normal Operation, Active Power Control in Normal Operation, Reactive Power Control in Normal Operation.

UNIT–II: GRID SYNCHRONIZATION FOR SINGLE-PHASE POWER CONVERTERS

Grid Synchronization Techniques for Single-Phase Systems, Phase Detection Based on In-Quadrature Signals, Some PLLs Based on In-Quadrature Signal Generation.

UNIT–III: GRID SYNCHRONIZATION FOR THREE-PHASE POWER CONVERTERS

The Three-Phase Voltage Vector under Grid Faults, Synchronous Reference Frame PLL under Unbalanced and Distorted Grid Conditions, Decoupled Double

Synchronous Reference Frame PLL (DDSRF-PLL), Double Second-Order Generalized Integrator FLL (DSOGI-FLL).

UNIT–IV: INTRODUCTION TO CONTROL STRATEGY OF CONVERTERS WITH DIFFERENT FILTER CONFIGURATIONS

Filter Topologies, Design Considerations, Practical Examples of LCL Filters and Grid Interactions, Resonance Problem and Damping Solutions, Nonlinear Behavior of the Filter. Converter configurations, Different current Control techniques– PI control, PR control, HCC, Model Predictive control.

UNIT–V: MPPT CONTROL FOR PV AND WT SYSTEM

The Dynamic Optimization Problem, Fractional Open-Circuit Voltage and Short-Circuit Current, MPPT Control Methods, The Perturb and Observe Approach, Improvements of the P&O Algorithm, The Incremental Conductance Method, MPPT Efficiency, Limitation of standard MPPT. Charge controller for off grid PV system.

UNIT–VI: GRID CONVERTER CONTROL FOR RENEWABLE ENERGY INTERFACE

Model of the Converter-Mathematical Model of the L-Filter Inverter; AC Voltage and DC Voltage Control-Management of the DC Link Voltage, Cascaded Control of the DC Voltage through the AC Current, Tuning Procedure of the PI Controller, PI-Based Voltage Control; Voltage Oriented Control (VOC) and Direct Power Control (DPC): Synchronous Frame VOC: PQ Open-Loop Control, PQ Closed-Loop Control, Direct Power Control, Stand-alone.

REFERENCES BOOKS:

1. Grid Converters for Photovoltaic and Wind Power systems, IEEE, A John Wiley and Sons, Ltd, Publication2010.
2. Power Electronics and Control Techniques for Maximum Energy Harvesting in Photovoltaic systems, CRC Press, Taylor and Francis Group2013.
3. Photovoltaic Power System: Modeling, Design, and Control by Weidong Xiao, Wiley Publication2017.
4. Modern MPPT Techniques for Photovoltaic Energy Systems by Ali M. Eltamaly, Almoataz Y. Abdelaziz, Springer International Publishing2020.
5. https://nptel.ac.in/courses/117/108/117108141/

Semester	VII SEM	L	T	P	C	COURSE CODE
Regulation	V18	3	-	-	3	V18EEL10
Name of the Course	Power Systems Lab					
Branches	EEE					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Calculate the sequence impedances of 3 phase Transformer	K4
CO2	Determine the power Angle Characteristics of 3-phase Alternator with infinite bus bars	K4
CO3	Calculate the dielectric strength of Transformer oil	K4
CO4	Explain load flow studies using N-R method	K5
CO5	Assess load frequency control with &without controller	K5
CO6	Evaluate economic load dispatch with & without losses	K5

Any 10 of the Following experiments are to be conducted:

1. Sequence impedances of 3 phase Transformer.
2. Sequence impedances of 3 phase Alternator by Fault Analysis.
3. Sequence impedances of 3 phase Alternator by Direct method.
4. ABCD parameters of Transmission line.
5. Power Angle Characteristics of 3phase Alternator with infinite bus bars.
6. Dielectric strength of Transformer oil.
7. Calibration of Tong Tester.
8. Load flow studies using Gauss-Seidel method
9. Load flow studies using N-R method
10. Transient Stability Analysis
11. Load frequency control with & without control
12. Load frequency control with control
13. Economic load dispatch with & without losses
14. Economic load dispatch with losses.

Semester	VIII SEM	L	T	P	C	Course

						Code
Regulation	**V18**	**3**	**-**	**-**	**3**	**V18EET36**
Name of the Course	**Electrical Distribution Systems (Professional Elective – V)**					
Branches	**EEE**					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Understand various factors of distribution system	**K2**
CO2	Construct the distribution substation and feeders	**K3**
CO3	Calculate the voltage drop and power loss calculations on Distribution System	**K3**
CO4	Understand the distribution system protection and its coordination.	**K2**
CO5	Understand the effect of compensation for power factor improvement.	**K2**
CO6	Understand the effect of voltage control on distribution system.	**K2**

UNIT I: GENERAL CONCEPTS

Introduction to distribution systems, Load modeling and characteristics, Coincidence factor, Contribution factor loss factor, Relationship between the load factor and loss factor, Classification of loads (Residential, commercial, Agricultural and Industrial).

UNIT II: SUBSTATIONS & DISTRIBUTION FEEDERS

Location of substations: Rating of distribution substation, Service area with 'n' primary feeders, Benefits and methods of optimal location of substations.

Design Considerations of distribution feeders: Radial and loop types of primary feeders, Voltage levels, Feeder loading, Basic design practice of the secondary distribution system.

UNIT III: SYSTEM ANALYSIS

Voltage drops and power–loss calculations: Derivation for voltage drop and power loss in lines, uniformly distributed loads and non-uniformly distributed loads, Numerical problems, three phase balanced primary lines.

UNIT IV: PROTECTION & CO-ORDINATION

Objectives of distribution system protection, Types of common faults and procedure for fault calculations for distribution system, Protective devices: Principle of operation of fuses, Circuit reclosures, Line sectionalizes and circuit breakers.

Co-ordination of protective devices: General coordination procedure, Various types of coordinated operation of protective devices, Residual Current Circuit Breaker.

UNIT V: COMPENSATION FOR POWER FACTOR IMPROVEMENT

Capacitive compensation for power factor control, Different types of power capacitors,
shunt and series capacitors, Effect of shunt capacitors (Fixed and switched), Power factor correction, Capacitor allocation, Economic justification, Procedure to determine the best capacitor location, Numerical problems.

UNIT VI: VOLTAGE CONTROL

Equipment for voltage control, Effect of series capacitors, Effect of AVB/AVR, Line drop compensation

TEXT BOOK:

1. "Electric Power Distribution system, Engineering" – by Turan Gonen, CRC press, 2nd edition, 2007.
2. Electric Power Distribution – by A.S. Pabla, Tata McGraw–hill Publishing Company, 4th edition, 1997.

REFERENCE BOOKS:

1. Electrical Distribution Systems by Dale R. Patrick and Stephen W. Fardo,
   CRC press, 2nd edition, 2021.
2. Electrical Power Distribution Systems by V. Kamaraju, 8th edition, 2014, Right Publishers.
3. https://nptel.ac.in/courses/108/107/108107112/.

Semester	VIII SEM	L	T	P	C	Course Code
Regulation	V18	3	-	-	3	V18EET37
Name of the Course	Digital Signal Processing (Professional Elective – V)					
Branches	EEE					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Classify Discrete Time Signals, systems, estimate the response of various Systems	K2
CO2	Compute DFT for discrete time signals using FFT Algorithm.	K3
CO3	Describe the various implementations of digital filter structures.	K2
CO4	Analyze and design a Digital filter (FIR&IIR) from the given specifications.	K4
CO5	Use the Multi-rate Processing concepts in various applications.	K2
CO6	Describe the concepts of DSP Processor.	K3

UNIT I: INTRODUCTION

Review of Signals and systems, Digital Signal Processing: Discrete time signals & sequences, Classification of Discrete time Systems, stability of LTI systems. Response of LTI systems to arbitrary inputs. Solution of Linear constant coefficient difference equations. Frequency domain representation of discrete time signals and systems.

UNIT II: DISCRETE FOURIER TRANSFORMS

Introduction to DTFT, Discrete Fourier transforms, Properties of DFT, Introduction to Fast Fourier transforms (FFT) - Radix-2 decimation in time and decimation in frequency FFT Algorithms, Inverse FFT.

UNIT III: REALIZATION OF DIGITAL FILTER

Review of Z-transform, digital filters, Block diagram representation of linear constant coefficient difference equations, Basic structures of IIR systems, Transposed forms. Basic structures of FIR systems.

UNIT IV: DESIGN OF IIR and FIR DIGITAL FILTERS

Analog filter approximations – Butterworth and Chebyshev, Design of IIR Digital filters from Analog filters, Characteristics of FIR Digital Filters, frequency response. Design of FIR Digital Filters using Window Techniques and Frequency Sampling technique, Comparison of IIR & FIR filters.

UNIT V: MULTIRATE DIGITAL SIGNAL PROCESSING

Introduction, Decimation, Interpolation, Sampling rate conversion, Implementation of sampling rate converters, Applications – Sub-band Coding of Speech Signals.

UNIT VI: INTRODUCTION TO DSP PROCESSORS

Introduction to programmable DSPs, Multiplier and Multiplier Accumulator, Modified bus structures and memory access schemes in P-DSPs, Multiple Access Memory, Multiported memory, VLIW architecture, Pipelining, Special addressing modes, On-Chip Peripherals.

TEXT BOOKS:

1. Digital Signal Processing, Principles, Algorithms, and Applications by John G. Proakis, Dimitris G. Manolakis, Pearson Education / PHI, 4th edition, 2007.
2. Discrete Time Signal Processing by A. V. Oppenheim and R.W. Schaffer, 3rd edition, 2010, PHI.

REFERENCE BOOKS:

1. Digital Signal Processing by Andreas Antoniou, TATA McGraw Hill, 2nd edition, 2006
2. Digital Signal Processing by MH Hayes, Schaum's Outlines, TATA Mc-Graw Hill, 2nd edition, 2007.
3. Digital Signal Processing by Alan V. Oppenheim, Ronald W. Schafer, PHI Ed., 2nd edition, 2006
4. Digital Signal Processing by Ramesh babu, Sci Tech publications, 6th edition, 2011.
5. Digital Signal Processing by A. Nagoor Kani, RBA Publications, 2nd edition, 2017.
6. https://nptel.ac.in/courses/117/102/117102060/

Semester	VIII SEM	L	T	P	C	Course Code
Regulation	V18	3	-	-	3	V18EET38
Name of the Course	Digital Control Systems (Professional Elective – V)					
Branches	EEE					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Understand the concepts of digital signal processing	K2
CO2	Solve difference equations and determine pulse transfer functions	K3
CO3	Analyze a discrete time system using state space model	K3
CO4	Determine the stability of a discrete time system	K4
CO5	Design a controller for discrete time system using conventional methods	K4
CO6	Design a controller for discrete time system using state feedback	K4

UNIT – I: INTRODUCTION AND SIGNAL PROCESSING

Introduction to analog and digital control systems – Advantages of digital systems – Typical examples – Signals and processing – Sample and hold devices – Sampling theorem and data reconstruction – Digital to Analog conversion and Analog to Digital conversion Frequency domain characteristics of zero order hold.

UNIT–II: Z-TRANSFORMS

Z-Transform and theorems, finding inverse and method for solving difference equations; Pulse transforms function, block diagram analysis of sampled – data systems.

UNIT–III: STATE SPACE ANALYSIS

State Space Representation of discrete time systems, Pulse Transfer Function Matrix solving discrete time state space equations, State transition matrix and it's Properties, Methods for Computation of State Transition Matrix, Discretization of continuous time state – space equations- Concepts of controllability and observability – Tests(without proof).

UNIT–IV: STABILITY ANALYSIS

Mapping between the S-Plane and the Z-Plane – Primary strips and Complementary Strips – Constant frequency loci, Constant damping ratio loci, Stability Analysis of closed loop systems in the Z-Plane. Jury stability test – Stability Analysis by use of the Bilinear Transformation and Routh Stability criterion.

UNIT – V: DESIGN OF DISCRETE TIME CONTROL SYSTEM BY CONVENTIONAL METHODS

Transient and steady – State response Analysis – Design based on the frequency response method –Bilinear Transformation and Design using frequency response in the w–plane for lag and led compensators and digital PID controllers.

UNIT – VI: STATE FEEDBACK CONTROLLERS AND OBSERVERS

Design of state feedback controller through pole placement – Necessary and sufficient conditions, Ackerman's formula.

TEXT BOOKS:

1. K. Ogata, "Discrete–Time Control systems", Pearson Education/PHI, 2nd Edition.
2. M. Gopal, "Digital Control and State Variable Methods", TMH, 4th Edition.

REFERENCE BOOKS:

1. Kuo, "Digital Control Systems", Oxford University Press, 2nd Edition, 2003.
2. https://nptel.ac.in/courses/108/103/108103008/

Semester	VIII SEM	L	T	P	C	Course Code
Regulation	V18	3	-	-	3	V18EET39
Name of the Course	Electrical and Hybrid Vehicles (Professional Elective – V)					
Branches	EEE					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Differentiate between Electric vehicles and Hybrid Electric Vehicles	K2
CO2	Discriminate between various Drive-Train Topologies	K2
CO3	Identify different motors used for hybrid electric vehicles.	K2
CO4	Explain the Sizing of Drive Train	K2
CO5	Illustrate different batteries and other energy storage systems.	K3
CO6	Discuss Various issues of energy management strategies	K2

UNIT-I: INTRODUCTION TO ELECTRIC VEHICLES

Conventional Vehicles: Basics of vehicle performance, vehicle power source characterization, transmission characteristics-Social and environmental importance of hybrid and electric vehicles, impact of modern drive-trains on energy supplies.

UNIT-II: DRIVE TRAINS

Hybrid Electric Drive-trains: Basic concept of hybrid traction, introduction to various hybrid drive-train topologies, power flow control in hybrid drive-train.

Electric Drive-trains: Basic concept of electric traction, introduction to various electric drive-train topologies, power flow control in electric drive-train.

UNIT-III: ELECTRIC PROPULSION UNIT

Introduction to electric components used in hybrid and electric vehicles, control of DC Motor drives, Control of Permanent Magnet Motor drives, control of Switch Reluctance Motor drives, drive system efficiency.

UNIT-IV: ENERGY STORAGE

Introduction to Energy Storage Requirements in Hybrid and Electric Vehicles, Battery based energy storage, Fuel Cell based energy storage - Super Capacitor based energy storage - Flywheel based energy storage

UNIT-V: SIZING THE DRIVE SYSTEM

Matching the electric machine and the internal combustion engine (ICE), Sizing the propulsion motor, sizing the power electronics, selecting the energy storage technology, Communications, supporting subsystems

UNIT-VI: ENERGY MANAGEMENT STRATEGIES

Introduction to energy management strategies used in hybrid and electric vehicles, classification of different energy management strategies, implementation issues of energy management strategies.

TEXT BOOKS:

1. Ali Emadi, Advanced Electric Drive Vehicles, CRC Press, 1st edition, 2014.
2. Iqbal Hussein, Electric and Hybrid Vehicles: Design Fundamentals, CRC Press, 1st edition, 2003.

REFERENCE BOOKS:

1. Mehrdad Ehsani, Yimin Gao, Ali Emadi, “Modern Electric, Hybrid Electric, and Fuel Cell Vehicles: fundamentals, theory, and design, 2nd edition, 2009.
2. Sandeep Dhameja, “Electric Vehicle Battery Systems”, Newnes, 1st edition, 2001.
3. http://nptel.ac.in/courses/108103009/

Semester	VIII SEM	L	T	P	C	Course Code
Regulation	V18	4	-	-	3	V18EET40
Name of the Course	Power System Reforms (Professional Elective – VI)					
Branches	EEE					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Understand fundamentals of power system deregulation and restructuring.	K2
CO2	Compute Available Transfer Capability (ATC)	K3
CO3	Apply methods to reduce congestion	K3
CO4	Compute electricity pricing in deregulated environment	K3
CO5	Understand the power system operation in deregulated environment	K2
CO6	Understand importance of ancillary services	K2

UNIT-I: BASIC ISSUES IN ELECTRIC UTILITIES

Introduction – Restructuring models – Independent system operator (ISO) – Power Exchange – Market operations – Market Power – Stranded cost – Transmission Pricing – Congestion Pricing

UNIT-II: OVERVIEW OF OASIS

Structure of OASIS – Posting of Information – Transfer capability on OASIS –Definitions of Transfer capability – Transfer Capability Issues – ATC calculations – TTC calculations – TRM calculations – CBM calculations – Methods to calculate ATC.

UNIT-III: CONGESTION MANAGEMENT

Introduction to congestion management –Effects of congestion – Methods to relieve congestion – Non market methods –Market Based methods – Management of Inter zonal/Intra zonal Congestion

UNIT-IV: PRICING OF ELECTRICITY

Introduction – Electricity price volatility – Factors effecting volatility – Measuring Volatility – electricity price indexes– Construction of forward price curves – Short–time price forecasting – Factors impacting electricity prices – Forecasting Methods – Analysing forecasting errors – Impact of data pre-processing – Impact of training vectors.

UNIT-V: POWER SYSTEM OPERATION IN DEREGULATED ENVIRONMENT

Introduction – Operational planning activities of ISO – The ISO in pool markets – The ISO in bilateral markets – Operational planning activities of a GENCO– the GENCO in pool markets – The GENCO in bilateral markets.

UNIT-VI: ANCILLARY SERVICES

Introduction – Types of ancillary services – Reactive power as an ancillary service –Synchronous generators as ancillary service providers.

TEXT BOOKS

1. Mohammad Shahidehpour, and Muwaffaqalomoush, – "Restructured electrical Power systems" Marcel Dekker, Inc. 1st edition, 2001
2. Kankar Bhattacharya, Math H.J. Boller, Jaap E. Daalder, 'Operation of Restructured Power System' Kluver Academic Publisher, 2nd edition, 2001

REFERENCE BOOKS

1. Loi Lei Lai; "Power system Restructuring and Deregulation", Jhon Wiley & Sons Ltd., England, 1st edition, 2001.
2. Electrical Power Distribution Case studies from Distribution reform, upgrades and Management (DRUM) Program, by USAID/India, TMH, 1st edition, 2012.
3. https://nptel.ac.in/courses/108/101/108101005/.

Semester	**VIII SEM**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	**V18**	**3**	**-**	**-**	**3**	**V18EET41**
Name of the Course	**Energy Storage and Battery Management (Professional Elective – VI)**					
Branches	**EEE**					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Understand need of energy storage systems	**K3**
CO2	Determine various types of energy storage and various devices used for the purpose	**K3**
CO3	Examine various real time applications	**K3**
CO4	Interpret the role of battery management system	**K3**
CO5	Illustrate the requirements of Battery Management System	**K3**
CO6	Interpret the concept associated with battery charging / discharging process	**K3**

UNIT-I: INTRODUCTION TO ENERGY STORAGE

Necessity of energy storage, different types of energy storage, mechanical, chemical, electrical, electrochemical, biological, magnetic, electromagnetic, thermal, comparison of energy storage technologies.

UNIT-II: NEEDSFOR ELECTRICAL ENERGY STORAGE

Emerging needs for EES, More renewable energy, less fossil fuel, Smart Grid uses, the roles of electrical energy storage technologies, the roles from the viewpoint of a utility, the roles from the viewpoint of consumers, the roles from the viewpoint of generators of renewable energy.

UNIT- III: FEATURES OF ENERGY STORAGE SYSTEMS

Classification of EES systems , Mechanical storage systems, Pumped hydro storage (PHS), Compressed air energy storage (CAES), Flywheel energy storage (FES),Electrochemical storage systems, Secondary batteries, Flow batteries, Chemical energy storage, Hydrogen (H2),Synthetic natural gas (SNG).

UNIT- IV: INTRODUCTION TO BATTERY MANAGEMENT SYSTEM

Introduction to Battery Management System, Cells & Batteries, Nominal voltage and capacity, C rate, Energy and power, Cells connected in series, Cells connected in parallel, Electrochemical and lithium-ion cells, Rechargeable cell, Charging and Discharging Process, Overcharge and Undercharge, Modes of Charging.

UNIT- V: BATTERY MANAGEMENT SYSTEM REQUIREMENT

Introduction and BMS functionality, Battery pack topology, BMS Functionality, Voltage Sensing, Temperature Sensing, Current Sensing, BMS Functionality, High-voltage contactor control, Isolation sensing, Thermal control, Protection, Communication Interface, Range estimation, State-of charge estimation, Cell total energy and cell total power.

UNIT- VI: BATTERY STATE OF CHARGE AND STATE OF HEALTH ESTIMATION, CELL BALANCING

Battery state of charge estimation (SOC), voltage-based methods to estimate SOC, Model-based state estimation, Battery Health Estimation, Lithium-ion aging: Negative electrode, Lithium ion aging: Positive electrode, Cell Balancing, Causes of imbalance, Circuits for balancing

TEXT BOOKS:

1. "James M. Eyer, Joseph J. Iannucci and Garth P. Corey ", "Energy Storage Benefits and Market Analysis", Sandia National Laboratories, 1st edition, 2004.
2. The Electrical Energy Storage by IEC Market Strategy Board.

REFERENCE BOOK:

1. "Jim Eyer, Garth Corey", Energy Storage for the Electricity Grid: Benefits and Market Potential Assessment Guide, Report, Sandia National Laboratories, Feb 2010.
2. Plett, Gregory L. Battery management systems, Volume I: Battery modeling. Artech House, 1st edition, 2015.
3. Plett, Gregory L. Battery management systems, Volume II: Equivalent-circuit methods. Artech House, 1st edition, 2015.
4. Bergveld, H.J., Kruijt, W.S., Notten, P.H.L "Battery Management Systems -Design by Modelling" Philips Research Book Series 2002.
5. https://nptel.ac.in/content/storage2/courses/108103009/download/M9.pdf.

Semester	VIII SEM	L	T	P	C	Course Code
Regulation	V18	3	-	-	3	V18EET42
Name of the Course	Switched Mode Power Converters (Professional Elective – VI)					
Branches	EEE					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Compute the operation and control of non-isolated switch mode converters	K3
CO2	Explain the operation and control of isolated switch mode converters	K2
CO3	Describe the concepts of resonant converters	K2
CO4	Compute control strategies of switching converters	K3
CO5	Develop modeling of DC-DC converters	K3
CO6	Illustrate controller design based on linearization	K3

UNIT-I: NON-ISOLATEDSWITCHMODECONVERTERS
Control of DC-DC converters: Buck converters, Boost converters, Buck-Boost converter, CUK Converter, continuous and discontinuous operation, Converter realization with non-ideal components.

UNIT-II: ISOLATED SWITCHED MODE CONVERTERS
Forwarded converter, fly back converter, push-pull converter, half-bridge converter, full bridge converter

UNIT- III: RESONANT CONVERTERS

Basic resonant circuit concepts, series resonant circuits, parallel resonant circuits, zero current switching quasi-resonant buck converter, zero current switching quasi-resonant boost converter, zero voltage switching quasi-resonant buck converter, zero voltage switching quasi-resonant boost converter.

UNIT-IV: CONTROL SCHEMES OF SWITCHING CONVERTERS

Voltage control, Current mode control, control scheme for resonant converters. Magnetic design consideration: Transformer design, inductor and capacitor design

UNIT-V: MODELING OF DC-DC CONVERTERS

Formulation of averaged models for buck and boost converters: state space analysis, average circuit models, linearization and small– signal analysis, small-signal models.

UNIT-VI: CONTROLLER DESIGN BASED ON LINEARIZATION

Control design based on linearization: Transfer function of converters, control design, large signal issues in voltage-mode and current-mode control.

TEXT BOOKS:

1. Fundamentals of Power Electronics-Erickson, Robert W.,Maksimovic, Dragan, Springer,2nd edition, 2011.
2. Power switching converters –SimonAng, Alejandro Oliva, CRCPress, 3rd edition, 2010.
3. Elements of Power Electronics–Philip T. Krein, Oxford University press, 2nd edition, 2014.
4. Design of Magnetic Components for Switched Mode Power Converters- Umanand, S.P. Bhat, John Wiley & Sons Australia, 1st edition, 1992.

REFERENCE BOOKS:

1. Power Electronics: Essentials and applications-L. Umanand, Wiley publications, 1st edition, 2009.
2. Switching Power Supply Design – Abraham I. Pressman, McGraw-Hill Ryerson, Limited, 3rd edition, 2009.
3. Power Electronics– Issa Batareseh, Jhon Wiley publications, 4th edition, 2004.
4. Power Electronics: converters Applications & Design–Mohan, Undeland, Robbins-Wiley publications 3rd edition, 2007.
5. https://nptel.ac.in/courses/108/108/108108036/.

Semester	VIII SEM	L	T	P	C	Course Code
Regulation	**V18**	**3**	**-**	**-**	**3**	**V18EET43**
Name of the Course	**Electrical Machine Design (Professional Elective – VI)**					
Branches	**EEE**					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Study mmf calculation and thermal rating of various types of electrical machines.	**K2**
CO2	To design armature and field systems for D.C. machines.	**K3**
CO3	To design core, yoke, windings and cooling systems of transformers.	**K3**
CO4	To design stator and rotor of induction machines.	**K3**
CO5	To design stator and rotor of synchronous machines and study their thermal behavior	**K3**
CO6	The importance of computer aided design method.	**K3**

UNIT I: DESIGN OF FIELD SYSTEM AND ARMATURE
Major considerations in Electrical Machine Design – Electrical Engineering Materials – Space factor – Choice of Specific Electrical and Magnetic loadings – Thermal considerations – Heat flow – Temperature rise and Insulating Materials – Rating of machines – Standard specifications.

UNIT II: DESIGN OF DC MACHINES
Construction - Output Equations – Main Dimensions – Choice of specific loadings – Selection of number of poles – Design of Armature – Design of commutator and brushes – design of field Computer program: Design of Armature main dimensions.

UNIT III: DESIGN OF TRANSFORMERS

Construction - KVA output for single and three phase transformers – Overall dimensions – design of yoke, core and winding for core and shell type transformers – Estimation of No load current – Temperature rise in Transformers – Design of Tank and cooling tubes of Transformers. Computer program: Complete Design of single phase core transformer.

UNIT IV: DESIGN OF INDUCTION MOTORS

Construction - Output equation of Induction motor – Main dimensions – choice of specific loadings – Design of squirrel cage rotor and wound rotor –Magnetic leakage calculations – Operating characteristics : Magnetizing current - Short circuit current – Circle diagram - Computer program: Design of slip-ring rotor .

UNIT V: DESIGN OF SYNCHRONOUS MACHINES

Output equations – choice of specific loadings – Design of salient pole machines – Short circuit ratio – Armature design – Estimation of air gap length – Design of rotor –Design of damper winding – Determination of full load field MMF – Design of field winding – Design of turbo alternators.

UNIT VI: DESIGN OF BLDC MACHINES

Computer program: Design of Stator main dimensions-Brushless DC Machines.

TEXT BOOKS:

1. Sawhney, A.K., 'A Course in Electrical Machine Design', Dhanpat Rai & Sons, New Delhi, 1st edition, 1984.
2. M. V. Deshpande "Design and Testing of Electrical Machine Design" Wheeler Publications, 1st edition, 2010.

REFERENCES BOOKS:

1. A. Shanmuga Sundaram, G. Gangadharan, R. Palani 'Electrical Machine Design Data Book', New Age International Pvt. Ltd., Reprint, 1st edition, 2007.
2. R. K. Agarwal "Principles of Electrical Machine Design" Esskay Publications, Delhi, 1st edition, 2002.
3. Sen, S.K., 'Principles of Electrical Machine Designs with Computer Programmes', Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi, 1st edition, 1987.
4. https://nptel.ac.in/courses/108/106/108106023/.

Annexure- EE-III

List courses offered under Open Elective –II & III in VII & VII semesters respectively under V18 Regulation for all other branches:

Open Electives(Offered to the other Departments)						
S. No.	**Course Code**	**Name of the Course**	**L**	**T**	**P**	**Credits**
Open Elective-I: (Approved by BOS)						
1.	V18EEOE1	Energy Audit & Conservation	3	-	-	3
2.	V18EEOE2	Electrical Measuring Instruments	3	-	-	3
3.	V18EEOE3	Industrial Safety	3	-	-	3
Open Elective-II: (For the Approval from BOS)						
1.	V18EEOE4	Non-Conventional Energy Sources	3	-	-	3
2.	V18EEOE5	Electrical Engineering Materials	3	-	-	3
3.	V18EEOE6	Servicing of Electrical Appliances	3	-	-	3
Open Elective-III: (For the Approval from BOS)						
1.	V18EEOE7	Energy Storage Systems	3	-	-	3
2.	V18EEOE8	Basics of Electrical Power Generation	3	-	-	3
3.	V18EEOE9	Industrial Automation	3	-	-	3

Syllabi for the Courses offering under Open Elective – II & III

Semester	VII SEM	L	T	P	C	Course Code
Regulation	V18	3	-	-	3	V18EETOE4
Name of the Course	Non Conventional Energy Sources (Open Elective-II)					
Branches	Common to all except EEE					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Understand the solar radiation and calculate geometric angle	K3
CO2	Understand the working of solar thermal collectors	K2
CO3	Understand the working of solar photo voltaic systems and develop the maximum power point techniques	K3
CO4	Understand the wind energy conversion systems, Betz coefficient and tip speed ratio.	K2
CO5	Understand the basic principle and working of hydro and tidal systems.	K2
CO6	Understand the basic principle and working of, biomass, fuel cell and geothermal systems.	K2

UNIT–I: FUNDAMENTALS OF SOLAR ENERGY AND ENERGY CONSERVATION PRINCIPLE

Energy scenario (world and India) – various forms of renewable energy - Solar radiation: Outside earth's atmosphere –Earth surface– Analysis of solar radiation data –Geometry–Radiation on tilted surfaces– Numerical problems.

UNIT–II: SOLAR THERMAL SYSTEMS

Liquid flat plate collectors: Performance analysis –Transmissivity– Absorptivity product collector efficiency factor –Collector heat removal factor – Numerical problems. Introduction to solar air heaters – Concentrating collectors, solar pond and solar still–solar thermal plants.

UNIT–III: SOLAR PHOTOVOLTAIC SYSTEMS

Solar photovoltaic cell, module, array – construction – Efficiency of solar cells – Developing technologies – Cell I-V characteristics – Equivalent circuit of solar cell – Series resistance – Shunt resistance – Applications and systems –Balance of system components - System design: storage sizing – PV system sizing – Maximum power point techniques: Perturb and observe(P&O)technique–Hill climbing technique.

UNIT–IV: WIND ENERGY

Sources of wind energy - Wind patterns – Types of turbines –Horizontal axis and vertical axis machines - Kinetic energyofwind–Betzcoefficient–Tip–speedratio–Efficiency–Poweroutputofwindturbine–Selection of generator(synchronous,induction) – Maximum power point tracking –wind farms–Power generation for utility grids.

UNIT–V: HYDRO AND TIDAL POWER SYSTEMS

Basic working principle – Classification of hydro systems: Large, small, micro–measurement of head and flow–Energy equation – Types of turbines – Numerical problems. Tidal power – Basics – Kinetic energy equation – Turbines for tidal power - Numerical problems – Wave power – Basics – Kinetic energy equation – Wave power devices – Linear generators.

UNIT–VI: BIOMASS AND GEOTHERMALSYSTEMS

Fuel classification – Pyrolysis – Direct combustion of heat– Different digesters and sizing. Geothermal: Classification – Dry rock and hot aquifer–Energy analysis–Geothermal based electric power generation

TEXT BOOKS:

1. Solar Energy: Principles of Thermal Collection and Storage, S.P. Sukhatme and J.K. Nayak, TMH, New Delhi, 3rd edition , 2013.
2. Renewable Energy Resources, John Twidell and Tony Weir, Taylor and Francis-2nd edition, 2013.

REFERENCE BOOKS:

1. Energy Science: Principles, Technologies and Impacts, John Andrews and Nick Jelly, Oxford University Press, 2nd edition, 2013.
2. Renewable Energy-Edited by Godfrey Boyle- oxford University. Press, 3rd edition, 2013.
3. Hand book of renewable technology Ahmed and Zobaa, Ramesh C Bansal, World scientific, Singapore, 1st edition, 2011.
4. Renewable Energy Technologies, Ramesh & Kumar, Narosa, 1st edition, 1997.
5. Renewable energy technologies– A practical guide for beginners –Chetong Singh Solanki, PHI, 1st edition, 2008.
6. Non-conventionalenergysource–B.H.khan-TMH-2nd edition, 2017.
7. https://nptel.ac.in/courses/121/106/121106014/.

Semester	VII SEM	L	T	P	C	Course Code
Regulation	V18	3	-	-	3	V18EEOE5
Name of the course	Electrical Engineering Materials (Open Elective-II)					
Branches	Common to all except EEE					

Course Outcomes:
After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Familiarise the properties of different conducting materials and their applications	K2
CO2	Analyse the properties of Insulating materials	K2
CO3	Understand semi conducting and dielectric materials and their properties	K2
CO4	Understand Magnetic materials and their properties	K2
CO5	Comprehend the working function of Special purpose materials	K2
CO6	Understand and analyse the working of Various Batteries	K3

UNIT-I: CONDUCTING MATERIALS

Conducting Materials – Properties -Hardening, Annealing – Its effects- Low Resistive Materials –Requirements – Properties and applications of Copper and Aluminum - Comparison between Copper and Aluminum - ACSR Conductors, AAAC, - High Resistive Materials – Requirements-Properties and applications of Manganin, Eureka, Constantan, Nichrome, Tungsten, Mercury and Carbon-colour coding of resistor.

UNIT-II: INSULATING MATERIALS

Properties -Insulation resistance - Factors effecting Insulation resistance - Classification of Insulating materials - Properties & Applications i) Impregnated paper ii) Wood iii) Cardboard iv) Asbestos v)Mica vi)Ceramics and vii) Glass- Thermo Plastics, Thermo Setting resins – PVC- Effects on PVC- Properties and Applications of Insulating Gases(Air, Nitrogen, Hydrogen and Sulphur Hexa Fluoride).

UNIT- III: SEMICONDUCTING & DIELECTRIC MATERIALS

Semiconductors - Intrinsic and Extrinsic semiconductors- `P’ and `N’ type materials- Distinguish between P-type and N- type Semi-Conductors. Permittivity of different Di-electric materials-Polarization-Dielectric Loss– Applications of Dielectrics- Colour coding of capacitors.

UNIT-IV: MAGNETIC MATERIALS

Classification of magnetic materials - Soft & Hard magnetic materials- B-H Curves – Hysteresis loop - Hysteresis loss - Steinmetz constant - Eddy Current Loss -- Curie Point – Magneto striction.

UNIT-V: SPECIAL PURPOSE MATERIALS

Need of Protective materials – List of Special Purpose Materials (Lead, Paints, Steel Tapes) - Thermocouple - Bi-metals- Fabrication -Soldering- Fuses -Galvanizing and Impregnating-Importance of Nano Materials.

UNIT-VI: BATTERIES

Primary cell and Secondary cells-Lead-Acid, Nickel iron and Nickel - cadmium - Chemical reactions during charging and discharging– Charging of Batteries- Constant Current method and Constant Voltage method-Trickle charging- Capacity of Battery - Ampere-Hour efficiency and Watt-Hour efficiency-Numerical problems on Ampere-Hour efficiency and Watt-Hour efficiency - Maintenance free batteries

TEXT BOOKS:

1. Electrical Engineering Materials – N.I.T.T.T.R Publications, 1st edition, 1959.
2. Introduction to Engineering materials – B. K. Agarwal, 1st edition, 2006.
3. Electrical Engineering Materials by PL Kapoor, Khanna Publishers, New Delhi, 1st edition, 1988.
4. Electrical & Electronics Engineering Materials BR Sharma and Others, Satya Parkashan, New Delhi, 1st edition, 2013.

REFERENCE BOOKS

1. Electronic Components -Dr. K. Padmanabham, laxmi publications (p) Ltd, 1st edition, 2016.
2. Electronic Components -D. V. Prasad
3. Material science for Electrical and Electronic Engineers – Ian P. Jones, Oxford Publications, 1st edition, 2000.
4. Electrical and Electronic Engineering Materials by SK Bhattacharya, Khanna Publishers, New Delhi Electronic Components and Materials by Grover and Jamwal, Dhanpat Rai and Co., New Delhi, 1st edition, 1996.
5. Electrical Engineering Materials by Sahdev, Unique International Publications
6. Electronic Components and Materials by SM Dhir, Tata McGraw Hill, New Delhi, 1st edition, 2006.
7. Electronic Engineering Materials by ML Gupta, Dhanpat Rai & Sons, New Delhi

Semester	VII SEM	L	T	P	C	Course Code
Regulation	V18	3	-	-	3	V18EEOE6
Name of the Course	Servicing of Electrical Appliances (Open Elective-II)					
Branches	Common to all except EEE					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Understand Testing of Electrical Domestic Appliances	K2
CO2	Understand maintenance of U.P.S and SMPS	K2
CO3	Understand Maintenance of Electrical Power devices	K2
CO4	Understand Safety procedure	K2
CO5	Understand Departmental Tests	K2
CO6	Understand Rural electrification and Indian Electricity Act	K2

UNIT-I: TESTING OF ELECTRICAL DOMESTIC APPLIANCES

Tools & meters required for testing and repair of Domestic appliances-Principle, construction & working with fault finding, dismantling, assembling and testing after repair of the Domestic appliances.

Note: Suitable tests to be conducted on the above Electrical Domestic appliances are Open circuit, Short circuit, Earth fault and Leakage tests.

UNIT-II: U.P.S AND SMPS

Commercial power supply-Disturbances and Spikes in voltages-UPS-SMPS

UNIT- III: MAINTENANCE OF ELECTRICAL POWER DEVICES

Preventive and periodical maintenance schedule of the following electrical power devices. i.e Batteries (Dry / Wet), UPS / Inverters, DC & AC Motors, Motor starters (AC & DC), Air conditioners, Power transformers, Pole mounted & Plinth mounted transformer yards, Circuit breakers.

UNIT-IV: SAFETY

Need of safety - Equipment used in Electrical and general safety - Different types of Electrical hazards / accidents - Causes of different Electrical hazards / accidents - Methods to avoid Electrical hazards / accidents - First-Aid methods followed to rescue a person met with Electric shock - Do's & Don't's of Electrical supervisor at Electrical substations - Different fire extinguishers- operation and application of different fire extinguishers.

UNIT-V: DEPARTMENTAL TESTS

Electrical installation testing - departmental procedure for testing before giving service connection – departmental procedure for obtaining service connection - desirable insulation resistance for domestic and power circuits – Tests for measuring insulation resistance - procedure for conducting insulation resistance test and continuity tests, earth continuity test

UNIT-VI: RURAL ELECTRIFICATION AND INDIAN ELECTRICITY ACTS.

Design of rural electrification scheme - Load survey-determination of capacity of transformer - estimation of quantity of materials required for the erection of distribution lines and 11 kV feeder from a nearby 11 kV feeder - determining the economic feasibility of the scheme as per the procedure laid out in NEC, - Indian Electricity Act-2003 rules related to domestic and Industrial lighting- power, agricultural and earthing installations, erection of 11 kV, 400 Volt

TEXT BOOKS:

1. Operation & Maintenance of Electrical Machines Vol – I by B.V.S. Rao - Media Promoters & Publisher, 1963.
2. Operation & Maintenance of Electrical Machines Vol – II by B.V.S. Rao - Media Promoters & Publisher, 1967.
3. Study of Electrical Appliances and devices by K. B. Bhatia, Khanna Publishers, New Delhi, 1st edition, 1988.

REFERENCE BOOKS:

1. Preventive Maintenance by C.J. Hubert, zs
2. Testing, Commissioning Operation & Maintenance of Electrical equipment by S. Rao
3. Indian Electricity Act-2003
4. APERC regulation Act (www.aperc.gov.in)
5. Electrical Installation design and drawing by CR Dargar -New Asian publishers

Semester	VIII SEM	L	T	P	C	Course Code
Regulation	V18	3	-	-	3	V18EEOE7
Name of the Course	Energy Storage Systems (Open Elective-III)					
Branches	Common to all except EEE					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Identify the Factors for the Need of Energy Storage	K2
CO2	Classify various types of energy Storages	K2
CO3	Describe the performance factors of Energy Storage Systems.	K2
CO4	Describe charging patterns in Battery Storage Systems	K2
CO5	Identify Various Types of Fuel Cells	K2
CO6	Identify various applications of Electrical Storage	K2

UNIT – I: NEED FOR ENERGY STORAGE

Electricity and the roles of EES, High generation cost during peak-demand periods, Long distance between generation and consumption-Variations in Energy Demand Variations in Energy Supply - Interruptions in Energy Supply - Transmission Congestion - Demand for Portable Energy

UNIT-II: TYPES OF ENERGY STORAGE SYSTEMS

Potential energy -pumped hydro, compressed air, springs - Kinetic energy - mechanical flywheels - Thermal energy with phase change-ice, molten salts, steam - Chemical energy-hydrogen, methane, gasoline, coal, oil - Electrochemical energy-batteries, fuel cells, Electrostatic energy -capacitors, Electromagnetic energy-superconducting magnets.

UNIT-III: PERFORMANCE FACTORS OF ENERGY STORAGE SYSTEMS

Energy capture rate and efficiency - Discharge rate and efficiency - Dispatch ability and load flowing characteristics, scale flexibility, durability – Cycle lifetime, mass and safety – Risks of fire, explosion, toxicity - Ease of materials, recycling and recovery -Environmental consideration and recycling

UNIT-IV: BATTERY STORAGE SYSTEM

Introduction with focus on Lead Acid and Lithium - Chemistry of Battery Operation, Power storage calculations, Reversible reactions, Charging patterns, Battery Management system.

UNIT-V: FUEL CELL

Fuel Cell-Construction-Working Principle-Types of Fuel Cells-Polymer electrolyte membrane Fuel Cell-Alkaline Fuel Cell-Solid oxide Fuel Cell-Merits and Demerits

UNIT – VI: APPLICATIONS OF ELECTRICAL ENERGY STORAGE

Waste heat recovery-Solar energy storage- Power plant applications-Energy storage in automotive applications

TEXT BOOKS:

1. Doughty Liaw, Narayan and Srinivasan, "Batteries for Renewable Energy Storage".
2. The Electroc Jiujun Zhang, Lei Zhang, Hansan Liu, Andy Sun, Ru-Shi Liu, "Electrochemical Technologies for Energy Storage and Conversion", John Wiley and Sons, 2012.hemical Society, New Jersy, 2010.
3. Detlef Stolten, "Hydrogen and Fuel Cells: Fundamentals, Technologies and Applications ", Wiley, 2010.

REFERENCE BOOKS:

1. The Electrical Energy Storage by IEC Market Strategy Board.
2. "James M. Eyer, Joseph J. Iannucci and Garth P. Corey ", "Energy Storage Benefits and Market Analysis", Sandia National Laboratories, 2004.
3. https://nptel.ac.in/content/storage2/courses/108103009/download/M9.pdf

Semester	VIII SEM	L	T	P	C	Course Code
Regulation	V18	3	-	-	3	V18EETOE8
Name of the Course	Basics of Electrical Power Generation (Open Elective-III)					
Branches	Common to all except EEE					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Understand the various energy sources, substations and switchgear devices.	K2
CO2	Understand the principle of operation of different components of thermal power stations.	K2
CO3	Understand the principle of different components of a Nuclear power stations.	K2
CO4	Understand the principle of operation of different components of hydro power stations.	K2
CO5	Understand the working of solar photo voltaic systems and applications.	K3
CO6	Understand the wind energy conversion systems, efficiency and power generation.	K2

UNIT–I: FUNDAMENTALS OF ELECTRICAL POWER SYSTEM

Energy scenario (world and India) – various Conventional and non-conventional energy sources–structure of electric power system: generation, transmission, distribution- classification of substations-switchgear devices: switches, fuses, relay, MCB.

UNIT–II: THERMAL POWER STATIONS

Schematic arrangement- Selection of site- general layout of a thermal power plant showing paths of coal, steam, water, air, ash handling system: generation, transmission, distribution and flue gasses, ash handling system- Brief description of components: Boilers, Super heaters, Economizers, electrostatic precipitators Condensers, feed water circuit, Cooling towers and Chimney.

UNIT–III: NUCLEAR POWER STATIONS

Location of nuclear power plant, Working principle, Nuclear fission, Nuclear fuels, Nuclear chain reaction, nuclear reactor Components: Moderators, Control rods, Reflectors and Coolants. Types of Nuclear reactors, Radiation: Radiation hazards and Shielding, nuclear waste disposal.

UNIT–IV: HYDRO POWER STATIONS

Schematic arrangement, advantages and disadvantages, choice of site constituents of hydro power plant, Hydro turbine. Environmental aspects for selecting the sites and locations of hydro power stations.

UNIT–V: SOLAR POWER PLANT

Solar photovoltaic cell, module, array – construction of power plant– Efficiency of solar cells – Cell I-V characteristics – Equivalent circuit of solar cell – Series resistance – Shunt resistance – Applications and systems - System design: storage sizing – PV system sizing.

UNIT–VI: WIND POWER PLANT

Sources of wind energy - Wind patterns – Types of turbines –Horizontal axis and vertical axis machines - construction of power plant –Efficiency– Poweroutputofwindturbine–Selectionofgenerator(synchronous,induction) –Power generation for utility grids.

TEXT BOOKS:

1. A Text Book on Power System Engineering by M. L. Soni, P. V. Gupta, U. S. Bhatnagar and A. Chakrabarti, Dhanpat Rai & Co. Pvt. Ltd.- 2nd edition, 2013.
2. Renewable Energy Resources, John Twidell andTonyWeir,TaylorandFrancis-2nd edition, 2013.

REFERENCE BOOKS:

1. Elements of Electrical Power Station Design by – M V Deshpande, PHI, NewDelhi-3rdedition,2010.
2. Renewable Energy – Edited by Godfrey Boyle – oxford university Press, 3rdedition, 2013.
3. Electrical Power Systems by C. L. Wadhwa, 6th Edition, New Age International Publishers, 2018.
4. Non-conventionalenergysource–B.H.khan-TMH-2ndedition,2017.
5. https://nptel.ac.in/content/storage2/courses/108105053/pdf/L-02(TB)(ET)%20((EE)NPTEL).pdf

Semester	**VIII SEM**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	**V18**	**3**	**-**	**-**	**3**	**V18EEOE 9**
Name of the Course	**Industrial Automation (Open Elective-III)**					
Branches	**Common to all except EEE**					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Understand the basic concepts of control systems.	**K3**
CO2	Understand the concepts of industrial automation and components of control system.	**K3**
CO3	Illustrate the concepts of electrical actuators and controllers.	**K3**
CO4	Analyse the Control Procedures in Control systems	**K4**
CO5	Analyse the Process control	**K4**
CO6	Understand the concept of PLC and its application	**K3**

UNIT-I: BASIC CONCEPTS OF CONTROL SYSTEMS

Basic concepts-Definition of open loop and closed loop system, examples with block diagrams. Terms used in the control systems-Types of feedback-Transfer function Definition &derivation control systems- Equivalence of physical system components

UNIT-II: INTRODUCTION TO INDUSTRIAL AUTOMATION

Need of Automation and its requirements, Structure & components Industrial Automation systems, Architectural levels of Industrial controls. Components of control systems-Contact types-Normally open & Normally closed, Solenoids-AC/DC, Input devices Push button, Selector switch, Photo electric, Level Control, Pressure sensing device, Output devices- contactors, valves, Pilot lamps, Relays-Electromagnetic and Reed Relay

UNIT- III: ELECTRICAL ACTUATORS AND CONTROLLERS

Potentiometers –working principle, AC & DC Servomotors-working principle, working of Synchro's - transmitter, control transformer, concept and purpose of a Tacho –generator

UNIT-IV: CONTROL PROCEDURES IN CONTROL SYSTEMS

Types of control systems-Time Variant/ Invariant systems, Continuous data and sampled data system, Linear and Non-Linear control system, Digital Control system Concept of controllers- P Controller, I Controller, PI Controller, PD Controller, PID Controller

UNIT-V: PROCESS CONTROL

Introduction to process control, PID control, controller tuning, implementation of PID controllers, speed control structures- feed forward and ratio control, predictive control, cascade, override and split range control.

UNIT-VI: PLC AND ITS APPLICATIONS

PLC Definition-advantages-Block diagram-Ladder diagrams for AND, OR, NOT, NAND, NOR-Instruction set-Ladder diagram for DOL starter, Star-Delta Starter, Stair case lighting, Traffic light control, Temperature controller-Special control systems DCS, SCADA.

TEXT BOOKS:

1. I J Nagarath & Gopal- Control Systems Engineering, New Age International Publishers, 6th edition, 2017.
2. Webb J.W-Programmable controllers: Principle and Applications, PHI publishers, 5th edition, 2002.
3. B.C. Kuo – Automatic Control Systems –John Wiley and Sons, 9th edition, 2014.

REFERENCE BOOKS:

1. Gary Dunning- Introduction to PLC - Delmar Cengage learning publisher, 3rd edition, 2005.
2. Jon Sterenson-Industrial automation and process control, Pearson publisher, 1st edition, 2002.
3. Ogata-Modern Control Engineering, Pearson publisher, 5th edition,2009.
4. https://nptel.ac.in/noc/courses/noc16/SEM1/noc16-ee02/

Annexure- EE-IV

APPROVED COURSE STRUCTURE B. TECH (EEE) UNDER V20 REGULATION

III-Semester

S.No.	Course Code	Course Title	Hours per Week			Credits
			L	T	P	
1	V20MAT03	Transform Calculus	3	0	0	3
2	V20EET04	Electrical Circuit Analysis-II	3	0	0	3
3	V20EET05	Electro Magnetic Fields	3	0	0	3
4	V20EET06	Electrical Machines-I	3	0	0	3
5	V20ECT06	Analog Electronics	3	0	0	3
6	V20EEL04	Electrical Circuits Lab	0	0	3	1.5
7	V20ECL03	Analog Electronics Laboratory	0	0	3	1.5
8	V20CSL31	Data Structures & Algorithms Lab	0	1	3	1.5
9		Skill Oriented Course	1	0	2	2
10	V20ENT02	Professional Communication Skills-I	2	0	0	0
					Total Credits	21.5

Total Contact Hours: 29 Total Credits : 21.5

IV-Semester

S.No.	Course Code	Course Title	Hours per Week			Credits
			L	T	P	
1	V20EET07	Signals and Systems	3	0	0	3
2	V20EET08	Electrical Machines - II	3	0	0	3
3	V20EET09	Electrical and Electronic Measurements	3	0	0	3
4	V20EET10	Electrical Power Generation and Transmission	3	0	0	3
5	V20MBT51	Managerial Economics and Financial Analysis	3	0	0	3
6	V20CSL32	Python Programming Lab	0	1	3	1.5
7	V20EEL05	Electrical Machines-I Lab	0	0	3	1.5
8	V20EEL06	Electrical Measurements Lab	0	0	3	1.5

9		Skill Oriented Course	1	0	2	2
10	V20ENT03	Professional Communication Skills-II	2	0	0	0
					Total Credits	21.5

Total Contact Hours: 29 Total Credits : 21.5

Internship two months (Mandatory) during summer vacation.

List of Skill Oriented Courses:

S. No.	Course Code	Course Title
1.	V20EES01	PCB Design
2.	V20EES02	Scilab
3.	V20EES03	Electrical CAD
4.	V20EES04	Arduino Board
5.	V20EES05	Fundamentals of Drone Technology
6.	V20EES06	Industrial Automation with PLC

Annexure- EE-V

Syllabi for the course offered in III & IV Semesters of B. Tech by Department of EEE under V20 Regulation

Semester	III SEM	L	T	P	C	Course Code
Regulation	V20	3	-	-	3	V20EET04
Name of the Course	Electrical Circuit Analysis –II					
Branches	EEE					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Determine electrical parameters for 3-phase unbalanced systems	K3
CO2	Apply the network theorems for solving electrical circuits.	K3
CO3	Analyze circuit parameters under transient conditions	K3
CO4	Calculate two-port network parameters for any type of electrical networks	K3
CO5	Understand the concept of filters	K2

Unit-I: Unbalanced Three phase circuits

Unbalanced star connected load supplied from: Balanced 3-ϕ, 4-wire system and balanced 3-ϕ, 3-wire system using Millman's, Mesh/Loop and Star-Delta transformation methods; Unbalanced delta connected load supplied from: Balanced 3-ϕ, 3-wire system; Measurement of 3-ϕ active power using two wattmeter method; Measurement of 3-ϕ reactive power using one wattmeter method; Numerical Problems.

Unit-II: Network Theorems (DC & AC Excitations)

Superposition, Thevenin‘s, Norton‘s, Milliman‘s, Reciprocity, Compensation, Maximum Power Transfer, Tellegen‘s theorems; Problem solving for the network consisting of independent and dependent sources; Concept of Duality and Dual networks.

Unit-III: Transient analysis in DC and AC Circuits

Initial Conditions; Analysis of R-L, R-C and R-L-C circuits with DC and AC excitations using differential equations and Laplace transforms; Numerical Problems.

Unit-IV: Two-Port Networks

Basic Definitions; Z-parameters; Y-parameters; Transmission line (ABCD) parameters; h-parameters; Relationship between parameter sets; Series, Parallel and Cascade connections of two port networks; Problem solving for the network consisting of independent and dependent sources.

Unit-V: Passive Filters

Classification of filters; Analysis and Design of low pass, high pass, band pass and band stop filters (Constant-k & m-derived); Low Pass and High Pass Filters with RC and RL Circuits; Band Pass and Band Stop Filters with RLC Circuit.

Text Books:

1. Engineering Circuit Analysis by William Hayt and Jack E. Kemmerley, McGraw Hill Company,6th edition,Jan 2005
2. Network Analysis by Van Valkenburg, Prentice-Hall of India Private Ltd, revised 3rd edition, 15 April 2019
3. Circuit Theory (Analysis and Synthesis) by A.Chakrabarthi, DhanpatRai& Co.,7th revised edition,1 Jan 2018
4. Network Analysis and Synthesis by Ravish R Singh, Mc Graw Hill Education (I) Pvt. Ltd., 2nd edition, 1 may 2019

Reference Books:

1. Network Theory-Analysis and Synthesis by Smarajit Ghosh, PHI Publishers, 9th edition, Aug 2015
2. Network Theory by N.C. Jagan, C. Lakshminarayana, Anshan Publications, 2nd edition September 30, 2005
3. Fundamentals of Electrical Circuits by Charles K. Alexander and Mathew N.O. Sadiku, McGraw Hill Education (India), 5th edition, 1st july 2013
4. Network Analysis by C.L.Wadhwa, New Age International Publishers., 3rd edition, 1 Aug 2018
5. Electrical Circuit Analysis by Sudhakar A. & Shyammohan S. Palli, McGraw Hill Publication, 5th edition 1 july 2017
6. Introductory Circuit Analysis by Robert L Boylestad, Pearson Publications,12th edition,1st Jan 2013
7. https://nptel.ac.in/courses/108/105/108105159/

Semester	**III SEM**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	**V20**	**3**	**-**	**-**	**3**	**V20EET05**
Name of the Course	**Electro Magnetic Fields**					
Branches	**EEE**					

Course Outcomes:

After successful completion of the course, the student will be able to:

CO No.	Course Outcome	Knowledge Level
CO1	Compute the electric field and potential due to different configurations of static charges and electric dipole.	**K3**
CO2	Calculate the capacitance of various configurations and understand the concept of conduction and convection current densities.	**K3**
CO3	Apply the Biot-Savart‘s law and Amperes Circuital Law for finding MFI for different cables and develop the Maxwell equations.	**K3**
CO4	Determine the magnetic forces, torque produced by currents in magnetic fields, self-inductance of solenoid and toroid.	**K3**
CO5	Calculate the induced E.M.F‘s and understand the concept of fields varying with time.	**K3**

Unit-I: Electrostatics

Electrostatic Fields; Coulomb‘s Law; Electric Field Intensity (EFI) - EFI due to a line and a surface charges; Work done in moving a point charge in an electrostatic field; Electric Potential - Properties of potential function, Potential gradient; Guass‘s law; Maxwell‘s first law, div(D)=ρv; Laplace‘s and Poison‘s equations; Electric dipole - Potential and EFI due to an electric dipole, Torque on an Electric dipole placed in an electric field.

Unit-II: Conductors, Dielectrics and Capacitance Conductors & Dielectrics

Conductors - Behavior of conductors in an electric field; Dielectrics - Polarization; Electric boundary conditions.

Capacitance: Capacitance of parallel plates, spherical and coaxial cables with composite dielectrics; Energy density in a static electric field; Current density -

Conduction and Convection current densities; Ohm‘s law in point form, Equation of continuity.

Unit-III: Magneto Statics

Introduction; Biot-Savart‘s law; Magnetic Field Intensity (MFI) - MFI due to a straight current carrying filament, circular, square and solenoidal current carrying wires; Maxwell‘s second Equation i.e, div(B)=0.

Ampere‘s circuital law - MFI due to an infinite sheet of current, long filament current carrying conductor, Pointform of Ampere‘s circuital law; Maxwell‘s third equation i.e, Curl (H)=J.

Unit-IV: Forces in Magnetic fields and Inductance

Magnetic force; Behavior of charges moving in magnetic field; Lorentz force equation; Force on a current carrying element placed in a magnetic field; Force on a straight and a long current carrying conductor placed in a magnetic field; Force between two straight long and parallel current carrying conductors; Magnetic dipole - a differential current loop as a magnetic dipole, Torque on a current loop placed in a magnetic field; Inductance: Basic expressions for self and mutual inductances, self-inductance of a solenoid and toroid.

Unit-V: Time Varying Fields

Introduction; Integral and point forms of faraday‘s laws of electromagnetic induction; statically and dynamically induced EMFs; Maxwell‘s fourth equation, Curl (E) = $-\partial B/\partial t$; Modification of Maxwell‘s equations for time varying fields; Simple problems.

Text Books:

1. Engineering Electromagnetics by William H. Hayt& John. A. Buck Mc. Graw-Hill Companies, 7th Editon.2006.
2. Electromagnetic Fields by R MeenaKumari, R Subhasri, New Age International, 2nd edition, Jan 2007.
3. Elements of Electromagnetics by Matthew N.O. Sadiku, Oxford University Press, 4th edition, 1 Jan 2006

Reference Books:

1. Introduction to Electro Dynamics by D J Griffiths, Prentice-Hall of India Pvt. Ltd, 4th edition, 1st Jan 2015
2. Electromagnetic Field Theory by Yaduvir Singh, Pearson., 1st edition 23 April 2011
3. Fundamentals of Engineering Electromagnetics by Sunil Bhooshan, Oxford higher education., 1st edition 30 june 2012
4. https://nptel.ac.in/courses/108/106/108106073/

Semester	III SEM	L	T	P	C	Course Code
Regulation	V20	3	-	-	3	V20EET06
Name of the Course	Electrical Machines – I					
Branches	EEE					

Course Outcomes:

After successful completion of the course, the student will be able to:

CO No.	Course Outcome	Knowledge Level
CO1	Asses the performance of a DC Machines	K3
CO2	Understand the torque production mechanism and control the speed of DC Machines	K2
CO3	Asses the performance of single phase transformers	K3
CO4	Calculate the regulation, losses and efficiency of single phase transformers	K3
CO5	Understand the parallel transforms, control voltages with tap changing methods and achieve three phase to two phase transformation	K2

Unit-I: Introduction and Performance of DC machines

Construction and principle of operation of DC machine; EMF equation of DC generator; Classification of DC machines based on excitation; Magnetization Characteristics of DC shunt generator, DC machine acts as a motor - back-emf and Torque, Armature Reaction and Commutation; Characteristics of separately-excited, shunt, series and compound motors; losses and efficiency of a DC machine; Applications of DC motors

Unit-II: Starting, Speed Control and Testing of D.C. Machines

Necessity of Starter - Working of 3-Point and 4-Point Starters; Speed Control of DC shunt motor by armature voltage and field flux control; Testing of DC machines - Brake Test, Swinburne‘s method, Hopkinson‘s Test, Retardation Test; Simple Numerical Problems.

Unit-III: Single-phase Transformers

Types, Constructional details, Principle of operation, EMF Equation of a 1-Φ Transformer; Transformer operation on No-Load and On-Load for lagging, leading and unity power factors loads and their phasor diagrams; Transformer equivalent circuit; Transformer Regulation, Losses and efficiency; effect of variation of supply frequency and voltage on losses; All day efficiency.

Unit-IV: Testing of Single-phase Transformers

O.C. and S.C. tests; Sumpner's test; Separation of losses of a 1-Φ transformer; Parallel operation with equal voltage ratios; Auto Transformer - equivalent circuit, comparison with two winding transformers.

Unit-V:-3-Phase Transformers

Poly-phase connections, Y/Y, Y/Δ, Δ/Y, Δ/Δ and open-Δ; Scott Connection; Three winding Transformer: Determination of Zp, Zs and Zt; Off-load and On-load tap changers.

Text Books:

1. Electrical Machines by P.S. Bhimbra, Khanna Publishers.7th edition 1st Jan 1977
2. Theory & Performance of Electrical Machines by J. B. Guptha. S. K. Kataria& Sons. 15th edition 2015

Reference Books:

1. Electrical Machines by D. P.Kothari, I .J .Nagarth, Mc Graw Hill Publications, 5thedition 23 june 2017
2. Electrical Machines by R. K. Rajput, Lakshmi publications, 5th edition, 1st Jan 2016
3. Electrical Machinery by Abijith Chakrabarthi and Sudhipta Debnath, McGraw Hill

Education 1st edition 9th Feb 2015

4. Electrical Machinery Fundamentals by Stephen J Chapman, McGraw Hill education

4th edition 1st july 2017

5. Electric Machines by Mulukutla S. Sarma & Mukeshk. Pathak, CENGAGE Learning., 1st edition 1st November 2009
6. Electric Machinery by A. E. Fitzgerald, Charles kingsley, Stephen D. Umans, TMH 6th edition 16th Aug 2002
7.https://nptel.ac.in/courses/108/105/108105155/

Semester	III SEM	L	T	P	C	Course Code
Regulation	V20	0	0	3	1.5	V20EEL04
Name of the Course	Electrical Circuits Laboratory					
Branches	EEE					

Course Outcomes:

After successful completion of the course, the student will be able to:

CO No.	Course Outcome	Knowledge Level
CO1	Compute response in the electrical circuits using various Network theorems	K3
CO2	Sketch Locus Diagrams of RL and RC Series Circuits	K2
CO3	Find parameters of the circuit under resonance conditions	K3
CO4	Determine two port network parameters	K3
CO5	Calculate 3phase power and choke coil parameters	K3

Any 10 experiments are to be conducted

1. Verification of KVL and KCL
2. Verification of Thevenin's and Norton's Theorems
3. Verification of Superposition and Reciprocity Theorem
4. Verification of Compensation and Millmann's Theorems.
5. Verification of Maximum Power Transfer Theorem.
6. Locus Diagrams of RL and RC Series Circuits.
7. Time Response of first order RC and second order RLC Networks.
8. Series and Parallel Resonance
9. Determination of Z and Y parameters.
10. Determination of Transmission and hybrid parameters.
11. Determine the Parameters of a choke coil
12. Measurement of 3-phase Power by two Wattmeter Method for unbalanced loads

Semester	IV SEM	L	T	P	C	Course Code
Regulation	V20	3	-	-	3	V20EET07
Name of the Course	Signals and Systems					
Branches	EEE					

Course Outcomes

After Successful completion of this course, students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Understand and estimate various types of signals and systems.	(K2)
CO2	Understand the basic principles of Sampling Theorem.	(K2)
CO3	Understand the characteristics of LTI Systems	(K2)
CO4	Understand the concepts of Cross-Correlation and Auto-Correlation of Functions	(K2)
CO5	Apply the concept of ROC for Laplace Transform and Z transform, Inverse Z transforms.	(K3)

Unit-I:Introduction

Definition of Signals and Systems, Classification of Signals, Classification of Systems, Operations on signals: time-shifting, time-scaling, amplitude-shifting, amplitude-scaling. Problems on classification and characteristics of Signals and Systems. Complex exponential and sinusoidal signals, Singularity functions and related functions: impulse function, step function signum function and ramp function. Analogy between vectors and signals, orthogonal signal space, Signal approximation using orthogonal functions, mean square error, closed or complete set of orthogonal functions, Orthogonality in complex functions.

Unit–II: Sampling theorem

Graphical and analytical proof for Band Limited Signals, impulse sampling, Natural and Flat top Sampling, Reconstruction of signal from its samples, effect of under sampling – Aliasing, Introduction to Band Pass sampling.

Unit-III: Linear Time Invariant (LTI) System

Linear- nonlinear, Time variant-invariant, casual - non-casual, static-dynamic, stable-unstable, invertible. Convolution sum and convolution integral using graphical methods for different signals (Time domain).

Unit-IV: Cross-Correlation And Auto-Correlation of Functions

Properties of correlation function, Energy density spectrum, Parseval's theorem, Power density spectrum, Relation between auto correlation function and energy/power spectral density function. Relation between convolution and correlation, Detection of periodic signals in the presence of noise by correlation, Extraction of signal from noise by filtering.

Unit –V: Transforms

Concept of region of convergence (ROC) for Laplace transforms, constraints on ROC for various classes of signals, Distinction between Laplace, Fourier and Z transforms. Region of convergence in Z-Transform, constraints on ROC for various classes of signals, Inverse Z-transform, properties of Z-transforms.

Text Books:

1. Signals, Systems & Communications - B.P. Lathi, BS Publications, 2008.
2. Signals and Systems - A.V. Oppenheim, A.S. Willsky and S.H. Nawab, PHI, 2nd Edn, 1996.
3. Signals & Systems- Narayan Iyer and K Satya Prasad, Cenage Publications, 1st Edition 2011.

Reference Books:

1. Signals & Systems - Simon Haykin and Van Veen, Wiley, 2nd Edition, 2017.
2. Principles of Linear Systems and Signals – BP Lathi, Oxford University Press, 2015
3. Signals and Systems – K Raja Rajeswari, B Visweswara Rao, PHI, 2nd Edition 2014
4. Fundamentals of Signals and Systems- Michel J. Robert, MGH International Edition,2008.
5. Signals and Systems – T K Rawat , Oxford University press, 2011

NPTEL Link : https://nptel.ac.in/courses/117/101/117101055/

Semester	IV SEM	L	T	P	C	Course Code
Regulation	V20	3	-	-	3	V20EET08
Name of the Course	Electrical Machines – II					
Branches	EEE					

Course Outcomes:

After successful completion of the course, the student will be able to:

CO No.	Course Outcome	Knowledge Level
CO1	Explain the operation and performance of three phase induction motor	K2
CO2	Assess the torque-speed relation, performance of induction motor and induction generator	K3
CO3	Explain the torque production mechanism and starting of single phase induction motors	K2
CO4	Asses the performance of synchronous generators by determining its voltage regulation	K3
CO5	Explain the operation and performance of Synchronous Motors	K2

Unit-I: 3-Phase Induction Motors

Construction details of cage and wound rotor machines; Production of rotating magnetic field; Principle of operation; Rotor EMF, Rotor frequency, Rotor Current and p.f. at standstill and during running conditions; Rotor power input; rotor copper losses; Mechanical power developed and their interrelationship; Equivalent circuit; Phasor diagram.

Unit-II: Characteristics, starting and testing methods of Induction Motors

Torque equation; expressions for maximum torque and starting torque; torque-slip characteristics; double cage and deep bar rotors construction; crawling and cogging; speed control of induction motor with V/f method; no-load and blocked rotor tests (construction of circle diagram for predetermination of performance parameters); methods of starting, soft starters; induction generator operation (Qualitative treatment only).

Unit-III: Single Phase Motors

Constructional features and its equivalent circuit; Problem of starting – Double revolving field theory; Starting methods; shaded pole motors; AC Series motor.

Unit-IV: Alternators

Constructional features of non–salient and salient pole type alternator; Armature windings – Distributed and concentrated windings; Distribution, Pitch and Winding factors; E.M.F equation; Improvements of waveform and armature reaction; Voltage regulation by synchronous impedance method, MMF method and Potier triangle method; Phasor diagrams; Two reaction analysis of salient pole machine and phasor diagram; Parallel operation of alternators, Numerical problems.

Unit-VI: Synchronous Motors

Principle and theory of operation of Synchronous Motor; Phasor diagram; Starting torque; Variation of current and power factor with excitation; Synchronous condenser; Mathematical Analysis for power developed; Hunting and its suppression; Methods of starting.

Text Books:

1. Electrical Machines by P.S. Bhimbra, Khanna Publishers , Edition-2,2021
2. Theory & Performance of Electrical Machines by J. B. Guptha. S. K. Kataria & Sons , Edition-2,2013
3. Electrical Machinery Fundamentals by Stephen J Chapman McGraw Hill education 5th edition 2011

Reference Books:

1. Electrical Machines by D. P. Kothari, I .J .Nagarth, McGrawHill Publications, 5th edition,2017
2. Electrical Machines by R. K .Rajput, Lakshmi publications, 5th edition, 2016
3. Electrical Machinery by Abijith Chakrabarthi and Sudhipta Debnath, McGraw Hill education 2015
4. Electric Machines by Mulukutla S. Sarma & Mukeshk .Pathak, CENGAGE Learning.
5. Electric Machinery by A.E.Fitzgerald, Charles kingsley, Stephen D.Umans, TMH

NPTEL Link : https://nptel.ac.in/courses/108/105/108105131/

Semester	IV SEM	L	T	P	C	Course Code
Regulation	V20	3	-	-	3	V20EET09
Name of the Course	Electrical and Electronic Measurements					
Branches	EEE					

Course Outcomes:

After successful completion of the course, the student will be able to:

CO No.	Course Outcome	Knowledge Level
CO1	Identify the proper instrument for measurement of AC or DC voltages and currents	**K2**
CO2	Choose the suitable instrument for the measurement of power and energy.	**K3**
CO3	Compute the electrical parameters by using appropriate bridge.	**K3**
CO4	Calculate different magnetic parameters by using magnetic instruments and Understand the operation of potentiometer.	**K3**
CO5	Understand the operation of various digital instruments.	**K2**

Unit-I: Electromechanical Indicating Instruments

Classification of measuring instruments; Construction and principle of operation of PMMC, MI instruments; Extension of instrument ranges using shunts, multipliers; Numerical Problems.

Instrument Transformers: Ratio and Phase angle errors (Derivation & Phasor Diagram) and their applications in the extension of instrument ranges, Numerical Problems.

Unit-II: Power and Energy Measurement

Single phase dynamometer wattmeter (LPF and UPF), expression for deflecting and control torques; Type of P.F. Meters; Single phase induction type energy meter, Driving and braking torques, errors and compensations, testing by phantom loading using R.S.S. meter; Numerical Problems.

Unit-III: Measurement of Parameters
Measurement of Resistance: wheat stone‘s bridge and its Sensitivity; Ohm meter; Kelvin‘s double bridge; Loss of charge method; Earth resistance measurement by fall of potential method and megger.

Measurement of inductance & Q-Factor: Maxwell‘s bridge; Hay‘s bridge; Anderson‘s bridge.

Measurement of capacitance and loss angle: Desauty‘s Bridge; Schering Bridge.

Unit-IV: Magnetic Measurements & Potentiometers
Magnetic Measurements: Constructional details of Flux meter; Determination of B–H Loop: Methods of reversals and Step-by-Step method; Core loss measurements by Maxwell‘s and Campbell‘s Bridges, D.C. & A.C. Crompton‘s potentiometer and their applications.

Unit-V: Electronic Instruments
Introduction; Digital Voltmeters (DVM); Ramp type DVM; Integrating type DVM; Successive-approximation DVM; Q- Meter, Digital frequency meter, Digital Tachometer; Measurement of phase difference & Frequency by using lissajous patterns in CRO; Electronic Multi meter.

Text Books:
1. A course in Electrical& Electronic Measurement and Instrumentation by A. K. Sawhney, Dhapat Rai& Co. 2015
2. Electronic Instruments by H.S. Kalsi, Tata Mc-Graw hill. 7th edition 2017

Reference Books:
1. Electrical and Electronic Measurements and instrumentation by R. K. Rajput, S.Chand. 2016
2. Digital Instrumentation by A.J. Bouwens, Tata Mc-Graw hill.
3. Modern Electronic instrumentation & Measuring instruments by A.D. Heltric & W.C. Copper, Wheeler Publication. 2015
4. Instrument transducers by H.K.P. Neubert, Oxford University press.
5. Electrical Measurements by Forest K. Harris, John Wiley and Sons.
6. **NPTEL Link** : https://nptel.ac.in/courses/108/105/108105153/

Semester	IV SEM	L	T	P	C	Course Code
Regulation	V20	3	-	-	3	V20EET10
Name of the Course	Electrical Power Generation & Transmission					
Branches	EEE					

Course Outcomes:

After successful completion of the course, the student will be able to:

CO No.	Course Outcome	Knowledge Level
CO1	Understand the working of conventional power generating stations	K2
CO2	Calculate various factors of load, insulation resistance and power factor of the cables.	K3
CO3	Compute the resistance, inductance and capacitance of transmission lines	K3
CO4	Determine the various transmission line parameters	K3
CO5	Calculate the corona loss, sag and tension in transmission lines	K3

Unit-I: Power Generating Stations

Introduction to renewable and non-renewable energy sources - general layout of a thermal power plant and its Components-General layout of Nuclear power plant - Nuclear fission and Chain Reaction –General Layout of Hydel power plant and Description of its main components- General Layout of Solar and wind Power plants.

Unit-II: Economic Aspects of Power Generation, Tariffs and Cables

Load curve- load duration and integrated load duration curves- discussion on economic aspects: connected load, maximum demand, and demand factor. Different Tariff methods. Construction of cables, Types of Cables, Calculation of insulation resistance and power factor of the cable.

Unit-III: Transmission Line Parameters

Conductor materials: Types of conductors – Calculation of resistance for solid conductors – Calculation of inductance for single phase– Single and double circuit lines–Concept of GMR and GMD–Symmetrical and asymmetrical conductor configuration with and without transposition–Bundled conductors-Numerical Problems–Calculation of capacitance for 2 wire– Effect of ground on capacitance – Capacitance calculations for symmetrical and asymmetrical for single phase– Numerical Problems.

Unit-IV: Modeling of Transmission Lines

Classification of Transmission Lines: Short, medium and their model representations –Nominal-T–Nominal-Pie and A, B, C, D Constants for symmetrical and Asymmetrical Networks— Evaluation of A,B,C,D Constants–regulation and efficiency-Numerical problems-Surge Impedance –Surge Impedance loading-Wavelengths and Velocity of Propagation.

Unit-V: Sag and Tension Calculations and Overhead Line Insulators
Skin and Proximity effects – Ferranti effect – Charging Current –Shunt Compensation –Corona – Description of the phenomenon–Factors affecting corona- Sag and Tension calculations with equal and unequal heights of towers–Effect of Wind and Ice on weight of Conductor–Numerical Problems

Text Books:

1. Generation, Distribution and Utilization of Electric Energy by C.L.Wadhawa, New age International (P) Limited, Publishers
2. Thermal Engineering by Rajput, Lakshmi publications
3. Electrical Power Systems by C.L.Wadhwa, 6th Edition, New Age International Publishers.

Reference Books:

1. Text Book on Power System Engineering by M.L.Soni, P.V.Gupta, U.S.Bhatnagar and Chakrabarti, DhanpatRai& Co. Pvt. Ltd
2. A Course in Power Systems by J. B. Gupta, S K Kataria& Sons Publishers. 2013
3. Principles of Power Systems by V.K Mehta and Rohit Mehta, S. Chand Publishers. 2nd Edition 2005
4. Electrical Power Systems by P.S.R. Murthy, B.S.Publications, 2017
5. **NPTEL Link :** https://nptel.ac.in/courses/108/102/108102047/

Semester	IV SEM	L	T	P	C	Course Code
Regulation	V20	0	0	3	1.5	V20EEL05
Name of the Course	Electrical Machines-I Lab					
Branches	EEE					

Course Outcomes:

After successful completion of the course, the student will be able to:

CO No.	Course Outcome	Knowledge Level
CO1	Sketch the magnetizing characteristics of DC shunt generator	K3
CO2	Determine and predetermine the performance of DC machines	K3
CO3	Apply different methods to control the speed of the DC motors	K3
CO4	Assess the performance of transformers	K3
CO5	Convert three phase supply to two phase	K2

Any 10 of the following experiments are to be conducted

1. Magnetization characteristics of DC shunt generator: Determination of critical field resistance and critical speed.
2. Brake test on DC shunt motor. Determination of performance curves.
3. Hopkinson‘s test on DC shunt machines. Predetermination of efficiency.
4. Swinburne‘s test and Predetermination of efficiencies as Generator and Motor.
5. Speed control of DC shunt motor by Field and armature Control.
6. Retardation test on DC shunt motor. Determination of losses at rated speed.
7. Separation of losses in DC shunts motor.
8. OC & SC test on single phase transformer.
9. Sumner‘s test on single phase transformers.
10. Scott connection of transformers.
11. Parallel operation of Single phase Transformers.
12. Separation of core losses of a single phase transformer.
13. Heat run test on a bank of 3 Nos. of single phase Delta connected transformers.

Semester	IV SEM	L	T	P	C	Course Code
Regulation	V20	0	0	3	1.5	V20EEL06
Name of the Course	Electrical Measurements Laboratory					
Branches	EEE					

Course Outcomes:

After successful completion of the course, the student will be able to:

CO No.	Course Outcome	Knowledge Level
CO1	Calibrate voltmeters, ammeters, single phase energy meter	K3
CO2	Measure the electrical parameters using Anderson, Schering& Kelvin's double Bridges.	K5
CO3	Apply various methods to calculate powers and choke coil parameters	K3
CO4	Calibrate dynamometer and LPF Wattmeters	K3
CO5	Measure the Dielectric Strength of transformer oil	K3

Any 10 experiments are to be conducted

1. Calibration and Testing of single phase energy Meter
2. Calibration of PMMC ammeter and voltmeter using Crompton D.C. Potentiometer
3. Calibration of AC voltmeter and measurement of choke parameters using AC Potentiometer in polar form.
4. Calibration of dynamometer wattmeter by using phantom loading.
5. Calibration of LPF wattmeter by using direct loading.
6. Capacitance Measurement using Schering Bridge
7. Inductance Measurement using Anderson Bridge.
8. Measurement of 3 phase power with single wattmeter and using two C.Ts
9. Measurement of single phase Power by using 3 Voltmeter and 3 Ammeter method.

10. Measurement of resistance using Kelvin's double Bridge.
11. Dielectric oil testing using H.T test Kit.
12. Measurement of 3 phase reactive power with single wattmeter for balanced loading.
13. Demonstration of Electronic Meters used by electrical field engineers

Annexure- EE-VI

Semester	**IV SEM (ECE & ECT);** **V SEM (EEE)**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	**V20**	**3**	**-**	**-**	**3**	**V20EET11**
Name of the Course	**Control Systems**					
Branches	**EEE, ECE & ECT**					

Course Outcomes

After successful completion of this course, students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Determine the mathematical modelling of physical systems	(K3)
CO2	Calculation of Time Domain Specification of first and second order systems and understand the effect of Controllers	(K3)
CO3	Investigate the stability of closed loop systems using Routh's stability criterion and root locus method.	(K3)
CO4	Find the stability of control systems using frequency response approaches.	(K3)
CO5	Analyze physical systems using state space approach.	(K4)

Unit – I: Mathematical Modeling of Control Systems

Classification of control systems, Open Loop and closed loop control systems and their differences, Feed-Back Characteristics, transfer function of linear system, Differential equations of electrical networks, Translational and Rotational mechanical systems, Transfer Function of DC Servo motor - AC Servo motor- Synchro, transmitter and receiver - Block diagram algebra – Representation by Signal flow graph - Reduction using Mason's gain formula.

Unit-II: Time Response Analysis

Standard test signals - Time response of first and second order systems - Time domain specifications - Steady state errors and error constants – Effects of various controllers

Unit –III: Stability And Root Locus Technique

The concept of stability – Routh's stability criterion –limitations of Routh's stability – Root locus concept - construction of root loci

Unit–IV: Frequency Response Analysis

Introduction to Frequency domain specifications-Bode diagrams- transfer function from the Bode Diagram-Phase margin and Gain margin-Stability Analysis from Bode Plots, Polar Plots, Nyquist Stability criterion. Effects of various controllers.

Unit–V: State Space Analysis of LTI Systems

Concepts of state, state variables and state model, state space representation of transfer function, Diagonalization- Solving the time invariant state equations- State Transition Matrix and it's Properties – Concepts of Controllability and Observability.

Text Books:

1. Control Systems principles and design, M. Gopal, Tata McGraw Hill education Pvt Ltd., 4th Edition, 2014.
2. Automatic control systems, Benjamin C. Kuo, Prentice Hall of India,2ndEdition, 2014.

Reference Books:

1. Modern Control Engineering, Kotsuhiko Ogata, Prentice Hall of India, 2002.
2. Control Systems, ManikDhanesh N, Cengage Publications, 2012.
3. Control Systems Engineering, I.J.Nagarath and M.Gopal, Newage International Publications, 5th Edition, 2007.
4. Control Systems Engineering, S.Palani, Tata McGraw Hill Publications, 2009.
5. https://nptel.ac.in/courses/107/106/107106081/

Annexure- EE-VII

Approved Course Structure of M. Tech EEE for Power Electronics & Power Systems (PE&PS) under V21 Regulation

M. Tech - I Semester							
S.No.	**Course Code**	**Course Title**	**L**	**T**	**P**	**Credits**	**Marks**
1.	V21PET01	Analysis of Power Electronic Converters	3	0	0	3	100
2.	V21PET02	Power System Operation & Control	3	0	0	3	100
3.	V21PET03 V21PET04 V21PET05	Elective – I: 1. Control & Integration of Renewable Energy systems 2. Smart Grid 3. Power Quality	3	0	0	3	100
4.	V21PET06 V21PET07 V21PET08	Elective – II: 1. Electrical Distribution Automation 2. HVDC Transmission 3. Advanced Power System Protection	3	0	0	3	100
5.	V21MBT55	Research Methodology and IPR	2	0	0	2	100
6.	V21PEL01	Power Electronics Simulation Lab	0	0	4	2	100
7.	V21PEL02	Power Systems Lab	0	0	4	2	100
8.		Audit Course – I	2	0	0	0	100
			16	0	8	18	800

M. Tech – II Semester							
S.No.	**Course Code**	**Course Title**	**L**	**T**	**P**	**Credits**	**Marks**
1.	V21PET09	Switched Mode Power Conversion	3	0	0	3	100
2.	V21PET10	Real Time Control of Power Systems	3	0	0	3	100
3.	V21PET11 V21PET12 V21PET13	Elective – III: 1. Electrical Machine Modeling & Analysis 2. Control of Electric Drives 3. Application of Power Converters	3	0	0	3	100
4.	V21PET14 V21PET15 V21PET16	Elective – IV: 1. EHVAC Transmission 2. Flexible AC Transmission Systems 3. Power System Dynamics & Stability	3	0	0	3	100
5.	V21PEP01	Mini Project with Seminar	0	0	4	2	100
6.	V21PEL03	Power Converters Lab	0	0	4	2	100
7.	V21PEL04	Power Systems Simulation Lab	0	0	4	2	100
8.		Audit Course – II	2	0	0	0	100
			14	0	12	18	800

Audit course 1 & 2

1. English for Research Paper Writing - V21PGENT54(BOS English)
2. Disaster Management (BOS of CIVIL) - V21STEAC1
3. Value Education (BOS English) - V21PGENT55
4. Constitution of India (BOS English) - V21PGENT56
5. Pedagogy Studies (BOS English) - V21PGENT51
6. Personality Development through Life Enlightenment Skills (BOS English) - V21PGENT52
7. Stress Management by Yoga - V21PGENT53

M. Tech – III Semester							
S.No.	**Course Code**	**Course Title**	**L**	**T**	**P**	**Credits**	**Marks**
1.	V21PET17 V21PET18	Elective – V: 1. Hybrid Electric Vehicles 2. Soft Computing Techniques in Electrical Engineering 3. MOOCS-1 through NPTEL/ SWAYAM- 12 Week Program related to the programme which is not listed in the course structure	3	0	0	3	100
2.	V21MAT02 V21MBT56	Open Elective : 1. Operations Research 2. Cost Management of Engineering Projects 3. MOOCs-2 Through NPTEL /SWAYAM - Any 12 week course on Engineering/ Management/ Mathematics offered by other than parent department	3	0	0	3	100
3.	V21PEP02	Dissertation Phase - I	0	0	20	10	50
			6	0	20	16	250

M. Tech – IV Semester							
S.No.	**Course Code**	**Course Title**	**L**	**T**	**P**	**Credits**	**Marks**
1.	V21PEP03	Dissertation Phase – II	0	0	32	16	100
			0	0	32	16	100

Annexure –EE-VIII

Syllabi for the Courses offered in I to IV semesters of M. Tech EEE for Power Electronics & Power Systems (PE&PS) under V21 Regulation

Semester	**I SEM**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V21	3	0	0	3	V21PET01
Name of the Course	Analysis of Power Electronic Converters					
Specialization	Power Electronics & Power systems					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	**Course Outcome**	**Knowledge Level**
CO1	Explain the Static and Dynamic Characteristics of power switching devices.	K2
CO2	Analyze the parameters of AC-DC converters	K4
CO3	Explain the operation of power factor correction converters	K2
CO4	Analyze the operation of three phase inverters with PWM control.	K4
CO5	Understand the principles of operation of multi- level inverters and their applications	K2

UNIT– I : Overview of Switching Devices:

Power MOSFET, IGBT, GTO, GaN devices-static and dynamic characteristics, gate drive circuits for switching devices.

UNIT– II: AC-DC converters:

Single phase fully controlled converters with RL load–Evaluation of input power factor and harmonic factor- Continuous and Discontinuous load current, Power factor improvements, Extinction angle control, symmetrical angle control, PWM control. Three Phase AC-DC Converters, fully controlled converters feeding RL load with continuous and discontinuous load current, Evaluation of input power factor and harmonic factor-three phase dual converters

UNIT– III: Power Factor Correction Converters:

Single-phase single stage boost power factor corrected rectifier, power circuit principle of operation and steady state- analysis, three phase boost PFC converter.

UNIT– IV : PWM Inverters:

Principle of operation - Voltage control of single phase inverters - sinusoidal PWM– modified PWM – phase displacement Control – Trapezoidal, staircase, stepped, harmonic injection and delta modulation. Voltage Control of Three-Phase Inverters- Sinusoidal PWM- 60^0 PWM- Third Harmonic PWM- Space Vector Modulation- Comparison of PWM Techniques- Three phase current source inverters-Variable dc link inverter.

UNIT– V : Multi level inverters:

Introduction, Multilevel Concept, Types of Multilevel Inverters- Diode-Clamped Multilevel Inverter, Principle of Operation, Features of Diode-Clamped Inverter, Improved Diode-Clamped Inverter- Flying-Capacitors Multilevel Inverter- Principle of Operation, Features of Flying-Capacitors Inverter- Cascaded Multilevel Inverter- Principle of Operation- Features of Cascaded Inverter-Switching Device Currents-DC-Link Capacitor Voltage Balancing- Features of Multilevel Inverters-Comparisons of Multilevel Converters.

Text Books

1. Ned Mohan, Tore M. Undeland, William P. Robbins, "Power Electronics: Converters, Applications, and Design", John Wiley& Sons, 2nd Edition, 2003.
2. Md. H. Rashid, "Power Electronics" –Pearson Education, 3rd Edition- First Indian Reprint-2008.

Reference Books:

1. Philip T. Krein, "Elements of Power Electronics", Oxford University press, 2nd Edition, 2015.
2. William Shepherd & Li Zhang-Yes Dee, "Power Converter Circuits", CRC Press, 1st Edition 2004.
3. https://nptel.ac.in/courses/108/108/108108035/

Semester	I SEM	L	T	P	C	COURSE CODE
Regulation	V21	3	0	0	3	V21PET02
Name of the Course	Power System Operation & Control					
Specialization	Power Electronics & Power systems					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Apply various load flow methods to analyse the system	K3
CO2	Apply various methods to solve unit commitment problem and understand Optimal power flow	K3
CO3	Determine the transfer function of single area load frequency control	K3
CO4	Calculate the frequency deviation for two area load frequency control	K3
CO5	Explain the effect of generation with limited energy supply.	K2

UNIT– I: Load Flow Analysis

Newton Raphson method, Fast Decoupled method, AC-DC load flow – Single and three phase methods

UNIT– II: Unit commitment & Optimal power flow

Unit commitment problem and optimal power flow solution: Unit commitment: Constraints in UCP, UC solution methods. Priority list method, introduction to Dynamic programming Approach.

Optimal power flow: OPF without inequality constraints, inequality constraints on control variables and dependent variables.

UNIT– III: Single area Load Frequency Control:

Necessity of keeping frequency constant. Definition of control area, single area control, Block diagram representation of an isolated Power System, Steady State analysis, Dynamic response-Uncontrolled case. Proportional plus Integral control of single area and its block diagram representation, steady state response.

UNIT– IV : Two area Load Frequency Control:

Load frequency control of two-area system, uncontrolled case and controlled case, tie-line bias control, steady state representation. Optimal two-area LF control-performance Index and optimal parameter adjustment. Load frequency control and Economic dispatch control.

UNIT– V: Generation with limited Energy supply:

Take-of-pay fuel supply contract, composite generation production cost function. Solution by gradient search techniques, hard limits and slack variables, Fuel scheduling by linear programming.

Text Books:

1. A. J. Wood and F. Wollenberg, “Power Generation, Operation and Control”, John Wiley & sons Inc., 3rd Edition, 2013.
2. I. J. Nagrath & D. P. Kothari, “Modern Power System Analysis”, Tata McGraw Hill Publishing Company ltd, 3rd edition 2007.

Reference Books:

1 P.S.R.Murthy, “Power System operation and Control”, 1st Edition, Tata McGraw Hill Publishers, 2008
2 O.I. Elgerd, “Electrical Energy Systems Theory”, Tata McGraw-Hill Publishing Company Ltd, 2nd edition, 2007.
3 T. J. E Miller, “Reactive Power Control in Electric Systems”, John Wiley & sons, 1982.
4 https://nptel.ac.in/courses/108/101/108101040/

Semester	I SEM	L	T	P	C	COURSE CODE
Regulation	V21	3	0	0	3	V21PET03
Name of the Course	Control & Integration of Renewable Energy Systems (Elective -I)					
Specialization	Power Electronics & Power systems					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Understand the fundamental requirements of Grid Integration	K2
CO2	Explain different conventional & non-conventional dynamic energy conversion technologies	K2
CO3	Describe different renewable energy sources and storage devices	K2
CO4	Understand the real & reactive power control techniques with renewable generators	K2
CO5	Develop a model of complete system for standalone/grid connected system	K4

UNIT– I: Introduction:

Electric grid introduction, Supply guarantee and power quality, Stability, Effects of renewable energy penetration into the grid, Boundaries of the actual grid configuration, Consumption models and patterns, static and dynamic energy conversion technologies, interfacing requirements .

UNIT– II: Dynamic Energy Conversion Technologies:

Introduction to different conventional and non-conventional dynamic generation technologies, principle of operation and analysis of reciprocating engines, gas and micro turbines, hydro and wind based generation technologies, control and integrated operation of different dynamic energy conversion devices.

UNIT– III: Static Energy Conversion Technologies:

Introduction to different conventional and non conventional static generation technologies, principle of operation and analysis of fuel cell, photovoltaic based generators, and wind based generation technologies, different storage technologies such as batteries, fly wheels and ultra-capacitors, plug-in-hybrid vehicles, control and integrated operation of different static energy conversion devices.

UNIT– IV: Real and reactive power control:

Control issues and challenges in Diesel, PV, wind and fuel cell based generators, PLL, Modulation Techniques, Dimensioning of filters, Linear and nonlinear controllers, predictive controllers and adaptive controllers, Fault-ride through Capabilities, Load frequency and Voltage Control.

UNIT– V: Integration of different Energy Conversion Technologies:

Resources evaluation and needs, Dimensioning integration systems, Optimized integrated systems, Interfacing requirements, integrated Control of different resources, Distributed versus Centralized Control, Synchro Converters, Grid connected and Islanding Operations, stability and protection issues, load sharing, Cases studies.

Text books:

1. Ali Keyhani Mohammad N. Marwali and Min Dai,“Integration and Control of Renewable Energy in Electric Power System”, John Wiley publishing company, 2010.
2. S. Chowdhury, S. P. Chowdhury, P. Crossley, “Microgrids and Active Distribution Networks”, IET Power Electronics Series, 2012.
3. G.M. Masters, “Renewable and Efficient Electric Power Systems”, IEEE-Wiley Publishers, 2nd edition2013.

References:

1. Quing-Chang Zhong, “Control of Power Inverters in Renewable Energy and Smart Grid Integration”, Wiley-IEEE Press, 1st edition, 2012.
2. BinWu, Yongqiang Lang, Navid Zargari, “Power Conversion and Control of Wind Energy Systems”, Wiley, 1st edition, 2011.

Semester	I SEM	L	T	P	C	COURSE CODE
Regulation	V21	3	0	0	3	V21PET04
Name of the Course	Smart Grid (Elective-I)					
Specialization	Power Electronics & Power systems					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Understand concept of smart grid and its advantages over conventional grid.	K2
CO2	Understand smart metering techniques and measuring techniques	K2
CO3	Understand monitoring, protection techniques and storage systems for smart grids	K2
CO4	Illustrate the concept of Micro Grid and its integration	K2
CO5	Examine different communication technologies that can be used for smart grid	K2

UNIT-I: Introduction to Smart Grid

Evolution of Electric Grid, Concept of Smart Grid, Definitions, Need of Smart Grid, Functions of Smart Grid, Opportunities & Barriers of Smart Grid, Difference between conventional & smart grid. Case study of Smart Grid.

UNIT-II : Smart Grid Technologies: Part 1

Introduction to Smart Meters, Real Time Prizing, Smart Appliances, Automatic Meter Reading (AMR), Outage Management System (OMS), Plug in Hybrid Electric Vehicles (PHEV), Vehicle to Grid, Smart Sensors, Home & Building Automation.

UNIT-III :Smart Grid Technologies: Part 2

Smart Substations, Substation Automation, Feeder Automation. Geographic Information System (GIS), Intelligent Electronic Devices (IED) & their application for monitoring & protection, Smart storage like Battery, SMES, Pumped Hydro, Compressed Air Energy Storage, Wide Area Measurement System (WAMS), Phasor Measurement Unit (PMU).

UNIT-IV : Microgrids and Distributed Energy Resources

Concept of micro grid, need & applications of micro grid, formation of microgrid, Issues of interconnection, protection & control of microgrid. Plastic & Organic solar cells, Thin film solar cells, Variable speed wind generators, fuelcells, microturbines, Captive power plants, Integration of renewable energy sources.

UNIT-V: Information and Communication Technology for Smart Grid

Advanced Metering Infrastructure (AMI), Home Area Network (HAN), Neighborhood Area Network (NAN), Wide Area Network (WAN).

Text Books:

1. Ali Keyhani, Mohammad N. Marwali, Min Dai "Integration of Green and Renewable Energy in Electric Power Systems", Wiley

2. Clark W. Gellings, "The Smart Grid: Enabling Energy Efficiency and Demand Response",CRC Press

3. JanakaEkanayake, Nick Jenkins, KithsiriLiyanage, Jianzhong Wu, Akihiko Yokoyama,"Smart Grid: Technology and Applications", Wiley

4. Jean Claude Sabonnadière, NouredineHadjsaïd, "Smart Grids", Wiley Blackwell 19

5. Peter S. Fox Penner, "Smart Power: Climate Changes, the Smart Grid, and the Futureof Electric Utilities", Island Press; 1 edition 8 Jun 2010

6. S. Chowdhury, S. P. Chowdhury, P. Crossley, "Microgrids and Active Distribution Networks." Institution of Engineering and Technology, 30 Jun 2009

7. Stuart Borlase, "Smart Grids (Power Engineering)", CRC Press

Reference Books:

1. Andres Carvallo, John Cooper, "The Advanced Smart Grid: Edge Power Driving Sustainability: 1", Artech House Publishers July 2011

2. James Northcote, Green, Robert G. Wilson "Control and Automation of Electric Power Distribution Systems (Power Engineering)", CRC Press

3. MladenKezunovic, Mark G. Adamiak, Alexander P. Apostolov, Jeffrey George Gilbert "Substation Automation (Power Electronics and Power Systems)", Springer

4. R. C. Dugan, Mark F. McGranghan, Surya Santoso, H. Wayne Beaty, "Electrical Power System Quality", 2nd Edition, McGraw Hill Publication

5. Yang Xiao, "Communication and Networking in Smart Grids", CRC Press

Semester	**I SEM**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V21	3	0	0	3	V21PET05
Name of the Course	Power Quality (Elective-I)					
Specialization	Power Electronics & Power systems					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	**Course Outcome**	**Knowledge Level**
CO1	Identify the issues related to power quality in power systems	K2
CO2	Describe the problems of transient and long duration voltage variations in power systems	K2
CO3	Analyze the effects of harmonics and understand different mitigation techniques.	K4
CO4	Identify the importance of custom power devices and their applications	K2
CO5	Choose suitable custom power device to mitigate power quality problem	K2

UNIT– I: Introduction to power quality:

Overview of Power Quality, Concern about the Power Quality, General Classes of Power Quality Problems, Voltage Unbalance, Waveform Distortion, Voltage fluctuation, Power Frequency Variations, Power Quality Terms, Voltage Sags, swells, flicker and Interruptions - Sources of voltage and current interruptions, Nonlinear loads.

UNIT– II: Transient and Long Duration Voltage Variations:

Source of Transient Over Voltages - Principles of Over Voltage Protection, Devices for Over Voltage Protection, Utility Capacitor Switching Transients, Utility Lightning Protection, Load Switching Transient Problems.

Principles of Regulating the Voltage, Device for Voltage Regulation, Utility Voltage Regulator Application, Capacitor for Voltage Regulation, End-user Capacitor Application, Regulating Utility Voltage with Distributed generation

UNIT– III : Harmonic Distortion and solutions:

Voltage vs. Current Distortion, Harmonics vs. Transients – Power System Quantities under Non-sinusoidal Conditions, Harmonic Indices, Sources of harmonics, Locating Sources of Harmonics, System Response Characteristics, Effects of Harmonic Distortion, Inter harmonics, Harmonic Solutions - Harmonic Distortion Evaluation, Devices for Controlling Harmonic Distortion, Harmonic Filter Design, Standards on Harmonics

UNIT– IV: Custom Power Devices:

Custom power and custom power devices, voltage source inverters, reactive power and harmonic compensation devices, compensation of voltage interruptions and current interruptions, static series and shunt compensators, compensation in distribution systems, interaction with distribution equipment, installation considerations.

UNIT– V: Application of custom power devices in power systems:

Static and hybrid Source Transfer Switches, Solid state current limiter - Solid state breaker. P-Q theory – Control of P and Q, Dynamic Voltage Restorer (DVR): Operation and control – Interline Power Flow Controller (IPFC): Operation and control of Unified Power Quality Conditioner (UPQC); Generalized power quality conditioner

Text Books:

1. Dugan R C, McGranaghan M F, Santoso S, and Beaty H W, “Electrical Power Systems Quality”,2nd Edition, McGraw-Hill, 2002.
2. Bollen M H J, “Understanding Power Quality Problems: Voltage Sags and Interruptions”, 1st Edition, IEEE Press; 2000.
3. Guidebook on Custom Power Devices, Technical Report, Published by EPRI, Nov 2000.
4. Gerard Ledwich, Arindam Ghosh, “Power Quality Enhancement Using Custom Power Devices – Power Electronics and Power Systems”, Springer US, 1st edition, 2002.

Reference Books:

1. Kennedy B W, “Power Quality Primer”, 1st Edition, McGraw-Hill, 2000.

2. Arrillaga J and Watson N R, “Power System Harmonics”, John Wiley & Sons, 2nd edition, 2003.
3. W. E. Kazibwe and M. H. Sendaula, “Electric Power Quality control Techniques”, Van Nostrad Reinhold Inc, New York, 1993 ed., 1993.
4. C. Shankaran, “Power Quality”, CRC Press, The electric power engineering series, 2002
5. Franciso C.DE LA Rosa, “Harmonics and Power Systems”, CRC Press (Taylor & Francis), 1st edition, 2006.
6. EwaldF.fuchs, Mohammad A.S. Masoum, “Power Quality in Power systems and Electrical Machines”, Elsevier, 1st edition, 2008.
7. H. Akagiet.al., “Instantaneous Power Theory and Application to Power Conditioning”, IEEE Press series, 2007.
8. Arindam Ghosh and Gerard Ledwich, “Custom Power Devices - An Introduction”, Springer, 1st edition, 2002
9. Yash Pal et.al., “A Review of Compensating Type Custom Power Devices for Power Quality Improvement”, Joint International Conference on Power System Technology and IEEE Power India Conference, 2008. POWERCON 2008.
10. https://nptel.ac.in/courses/108/107/108107157/

Semester	I SEM	L	T	P	C	COURSE CODE
Regulation	V21	3	0	0	3	V21PET06
Name of the Course	Electrical Distribution Automation (Elective-II)					
Specialization	Power Electronics & Power systems					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Understand various factors of distribution system	**K2**
CO2	Construct the distribution substation and feeders	**K3**
CO3	Understand the distribution system protection and its coordination.	**K2**
CO4	Understand the effect of compensation for power factor improvement.	**K2**
CO5	Explain the distribution automation functions	**K2**

UNIT– I: Introduction to Distribution systems:

Introduction, an overview of the role of computers in distribution system planning-Load modeling and characteristics - definition of basic terms like demand factor, utilization factor, load factor, plant factor, diversity factor, coincidence factor, contribution factor and loss factor-Relationship between the load factor and loss factor - Classification of loads (Residential, Commercial, Agricultural and Industrial) and their characteristics.

UNIT– II: Distribution Feeders and Substations:

Design consideration of Distribution feeders: Radial and loop types of primary feeders, voltage levels, and feeder-loading. Design practice of the secondary distribution system. Location of Substations: Rating of a Distribution Substation, service area with "n" primary feeders. Benefits derived through optimal location of substations.

UNIT– III: **Protective devices and coordination:**

Objectives of distribution system protection, types of common faults and procedure for fault calculation. Protective Devices: Principle of operation of fuses, circuit reclosers, line sectionalizer and circuit breakers. Coordination of protective devices: General coordination procedure; types of coordination.

UNIT– IV: Capacitive compensation for power factor control:

Different types of power capacitors, shunt and series capacitors, effect of shunt capacitors (Fixed and switched), power factor correction, capacitor location. Economic justification. Procedure to determine the best capacitor location. Voltage control: Equipment for voltage control, effect of series capacitors, effect of AVB/AVR, line drop compensation.

UNIT– V: Distribution automation functions:

Electrical system automation, EMS functional scope, DMS functional scope functionality of DMS- Steady state and dynamic performance improvement; Geographic information systems-AM/FM functions and Database management; communication options, supervisory control and data acquisition: SCADA functions and system architecture; Synchro phasors and its application in power systems.

Text Books:

1. Turan Gonen, "Electric Power Distribution System Engineering ", CRC Press, 2nd edition, 2008.
2. Juan M. Gers, "Distribution System Analysis and Automation", The Institution of Engineering and Technology, UK, Power and energy series 68, 2014.

Reference Books:

1. A.S. Pabla, "Electric Power Distribution", Tata McGraw-Hill Publishing Company, 4th edition, 1997.
2. V. Kamaraju, "Electrical Distribution", Tata McGraw Hill-8th Edition, 2009.
3. Gorti Ramamurthy "Handbook of Electrical Power Distribution", Universities press, 2009.
4. https://nptel.ac.in/courses/108/107/108107112/

Semester	**I SEM**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V21	3	0	0	3	V21PET07
Name of the Course	HVDC Transmission (Elective-II)					
Specialization	Power Electronics & Power systems					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Understand the various schemes of HVDC transmission	K2
CO2	Explain the operation of static power converters for HVDC transmission	K2
CO3	Describe various control techniques of power converters	K2
CO4	Understand the interaction between HVAC and HVDC system.	K2
CO5	Understand the various protection schemes of HVDC transmission	K2

UNIT– I: Limitation of EHV AC Transmission, Advantages of HVDC:

Technical economical and reliability aspects. HVDC Transmission: General considerations, Power Handling Capabilities of HVDC Lines, Basic Conversion principles, static converter configuration. Types of HVDC links-Apparatus and its purpose

UNIT– II: Static Power Converters:

6-pulse bridge circuit and 12-pulse converters, converter station and Terminal equipment, commutation process, Rectifier and inverter operation, equivalent circuit for converter – special features of converter transformers. Comparison of the performance of diametrical connection with 6-pulse bridge circuit

UNIT– III: Control of HVDC Converters and systems:

Constant current, constant extinction angle and constant Ignition angle control. Individual phase control and equidistant firing angle control, DC power flow control. Factors responsible for generation of Harmonics voltage and current, harmonics effect of variation of α and μ. Filters, Harmonic elimination.

UNIT– IV: Interaction between HV AC and DC systems:

Voltage interaction, Harmonic instability problems and DC power modulation. Development of DC circuit Breakers, Multi-terminal DC links and systems; series, parallel and series parallel systems, their operation and control.

UNIT– V: Transient over voltages in HV DC systems:

Over voltages due to disturbances on DC side, over voltages due to DC and AC side line faults. Converter faults and protection in HVDC Systems: Converter faults, over current protection - valve group, and DC line protection, circuit breakers. Over voltage protection of converters, surge arresters.

Text Books:

1. S Kamakshaih and V Kamaraju “HVDC Transmission”, Tata Mc Graw hill, 2011.
2. K.R.Padiyar, “High Voltage Direct current Transmission”, Wiley Eastern Ltd., New Delhi – 1992.

Reference Books:

1. E.W. Kimbark, “Direct current Transmission”, Wiley Inter Science – New York, 1st edition, 1971.
2. J.Arillaga, “H.V.D.C.Transmission”, Peter Peregrinus ltd., London UK, 1983.
3. Vijay K Sood, “HVDC and FACTS controllers:Applications of static converters in power systems”, Springer US, 1st edition, 2004.
4. https://nptel.ac.in/courses/108/104/108104013/

Semester	I SEM	L	T	P	C	COURSE CODE
Regulation	V21	3	0	0	3	V21PET08
Name of the Course	Advanced Power Systems Protection (Elective-II)					
Specialization	Power Electronics & Power systems					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Classify different types of static relays and tools.	K2
CO2	Explain various Amplitude and Phase Comparators	K2
CO3	Describe different types of static over current relays.	K2
CO4	Understand the PILOT Relaying schemes	K2
CO5	Identify suitable Microprocessor based and Numerical relays for power system protection	K2

UNIT– I: Static Relays classification and Tools :

Comparison of Static with Electromagnetic Relays, Basic classification, Level detectors and Amplitude and phase Comparators – Duality – Basic Tools – Schmitt Trigger Circuit, Multi-vibrators, Square wave Generation – Polarity detector – Zero crossing detector – Thyristor and UJT Triggering Circuits. Phase sequence Filters – Speed and reliability of static relays.

UNIT– II: Amplitude and Phase Comparators (2 Input) :

Generalized equations for Amplitude and Phase comparison – Derivation of different characteristics of relays – Rectifier Bridge circulating and opposed voltage type amplitude comparators – Averaging & phase splitting type amplitude comparators – Principle of sampling comparators.

Phase Comparison : Block Spike and phase Splitting Techniques – Transistor Integrating type, phase comparison, Rectifier Bridge Type Comparison – Vector product devices.

UNIT– III: Static over current (OC) relays:

Instantaneous, Definite time, Inverse time OC Relays, static distance relays, static directional relays, static differential relays, measurement of sequence impedances in distance relays, multi input comparators, elliptic & hyperbolic characteristics, switched distance schemes, Impedance characteristics during Faults and Power wings,

UNIT– IV: PILOT Relaying schemes:

Wire pilot protection: circulating current scheme – balanced voltage scheme – translay scheme – half wave comparison scheme - carrier current protection: phase comparison type – carrier aided distance protection – operational comparison of transfer trip and blocking schemes – optical fibre channels.

UNIT– V: Microprocessor based relays and Numerical Protection:

Introduction – over current relays – impedance relay – directional relay – reactance relay.

Numerical Protection: Introduction - numerical relay - numerical relaying algorithms - mann-morrison technique - Differential equation technique and discrete fourier transform technique - numerical over current protection - numerical distance protection.

Text Books:

1. TS MadhavaRao, "Power System Protection with Static Relays", TMH, 2nd edition, 2017.
2. Badri Ram & D N vishwakarma, "Power system protection & switchgear", TMH, 22nd reprint, 2007.

Reference Books:

1. A.R. van C.Warrington, "Protective Relays their Theory and Practice, Vol-II", Springer, 3rd edition, 1978.
2. C R Mason, "The Art & Science of Protective Relaying", Willey-Blackwell,1966.
3. Kimbark, "Power System Stability", Vol-II, student edition, Wiley, 2007.
4. C.Christopoulos and A.Wright, "Electrical Power System Protection", Springer US, 2nd Edition, 1999.
5. BhaveshBhalaja, R.PMaheshwari, NileshG.Chothani "Protection & Switchgear", Oxford university press, 2nd edition, 2018.
6. https://nptel.ac.in/courses/108/101/108101039/

Semester	**I SEM**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V21	0	0	4	2	V21PEL01
Name of the Course	Power Electronics Simulation Laboratory					
Specialization	Power Electronics & Power systems					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	**Course Outcome**	**Knowledge Level**
CO1	Analyze the DC-DC converters using small signal model	K4
CO2	Analyze the operation of Multi-level inverters	K4
CO3	Analyze the different PWM techniques for inverters	K4
CO4	Analyze the operation of AC Voltage regulators	K4
CO5	Analyze the operation of AC-DC converters	K4

List of Experiments:

1. Simulation of Buck converter using small signal model.
2. Simulation of Boost converter using small signal model.
3. Simulation of single phase half bridge inverter.
4. Simulation of full bridge inverter using Uni-polar & Bi-polar PWM techniques.
5. Simulation of three phase inverter using sine-triangle PWM.
6. Simulation of three phase inverter using space vector PWM.
7. Simulation of three level three phase NPC inverter.
8. Study of neutral point voltage floating in NPC three level inverter
9. Simulation of 3-level flying capacitor inverter & evaluation of capacitor voltage balanced methods.
10. Simulation of single phase AC voltage regulator.
11. Simulation of three phase AC voltage regulator.
12. Comparison of harmonic profile of two level& three level inverter (FFT analysis).
13. Simulation of 5-level inverter using carrier based PWM methods.
14. Simulation of three phase full converter with RL & RLE loads.
15. Simulation of three-phase dual converter.

Semester	I SEM	L	T	P	C	COURSE CODE
Regulation	V21	0	0	4	2	V21PEL02
Name of the Course	Power Systems Laboratory					
Specialization	Power Electronics & Power systems					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Calculate the sequence impedances of 3 phase Transformer and Alternator	K3
CO2	Determine the power Angle Characteristics of 3-phase Alternator with infinite bus bars	K4
CO3	Estimate the performance of long transmission lines	K4
CO4	Determine the ABCD parameters of a transmission line model	K4
CO5	Analyse the Ferranti effect in long transmission line	K4

List of Experiments:

1. Determination of Sequence Impendence of an Alternator by direct method.
2. Determination of Sequence impedance of an Alternator by fault Analysis.
3. Measurement of sequence impedance of a three phase transformer
   (a) application of sequence voltage. (b). using fault analysis.
4. Power angle characteristics of a salient pole Synchronous Machine.
5. Poly-phase connection on three single phase transformers and measurement of phase displacement.
   a. Determination of equivalent circuit of 3-winding Transformer.
6. Measurement of ABCD parameters on transmission line model.
7. Performance of long transmission line without compensation.
8. Study of Ferranti effect in long transmission line.
9. Performance of long transmission line with shunt compensation.

Semester	II SEM	L	T	P	C	COURSE CODE
Regulation	V21	3	0	0	3	V21PET09
Name of the Course	Switched Mode Power Conversion					
Specialization	Power Electronics & Power systems					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Explain operation and control of non-isolated switch mode converters.	K2
CO2	Describe operation and control of isolated switch mode converters.	K2
CO3	Understand the operation and control of resonant converters	K2
CO4	Compute control strategies of switching converters	K3
CO5	Explain the operation of switch mode converters based on linearization and small-signal analysis.	K3

UNIT– I: Non-isolated switch mode converters:

Control of DC-DC converters: Buck converters, Boost converters, Buck-Boost converter, CUK Converter, continuous and discontinuous operation, Converter realization with non-ideal components.

UNIT– II: Isolated switched mode converters:

Forwarded converter, flyback converter, push-pull converter, half-bridge converter, full bridge converter.

UNIT– III: Resonant converters:

Basic resonant circuit concepts, series resonant circuits, parallel resonant circuits, zero current switching quasi-resonant buck converter, zero current switching quasi-resonant boost converter, zero voltage switching quasi-resonant buck converter, zero voltage switching quasi-resonant boost converter.

UNIT– IV: Control schemes of switching converters:

Voltage control, Current mode control, control scheme for resonant converters.

Magnetic design consideration: Transformer design, inductor and capacitor design.

UNIT– V: Modeling and Controller design based on linearization:

Formulation of averaged models for buck and boost converters: state space analysis, average circuit models, linearization and small – signal analysis, small-signal models.

Control design based on linearization: Transfer function of converters, control design, large signal issues in voltage-mode and current-mode control.

Text Books:

1. Fundamentals of Power Electronics Third Edition-Erickson, Robert W., Maksimovic, Dragan, Springer, 2011.
2. Power switching converters Third Edition-Simon Ang, Alejandro Oliva, CRC Press, 2010.
3. Elements of Power Electronics Second Edition– Philip T. Krein, Oxford University press, 2014.

4. Design of Magnetic Components for Switched Mode Power Converters First Edition- Umanand, S.P. Bhat, John Wiley & Sons Australia, 1992.

Reference Books:

1. Switching Power Supply Design Third Edition-Abraham I. Pressman, McGraw-Hill Ryerson, Limited, 1991.
2. Power Electronics Second Edition– Issa Batareseh, Jhon Wiley publications, 2004.
3. Power Electronics: converters Applications & Design Third Edition- – Mohan, Undeland, Robbins-Wiley publications,2002.
4. https://nptel.ac.in/courses/108/108/108108036/

Semester	II SEM	L	T	P	C	COURSE CODE
Regulation	V21	3	0	0	3	V21PET10
Name of the Course	Real Time Control of Power Systems					
Specialization	Power Electronics & Power systems					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Classify the state estimation methods and understand the concepts of bad data observability, detection, identification and elimination	K2
CO2	Identify and Recognize the security, contingency and line outages in power system	K2
CO3	Illustrate the need of computer control and SCADA in real time power system	K2
CO4	Understand the concept of voltage stability in real time power systems	K2
CO5	Understand the basic concepts of Synchrophasor Measurement units	K2

UNIT– I: State Estimation:

Different types of State Estimations, Theory of WLS state estimation, sequential and non-sequential methods to process measurements. Bad data Observability, Bad data detection, identification and elimination.

UNIT– II: Security and Contingency Evaluation:

Security concept, Security Analysis and monitoring, Contingency Analysis for Generator and line outages by iterative linear power flow method, Fast Decoupled model, and network sensitivity methods.

UNIT– III: Computer Control of Power Systems:

Need for real time and computer control of power systems, operating states of a power system, SCADA - Supervisory control and Data Acquisition systems implementation considerations, energy control centers, software requirements for implementing the above functions.

UNIT– IV: Voltage Stability:

Voltage collapse, and voltage security, relation of voltage stability to rotor angle stability. Voltage stability analysis Introduction to voltage stability analysis `P-V‟curves and `Q-V‟ curves, voltage stability in mature power systems, long-term voltage stability, power flow analysis for voltage stability, voltage stability static indices.

UNIT– V: Synchrophasor Measurement units:

Introduction, Phasor representation of sinusoids, a generic PMU, GPS, Phasor measurement systems, Communication options for PMUs, Functional requirements of PMUs and PDCs, Phasors for nominal frequency signals, types of frequency excursions in power systems, DFT estimation at off nominal frequency with a nominal frequency clock.

Text Books:

1. John J.Grainger and William D.Stevenson, Jr. First Edition: Power System Analysis, McGraw-Hill, 1994, International Edition
2. Allen J.Wood and Bruce F.Wollenberg Third Edition: Power Generation operation and control, John Wiley & Sons, 2013.
3. A.G.PhadkaandJ.S.Thorp,"SynchronizedPhasorMeasurementsand Their Applications" First Edition,Springer,2008

Reference Books:

1. R.N.Dhar : Computer Aided Power Systems Operation and Analysis First Edition, Tata McGraw Hill, 1982
2. L.P.Singh : Advanced Power System Analysis and Dynamics Fourth Edition, Wiley Eastern Ltd. 2008
3. PrabhaKundur : Power System Stability and Control First Edition, McGraw Hill, 2006
4. P.D.Wasserman : `Neural Computing:Theory and Practice‟Van Nostrand First Edition -Feinhold, New York.

Semester	II SEM	L	T	P	C	COURSE CODE

Regulation	V21	3	0	0	3	V21PET11
Name of the Course	Electrical Machine Modeling and Analysis (Elective –III)					
Specialization	Power Electronics & Power systems					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Analyze Kroon's Primitive Machine	K2
CO2	Develop modeling of dc machine	K3
CO3	Explain linear Transformation	K4
CO4	Apply mathematical modeling concepts to 3-phase Induction machines	K3
CO5	Design control strategies based on dynamic modeling of 3-ph Induction machines and3-phase Synchronous machine	K4

UNIT– I: Basic concepts of Modeling:

Basic two-pole machine representation of Commutator machines, representations of 3-phase synchronous machine with and without damper bars and 3-phase induction machine, Kron"s primitive Machine voltage, current and torque equations.

UNIT– II: DC Machine Modeling:

Mathematical model of separately excited D.C motor – Steady state analysis-transient State analysis-sudden application of inertia load-transfer function of separately excited D.C motor- Mathematical model of D.C Series motor, Shunt motor-Linearization techniques for small perturbations

UNIT– III: Reference frame theory & Modeling of single phase Induction Machines:

Linear transformation-Phase transformation - three phase to two phase transformation (abc to αβ0) and vice-versa, transformation to rotating reference frame, (αβ0 to dqo) and vice versa -Power equivalence-Mathematical modeling of single phase induction machines.

UNIT– IV: Modeling of three phase Induction Machine:

Generalized model in arbitrary reference frame-Derivation of commonly used induction machine models-Synchronously rotating reference frame model, Stator reference frame model-Rotor reference frame model--power equation, electromagnetic torque equation, state space model in induction motor with flux linkages as variables

UNIT– V: Modeling of Synchronous Machine:

Synchronous machine inductances –derivation of voltage equations in the rotor‟s dq0 reference frame electromagnetic torque-current in terms of flux linkages-three phase synchronous motor. State space models with flux linkages as variables.

Text Books

1. Analysis of Electric Machinery and Drive Systems, 3rd Edition-Wiley-IEEE Press-Paul Krause, Oleg Wasynczuk, Scott D. Sudhoff, Steven Pekarek, Junr 2013.
2. Electric Motor Drives First Edition- Modeling, Analysis & control -R. Krishnan-Pearson Publications.

Reference Books:

1. Generalized theory of Electrical Machines First edition- Khanna Publishers P. S. Bimbhra, 1985.
2. Dynamic simulation of Electric machinery using MATLAB / Simulink Second Edition–CheeMunOng- Prentice Hall, 2003.
3. Magneto electric devices transducers, transformers and machines-G. R. Slemon First Edition - Wiley in New York, London, 1966
4. https://nptel.ac.in/courses/108/106/108106023/

Semester	II SEM	L	T	P	C	COURSE CODE
Regulation	V21	3	0	0	3	V21PET12
Name of the Course	Control of Electric Drives (Elective –III)					
Specialization	Power Electronics & Power systems					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Understand fundamentals of electric drives	K2
CO2	Understand various DC motor drives and control	K2
CO3	Analyze control techniques of synchronous motor drives	K4
CO4	Analyze control techniques for Switched Reluctance Motor	K4
CO5	Understand operation and various control schemes of BLDC motor	K2

Unit I: Fundamentals of Electric Drive:

Electric Drives and its parts, advantages of electric drives Classification of electric drives Speed-torque conventions and multi-quadrant operations, Constant torque and constant power operation, Types of load torque: components, nature and classification

Unit II: DC Motor Drives:

Starting, Braking and Speed Control, Transient analysis of separately excited motor with armature and field control, Energy losses during transient operation, Phase controlled converter fed DC drives, Chopper Control DC drives.

Unit III: Control of Synchronous Motor Drives:

Synchronous motor and its characteristics- Control strategies-Constant torque angle control- power factor control, constant flux control, flux weakening operation, load commutated inverter fed synchronous motor drive, motoring and regeneration, phasor diagrams.

Unit IV: Control of Switched Reluctance Motor Drives:

SRM Structure-Stator Excitation-techniques of sensor less operation-convertor topologies-RM Waveforms-SRM drive design factors-Torque controlled SRM-Torque Ripple-Instantaneous Torque control -using current controllers-flux controllers.

Unit V: Control of BLDC Motor Drives:

Principle of operation of BLDC Machine, Sensing and logic switching scheme, BLDM as Variable Speed Synchronous motor-methods of reducing Torque pulsations -Three-phase full wave Brushless dc motor -Sinusoidal type of Brushless dc motor -current controlled Brushless dc motor Servo drive.

Text Books:

1. Fundamentals of Electrical Drives – G.K. Dubey – Narosa Publications - 1995
2. Power Electronics control of AC motors – MD Murphy & FG Turn Bull Pergman Press -1st edition-1998.
3. Electric Motor Drives Modeling, Analysis & control -R. Krishnan- Pearson Education-4th edition – 2015
4. Brushless permanent magnet and reluctance motor drives- T J E Miller- Oxford university press- 1989

Reference Books:

1. Ned Mohan, T.M. Undeland and William P. Robbins: Power Electronics: Converters, Applications, 3rd Edition, John Wiley & Sons, 2009
2. Modelling, Simulation and control of Electric Drives- M.F Rahman, Sanjeet K. Dwivedi- IET Publiers-1st edition-Oct 2019
3. Power Semiconductor drives- G.K. Dubey-Prentice hall-1989

Semester	II SEM	L	T	P	C	COURSE CODE
Regulation	V21	3	0	0	3	V21PET13
Name of the Course	Applications of Power Converters (Elective –III)					
Specialization	Power Electronics & Power systems					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	understand the inverters for induction heating applications	K2
CO2	understand the power converters for different industrial applications	K2
CO3	understand modeling of high voltage power supplies using the power converters for radar and space applications	K2
CO4	understand modeling of low voltage and high current power supplies using the power converters for microprocessors and computer loads	K2
CO5	understand the applications of DC-DC converters	K2

UNIT– I: Inverters for Induction Heating:

For induction cooking, induction hardening, melting, and welding applications.

UNIT– II: Power Converters for Lighting, pumping and refrigeration Systems:

Electronic ballast, LED power drivers for indoor and outdoor applications. PFC based grid fed LED drivers, PV / battery fed LED drivers. PV fed power supplies for pumping/refrigeration applications.

UNIT– III: **High Voltage Power Supplies:**

Power supplies for X-ray applications - power supplies for radar applications - power supplies for space applications.

UNIT– IV: Low voltage high current power supplies:

Power converters for modern microprocessor and computer loads

UNIT– V: Bi-directional DC-DC (BDC) converters:

Electric traction, automotive Electronics and charge/discharge applications, Line Conditioners and Solar Charge Controllers

Text Books:

1. Ali Emadi, A. Nasiri, and S. B. Bekiarov: Uninterruptible Power Supplies and Active Filters First Edition, CRC Press, 2004.
2. M. Ehsani, Y. Gao, E. G. Sebastien and A. Emadi: Modern Electric, Hybrid Electric and Fuel Cell Vehicles, 1st Edition,CRC Press, 2004.

References Books:

1. William Ribbens: Understanding Automotive Electronics Eight Edition, Newnes, 2017.
2. https://nptel.ac.in/courses/108/107/108107128/

Semester	**II SEM**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V21	3	0	0	3	V21PET14
Name of the Course	EHVAC Transmission (Elective –IV)					
Specialization	Power Electronics & Power systems					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	**Course Outcome**	**Knowledge Level**
CO1	Determine the transmission line parameters	K3
CO2	Calculate the field effects on EHV and UHV AC lines.	K3
CO3	Determine the corona, RI and audible noise in EHV and UHV lines	K3
CO4	Analyze voltage control and compensation problems in EHV and UHV transmission systems	K4
CO5	Understand reactive power compensation using SVC and TCR	K2

UNIT– I: E.H.V. A.C. Transmission, line trends and preliminary aspects, standard transmission voltages – power handling capacities and line losses – mechanical aspects. Calculation of line resistance and inductance: resistance of conductors, temperature rise of conductor and current carrying capacity. Properties of bundled conductors and geometric mean radius of bundle, inductance of two conductor lines and multi conductor lines, Maxwell‟s coefficient matrix. Line capacitance calculation. Capacitance of two conductor line, and capacitance of multi conductor lines, potential coefficients for bundled conductor lines, sequence inductances and capacitances and diagonalization.

UNIT– II: Calculation of electro static field of AC lines:

Effect of high electrostatic field on biological organisms and human beings. Surface voltage Gradient on conductors, surface gradient on two conductor bundle and cosine law, maximum surface voltage gradient of bundle with more than 3 sub conductors, Mangolt formula.

UNIT– III: Corona:

Corona in EHV lines – corona loss formulae – attenuation of traveling waves due to corona – Audio noise due to corona, its generation, characteristics and limits, measurement of audio noise.

UNIT– IV: Power Frequency voltage control:

Problems at power frequency, generalized constants, No load voltage conditions and charging currents, voltage control using synchronous condenser, cascade connection of components : Shunt and series compensation, sub synchronous resonance in series – capacitor compensated lines

UNIT– V: Reactive power compensating systems:

Introduction, SVC schemes, Harmonics injected into network by TCR, design of filters for suppressing harmonics injected into the system.

Text Books :

1. Extra High Voltage AC Transmission Engineering Fourth Edition– Rakesh Das Begamudre, Wiley Eastern ltd., New Delhi – 2011.
2. EHV Transmission line reference book – Edison Electric Institute (GEC) 1986.
3. https://nptel.ac.in/courses/108/108/108108099/

Semester	II SEM	L	T	P	C	COURSE CODE
Regulation	V21	3	0	0	3	V21PET15
Name of the Course	Flexible AC Transmission System (Elective –IV)					
Specialization	Power Electronics & Power systems					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Explain the improvements of transmission system with FACTS	K2
CO2	Illustrate different Types of Static VAr generation systems	K3
CO3	Estimate the effect of static shunt compensation.	K2
CO4	Estimate the effect of static series compensation.	K2
CO5	Explain the principle of operation and various controls of UPFC	K2

UNIT– I: Introduction

FACTS concepts, Transmission interconnections, power flow in an AC System, loading capability limits, Dynamic stability considerations, importance of controllable parameters, basic types of FACTS controllers, benefits from FACTS controllers.

UNIT– II: Static shunt compensation

Basic concept of voltage and current source converters, comparison of current source converters with voltage source converters.

Static shunt compensation : Objectives of shunt compensation, midpoint voltage regulation, voltage instability prevention, improvement of transient stability, Power oscillation damping, methods of controllable VAr generation, variable impedance type static VAr generation, switching converter type VAr generation, hybrid VAr generation.

UNIT– III: SVC and STATCOM

The regulation slope, transfer function and dynamic performance, transient stability enhancement and power oscillation damping, operating point control and summary of compensation control.

UNIT– IV: Static Series compensators

Concept of series capacitive compensation, improvement of transient stability, power oscillation damping, functional requirements. GTO Thyristor controlled series capacitor (GSC), Thyristor switched series capacitor (TSSC), and Thyristor controlled series capacitor (TCSC), control schemes for GSC, TSSC and TCSC.

UNIT– V: Unified Power Flow Controller

Basic operating principle, conventional transmission control capabilities, independent real and reactive power flow control, comparison of the UPFC to series compensators and phase angle regulators. Introduction to Inter line Power Flow Controller (IPFC)

Text Books:

1. Understanding FACTS Devices by N. G. Hingorani and L. Guygi, IEEE Press, 2001

Reference Books:

1. Flexible AC Transmission systems bySang. Y. Hand John. A.T, IEEE Press, 2006
2. HVDC & FACTS Controllers: applications of static converters in power systems by Vijay K. Sood, First Edition- - Springer publishers, 2004.
3. https://nptel.ac.in/courses/108/107/108107114/

Semester	II SEM	L	T	P	C	COURSE CODE
Regulation	V21	3	0	0	3	V21PET16
Name of the Course	Power System Dynamics and Stability (Elective –IV)					
Specialization	Power Electronics & Power systems					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Develop the State space Model of Synchronous Machine	K3
CO2	Analyse the Steady State Stability and Dynamic Stability of Synchronous machine	K4
CO3	Solve the Swing Equation using different methods to obtain the Transient Stability	K3
CO4	Illustrate the Effect of Governing and Excitation systems on Stability	K3
CO5	Discuss Different types of Excitation Systems	K2

UNIT– I: System Dynamics

Synchronous machine model in state space from computer representation for excitation and governor system –modeling of loads and induction machines.

UNIT– II: Steady state stability

steady state stability - steady state stability limit – Dynamics Stability limit – Dynamic stability analysis – State space representation of synchronous machine connected to infinite bus-time response – Stability by eigen value approach.

UNIT– III: Digital Simulation of Transient Stability

Swing equation machine equations – Representation of loads – Alternate cycle solution method – Direct method of solution – Solution Techniques : Modified Euler method – Runge Kutta method – Concept of multi machine stability.

UNIT– IV

Effect of governor action and excite on power system stability effect of saturation, saliency & automatic voltage regulators on stability.

UNIT– V: Excitation Systems

Rotating Self-excited Exciter with direct acting Rheostatic type voltage regulator – Rotating main and Pilot Exciters with Indirect Acting Rheostatic Type Voltage Regulator – Rotating Main Exciter, Rotating Amplifier and Static Voltage Regulator – Static excitation scheme – Brushless excitation system.

Text Books:

1. Power System Stability by Kimbark Vol. I&II, III, Willey.
2. Power System control and stability Third Edition by Anderson and Fund, IEEE Press, 2019.

Reference Books:

1. Power systems stability and control First Edition by PRABHA KUNDUR, TMH, 2006.
2. Computer Applications to Power Systems Twelth Edition–Glenn. W. Stagg& Ahmed. H. El. Abiad, TMH 1987.
3. Computer Applications to Power Systems Third Edition– M.A.Pai, TMH, 2014.
4. Power Systems Analysis & Stability First Edition– S.S.Vadhera, Khanna Publishers, 2005.
5. https://nptel.ac.in/courses/108/101/108101004/

Semester	II SEM	L	T	P	C	COURSE CODE
Regulation	V21	0	0	4	2	V21PEL03
Name of the Course	Power Converters Laboratory					
Specialization	Power Electronics & Power systems					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Find the duty ratio of DC-DC Converters	K3
CO2	Analyze the performance of 1- ϕ AC-DC Controlled rectifiers	K4
CO3	Sketch the characteristics of power semiconductor devices	K3
CO4	Find the modulation index of square wave &SPWM inverters	K3
CO5	Calculate input power factor of 3-ϕ full converter	K3

Any 10 of the following experiments are to be conducted.

List of experiments

1. Study of DC-DC non-isolated converters such as Buck & Boost converter.
2. Study of DC-DC Buck - Boost and Cuk converters.
3. Study of 1-ϕ dual converter.
4. Determination of input p.f. and harmonic factor for 1-ϕ semi- converter and 1- ϕ full-converter (Inductive load)
5. Study of p.f. improvement in 1-ϕ full-converter with symmetric and extinction angle control.
6. Study of 1-ϕ square wave and sinusoidal PWM inverter.
7. Study of 3-ϕ inverter with 120^o and 180^o mode of operation.
8. Study of 3-ϕ sinusoidal PWM inverter.
9. Study of 3-level NPC inverter.
10. Study of 5-level cascaded H-bridge inverter.
11. Determination of input p.f. and harmonic factor for 3-ϕ full converter (Inductive load).
12. Determination of input p.f. and harmonic factor for 3-ϕ semi converter (Inductive load).
13. Study the characteristics of IGBT, MOSFET & GTO‟s.
14. Design of gate drive circuits for IGBT & MOSFET‟s.

Semester	II SEM	L	T	P	C	COURSE CODE
Regulation	V21	0	0	4	2	V21PEL04
Name of the Course	Power Systems Simulation Laboratory					
Specialization	Power Electronics & Power systems					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Analyze the performance of the various transmission lines at different loading conditions	K4
CO2	Examine the load flow study on distribution systems	K4
CO3	Inspect the Z- and Y-bus matrices for the given power transmission system	K4
CO4	Determine the load flow solution obtained using GS and NR methods	K4
CO5	Analyze the transient stability & load frequency control problem of a power system	K4

Any 10 of the following experiments are to be conducted.

List of Experiments:

1. Performance analysis of short, medium and long transmission lines
2. Distribution load flow analysis
3. Economic Load Dispatch with & without transmission losses
4. Formation of Y-bus by direct inspection method
5. Formations of Z-bus by building algorithm
6. Load Flow Solution Using Gauss Siedel Method
7. Load Flow Solution Using Newton Raphson Method
8. Symmetrical and Unsymmetrical Fault analysis using Z-bus
9. Transient Stability Analysis using modified Euler"s method.
10. Transient Stability Analysis using modified R-K method
11. Transient Stability Analysis Using Point By Point Method
12. Load Frequency Control of Single Area Control & Two Area Control system with and without controllers.

Semester	**II SEM**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V21	0	0	4	2	V21PEP01
Name of the Course	Mini Project with Seminar					
Specialization	Power Electronics & Power systems					

Syllabus content:

A Student has to select one paper published in any of the IEEE Transactions and simulate the same. The student has to present the progress of the work at the middle of the semester. At the end of the semester, the student has to present the results by explaining the idea of the topic, methodology, finding of the simulations. A Student should also submit a report of the entire work carried out under this course. The end semester presentation must be video recorded and preserved.

Semester	III SEM	L	T	P	C	COURSE CODE
Regulation	V21	3	0	0	3	V21PET17
Name of the Course	Hybrid Electric Vehicles (Elective–V)					
Specialization	Power Electronics & Power systems					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Explain various configurations and basics of HEVs	K2
CO2	Distinguish the concepts and components of various hybrid technologies	K2
CO3	Review the architectures, range extension mechanisms and grid support of PHEVs	K2
CO4	Discuss the PE converters for battery charging and speed control of HEVs	K2
CO5	Illustrate various Energy Storage Technologies	K2

UNIT– I: Introduction

History of hybrid vehicles, architectures of HEVs, series and parallel HEVs, complex HEVs.

UNIT– II: Hybridization of Automobile

Fundamentals of vehicle, components of conventional vehicle and propulsion load; Drive cycles and drive terrain; Concept of electric vehicle and hybrid electric vehicle; Plug-in hybrid vehicle, constituents of PHEV, comparison of HEV and PHEV; Fuel Cell vehicles and its constituents.

UNIT– III: Plug-in Hybrid Electric Vehicle

PHEVs and EREVs blended PHEVs, PHEV Architectures, equivalent electric range of blended PHEVs; Fuel economy of PHEVs, power management of PHEVs, end-of-life battery for electric power grid support, vehicle to grid technology, PHEV battery charging.

UNIT– IV: Power Electronics in HEVs

Rectifiers used in HEVs, voltage ripples; Buck converter used in HEVs, non-isolated bidirectional DC-DC converter, regenerative braking, voltage source inverter, current source inverter, isolated bidirectional DC-DC converter, PWM rectifier in HEVs, EV and PHEV battery chargers.

UNIT– V: Battery and Storage Systems

Energy Storage Parameters; Lead–Acid Batteries; Ultra capacitors; Flywheels - Superconducting Magnetic Storage System; Pumped Hydroelectric Energy Storage; Compressed Air Energy Storage - Storage Heat; Energy Storage as an Economic Resource

Text Books

1. Ali Emadi, Advanced Electric Drive Vehicles, CRC Press, 2014.
2. Iqbal Hussein, Electric and Hybrid Vehicles: Design Fundamentals, CRC Press, 2003.

Reference Books:

1. Mehrdad Ehsani, YimiGao, Sebastian E. Gay, Ali Emadi, Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design, CRC Press, 2004.
2. James Larminie, John Lowry, Electric Vehicle Technology Explained, Wiley, 2003.
3. H. Partab: Modern Electric Traction – Dhanpat Rai & Co, 2007.
4. Pistooa G.,“Power Sources, Models, Sustanability, Infrstructure and the market”, Elsevier2008
5. Mi Chris, MasrurA. and GaoD.W., “Hybrid Electric Vehicle: Principles and Applications with Practical Perspectives” 1995.

Semester	III SEM	L	T	P	C	COURSE CODE
Regulation	V21	3	0	0	3	V21PET18
Name of the Course	Soft Computing Techniques in Electrical Engineering (Elective–V)					
Specialization	Power Electronics & Power systems					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Understand the basic of Soft Computing Techniques.	K2
CO2	Recognize an appropriate soft computing methodology for an engineering problem.	K3
CO3	Apply fuzzy logic and reasoning to handle uncertainty while solving engineering problems.	K3
CO4	Analysis of neural network and genetic algorithms to combinatorial optimization problems.	K4
CO5	Design of different problems of optimization in power systems	K5

UNIT– I: Introduction to Soft Computing

Introduction, Definition of Soft Computing Techniques, Importance of Soft Computing, Main Components of Soft Computing: Fuzzy Logic, Artificial Neural Networks, Introduction to Evolutionary Algorithms, Hybrid Intelligent Systems, Single and multi-objective optimization.

UNIT– II: Artificial Neural Network and Applications

Introduction, Artificial Neuron Structure, ANN Learning; Back-Propagation Learning, Properties of Neural Networks, Unsupervised learnings, Hopfield networks, Application of GN Models to Electrical Machine Modeling, Short Term Electrical Load Forecasting Using Generalized Neuron Model, Aircraft Landing Control System Using GN Model.

UNIT– III: Introduction to Fuzzy Logic and Genetic Algorithm

Introduction, Uncertainty and Information, Types of Uncertainty, Introduction of Fuzzy Logic, Fuzzy Set, Operations on Fuzzy Sets, Fuzzy Intersection, Fuzzy Union, Fuzzy

Complement, Fuzzy Concentration, Fuzzy Dilation, Fuzzy Intensification, α-Cuts, Characteristics of Fuzzy Sets, Demorgan‟s Law, Fuzzy Cartesian Product, Various Shapes of Fuzzy Membership Functions, Methods of Defining of Membership Functions, Fuzzy Relation, Defuzzification Methods. Introduction to Genetic Algorithm, Crossover, Mutation, Survival of Fittest, Population Size, Evaluation of Fitness Function.

UNIT– IV: Applications of Fuzzy Rule Based System

Introduction, System‟s Modeling and Simulation Using Fuzzy Logic Approach, Selection of Variables, Normalization Range and Number of Linguistic Values, Selection of Shape of Membership Functions for Each Linguistic Value, Selection of Fuzzy Union and intersection Operators, Selection of Defuzzification Method, Power System Stabilizer Using Fuzzy Logic.

UNIT– V: Applications of Soft Computing Techniques to Electrical Engineering

Applications of Artificial Neural Network, Genetic Algorithms, Fuzzy and Hybrid Systems for Power System Applications: voltage stability, Economic load dispatch, Unit commitment, Condition monitoring.

Text Books:

1. Neural Networks: A Comprehensive Foundation – Siman Haykin, IEEE, Press, MacMillan, N.Y. 1994.
2. S. Rajasekaran, G. A. Vijayalakshmi, Neural Networks, Fuzzy logic and Genetic algorithms, PHI publication.
3. Fuzzy logic with Engineering Applications - Timothy J. Ross, McGraw-Hill International Editions.
4. Chaturvedi, Devendra K, Soft Computing Techniques and its Applications in Electrical Engineering, Hardcover ISBN:- 978-3-540-77480-8, Springer.
5. Kalyanmoy Deb, Multi-objective Optimization using Evolutionary Algorithms, Willey Publication.

Reference Books:

1. Soft Computing with Matlab Programming by N.P.Padhy & S.P.Simson, Oxford University Press – 2015
2. Kalyanmoy Deb, Optimization for Engineering Design, PHI publication
3. Kevin Warwick, Arthur Ekwue, Rag Agarwal, Artificial intelligence techniques in power systems. IEE Power Engineering Series-22.
4. Fuzzy Sets and Fuzzy logic: Theory and Applications - George J. Klir and Bo. Yuan, Prentice- Hall of India Private Limited.

Semester	**III SEM**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V21	0	0	20	10	V21PEP02
Name of the Course	DISSERTATION PHASE-I					
Specialization	Power Electronics & Power systems					

Semester	**IV SEM**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V21	0	0	32	16	V21PEP03
Name of the Course	DISSERTATION PHASE-II					
Specialization	Power Electronics & Power systems					

Annexure-V

Sri Vasavi Engineering College (Autonomous)

(Sponsored by Sri Vasavi Educational Society)

(Approved by AICTE, New Delhi & Permanently affiliated to JNTUK, Kakinada)
(Accreted by NBA & NAAC with 'A' Grade, Recognized by UGC Under Section 2(f) & 12(B))
Pedatadepalli, Tadepalligudem, W.G.Dt, A.P-534101

Department of Mechanical Engineering

Date: 28-08-2021

Fifth meeting of BOS in Mechanical Engineering Department along with external members is held on 28/08/2021 at 02.00 PM in online mode through ZOOM meeting app in view of COVID-19 pandemic.

The following members are present.

S. No	Name of the BOS Members
1.	Dr.N. Mohan Rao, Professor &CE, JNTUK,Kakinada
2.	Dr. R.V. Chalam, Professor,NIT,Warangal
3.	Dr. A. Krishnaiah, Professor, Osmania University, Hyderabad
4.	Sri S.S. SubramanyaSastry, Head of Practice QMS Veave Technologies, Banglore, India.
5.	Sri A.Sai Krishna, Alumni, Maruthi Design and Engg. Pvt. Ltd ,Bangalore
6.	Dr. Ch.Rambabu, Professor & I/C Principal, SVEC
7.	Dr. M.V. Ramesh, Chairman & HOD, SVEC
8.	All the BOS internal members

Minutes of meeting

Chairman welcomed all the BOS members and introduced to all the BOS internal members.
Item No. 1: Approval of course structure and syllabi for VII & VIII semesters of B.Tech under V18 Regulations.

- Lab course named Production Drawing Lab (course code. **V18MEL13**), MNC course was changed to credit course and 1.5 credits were given in VII semester.
  The approved course structure and their syllabi is attached in **Annexure-ME-I.**

Item No.2: Approval of list of courses offering under Open Electives - II & III in VII & VIII semesters of B.Tech respectively and their syllabi under V18 Regulations for all other branches.

The approved courses offering under Open Electives are attached in **Annexure-ME-II.**

Item No. 3: Approval of course structure & syllabi for the courses offered in III & IV semesters B.Tech under V20 Regulation.

The approved course structure & their syllabi is attached in **Annexure-ME-III.**

Item No. 4: Approval of Course Structure & syllabi of M.Tech-Thermal Engineering programme under V21 regulations.

Approved by the BOS members **Annexure-ME-IV.**

Chairman (Head –ME)
Head of the Department
Mechanical Engineering
Sri Vasavi Engineering College
TADEPALLIGUDEM-53410

Sri Vasavi Engineering College (Autonomous)

(Sponsored by Sri Vasavi Educational Society)

(Approved by AICTE, New Delhi & Permanently affiliated to JNTUK, Kakinada)
ccredited by NBA & NAAC with 'A' Grade, Recognized by UGC Under Section 2(f) & 12(B))

Pedatadepalli, Tadepalligudem, W.G.Dt, A.P-534101

Department of Mechanical Engineering

Annexure –ME-I

Course structure Approved in previous BOS under V18 Regulations

IV B.Tech.

VII Semester						
S.No.	**Course Code**	**Course**	**L**	**T**	**P**	**Credits**
1	**V18MET20**	Automation in manufacturing	3	0	0	3
2	**V18MET21**	Operation Research	3	0	0	3
3		Professional Elective – II	3	0	0	3
4		Professional Elective – III	3	0	0	3
5		Open Elective – II	3	0	0	3
6	**V18MEL12**	Simulation Lab	0	0	3	1.5
7	**V18MEL13**	Production Drawing Lab	0	0	3	1.5
8	**V18MEP01**	Project Work –PART-A	0	0	9	3
			15	**0**	**15**	**21**

Contact hours: 30 Total Credits: 21

VIII Semester						
S.No.	**Course Code**	**Course**	**L**	**T**	**P**	**Credits**
	V18MET28	Automobile Engineering	3	0	0	3
1		Open Elective – III	3	0	0	3
2		/ Professional Elective - IV	3	0	0	3
3		Professional Elective –V	3	0	0	3
4	**V18MEP02**	Project Work – PART-B	0	0	18	9
			12	**0**	**18**	**21**

Contact hours : 30 Total Credits : 21

Professional Elective –II **V18MET22 -** Industrial Engineering and Management **V18MET23 -** Composite Materials **V18MET24 -** Refrigeration & Air Conditioning	**Professional Elective –III** **V18MET25 -**Total Quality Management **V18MET26 -** Finite Element Methods **V18MET27 -** Micro Electro Mechanical Systems (MEMS)
Professional Elective –IV **V18MET31 –** Process Planning & Cost Estimation **V18MET32 -** Non Destructive Evaluation **V18MET33 -** Industrial Hydraulics and Pneumatics	**Professional Elective –V** **V18MET34 -** Computational Fluid Dynamics **V18MET35-** Production Planning and Control **V18MET36 -** Energy Conservation and Management

Open Elective –II **V18MEOE4-** Computer Aided Design **V18MEOE5-** Condition Monitoring & Machine learning	**Open Elective –III** **V18MEOE6-** Power Plant Engineering **V18MEOE7 -** Mechatronics

Detailed syllabi of VII & VIII sem B.Tech., for approval in 5th BOS
Syllabi for the courses offered in VII semester B. Tech under V18 Regulation
for the Academic Year 2021-2022
VII Semester

Semester	**VII**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	**V18**	**3**	**0**	**0**	**3**	**V18MET20**
Name of the Course	**Automation in Manufacturing**					
Branch	**Mechanical Engineering**					

Course Outcomes:
After successful completion of the course, the student will be able to

CO1	Understand the basic types, levels, strategies of automation.	K2
CO2	Identify the basic components and their functions of automated production line system.	K2
CO3	Differentiate various automated assembly systems.	K4
CO4	Compute various storage system and transportation requirements of automated systems.	K3
CO5	Apply appropriate process control strategy to an automated system.	K3
CO6	Illustrate the concepts of CIM..	K3

UNIT – I
INTRODUCTION : Facilities — Manual work systems, worker-machine systems and automated systems. Manufacturing support systems, Automation in Production systems — Automated Manufacturing systems, Computerized manufacturing support systems, Manual labour in Production systems, Automation principles and strategies.
UNIT – II
AUTOMATED PRODUCTION LINES : Fundamentals- System configurations, work part transfer mechanisms, Storage buffers, and Control of the production line. Applications — Machining systems and System Design Considerations. Analysis of Transfer lines — Transfer lines with No internal parts storage, Transfer lines with internal storage buffers.
UNIT – III
AUTOMATED ASSEMBLY SYSTEMS : System configurations, Parts delivery at workstations, and applications, quantitative analysis of assembly systems-Parts Delivery System at Workstations, Multi-Station Assembly Machines, Single Station Assembly Machines, Partial Automation.
UNIT – IV
AUTOMATED MATERIAL TRANSPORT & STORAGE SYSTEMS : Automated Material Transport & Storage systems: Automated Guided Vehicle (AGV) Systems, Types and applications, Vehicle Guidance Technology, Vehicle Management and Vehicle safety. Automated Storage/Retrieval Systems (ASRS) and Carousel Storage Systems.

UNIT – V

AUTOMATED INSPECTION SYSTEMS : Quality in Design and manufacturing, inspection principles and strategies, automated inspection, contact Vison-contact, CMM. Manufacturing support systems. Quality function deployment, computer aided process planning, concurrent engineering, shop floor control, just in time and lean production.

UNIT – VI

COMPUTER INTEGRATED MANUFACTURING : The Scope of CAD/CAM and CIM, Computerized elements of a CIM System, Components of CIM, Database for CIM, Planning , Scheduling and Analysis of CIM Systems.

TEXT BOOKS:

1. Nagrath and Mittel, "Robotics and Control", Tata McGraw-Hill, 2003.
2. Mikell P Groover, " Automation, production Systems and Computer Integrated Manufacturing," 3rd Edition, Prentice Hall Inc., New Delhi, 2007.
3. Nanua Singh, "System Approach to Computer Integrated Manufacturing," Wiley & Sons Inc.,
4. CAD CAM: Principles, Practice and Manufacturing Management by Chris Mc Mohan, JimmieBrowne, Pearson edu. (LPE).
5. Automation by Buckinghsm W, Haper& Row Publishers, New York, 1961
6. Automation for Productivity by Luke H.D, John Wiley & Sons, New York, 1972.

REFERENCE BOOKS:

1. P. Radhakrishnan, S, Subrarnanyan and V, Raju, 'CAD/CAM/CIM', New Age International (P) Ltd., New Delhi, 2009.
2. S.R.Deb and Sankha Deb, 'Robotics Technology and Flexible Automation', Tata McGraw Hill,Seconcl Edition, New Delhi, 2010.
3. Peter Corke, 'Robotics, Vision and Control' Fundamental Algorithms in MATLAB', Springer, 2011.
4. Nicholas Odrey, MikellGroover, Roger Nagel, Ashish Dutta, 'Industrial Robotics (SIE): Technology, Programming and Applications', McGraw Hill, 2012.

WEB REFERENCES:

1. https://nptel_acinicourses/108/105/108105063/
2. https://www.automationmag.com/
3. https://www.springer.com/gp/book/9783319771786.
4. https://library.automationdirect.com/industrial-automation-top-10-trends/
5. https://nptel.ac.inicourses/112/102/112102011

Semester	VII	L	T	P	C	Course Code
Regulation	**V18**	**3**	**0**	**0**	**3**	**V18MET21**
Name of the Course	**Operation Research**					
Branch	**Mechanical Engineering**					

Course Outcomes:
After successful completion of the course, the student will be able to

CO1	Understand the formulating of LPP and solve LPP by Simplex methods, artificial variables techniques.	K2
CO2	Solve Transportation and assignment problems.	K3
CO3	Explain the concept of Sequencing and replacement of item.	K2
CO4	Understand the concept of queues with single server, solution of games with and without saddle points.	K2
CO5	Apply the concept of inventory models in solving EOQ problems.	K3
CO6	Solve the issues of dynamic programming and simulation.	K3

UNIT – I
HISTORICAL OVERVIEW – Definition and scope– types of operation research models – applications.
LINEAR PROGRAMMING: Problem formulation – graphical solution – simplex method – artificial variables techniques - big-M method, two–phase method.
UNIT – II
TRANSPORTATION PROBLEM: Formulation – optimal solution, unbalanced transportation problem – degeneracy
ASSIGNMENT PROBLEM: Introduction, optimal solution, Traveling Salesman problem.
UNIT – III
SEQUENCING – Introduction – flow **–**shop sequencing – n jobs through two machines – n jobs through three machines
REPLACEMENT: Introduction – replacement of items that deteriorate with time – when money value is not counted and counted – replacement of items that fail completely, group replacement.
UNIT – IV
THEORY OF GAMES: Introduction – mini. max (max. mini) – criterion and optimal strategy – solution of games with saddle points – rectangular games without saddle points – 2 x 2 games – dominance principle – m x 2 & 2 x n games -graphical method.
WAITING LINES: Introduction – single channel – poison arrivals – exponential service times – with infinite population and finite population models
UNIT – V
INVENTORY : Introduction – single item – deterministic models – purchase inventory models with one price break– shortages are not allowed – stochastic models – demand may be discrete variable or continuous variable – instantaneous production. Instantaneous demand and continuous demand and no set up cost.
UNIT – VI
DYNAMIC PROGRAMMING: Introduction – Bellman’s principle of optimality – applications of dynamic programming- capital budgeting problem – shortest path problem .

SIMULATION: Definition – types of simulation models – phases of simulation– applications of simulation – inventory and queuing problems – advantages and disadvantages – simulation languages.

TEXT BOOKS:

1. Operations Research / S.D.Sharma-Kedarnath
2. Operations Research by R. Pannerselvam; Publisher: Prentice Hall International.

REFERENCES:

1. Introduction to O.R/Hiller & Libermann (TMH).
2. Operations Research / A.M.Natarajan, P. Balasubramani, A. Tamilarasi / Pearson Education.
3. Operations Research: Methods & Problems / Maurice Saseini, Arhur Yaspan & Lawrence Friedman.

Semester	VII	L	T	P	C	Course Code
Regulation	V18	3	0	0	3	V18MET22
Name of the Course	**Industrial Engineering and Management** Professional Elective –II					
Branch	**Mechanical Engineering**					

Course Outcomes:
After successful completion of the course, the student will be able to

CO1	Design and conduct experiments, analyze, interpret data and synthesize valid conclusions	K4
CO2	Design a system, component, or process, and synthesize solutions to achieve desired needs	K4
CO3	Use the techniques, skills, and modern engineering tools necessary for engineering practice with appropriate considerations for public health and safety, cultural, societal, and environmental constraints	K3
CO4	Examine effectively within multi-disciplinary teams and understand the fundamental precepts of effective project management	K3
CO5	Understand quality and quality management	K2
CO6	Understand concepts on recourse management	K2

UNIT – I
INTRODUCTION: Definition of industrial engineering (I.E), development, applications, role of an industrial engineer, differences between production management and industrial engineering, quantitative tools of IE and productivity measurement. concepts of management, importance, functions of management, scientific management, Taylor's principles, theory X and theory Y, Fayol's principles of management.
UNIT – II
PLANT LAYOUT: Factors governing plant location, types of production layouts, advantages and disadvantages of process layout and product layout, applications, quantitative techniques for optimal design of layouts, plant maintenance, preventive and breakdown maintenance.
UNIT – III
WORK STUDY: Importance, types of production, applications, work study, method study and time study, work sampling, PMTS, micro-motion study, rating techniques, MTM, work factor system, principles of Ergonomics, flow process charts, string diagrams and Therbligs
UNIT – IV
STATISTICAL QUALITY CONTROL: Quality control, Queuing assurance and its importance, SQC, attribute sampling inspection with single and double sampling, Control charts – and R – charts and *S* charts and their applications, numerical examples.

UNIT – V
TOTAL QUALITY MANAGEMENT: zero defect concept, quality circles, implementation, applications, ISO quality systems. six sigma – definition, basic concepts

VALUE ANALYSIS: Value engineering, implementation procedure, enterprise resource planning and supply chain management.

UNIT – VI

RESOURCE MANAGEMENT: Concept of human resource management, personnel management and industrial relations, functions of personnel management, Job-evaluation, its importance and types, merit rating, quantitative methods, wage incentive plans, types.
PROJECT MANAGEMENT (PERT/CPM): Network Analysis, Programme Evaluation and Review Technique (PERT), Critical Path Method (CPM), Identifying critical path, Probability of Completing the project within given time, Project Cost Analysis, Project Crashing. (simple problems).

TEXT BOOKS:

1. Industrial Engineering and management / O.P Khanna/Khanna Publishers.
2. Industrial Engineering and Production Management/Martand Telsang/S.Chand & Company Ltd. New Delhi

REFERENCE BOOKS:

1. Industrial Management / Bhattacharya DK/Vikas publishers
2. Operations Management / J.G Monks/McGrawHill Publishers.
3. Industrial Engineering and Management Science/T.R. Banga,S.C.Sharma, N. K. Agarwal/Khanna Publishers
4. Principles of Management /Koontz O' Donnel/McGraw Hill Publishers.
5. Statistical Quality Control /Gupta/Khanna Publishers
6. Industrial Engineering and Management /NVS Raju/Cengage Publishers

Semester	VII	L	T	P	C	Course Code
Regulation	**V18**	**3**	**0**	**0**	**3**	**V18MET23**
Name of the Course	**Composite Materials** Professional Elective –II					
Branch	**Mechanical Engineering**					

Course Outcomes:
After Successful completion of this course the student will be able to

CO1	Explain the required properties, reinforcements and uses of various composites.	K2
CO2	Explain how common fibers are produced and how the properties of the fibers are related to the internal structure and the interfaces obtained.	K2
CO3	Illustrate the processing techniques for polymer matrix, ceramic matrix and metal matrix composites and list out their properties and applications	K3
CO4	Analyze different ceramic composite materials	K4
CO5	Examine the processing of ceramic matrix composites	K3
CO6	Evaluate mechanical properties of composite materials	K5

UNIT-I

Introduction, Classification of Composite materials based on structure and matrix and reinforcements, Advantages and applications of composites, Functional requirements of reinforcement and matrix materials. Difference between composites and metals &alloys, Properties of composites in comparison with standard materials

UNIT-II

TYPES OF REINFORCEMENTS AND THEIR PROPERTIES: Glass, Carbon, Boron, Aramid, Al_2O_3 and SiC fibers. Nature and manufacture of glass, carbon and aramid fibers, Comparison of fibers. Role of interfaces: Wettability and Bonding, the interface in Composites, Interactions and Types of bonding at the Interface.

UNIT-III

Fabrication of Polymeric Matrix Composites, Structure and properties of Polymeric Matrix Composites, Interface in Polymeric Matrix Composites, Applications,Recycling of PMCs

UNIT-IV

FABRICATION OF METAL MATRIX COMPOSITES (MMC): Solid state fabrication, Liquid state fabrication and In-situ fabrication techniques. Interface in Metal Matrix Composites. Mechanical bonding, Chemical bonding and Interfaces in In-situ Composites. MMC: Properties and Applications.

UNIT -V

FABRICATION OF CERAMIC MATRIX COMPOSITES (CMC): Processing of CMCs: Cold Pressing and Sintering, Hot Pressing, Reaction Bonding Processes, Infiltration, Sol–Gel process. Interface in CMCs. Properties of CMCs, Applications of CMCs.

UNIT -VI

MECHANICAL TESTING OF COMPOSITES AND THEIR CONSTITUENTS: Measurement of Constituent Material Properties Fiber Tests, Neat Resin Matrix Tests, Constituent Volume Fraction Measurement. Measurement of Basic Composite Properties: Tensile Tests, Compressive Tests, Shear Tests, Flexure Tests, Fiber/Matrix Interface Tests.

TEXT BOOKS:

1. Composite Materials – Science & Engineering, K.K. Chawla, Springer-Verlag, New York, 1987.
2. Principles of Composite Material Mechanics, Ronald F. Gibson
3. An Introduction to Composite Materials, Hull, Cambridge, 2nd Edt.1997.

REFERENCE BOOKS:

1. Composites, Engineered Materials Handbook, Vol.1, ASM International, Ohio, 1988.
2. Structure and Properties of Composites, Materials Science and Technology, Vol. 13, VCH, Weinheim, Germany, 1993
3. Composite Materials: Engineering and Science, F.L. Matthews and R.D. Rawlings, Chapman & Hall, London, 1994.

Semester	VII	L	T	P	C	Course Code
Regulation	**V18**	**3**	**0**	**0**	**3**	**V18MET24**
Name of the Course	**Refrigeration & Air Conditioning** Professional Elective –II					
Branch	**Mechanical Engineering**					

Course Outcomes:
After successful completion of the course, the student will be able to

CO1	Apply the concept of refrigeration to various systems.	K3
CO2	Employ the methods to improve performance of vapor compression systems.	K3
CO3	Identify eco-friendly refrigerants and understanding various VCR System Components.	K2
CO4	Describe vapour absorption systems.	K2
CO5	Analyze cooling and heating loads in an air conditioning system.	K4
CO6	Explain various air conditioning systems.	K2

UNIT – I
INTRODUCTION TO REFRIGERATION: Necessity and applications – Unit of refrigeration and C.O.P. –Mechanical refrigeration – Types of ideal cycles of refrigeration.
Air refrigeration: Bell Coleman cycle - Open and Dense air systems – Refrigeration needs of Air crafts-Refrigeration systems used in air crafts and Problems.
UNIT – II
VAPOUR COMPRESSION REFRIGERATION: Working principle and essential components of the plant –simple vapour compression refrigeration cycle – COP – Representation of cycle on T-S and p-h charts – Effect of sub cooling and super heating – Cycle analysis – Actual cycle influence of various parameters on system performance – Use of p-h charts – Problems.
UNIT – III
Refrigerants – Classification – Desirable properties of an ideal refrigerant – Common refrigerants used – Nomenclature of refrigerants.
VCR System Components: Compressors – General classification – comparison – Advantages and Disadvantages. Condensers – Classification – Working Principles. Evaporators – Classification – Working Principles. Expansion devices – Types – Working Principles.
UNIT – IV
VAPOR ABSORPTION SYSTEM: Calculation of maximum COP – description and working of Water-Ammonia Systems, Water-Lithium Bromide System. Principle of operation three fluid absorption system, salient features.
UNIT – V
INTRODUCTION TO AIR CONDITIONING: Psychometric properties & Processes – Characterization of sensible and latent heat loads — Need for ventilation, Consideration of infiltration – Load concepts of RSHF, GSHF- Problems, concept of ESHF and ADP temperature.
Requirements of industrial air conditioning, Air conditioning load calculations.

UNIT – VI

AIR CONDITIONING SYSTEMS: Classification of equipment, Components related to Air-Conditioning Systems- filters, grills and registers, fans and blowers.

TEXT BOOKS:

1. A Course in Refrigeration and Air conditioning, SC Arora & Domkundwar, Dhanpatrai
2. Refrigeration and Air Conditioning, CP Arora, TMH.
3. Refrigeration and Air Conditioning / Manohar Prasad / New Age

REFERENCE BOOKS:

1. Principles of Refrigeration /Dossat / Pearson Education.
2. Basic Refrigeration and Air-Conditioning / Ananthanarayanan / TMH
3. Stoecker, W. F., and Jones, J. W., Refrigeration and Air-Conditioning, McGraw - Hill, New Delhi.
4. Data Book: Refrigerant and Psychrometric Properties - Tables and Charts [SI Units], MathurM. L., and Mehta F. S., Jain Brothers.

Semester	VII	L	T	P	C	Course Code
Regulation	**V18**	**3**	**0**	**0**	**3**	**V18MET25**
Name of the Course	**Total Quality Management** Professional Elective –III					
Branch	**Mechanical Engineering**					

Course Outcomes:
After the completion of this course, the students will be able to

CO1	Understand the importance of significance of quality & to understand the concept of Quality.	K2
CO2	Develop quality improvement teams & to implement Quality Implementation Programs.	K3
CO3	Identify requirements of quality improvement programs & bench marketing	K2
CO4	Apply the tools and techniques of quality management to manufacturing and services processes.	K3
CO5	Apply the concepts of comprehensive quality management and the challenges of putting them into practice.	K3
CO6	Apply the quality management methods for analysing and solving problems of organization.	K3

UNIT – I
INTRODUCTION: The concept of TQM, Quality and Business performance, attitude and involvement of top management, communication, culture and management systems. Management of Process Quality: Definition of quality, Quality Control, a brief history, Product Inspection vs, Process Control, Statistical Quality Control, Control Charts and Acceptance Sampling.

UNIT – II
CUSTOMER FOCUS AND SATISFACTION: The importance of customer satisfaction and loyalty- Crating satisfied customers, Understanding the customer needs, Process Vs. Customer, internal customer conflict, quality focus, Customer Satisfaction, role of Marketing and Sales, Buyer – Supplier relationships. .

UNIT – III
BENCH MARKETING: Evolution of Bench Marketing, meaning of Bench marketing, benefits of bench marketing, the bench marketing process, pitfalls of bench marketing.

UNIT – IV
ORGANIZING FOR TQM: The systems approach, Organizing for quality implementation, making the transition from a traditional to a TQM organizing, Quality Circles. Productivity, Quality and Reengineering:

UNIT – V

THE COST OF QUALITY: Definition of the Cost of Quality, Quality Costs, Measuring Quality Costs, use of Quality Cost Information, Accounting Systems and Quality Management.

UNIT – VI

QUALITY MANAGEMENT SYSTEM (QMS): Introduction to QMS. Universal Standards of Quality: ISO around the world, The ISO9001 ANSI/ASQCQ-Series Standards, benefits of ISO9001 certification, the third party audit, Documentation ISO9001 and services, the cost of certification implementing the system.

TEXT BOOKS:

1. Total Quality Management / Joel E.Ross/Taylor and Franscis Limited
2. Total Quality Management/P.N.Mukherjee/PHI
3. Total Quality Management Paperback / R Kesavan, C Elanchezhian, B Vijaya Ramnath / I K International Publishing House

REFERENCE BOOKS:

1. Beyond TQM / Robert L.Flood
2. Statistical Quality Control / E.L. Grant / McGraw Hill.
3. Total Quality Management- A Practical Approach/H. Lal
4. Quality Management/Kanishka Bedi/Oxford University Press/2011
5. Total Engineering Quality Management/Sunil Sharma/Macmillan

Semester	VII	L	T	P	C	Course Code
Regulation	**V18**	**3**	**0**	**0**	**3**	**V18MET26**
Name of the Course	**Finite Element Methods** Professional Elective – III					
Branch	**Mechanical Engineering**					

Course Outcomes:
After the completion of this course, the students will be able to

CO1	Use the concepts of variational methods and weighted residual methods in FEM.	K3
CO2	Use Finite Element Formulation for solving the problems.	K3
CO3	Solve the problems of Truss elements by FEM.	K3
CO4	Solve the problems of Beam s elements by FEM.	K3
CO5	Use FEM to solve 2D CST problems.	K3
CO6	Analyze finite element method for problems involving dynamics and heat transfer.	K4

UNIT-I
INTRODUCTION TO FINITE ELEMENT METHOD: stress and equilibrium, strain – displacement relations, stress-strain relations, plane stress and plane strain conditions, variational and weighted residual methods, the concept of potential energy, one-dimensional problems.

UNIT – II
FINITE ELEMENT FORMULATION: Discretization of the domain, element shapes, discretization procedures, assembly of stiffness matrix, bandwidth, node numbering, mesh generation, interpolation functions, convergence requirements, Treatment of Boundary conditions, Derivation of element stiffness matrix for Bar elements and problems

UNIT – III
ANALYSIS OF TRUSSES: Finite element modelling, coordinates and shape functions, assembly of global stiffness matrix and load vector, finite element equations, treatment of boundary conditions, stress, strain and support reaction calculations.

UNIT – IV
ANALYSIS OF BEAMS: Derivation of Element stiffness matrix for beam element, derivation of load vector for concentrated and UDL, Problems on Cantilever, simply supported beams with point and uniformly distributed loads.

UNIT-V
CST AND AXISYMMETRIC ELEMENTS: Finite element modelling of two-dimensional stress analysis with constant strain triangles and treatment of boundary conditions, formulation of axisymmetric problems,

HIGHER ORDER AND ISOPARAMETRIC ELEMENTS: One dimensional quadratic and cubic elements in natural coordinates, two dimensional four noded isoparametric elements, numerical integration.

UNIT – VI

STEADY STATE HEAT TRANSFER ANALYSIS: one dimensional analysis of a fin and two dimensional analysis of thin plate, analysis of a uniform shaft subjected to torsion.

DYNAMIC ANALYSIS: Formulation of finite element model, element consistent and lumped mass matrices, evaluation of eigen values and eigen vectors, free vibration analysis.

TEXT BOOKS:

1. The Finite Element Methods in Engineering / S. S Rao / Pergamon.

REFERENCE BOOKS:

1. Finite Element Method with applications in Engineering / YM Desai, Eldho& Shah /Pearson publishers
2. An introduction to Finite Element Method / JN Reddy / McGraw Hill
3. The Finite Element Method for Engineers – Kenneth H. Huebner, Donald L. Dewhirst, Douglas E. Smithand Ted G. Byrom / John Wiley &Sons (ASIA) Pte Ltd.
4. Finite Element Analysis/ P.Seshu
5. Finite Element Methods: Basic Concepts and Applications ByChennakesava R. Alavala
6. Finite Element Analysis: for students & Practicing Engineers / G.LakshmiNarasaiah / BSP Books Pvt.Ltd.

Semester	VII	L	T	P	C	Course Code
Regulation	**V18**	**3**	**0**	**0**	**3**	**V18MET27**
Name of the Course	**Micro Electro Mechanical Systems (MEMS)** Professional Elective – III					
Branch	**Mechanical Engineering**					

Course Outcomes:

After successful completion of the course, the student will be able to

CO1	Understand about the basics of MEMS, Methods of Micro machining.	K2
CO2	Interpret various Mechanical sensors & Actuators	K3
CO3	Illustrate the working principles of various Thermal sensors and Actuators & its applications.	K3
CO4	Differentiate between different types of MOEMS devices	K4
CO5	Illustrate and explain various Magnetic sensors and Actuators & its applications	K3
CO6	Illustrate and explain various micro-fluidic devices & its applications	K3

UNIT – I
INTRODUCTION: Definition of MEMS, MEMS history and development, micro machining, lithography principles & methods, structural and sacrificial materials, thin film deposition, impurity doping, etching, surface micro machining, wafer bonding, LIGA.

UNIT – II
MECHANICAL SENSORS AND ACTUATORS: Principles of sensing and actuation: beam and cantilever, capacitive, piezo electric, strain, pressure, flow, pressure measurement by micro phone, MEMS gyroscopes, shear mode piezo actuator, gripping piezo actuator, Inchworm technology.

UNIT – III
THERMAL SENSORS AND ACTUATORS: Thermal energy basics and heat transfer processes, thermisters, thermo devices, thermo couple, micro machined thermo couple probe, micro hot plate gas sensors, MEMS thermo vessels, pyro electricity, shape memory alloys (SMA).

UNIT – IV
MICRO-OPTO-ELECTRO MECHANICAL SYSTEMS: Principle of MOEMS technology, properties of light, light modulators, beam splitter, micro lens, micro mirrors, digital micro mirror device (DMD), light detectors, grating light valve (GLV), optical switch.

UNIT – V
MAGNETIC SENSORS AND ACTUATORS: Magnetic materials for MEMS and properties, magnetic sensing and detection, magneto resistive sensor, more on hall effect, magneto diodes, magneto transistor, MEMS magnetic sensor, pressure sensor utilizing MOKE, mag MEMS actuators, by directional micro actuator.

UNIT – VI

MICRO FLUIDIC SYSTEMS: Applications, considerations on micro scale fluid, fluid actuation methods, dielectro phoresis (DEP), electro wetting, electro thermal flow, thermo capillary effect, electro osmosis flow, opto electro wetting (OEW), micro fluid dispenser, micro needle, micro pumps.

TEXT BOOKS:

1. MEMS, Nitaigour Premchand Mahalik, TMH Publishing co.

REFERENCE BOOKS:

1. Foundation of MEMS, Chang Liu, Prentice Hall Ltd.
2. MEMS and NEMS, Sergey Edwrd Lyshevski, CRC Press, Indian Edition.
3. MEMS and Micro Systems: Design and Manufacture, Tai-Ran Hsu, TMH Publishers.
4. Introductory MEMS, Thomas M Adams, Richard A Layton, Springer International Publishers.

Semester	VII	L	T	P	C	Course Code
Regulation	**V18**	**0**	**0**	**3**	**1.5**	**V18MEL12**
Name of the Course	**Simulation Lab**					
Branch	**Mechanical Engineering**					

Course Outcomes:
After successful completion of the course, the student will be able to

CO1	Apply the tools like ANSYS or FLUENT in solving real time problems and day to day problems.	K3
CO2	Develop drawings for various components.	K3
CO3	Practice programming on CNC Machines.	K3

List of experiments:

1. **DRAFTING:** Development of part drawings for various components in the form of orthographic and isometric representation of dimensioning and tolerances scanning and plotting. Study of script, DXE and IGES files.

2. **PART MODELING:** Generation of various 3D models through protrusion, revolve, shell sweep. Creation of various features. Study of parent child relation. Feature based and Boolean based modelling surface and assembly modelling. Study of various standard translators. Design simple components.

3. a) Determinationofdeflectionandstressesin2Dand3Dtrussesandbeams.
   b) Determination of deflections component and principal and Von-mises stresses in plane stress, plane strain and axisymmetric components.
   c) Determination of stresses in 3D and shell structures (at least one example in each case)
   d) Estimation of natural frequencies and mode shapes, Harmonic response of 2D beam.
   e) Steady state heat transfer Analysis of plane and Axisymmetriccomponents.

4. a) Study of various post processors used in NC Machines.
   b) Machining of simple components on NC lathe and Mill by transferring NC Code / from a CAM package. Through RS 232.
   c) Practice on CNC Sinutrain Turning
   d) Practice on CNC Sinutrain Milling
   e) CNC programming forturned components using FANUC Controller
   f) CNC programming for milled components using FANUC Controller
   g) Automated CNC Tool path & G-Code generation using

   Pro/E/MasterCAM**Packages to be provided to cater to drafting, modeling & analysis from the following:**CATIA, Pro-E, I-DEAS, ANSYS, NISA, CAEFEM, Gibbs CAM, Master CAM etc.

Semester	VII	L	T	P	C	Course Code
Regulation	**V18**	**0**	**0**	**3**	**1.5**	**V18MEL13**
Name of the Course	**Production Drawing Lab**					
Branch	**Mechanical Engineering**					

Course Outcomes:
After successful completion of the course, the student will be able to

CO1	Recognise the need of limits, fits and tolerances, and apply the same on part drawings for manufacturing.	K2
CO2	Illusttrate the Geometric Dimensioning and tolerancing, able to apply GD&T to a part drawing.	K3
CO3	Indicate various surface roughness symbols on part drawings for manufacturing.	K2
CO4	Assess the raw material requirements, final cost of the component and heat treatment process.	K3
CO5	Develop skill to produce detailed drawings from assembly drawings.	K3
CO6	Construct press tools, die-casting dies and jigs and fixtures using computer aided design software.	K3

PART-A
LIMITS, FITS AND TOLERANCES: Types of fits, exercises involving selection and interpretation of fits and estimation of limits from tables.
GEOMETRIC DIMENSIONING AND TOLERANCING: Introduction to GD&T ,terminology & basic rules, features and material conditions, maximum material condition, least material condition, regardless of feature's size, datums, datum reference frame, **form tolerances, orientation tolerances, profile tolerances, runout tolerances.**

ADDING GD&T TO A DRAWING/DESIGN – size, location, orientation & form, choosing datums, indication of form and position tolerances on drawings, preparation of bill of material
SURFACE ROUGHNESS AND ITS INDICATIONS: Definition, types of surface roughness indication-Surface roughness obtained from various manufacturing process, recommended surface roughness on mechanical components, heat treatment and surface treatment symbols used on drawings.

PART-B
Drawing of parts from assembly of stuffing box, piercing and blanking die, Die casting die, Box jig, machining fixture with indication of size, tolerance, roughness, form and position tolerances using Computer aided design software.

TEXT BOOKS:
1. Production and Drawing – K.L. Narayana& P. Kannaiah/New Age Publication

2. Tool Engineering & Design_G.R.Nagpal/Khannapublishers,1st edition, Khanna Publishers, 2009

3. MachineDrawingwithAutoCAD-PohitandGhosh,1st edition, Pearso, 2017

4. Geometric dimensioning and tolerancing- James D. Meadows/B.S Publications.

REFERENCE BOOKS:

1. MachineDrawingbyNagpal,1st edition, khanna publishers,2009
2. Machinedrawing,AjeetSingh,2nd edition,TMH,2016
3. Engineering Metrology, R.K. Jain, Khanna Publications.

Syllabi for the courses offered in VIII semester B. Tech under V18 Regulation for the Academic Year 2021-2022

VIII Semester

Semester	VIII	L	T	P	C	Course Code
Regulation	V18	3	0	0	3	V18MET28
Name of the Course	Automobile Engineering					
Branch	Mechanical Engineering					

Course Outcomes:
After successful completion of the course, the student will be able to

CO1	Understand various components in four wheel automobile.	K2
CO2	Differentiate between different types of transmission systems used in automobile.	K4
CO3	Examine steering geometry and steering systems used in automobile.	K3
CO4	Interpret suspension, breaking and electrical systems in automobile.	K3
CO5	Understand various safety systems used in automobile.	K2
CO6	Practice engine service for different components in automobile.	K3

UNIT – I
INTRODUCTION: Components of four wheeler automobile – chassis and body – power unit – power transmission – rear wheel drive, front wheel drive, 4 wheel drive – types of automobile engines, engine construction, turbo charging and super charging – engine lubrication, splash and pressure lubrication systems, oil filters, oil pumps – crank case ventilation – engine service, reboring, decarbonisation, Nitriding of crank shaft.

UNIT – II
TRANSMISSION SYSTEM: Clutches, principle, types, cone clutch, single plate clutch, multi plate clutch, magnetic and centrifugal clutches, fluid fly wheel – gear boxes, types, sliding mesh, construct mesh, synchromesh gear boxes, epicyclic gear box, over drive torque converter. Propeller shaft – Hotch – Kiss drive, Torquetube drive, universal joint, differential rear axles – types – wheels and tyres.

UNIT – III
STEERING SYSTEM: Steering geometry – camber, castor, king pin rake, combined angle toein, center point steering. Types of steering mechanism – Ackerman steering mechanism, Davis steering mechanism, steering gears– types, steering linkages.

UNIT – IV

SUSPENSION SYSTEM: Objects of suspension systems – rigid axle suspension system, torsion bar, shock absorber, Independent suspension system.
BRAKING SYSTEM: Mechanical brake system, hydraulic brake system, master cylinder, wheel cylinder tandem master cylinder requirement of brake fluid, pneumatic and vacuum brakes.
ELECTRICAL SYSTEM: Charging circuit, generator, current – voltage regulator – starting system, bendix drive mechanism solenoid switch, lighting systems, horn, wiper, fuel gauge – oil pressure gauge, engine temperature indicator etc.

UNIT – V
ENGINE SPECIFICATION AND SAFETY SYSTEMS: Introduction- engine specifications with regard to power, speed, torque, no. of cylinders and arrangement, lubrication and cooling etc.
Safety: Introduction, safety systems - seat belt, air bags, bumper, anti lock brake system (ABS), wind shield, suspension sensors, traction control, mirrors, central locking and electric windows, speed control.

UNIT – VI
ENGINE SERVICE: Introduction, service details of engine cylinder head, valves and valve mechanism, piston connecting rod assembly, cylinder block, crank shaft and main bearings, engine reassembly-precautions.

TEXT BOOKS:
1. Automotive Mechanics – Vol. 1 & Vol. 2 / Kirpal Singh/standard publishers
2. Automobile Engineering / William Crouse/TMH Distributors
3. Automobile Engineering/P.S Gill/S.K. Kataria & Sons/New Delhi.

REFERENCE BOOKS:
1. Automotive Engines Theory and Servicing/James D. Halderman and Chase D. Mitchell Jr.,/ Pearson education inc.
2. Automotive Engineering / K Newton, W.Steeds & TK Garrett/SAE
3. Automotive Mechanics: Principles and Practices/ Joseph Heitner/Van Nostrand Reinhold
4. Automobile Engineering / C Srinivasan / Mc Graw Hill

Semester	VIII	L	T	P	C	Course Code
Regulation	**V18**	**3**	**0**	**0**	**3**	**V18MET31**
Name of the Course	**Process Planning & Cost Estimation** Professional Elective – IV					
Branch	**Mechanical Engineering**					

Course Outcomes:
After successful completion of the course, the student will be able to

CO1	Understand the basic concepts of production, steps involved in types of process planning.	K2
CO2	Calculate the process parameters for various production processes.	K3
CO3	Prepare the types of estimates.	K3
CO4	Calculate depreciation cost and explain about different costs.	K3
CO5	Estimate production cost in forging, welding and foundry.	K2
CO6	Determine the machining time of different machining operations.	K4

UNIT – I
INTRODUCTION: Types of production, standardization, simplification, product design and selection-process planning-methods, selection and analysis-steps involved in manual and computer aided process planning-Break even analysis.

UNIT – II

PROCESS PLANNING ACTIVITIES: Calculation of process parameters for various production processes-Selection of jigs & fixtures-Selection quality assurance methods-Set of documents for process planning.

UNIT – III

ESTIMATION AND COSTING: Aim and objective of cost estimation – Functions of estimation – Costing – Importance and aims of costing – Difference between costing and estimation. Types of estimates – Estimation procedure.

UNIT – IV

COST ELEMENTS: Material cost – Determination of material cost, labour cost, Expenses – – Analysis of overhead expenses – Factory expenses, Administrative expenses – Selling and Distributing expenses – Allocation of over head expenses. Cost of product – Illustrative examples Depreciation: Depreciation – Causes of Depreciation – Methods of Depreciation calculation.

UNIT – V

ESTIMATION OF PRODUCTION COST : Estimation in forging shop – Losses in forging – forging cost – Illustrative examples. Estimation in welding shop – Gas cutting – Electric welding - Illustrative examples. Estimation in foundry shop – Estimation of pattern cost and casting cost - Illustrative examples.

UNIT – VI

MACHINING TIME ESTIMATION: Estimation of Machining Time for Lathe operations – Estimation of Machining Time for Drilling, Boring, Shaping, Planning, Milling and Grinding operations - Illustrative examples.

TEXT BOOKS:

1. M.Adithian and B.S. Pabla, Estimation and Costing, Konark publishers Pvt. Ltd., 1989.
2. A.K.Chitale and R.C.Gupta, Product Design and Manufacturing, Prentice Hall Pvt. Ltd.., 2005

REFERENCE BOOKS :

1. Namua Singh, System Approach to computer integrated Design and Manufacturing, John Wiley & Sons,Inc.,1996.
2. Joseph G Monks, Operation Management, Theory & Problems, McGraw Hill Book Company, 1987.
3. T.R.Banga and S.C.Sharma, Estimations and Costing, Khanna Publishers,1988.
4. G.B.S.Narang and V.Kumar, Production and Costing, Khanna Publishers, 1995.
5. Sinha B.P – Mechanical estimating & costing – Tata McGrawhill publishing co.,1995

Semester	VIII	L	T	P	C	Course Code
Regulation	**V18**	**3**	**0**	**0**	**3**	**V18MET32**
Name of the Course	**Non Destructive Evaluation** Professional Elective – IV					
Branch	**Mechanical Engineering**					

Course Outcomes:
After Successful completion of this course the student will be able to

CO1	Examine the Radiograpic test method	K3
CO2	Examine the Radiograpic test method	K3
CO3	Understand the Radiograpic test method	K2
CO4	Understand the Radiograpic test method	K2
CO5	Examine the Radiograpic test method	K3
CO6	Apply knowledge of non destructive testing methods for the products of railways, automobiles, aircrafts, chemical industries etc.	K3

UNIT – I
Introduction to non-destructive testing, Radiographic test, Sources of X and Gamma Rays and their interaction with Matter, Radiographic equipment, Radiographic Techniques, Safety Aspects of Industrial Radiography.

UNIT – II
ULTRASONIC TEST: Principle of Wave Propagation, Reflection, Refraction, Diffraction, Mode Conversion and Attenuation, Sound Field, Piezo-electric Effect, Ultrasonic Transducers and their Characteristics, Ultrasonic Equipment and Variables Affecting Ultrasonic Test, Ultrasonic Testing, Interpretations and Guidelines for Acceptance, Rejection, Effectiveness and Limitations of Ultrasonic Testing.

UNIT – III
LIQUID PENETRANT TEST: Liquid Penetrant Test, Basic Concepts, Liquid Penetrant System, Test Procedure, Effectiveness and Limitations of Liquid Penetrant Testing.
EDDY CURRENT TEST: Principle of Eddy Current, Eddy Current Test System, Applications of Eddy Current Testing Effectiveness of Eddy Current Testing.

UNIT – IV
MAGNETIC PARTICLE TEST: Magnetic Materials, Magnetization of Materials, Demagnetization of Materials,Principle of Magnetic Particle Test, Magnetic Particle Test Equipment, Magnetic Particle Test Procedure, Standardization and Calibration, Interpretation and Evaluation, Effective Applications and Limitations of the Magnetic Particle Test.

UNIT – V
INFRARED AND THERMAL TESTING: Introduction and fundamentals to infrared and thermal testing, Heat transfer –Active and passive techniques, Lock in and pulse thermography, Contact and non contact thermal inspection methods, Heat sensitive paints and papers, thermally quenched phosphors liquid crystals, techniques for applying liquid crystals, other temperature sensitive coatings, Inspection methods, Infrared radiation and infrared detectors, thermo mechanical behavior of materials, IR imaging in aerospace applications,electronic components, Honey comb and sandwich structures–Case studies.

UNIT – VI

INDUSTRIAL APPLICATIONS OF NDE: Span of NDE Activities Railways, Nuclear, Non-nuclear and Chemical Industries, Aircraft and Aerospace Industries, Automotive Industries, Offshore Gas and Petroleum Projects, Coal Mining Industry, NDE of pressure vessels, castings, welded constructions.

TEXT BOOKS:

1. Non destructive test and evaluation of Materials/J Prasad, GCK Nair/TMH Publishers
2. Ultrasonic testing of materials/ H Krautkramer/Springer
3. Non destructive testing/Warren, J Mc Gonnagle / Godan and Breach Science publishers
4. Nondestructive evaluation of materials by infrared thermography / X. P. V. Maldague, Springer-Verlag, 1st edition, (1993)

REFERENCE BOOKS:

1. Ultrasonic inspection training for NDT/ E. A. Gingel/Prometheus Press,
2. ASTM Standards, Vol 3.01, Metals and alloys
3. Non-destructive, Hand Book – R. Hamchand

Semester	VIII	L	T	P	C	Course Code
Regulation	**V18**	**3**	**0**	**0**	**3**	**V18MET33**
Name of the Course	**Industrial Hydraulics and Pneumatics** Professional Elective – IV					
Branch	**Mechanical Engineering**					

Course Outcomes:
After Successful completion of this course the student will be able to

CO1	Understand the fundamentals of Fluid Power Systems	K2
CO2	Develop general concepts associated with Hydraulic actuators and cylinders.	K3
CO3	Identify Hydraulic elements in the design of circuits	K2
CO4	Illustrate various accumulators & intensifiers	K3
CO5	Develop the operation of pnuematics circuits and components typically used in industry.	K3
CO6	Examine the applications of Industrial Hydraulics and Pneumatics.	K3

UNIT – I
FUNDAMENTALS OF FLUID POWER SYSTEMS-INTRODUCTION – types advantages, disadvantages & applications-fluid characteristics-terminologies used in fluid power-hydraulic symbols-hydraulic systems and components-sources- pumping theory-gear, vane & piston pumps.

UNIT-II
FLUID POWER ACTUATORS: Introduction-hydraulic actuators-hydraulic cylinders-types, construction, specifications and special types. Hydraulic motors- working principle-selection criteria for various types-hydraulic motors in circuits- formulae-numerical problems

UNIT-III
HYDRAULIC ELEMENTS IN THE DESIGN OF CIRCUITS- Introduction-control elements-direction control valve-check valve-pressure control valve-relief valve- throttle valve-temperature & pressure compensation-locations of flow control valve

UNIT-IV
ACCUMULATORS & INTENSIFIERS-types, size &function of accumulators- application & circuits of accumulators- intensifiers-circuit & applications.

UNIT-V
PNEUMATIC SYSTEMS- INTRODUCTION- symbols used-concepts & components-comparison-types & specifications of compressors-arrangement of a complete pneumatic system-compressed air behaviour- understanding pneumatic circuits-direction control valves

UNIT-VI

APPLICATIONS- Servo systems-introduction-closed loop, hydro-mechanical and electro hydraulic – conventional and proportional valves-characteristics of proportional and servo valves- PLC applications in fluid power – selected pneumatic / electro pneumatic circuit problems – failure and trouble shooting in fluid power systems.

TEXT BOOKS:

1. Introduction to Hydraulics and Pneumatics by S. Ilango and V. Soundararajan, PHI , New Delhi
2. Applied hydraulics and pneumatics-T. Sunder Selwyn & R.Jayendiran, Anuradha Publications.

REFERENCE BOOKS:

1. Oil Hydraulic Systems, S.R .Majumdar, McGrawHill Companies
2. Pneumatic Systems: Principles and Maintenance, Majumdar, McGrawHill

Semester	VIII	L	T	P	C	Course Code
Regulation	**V18**	**3**	**0**	**0**	**3**	**V18MET34**
Name of the Course	**Computational Fluid Dynamics** Professional Elective – V					
Branch	**Mechanical Engineering**					

Course Outcomes:
After Successful completion of this course the student will be able to

CO1	Apply techniques in the numerical solution of fluid equations	K3
CO2	Apply numerical modeling and its role in the field of heat transfer and fluid flow.	K3
CO3	Develop methodologies used in CFD	K3
CO4	Comapre various discretization methods and solving methodologies.	K4
CO5	Apply skills in the actual implementation of CFD methods (e.g. boundary conditions, different numerical schemes etc.	K3
CO6	Apply the finite element methods in the application of CFD analysis to real life engineering designs.	K3

UNIT – I
ELEMENTARY DETAILS IN NUMERICAL TECHNIQUES: Number system and errors, representation of integers, fractions, floating point arithmetic, loss of significance and error propagation, condition and instability, computational methods for error estimation, convergence of sequences.
UNIT – II
APPLIED NUMERICAL METHODS: Solution of a system of simultaneous linear algebraic equations, iterative schemes of matrix inversion, direct methods for matrix inversion, direct methods for banded matrices.
EQUATIONS GOVERNING FLUID FLOW AND HEAT TRANSFER: Introduction, conservation of mass, Newton's second law of motion, expanded forms of navier-stokes equations, conservation of energy principle, special forms of the navier-stokes equations.
UNIT – III
Steady flow, dimensionless form of momentum and energy equations, stokes equation, conservative body force fields, stream function - vorticity formulation. Finite difference applications in heat conduction and convention – heat conduction, steady heat conduction in a rectangular geometry, transient heat conduction, finite difference application in convective heat transfer, closure.
UNIT – IV
Finite differences, discretization, consistency, stability, and fundamentals of fluid flow modeling: introduction, elementary finite difference quotients, implementation aspects of finite-difference equations, consistency, explicit and implicit methods.

UNIT – V

Introduction to first order wave equation, stability of hyperbolic and elliptic equations, fundamentals of fluid flow modeling, conservative property, the upwind scheme

UNIT – VI

FINITE VOLUME METHOD: Approximation of surface integrals, volume integrals, interpolation and differentiation practices, upwind interpolation, linear interpolation and quadratic interpolation.

TEXT BOOKS:

1. Numerical heat transfer and fluid flow / Suhas V. Patankar- Butter-worth Publishers.
2. Computational fluid dynamics - Basics with applications - John. D. Anderson / McGraw Hill.

REFERENCE BOOKS:

1. Computational Fluid Flow and Heat Transfer/ Niyogi, Pearson Publications.
2. Fundamentals of Computational Fluid Dynamics – Tapan K. Sengupta / Universities Press.
3. Computational fluid dynamics, 3rd edition/Wendt/Springer publishers

Semester	VIII	L	T	P	C	Course Code
Regulation	V18	3	0	0	3	V18MET35
Name of the Course	**Production Planning and Control** Professional Elective – V					
Branch	**Mechanical Engineering**					

Course Outcomes:
After Successful completion of this course the student will be able to

CO1	Generalise structure, elements and functions of Production planning and Control.	K2
CO2	Apply the principles of different forecasting methods.	K3
CO3	Analyze principles of different inventory control systems.	K4
CO4	Generalise Routing, its procedure, factors affecting Routing procedure.	K2
CO5	Explain Scheduling methods, Planning and controlling aspects.	K2
CO6	Understand Dispatching procedure, types of follow up, applications of computers in production planning and control.	K2

UNIT – I
Introduction: Definition – objectives and functions of production planning and control – elements of production control – types of production – organization of production planning and control department – internal organization of department.
UNIT – II
Forecasting– importance of forecasting – types of forecasting, their uses – general principles of forecasting – forecasting techniques – qualitative methods and quantitive methods.
UNIT – III
Inventory management– functions of inventories – relevant inventory costs – ABC analysis – VED analysis – EOQ model – Inventory control systems – P–Systems and Q-Systems. Introduction to MRP I, MRP II, ERP, JIT systems.
UNIT – IV
Routing– definition – routing procedure –route sheets – bill of material – factors affecting routing procedure, schedule –definition – difference with loading.
UNIT – V
Scheduling policies– techniques, standard scheduling methods. Line Balancing, aggregate planning, chase planning, expediting.
UNIT – VI
Dispatching– activities of dispatcher – dispatching procedure – follow up – definition – reasons for existence of functions – applications of computers in production planning and control.

TEXT BOOKS:
1. Elements of Production Planning and Control / Samuel Eilon.
2. Manufacturing, Planning and Control, Partik Jonsson Stig-Arne Mattsson, Tata Mc Graw Hill

Semester	VIII	L	T	P	C	Course Code
Regulation	**V18**	**3**	**0**	**0**	**3**	**V18MET36**
Name of the Course	**Energy Conservation and Management** Professional Elective – V					
Branch	**Mechanical Engineering**					

Course Outcomes:
After Successful completion of this course the student will be able to

CO1	Understand the principles of Energy.	K2
CO2	Evaluate thermal Performance.	K5
CO3	Illustrate Energy Conservation Program.	K3
CO4	Predict the Energy Conservation Options	K2
CO5	Recognise the Strategies for Electricity and Management	K2
CO6	Express the Importance and Role of Energy Management	K2

UNIT-I
Energy scenario, Principles of energy conservation, Energy consumption pattern, Resource availability.

UNIT-II
Calculation of thermal performance, calculation of heat loss – heat gain, estimation of annual heating & cooling load factors that influence thermal performance, analysis of existing buildings.

UNIT-III
Organizing for energy conservation program, the energy audit and energy information system, technology for energy conservation, co-generation of process, steam & electricity, computer controlled energy.

UNIT-IV
Commercial options in waste heat recovery equipment, cases of energy studies, energy conservation opportunity, Energy conservation in I. C. Engine.

UNIT-V
Strategies for electricity and management, setting up an energy management programme, electricity saving technique by category of end use, Electrical end use in industries, energy & power management in industry, energy management strategies for industry, demand management.

UNIT-VI
Importance and role of energy management, Energy economics, Payback period, Internal rate of return, life cycle costing.

TEXT BOOKS:

1. Hamies, Energy Auditing and Conservation, Methods, Measurements, Management and Case Study, Hemisphere,Washington, 1980
2. W.F.Kenny, Energy Conservation in Process Industry.
3. Trivedi, P.R, Jolka K.R., Energy Management, Commonwealth Publication, New Delhi, 1997.
4. C.B.Smith, Energy Management Principles, Pergamon Press, New York, 1981.

REFERENCE BOOKS:

1. W.C. Turner, Energy Management, Hand Book.
2. Kreith, Economics of Solar Energy and Conservation Systems, Vol -3.
3. Witte, Larry C, Industrial Energy Management and Utilization, Hemisphere Publishers, Washinton, 1988.

Annexure-ME-II

Course offered in OPEN ELECTIVE - II & III in VII & VIII sem B.Tech., under V18 Regulations
VII SEMESTER

Semester	VII	L	T	P	C	Course Code
Regulation	**V18**	**3**	**0**	**0**	**3**	**V18MEOE4**
Name of the Course	**Computer Aided Design** Open Elective – II					
Branch	**Common to all except Mechanical Engineering**					

Course Outcomes:
After successful completion of the course, the student will be able to

CO1	Explain the basic fundamentals of CAD tools	K2
CO2	Find the characteristics of curves, Representation and continuity requirements	K3
CO3	Illustrate the Geometric Transformations.	K3
CO4	Demonstrate various types of surfaces and Representation.	K3
CO5	Differentiate between the methods of representing Solid Modelling.	K4
CO6	Apply the local and global properties for product development	K3

UNIT – I
CAD Introduction: Need of machine design, use of computer, computer fundamentals, computer aided design process, CAD configuration, and CAD tools, positive and negative points of CAD, CAD and CAM integration.

UNIT – II
DESIGN OF CURVES: Fundamental of Curve Design, Parametric Space of a Curve, Representation, Parametric cubic curve, Blending functions, Truncation, extension, and subdivision, composite curve: continuity requirements .

UNIT – III
GEOMETRIC TRANSFORMATIONS: Translation, Rotation, Scaling Symmetry and Reflection, Homogeneous Transformations. Orthographic Projections, Axonometric Projections, Oblique Projections, Perspective Transformation.

UNIT – IV
DESIGN OF SURFACES: Fundamental of Surface Design, Parametric Space of a Surface, Representation of a Surface patch, sixteen point form, Four Curve Form, Plane.

UNIT – V
SOLID MODELLING: Solid Modelling fundamentals, topology and geometry. Geometric Modelling Method, Constructive Solid Geometry (CSG), Boundary Representation (Brep), Introduction to Wireframe, surface and solid modelling techniques. Introduction CAD data exchange format IGES, STEP

UNIT – VI

GEOMETRIC PROPERTIES: Local and global properties of a curve, Local and global properties of a surface, Global properties of complex solids, Relational properties, intersections. Applications in Product Development and other areas.

REFERENCE BOOKS:

1. Geometric Modeling: Michael E. Mortenson, Third Edition, Industrial Press Inc.2006.
2. Mathematical Elements of Computer Graphics, Rogers and Adams, McGraw Hill. 1994
3. CAD CAM Theory and Prectice: I. Zeid, Tata-McGraw Hill, 2006
4. Computer-Aided Engineering Design, B Sahay and ASaxena, Springer, 2005.
5. Differential Geometry of Curves and Surfaces, Thomas F. Banchoff and Stephen T. Lovett, Thomas Banchoff-Stephen Lovett, 2010.
6. Computational Geometry for Design and Manufacture, I.D. Faux and M.J. Pratt, John Wiley, 1980.
7. Lectures on Classical Differential Geometry, Dirk J. Struick, Addison Wesley, 1980.

Semester	VII	L	T	P	C	Course Code
Regulation	V18	3	0	0	3	V18MEOE5
Name of the Course	**Condition Monitoring and Machine Learning** Open Elective – II					
Branch	**Common to all except Mechanical Engineering**					

Course Outcomes:
After successful completion of the course, the student will be able to

CO1	Understand various condition monitoring techniques	K2
CO2	Demonstrate the construction and principle of working of sensors for condition monitoring.	K3
CO3	Interpret the concepts of signal processing analysis	K3
CO4	Assess various failure analysis and maintenance.	K3
CO5	Examine the elements of Machine condition monitoring	K3
CO6	Examine the concepts of machine learning systems for signal analysis and fault detection systems	K3

UNIT – I
CONDITION MONITORING TECHNIQUES: Introduction, Condition Monitoring in manufacturing industries; Noise monitoring, Wear and debris Analysis, Thermography, Cracks monitoring, Ultrasonic techniques - Case studies.

UNIT – II
SENSORS FOR CONDITION MONITORING: Accelerometers, strain gauges, eddy current probes, LVDT for measurement of displacement, velocity and acceleration; Temperature transducers, radiation pyrometers and thermal imaging devices.

UNIT – III
SIGNAL PROCESSING: Study of periodic and random signals, probability distribution, statistical properties, auto and cross correlation and power spectral density functions.
SIGNAL ANALYSIS: Time domain and Frequency domain and Time-frequency domain analysis

UNIT – IV
FAILURE ANALYSIS AND MAINTENANCE: Maintenance Principles, Failure mode analysis - Equipment down time analysis – Breakdown analysis - condition based maintenance.

UNIT – V
MACHINE CONDITION MONITORING: Vibration, Acoustic emission and vibro-acoustics signal analysis; intelligent fault detection system, Case studies.

UNIT – VI

MACHINE LEARNING: Vibration, Acoustic emission and vibro-acoustics signal analysis; intelligent fault detection system, Case studies.

TEXT BOOKS:

1. EthemAlpaydin, Introduction to Machine Learning (2010), The MIT Press, Cambridge, London.

REFERENCE BOOKS:

1. K. P. Soman, Data mining theory and practice (2006), Prentice-Hall of India.
2. Amiya RanjanMohanty, Machinery Condition Monitoring: Principles and Practices (2015), CRC Press
3. Mishra, R.C., Pathak, K., Maintenance Engineering and Management (2012), Prentice Hall of India.
4. Clarence W. De Silva, Sensors and Actuators: Control System Instrumentation (2007), CRC Press – Taylor and Francis Group.
5. Boualem Boashash, Time Frequency Signal Analysis and Processing: A Comprehensive Reference (2015), Elsevier.

VIII SEMESTER

Semester	VIII	L	T	P	C	Course Code
Regulation	**V18**	**3**	**0**	**0**	**3**	**V18MEOE6**
Name of the Course	**Power Plant Engineering** Open Elective – III					
Branch	**Common to all except Mechanical Engineering**					

Course Outcomes:
After successful completion of the course, the student will be able to

CO1	Explain the working and layout of steam power plant and the different systems comprising the plant.	K2
CO2	Outline the working principle of diesel power plant and its layout.	K2
CO3	Illustrate the working and layout of gas turbine power plant and various auxiliaries comprising the plant.	K3
CO4	Construct the working principle and basic components of the hydro electric plants.	K3
CO5	Describe the and basic components and working principle of different reactors of nuclear power plant.	K2
CO6	Outline the power plant economics .	K4

UNIT – I
Introduction to the Sources of Energy.
Steam Power Plant: Plant layout, working of different circuits, coal handling equipment, ash handling systems, overfeed and underfeed fuel beds, types of stokers, dust collectors, cooling towers and feed water treatment.

UNIT – II
Diesel power Plant: IC Engines, types, Plant layout with auxiliaries – fuel supply system, air starting equipment, lubrication and cooling system, super charging.

UNIT – III
Gas Turbine Plant: Introduction, classification, construction, Layout with auxiliaries, Principles ofworking of closed and open cycle gas turbines, combined cycle power plants and comparison.

UNIT – IV
Hydro Electric Power Plant: Water power , hydrological cycle, hydrographs, classification of dams and spill ways.
Hydro Projects and Plant: Classification – typical layouts – plant auxiliaries – plant operation pumped storage plants.

UNIT – V

Nuclear Power Station: Nuclear fuel – breeding and fertile materials, nuclear reactor – reactor operation. Types of reactors and their operation - Pressurized water reactor, boiling water reactor, sodium-graphite reactor, fast breeder reactor. Radiation hazards and shielding, radioactive waste disposal.

UNIT – VI

Power Plant Economics: Capital cost, investment of fixed charges, operating costs, general arrangement of power distribution, load curves, load duration curve, definitions of connected load, maximum demand, demand factor, average load, load factor, diversity factor – related exercises.

TEXT BOOKS:

1. A course in Power Plant Engineering /Arora and Domkundwar/Dhanpatrai& Co.
2. Power Plant Engineering /P.C.Sharma / S.K.Kataria Pub

REFERENCE BOOKS:

1. Power Plant Engineering: P.K.Nag/ TMH.
2. Power station Engineering – M.M.Ei-Wakil / McGrawHill.

Semester	VIII	L	T	P	C	Course Code
Regulation	V18	3	0	0	3	V18MEOE7
Name of the Course	**Mechatronics** Open Elective – III					
Branch	**Common to all except Mechanical Engineering**					

Course Outcomes:
After successful completion of the course, the student will be able to

CO1	Understand the elements of Mechatronics & levels and explain various types of sensors , transducers and Mechatronics design process	K2
CO2	Sketch and explain various types of solid state devices like Diode, BJT, MOSFET, etc.,	K3
CO3	Illustrate and explain basic principles of Hydraulic, pneumatic, electro hydraulic, electro hydraulic servo actuating systems.	K3
CO4	Illustrate and explain microprocessors, microcontrollers and PLC	K3
CO5	Sketch and explain System interfacing and data acquisition systems.	K3
CO6	Sketch and explain Digital Controllers and Design of mechatronics systems.	K3

UNIT – I
MECHATRONICS SYSTEMS – elements & levels of mechatronics system, Mechatronics design process, system, measurement systems, control systems, advantages and disadvantages of mechatronics systems. Sensors and transducers, types, displacement, velocity, force, acceleration, liquid flow, liquid level, temperature and light sensors.

UNIT– II
SOLID STATE ELECTRONIC DEVICES - PN junction diode, BJT, FET, Analog signal conditioning, operational amplifiers, filters.

UNIT– III
HYDRAULIC AND PNEUMATIC ACTUATING SYSTEMS - Fluid systems, Hydraulic systems, and pneumatic systems, components, control valves, electro-pneumatic, hydro-pneumatic, electro-hydraulic servo systems.

UNIT– IV
DIGITAL ELECTRONICS AND SYSTEMS - Digital logic control, micro processors and micro controllers, programming, programmable logic controllers, PLCs versus computers, application of PLCs for control.

UNIT– V
SYSTEM AND INTERFACING AND DATA ACQUISITION – Data Acquisition Systems, Analog to Digital and Digital to Analog conversions; Digital Signal Processing.

UNIT– VI

DYNAMIC MODELS AND ANALOGIES - System response. Process Controllers – Digital Controllers, Programmable Logic Controllers, Design of mechatronics systems & future trends.

TEXT BOOKS:

1. MECHATRONICS Integrated Mechanical Electronics Systems/KP Ramachandran, GK Vijaya Raghavan & MS Balasundaram/WILEY India Edition

REFERENCE BOOKS:

1. Mechatronics /Smaili A, Mrad F/ Oxford Higher Education, Oxford University Press
2. Mechatronics Source Book / Newton C Braga/Thomson Publications,Chennai.
3. Mechatronics – N. Shanmugam / Anuradha Agencies Publishers.
4. Mechatronics System Design / Devdas shetty/Richard/Thomson.
5. Mechatronics/M.D.Singh/J.G.Joshi/PHI.
6. Mechatronics – Electronic Control Systems in Mechanical and Electrical Engg. 4th Edition / W. Bolton/ Pearson, 2012
7. Mechatronics – Principles and Application / Godfrey C. Onwubolu/Elsevier, Indian print

Annexure – ME-III

Course structure & Syllabi for the courses offered in III & IV semesters B. Tech under V20 Regulations

Course Structure of Mechanical Engineering – V20 Regulation
(For 2020 – 2021 Admitted Batch)

III SEMESTER							
S.No	**Category**	**Course Code**	**Course Title**	**Hours per week**			
				L	**T**	**P**	**C**
1	Basic Science Course / Prof core course	V20MET03	Metallurgy and Material Science	3	0	0	3
2	Engineering Science Course	V20MET04	Mechanics of Solids	3	0	0	3
3	Professional Core Course	V20MET05	Fluid Mechanics with Machine Learning	3	0	0	3
4	Professional Core course	V20MET06	Thermodynamics	3	0	0	3
5	Humanities and Social Sciences	V20MBT51	Managerial Economics and Financial Analysis (Under BOS of MBA)	3	0	0	3
6	Professional Core course (LAB)	V20MEL02	Fluid Mechanics & Hydraulic Machines Lab	0	0	3	1.5
7	Professional Core course (LAB)	V20MEL03	Mechanics of Solids & Materials Engineering Lab	0	0	3	1.5
8	Professional Core course (LAB)	V20MEL04	Machine drawing	0	0	3	1.5
9	**Skill oriented course***	V20MESOC1	Certificate course offered by industries/Professional bodies/APSSDC or any other accredited bodies.	**1**	**0**	**2**	**2**
10	Mandatory course	V20ENT02	PCS-I (Under BOS of English)	2	0	0	MNC
Total Credits				18	0	11	21.5

Total Contact Hours: 29 Total Credits: 21.5

IV SEMESTER							
S.No	**Category**	**Course Code**	**Course Title**	**Hours per week**			
				L	**T**	**P**	**C**
1	Basic Science course	V20MAT04	Probability and Statistics (Under BOS of BSH)	3	0	0	3
2	Professional Core course	V20MET07	Kinematics of Machinery	3	0	0	3
3	Professional Core course	V20MET08	Manufacturing Science with Artificial Intelligence	3	0	0	3
4	Professional Core course	V20MET09	Mechanical measurements and Metrology	3	0	0	3
5	Professional Core course	V20MET10	Applied Thermodynamics	3	0	0	3
6	Engineering Science Course/Prof Core (Interdisciplinary) (LAB)	V20MEL05	Mechanical measurements and Metrology lab	0	0	3	1.5
7	Professional Core course (LAB)	V20MEL06	Manufacturing Process Lab	0	0	3	1.5
8	Professional Core course (LAB)	V20MEL07	Thermal Engineering Lab	0	0	3	1.5
9	**Skill oriented course***	V20MESOC2	Certificate course offered by industries/Professional bodies/APSSDC or any other accredited bodies.	**1**	**0**	**2**	**2**
10	Mandatory course	V20ENT03	PCS-II (Under BOS of English)	**2**	**0**	**0**	**MNC**
Total Credits				18	0	11	21.5
Internship 2 months (Mandatory) during summer vacation							

Total Contact Hours: 29 Total Credits: 21.5

Syllabi for the courses offered in III & IV semester B. Tech under V20 Regulation for the Academic Year 2021-2022
III Semester

Semester	III	L	T	P	C	Course Code
Regulation	V20	3	0	0	3	V20MET03
Name of the Course	Metallurgy and Material Science					
Branch	Mechanical Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to:	Knowledge Level
CO1	Explain the types of bonds in solids and crystallization of Metals.	K2
CO2	Construct phase diagrams for the study of alloys and phase Transformation reactions.	K2
CO3	Use different ferrous and nonferrous metals based on properties for various applications	K3
CO4	Apply suitable heat treatment process to achieve desired properties of metals and alloys.	K3
CO5	Illustrate the properties and applications of composites and Ceramic materials and understand the concepts of powder metallurgy.	K2

UNIT – I
INTRODUCTION TO METALLURGY AND MATERIAL SCIENCE: Structure of Metals, Properties of metals, Types of Bonds in Solids, Crystal geometry – Space Lattices, Unit cells, Crystal Structure, Miller indices. Imperfections in crystals-Line defects, Point defects, Surface defects. Crystallization of metals, grain, grain boundaries and their properties. Constitution of alloys: Necessity of alloying, types of solid solutions, Hume Rotherys rules.

UNIT – II
EQUILIBRIUM DIAGRAMS: Experimental methods of construction of equilibrium diagrams, phase rule, Isomorphous alloy systems, Lever rule, eutectic systems, peritectic reaction. Transformations in the solid state – allotropy, eutectoid, peritectoid reactions, Study of important binary phase diagrams of Cu-Ni, Al- Si, and Fe-Fe3C.

UNIT – III
FERROUS, NONFERROUS METALS AND THEIR ALLOYS: Production of Iron and steel: Blast furnace, Cupola, Electric furnace and Induction furnace, Types of Cast irons- White, Grey, Malleable and Nodular Cast Irons, Properties and application of cast irons, Effect of alloying elements on structure and properties

of steels, Properties and uses of Silicon and Hadfield Manganese steels, High speed steels and Stainless steel. Properties and uses of important non-ferrous metals like Cu, Al, Pb, Sn, Zn. Study of important non-ferrous alloys: Brass & Bronzes, Bearing alloys, Al alloys & Ti alloys.

UNIT – IV

HEAT TREATMENT OF FERROUS AND NON-FERROUS ALLOYS: Types of heat treatment processes, Annealing, normalizing, hardening, tempering, hardenability, surface - hardening methods, TTT diagrams, Age hardening treatment

UNIT – V

ADVANCED MATERIALS: Composites and its classification, methods of manufacturing of composites – stir casting method, hand layup process, filament winding process. Properties and applications of crystalline ceramics, shape memory alloys, Bio materials and nano-materials

POWDER METALLURGY: Introduction, Steps in Powder metallurgy, Powder characterizations, powder compact methods.

TEXT BOOKS:

1. Introduction to Physical Metallurgy/ Sidney H.Avner/ 2nd edition, McGraw Hill Education (India) Private Limited/2016.
2. Materials Science and Engineering/William D Callister (Adapted by R. Bala subramaniam) /Wiley Inida (P) Ltd/ 2007
3. Material Science and Metallurgy/ Dr.V.D.Kodgire/40th edition, Everest Publishing House/2017

REFERENCE BOOKS

1. Materials Science and Engineering/ V. Raghavan /5th Edition) Prentice-Hallof India Pvt. Ltd/2004.
2. Essential of Materials science and engineering /Donald Askeland/2nd edition Thomson/2014
3. Engineering mechanics of Composite Materials/Isaac M.Daniel,Ori Ishai/ 5th edition/Oxford Publications/2015.

Semester	III	L	T	P	C	Course Code
Regulation	V20	3	0	0	3	V20MET04
Name of the Course	Mechanics of Solids					
Branch	Mechanical Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge Levels
CO1	Illustrate concept of stress and strain of composite bars.	K3
CO2	Solve shear force and bending moment in beams.	K3
CO3	Calculate flexural and shear stresses in a beam and understand the torsional rigidity of shaft.	K3
CO4	Analyze the principal stresses in structural members.	K4
CO5	Solve the buckling load capacity of columns, and longitudinal stress and strains in thin cylinders.	K3

UNIT – I

SIMPLE STRESSES & STRAINS: Definitions of stress and strain – types of stresses and strains – Elasticity –Hooke's law–Stress–Strain diagram for Mild steel – working stress- factor of safety-Lateral strain–Poisson's ratio and volumetric strain – Elastic Moduli and the relationship between elastic constants–Bars of varying section – composite bars – temperature stresses.
STRAIN ENERGY: Definition – Resilience – Strain Energy due to gradually applied; suddenly applied and impact loads–simple applications.

UNIT – II

SHEAR FORCE & BENDING MOMENT DIAGRAMS: Definition of beam –Types of beams – concept of SF and BM – SF & BM diagrams for cantilever, Simple support and over hanging beams subject end point loads, Uniform distributed load (UDL), uniformly varying loads– point of contra flexure –Relationship between S.F, BM and rate of loading.

UNIT – III

FLEXURAL STRESSES: Theory of simple Bending – Assumptions–Derivation of Bending equation – Neutral axis – Determination of bending stresses – section modulus of rectangular, Circular sections (Solid and Hollow), I and T channel sections.
DEFLECTION OF BEAMS: Relation between curvature, slope and deflection; Slope and deflection of cantilever, simply supported with point and U.D.L– Macaulay's method.

UNIT – IV

PRINCIPAL STRESSES AND STRAINS: Introduction – stresses on an inclined section of a bar under axial loading - compound stresses - Normal and tangential stresses on an inclined plane for biaxial stresses-Two perpendicular normal stresses–representation of stress on Mohr's circle diagram, Introduction to theories of Failure.

UNIT – V

COLUMNS: Buckling and Stability, Columns with Pinned ends, Columns with other support Conditions, Limitations of Euler's Formula, Rankine's Formula.

THIN CYLINDERS: Thin seamless cylindrical shells– Derivation of formula for longitudinal and circumferential stresses – hoop, longitudinal and volumetric strains – changes in diameter, and volume of thin cylinders.

TEXT BOOKS:

1. Strength of materials/R.K.Bansal/LaxmiPublications5th edition/2017
2. Mechanics of Materials/Gere and Timoshenko,/TMH4thedition/2010
3. Strength of materials/ S.Ramamrutham/Dhanpatrai publishers 1stedition /2016

REFERENCE BOOKS:

1. Solid Mechanics, by Popov/PHIpublications2nd edition/2017.
2. Introduction to Solid Mechanics / Irving H Shames/ 4th edition PEARSON /2014.
3. Strengthofmaterials/Young,D.H.Timoshenko,Stephen/CBSpublishers/2002

Semester	III	L	T	P	C	Course Code
Regulation	V20	3	0	0	3	V20MET05
Name of the Course	Fluid Mechanics with Machine Learning					
Branch	Mechanical Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge Levels
CO1	Explain the concepts of fluid properties and measurement of pressure.	K2
CO2	Describe the types of flows, lines & apply equations of fluid mechanics and its applications.	K3
CO3	Calculate losses and force on different types of vanes.	K3
CO4	Calculate the performance of turbines.	K3
CO5	Calculate the performance of pumps & understand hydraulic systems.	K3

UNIT – I

FLUID STATICS: Dimensions and units-Physical properties of fluids-Density, Specific gravity, Viscosity, Surface tension, Vapour pressure, Capillarity, Bulk modulus. Pressure types-Atmospheric, absolute, gauge and vacuum pressure and measurement of pressure-Piezometer, different types of manometers.

UNIT – II

FLUID KINEMATICS: stream line, path line and steak line and stream line, classification of flows steady &un steady, uniform & non uniform, laminar & turbulent, rotational & irrotational flows-equation of continuity for one dimensional flow and three dimensional flow. Equation of continuity in differential form.

FLUID DYNAMICS: Surface and body forces, Bernouli's equation along a stream line, Momentum equation, application of momentum equation on pipe bend. Measurement of flow: Pitot tube, Venturimeter, Orifice meter.

UNIT – III

CLOSED CONDUIT FLOW: Reynolds experiments, Darcy-Weisbach equation, Major and minor losses, Hydraulic gradient line, Total energy line, Pipes in series and parallel.

BASICS OF TURBO-MACHINERY: Determination of hydrodynamic force of jet on stationary and moving flat, inclined, curved vanes (jet striking at tip and centre), velocity diagrams, work done and efficiency, flow over radial vanes, series of vanes.

UNIT – IV

TURBINES AND PUMPS: Classification of turbines, Pelton wheel, Francis turbine, Kaplan turbine- working proportions, work done, efficiencies. Draft tube-types, functions and efficiency.

CENTRIFUGAL PUMPS: Working, work done, heads, efficiencies, losses.

RECIPROCATING PUMPS: Working, work done, slip, indicator diagrams.

UNIT – V

FUNDAMENTALS OF MACHINE LEARNING: Supervised, semi-supervised and supervised learning.

MACHINE LEARNING FOR FLUID MECHANICS: Introduction, historical developments, challenges and opportunities; concepts of flow modelling and flow optimization & control.

TEXT BOOKS:

1. Hydraulics, Fluid mechanics and Hydraulic machinery – Modi & Seth.
2. Fluid mechanics and Hydraulic machines – R.K. Bansal.
3. Introduction to Fluid mechanics and fluid machines – S.K. Som & G. Biswas. (Tata –Mcgrawhill)
4. Ethem Alpaydin, Introduction to Machine Learning , MIT Press, Prentice Hall of India, Third Edition 2014.

REFERENCE BOOKS:

1. Fluid mechanics and machinery – G. Ramadurgaih (New age international publishers)
2. Fluid mechanics and fluid power engineering – D.S.Kumar (S.K. Kataria and sons)

Semester	III	L	T	P	C	Course Code
Regulation	V20	3	0	0	3	V20MET06
Name of the Course	Thermodynamics					
Branch	Mechanical Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge Levels
CO1	Discuss the basic terms related to work and heat.	K2
CO2	Explain first law of thermodynamics and internal energy.K2	K2
CO3	Apply the second law of thermodynamics to basic thermal systems.	K3
CO4	Analyze various thermodynamic cycles.	K4
CO5	Discuss about pure substance.	K2

UNIT – I

Thermodynamic System, boundary, Surrounding, control volume, Universe, Types of Systems, Macroscopic and Microscopic viewpoints, Concept of Continuum, Thermodynamic Equilibrium, State, Property, Process, Cycle – Reversibility – Quasi – static Process, Irreversible Process, Causes of Irreversibility – Energy in State Work and Heat, Point and Path function. Zeroth law of thermodynamics.

UNIT – II

Joule's Experiments – First law of Thermodynamics –First law applied to a Process – First law applied to a flow system –Energy balance for closed systems-Specific heats at constant volume and pressure - Internal energy and Enthalpy, Some steady flow energy equation applied to Nozzle, Turbine, Compressor and heat exchanger devices, PMM-I, Limitations of the First Law – Thermal Reservoir, Heat Engine, Heat pump, Parameters of performance.

UNIT – III

Second Law of Thermodynamics, Kelvin-Planck and Clausius Statements and their Equivalence / Corollaries, PMM of Second kind, Carnot's principle, Carnot cycle and its specialties, Clasius theorem Clausius Inequality, Entropy, Principle of Entropy Increase, availability and irreversibility(Basic definitions), T-ds relations, Helmholtz and Gibbs functions, Gibbs relations, Maxwell relations, Elementary Treatment of the Third Law of Thermodynamics.

UNIT – IV

THERMODYNAMIC CYCLES: Carnot vapor cycle, ideal Rankine cycle, Rankine reheat cycle, air-standard Otto cycle, air-standard Diesel cycle, air-standard Brayton cycle, vapor-compression refrigeration cycle.

UNIT – V

PURE SUBSTANCES: P-V-T- surfaces, T-S and h-s diagrams, Mollier Charts, Phase Transformations, Triple point and critical point, properties during change of phase, Dryness Fraction, Clausius – Clapeyron Equation.

TEXT BOOKS:

1. Engineering Thermodynamics, PK Nag 5th Edn, TMH,2014.
2. Thermodynamics, An engineering Approach, Y.A. Cengel& M.A. Boles, 7th Edn- McGraw Hill, 2014.
3. Internal Combustion Engine –V Ganeshan.4th edition, TMH, 2016

REFERENCE BOOKS:

1. Engineering Thermodynamics by Y.V.C. Rao, 1st edition, Universities, 2005.
2. A text book of Engineering thermodynamics, R.K Rajput, 4th edition, Lakshmi Publishers, 2010.

Semester	III	L	T	P	C	Course Code
Regulation	V20	0	0	3	1.5	V20MEL02
Name of the Course	Fluid Mechanics & Hydraulic Machines Lab					
Branch	Mechanical Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge Levels
C01	Determine the force exerted by jet, friction factor, loss of head due to sudden contraction.	K3
C02	Examine and Analyze the performance of pumps and turbines.	K3
C03	Calibrate different flow measuring devices.	K3

1. Determination of force exerted by jet on a flat vane.
2. Determination of loss of head due to sudden contraction.
3. Determination of friction factor.
4. Calibration of Venturimeter.
5. Calibration of Orifice meter.
6. Calibration of Turbine flow meter.
7. Analyze the performance of single stage centrifugal pump.
8. Analyze the performance of multi stage centrifugal pump.
9. Analyze the performance of reciprocating pump.
10. Analyze the performance of Pelton wheel.
11. Analyze the performance of Francis turbine.

Semester	III	L	T	P	C	Course Code
Regulation	V20	0	0	3	1.5	V20MEL03
Name of the Course	Mechanics of Solids & Materials Engineering Lab					
Branch	Mechanical Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge Levels
CO1	Assess the Mechanical properties of different metals.	K3
CO2	Examine the micro structures of different Ferrous and non Ferrous metals.	K3
CO3	Identify the effect of heat treatment and cooling rates on the Properties of steels.	K4

NOTE: Any 6 experiments from each section A and B.

A) MECHNICS OF SOLIDS LAB:

1. Direct tension test
2. Bending test
a) Simply supported beam
b) Can til ever beam
3. Torsion test
4. Hardness test
a) Brinell hardness test
b) Rockwell hardness test
5. Test on springs
6. Compression test on cube
7. Impact test
8. Punch shear test

B) METALLURGY LAB:

1. Preparation and study of the Micro Structure of pure metals like Iron, Cu and Al.
2. Preparation and study of the Micro structure of Mild steels, Medium carbon steels, and \high–Csteels.
3. Study of the Micro Structures of Cast Irons.
4. Study of the Micro Structures of Non-Ferrous alloys–Brass and Bronze.
5. Study of the Micro structures of Heat treated steels.
6. Hard enability of steels by Jominy End Quench Test.
7. To find out the hardness of various treated and untreated steels.

REFERENCE BOOKS:

1. Strength of materials, S.S.Bhavikatti Vikas Publications, 4th edition, 2013.
Material Science and Metallurgy, Dr.V.D.Kodagire, Everest Publishing House, 40th Edition, 2017

Semester	III	L	T	P	C	Course Code
Regulation	**V20**	**0**	**0**	**3**	**1.5**	**V20MEL04**
Name of the Course	**Machine Drawing**					
Branch	**Mechanical Engineering**					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge Levels
CO1	Identify the national and international standards pertaining to machine drawing.	K2
CO2	Illustrate the importance of the linking functional and visualization aspects in the preparation of the part drawings	K3
CO3	Apply limits and tolerances to assemblies and choose appropriate fits for given assemblies.	K3
CO4	Interpret the Machining and surface finish symbols on the component drawings.	K3
CO5	Develop the part or assembly drawings as per the conventions.	K3

INTRODUCTION: (AUTO CAD or any other drafting Software)
Review of graphic interface of the software. Review of basic sketching commands and navigational commands. Starting a new drawing sheet. Sheet sizes. Naming a drawing, Drawing units, grid and snap. Conversion of pictorial views into orthographic projections of simple machine parts (with and without section). Hidden line conventions. Precedence of lines

PART-A

SECTIONS OF SOLIDS: Sections of Pyramids, Prisms, Cubes, Tetrahedrons, Cones and Cylinders resting only on their bases (No problems on axis inclinations, spheres and hollow solids). True shape of sections. Conversion of pictorial views into orthographic projections of simple machine parts. Hidden line conventions. Precedence of lines. Conversion of pictorial views into orthographic projections of simple machine parts (with section planes indicated on the part).

THREAD FORMS: Thread terminology, sectional views of threads. ISO Metric (Internal & External), BSW (Internal & External) square and Acme. Sellers thread, American Standard thread.

FASTENERS: Hexagonal headed bolt and nut with washer (assembly), square headed bolt and nut with washer (assembly) simple assembly using stud bolts with nut and lock nut. Flanged nut, slotted nut, taper and split pin for locking, counter sunk head screw, grub screw, Allen screw.

KEYS: Parallel key, Taper key, Feather key, Gib-head key and Woodruff key.

JOINTS: Cotter joint (socket and spigot), knuckle joint (pin joint) for two rods. Couplings: Split Muff coupling, Protected type flanged coupling, pin (bush) type flexible coupling, and universal coupling (Hooks' Joint)

PART-B
Limits, Fits and Tolerances: Introduction, Fundamental tolerances, Deviations, Methods of placing limit dimensions, machining symbols, types of fits with symbols and applications, geometrical tolerances on drawings. Standards followed in industry.

Assembly Drawings (Any modeling software)
1. Plummer block (Pedestal Bearing)
2. Stuffing box
3. Propeller Blade
4. Spur Gear
5. Tailstock of lathe
6. Machine vice
7. Tool head of shaper

TEXT BOOKS:
1. Machine drawing _ K.L. Narayana, P. Kannaiah& K.Venkata reddy, 1st edition, Radiant, 2016
2. Tool Engineering & Design _ G.R. Nagpal/Khanna publishers, 1st edition, Khanna Publishers,2009
3. Machine Drawing with Auto CAD- Pohit and Ghosh, 1st edition, Pearso, 2017

REFERENCE BOOKS:
1. Machine Drawing by Nagpal,1st edition, khanna publishers, 2009
2. Machine drawing, Ajeet Singh, 2nd edition, TMH, 2016
3. Machine drawing with autocad, Pohit; Goutam, 1st edition, Pearson, 2017.

IV Semester

Semester	IV	L	T	P	C	Course Code
Regulation	V20	3	0	0	3	V20MET07
Name of the Course	Kinematics of Machinery					
Branch	Mechanical Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to:	Knowledge Level
CO1	Explain the inversion of the four bar, slider crank and double slider chains.	K2
CO2	Analyze and perform the velocities and accelerations in mechanisms by graphical method.	K4
CO3	Explain the working of copying mechanism, straight line motion mechanisms, steering gears and Hooke's joint.	K2
CO4	Develop the cam profiles for given follower motions.	K3
CO5	Describe tooth profiles for gears, gear trains and compute the velocity ratio and torque in gear trains and calculate various parameters related to belts.	K3

UNIT – I

MECHANISMS : Introduction, terminology, definitions and assumptions, planar, spherical and spatial mechanisms, mobility, classification of mechanisms, kinematic inversion, inversions of four bar chain, slider crank chain and double slider chain, Grashoff's law, mechanical advantage.

UNIT – II

VELOCITY ANALYSIS : Introduction, Absolute and relative motions, Vectors, Addition and subtraction of vectors, Motion of a link, Four-link mechanism, Velocity diagrams, Angular velocity of links, Velocity of rubbing, Slider-crank mechanism, crank and slotted lever mechanism, Instantaneous center, Kennedy's theorem, Locating I-centers, Angular velocity ratio theorem.

ACCELERATION ANALYSIS: Introduction -Acceleration, four-link mechanism, Acceleration of intermediate and offset points, Slider-crank mechanism, Coriolis component, Crank and slotted lever mechanism using graphical method, Klein's Construction.

UNIT – III

LOWER PAIRS: Pantograph, Exact straight line mechanism condition, Peaucellier, Hart Scott-Russel mechanisms. Approximate straight line mechanisms, Grasshopper, Watt, Chebyshev, Robert mechanisms. Steering gears-condition for correct steering, Davis, Ackerman steering gears, Hooke's joint-velocity ratio, angular acceleration of driven shaft, double Hooke's joint.

UNIT – IV

CAMS: Types of cams and followers, types of follower motion, velocity and acceleration diagrams, profile of cams.

UNIT – V

GEARS: Classification of gears, spur gears- terminology, fundamental law of toothed gearing, involute and cycloidal profile, Path of contact, arc of contact, contact ratio, minimum number of teeth, interference and methods of avoiding interference, rubbing velocity.

GEAR TRAINS: Introduction, Types - Simple , compound and reverted gear trains , Epicyclic gear train.
BELT DRIVES: Belt and rope drives, open and crossed belt drives, velocity ratio, slip, material for belts and ropes, crowning of pulleys, ratio of friction tensions, power transmitted, centrifugal effect on belts, maximum power transmitted by a belt, initial tension.

TEXT BOOKS:
1. Theory of Machines/ Rattan SS, Tata McGraw Hill Education Publishers, 4th Edition 2015.
2. Theory of Machines / Beven Thomos / CBS publication, 3rd edition /2005

REFERENCE BOOKS:
1. Theory of Machines / R.K.Bansal/ Laxmi Publications 5th edition /2016
2. Mechanisms of Machines, V Ramamurthy, Narosa publishing House, Reprint ,2019
3. Theory of Machines by R S Khurmi, S Chand Publications, 1st Edition, 2011.
4. Theory of Machines and Mechanisms, Ballaney P, Khanna publications,1st Edition,2011.

Semester	IV	L	T	P	C	Course Code
Regulation	V20	3	0	0	3	V20MET08
Name of the Course	Manufacturing Science with Artificial Intelligence					
Branch	Mechanical Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to:	Knowledge Level
CO1	Understand fundamentals of casting-patterns and its materials, Gating System	K2
CO2	Distinguish various welding processes and select a suitable process based on the application and requirements, explain advanced welding techniques, testing methods	K2
CO3	Explain the knowledge on Hot working and Cold Working Process	K3
CO4	Describe various bulk forming processes, sheet metal forming and processing of plastics.	K2
CO5	Apply the concepts of Artificial intelligence in manufacturing processes.	K3

UNIT – I

CASTING - Steps involved in making a casting, types of sands – Advantage of casting and its applications.
PATTERNS AND PATTERN MAKING – Types of patterns – Materials used for patterns, pattern allowances and their construction, risers, Centrifugal, Die, Investment castings.
PRINCIPLES OF GATING – Gating ratio and design of Gating systems.
METHODS OF MELTING – Crucible melting and cupola operation.
SOLIDIFICATION OF CASTING – Concept – Solidification of pure metal and alloys.

UNIT – II

WELDING: Classification of welding process types of welds and welded joints and their characteristics, design of welded joints Gas welding, ARC welding, Forge welding, resistance welding, Thermit welding, Inert Gas welding - TIG & MIG, welding, Laser welding, Soldering & Brazing. welding defects, destructive non-destructive testing of welds.

UNIT – III

HOT & COLD WORKING: strain hardening, recovery, re-crystallization and grain growth, Comparison of properties of Cold and Hot worked parts.
ROLLING FUNDAMENTALS – Theory of rolling, types of Rolling mills and products
EXTRUSION OF METALS: Basic extrusion process and its characteristics. Hot extrusion and cold extrusion - Forward extrusion and backward extrusion–Impact extrusion Hydrostatic extrusion
DRAWING – Wire drawing and Tube drawing

UNIT – IV

BULK FORMING PROCESSES: Principles of forging – Tools and dies – Types Forging – Smith forging, Drop Forging – Roll forging – Forging hammers: Rotary forging – forging defects.

SHEET METAL FORMING: Stretch Forming, Deep Drawing, Coining, Spinning, Blanking and Piercing – Bending and Forming, Stamping dies, Spring Back effect.

PROCESSING OF PLASTICS: Types of Plastics, Properties, applications and their Processing methods & Equipment (blow &injection moulding)

UNIT – V

ARTIFICIAL INTELLIGENCE IN MANUFACTURING INDUSTRY: Introduction, developments of Artificial intelligence in manufacturing Industry; Advantages, limitations and applications of Artificial Intelligence in Manufacturing industry- fault diagnosis, Quality inspection, inventory control, industrial safety and maintenance.

TEXT BOOKS:

1. Manufacturing Engineering and Technology/ Kalpakjian, Serope;Steven, Schmid R. / Pearson, 1st Edition 2013.
2. Manufacturing Technology / P.N. Rao/ Tata McGraw Hill, 4th Edition 2016.
3. Russell, S. and Norvig, P. 2015. Artificial Intelligence - A Modern Approach, 3rd edition, Prentice Hall.

REFERENCE BOOKS

1. Production Technology / R.K. Jain /Khanna publishers,17th edition 2004.
2. Principles of Metal Castings / Richard W Heine and Roenthal. McGraw Hill Education, 2nd Edition 2017.
3. Welding Process and technology /Dr. Paramar / Khanna Publishers,3rd Edition.
4. Production Technology /Sarma P C / S.Chand Publications,4th Edition 2014.

Semester	IV	L	T	P	C	Course Code
Regulation	**V20**	**3**	**0**	**0**	**3**	**V20MET09**
Name of the Course	**Mechanical Measurements and Metrology**					
Branch	**Mechanical Engineering**					

Course Outcomes:

	After successful completion of the course, the student will be able to:	Knowledge Level
CO1	Discuss the basic concepts of measurement system and Linear measuring Instruments.	K2
CO2	Explain various types of Temperature, Pressure and Flow measuring Instruments.	K2
CO3	Understand the working of Acceleration, Vibration and Strain measuring devices.	K2
CO4	Apply tolerances and fits for selected product quality and explain various Linear, Angular and Optical measuring instruments and their applications	K3
CO5	Explain the measurement of surface finish with various comparators	K2

UNIT – I

BASIC CONCEPTS: Introduction, Fundamental Measuring Processes and methods, Generalized measurement system and its functional elements, Performance characteristics.

DISPLACEMENT MEASUREMENT: Principle and construction of various transducers – piezo electric, inductive, capacitance, resistance, ionization and photo electric transducers, calibration procedures.

UNIT – II

TEMPERATURE MEASUREMENT: Thermometry, scales of temperature, electrical resistance – thermister, RTD, thermocouple, pyrometers.

PRESSURE MEASUREMENT: Working of Various instruments - dead weight pressure gauge , bourdon pressure gauges, bellows , diaphragm gauges.

FLOW MEASUREMENT- Rota meter, Magnetic, Ultrasonic, hot – wire anemometer, Laser Doppler Anemometer (LDA).

UNIT – III

ACCELERATION AND VIBRATION MEASUREMENT: Principles of seismic instruments – Vibrometer and Accelerometer

STRAIN MEASUREMENTS: Various types of strain measuring instruments – electrical strain gauge – gauge factor – use of resistance strain gauge for measuring bending compressive and tensile strains, strain gauge rosettes.

UNIT – IV

LIMITS AND FITS: Introduction, Normal size, Tolerance limits, Deviations, Allowance, Fits and their types – unilateral and bilateral tolerance system, hole and shaft basis systems –interchangeability and selective assembly. Indian standard Institution system.

LINEAR MEASUREMENT: Standards of measurements- line and end standard. Basic principle and applications of slip gauges, dial indicator and micrometers.

ANGULAR MEASUREMENTS: Bevel protractor – angle slip gauges – sine bar, rollers and spheres used to determine the tapers, Applications of angular measurement.
OPTICAL MEASURING INSTRUMENTS: Tool maker's microscope and its uses – collimators, optical projector – optical flats and their uses, interferometer, and those applications.

UNIT – V
SURFACE TEXTURE: Factors effecting surface roughness, reasons for controlling surface texture, Differences between surface roughness and surface waviness, Elements of surface texture -Numerical assessment of surface finish – CLA, R, R.M.S Values – Ra values, and Rz values. Basic principle of profile meter and Talysurf. ISI symbols for indication of surface finish, Applications surface texture.
COMPARATORS: Types – Mechanical, Optical, Electrical and Electronic, Pneumatic Comparators and Their Uses.

TEXT BOOKS:
1. Measurement Systems: Applications & design / D.S Kumar/ Metropolitan/1st/2015
2. Mechanical Measurements / BeckWith, Marangoni, Linehard/ Pearson/6th/2018
3. Engineering Metrology by R.K.Jain / Khanna Publishers

REFERENCE BOOKS
1. Dimensional Metrology, Connie Dotson, Cengage Learning.
2. Engineering Metrology by I.C.Gupta / DhanpatRai Publishers.
3. Precision Engineering in Manufacturing by R.L.Murthy / New Age.
4. Engineering Metrology and Measurements by NV Raghavendra, L Krishna murthy, Oxford publishers.
5. Engineering Metrology by KL Narayana, Scitech publishers.
6. Mechanical and Industrial Measurements / R.K. Jain/ Khanna Publishers/2008
7. Measurement systems: Application and design/Doeblin Earnest. O. Adaptation/ TMH/ 6th edition, 2018

Semester	IV	L	T	P	C	Course Code
Regulation	**V20**	**3**	**0**	**0**	**3**	**V20MET10**
Name of the Course	**Applied Thermodynamics**					
Branch	**Mechanical Engineering**					

Course Outcomes:

	After successful completion of the course, the student will be able to:	Knowledge Level
CO1	Illustrate the working of various IC engines and associated systems such as lubricating system, cooling system, fuel feed system and ignition system.	K2
CO2	Explain the working of boilers and its performance parameters.	K2
CO3	Compute the performance of steam nozzles and steam turbines.	K3
CO4	Analyze the working of steam condensers and their performance parameters.	K4
CO5	Compute the performance of gas turbines.	K3

UNIT – I

I. C. ENGINES: Classification, Working principles of Four & Two stroke engine- SI & CI engines, Valve and Port Timing Diagrams, Engine systems- Carburetor, Fuel injection systems for CI engines, Ignition, Cooling and Lubrication system.

UNIT – II

STEAM BOILERS: Classification, working principles Cochran, Locomotive, Babcock and Wilcox, Benson and Loeffler boiler with sketches, mountings and accessories- working principles, boiler horse power, equivalent evaporation, efficiency and heat balance, Draught: classification, height of chimney for given draught and discharge, condition for maximum discharge, efficiency of chimney.

UNIT – III

STEAM NOZZLES: Applications and Types, Flow through nozzles, Thermodynamic analysis – assumptions -velocity of fluid at nozzle exit, Ideal and actual expansion in a nozzle, velocity coefficient, Condition for maximum discharge, critical pressure ratio, Super saturated flow in nozzles- its effects, Wilson's line.

STEAM TURBINES: Classification, Impulse turbine- mechanical details- velocity diagram- effect of friction- power developed, axial thrust, blade or diagram efficiency- condition for maximum efficiency. Methods to reduce rotor speed-Velocity compounding, Pressure compounding and velocity & pressure Compounding, - Velocity and Pressure variation along the flow – Combined velocity diagram for a velocity compounded impulse turbine.

UNIT – IV

REACTION TURBINE: Mechanical details, principle of operation, thermodynamic analysis of a stage, degree of reaction, velocity diagram, Parson's reaction turbine, condition for maximum efficiency.

STEAM CONDENSERS: Classification of condensers- working principles of Jet, Evaporative and surface condensers, Vacuum and its Measurement, Vacuum efficiency and condenser efficiency, Sources of air leakage and its affects in condensers- Condenser Efficiency, Daltons law of partial pressures, Determination of mass of cooling water.

UNIT – V

GAS TURBINES: Simple gas turbine plant- Ideal cycle, essential components, parameters of performance, actual cycle, regeneration, inter cooling and reheating, closed and open cycles, merits and demerits.

TEXT BOOKS:

1. Engineering Thermodynamics, PK Nag 4th Edn, TMH.
2. Thermodynamics. An engineering Approach with student resources/ DVD. Y.A. Cengel & M.A. Boles/ 8th Edn-McGrawHill/2016.
3. Gas Turbines / V Ganesan/3rd edition, TMH/2016.

REFERENCE BOOKS

1. Thermal Engineering/ R.K.Rajput/4th edition/ Laxmi Publications/2010
2. Applied Thermodynamics-II / R. Yadav./6th edition, Central Publishing House/2016
3. Gas turbines and Propulsive Systems/1st edition, DhanpatRai/2014
4. Tables of the properties of steam and other vapours and temperature-Entropy table by Cecil H Peabody by Forgotten books
5. Steam tables by C.P Kodandaraman – New age International

Semester	IV	L	T	P	C	Course Code
Regulation	V20	0	0	3	1.5	V20MEL05
Name of the Course	Mechanical Measurements and Metrology Lab					
Branch	Mechanical Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to:	Knowledge Level
CO1	Experiment and examine errors in calibration of various instruments	K3
CO2	Explain the working principle of metrology and measuring equipments.	K2
CO3	Compute distance, angle and surface finish by using standard measuring equipments	K3

List of experiments :

METROLOGY

1. Measurement of length, height and diameter by vernier calipers, micrometer and height gauge.
2. Surface roughness measurement using talysurf.
3. Taper angle measurement.
4. Tool maker's microscope.
5. Measurement of bores using dial bore indicator.
6. Measurement of thickness of gear tooth by vernier tooth caliper.

INSTRUMENTATION & CONTROL SYSTEMS LAB

List of experiments:

1. Study and calibration of LVDT transducer for displacement measurement.
2. Calibration of pressure gauge.
3. Angular Measurement using angular sensor.
4. Measurement of speed using opto-coupler pickup.
5. Calibration of strain gauge.
6. Study & calibration of resistance temperature detector (RTD) transducer for temperature measurement.
7. Study and calibration of a rota meter for water flow measurement.
8. Vibration measurement trainer.

Semester	IV	L	T	P	C	Course Code
Regulation	V20	0	0	3	1.5	V20MEL06
Name of the Course	Manufacturing Process Lab					
Branch	Mechanical Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge Levels
CO1	Design and Make a pattern, test the properties of sand and prepare a casting.	K3
CO2	Perform Arc welding, Spot welding, TIG, MIG welding and Plasma Arc Cutting operations	K3
CO3	Perform blanking, piercing, Drawing and bending operations.	K3
CO4	Operate injection and blow moulding machines to manufacture plastic components	K3

METAL CASTING:
Pattern Design and pattern making using wood turning lathe Sand properties testing for Compression strength and permeability. Mould preparation, melting and casting.

WELDING:
ARC Welding Lap, Butt & T- Joint Spot Welding –Lap &Butt Joint
TIG Welding -Butt Joint
MIG Welding- Butt Joint Plasma Arc Cutting

METAL FORMING:
Blanking & Piercing operation by using Progressive die

PROCESSING OF PLASTICS:
Injection Molding, Blow molding

REFERENCE BOOKS:
1. Production technology lab – college manual.
2. Manufacturing Engineering and Technology/ Kalpakjian, Serope; Steven, Schmid R./Pearson, 1st Edition, 2013
3. Manufacturing Technology / P.N. Rao/TMH, 4th Edition, 2016.

Semester	IV	L	T	P	C	Course Code
Regulation	V20	0	0	3	1.5	V20MEL07
Name of the Course	Thermal Engineering Lab					
Branch	Mechanical Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge Levels
CO1	Evaluate the performance of I.C.Engines.	K4
CO2	Evaluate the performance of compressors.	K4
CO3	Describe the working of Boilers.	K2

1. I.C. Engines valve and port timing diagrams.
2. I.C. Engines performance test and Exhaust emission measurements (4 -stroke diesel engine).
3. I.C. Engines Performance Test for 2 Stroke SI engines
4. Evaluation of engine friction by conducting Morse test on 4-stroke multi cylinder petrol engine.
5. Draw the heat balance sheet for 4- stroke multi cylinder petrol engine.
6. I.C. Engines Retardation Test
7. Economical speed test of an IC engine.
8. Performance test on variable compression ratio engines.
9. Performance test on reciprocating air compressor unit.
10. Dis-assembly / Assembly of Engines
11. Study of Boilers

Annexure – ME- IV

Course structure & Syllabi of P.G Programme for approval under V21 regulations

M.Tech (Thermal Engineering) Programme Course Structure

(With effect from **2021-22** Admitted Batch onwards)

I-SEMESTER

S.No	Course Code	Course	L	T	P	C
1	**V21TET01**	Advanced Fluid Mechanics	3	0	0	3
2	**V21TET02**	Computational Fluid Dynamics	3	0	0	3
3		**Program Elective – I**	3	0	0	3
4		**Program Elective – II**	3	0	0	3
5	**V21TEL01**	Computational Fluid Dynamics Lab –I	0	0	3	2
6	**V21TEL02**	Thermal Engineering Lab-I	0	0	3	2
7	**V21MBT55**	Research Methodology And IPR (Under BOS of MBA)	2	0	0	2
8		Audit course-I (Under BOS of English & MBA)	2	0	0	0
		Total:	**16**	**0**	**6**	**18**

Total Contact Hours = 22

II-SEMESTER

S.No.	Course Code	Course	L	T	P	C
1	**V21TET03**	Advanced Heat and Mass Transfer	3	0	0	3
2	**V21TET04**	Thermal Measurements and Process Controls	3	0	0	3
3		**Program Elective – III**	3	0	0	3
4		**Program Elective -IV**	3	0	0	3
5	**V21TEL03**	Computational Fluid Dynamics Lab–II	0	0	3	2
6	**V21TEL04**	Thermal Engineering Lab-II	0	0	3	2
7	**V21TET05**	Mini Project with Seminar	2	0	0	2
8		Audit course-II (Under BOS of English & MBA)	2	0	0	0
	Total		**16**	**0**	**6**	**18**

Total Contact Hours = 22

List of Audit course I & II

1. English for Research Paper Writing - V21PGENT54(BOS English)
2. Disaster Management (BOS of CIVIL) - V21STEAC1
3. Value Education (BOS English) - V21PGENT55
4. Constitution of India (BOS English) - V21PGENT56
5. Pedagogy Studies (BOS English) - V21PGENT51
6. Personality Development through Life Enlightenment Skills (BOS English) - V21PGENT52
7. Stress Management by Yoga - V21PGENT53

III-SEMESTER

S.No	Course Code	Course	L	T	P	C
1		**Program Elective - V** (OR) **MOOCS-I Through NPTEL** /SWAYAM- 12 week Course related to the program which is not listed in the course structure.	3	0	0	3
2	V21MBT56 V21MAT02	**Open Elective** 1. Cost Management for Engineering Projects (Under BOS of MBA) 2. Operations Research (Under BOS of Maths) Students are advised to opt for an open elective course of their choice being offered by other Departments of the Institute (OR) **MOOCS-II Through NPTEL** /SWAYAM- Any 12weeek Course in Engineering/ Management certification courses duly approved by the Department.	3	0	0	3
3	**V21TEL05**	Dissertation phase –I	0	0	20	10
	Total		**6**	**0**	**20**	**16**

Total Contact Hours = 26

IV-SEMESTER

S.No.	Course Code	Course	L	T	P	C
1	**V21TEL06**	Dissertation phase –II	0	0	32	16
	Total		**-**	**-**	**32**	**16**

Program Elective –I **V21TEE01 –** Advanced I.C engine, Electric & Hybrid Vehicles **V21TEE02 –** Gas Dynamics **V21TEE03 –** Cryogenic Engineering **V21TEE04 –** Advanced Thermodynamics	**Program Elective – II** **V21TEE05 –** Gas Turbines **V21TEE06 –** Alternative Fuel Technologies **V21TEE07 –** Energy Conservation and Management **V21TEE08 –** Theory and Technology of Fuel Cells
Program Elective – III **V21TEE09 –** Equipment Design for Thermal Systems **V21TEE10 –** Solar Energy Technologies **V21TEE11 –** Advanced Power Plant Engineering **V21TEE12 –** Combustion, Emissions and Environment	**Program Elective – IV** **V21TEE13 –** Jet Propulsion and Rocket Engineering **V21TEE14 –** Automotive Engineering **V21TEE15 –** Modelling of I.C engines **V21TEE16 –** Renewable Energy Technologies
Program Elective –V **V21TEE17 –** Optimization Techniques and Applications **V21TEE18 –** Design and Analysis of Experiments **V21TEE19 –** Convective Heat Transfer **V21TEE20 –** Extraction of Energy from Waste **V21TEE21 –** Advanced Finite Element Methods **(OR)** MOOCS/ NPTEL certification courses	

Total Contact Hours = 32
Total Credits (for all sem) = 68

Syllabi for the courses offered in M. Tech under V21 Regulation for the Academic Year 2021-2022

I Semester

Semester	I	L	T	P	C	Course Code
Regulation	V21	3	0	0	3	V21TET01
Name of the Course	Advanced Fluid Mechanics					
Specialization	Thermal Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge Level
CO1	Apply equations of motion for fluid flow and in viscid flow problems	K3
CO2	Analyze fluid flow using Navier stokes equation	K4
CO3	Explain Boundary layer concepts to flow over flat plate	K2
CO4	Analyze turbulent layer equations and internal flow	K4
CO5	Illustrate Compressible flow	K3

UNIT – I

INVISCID FLOW OF INCOMPRESSIBLE FLUIDS: Lagrangian and Eulerain Descriptions of fluid motion, Path lines, Stream lines, Streak lines, stream tubes – velocity of a fluid particle, types of flows, Equations of three dimensional continuity equation, Stream and Velocity potential functions.

BASIC LAWS OF FLUID FLOW: Condition for irrotationality, circulation & vorticity Accelerations in Carte systems normal and tangential accelerations, Euler's, Bernouli equations in 3D– Continuity and Momentum Equations.

UNIT – II

VISCOUS FLOW: Derivation of Navier,Stoke's Equations for viscous compressible flow – Exact solutions to certain simple cases: Plain Poisoulle flow, Coutte flow with and without pressure gradient , Hagen Poisoulle flow, Blasius solution.

UNIT – III

BOUNDARY LAYER CONCEPTS : Prandtl's contribution to real fluid flows – Prandtl's boundary layer theory , Boundary layer thickness for flow over a flat plate – Approximate solutions – Creeping motion (Stokes) – Oseen's approximation,Von,Karman momentum integral equation for laminar boundary layer –– Expressions for local and mean drag coefficients for different velocity profiles.

UNIT – IV

INTRODUCTION TO TURBULENT FLOW: Fundamental concept of turbulence – Time Averaged Equations – Boundary Layer Equations , Prandtl Mixing Length Model , Universal Velocity Distribution Law: Van Driest Model –Approximate solutions for drag coefficients – More Refined Turbulence Models – k,epsilon model , boundary layer separation and form drag – Karman Vortex Trail, Boundary layer control, lift on circular cylinders.

INTERNAL FLOW: Smooth and rough boundaries – Equations for Velocity Distribution and frictional Resistance in smooth and rough Pipes – Roughness of Commercial Pipes – Moody's diagram.

UNIT – V

COMPRESSIBLE FLUID FLOW – I: Thermodynamic basics – Equations of continuity, Momentum and Energy , Acoustic Velocity, Derivation of Equation for Mach Number – Flow Regimes – Mach Angle – Mach Cone – Stagnation State.

COMPRESSIBLE FLUID FLOW – II: Area Variation, Property Relationships in terms of Machnumber, Nozzles, Diffusers – Fanno and Releigh Lines, Property Relations – Isothermal Flow in Long Ducts – Normal Compressible Shock, Oblique Shock: Expansion and Compressible Shocks – Supersonic Wave Drag.

TEXT BOOKS:

1. Fluid Mechanics / L.VictorSteeter / TMH
2. Fluid Mechanics / Frank M.White / MGH

REFERENCE BOOKS:

1. Fluid Mechanics and Machines/Modi and Seth/Standard Book House
2. Fluid Mechanics/Cohen and Kundu/Elsevier/5th edition
3. Fluid Mechanics/Potter/Cengage Learning
4. Fluid Mechanics/William S Janna/CRC Press
5. Fluid Mechanics / Y.A Cengel and J.M Cimbala/MGH
6. Boundary Layer Theory/ Schlichting H /Springer Publications
7. Dynamics & Theory and Dynamics of Compressible Fluid Flow/ Shapiro.
8. Fluid Dynamics/ William F. Hughes & John A. Brighton/TMH
9. Fluid Mechanics / K.L Kumar /S Chand & Co.

Semester	**I**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	**V21**	**3**	**0**	**0**	**3**	**V21TET02**
Name of the Course	**Computational Fluid Dynamics**					
Specialization	**Thermal Engineering**					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge Level
CO1	Explain various finite element formulations/methods	K2
CO2	Apply Hyperbolic equations for non linear problems	K3
CO3	Differentiate formulations of Compressible and incompressible flows	K4
CO4	Differentiate various formulations for 2D & 3D problems	K4
CO5	Illustrate various formulations for steady state and transient problems	K3

UNIT – I

INTRODUCTION: Finite difference method, finite volume method, finite element method, governing equations and boundary conditions. Derivation of finite difference equations.

SOLUTION METHODS: Solution methods of elliptical equations – finite difference formulations, interactive solution methods, direct method with Gaussian elimination.
Parabolic equations, explicit schemes and Von Neumann stability analysis, implicit schemes, alternating direction implicit schemes, approximate factorization, fractional step methods, direct method with tridiagonal matrix algorithm.

UNIT – II

HYPERBOLIC EQUATIONS: Explicit schemes and Von Neumann stability analysis, implicit schemes, multi step methods, nonlinear problems, second order one-dimensional wave equations.Burgers equations: Explicit and implicit schemes, Runge-Kutta method.

UNIT – III

FORMULATIONS OF INCOMPRESSIBLE VISCOUS FLOWS: Formulations of incompressible viscous flows by finite difference methods, pressure correction methods, vortex methods.

TREATMENT OF COMPRESSIBLE FLOWS: Potential equation, Eluer equations, Navier-Stokes system of equations, flow-field, dependent variation methods, boundary conditions.

UNIT – IV

FINITE VOLUME METHOD: Finite volume method via finite difference method,formulations for two and three, dimensional problems.

UNIT – V

STANDARD VARIATIONAL METHODS: Linear fluid flow problems, steady state problems, Transient problems.

TEXT BOOKS:

1. Computational fluid dynamics, T. J.Chung, Cambridge University press, 2002.
2. Computational Fluid Dynamics by John D. Anderson, McGraw Hill Book Company 2017.

REFERENCE BOOKS:

1. Text book of fluid dynamics, Frank Chorlton, CBS Publishers &distributors, 1985.
2. Computational Techniques for Fluid Dynamics, Volume 1& 2 by C. A. J. Fletcher, SpringerPublication, 2012.

Semester	I	L	T	P	C	Course Code
Regulation	V21	3	0	0	3	V21TEE01
Name of the Course	**Advanced I.C Engine Electric and Hybrid Vehicles** Program Elective – I					
Specialization	**Thermal Engineering**					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge Level
CO1	Explain static and dynamic effects of gas exchange process	K2
CO2	Illustrate motion of charge inside the cylinder	K3
CO3	Differentiate between the phenomena of combustion in IC engines	K4
CO4	Explain Electric vehicles and types of Batteries	K2
CO5	Analyze Hybrid and Fuel Cell Vehicles	K3

UNIT – I

GAS EXCHANIGING PROCESSES: Inlet and exhaust processes in the four stroke cycle volumetric efficiency quasi static effects combined quasi static and dynamic effects variation with speed and valve area lift and timing –flow through valves poppet valve geometry and timing flow rate and discharge coefficients, residual gas fraction , exhaust gas flow rate and temperature variation, scavenging in two stroke cyclic engines, scavenging parameters and models actual scavenging processes , flow through ports, super charging and turbo changing – methods of power boosting basic relationships compressors, turbines wave compression devices.

UNIT – II

CHARGE MOTION WITHIN THE CYLINDER: Intake Jet Flow, Mean velocity and turbulence characteristics definitions application to engine velocity data swirl – swirl measurement, swirl generation during induction swirl modification within the cylinder squish pre chamber engine flows crevice flows and blowby flows generated by piston –cylinder wall interaction.

UNIT – III

COMBUSTION IN S.I AND C.I ENGINES: Review of normal and abnormal combustion in SI and CI engine cyclic variation in combustion of SI engine , analysis of cylindrical pressure data in SI and CI engine ,MPFI in SI engines common rail fuel injection system in CI engines fuel spray behavior in CI engines.

UNIT – IV

ELECTRIC VEHICLES: Introduction: Limitations of IC Engines as prime mover, History of EVs, EV system, components of EV-DC and AC electric machines: Introduction and basic structure, Electric vehicle drive train, advantages and limitations, Permanent magnet and switched reluctance motors

BATTERIES: Battery: lead, acid battery, cell discharge and charge operation, construction, advantages of lead, acid battery, Battery parameters: battery capacity, discharge rate, state of charge, state of discharge, depth of discharge, Technical characteristics, Ragone plots.

UNIT – V

HYBRID VECHILES: Configurations of hybrids, Series and Parallel, advantages and limitations, Hybrid drive trains, sizing of components Initial acceleration, rated vehicle

velocity, Maximum velocity and maximum gradeability, Hydrogen: Production, Hydrogen storage systems, reformers.
FUEL CELL VECHILES: Introduction, Fuel cell characteristics, Thermodynamics of fuel cells, Fuel cell types: emphasis on PEM fuel cell.

TEXT BOOKS:
1. J.B. Heywood Internal Combustion Engine Fundamentals, McGraw Hill Co.1988
2. Seth Leitman and Bob Brant Build your own electric vehicle McGraw Hill Co.2009.
3. F. Barbir PEM Fuel Cells-Theory and Practice Elsevier Academic Press,2005.

REFERENCE BOOKS:
1. W.W. Pulkrabek Engineering Fundamentals of IC Engine, PHI Pvt. Ltd 2002

Semester	I	L	T	P	C	Course Code
Regulation	V21	3	0	0	3	V21TEE02
Name of the Course	**Gas Dynamics** Program Elective – I					
Specialization	**Thermal Engineering**					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge level
CO1	Explain equations governing compressible flows	K2
CO2	Explain one dimensional compressible flow concepts	K2
CO3	Explain Two dimensional compressible flow concepts	K2
CO4	Illustrate equations governing quasi one dimensional flows	K3
CO5	Illustrate Unsteady wave motions	K3

UNIT – I

BASIC CONCEPTS : Introduction to compressible flow, A brief review of thermodynamics and fluid mechanics, Integral forms of conservation equations, Differential conservation equations, Continuum Postulates, Acoustic speed and Mach number, Governing equations for compressible flows.

UNIT – II

ONE-DIMENSIONAL COMPRESSIBLE FLOW: One dimensional flow concept, Isentropic flows, Stagnation/Total conditions, Characteristic speeds of gas dynamics, Dynamic pressure and pressure coefficients, Normal shock waves, Rankine , Hugonoit equations, Rayleigh flow, Fannoflow, Crocco's theorem.

UNIT – III

TWO-DIMENSIONAL FLOWS: Oblique shock wave and its governing equations, θ,B,M relations, The Hodograph and Shock Polar, Supersonic flow over wedges and cones, Mach line, Attached and Detached shock, Reflections and interaction of oblique shock waves, Expansion waves, Prandtl , Meyer flow and its governing equations, Supersonic flow over convex and concave corners, Approximation of continuous expansion waves by discrete waves.

UNIT – IV

QUASI-ONE DIMENSIONAL FLOWS: Governing equations, Area velocity relations,Isentropic flow through variable, area ducts, convergent, divergent (or De Laval) nozzles, Over, expanded and under, expanded nozzles, Diffusers.

UNIT – V

UNSTEADY WAVE MOTIONS: Moving normal shock waves, Reflected shock waves, Physical features of wave propagation, Elements of acoustic theory, Incident and reflected waves, Shock tube relations, Piston analogy, Incident and reflected expansion waves, Finite compression waves, Shock tube relations.

INTRODUCTION TO EXPERIMENTAL FACILITIES: Subsonic wind tunnels, Supersonic wind tunnels, Shock tunnels, Free, piston shock tunnel, detonation, driven shock tunnels, and Expansion tubes.

TEXT BOOKS:
1. Gas Dynamics by S.M Yahya, 2017
2. Gas Dynamics by E. Radha Krishnan, Prentice Hall India Learning Private Limited

REFERENCE BOOKS:
1. Fundamentals of Gas Dynamics by Robert D. Zucker, John Wiley & Sons, INC.
2. Dynamics and Thermodynamics of compressible fluid flow (Vol. I, II) by Ascher H.Shapiro.
3. Elements of Gas Dynamics by H.W. Liepmann and A. Roshko, Wiley.
4. Fundamentals of Gas Dynamics by V. Babu, John Wiley & Sons.
5. Modern Compressible Flow by John D. Anderson, Jr./McGraw Hill.

Semester	I	L	T	P	C	Course Code
Regulation	V21	3	0	0	3	V21TEE03
Name of the Course	**Cryogenic Engineering** Program Elective – I					
Specialization	**Thermal Engineering**					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge level
CO1	Explain Vapour compression Refrigeration System and its components	K2
CO2	Illustrate Multiple stage Refrigeration system	K3
CO3	Explain concepts of Cryogenics	K2
CO4	Illustrate the applications of Cryogenics	K3
CO5	Explain insulation to low temperatures	K2

UNIT – I

VAPOUR COMPRESSION REFRIGERATION SYSTEMS:
Analysis of vapor compression refrigeration cycle, Second law of Thermodynamics, Carnot refrigerator, Vapor Compression Refrigeration Cycle, components, Properties of Refrigerants.

UNIT – II

MULTIPLE STAGE REFRIGERATION SYSTEM : Introduction, Methods of improving COP of Multi Stage Compression with Intercooling , Multistage evaporator System, Cascade Refrigeration System, Dry ice Manufacturing, Auto Cascade System, Joule-Thomson Coefficient.

UNIT – III

CRYOGENICS: Liquefaction of air, Linde system, Analysis, Liquefaction of Neon, Hydrogen and Helium.

UNIT – IV

APPLICATION OF LOWER TEMPERATURES: Effects on the properties of metal strength, Thermal properties, super conductivity, super fluidity. Applications, such as expansion fitting, cryobiology, cryosurgery, space research, computers , underground power lines.

UNIT – V

LOW TEMPERATURE INSULATION: Reflective insulation, Evacuated powders, Rigid foams, Super insulation. Cooling by adiabatic de-magnetization, Gas separation and cryogenic systems, separation of gases, Rectifying columns, Air separating, single and double columns Air separation plant. Storage and handling of cryogenic liquids, Dewars and other types of containers.

TEXT BOOKS:
1. Refrigeration & Air, Conditioning by C.P. Arora, TMH, 2017
2. Cryogenic Systems by R.F Barron, Oxford University Press, 1985.

REFERENCE BOOKS:
1. Refrigeration& Air, Conditioning, StoeckerW.F. Jones, J.W., McGraw Hill, 2014.
2. Refrigeration & Air, Conditioning, Manohar Prasad New Age, 2018.
3. Refrigeration & Air, Conditioning Domkunduwar, and Arora, Dhanpatrai & Sons, 2015.

Semester	I	L	T	P	C	Course Code
Regulation	**V21**	**3**	**0**	**0**	**3**	**V21TEE04**
Name of the Course	**Advanced Thermodynamics** Program Elective – I					
Specialization	**Thermal Engineering**					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge level
CO1	Explain availability and irreversibility	K2
CO2	Explain relations of thermodynamic properties	K2
CO3	Differentiate between properties of mixtures of gases and liquids	K4
CO4	Illustrate equilibrium of vapour and liquid mixtures	K3
CO5	Explain combustion phenomena and reactions involved in combustion	K2

UNIT – I
AVAILABILITY AND IRREVERSIBILITY: Quality of Energy, available and unavailable energy, availability, surroundings work, reversible work and irreversibility, availability in a closed system, availability in a SSSF process in an open system, second law efficiencies of processes, second law efficiency of cycles and exergy balance equations.

UNIT – II
THERMODYNAMIC PROPERTY RELATIONS: Helmholtz and Gibbs Functions, two Mathematical Conditions for Exact Differentials, Maxwell Relations, Clapeyron Equation, Relations for Changes in Enthalpy, Internal Energy and Entropy, Specific Heat Relations, Generalized Relations/Charts for Residual Enthalpy and Entropy, Gibbs Function at zero Pressure: A Mathematical Anomaly, Fugacity, Fugacity Coefficient and Residual Gibbs Function, The Joule, Thomson Coefficient and Inversion Curve, Thermodynamic similarity.

UNIT – III

NON-REACTING MIXTURES OF GASES AND LIQUIDS: Measures of Composition in Multi Component Systems.

GAS MIXTURES: Mixtures of ideal Gases, Gas-Vapor Mixtures, Application of First Law to Psychometric Processes, Real Gas Mixtures.

LIQUID MIXTURES/SOLUTIONS: Ideal Solutions, Real Solutions.

THERMODYNAMIC RELATIONS FOR REAL MIXTURES: Partial Properties, Relation for Fugacity and Fugacity Coefficient in Real Gas Mixtures, Relations for Activity and Activity Coefficient in Real Liquid Mixtures/Solutions.

UNIT – IV

PHASE EQUILIBRIUM: V A P O U R LIQUID EQUILIBRIUM OF MIXTURES: Phase Diagrams for Binary Mixtures, Vapor, Liquid Equilibrium in Ideal Solutions, Criteria for Equilibrium, Criterion foe phase Equilibrium, Calculation of Standard State Fugacity of Pure Component, Vapor Liquid Equilibrium at Low to Moderate Pressures, Determination of Constants of Activity Coefficient Equations, and Enthalpy Calculations.

UNIT – V

CHEMICAL REACTIONS AND COMBUSTION: Thermo chemistry, Measures of Composition in Chemical Reactions, Application of First Law of Thermodynamics to chemical Reactions, the Combustion Process-Standard Heat/Enthalpy of Combustion, Reactions at actual Temperatures, adiabatic Flame Temperature, Entropy Change of Reacting Systems, Application of second Law of Thermodynamics to chemical Reactions, chemical equilibrium-Advancement of Chemical Reactions, Equilibrium Criterion in Chemical Reactions, equilibrium Constant and Law of Mass Action, Equilibrium Constant for Gas Phase Reactions in the standard state.

TEXT BOOKS:

1. Basic and Applied Thermodynamics, P.K.Nag, TMH, 2019.
2. Thermodynamics, J.P Holman, Mc Graw Hill, 2017.
3. Thermodynamics, CP Arora, Mc Graw Hill education (India pvt limited), 2016.

REFERENCE BOOKS:

1. Engg. Thermodynamics, PL.Dhar, Elsevier, 2008.
2. Thermodynamics, Sonnatag & Van Wylen, John Wiley & Sons, 2004.
3. Thermodynamics for Engineers, Doolittle-Messe, John Wiley & Sons, 2018.
4. Irreversible thermodynamics, HR De Groff,
5. Thermal Engineering, Soman, PHI, 2011.
6. Thermal Engineering, Rathore, TMH, 2010.
7. Engineering Thermodynamics, Chatopadyaya, 2010.

Semester	I	L	T	P	C	Course Code
Regulation	**V21**	**3**	**0**	**0**	**3**	**V21TEE05**
Name of the Course	**Gas Turbines** Program Elective – II					
Specialization	**Thermal Engineering**					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge level
CO1	Explain turbo machines and cycles used in gas turbines	K2
CO2	Apply the concepts of rotating machines and centrifugal compressors	K3
CO3	Analyze Axial flow compressors and design concepts	K4
CO4	Illustrate Gas turbine combustion systems	K3
CO5	Illustrate Axial and Radial flow turbines	K3

UNIT – I

INTRODUCTION: Review of the fundamentals, Classification of turbo machines, Applicationsof gas turbines.

GAS TURBINE CYCLES FOR SHAFT POWER: Ideal shaft power cycles and their analysis, Practical shaft power cycles and their analysis.

UNIT – II

FUNDAMENTALS OF ROTATING MACHINES: Euler's energy equation, Components of energy transfer, Impulse and reaction machines, Degree of reaction, Flow over an airfoil, Lift and drag.

CENTRIFUGAL COMPRESSORS: Construction and principle of operation, Factors affecting stage pressure ratio, Compressibility effects, Surging and choking, Performance characteristics.

UNIT – III

AXIAL FLOW COMPRESSORS: Construction and principle of operation, Factors affecting stage pressure ratio, Degree of reaction, Three dimensional flow, Design process, Blade design, Stage performance, Compressibility effects, Off, design performance.

UNIT – IV

GAS TURBINE COMBUSTION SYSTEMS: Operational requirements, Factors affecting combustion chamber design, Combustion process, Flame stabilization, Combustion chamber performance, Practical problems, Gas turbine emissions.

UNIT – V

AXIAL AND RADIAL FLOW TURBINES: Construction and operation of axial flow turbines, Vortex theory, Estimation of stage performance, Overall turbine performance, Turbine blade cooling, Radial flow turbines.

TEXT BOOKS:
1. Sarvanamuttoo, H.I.H., Rogers, G. F. C. and Cohen, H., Gas Turbine Theory, 7thEdition, Pearson Prentice Hall, 2017.
2. Ganesan, V., Gas Turbines, 3rd Edition, Tata McGraw Hill, 2017.

REFERENCE BOOKS:
1. Dixon, S.L., Fluid Mechanics and Thermodynamics of Turbo machinery, 7th Edition, Elsevier, 2014.
2. Flack, R.D., Fundamentals of Jet Propulsion with Applications, Cambridge University Press, 2011.
3. Yahya, S. M., Turbines, Compressors and Fans, 4th Edition, Tata McGraw Hill, 2017.
Lefebvre, A.H. and Ballal D. R., Gas Turbine Combustion – Alternative Fuels andEmissions, CRC Press, 2010

Semester	I	L	T	P	C	Course Code
Regulation	V21	3	0	0	3	V21TEE06
Name of the Course	**Alternative Fuel Technologies** Program Elective – II					
Specialization	**Thermal Engineering**					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge level
CO1	Explain alternative fuels	K2
CO2	Explain production methods of alternative fuels	K2
CO3	Illustrate performance characteristics of liquid alternative fuels	K3
CO4	Illustrate performance characteristics of gaseous alternative fuels	K3
CO5	Analyze performance characteristics of alternative fuels and methods to improve efficiency	K4

UNIT – I
Fossil fuels and their limitations Engine requirements; Potential alternative liquid and gaseous fuels.

UNIT – II
Methods of production; Properties, safety aspects, handling and distribution of various liquid alternative fuels like alcohols, vegetable oils, Di, methyl and Di, ethyl ether etc.

UNIT – III
Different ways of using alternative liquid fuels in engines, performance and emission characteristics; Conversion of vegetable oils to their esters and effect on engine performance.

UNIT – IV
Use of gaseous fuels like biogas, LPG, hydrogen, natural gas, producer gas etc. in SI/CI engines; Production, storage, distrbution and safety aspects of gaseous fuels.

UNIT – V
Different approaches like duel fuel combustion and surface ignition to use alternative fuels in engines; Use of additives to improve the performance with alternative fuels; Hybrid power plantsand fuel cell.

TEXT BOOK:
1. Alternative Fuels: The Future of Hydrogen, Second Edition**,** Michael Frank Hordeski, CRCPress

REFERENCE BOOKS:
1. Alternative Fuels for Transportation, A S Ramadhas, CRC Press
2. Alternative Fuels & Advanced Technology Vehicles: Incentives & Considerations, Thomas Huber, Jack Spera, Nova Science Publishers

Semester	I	L	T	P	C	Course Code

Regulation	V21	3	0	0	3	V21TEE07
Name of the Course	**Energy Conservation and Management** Program Elective – II					
Specialization	**Thermal Engineering**					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge level
CO1	Explain the importance of energy conservation and management	K2
CO2	Explain various methods of energy conservation	K2
CO3	Illustrate various methods of energy management	K3
CO4	Illustrate Economic analysis	K3
CO5	Explain standards and laws of energy conservation and management	K2

UNIT – I
The energy market, energy scenario, planning, utilization pattern and future strategy, Importanceof energy management.
UNIT – II
ENERGY CONSERVATION: Methods of energy conservation and energy efficiency for buildings, air conditioning, heat recovery and thermal energy storage systems Energy conservation in industries, Cogeneration, Combined heating and power systems.
UNIT – III
ENERGY MANAGEMENT: Principles of Energy Management, Energy demand estimation, Organising and Managing Energy Management Programs, Energy pricing
Energy Audit: Purpose, Methodology with respect to process Industries, Characteristic method employed in Certain Energy Intensive Industries
UNIT – IV
ECONOMIC ANALysis: Scope, Characterization of an Investment Project
UNIT – V
Relevant international standards and laws.

TEXT BOOK:
1. L.C. Witte, P.S. Schmidt, D.R.Brown, “Industrial Energy Management and Utilization”, Hemispherical Publication, 1988.
2. Callaghan “Energy Conservation”.

REFERENCE BOOKS:
1. D.A. Reeg, “Industrial Energy Conservation”, Pergamon Press, 1980.
2. T.L. Boyen, “Thermal Energy Recovery” Wiley, 1980
3. L.J. Nagrath, “Systems Modeling and Analysis”, Tata McGraw Hill, 1982.
4. W.C. Turner, “Energy Management Handbook “, Wiley, New York, 1982.
5. I.G.C. Dryden, “The Efficient Use of Energy “, Butterworth, London, 1982.
6. R. Loftnen, Van Nostrarid Reinhold C. “Energy Handbook”, 1978.
7. TERI Publications.
8. WR Murphy, G McKay “Energy Management”

Semester	I	L	T	P	C	Course Code
Regulation	V21	3	0	0	3	V21TEE08

Name of the Course	**Theory and Technology of Fuel Cells** Program Elective – II
Specialization	**Thermal Engineering**

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge level
CO1	Explain concepts of Fuel cells	K2
CO2	Explain various models of Fuels cells	K2
CO3	Illustrate Low and High temperature fuel cells	K3
CO4	Determine the production of fuels and design of various fuel cells	K4
CO5	Explain the components of fuel cell system	K2

UNIT – I
INTRODUCTION: Relevance, Principle, various configurations (Alkaline, Acid, Proton Exchange Membrane, direct methanol, molten carbonate and solid oxide fuel cells) fuel cell applications. Basic theory of electrochemistry, electrochemical energy conversion, electrochemical techniques, Thermodynamics of fuel cells, Heat and mass transfer in fuel cells, Single cell characteristics.
UNIT – II
MODELLING: Electrochemical model, Heat and mass transfer model, System thermodynamic model.
UNIT – III
LOW AND HIGH TEMPERATURE FUEL CELLS: Proton exchange membrane fuel cell (PEMFC) and direct methanol fuel cell (DMFC): their special features and characteristics. Molten carbonate fuel cell (MCFC) and solid oxide fuel cell (SOFC) for power generation, theirspecial features and characteristics.
UNIT – IV
FUELS AND FUEL PROCESSING: Availability, production and characteristics of Hydrogen, fossil fuel – diverted fuels and biomass, diverted fuels. Principles of design of PEMFC, DMFC and SOFC.
UNIT – V
FUEL CELL SYSTEM: Materials, component, stack, interconnects, internal and external reforming, system layout, operation and performance.

TEXT BOOKS:
1. Basu, S. (Ed) Fuel Cell Science and Technology, Springer, N.Y. (2007).
2. O'Hayre, R. P., S. Cha, W. Colella, F. B. Prinz, Fuel Cell Fundamentals, Wiley, NY(2006).

REFERENCE BOOKS:
1. J., Dick A., Fuel Cell Systems Explained, 2nd Ed. Wiley, 2003.
2. Liu, H., Principles of fuel cells, Taylor & Francis, N.Y. (2006).
3. Bard, A. J. , L. R., Faulkner, Electrochemical Methods, Wiley, N.Y. (2004) RefBook.
4. M.T.M. Koper (ed.), Fuel Cell Catalysis, Wiley, Larminie 2009.
5. J.O'M. Bockris, A.K.N. Reddy, Modern Electrochemistry, Springer 1998.

Semester	**I**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	**V21**	**0**	**0**	**3**	**2**	**V21TEL01**

Name of the Course	**Computational Fluid Dynamics Lab – I**
Specialization	**Thermal Engineering**

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge level
CO1	Analyze flow through pipes, Heat exchanger	K4
CO2	Analyze performance characteristics of combustion and air cooler	K4
CO3	Analyze thermal stresses, temperature gradient & Radiation heat transfer in cylinders	K4
CO4	Determination of Insulated Wall Temperature, thermal loading of support structure	K4
CO5	Illustrate Solid Liquid Phase Change	K3

1. Analysis of Transient state compressible flow through pipes
2. Performance Analysis of Heat Exchanger Device
3. Calibration Performance characteristics of Combustion
4. Estimation of C.O.P for Refrigeration Cycle
5. Analysis of Gas cooled Air-Cooler
6. Performance of Air-Conditioner
7. Thermal Stresses in long cylinder
8. Determination of Insulated Wall Temperature
9. Temperature Gradient across solid Cylinder
10. Radiation Heat Transfer between Concentric Cylinders
11. Solid Liquid Phase Change
12. Thermal Loading on Support structure

- MATLAB, ANSYS fluent modules: for conducting the simulation experiments.

Semester	I	L	T	P	C	Course Code
Regulation	V21	0	0	3	2	V21TEL02
Name of the Course	THERMAL ENGINEERING LAB – I					
Specialization	Thermal Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge level
CO1	Determination of fuel properties	K4
CO2	Investigate the exhaust emissions of IC Engines	K4
CO3	Test the Performance of compressors & IC Engines	K4

1. Abel's apparatus: Determination of flash and fire points of a given oil sample
2. Redwood Viscometer No.1: Determination of kinematic and absolute viscosities of an oil sample given
3. Measurement of Viscosity by Sayboltz's Viscometer.
4. Determination of Calorific Value of fuel.
5. Two-Stage Reciprocating Air-Compressor - Determination of volumetric efficiency of the compressor as
   a function of receiver pressure.
6. I.C. Engines performance test and Exhaust emission measurements (4 -stroke diesel engine)
7. I.C. Engines performance test and Exhaust emission measurements (2-stroke petrol engine)
8. Evaluation of engine friction by conducting Morse test on 4-stroke multi cylinder petrol engine.
9. I.C. Engines heat balance at different loads and show the heat distribution curve.
10. Performance test on variable compression ratio engines.
11. Performance test on Rotary Air Compressor.

II Semester

Semester	II	L	T	P	C	Course Code
Regulation	V21	3	0	0	3	V21TET03
Name of the Course	Advanced Heat and Mass Transfer					
Specialization	Thermal Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge level
CO1	Explain Equations governing heat conduction heat transfer	K2
CO2	Illustrate finite difference methods for heat conduction and convection problems	K3
CO3	Analyze heat and mass transfer in internal and external flows	K4
CO4	Explain concepts related to free convection, boiling & condensation and Heat exchangers	K2
CO5	Explain concepts of Radiation heat transfer and mass transfer.	K2

UNIT – I

BRIEF INTRODUCTION TO DIFFERENT MODES OF HEAT TRANSFER: Conduction: General heat Conduction equation, initial and boundary conditions.

Transient heat conduction: Lumped system analysis, Heisler charts, semi infinite solid,use of shape factors in conduction,2D transient heat conduction, product solutions.

UNIT – II

FINITE DIFFERENCE METHODS FOR CONDUCTION: ID & 2D steady state and simple transient heat conduction problems, implicit and explicit methods.

FORCED CONVECTION: Equations of fluid flow, concepts of continuity, momentum equations, derivation of energy equation, methods to determine heat transfer coefficient: Analytical methods, dimensional analysis and concept of exact solution. Approximate method, ntegral analysis.

UNIT – III

EXTERNAL FLOWS: Flow over a flat plate: Integral method for laminar heat transfer coefficient for different velocity and temperature profiles. Application of empirical relations to variation geometries for laminar and turbulent flows.

INTERNAL FLOWS: Fully developed flow: Integral analysis for laminar heat transfer coefficient, types of flow, constant wall temperature and constant heat flux boundary conditions, hydrodynamic &thermal entry lengths; use of empirical correlations.

UNIT – IV

FREE CONVECTION: Approximate analysis on laminar free convective heat transfer, boussinesque approximation, different geometries, and combined free and forced convection.

BOILING AND CONDENSATION: Boiling curve, correlations, Nusselts theory of film condensation on a vertical plate, assumptions & correlations of film condensation for different geometries.

HEAT EXCHANGERS Types of Heat Exchangers, LMTD and NTU methods

UNIT – V
RADIATION HEAT TRANSFER: Radiant heat exchange in grey, non, grey bodies, with transmitting, Reflecting and absorbing media, specular surfaces, gas radiation, from flames.
MASS TRANSFER: Concepts of mass transfer, diffusion & convective mass transfer analogies, significance of non-dimensional numbers.

TEXT BOOKS:
1. Principles of Heat Transfer / Frank Kreith / Cengage Learning
2. Heat Transfer / Necati Ozisik / TMH

REFERENCE BOOKS:
1. Fundamentals of Heat and Mass Transfer,5th Ed. / Frank P. Incropera/John Wiley
2. Elements of Heat Transfer/E. Radha Krishna/CRC Press/2012
3. Introduction to Heat Transfer/SK Som/PHI
4. Heat Transfer / Nellis& Klein / Cambridge University Press / 2012.
5. Heat Transfer/ P.S. Ghoshdastidar/ Oxford Press
6. Engg. Heat & Mass Transfer/ Sarat K. Das/DhanpatRai
7. Heat Transfer/ P.K.Nag /TMH
8. Heat Transfer / J.P Holman/MGH

Semester	II	L	T	P	C	Course Code
Regulation	V21	3	0	0	3	V21TET04
Name of the Course	Thermal Measurements and Process Controls					
Specialization	Thermal Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge level
CO1	Explain elements of measuring instruments	K2
CO2	Explain flow measuring devices	K2
CO3	Explain temperature measurement methods	K2
CO4	Illustrate various indicating, recording and data acquisition systems	K3
CO5	Analyze various process control systems	K4

UNIT – I

GENERAL CONCEPTS: Fundamental elements of a measuring instruments. Static and dynamic characteristics – errors in instruments – Different methods of measurement and their analysis – Sensing elements and transducers. Measurement of pressure – principles of pressure measurement, static and dynamic pressure, vacuum and high pressure measurement – Measurement of low pressure, Manometers, Calibration methods, Dynamic characteristics, design principles.

UNIT – II

MEASUREMENT OF FLOW: Obstruction meters, variable area meters, Pressure probes, compressible fluid flow measurement, Thermal anemometers, calibration of flow measuring instruments. Introduction to design of flow measuring instruments.

UNIT – III

TEMPERATURE MEASUREMENT: Different principles of Temperature Measurement, use of bimetallic thermometers – Mercury thermometers, Vapor Pressure thermometers, Thermo positive elements, thermocouples in series & parallel, pyrometry, measurement of heat flux, calibration of temperature measuring instruments. Design of temperature measuring instruments.

MEASURMENT OF : Velocity, moisture content , humidity and thermal conductivity .

UNIT – IV

VOLTAGE INDICATING, RECORDING AND DATA ACQUISITION SYSTEMS: Standards and calibration, analog volt meters and potentiometers. Electrical instruments. Digital voltmeters and multimeters. Signal generation. Electro mechanical servo type XT and XY recorders. Thermal array recorders and data acquisition systems. Analog and digital CROs.

Displays and liquid crystals flat panel displays. Displays. Virtual instruments. Magnetic tape and disk recorders/reproducers. Fiber optic sensors.

UNIT – V
PROCESS CONTROL: Introduction and need for process control principles, transfer functions, block diagrams, signal flow graphs, open and closed loop control systems – Analysis of First & Second order systems with examples of mechanical and thermal systems. Control System Evaluation – Stability, steady state regulations, transient regulations.

TEXT BOOK:

1. Measurement System, Application & Design – E.O. Doeblin, MGH

REFERENCE BOOKS:

1. Mechanical and Industrial Measurements – R.K. Jain – Khanna Publishers.
2. Mechanical Measurements – Buck & Beckwith – Pearson.
3. Control Systems, Principles & Design, 2nd Edition – M. Gopal – TMH.
4. Mechanical Measurements – J.P Holman

Semester	**II**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	**V21**	**3**	**0**	**0**	**3**	**V21TEE09**
Name of the Course	**Equipment Design for Thermal Systems** Program Elective – III					
Specialization	**Thermal Engineering**					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge level
CO1	Explain various Heat Exchangers and methods of designing them	K2
CO2	Illustrate design of double pipe heat exchanger	K3
CO3	Demonstrate condensation of vapours	K3
CO4	Explain concepts of vaporizers, evaporators and reboilers	K3
CO5	Outline concepts of designing of direct contact heat exchangers	K4

UNIT – I

CLASSIFICATION OF HEAT EXCHANGERS: Introduction, Recuperation & regeneration, Tabular heat exchangers, Double pipe, shell & tube heat exchanger, Plate heat Exchangers, Gasketedplate heat exchanger. Spiral plate heat exchanger, Lamella heat exchanger, Extended surface heat exchanger, Plate fin and Tabular fin.

BASIC DESIGN METHODS OF HEAT EXCHANGER: Introduction, Basic equations in design, Overall heat transfer coefficient, LMTD method for heat exchanger analysis, Parallel flow, Counter flow. Multipass, cross flow heat exchanger design calculations:

UNIT – II

DOUBLE PIPE HEAT EXCHANGER: Film coefficient for fluids in annulus, fouling factors, Calorific temperature, Average fluid temperature, The calculation of double pipe exchanger, Double pipe exchangers in series parallel arrangements.

Shell & Tube Heat Exchangers: Tube layouts for exchangers, Baffle heat exchangers, Calculation of shell and tube heat exchangers, Shell side film coefficients, Shell side equivalent diameter, The true temperature difference in a 1,2 heat exchanger. Influence of approach temperature on correction factor. Shell side pressure drop, Tube side pressure drop, Analysis of performance of 1,2 heat exchanger and design of shell & tube heat exchangers, Flow arrangements for increased heat recovery, the calculation of 2,4 exchangers.

UNIT – III

CONDENSATION OF SINGLE VAPOURS: Calculation of horizontal condenser, Vertical condenser, De,Super heater condenser, Vertical condenser,sub,Cooler, Horizontal Condenser,Sub cooler, Vertical reflux type condenser. Condensation of steam.

UNIT – IV

VAPORIZERS, EVAPORATORS AND REBOILERS: Vaporizing processes, Forced circulation vaporizing exchanger, Natural circulation vaporizing exchangers, Calculations of a reboiler. Extended Surfaces: Longitudinal fins. Weighted fin efficiency curve, Calculation of a Double pipe fin efficiency curve. Calculation of a double pipe finned exchanger, Calculation of a longitudinal fin shell and tube exchanger.

UNIT – V

DIRECT CONTACT HEAT EXCHANGER: Cooling towers, relation between wet bulb & dew point temperatures, The Lewis number and Classification of cooling towers, Cooling tower internals and the roll of fill, Heat Balance. Heat Transfer by simultaneous diffusion and convection, Analysis of cooling tower requirements, Deign of cooling towers, Determination of the number of diffusion units, Calculation of cooling tower performance.

TEXT BOOK:

1. Process Heat Transfer/D.Q.Kern/ TMH
2. Design of Thermal Systems / Wilbert F. Stoecker / McGrawHill 1. Heat Exchanger Design/
   A.P.Fraas and M.N.Ozisicj/ John Wiely& sons, New York.
3. Cooling Towers / J.D.Gurney and I.A. Cotter/ Maclaren
4. Design & Optimization of Thermal Systems / Yogesh Jaluria / CRC Press

REFERENCE BOOKS:

1. Heat Exchanger Design/ A.P.Fraas and M.N.Ozisicj/ John Wiely& sons, New York.
2. Cooling Towers / J.D.Gurney and I.A. Cotter/ Maclaren
3. Design & Optimization of Thermal Systems / Yogesh Jaluria / CRC Press

Semester	II	L	T	P	C	Course Code
Regulation	**V21**	**3**	**0**	**0**	**3**	**V21TEE10**
Name of the Course	**Solar Energy Technologies** Program Elective – III					
Specialization	**Thermal Engineering**					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge level
CO1	Explain various elements of solar energy systems	K2
CO2	Illustrate the design of solar water heating system	K3
CO3	Illustrate solar energy storage systems	K3
CO4	Explain performance characteristics and energy conversion systems	K2
CO5	Explain economics of solar energy systems	K2

UNIT – I

INTRODUCTION: Solar energy option, specialty and potential – Sun – Earth – Solar radiation, beam and diffuse – measurement – estimation of average solar radiation on horizontal and tilted surfaces – problems – applications.
Capturing solar radiation – physical principles of collection – types – liquid flat plate collectors – construction details – performance analysis – concentrating collection – flat plate collectors with plane reflectors– cylindrical parabolic collectors – Orientation and tracking – Performance Analysis.

UNIT – II

DESIGN OF SOLAR WATER HEATING SYSTEM AND LAYOUT: Power generation – solar central receiver system – Heliostats and Receiver – Heat transport system – solar distributed receiver system – Power cycles, working fluids and prime movers, concentration ratio.

UNIT – III

THERMAL ENERGY STORAGE: Introduction – Need for – Methods of sensible heat storage using solids and liquids – Packed bed storage – Latent heat storage – working principle – construction – application and limitations. Other solar devices – stills, air heaters, dryers, Solar Ponds & Solar Refrigeration, active and passive heating systems.

UNIT – IV

DIRECT ENERGY CONVERSION: Solid, state principles – semiconductors – solar cells – performance – modular construction – applications. conversion efficiencies calculations.

UNIT – V

ECONOMICS: Principles of Economic Analysis – Discounted cash flow – Solar system – life cycle costs – cost benefit analysis and optimization – cost based analysis of water heating and photo voltaic applications.

TEXT BOOK:
1. Principles of solar engineering/ Kreith and Kerider/Taylor and Franscis/2nd edition

REFERENCE BOOKS:
1. Solar energy thermal processes/Duffie and Beckman/John Wiley & Sons
2. Solar energy: Principles of Thermal Collection and Storage/Sukhatme/TMH/2nd edition
3. Solar energy/Garg/TMH
4. Solar energy/Magal/McGraw Hill
5. Solar Thermal Engineering Systems /Tiwari and Suneja/Narosa
6. Power plant Technology/ El Wakil/TMH

Semester	II	L	T	P	C	Course Code
Regulation	**V21**	**3**	**0**	**0**	**3**	**V21TEE11**
Name of the Course	**Adavanced Power Plant Engineering** Program Elective – III					
Specialization	**Thermal Engineering**					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge level
CO1	Explain various components of Steam power plant	K2
CO2	Explain various components of Gas turbine & Hydro power plant	K2
CO3	Explain Nuclear power station and types of reactors	K2
CO4	Illustrate operation of combined power plants	K3
CO5	Outline economics and environmental considerations of power plants	K4

UNIT – I
Introduction to the sources of energy – resources and development of power in India.
STEAM POWER PLANT: Plant layout, working of different circuits, fuel handling equipments, types of coals, coal handling, choice of handling equipment, coal storage, ash handling systems. Combustion: properties of coal – overfeed and underfeed fuel beds, traveling grate stokers, spreader stokers, retort stokers, pulverized fuel burning system and its components, combustion needs and draught system, cyclone furnace, design and construction, dust collectors, cooling towers and heat rejection. corrosion and feed water treatment.
UNIT – II
GAS TURBINE PLANT: Introduction – classification , construction – layout with auxiliaries, combined cycle power plants and comparison. Cogeneration of Power and Process heat. Waste heat recovery systems.
HYDRO PROJECTS AND PLANT: Classification – typical layouts – plant auxiliaries – plant operation pumped storage plants.
UNIT – III
NUCLEAR POWER STATION: Nuclear fuel – breeding and fertile materials – nuclear reactor – reactor operation.
TYPES OF REACTORS: Pressurized water reactor, boiling water reactor, sodium,graphite reactor, fast breeder reactor, homogeneous reactor, gas cooled reactor, radiation hazards and shielding – radioactive waste disposal.
UNIT – IV
COMBINED OPERATIONS OF DIFFERENT POWER PLANTS: Introduction, advantages of combined working, load division between power stations, storage type hydro, electric plant in combination with steam plant, run of river plant in combination with steam plant, pump storage plant in combination with steam or nuclear power plant, co ordination of hydro, electric and gas turbine stations, co ordination of hydro,electric and nuclear power stations, co ordination of different types of power plants.
POWER PLANT INSTRUMENTATION AND CONTROL: Importance of measurement and instrumentation in power plant, measurement of water purity, gas analysis, O2 and CO2

measurements, measurement of smoke and dust, measurement of moisture in carbon dioxide circuit, nuclear measurements.

UNIT – V

POWER PLANT ECONOMICS AND ENVIRONMENTAL CONSIDERATIONS: Capital cost, investment of fixed charges, operating costs, general arrangement of power distribution, load curves, load duration curve, definitions of connected load, maximum demand, demand factor, average load, load factor, diversity factor – related exercises. effluents from power plants and Impact on environment – pollutants and pollution standards – methods of pollution control.

TEXT BOOKS:

1. A course in Power Plant Engineering /Arora and Domkundwar/Dhanpatrai & Co.
2. Power Plant Engineering /P.C.Sharma / S.K.Kataria Pub

REFERENCES BOOKS:

1. Power Plant Engineering: P.K.Nag/ II Edition /TMH.
2. Power station Engineering – ElWakil / McGrawHill.
3. An Introduction to Power Plant Technology / G.D. Rai/Khanna Publishers

Semester	II	L	T	P	C	Course Code
Regulation	**V21**	**3**	**0**	**0**	**3**	**V21TEE12**
Name of the Course	**Combustion, Emissions and Environment** Program Elective – III					
Specialization	**Thermal Engineering**					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge level
CO1	Explain principles of combustion	K2
CO2	Illustrate the combustion phenomena	K3
CO3	Differentiate the laminar and turbulent flame propagation	K4
CO4	Illustrate the measurement and control of pollution	K3
CO5	Explain environmental considerations of pollution	K2

UNIT – I

PRINCIPLES OF COMBUSTION: Chemical composition , Flue gas analysis, dew point of products, Combustion stoichiometry, Chemical kinetics, Rate of reaction, Reaction order, Molecularity, Zeroth, first, second and third order reactions , complex reactions, chain reactions, Theories of reaction Kinetics, General oxidation behavior of HCs.

UNIT – II

THERMODYNAMICS OF COMBUSTION: Enthalpy of formation, heating value of fuel, Adiabatic flame Temperature, Equilibrium composition of gaseous mixtures.

UNIT – III

LAMINAR AND TURBULENT FLAMES PROPAGATION AND STRUCTURE: Flame stability, burning velocity of fuels, Measurement of burning velocity, factors affecting the Burning velocity. Combustion of fuel droplets and sprays, Combustion systems, Pulverized fuel furnaces- fixed, entrained and fluidized bed systems.

UNIT – IV

POLLUTION FORMATION MEASUREMENT AND CONTROL: Causes for Formation of NOx, SOx, COx, Smoke and UBHC. Different methods of measurement of pollutants. Methods of controlling the formation of pollutants, BHARAT and EURO standards of emissions.

UNIT – V

ENVIRONMENTAL CONSIDERATIONS: Air pollution, effects on environment, human health etc. Principal pollutants, Legislative measures, methods of emission control.

TEXT BOOK:

1. Fuels and combustion, Sharma and Chandra Mohan, Tata McGraw Hill, 1984..

REFERENCE BOOKS:

1. Combustion Fundamentals , Roger A strehlow , McGraw Hill.
2. Combustion Engineering and Fuel Technology , Shaha A.K., Oxford and IBH.
3. Principles of Combustion , KannethK.Kuo, Wiley and Sons.
4. Combustion , Samir Sarkar , Mc. Graw Hill, 2009.
5. An Introduction to Combustion , Stephen R. Turns, Mc. Graw Hill International Edition.
6. Combustion Engineering , Gary L. Berman & Kenneth W. Ragland, Mc. Graw Hill

Semester	II	L	T	P	C	Course Code
Regulation	V21	3	0	0	3	V21TEE13
Name of the Course	**Jet Propulsion and Rocket Engineering** Program Elective – III					
Specialization	**Thermal Engineering**					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge level
CO1	Explain Turbo Jet propulsion systems	K2
CO2	Outline the principles and characteristic parameters of jet propulsion and rockets	K4
CO3	Illustrate chemical formulations of combustion products	K2
CO4	Differentiate solid and liquid propellant rocket systems	K4
CO5	Explain Ramjet propellant rocket system	K2

UNIT – I

TURBO JET PROPULSION SYSTEMS: Gas turbine cycle analysis, layout of turbo jet engine. Turbo machinery, compressors and turbines, combustor, blade aerodynamics, engine off design performance analysis.

FLIGHT PERFORMANCE: Forces acting on vehicle, Basic relations of motion, multi stage vehicles.

UNIT – II

PRINCIPLES OF JET PROPULSION AND ROCKETRY: Fundamentals of jet propulsion, Rockets and air breathing jet engines,Classification,turbo jet , turbo fan, turbo prop, rocket (Solid and Liquid propellant rockets) and Ramjet engines.

NOZZLE THEORY AND CHARACTERISTICS PARAMETERS: Theory of one dimensional convergent, divergent nozzles, aerodynamic choking of nozzles and mass flow through a nozzle, nozzle exhaust velocity, thrust, thrust coefficient, Ac / At of a nozzle, Supersonic nozzle shape, non, adapted nozzles, Summerfield criteria, departure from simple analysis, characteristic parameters,1) characteristic velocity, 2) specific impulse 3) total impulse 4) relationship between the characteristic parameters 5) nozzle efficiency, combustion efficiency and overall efficiency.

UNIT – III

AERO THERMO CHEMISTRY OF THE COMBUSTION PRODUCTS: Review of properties of mixture of gases, Gibbs, Dalton laws, Equivalent ratio, enthalpy changes in reactions, heat of reaction and heat of formation, calculation of adiabatic flame temperature and specific impulse, frozen and equilibrium flows.

SOLID PROPULSION SYSTEM: Solid propellants, classification, homogeneous and heterogeneous propellants, double base propellant compositions and manufacturing methods. Composite propellant oxidizers and binders. Effect of binder on propellant properties. Burning rate and burning rate laws, factors influencing the burning rate, methods of determining burning rates.

UNIT – IV

SOLID PROPELLANT ROCKET ENGINE: Internal ballistics, equilibrium motor operation and equilibrium pressure to various parameters. Transient and pseudo equilibrium operation, end burning and burning grains, grain design. Rocket motor hard ware design. Heat transfer considerations in solid rocket motor design. Ignition system, simple pyro devices.

LIQUID ROCKET PROPULSION SYSTEM: Liquid propellants, classification, Mono and Bi propellants, Cryogenic and storage propellants, ignition delay of hypergolic propellants, physical and chemical characteristics of liquid propellant. Liquid propellant rocket engine,system layout, pump and pressure feed systems, feed system components. Design of combustion chamber, characteristic length, constructional features, and chamber wall stresses. Heat transfer and cooling aspects. Uncooled engines, injectors,various types, injection patterns, injector characteristics, and atomization and drop size distribution, propellant tank design.

UNIT – V

RAMJET AND INTEGRAL ROCKET RAMJET PROPULSION SYSTEM: Fuel rich solid propellants, gross thrust, gross thrust coefficient, combustion efficiency of ramjet engine, air intakes and their classification, critical, super critical and sub,critical operation of air intakes, engine intake matching, classification and comparison of Integral Rocket Ramjet (IRR) propulsion systems.

TEXT BOOKS:

1. Mechanics and Dynamics of Propulsion/ Hill and Peterson/John Wiley & Sons
2. Rocket propulsion elements/Sutton/John Wiley & Sons/8th Edition

REFERENCE BOOKS:

1. Gas Turbines/Ganesan /TMH
2. Gas Turbines & Propulsive Systems / Khajuria & Dubey / Dhanpat Rai& Sons
3. Rocket propulsion/Bevere/
4. Jet propulsion /Nicholas Cumpsty/University of Cambridge

Semester	II	L	T	P	C	Course Code
Regulation	**V21**	**3**	**0**	**0**	**3**	**V21TEE14**
Name of the Course	**Automotive Engineering** Program Elective – IV					
Specialization	**Thermal Engineering**					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge level
CO1	Explain classification of automobiles	K2
CO2	Illustrate Fuel, ignition and electrical systems of automobile	K3
CO3	Illustrate Cooling and lubrication systems of automobile	K3
CO4	Illustrate Steering system of automobile	K3
CO5	Explain automation in automobiles	K2

UNIT – I

INTRODUCTION: Overview of the course, Examination and Evaluation patterns, History of Automobiles, Classification of Automobiles.

POWER PLANT: Classification, Engine Terminology, Types of Cycles, working principle of and IC engine, advanced classification of Engines, Multi cylinder engines, Engine balance, firing order.

UNIT – II

FUEL SYSTEM, IGNITION SYSTEM AND ELECTRICAL SYSTEM: spark Ignition engines, Fuel tank, fuel filter, fuel pump, air cleaner/filter, carburetor, direct injection of petrol engines. Compression Ignition engines, Fuel Injection System, air & solid injection system, Pressure charging of engines, super charging and turbo charging, Components of Ignition systems, battery ignition system, magneto ignition system, electronic ignition and ignition timing. Main electrical circuits, generating & stating circuit, lighting system, indicating devices, warning lights, speedometer.

UNIT – III

LUBRICATING SYSTEMS AND COOLING SYSTEMS: Functions & properties of lubricants, methods of lubrication, splash type, pressure type, dry sump, and wet sump & mist lubrication. Oil filters, oil pumps, oil coolers. Characteristics of an effective cooling system, types of cooling system, radiator, thermostat, air cooling & water cooling.

TRANSMISSION, AXLES, CLUTCHES, PROPELLER SHAFTS AND DIFFERENTIAL: Types of gear boxes, functions and types of front and rear axles, types and functions, components of the clutches, fluid couplings, design considerations of Hotchkiss drive torque tube drive, function and parts of differential and traction control.

UNIT – IV

STEERING SYSTEM: Functions of steering mechanism, steering gear box types, wheel geometry. Braking and suspension system: Functions and types of brakes, operation and principle of brakes, constructional and operational classification and parking brake. Types of springs shock observers, objectives and types of suspension system, rear axles suspension, electronic control and proactive suspension system.

WHEELS AND TYRES : Wheel quality, assembly, types of wheels, wheel rims,construction of tyres and tyre specifications.

UNIT – V

AUTOMATION IN AUTOMOBILES: Sensors and actuators, electronic fuel injection system, electronic management system, automatic transmission, electronic transmission control, Antilock Braking System (ABS).

TEXT BOOKS:

1. Joseph Heitner, Automotive Mechanics, CBS publications,2017.
2. Srinivasan. S, Automotive Mechanics, 2nd Edition, Tata McGraw,Hill, 2003

REFERENCE BOOKS:

1. Crouse and Anglin, Automotive Mechanism, 9th Edition. Tata McGraw,Hill, 2003.
2. Jack Erjavec, A Systems Approach to Automotive Technology, Cengage Learning Pub.2009

Semester	**II**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	**V21**	**3**	**0**	**0**	**3**	**V21TEE15**
Name of the Course	**Modelling of IC Engines** Program Elective – IV					
Specialization	**Thermal Engineering**					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge level
CO1	Explain fundamentals of IC Engine modeling	K2
CO2	Analyze thermodynamic combustion models of IC Engines	K4
CO3	Illustrate spray behavior of fuels	K3
CO4	Illustrate modeling of charging system	K3
CO5	Explain mathematical models of SI Engines	K2

UNIT – I

FUNDAMENTALS: Governing equations, Equilibrium charts of combustion chemistry, chemical reaction rates, and approaches of modeling, model building and integration methods, gas exchange through valves, engine and porting geometry, exhaust gas recirculation, valve lift curves.

UNIT – II

THERMODYNAMIC COMBUSTION MODELS OF CI ENGINES: Single zone models, premixed and diffusive combustion models, combustion heat release using wiebe function, wall heat transfer correlations, ignition delay, internal energy estimations, two zone model, application of heat release analysis.

UNIT – III

FUEL SPRAY BEHAVIOR: Fuel injection, spray structure, fuel atomization, droplet turbulence interactions, droplet impingement on walls.

UNIT – IV

MODELING OF CHARGING SYSTEM: Constant pressure and pulse turbo charging, compressor and turbine maps, charge air cooler.

UNIT – V

MATHEMATICAL MODELS OF SI ENGINES: Simulation of Otto cycle at full throttle, part throttle and supercharged conditions. Progressive combustion, Autoignition modeling, single zone models, mass burning rate estimation, SI Engine with stratified charge. Friction in pumping, piston assembly, bearings and valve train etc. friction estimation for warm and warm up engines

REFERENCE BOOKS:

1. Haywood, “I.C. Engines”, Mc Graw Hill.
2. Ramos **J** (1989**)** Internal Combustion Engine Modeling**.** Hemisphere Publishing Company
3. C. D. Rakopoulos and E. G. Giakoumis, “Diesel Engine Transient
4. V. Ganeshan, “Internal Combustion Engines”, Tata McGraw Hill, New Delhi, 1996.
5. P.A. Lakshminarayanan and Y. V. Aghav, “ Modelling Diesel Combustion” Springer, 2010
6. Bernard Challen and Rodica Baranescu, “Diesel Engine Reference Book” Butterworth Heinemann, 1999.

Semester	II	L	T	P	C	Course Code
Regulation	**V21**	**3**	**0**	**0**	**3**	**V21TEE16**
Name of the Course	**Renewable Energy Technologies** Program Elective – IV					
Specialization	**Thermal Engineering**					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge level
CO1	Explain solar energy and its applications	K2
CO2	Explain Geothermal energy and techniques of harnessing it	K2
CO3	Illustrate energy conversion systems and application of hydrogen as fuel	K3
CO4	Illustrate Bio energy systems	K3
CO5	Illustrate Wind and Tidal energy systems	K3

UNIT – I

INTRODUCTION: Energy Scenario, Survey of energy resources. Classification and need for conventional energy resources.

SOLAR ENERGY: Sun , Earth relationship, Basic matter to waste heat energy circuit, Solar Radiation, Attention, Radiation measuring instruments.

SOLAR ENERGY APPLICATIONS: Solar water heating. Space heating, Active and passive heating. Energy storage. Selective surface. Solar stills and ponds, solar refrigeration, Photovoltaic generation.

UNIT – II

GEOTHERMAL ENERGY: Structure of earth, Geothermal Regions, Hot springs. Hot Rocks, Hot Aquifers. Analytical methods to estimate thermal potential. Harnessing techniques, Electricity generating systems.

UNIT – III

DIRECT ENERGY CONVERSION: Nuclear Fusion,Fusion, Fusion reaction, P,P cycle, Carbon cycle, Deuterium cycle, Condition for controlled fusion, Fuel cells and photovoltaic. Thermionic & thermoelectric generation, MHD generator.

HYDROGEN GAS AS FUEL: Production methods, Properties, I.C. Engine applications, Utilization strategy, Performance.

UNIT – IV

BIO,ENERGY: Biomass energy sources. Plant productivity, Biomass wastes, aerobic and Anaerobic bioconversion processes, Raw material and properties of bio,gas, Bio,gas plant technology and status, the energetic and economics of biomass systems, Biomass gasification

UNIT – V

WIND ENERGY: Wind, Beaufort number, Characteristics, Wind energy conversion systems, Types, Betz model. Interference factor. Power coefficient, Torque coefficient and Thrust coefficient, Lift machines and Drag machines. Matching, Electricity generation.

ENERGY FROM OCEANS: Tidal energy, Tides, Diurnal and semi, diurnal nature, Power from tides, Wave Energy, Waves, Theoretical energy available. Calculation of period and phase velocity of waves, Wave power systems, submerged devices. Ocean thermal Energy, Principles, Heat exchangers, Pumping requirements, Practical considerations.

TEXT BOOK:

1. Renewable Energy Resources/ John Twidell& Tony Weir/Taylor & Francis/2nd edition

REFERENCE BOOKS:

1. Renewable Energy Resources, Basic Principles and Applications/ G.N.Tiwari and M.K.Ghosal/ Narosa Publications
2. Biological Energy Resources/ Malcolm Fleischer & Chris Lawis/ E&FN Spon
3. Renewable Energy Sources / G.D Rai /Khanna Publishers

Semester	II	L	T	P	C	Course Code
Regulation	V21	0	0	3	2	V21TEL03
Name of the Course	Computational Fluid Dynamics Lab – II					
Specialization	Thermal Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge level
CO1	Analyze the 3D laminar flow through pipe, internal & external flow and rectangular duct.	K4
CO2	Determine the variation of various parameters of rotor & rotary compressor and various losses in pipe flow due to variation of cross section	K4
CO3	Analyze Steady and transient state analysis of solids	K4
CO4	Analyze structural analysis of rectangular plate with hole and orifice in cylinder	K4
CO5	Analyze structural analysis of pressure and velocity in convergent divergent nozzle	K4

1. Static Structural Analysis of a Rectangular Plate with Circular hole
2. Steady State Analysis of a Composite Slab
3. Analysis of Laminar flow in a 3D Circular Pipe
4. Analysis of Pressure and Velocity in a Convergent Divergent Nozzle
5. Study of Variation of various losses in a sudden contraction in pipes
6. External flow analysis of a Cylinder
7. 3 D analysis of a Rectangular Duct
8. Internal Flow 3D analysis
9. Study of Variation of various parameters in a Rotor
10. Study of Variation of various parameters in a Rotary Compressor
11. Transient State Analysis of a Sphere
12. Analysis of Orifice in a Cylinder

Semester	II	L	T	P	C	Course Code
Regulation	V21	0	0	3	2	V21TEL04
Name of the Course	Thermal Engineering Lab – II					
Specialization	Thermal Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge level
CO1	Determination of Heat transfer coefficient in convective heat transfer	K4
CO2	Examine the emissivity of test plate	K4
CO3	Test the performance of heat exchanger, Solar flat plate collector and water cooler	K4

1. Composite Slab Apparatus: Determination of theoretical end experimental values of equivalent thermal resistance of a composite slab.
2. Natural Convection Apparatus: Determination of experimental and empirical values of convection heat transfer coefficient from a Vertical Heated Cylinder losing heat to quiescent air
3. Forced Convection Apparatus: Determination of theoretical, experimental and empirical values of convection heat transfer coefficient for internal forced convection through a circular GI pipe
4. Pin-Fin Apparatus: Determination of temperature distribution, efficiency and effectiveness of the fin working in Natural & forced convection environment.
5. Emissivity Apparatus: Determination of surface emissivity of a given aluminium test plate at a given absolute temperature.
6. Heat Pipe Demonstrator: Demonstration of near isothermal characteristic exhibited by a heat pipe in comparison to stainless steel and copper pipes
7. Performance evaluation of Shell and Tube heat exchanger.
8. Determination of COP of water cooler test rig
9. Measurement of Dryness Fraction by using Throttling Calorimeter.
10. Performance evaluation of Solar Flat Plate Collector.
11. Determination of convective heat transfer coefficient in drop wise and film wise condensation.

III Semester

Semester	III	L	T	P	C	Course Code
Regulation	V21	3	0	0	3	V21TEE17
Name of the Course	**Optmization Techniques & Applications** Program Elective – V					
Specialization	**Thermal Engineering**					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge level
CO1	Explain various single variable optimization techniques	K2
CO2	Illustrate various multi variable optimization techniques	K3
CO3	Explain various linear programming methods	K2
CO4	Explain various non traditional optimization algorithms	K2
CO5	Analyze various applications of optimization techniques to thermal systems	K4

UNIT – I

SINGLE VARIABLE NON,LINEAR UNCONSTRAINED OPTIMIZATION: One dimensional Optimization methods:, Uni, modal function, elimination methods, Fibonacci method, golden section method, interpolation methods, quadratic & cubic interpolation methods.

UNIT – II

MULTI VARIABLE NON LINEAR UNCONSTRAINED OPTIMIZATION: Direct search method, Univariant method , pattern search methods, Powell's, Hook ,Jeeves, Rosenbrock search methods, gradient methods, gradient of function, steepest decent method, Fletcher Reeves method, variable metric method.

UNIT – III

LINEAR PROGRAMMING: Formulation, Sensitivity analysis. Change in the constraints, cost coefficients, coefficients of the constraints, addition and deletion of variable, constraints. Duality, importance of duality, solution of primal from dual.

UNIT – IV

NON TRADITIONAL OPTIMIZATION ALGORITHMS: Genetics Algorithm, Working Principles, Similarities and Differences between Genetic Algorithm & Traditional Methods. Simulated Annealing, Working Principle, Simple Problems.

UNIT – V

APPLICATIONS TO THERMAL SYSTEMS: Optimal design of heat exchangers, condensers, evaporator and IC Engines.

TEXT BOOKS:
1. Optimization theory & Applications / S.S.Rao / New Age International.
2. Optimization for Engineering Design, Kalyanmoy Deb, PHI

REFERENCE BOOKS:
1. S.D.Sharma / Operations Research
2. Optimization Techniques /Benugundu & Chandraputla / Pearson Asia.
3. Design of Thermal Systems / W.F Stoecker/Mc Graw Hill Education

Semester	III	L	T	P	C	Course Code
Regulation	**V21**	**3**	**0**	**0**	**3**	**V21TEE18**
Name of the Course	**Design and Analysis of Experiments** Program Elective – V					
Specialization	**Thermal Engineering**					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge level
CO1	Explain various strategy of experimentation	K2
CO2	Illustrate various factorial design	K3
CO3	Illustrate various two level factorial design	K3
CO4	Analyze various regression models	K4
CO5	Illustrate the Response surface methods	K3

UNIT – I

STRATEGY OF EXPERIMENTATION: Guidelines for designing experiments, sampling and sampling distributions, hypothesis testing, choice of sample size. Experiments with single factor**:** Analysis of variance, analysis of the fixed effects model, model adequacy checking, sample computer output, regression approach to the analysis of variance.

UNIT – II

FACTORIAL DESIGNS: Principles, advantage of factorials, two-factor factorial design, general factorial design, fitting response curves and surfaces.2k factorial design: 22 design, 23 design, General 2kdesign, single replicate of 2k design.

UNIT – III

TWO-LEVEL FRACTIONAL FACTORIAL DESIGNS: one-half fraction of 2K design, one-quarter fraction of 2K design, blocking replicated 2K factorial design, confounding in 2K factorial design. Three-level and mixed-level factorial design: 3K factorial design, confounding in 3K factorial design, fractional replication of 3K factorial design, factorials with mixed levels.

UNIT – IV

REGRESSION MODELS: Linear regression models, estimation of the parameters, hypothesis testing in multiple regression, confidence intervals in multiple regression, prediction of new response observations, regression model diagnostics.

UNIT – V

RESPONSE SURFACE METHODS: Introduction, method of steepest ascent, analysis of second-order response surface, experimental designs for fitting response surfaces.

TEXT BOOK:

1. D.C. Montgomery, “Design and Analysis of Experiments”, 5th edition, John Wiley and sons, 2009.

REFERENCE BOOKS:

1. D.C. Montgomery,” Introduction to Statistical Quality Control”, 4th edition, John Wiley and sons, 2001.
2. Angela Dean and Daniel Voss, “Design and Analysis of Experiments”, Springer, 1999

Semester	III	L	T	P	C	Course Code
Regulation	**V21**	**3**	**0**	**0**	**3**	**V21TEE19**
Name of the Course	**Convective Heat Transfer** Program Elective – V					
Specialization	**Thermal Engineering**					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge level
CO1	Explain free, forced convection and equations governing the phenomena	K2
CO2	Illustrate convection heat transfer in laminar, turbulent flows both internal & external	K3
CO3	Illustrate equations of natural convection laminar flow heat transfer	K3
CO4	Analyze equations of combined convection heat transfer in laminar and turbulent flows	K4
CO5	Explain convection heat transfer in porous media	K3

UNIT – I

Introduction to free, forced combined convection,convective heat transfer coefficient,Application of dimensional analysis to convection,Physical interpretation of dimensionless numbers.

EQUATIONS OF CONVECTIVE HEAT TRANSFER: Continuity, Navier,Strokes equation & energy equation for steady state flows,similarity,Equations for turbulent convective heat transfer,Boundary layer equations for laminar, turbulent flows,Boundary layer integral equations.

UNIT – II

EXTERNAL LAMINAR FORCED CONVECTION: Similarity solution for flow over an isothermal plate,integral equation solutions,Numerical solutions,Viscous dissipation effects on flow over a flat plate.

EXTERNAL TURBULENT FLOWS: Analogy solutions for boundary layer flows,Integral equation solutions,Effects of dissipation on flow over a flat plate.

INTERNAL LAMINAR FLOWS: Fully developed laminar flow in pipe, plane duct & ducts with other cross,sectional shapes,Pipe flow & plane duct flow with developing temperature field,Pipe flows & plane duct flow with developing velocity & temperature fields.

INTERNAL TURBULENT FLOWS: Analogy solutions for fully developed pipe flow –Thermally developing pipe & plane duct flow.

UNIT – III

NATURALCONVECTION: Boussineq approximation,Governingequations,Similarity,Boundary layer equations for free convective laminar flows, Numerical solution of boundary layer equations. Free Convective flows through a vertical channel across a rectangular enclosure,Horizontal enclosure,Turbulent natural convection.

UNIT – IV

COMBINED CONVECTION: Governing parameters & equations,laminar boundary layer flow over an isothermal vertical plate,combined convection over a horizontal plate,correlations for mixed convection,effect of boundary forces on turbulent flows,internal flows , internal mixed convective flows,Fully developed mixed convective flow in a vertical plane channel & in a horizontal duct.

UNIT – V

CONVECTIVE HEAT TRANSFER THROUGH POROUS MEDIA: Area weighted velocity,Darcy flow model, energy equation, boundary layer solutions for 2D forced convection, Fully developed duct flow, Natural convection in porous media, filled enclosures, stability of horizontal porous layers.

TEXT BOOK:

1. Convective Heat & Mass Transfer /Kays& Crawford/TMH

REFERENCE BOOKS:

1. Introduction to Convective Heat Transfer Analysis/ Patrick H. Oosthuigen & David Naylor, MGH.
2. Convection Heat Transfer / Adrian Bejan / Wiley
3. Principles of Convective Heat Transfer / Kaviany, Massoud /Springer

Semester	**III**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	**V21**	**3**	**0**	**0**	**3**	**V21TEE20**
Name of the Course	**Extraction of Energy from Waste** Program Elective – V					
Specialization	**Thermal Engineering**					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge level
CO1	Explain energy from waste, types of waste and energy conversion devices.	K2
CO2	Explain the methods of yield of biomass	K2
CO3	Illustrate various gasifiers of biomass	K3
CO4	Illustration various combustors of biomass	K3
CO5	Explain concepts of biogas technology	K2

UNIT – I

INTRODUCTION TO ENERGY FROM WASTE: Classification of waste as fuel, Agro based, Forest residue, Industrial waste, MSW, Conversion devices, Incinerators, gasifiers, digesters

UNIT – II

BIOMASS PYROLYSIS: Pyrolysis, Types, slow fast, Manufacture of charcoal, Methods Yields and application, Manufacture of pyrolytic oils and gases, yields and applications.

UNIT – III

BIOMASS GASIFICATION: Gasifiers, Fixed bed system, Downdraft and updraft gasifier– Fluidized bed gasifiers, Design, construction and operation, Gasifier burner arrangement for thermal heating, gasifier engine arrangement and electrical power Equilibrium and kinetic consideration in gasifier operation.

UNIT – IV

BIOMASS COMBUSTION: Biomass stoves, Improved chullahs, types, some exotic designs, Fixed bed combustors, Types, inclined grate combustors, Fluidized bed combustors, Design, construction and operation , Operation of all the above biomass combustors.

UNIT – V

BIOGAS: Properties of biogas (Calorific value and composition) , Biogas plant technology and status , Bio energy system , Design and constructional features , Biomass resources and their classification , Biomass conversion processes , Thermo chemical conversion , Direct combustion ,biomass gasification , pyrolysis and liquefaction , biochemical conversion , anaerobic digestion ,Types of biogas Plants, Applications , Alcohol production from biomass, Bio diesel production ,Urban waste to energy conversion , Biomass energy programmed in India.

TEXT BOOKS:

1. Biogas Technology , A Practical Hand Book , Khandelwal, K. C. and Mahdi, S. S., Vol. I & II, Tata McGraw Hill Publishing Co. Ltd., 1983.
2. Biomass Conversion and Technology, C. Y. WereKo-Brobby and E. B. Hagan, John Wiley &Sons, 1996.

REFERENCE BOOKS:

1. Non Conventional Energy, Desai, Ashok V., Wiley Eastern Ltd., 1990.
2. Food, Feed and Fuel from Biomass, Challal, D. S., IBH Publishing Co. Pvt. Ltd., 1991.

Semester	**III**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	**V21**	**3**	**0**	**0**	**3**	**V21TEE21**
Name of the Course	**Advanced Finite Elements Methods** Program Elective – V					
Specialization	**Thermal Engineering**					

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge level
CO1	Explain various approaches to finite element formulations	K2
CO2	Illustrate the displacement, stresses of ID elements used in Finite element analysis	K3
CO3	Differentiate various 2D elements used in Finite element analysis	K4
CO4	Illustrate the iso parametric formulation and convergence criteria	K3
CO5	Analyze the various elements in structural analysis	K4

UNIT – I

FORMULATION TECHNIQUES: Methodology, Engineering problems and governing differential equations, finite elements., Variational methods-potential energy method, Raleigh Ritz method, strong and weak forms, Galerkin and weighted residual methods, calculus of variations, Essential and natural boundary conditions.

UNIT – II

ONE-DIMENSIONAL ELEMENTS: Bar, trusses, beams and frames, displacements, stresses and temperature effects.

UNIT – III

TWO DIMENSIONAL PROBLEMS: CST, LST, four nodded and eight nodded rectangular elements, Lagrange basis for triangles and rectangles, serendipity interpolation functions. Axisymmetric Problems: Axisymmetric formulations, Element matrices, boundary Conditions. Heat Transfer problems: Conduction and convection, examples: - two-Dimensional fin.

UNIT – IV

ISOPARAMETRIC FORMULATION: Concepts, sub parametric, super parametric elements, numerical integration, Requirements for convergence, h-refinement and p-refinement, complete and incomplete interpolation functions, Pascal’s triangle, Patch test.

UNIT – V

FINITE ELEMENTS IN STRUCTURAL ANALYSIS: Static and dynamic analysis, eigen value problems, and their solution methods, case studies using commercial finite element packages.

ANALYSIS OF NON LINEAR ELASTIC SYSTEMS: Introduction to nonlinear FEM, Nonlinear elastic analysis, Numerical integration for elastoplasticity.

TEXT BOOK:
1. Finite element methods by Chandrubatla & Belagondu.
2. The Finite Element Method in Engineering By Singiresu S. Rao, 5th Edition, Publisher: Butterworth-Heinemann.

REFERENCE BOOKS:
1. J.N. Reddy, Finite element method in Heat transfer and fluid dynamics, CRC press, 1994
2. Zienckiwicz O.C. & R. L. Taylor, Finite Element Method, McGraw-Hill,1983.
3. K. J. Bathe, Finite element procedures, Prentice-Hall, 1996
4. Finite Element Analysis, P. Seshu, Publisher: PHI Learning Pvt. Ltd., New Delhi, 2012.

Annexure-VI

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(Approved by **AICTE**, New Delhi & Recognized by **UGC** under section **2(f) & 12(B)**)
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Pedatadepalli, **TADEPALLIGUDEM – 534 101.**W.G.Dist. (**A.P**)

Department of Electronics and Communication Engineering

Date: 04.09.2021

Minutes of the 5th meeting of BOS
(Held on 03.09.2021)

The ECE Department 5th meeting of Board of Studies (BOS) was conducted through online mode on 03.9.2021 at 11.00 A.M using ZOOM Application with following given link address.
https://us02web.zoom.us/j/83132873142.
Following external members have attended the meeting along with internal faculty members. The ECE HOD, Dr E. Kusuma Kumari, BOS Chairman headed the meeting.

Details of members attended:

S.No	Name of the BOS Member	Nominee	Address
1.	Dr.E.KusumaKumari	Chair person	Professor & Head, ECE, SVEC
2.	Prof.I. SanthiPrabha	University Nominee	Prof. in ECE Dept., University College of Engg., JNTUK, Kakinada
3.	Prof. NVSN. Sarma	Subject Expert	Director, IIIT Trichy Tiruchirapalli, Tamilnadu.
4.	Prof. M. VenugopalaRao	Subject Expert	Prof., ECE Dept., K.L.University, Vijayawada.
5.	Sri. Sunkavalli Siva Kumar	Alumni Nominee	Sr.Engineer, Qualcomm, Bangalore.
6.	l Faculty Members in Dept.	Members	ECE Dept., SVEC

The following are the key points discussed in the meeting.

- **Item No.1 : Chairperson, BOS has welcomed all the members and given the Opening Remarks.**

- **Item No.2: Review & Approval of the VII& VIII Sem of B. Tech ECE of V18 Reg.**

BOS members Reviewed the Course Structure and given Following Suggestions

- Change the Course title of Radar Systems to Radar Engineering (V18ECT20) in VII semester
- Change the Professional Elective course title from IoT: Concepts & Applications to IoT: Use cases (V18ECT24) in VII semester.
- Removal of topic of "Efficiency of Non Matched Filter in the syllabus of Radar Engg. Course (V18ECT20) in VII Semester.
- Rearrange the syllabus for course titled Optical Communication (V18ECT21) in VII semester.
- Add One more Text book for the Bio-Medical Instrumentation Course (V18ECT35) in VIII semester.

The approved course structure & Syllabus for the VII & VIII semesters of B. Tech ECE of V18 regulation was given in **Annexure-EC-I**

- **Item No.3: Review & Approval the List of Open Elective Courses offered by ECE Dept., in VII & VIII Semesters B. Tech ECE of V18 Reg.**

BOS Members suggested that to Change the Open elective course title in VII Semester "Principles of Wireless, Cellular Mobile Comm. is to " Principles of Wireless Communication" (V18ECTOE4) and approved the Syllabus.

Approved List of Courses and Syllabus was given in **Annexure-EC-II**

- **Item No. 4: Review & Approval of the Proposed Course Structure and Syllabi for the III and IV Semester of B. Tech ECE under V20 Regulation.**

- BOS members reviewed and suggested that try to include Machine Learning Topics in Course titled as Skill Oriented Course (V20ECSOC01) in the III and IV Semester of B. Tech ECE under V20 Regulation and approved the Syllabus.
- In the III semester, the Course titled Probability Theory & Stochastic Processes can be approved in the Basic Science BOS meeting. ECE BOS members were accepted to that proposal.
- Approved the Proposed Course Structure and Syllabi for the III and IV Semester of B. Tech ECE under V20 Regulation.

Approved List of Courses and Syllabus was given in **Annexure-EC-III**

Item No. 5: Approval of List of Courses offered to EEE Department in III Semester of B. Tech EEE under V20 Regulation.

BOS members approved the Syllabus and details are given in **Annexure-EC-IV**

1. **Item No. 6: Approval of Proposed course structure & syllabi for the courses offered in III & IV semesters of B. Tech ECT under V20 Regulation.**

   BOS members approved the Syllabus and details are given in **Annexure-EC-V**

2. **Item No. 7: Approval of Proposed course structure and Syllabi for M. Tech Programme with specialization of Embedded Systems & VLSI under V21 Regulations.**

   BOS Members Suggested that to include the MOOCS courses in III semester of the M. Tech Programme, approved the Course Structure and Syllabus. The details are given in **Annexure-EC-VI**

Finally, the chairperson thanked all the BOS members and faculty. The meeting was ended at 12.30 P.M

Dr. E. Kusuma Kumari,
Chairperson, BOS

Annexure-EC-I

Approved Course Structure & Syllabus for VII& VIII Semesters

COURSE STRUCTURE

(For V18 Regulation)

VII Semester

Sl.No.	Course Code	Category	Course Title	Hours per week			Credits
				L	T	P	C
1	V18ECT20	Professional Core Courses	Radar Engineering	3	0	0	3
2	V18ECT21	Professional Core Courses	Optical Communication	3	0	0	3
3	V18ECT22	Professional Core Courses	Digital Image Processing	3	0	0	3
4	V18ECT24 V18ECT25 V18ECT26	Prof. Elective Course	**Prof. Elective 3:** • IOT: Use Cases • CMOS Analog IC Design • Digital TV Engg.	3	0	0	3
5	V18ECT27 V18ECT28 V18ECT29	Prof. Elective Course	**Prof. Elective 4:** • Low Power IC Design • System On Chip • System Design Through Verilog	3	0	0	3
6	V18ECTOE4 V18ECTOE5 V18ECTOE6	Open Elective Course	**Open Elective-2:** • Principles of Wireless Comm. • Medical Electronics • Concepts of Embedded Systems	3	0	0	3
7	V18ECL11	Professional Core Course Lab	Microwave & Optical Comm. Lab	0	0	2	1
8	V18ECPR01	Main Project	Project	0	0	6	3
			Total	**18**	**0**	**8**	**22**

VIII Semester

Sl.No.	Course Code	Category	Course Title	Hours per week			Credits
				L	T	P	C
1	V18ECT30	Professional Core Course	Cellular Mobile Communication	3	0	0	3
2	V18ECT31 V18ECT32 V18ECT33	Professional Elective Course	**Prof. Elective 5:** • Electronics Measurements & Instrumentation • FPGA Architecture • Principles of Modern Wireless Communication Systems	3	0	0	3
3	V18ECT34 V18ECT35 V18ECT36	Professional Elective Course	**Prof. Elective 6:** • Satellite Communication • Biomedical Instrumentation. • Wireless Sensor Networks	3	0	0	3
4	V18ECTOE7 V18ECTOE8 V18ECTOE9	Open Elective Course	**Open Elective-3:** • Fundamentals of Digital Image & Video Processing • Embedded RTOS • Principles of Digital TV Engg.	3	0	0	3
5	V18ECPR02	Main Project	Project Contd.	0	0	16	8
			TOTAL	**12**	**0**	**16**	**20**

VII-Semester Syllabus

VII Sem.	Radar Engineering	Course Code:V18ECT20	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

- CO1: Derive the radar range equation and to solve some analytical problems. **[K2]**
- CO2: Describe the operation of CW and FMCW Radar systems. **[K2]**
- CO3: Illustrate the principle of each and every block of MTI and Pulse Doppler Radar **[K2]**
- CO4: Distinguish the different methods used for tracking targets. **[K2]**
- CO5: Relate the Noise Figure and Noise Temperature in Radar Receivers **[K2]**
- CO6: Explain the various components of radar receiver and its performance. **[K2]**

UNIT–I:

Basics of Radar: Introduction, Maximum Unambiguous Range, simple Radar range Equation, Radar Block Diagram and Operation, Radar Frequencies and Applications.

Radar Equation : Prediction of Range Performance, Minimum Detectable Signal, Receiver Noise, Modified Radar Range Equation, SNR, Probability of Detection, Probability of False Alarm, Integration of Radar Pulses, Radar Cross Section of Targets (simple targets-sphere, cone-sphere), Transmitter Power, PRF and Range Ambiguities, System Losses.

UNIT–II:

CW and Frequency Modulated Radar: Doppler Effect, CW Radar – Block Diagram, Isolation between Transmitter and Receiver, Non-zero IF Receiver, Receiver Bandwidth Requirements, Applications of CW radar.

FM-CW Radar: Range and Doppler Measurement, Block Diagram and Characteristics, FM-CW altimeter, Multiple Frequency CW Radar.

UNIT-III:

MTI and Pulse Doppler Radar: Introduction, Principle, MTI Radar with - Power Amplifier Transmitter and Power Oscillator Transmitter, Delay Line Cancellers – Filter Characteristics, Blind Speeds, Double Cancellation, Nth Cancellation Staggered PRFs. Range Gated Doppler Filters. MTI Radar Parameters, Limitations to MTI Performance, MTI versus Pulse Doppler Radar.

UNIT –IV:

Tracking Radar: Tracking with Radar, Sequential Lobing, Conical Scan, Mono pulse Tracking Radar – Amplitude Comparison Mono pulse (one- and two- coordinates), Phase Comparison Mono pulse, Tracking in Range, Acquisition and Scanning Patterns, Comparison of Trackers.

UNIT –V:

Detection of Radar Signals in Noise: Introduction, Matched Filter Receiver – Response Characteristics and Derivation, Correlation Detection and Cross-correlation Receiver, Matched Filter with Non-white Noise, Noise Figure and Noise Temperature.

UNIT –VI:

Radar Receivers –Displays – types. Duplexers – Branch type and Balanced type, Circulators as Duplexers.

Introduction to Phased Array Antennas – Basic Concepts, Radiation Pattern, Beam Steering and Beam Width changes, Series versus parallel feeds, Applications, Advantages and Limitations.

TEXT BOOKS:

1. Introduction to Radar Systems – Merrill I. Skolnik, TMH Special Indian Edition, 2ndEd., 2007.
2. Radar Principles – Peebles, Jr., P.Z., Wiley, New York, 1998.
3. Microwave & Radar Engineering – G. SasibhushanaRao, Pearson Publications

REFERENCE BOOKS:

1. Introduction to Radar Systems, 3rd edition – M.I. Skolnik, TMH Ed., 2005
2. Microwave & Radar Engineering – M. Kulkarni, Umesh Publications, 3rd edition
3. Radar Engineering – GSN Raju, IK International.

VII Sem.	Optical Communication	Course Code:V18ECT21	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe the overview of optical fiber communication, ray theory transmission and Concepts of modes.**[K2]**
CO2: Explain thoroughly the operation of optical sources, Quantum efficiency and power. **[K2]**
CO3: Classify different types of optical detectors and also explain the operation of optical Receiver.**[K2**
CO4: Explain the types of fiber materials with their properties and fiber losses. **[K2]**
CO5: Illustrate the concept of power launching and power coupling for optical fibers. Discuss splicing techniques and connector losses. **[K3]**
CO6:Construct optical link and becomes familiar with WDM concepts and measurement Techniques.**[K3]**

UNIT I
Introduction - Historical development, the general system, advantages of optical fiber communications. Optical fiber wave guides - Ray theory transmission, Total Internal Reflection, Acceptance angle, Numerical Aperture, Skew rays, Cylindrical fibers- Modes, V-number, Mode coupling, Step Index fibers, Graded Index fibers, Single mode fibers - Cut off wavelength, Mode Field Diameter, Effective Refractive Index, Related problems.

UNIT II
Optical sources-LEDs, Structures, Materials, Quantum efficiency, Power, Modulation, Power bandwidth product. Injection Laser Diodes- Modes, Threshold conditions, Laser diode rate equations, External quantum efficiency, resonant frequencies, Reliability Considerations.

UNIT III
Optical detectors- Physical principles of PIN and APD, Detector response time, Temperature effect on Avalanche gain, Comparison of Photo detectors, Optical receiver operation - Fundamental receiver operation, Digital signal transmission, error sources, Receiver configuration, Digital receiver performance, Probability of Error, Quantum limit, Analog receivers. Related problems.

UNIT IV
Fiber materials - Glass, Halide, Active glass, Chalgenide glass, Plastic optical fibers. Signal Degradation in optical fibers - Attenuation, Absorption, Scattering and Bending losses, Core and Cladding losses, Information capacity determination, Group delay, Types of Dispersion: Material dispersion, Wave-guide dispersion, Polarization-Mode dispersion, Intermodal dispersion, Pulse broadening in Graded index fiber, Related problems.

UNIT V

Source to fiber power launching-Output patterns, Power coupling, Power launching, Equilibrium Numerical Aperture, Lensing Schemes for Coupling, Laser diode to fiber coupling. Fiber to Fiber joints – Mechanical misalignment, Fiber related losses, End face preparation, Fiber Splicing-Splicing techniques, Splicing single mode fibers, Optical fiber Connectors-Connector types, Single mode fiber connectors, Connector return loss, Multimode fiber joints, Single mode fiber joints.

UNIT VI

Optical system design - Point-to- point links- System considerations, Link power budget, Rise time budget with examples, Line coding in Optical links, Operational Principles of WDM, Measurement of Attenuation and Dispersion, Eye pattern.

TEXT BOOKS:

1. Optical Fiber Communications – Gerd Keiser, McGraw-Hill International edition, 3rd Edition, 2000.
2. Fiber Optic Communication Systems – Govind P. Agarwal, John Wiley, 3rd Edition, 2004.

RERFERENCES:

1. Fiber Optic Communications – D.K. Mynbaev, S.C. Gupta and Lowell L. Scheiner, Pearson Education,2005.
2. Text Book on Optical Fiber Communication and its Applications – S.C.Gupta, PHI, 2005.
3. Fiber Optic Communications – Joseph C. Palais, 4th Edition, Pearson Education, 2004.

VII Sem.	Digital Image Processing	Course Code:V18ECT22	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1. Illustrate the different Transforms Techniques & their use in Image Processing Applications**(K3)**
CO2. Examine Spatial & frequency domain filtering like smoothing & sharpening Operation son Images **(K4)**
CO3. Analyze Restoration operations/techniques on Images**(K4)**
CO4. Describe the Image compression Techniques and multi-resolution processing on Images**(K3)**
CO5. Analyze morphological operations on Images & Image segmentation**(K4)**
CO6. Illustrate the different color Image Processing Techniques on Images**(K3)**

UNIT-I

Introduction: Introduction to Image Processing, Fundamental steps in digital image processing, components of an image processing system, image sensing and acquisition, image sampling and quantization, some basic relationships between pixels, an introduction to the mathematical tools used in digital image processing.

Image Transforms: Need for image transforms, Discrete Fourier transform (DFT) of one variable, Extension to functions of two variables, some properties of the 2-D Discrete Fourier transform, Walsh Transform. Hadamard transform, Haar Transform, Slant transform, Discrete Cosine transform, Discrete Sine Transform, Comparison of different image transforms.

UNIT-II

Intensity Transformations and Spatial Filtering: Some basic intensity transformation functions, histogram processing, fundamentals of spatial filtering, smoothing spatial filters, and sharpening spatial filters.

Filtering in the Frequency Domain: The Basics of filtering in the frequency domain, image
Smoothing using frequency domain filters, Image Sharpening using frequency domain filters, Selective filtering.

UNIT-III

Image Restoration and Reconstruction: A model of the image degradation / Restoration process, Noise models, restoration in the presence of noise only-Spatial Filtering, Periodic Noise Reduction by frequency domain filtering, Linear, Position – Invariant Degradations, Estimating the degradation function, Inverse filtering, Minimum mean square error (Wiener) filtering, geometric mean filter .

UNIT-IV

Image compression: Fundamentals, Basic compression methods: Huffman coding, Arithmeticcoding,LZWcoding,Run-Lengthcoding,Symbol-Basedcoding,Bit-Planecoding,BlockTransformcoding,

Wavelets and Multi resolution Processing: Image pyramids, sub band coding, Multi resolution expansions, wavelet transforms in one dimensions &two dimensions, Wavelet coding.

UNIT-V

Image segmentation: Fundamentals, point, line, edge detection, thresholding and region –based segmentation.

Morphological Image Processing: Erosion and dilation, opening and closing,basic morphological algorithms for boundary extraction, thinning, gray scale morphology.

UNIT-VI

Color image processing: color fundamentals, color models, pseudo color image processing, basics of full color image processing, color transformations, smoothing and sharpening. Image segmentation based on color, noise in color images, color image compression.

TextBooks:

1. R.C. Gonzalez and R.E.Woods, Digital ImageProcessing, 3rdedition, PrenticeHall, 2008.
2. Jayaraman, S.Esakkirajan, and T.Veerakumar,"DigitalImageProcessing", TataMcGraw-Hill Education, 2011.

Reference Books:

1. AnilK.Jain,"FundamentalsofDigitalImageProcessing",PrenticeHallofIndia,9thEdition,IndianReprint,2002.
2. B.Chanda, D.Dutta Majumder, "Digital ImageProcessingandAnalysis",PHI,2009.

VII Sem.	IOT: Use Cases (Professional Elective-III)	Course Code:V18ECT24	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

- CO1: Describe M2M and IOT Technologies. **[K2]**
- CO2: Explain the layers and protocols in IOT. **[K2]**
- CO3: Describe various communication technologies used in IOT. **[K2]**
- CO4: Illustrate various hardware components required for IOT applications. **[K2]**
- CO5: Discuss the cloud technologies and their services. **[K2]**
- CO6: Explain the IoT Applications. **[K2]**

UNIT I – INTRODUCTION [1]
Introduction from M2M to IoT - An Architectural Overview, building architecture, Main design principles and needed capabilities, An IoT architecture outline, M2M and IoT Technology Fundamentals - Devices and gateways.

UNIT II – IOT PROTOCOLS [2]
Functionality of Layers in IoT –Study of protocols - Wireless HART, Z-Wave, 6LoWPAN, RPL, CoAP, MQTT.

UNIT III - COMMUNICATION TECHNOLOGIES IN IOT [2, 4]
Study of IoT Connectivity –IEEE 802.15.4,Zigbee, LPWAN, Wi-Fi, Bluetooth, 5G Era.

UNIT IV - SYSTEM HARDWARE [3, 4]
Sensors, Actuators, Radio Frequency Identification, Introduction to Embedded Devices for IoT - RASPBERRY PI, BeagleBone black.

UNIT V – Cloud Computing [3, 4]
Data Collection, Storage and Computing Using a Cloud Platform for IoT Applications/Services, AWS for IoT-Introduction to Amazon EC2.

UNIT VI - IOT APPLICATIONS [2, 3]
Applications - Smart and Connected Cities, Public Safety, Agriculture, and Healthcare.

TEXTBOOKS:

1. "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, StamatisKarnouskos, David Boyle, 1st Edition, Academic Press, 2014.
2. IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things, David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry, and Cisco Press 800 East 96th Street Indianapolis, Indiana 46240 USA.
3. "Internet of Things (A Hands-on- Approach)", Vijay Madisetti and ArshdeepBahga, 1stEdition, VPT, 2014.
4. Internet of Things - By Raj Kamal, McGraw-Hill Education. Copyright.

REFERENCE BOOKS:

1. From Internet of Things to Smart Cities: Enabling Technologies - edited by Hongjian Sun, Chao Wang, Bashar I. Ahmad, CRC Press -2018.
2. Bernd Scholz-Reiter, Florian Michahelles, "Architecting the Internet of Things", ISBN 978-3-642-19156-5 e-ISBN 978-3-642-19157-2, Springer.
3. IOT (Internet of Things) Programming: A Simple and Fast Way of Learning IOT, David Etter.

			L	T	P	C
VII Sem.	**CMOS ANALOG IC DESIGN (Professional Elective-III)**	**Course Code:V18ECT25**	**3**	**0**	**0**	**3**

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

- CO1: Describe the Large and Small signal models of different Analog Devices**(K2)**
- CO2: Analyse the various types of current mirrors**.(K3)**
- CO3: Analyse the different types of single stage MOS amplifiers**.(K3)**
- CO4: Describe the Noise modelling of Various Circuit Elements**.(K2**)
- CO5: Illustrate the construction and working of OP-AMP**.(K3)**
- CO6: Illustrate the types of CMOS Comparators **.(K3)**

UNIT -I: Integrated circuit Devices and Modelling

Semiconductors and p-n junction: diodes reverse biased diodes, graded junctions, large signal junction capacitance and forward biased junctions small signal model of forward biased diode

The MOS Transistor**:** symbol for MOS Transistors, basic Operation, and Large signal modelling small signal modelling.

Bi-Polar Transistors: basic Operation, Large signal modelling small signal modelling

UNIT -II: Basic Current Mirrors

Basic CMOS current Mirrors, source Degenerated current mirror, Cascade current Mirror and Wilson Current Mirror, bipolar current mirror and Current mirror with Beta Helper.

UNIT -III: Single Stage Amplifiers

Common source amplifier, Source follower, common gate Amplifier, Cascode Gain stage amplifier and MOS Differential Amplifiers. Frequency response of Amplifiers.

UNIT -IV: Noise Analysis and Modelling

Time Domain Analysis of Noise**:** RMS, SNR, Units of dBm& Noise summation**.**

Frequency Domain Analysis of Noise**:** Noise spectral Density, White Noise, Flicker Noise, Noise filtering & Noise bandwidth**.**

Noise models for circuit elements**:** Resistors, Diodes, Transistors and MOSFETS

UNIT -V: CMOS Operational Amplifiers & Compensation

Block diagram of Op-amp, op-amp gain, frequency response &Slew Rate, op-amp Compensation

UNIT -IV: Comparators

Characterization of Comparator, Two-Stage,Open-Loop Comparators, Other Open-Loop Comparators, Improving the Performance of Open-Loop Comparators, Discrete- Time Comparators.

TEXT BOOKS:

1. Analog Integrated Circuit Design- David A.Johns, Ken Martin, Wiley Student Edn,2013.
2. CMOS Analog Circuit Design - Philip E. Allen and Douglas R. Holberg, Oxford University Press, International Second Edition/Indian Edition,2010.

REFERENCES:

1. Analysis and Design of Analog Integrated Circuits- Paul R. Gray, Paul J. Hurst, S. Lewis and R. G. Meyer, Wiley India, Fifth Edition,2010.
2. Design of Analog CMOS Integrated Circuits- Behzad Razavi, TMH Edition, Second Edition

<table>
<tr><td rowspan="2">VII Sem.</td><td rowspan="2">Digital TV Engineering (Professional Elective-III)</td><td rowspan="2">Course Code:V18ECT26</td><td>L</td><td>T</td><td>P</td><td>C</td></tr>
<tr><td>3</td><td>0</td><td>0</td><td>3</td></tr>
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Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

- CO1: Illustrate the fundamentals of television engineering. **[K2]**
- CO2:Explain the colour TV transmission and reception **[K2]**
- CO3: Compare Digital TV transmission standards **[K4]**
- CO4: Discuss factors affecting system noise and transmission errors **[K2]**
- CO5: Explain the Digital TV transmission and reception. **[K2]**
- CO6: Describe the operation of LCD and Plasma screens **[K2]**

UNIT I

Introduction: TV transmitter and receivers, synchronization

Television Pictures: Geometric form and aspect ratio, image continuity, interlaced scanning, picture resolution

Composite video signal: Horizontal and vertical sync details

TV Signal Transmission: VSB transmission, standard channel BW, TV transmitter

UNIT II

Colour Television: Perception of brightness and colours, additive colour mixing, video signals for colours, luminance signal, colour difference signals, encoding of colour difference signals, formation of chrominance signals, PAL encoder, PAL colour receiver

UNIT III

Digital Television Transmission Standards: ATSC terrestrial transmission standard, vestigial sideband modulation, DVB -T transmission standard, ISDB-T transmission standard, channel allocations, antenna height and power, MPEG-2.

UNIT IV

Performance Objectives for Digital Television: System noise, external noise sources, transmission errors, error vector magnitude, eye pattern, interference, co-channel interference, adjacent channel interference, analog to digital TV, transmitter requirements.

UNIT V

Digital Television: Digital System Hardware, Signal Quantization and Encoding, Digital Satellite Television, Direct to Home Satellite Television, Digital TV Receiver, Merits of Digital TV Receivers

UNIT VI

LCD and Plasma Screens: LCD Technology, LCD Matrix types and operation, LCD Screens for Television, Plasma and conduction of charge, Plasma TV Screens, Plasma Color Receiver, LCD color receiver

Text Books:

1. Modern Television Practice: Transmission, Reception and Applications- R. R.Gulati, 4th
Revised edition, New Age International Publishers.
2. Television and Video Engineering – A.M. Dhake, 2nd Edition, Tata McGraw Hill Publishers.
3. Fundamentals of Digital Television Transmission- Gerald W. Collins, John Wiley & Sons.
4. Television engineering and video systems – R G Gupta, Tata McGraw Hill Publishers.

References

1. Basic Television and Video Systems – Bernard Grob, McGrawHill Publishers.
2. Monochrome and Colour Television - R RGulati, New Age International Publishers.
3. Colour Television, Theory and Practice - S.P.Bali, Tata McGraw-Hill Publishers.

VII Sem.	**Low Power IC Design (Professional Elective-IV)**	**Course Code:V18ECT27**	**L**	**T**	**P**	**C**
			3	**0**	**0**	**3**

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

- CO1: Explain the need of Low power circuit design **(K2)**.
- CO2: Describe the different architectural approaches **(K2)**.
- CO3: Analyze Low-Power Design Approaches**(K4).**
- CO4: Analyze and design Low-Voltage Low-Power Adders circuits**(K4).**
- CO5: Analyze and design Low-Voltage Low-Power Multiplier circuits**(K4).**
- CO6: Analyze and design of Low-Voltage Low-Power Memories**(K4).**

UNIT–I:
Fundamentals: Need for Low Power Circuit Design, Sources of Power Dissipation–Switching Power Dissipation, Short Circuit Power Dissipation, Leakage Power Dissipation, Glitching Power Dissipation, Short Channel Effects.

UNIT–II:
Supply Voltage Scaling for Low Power: Device Feature Size Scaling, Constant-Field Scaling, Constant-Voltage Scaling, Architectural-Level Approaches: Parallelism for Low Power, Pipelining for Low Power, Combining Parallelism with Pipelining.
Voltage Scaling Using High-Level Transformations: Multilevel Voltage Scaling Challenges in MVS Voltage Scaling Inter faces, Static Timing Analysis Dynamic Voltage and Frequency Scaling.

UNIT-III
Low-PowerDesignApproaches: Low-PowerDesignthroughVoltageScaling VTCMOS circuits, MTCMOS circuits, Architectural Level Approach–Pipelining and Parallel Processing Approaches. Power Gating, Clock Gating Versus Power Gating, Power-Gating Issues.

UNIT–IV:
Low-Voltage Low-Power Adders: Introduction, Standard Adder Cells, CMOS Adder's Architectures – Ripple Carry Adders, Carry Look- Ahead Adders, Carry Select Adders, Carry Save Adders, Low-Voltage Low-Power Design Techniques –Trends of Technology and Power Supply Voltage.

UNIT-V
Low-Voltage Low-Power Multipliers: Introduction, Overview of Multiplication, Types of Multiplier Architectures, BraunMultiplier, Baugh-Wooley Multiplier, Introduction to Wallace Tree Multiplier.

UNIT–VI:

Low-Voltage Low-Power Memories: Basics of ROM, Low-Power ROM Technology, Future Trend and Development of ROMs, Basics of SRAM, Memory Cell, Pre-charge and Equalization Circuit, Low-Power SRAM Technologies, Basics of DRAM, Self-Refresh Circuit, Future Trend and Development of DRAM.

TEXTBOOKS:

1. CMOS Digital Integrated Circuits–Analysis and Design–Sung-Mo Kang, Yusuf Leblebici, TMH, 2011.
2. Low-Voltage, Low-Power VLSI Subsystems–Kiat-SengYeo, KaushikRoy, TMH ProfessionalEngineering, 1st edition, 2004

REFERENCEBOOKS:

1. Introduction to VLSISystems: ALogic, Circuit and System Perspective–Ming-BO Lin, CRCPress, 2011
2. Low Power CMOS VLSI Circuit Design – Kaushik Roy, Sharat C. Prasad, JohnWiley& Sons, 2000.
3. Practical Low Power Digital VLSI Design–Gary K.Yeap, Kluwer AcademicPress, 2002.
4. Leakage in Nanometer CMOS Technologies–SivaG.Narendran, Anatha Chandrakasan, Springer, 2005.

VII Sem.	System on Chip (Professional Elective-IV)	Course Code:V18ECT28	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

- CO1: Describe SOC System Approach, design and its Architecture.**[K2]**
- CO2: Discuss the selection of processor and its micro architecture for SOC**[K2]**
- CO3: Describe Memory Design for SOC **[K2]**
- CO4: Explain the concepts of bus models and Interconnect Architectures **[K2]**
- CO5: Describe the overview of Zynq SOC**[K2]**
- CO6: Explain the SOC based Applications. **[K2]**

UNIT – I: Introduction to the System Approach: System Architecture, Components of the system, Hardware & Software, Processor Architectures, Memory and Addressing. System level interconnection, an approach for SOC Design, System Architecture and Complexity.

UNIT – II : Processors: Introduction , Processor Selection for SOC, Basic concepts in Processor Architecture, Basic concepts in Processor Micro Architecture, Basic elements in Instruction handling. Buffers: minimizing Pipeline Delays, Branches, More Robust Processors, Vector Processors and Vector Instructions extensions, VLIW Processors, Superscalar Processors.

UNIT – III : Memory Design for SOC: Overview of SOC external memory, Internal Memory, Size, Scratchpads and Cache memory, Cache Organization, Cache data, Write Policies, Strategies for line replacement at miss time, Types of Cache, Split – I, and D – Caches, Multilevel Caches, Virtual to real translation , SOC Memory System, Models of Simple Processor – memory interaction.

UNIT – IV : Interconnect Customization and Configuration: Inter Connect Architectures, Bus: Basic Architectures, SOC Standard Buses , Analytic Bus Models, Using the Bus model, Effects of Bus transactions and contention time. SOC Customization: An overview, Customizing Instruction Processor, Reconfiguration Technologies, Mapping design onto Reconfigurable devices, Instance Specific design, Customizable Soft Processor.

UNIT-V: Zynq system on chip design overview: interfacing and signals, interconnects, Memory and interrupts.

UNIT – VI: Application Studies / Case Studies: SOC Design approach, Design and evaluation - AES algorithms, Image compression – JPEG compression.

TEXT BOOKS:

1. Computer System Design System-on-Chip - Michael J. Flynn and Wayne Luk, Wiely India Pvt. Ltd.
2. Embedded Processing with the ARM Cortex-A9 on the Xilinx Zynq-7000 All Programmable SoC-Louise H. Crockett Ross A. Elliot Martin A. Enderwitz Robert W. Stewart
3. Design of System on a Chip: Devices and Components – Ricardo Reis, 1st Ed., 2004, Springer

REFERENCE BOOKS:

1. Co-Verification of Hardware and Software for ARM System on Chip Design

(Embedded Technology) – Jason Andrews – Newnes, BK and CDROM.

2. System on Chip Verification – Methodologies and Techniques – Prakash Rashinkar, Peter Paterson and Leena Singh L, 2001, Kluwer Academic Publishers.

VII Sem.	System Design Through VERILOG (Professional Elective-IV)	Course Code:V18ECT29	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

- CO1: Outline basic concepts of RTL code for digital circuits **K2**
- CO1: Model RTL codes for digital circuit at gate level **K3**
- CO1: Model RTL codes for digital circuit at behavioural level **K3**
- CO1: Model RTL codes for digital circuit at data flow and switch level **K3**
- CO1: Ouline the concepts of task, function and complier directives **K2**
- CO1: Analyze Synthesize of Combinational and Sequential Circuits **K4**

UNIT-I

INTRODUCTIONTOVERILOG:

Verilog as HDL, Levels of design description, concurrency, module, simulation and synthesis, test bench, functional verification, programming language interface (PLI), simulation and synthesistools.

LANGUAGECONSTRUCTSANDCONVENTIONS:

Introduction, keywords, identifiers, whitespace characters, comments, numbers, strings, logic values, data types, scalars and vectors, parameters, memory, operators, system tasks.

UNIT-II

GATELEVELMODELLING:

Introduction, and gate primitive, module structure, other gate primitives, illustrative examples, tristate gates, array of instances of primitives, design of Flip flops with gate primitives, delays, strengths and contention resolution, net types, design of basic circuits.

UNIT-III

BEHAVIORALMODELLING:

Introduction, operations and assignments, initial construct, always construct, examples, assignments with delays, wait construct, multiple always blocks, designs at behavioral level, blocking and non-blocking assignments, the case statement, if and if else constructs, assign-De assign construct, repeat construct, FOR loop, the disable construct, While loop, Forever loop, parallel blocks, force-release construct, event.

UNIT-IV

DATA FLOWLEVEL MODELLING

Introduction, continuous assignment structures, delays and continuous assignments, assignment to vectors.

SWITCH LEVEL MODELLING

Basic transistor switches, CMOS switch, Bidirectional gates and time delays with switch primitives, instantiations with strengths and delays, strength contention with triregnets, switch level modeling for NAND, NOR and XOR.

UNIT-V

SYSTEM TASKS, FUNCTIONS, AND COMPILER DIRECTIVES: Introduction, System Tasks and Functions, File based Tasks and Functions, Compiler Directives, Hierarchical Directives, User-defined Primitives (UDP), FSM Design (Moore and Melay Machines).

UNIT-VI

SYNTHESISOFCOMBINATIONAL ANDSEQUENTIAL LOGIC USINGVERILOG: Synthesis of Combinational logic: Net list of structured primitives, a set of continuous assignment statements and level sensitive cyclic behavior with examples, Synthesis of priority structures, exploiting logic don’t care conditions.

Synthesis of sequential logic with latches: Accidental synthesis of latches and Intentional synthesis of latches, Synthesis ofsequentiallogicwithflip-flops, Synthesis of explicitstate machines.

TEXTBOOKS:

1. Design through VerilogHDL —T.R.PadmanabhanandB. BalaTripuraSundari, WSE, IEEEPress, 2004.
2. Advanced Digital Design withVerilog HDL—MichaelD.Ciletti, PHI, 2005.

REFERENCES:

1. FundamentalsofLogicDesignwithVerilog—Stephen.BrownandZvonkoVranesic, TMH, 2005.
2. AVerilogPrimier—J.Bhasker, BSP, 2003.

VII Sem.	Microwave & Optical Comm. Lab	Course Code:V18ECL11	L	T	P	C
			0	0	3	1

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1. Sketch the characteristics of various Microwave & Optical sources **(K3)**

CO2. Compute the various Parameters of Microwave & Optical Components **(K3)**

CO3. Measure the radiation pattern of Horn antenna and reflector antenna. **(K5)**

CO4. Analyze a rectangular microstrip patch antenna using HFSS software **(K4)**

Minimum Twelve Experiments to be conducted:

Part – A (Any 7 Experiments):

1. Reflex Klystron Characteristics.
2. Gunn-Diode Characteristics.
3. Attenuation Measurement.
4. Directional Coupler Characteristics.
5. Impedance and Frequency Measurement.
6. Scattering parameters of Circulator.
7. Scattering parameters of Magic Tee.
8. Radiation Pattern of Horn and Parabolic Antennas.
9. Synthesis of Microstrip antennas (Rectangular Structure) Using HFSS.

Part – B (Any 5 Experiments):

10. Characterization of LED.
11. Characterization of Laser Diode.
12. Intensity modulation of Laser output through an optical fiber.
13. Measurement of Data rate for Digital Optical link.
14. Measurement of NA.
15. Measurement of losses for Analog Optical link.

Equipment required for Laboratories:

1. Klystron Power Supply, Klystron mount
2. VSWR Meter
3. Micro Ammeter
4. Multi meter
5. CRO
6. GUNN Power Supply, Pin Modulator
7. Crystal Diode detector
8. Attenuator
9. Frequency Meter
10. Slotted line carriage
11. Probe detector

12. Wave guide shorts
13. SS Tuner
14. Directional Coupler
15. E, H, Magic Tees
16. Circulators, Isolator
17. Matched Loads
18. Pyramidal Horn and Parabolic Antennas
19. Turntable for Antenna Measurements
20. HFSS Software
21. Fiber Optic Analog Trainer based LED
22. Fiber Optic Analog Trainer based laser
23. Fiber Optic Digital Trainer
24. Fiber cables - (Plastic, Glass)

VIII-Semester Syllabus

VIII Sem.	Cellular & Mobile Communication	Course Code:V18ECT30	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Demonstrate the limitations of conventional mobile telephone systems; Understand the concepts of cellular systems. **[K2]**
CO2: Illustrate the concept of frequency Reuse channels, deduce Co- channel Interference reduction factor **[K2]**
CO3: Understand the frequency management, channel assignment strategies and Antennas in cellular systems.**[K2]**
CO4:Discuss the concepts of Handoff, dropped calls and cell splitting, Intersystem Handoff. **[K2]**
CO5: Explain the knowledge about GSM architecture and GSM channels, multiple Access schemes like FDMA,TDMA and CDMA. **[K2]**
CO6: Summarize the concepts of upcoming technologies like 3G, 4G etc. **[K2]**

UNIT-I CELLULAR MOBILE RADIO SYSTEMS: Introduction to Cellular Mobile System, uniqueness of mobile radio environment, operation of cellular systems, consideration of the components of Cellular system, Hexagonal shaped cells, Analog and Digital Cellular systems.

CELLULAR CONCEPTS: Evolution of Cellular systems, Concept of frequency reuse, frequency reuse ratio, Number of channels in a cellular system, Cellular traffic: trunking and blocking, Grade of Service; Cellular structures: macro, micro, pico and femto cells; Cell splitting, Cell sectoring.

UNIT-II INTERFERENCE: Types of interferences, Introduction to Co-Channel Interference, real time Co-Channel interference, Co-Channel measurement, Co-channel Interference Reduction Factor, desired C/I from a normal case in a Omni directional Antenna system, design of Antenna system, antenna parameters and their effects, diversity receiver, non-cochannel interference-different types.

UNIT-III FREQUENCY MANAGEMENT AND CHANNEL ASSIGNMENT: Numbering and grouping, setup access and paging channels, channel assignments to cell sites and mobile units: fixed channel and non-fixed channel assignment, channel sharing and borrowing, overlaid cells. CELL COVERAGE FOR SIGNAL AND TRAFFIC: Signal reflections in flat and hilly terrain, effect of human made structures, phase difference between direct and reflected paths, straight line path loss slope, and general formula for mobile propagation over water and flat open area, near and long distance propagation, antenna height gain, form of a point to point model.

UNIT-IV HANDOFF STRATEGIES Concept of Handoff, types of handoff, handoff initiation, delaying handoff, forced handoff, mobile assigned handoff, intersystem handoff, vehicle locating methods, dropped call rates and their evaluation.

UNIT-V DIGITAL CELLULAR NETWORKS: GSM architecture, GSM channels, multiple access schemes; FDMA, TDMA, CDMA, OFDMA;

UNIT-VI HIGHER GENERATION CELLULAR STANDARDS: 3G System architecture (UMTS) enhancements in 4G standard, Architecture and representative protocols, introduction to 5G.

TEXTBOOKS:

1. Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2rd Edn,
2006.
2. Principles of Mobile Communications – Gordon L. Stuber, Springer International
2ndEdition, 2007.

REFERENCES:

1. Wireless Communications – Theodore. S. Rapport, Pearson education, 2nd Edn, 2002.
2. Wireless and Mobile Communications – Lee McGraw Hills, 3rd Edition, 2006. 3. Mobile Cellular Communication – G Sasibhushana Rao Pearson Wireless Communication and Networking – Jon W. Mark and Weihua Zhqung, PHI,
2005.
4. Wireless Communication Technology – R. Blake, Thompson Asia Pvt. Ltd., 2004.

			L	T	P	C
VIII Sem.	**Electronics Measurements & Instrumentation (Professional Elective-V)**	**Course Code:V18ECT31**	**3**	**0**	**0**	**3**

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1. Select the instrument to be used based on the requirements.**[K2]**
CO2. Understand the design of oscilloscopes for different applications.**[K2]**
CO3. Explain different signal generators and analyzers.**[K2]**
CO4. Understand the design of different types of Bridge circuits for different Applications.**[K2]**
CO5. Explain and Design different types of transducers for different Applications. **[K2]**
CO6. Explain different types of transducers for measurement of Physical parameters. **[K2]**

UNIT-I
Performance characteristics of instruments, Static characteristics, Accuracy, Resolution, Precision, Expected value, Error, Sensitivity. Errors in Measurement, Dynamic Characteristics- speed of response, Fidelity, Lag and Dynamic error. DC Voltmeters- Multi-range, Range extension/Solid state and differential voltmeters, AC voltmeters- multirange, range extension, shunt. Thermocouple type RF ammeter, Ohmmeters series type, and shunt type, Multi-meter for Voltage, Current and resistance measurements.

UNIT-II
Oscilloscopes CRT features, vertical amplifiers, horizontal deflection system, sweep, trigger pulse, delay line, sync selector circuits, simple CRO, triggered sweep CRO, Dual beam CRO, Dual trace oscilloscope, sampling oscilloscope, storage oscilloscope, digital readout oscilloscope, digital storage oscilloscope, Lissajous method of frequency measurement, standard specifications of CRO, Probes for CRO- Active & Passive, attenuator types.

UNIT-III
Signal Generator- fixed and variable, AF oscillators, Standard and AF sine and square wave signal generators, Function Generators, Square pulse, Random noise, sweep, Arbitrary waveform. Wave Analyzers, Harmonic Distortion Analyzers, Spectrum Analyzers, Digital Fourier Analyzers.

UNIT-IV
DC Bridges: Measurement of Resistance-Wheatstone's Bridge, Kelvin's Bridge. AC Bridges: Measurement of inductance- Maxwell's bridge, Hay's bridge, Anderson Bridge. Measurement of capacitance-Schering's Bridge. Measurement of Frequency- Wien Bridge, Errors and precautions in using bridges.Q-meter.

UNIT-V
Transducers- active & passive transducers : Resistance, Capacitance, inductance; Strain gauges, LVDT, Piezo Electric transducers, Resistance Thermometers, Thermocouples, Thermistors, Sensistors.

UNIT-VI
Measurement of physical parameters- Force, Pressure, Velocity, Acceleration, Humidity, Moisture, Proximity, Displacement.Data acquisition systems.

TEXTBOOKS:

1. Electronic Instrumentation, second edition-H.S. Kalsi, Tata McGrawHill, 2004.
2. Modern Electronic Instrumentation and Measurement Techniques–A.D. Helfrick and W.D.Cooper, PHI, 5thEdition, 2002.

REFERENCES:

1. Electronic Instrumentation &Measurements- David A. Bell, PHI, 2ndEdition, 2003.
2. Electronic Test Instruments, Analog and Digital Measurements-Robert A. Witte, Pearson Education, 2ndEdition, 2004.
3. Electronic Measurements & Instrumentations by K. LalKishore, Pearson Education-2005.
4. Electronic Measurements & Instrumentation by UdayA.Bakshi& Ajay V. Bakshi
Technical Publications

VIII Sem.	FPGA Architecture (Professional Elective-IV)	Course Code:V18ECT32	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe Low end programmable devices.**[K2]**
CO2: Explain FPGA basics.**[K2]**
CO3: Comprehend Spartan 6 basics.**[K2]**
CO4: Use Virtex 5 clock sources and FIFO. Comprehend various I/O standards.**[K2]**
CO5: Use Memory, DSP blocks in complex designs. Comprehend SerDes.**[K2]**
CO6: Comprehend JTAG. Distinguish RISC based Soft processors from Xilinx, Aletra.**[K2]**

UNIT-I
DESIGNING WITH PROGRAMMABLE LOGIC DEVICES:
Read only Memories, Programmable logic Arrays (PLA), Programmable Array logic (PAL), Programmable logic Devices (PLD) Skew, setup, hold time.

UNIT-II
DESIGNING WITH FPGA:
Logic implementation options, Technology trends, Simple SRAM programmable FPGA architecture, Xilinx 3000 series FPGAs, Programmable interconnects, Xilinx 4000 series FPGAs, Programming the FPGA.

UNIT-III
SPARTAN 6 ARCHITECUTUTE:
Spartan 6 Device features- 6 input LUT, Slice, Single Port RAM, Dual Port RAM, ROM, Distributed RAM, 32 x 6, 64 x 1, 128 x 1, Distributed RAM timings, Shift Registers, Multiplexers, Interconnect, PLL, DCM, DSP Slice.

UNIT-IV
VIRTEX 5 ARCHITECTURE:
Clock resources-Global clocks, regional clocks, Clock buffer, Clock Gating.Clock Tree, Clock De-skew, True Dual port RAM. Write modes, FIFO architecture, empty flags, almost empty flags, almost fill flags, full flag, cascading FIFOS, connecting FIFOs in parallel, designing Large multiplexer 4xl, 8xl, 16xl. Control impedance, I/O primitives. I/O supported standards, LVDS.

UNIT-V
STARATIX V ARCHITECTURE:
ALM Block diagram, ALM operating modes, ALM in Arithmetic mode, Types of embedded memory, Control clocking, Memory features, Memory modes, DSP block features, operational modes, DSP block architecture in 27 X 27 mode, independent complex multiplier mode, I/O features mixing voltage referenced and non-voltage referenced standard I/O features standards. Dynamic OCT.LVDS SerDes block diagram and features, Differential Receiver Block diagram and features.

UNIT-VI
SOFT PROCESSORS:
JTAG, programming through JTAG, IEEE 1149.1 Boundary scan testing, programmable power technology, Features of Soft processors, Nios-II, Microblaze.

TEXT BOOKS:

1. Charles H Roth Jr "Digital System Design using VHDL", second edition, 2008.
2. Spartan 6 family overview.
3. Virtex 5- User Guide.
4. Staratix V Device Hand Book.
5. Nios-II, Microblaze Features – Altera, Xilinx.

REFERENCES:

1. J. Old Field,R.Dorf, "Field Programmable Gate Arrays", John Wiley & Sons, New York, 1995.
2. S. Trimberger, Edr."Field Programmable Gate Arrays Technology", Kluwer Academic Publications, 1994.
3. Bob Zeidman, "Designing with FPGAs & CPLDs", CMP Books, 2002.

			L	T	P	C
VIII Sem.	**Principles of Modern Wireless Communication Systems (Professional Elective-V)**	**Course Code:V18ECT33**	**3**	**0**	**0**	**3**

Syllabus Details

CO1: Describe how to measure the performance of wireless system, in multipath Environment **[K2]**
CO2: Summarize about Wireless Channel. **[K2]**
CO3: Explain Principle and properties of CDMA. **[K2]**
CO4: Discuss the working and advantages of MIMO wireless communication systems **[K2]**
CO5: Explain the principle and advantages of OFDM system **[K2]**
CO6: Describe of various modern wireless communication technologies **[K2]**

UNIT-I

Principles of Wireless Communication: The wireless communication environment, modelling of wireless systems, system model for narrowband signals, Rayleigh fading wireless channel, BER performance of wireless systems, channel estimation in wireless systems, Diversity in wireless communication, multiple antenna receive model, BER in multiple antenna system, channel estimation in multiple antenna system.

UNIT-II

Wireless Channel: Basics of Wireless Channel Modelling, Maximum Delay Spread, RMS Delay Spread, RMS Delay Based on Average Power Profile, Average Delay Spread in Outdoor Cellular Channels, Coherence Bandwidth in Wireless Communications, Relation between ISI and Coherence Bandwidth.

UNIT-III

Code Division Multiple Access: Fundamentals of CDMA codes, Spreading codes based on Pseudo-Noise sequences, correlation properties of random CDMA spread sequences, Multi-user CDMA, Advantages of CDMA, CDMA near far problem and power control.

UNIT-IV

Multiple Input Multiple Output Wireless Communications: Introduction to MIMO wireless Communications, MIMO System model, MIMO zero forcing (ZF) receiver, MIMO MMSE receiver, Singular Value Decomposition (SVD) of the MIMO channel, MIMO capacity, Asymptotic MIMO capacity, MIMO beam forming.

UNIT-V

Orthogonal Frequency Division Multiplexing: Introduction to OFDM, multicarrier transmission, cyclic prefix in OFDM, BER for OFDM, MIMO-OFDM, effect of frequency offset in OFDM, Peak to Average Power ratio in OFDM, SC-FDMA.

UNIT-VI

Recent advancements in wireless technology: Introduction to 4G LTE, VoLTE, 5G Technology, NOMA and Massive MIMO.

Text Books:

1. Aditya K. Jagannatham, "Principle of Modern Wireless Communication Systems: Theory and practice" 1st Edition, McGrawHill Publication
2 Theodore S. Rappaport, "Wireless Communications: Principles and Practice" Second Edition, Pearson Education

Reference Books:

1. Simon Haykin, MichaleMoher, "Modern Wireless Communications", Pearson.
2. Xiaodong Wang, H. Vincent Poor, "Wireless Communication Systems: Advanced Techniques for Signal Reception", Pearson 5 Proakis J.J.,D Wozencraft J.M. and Jacobs I.M., Principles of Communication Engineering, John Wiley

VIII Sem.	Satellite Communication (Professional Elective-VI)	Course Code:V18ECT34	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1. Describe the basic concepts of Satellite Communications & analyze the concepts of
Orbital mechanics & Launchers**(K4)**

CO2.Discuss the major Sub-Systems of a Satellite**(K2)**

CO3.Design the Communication Link for Satellite**(K4)**

CO4.Compare the various Multiple Access Techniques**(K3)**

CO5.Analyze the various sub-systems used in Earth stations & review the different orbits **(K4)**

CO6.Analyze the Satellite Navigation & the Global positioning system **(K4)**

UNIT-I

Introduction: Origin of Satellite Communications, Historical Back-ground, Basic Concepts of Satellite Communications, Frequency allocations for Satellite Services, Applications, Future Trends of Satellite Communication.

Orbital Mechanics and Launchers: Orbital Mechanics, Look Angle determination, Orbital perturbations, Orbit determination, launches and launch vehicles, Orbital effects in communication systems performance.

UNIT-II

Satellite Subsystems: Attitude and orbit control system, telemetry, tracking, Command &monitoring, power systems, communication subsystems, Satellite antenna Equipment reliability and Space qualification.

UNIT-III

Satellite Link Design: Basic transmission theory, system noise temperature and G/T ratio, Design of down links, up link design, Design of satellite links for specified C/N, System design example.

UNIT-IV

Multiple Access: Frequency division multiple access (FDMA), Inter modulation, Calculation of C/N. Time division Multiple Access (TDMA), Frame structure, Examples. Satellite Switched TDMA Onboard processing, DAMA, Code Division Multiple access (CDMA), Spread spectrum transmission and reception.

UNIT-V

Earth Station Technology: Introduction, Transmitters, Receivers, Antennas, Tracking systems, Terrestrial interface, Primary power test methods.

Low Earth Orbit and Geo-Stationary Satellite Systems: Orbit consideration, coverage and frequency considerations, Delay & Throughput considerations, System considerations, Operational NGSO constellation Designs

UNIT-VI

Satellite Navigation & The Global Positioning System: Radio and Satellite Navigation, GPS Position Location principles, GPS Receivers and codes, Satellite signal acquisition, GPS Navigation Message, GPS signal levels, GPS receiver operation, GPS C/A code accuracy, Differential GPS.

Text Books:

1. Satellite Communications – Timothy Pratt, Charles Bostian& Jeremy Allnutt, WSE, Wiley Publications, 2nd Edition, 2003.
2. Satellite Communications Engineering – Wilbur L. Pritchard, Robert A Nelson & Henri G. Suyderhoud, 2nd Edition, Pearson Publications, 2003.

References:

1. Satellite Communication: Design Principles – M. Richharia, BS Publications, 2nd Edition, 2003.
2. Satellite Communication - D.C Agarwal, Khanna Publications, 5th Ed.
3. Fundamentals of Satellite Communications – K.N. Raja Rao, PHI, 2004
4. Satellite Communications – Dennis Roddy, McGraw Hill, 2nd Edition, 1996.

VIII Sem.	Bio-Medical Engineering (Professional Elective-VI)	Course Code:V18ECT35	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

- CO1: Explain the basics concepts of Bio-Medical Instrumentation. **[K2]**
- CO2: Explain the concepts of electrode theory, classification of Electrodes and Transducers used in Bio-Medical Applications.**[K2]**
- CO3: Explainhe Anatomy and Physiology of Cardiovascular system and Illustrate the application of Bio-Medical Instruments to measure the Physiological parameters of Cardiovascular System.**[K2]**
- CO4: Discuss the processing methods in elements used for Patient's Health care & monitoring.**[K2]**
- CO5: Explain the Principles of Diagnostic Techniques and the concepts of Bio-Telemetry.**[K2]**
- CO6: Classify different types of monitors, discuss the principles of recorders and Illustrate the methods of accident preventions i.e. Shock Hazards from different Electrical Equipment.**[K2]**

UNIT-I:

INTRODUCTIONTOBIOMEDICALINSTRUMENTATION: AgeofBiomedicalEngineering, Development of Biomedical Instrumentation, Man Instrumentation System, Components of the Man-Instrument System, Physiological System of the Body, Problems Encountered in Measuring a Living System, Sources of Bioelectric Potentials, Muscle, Bioelectric Potentials, Sources of Bioelectric Potentials, Resting and ActionPotentials,BioelectricPotentials-ECG,EEGandEMG,EvokedResponses.

UNIT-II:

ELECTRODES AND TRANSDUCERS: Introduction, Electrode Theory, Bio potential Electrodes, Examples of Electrodes, Basic Transducer Principles ,The Transducer and Transduction Principles, Active Transducers, Passive Transducers, Transducers for Biomedical Applications, Pulse Sensors, Respiration Sensor, Transducers with Digital Output.

UNIT-III:

CARDIOVASCULAR SYSTEM AND MEASUREMENTS: The Heart and Cardiovascular System, Electro Cardiography, Blood Pressure Measurement, Measurement of Blood Flow and Cardiac Output, Measurement of Heart Sounds, Plethysmography.

MEASUREMENTSINTHERESPIRATORYSYSTEM: The Physiology of The Respiratory System, Tests and Instrumentation f orthe Mechanics of Breathing, Respiratory Therapy Equipment.

UNIT-IV:

PATIENTCAREANDMONITORING: Elements of Intensive-CareMonitoring, Patient Monitoring Displays, Diagnosis, Calibration and Repair ability of Patient-Monitoring Equipment, Other Instrumentation for Monitoring Patients, Organization of the Hospital for Patient-Care Monitoring, Pacemakers, Defibrillators.

UNIT-V:

DIAGNOSTIC TECHNIQUES AND BIO-TELEMETRY: Principles of Ultrasonic Measurement, UltrasonicImaging, Ultrasonic Applications of Therapeutic Uses, Ultrasonic Diagnosis, X-Ray and Radio-Isotope Instrumentations, CATScan, Emission Computerized Tomography, MRI, Introduction to Biotelemetry, Physiological Parameters Adaptable to Biotelemetry, The Components of Biotelemetry System, Implantable Units, Telemetry for ECG Measurements during Exercise, Telemetryfor Emergency Patient Monitoring

UNIT-VI:

MONITORS,RECORDERSANDSHOCKHAZARDS: Bio potential Amplifiers, Monitors, Recorders, Shock Hazards and Prevention, Physiological Effects and Electrical Current, Shock Hazards from Electrical Equipment, Methods of Accident Prevention, Isolated Power Distribution System.

TextBooks:

1. “Bio-Medical Electronics and Instrumentation”, Onkar N.Pandey,RakeshKumar, Katson Books.
2. “Bio-Medical Instrumentation”,Cromewell,Wiebell,Pfeiffer

References:

1. “HandBookofBio-MedicalInstrumentation”,Khandapur.McGrawHill
2. “IntroductiontoBio-medical Equipment Technology”, 4th Edition, Joseph J.Carr, John M.Brown, PearsonPublications.

VIII	Wireless Sensor	Course Code:V18ECT36	L	T	P	C

Sem.	**Networks (Professional Elective-VI)**		**3**	**0**	**0**	**3**

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

- CO1: Explain the concepts of Wireless Sensor Networks, its Architecture. **[K2]**
- CO2: Describe the Networking Technologies**. [K2]**
- CO3: Explain the MAC Protocols**. [K2]**
- CO4: Illustrate the Routing Protocols. **[K2]**
- CO5: Describe the Transport Layer Protocols. **[K2]**
- CO6: Explain the Security Layer Protocols and Applications of WSN. **[K2]**

UNIT-I –Introduction to Wireless Sensor Networks:
Key definitions of sensor networks, Advantages of sensor Networks, Unique constraints and challenges, Driving Applications, Enabling Technologies for Wireless Sensor Networks. Single-Node Architecture - Hardware Components, Energy Consumption of Sensor Nodes, Operating Systems and Execution Environments, Network Architecture - Sensor Network Scenarios, Gateway Concepts.

UNIT-II - Networking Technologies:
Physical Layer and Transceiver Design Considerations, Personal area networks (PANs), hidden node and exposed node problem, Topologies of PANs, MANETsand WANETs.

UNIT-III - MAC Protocols for Wireless Sensor Networks:
Issues in Designing a MAC protocol for Ad Hoc Wireless Networks, Design goals of a MAC Protocol for Ad Hoc Wireless Networks, Classifications of MAC Protocols - Contention - Based Protocols, with reservation Mechanisms, and with Scheduling Mechanisms.

UNIT-IV - Routing Protocols:
Introduction, Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks, Classification of Routing Protocols, Table–Driven Routing Protocols, On – Demand Routing Protocols, Hierarchical Routing Protocols, Proactive Routing.

UNIT-V - Transport Layer Protocols:
Introduction, Issues in Designing a Transport Layer Protocol for Ad Hoc Wireless Networks, Design Goals of a Transport Layer Protocol for Ad Hoc Wireless Networks, Classification of Transport Layer Solutions, TCP Over Ad Hoc Wireless Networks.

UNIT- VI - Security, Platforms & Applications:
Security in Ad Hoc Wireless Networks, Network Security Requirements, Issues and Challenges in Security Provisioning; Sensor Node Hardware – Berkeley Motes, Programming Challenges; Applications - Home Automation, Smart Metering.

TEXT BOOKS:

1. Ad Hoc Wireless Networks: Architectures and Protocols, C. Siva Ram Murthy and B.S.Manoj, 2004, PHI.
2. Wireless Adhoc and Sensor Networks: Protocols, Performance and Control, JagannathanSarangapani, CRC Press.
3. Holger Karl & Andreas Willig, “Protocols and Architectures for Wireless Sensor Networks", John Wiley, 2005.

REFERENCES:

1. Wireless Sensor Networks- Technology, Protocols, and Applications, KazemSohraby, Daniel Minoli, &TaiebZnati, John Wiley, 2007.
2. Wireless Sensor Networks- Information Processing Approach, Feng Zhao & Leonidas J. Guibas, Elsevier, 2007.
3. Adhoc Mobile Wireless Networks: Protocols & Systems, C.K. Toh,1st Ed., Pearson Education.
4. Wireless Sensor Networks - C. S. Raghavendra, Krishna M. Sivalingam, 2004, Springer.
5. Wireless Sensor Networks – S Anandamurugan, Lakshmi Publications.

Annexure- EC-II

Approved List of Open Elective- II Courses

VII Semester

S.No	Course Code	Name of the Course	Department Offered
1	V18ECTOE4	Principles of Wireless Comm.	Electronics & Communication Engineering
2	V18ECTOE5	Medical Electronics	
3	V18ECTOE6	Concepts of Embedded Systems	
4	V18CSTOE04	Operating Systems	Computer Science Engineering.
5	V18CSTOE05	Artificial Intelligence	
6	V18CSTOE06	Java Programming	
7	V18EEOE4	Non-Conventional Energy Sources	Electrical & Electronics Engineering
8	V18EEOE5	Electrical Engineering Materials	
9	V18EEOE6	Servicing of Electrical Appliances	
10	V18MEOE4	Computer Aided Design	Mechanical Engineering
11	V18MEOE5	Condition Monitoring & Machine learning	
12	V18CEOE03	Environmental Pollution and Control	Civil Engineering
13	V18CEOE04	Disaster Management	

Approved List of Open Elective- III Courses

VIII Semester

S.No	Course Code	Name of the Course	Department Offered
1	V18ECTOE7	Fundamentals of Digital Image & Video Processing	Electronics & Communication Engineering
2	V18ECTOE8	Embedded RTOS	
3	V18ECTOE9	Principles of Digital TV Engg	
4	V18CSTOE07	Software Testing Methodologies	Computer Science Engineering.
5	V18CSTOE08	Cyber Security	
6	V18CSTOE09	Computer Graphics	
7	V18EEOE7	Energy Storage Systems	Electrical & Electronics Engineering
8	V18EEOE8	Basics of Electrical Power Generation	
9	V18EEOE9	Industrial Automation	
10	V18MEOE6	Power Plant Engineering	Mechanical Engineering
11	V18MEOE7	Mechatronics	
12	V18CEOE05	Solid Waste Management	Civil Engineering
13	V18CEOE06	Water Quality and Conservation	

			L	T	P	C
VII Sem.	**Principles of Wireless Comm.** **(Open Elective-II)**	**Course Code:V18ECTOE4**	**3**	**0**	**0**	**3**

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Discuss the cellular system evolution of mobile radio systems **[K2]**
CO2: Illustrate the basic cellular concepts. **[K2]**
CO3: Explain the Various Propagation models. **[K2]**
CO4: Discuss the need of modulation, diversity and equalization in cellular & Mobile Communication. **[K2]**
CO5: Demonstrate the knowledge about GSM architecture, multiple accesss chemes like FDMA,TDMA, CDMA. **[K2]**
CO6: Summarize the concepts of upcoming technologies like 3G, 4G etc. **[K2]**

UNIT-I: Introduction of Wireless Communication
History and evolution of mobile radio systems: Types of mobile wireless services/systems-Cellular, WLL, Paging, Satellite systems, Future trends in personal wireless systems.

UNIT-II: Cellular Concepts and System Design Fundamentals
Cellular concept and frequency reuse, channel assignment, handoff strategies, Interference and system capacity, Trunking and GOS, cell splitting,cell sectoring.

UNIT-III: Mobile radio Propagation Models

Radio wave propagation issues in personal wireless systems, Propagation models, Multipath fading, parameters of mobile multipath channels and Antenna systems in mobile radio.

UNIT-IV: Overview analog and digital modulation techniques
Need For Modulation. Different Analog and Digital modulation techniques used in Cellular and mobile communication systems.

UNIT-V DIGITAL CELLULAR NETWORKS: GSM architecture, GSM Services, multiple access schemes; FDMA, TDMA, CDMA, OFDMA;

UNIT-VI Higher Generation Cellular Standards: 3G System architecture (UMTS), 4G System Architecture, Introduction to 5G.

Text Books

1. Theodore S. Rappaport, “wireless communications Principles and Practices”, PHI, 2005
2. Jochen Schiller, “Mobile Communications”, Pearson Education, second edition, 2009.

Reference Book

1. Lee W.C.Y, “Mobile communication Engineering
2. Theory and Applications”, 2/e McGraw-Hill,New York, 2003
3. Andreas F. Molisch, “Wideband Wireless Digital Communication”, Pearson Education 2001.
4. Blake, “Wireless Communication Technologies,” Thomson Delmer, 2003

			L	T	P	C
VII Sem.	**Medical Electronics (Open Elective-II)**	**Course Code:V18ECTOE5**	**3**	**0**	**0**	**3**

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

- CO1: Explain the basics concepts of Bio-Medical Instrumentation.**[K2]**
- CO2: Explain the concepts of electrode theory, classification of Electrodes and Transducers used in Bio-Medical Applications.**[K2]**
- CO3: Explainthe Anatomy and Physiology of Cardiovascular system and Illustrate the application of Bio-Medical Instruments to measure the Physiological Parameters of Cardiovascular System. **[K2]**
- CO4: Discuss the elements used for Patient's Health care & monitoring.**[K2]**
- CO5: Explain the Principles of Diagnostic Techniques and the concepts of Bio-Telemetry.**[K2]**
- CO6: Classify different types of monitors, discuss the principles of recorders and Illustrate the methods of accident preventions.**[K2]**

UNIT-I:

INTRODUCTION TO BIOMEDICAL INSTRUMENTATION: Age of Biomedical Engineering, Development of Biomedical Instrumentation, Man Instrumentation System, Components of the Man-InstrumentSystem, Physiological System of the Body, Problems Encountered in Measuring a Living System, Sources of Bioelectric Potentials, Muscle, Bioelectric Potentials, Sources of Bioelectric Potentials, Resting and Action Potentials, BioelectricPotentials-ECG,EEGandEMG,

UNIT-II:

ELECTRODES AND TRANSDUCERS: Introduction, Electrode Theory, Biopotential Electrodes, Examplesof Electrodes, Basic TransducerPrinciples, Active Transducers, Passive Transducers, Transducers for Biomedical Applications, Pulse Sensors, Respiration Sensor, Transducers with Digital Output.

UNIT-III:

CARDIOVASCULAR SYSTEM AND MEASUREMENTS: The Heart and Cardiovascular System, ElectroCardiography, Blood Pressure Measurement, Measurement of Blood Flow and Cardiac Output, Measurement ofHeartSounds, Plethysmography.

UNIT-IV:

PATIENTCAREANDMONITORING: Elements of Intensive-Care Monitoring, Patient Monitoring Displays, Diagnosis, Calibration and Repair ability of Patient-Monitoring Equipment, Other Instrumentation forMonitoring Patients, Organization of the Hospitalfor Patient-Care Monitoring, Pacemakers, Defibrillators.

UNIT-V:

DIAGNOSTIC TECHNIQUES AND BIO-TELEMETRY: Principles of Ultrasonic Measurement, UltrasonicImaging, Ultrasonic Applications of The rapeutic Uses, Ultrasonic Diagnosis, X-Ray and Radio-Isotope Instrumentations, CATScan, Emission Computerized To mography, MRI,IntroductiontoBiotelemetry,Physiological Parameters Adaptable to Biotelemetry, The Components of Biotelemetry System, Implantable Units, Telemetry for ECG Measurements during Exercise, Telemetry for Emergency Patient Monitoring.

UNIT-VI:

MONITORS, RECORDERS AND SHOCK HAZARDS: Bio potential Amplifiers, Monitors, Recorders, Shock Hazards and Prevention, Physiological Effects and Electrical Current, Shock Hazards from Electrical Equipment, Methods of Accident Prevention.

TextBooks:

1. “Bio-MedicalElectronicsand Instrumentation”, Onkar N.Pandey, Rakesh Kumar, Katson Books.
2. “Bio-Medical Instrumentation”, Cromewell, Wiebell, Pfeiffer

References:

1. “Hand Book of Bio-Medical Instrumentation”, Khandapur. McGrawHill
2. “IntroductiontoBio-Medical Equipment Technology”, 4th Edition, Joseph J.Carr, John M.Brown, Pearson Publications.

VII Sem.		Course Code:V18ECTOE6	L	T	P	C
			3	0	0	3

	Concepts of Embedded Systems **(Open Elective-II)**					

Syllabus Details

COs	Course outcomes
CO1	Describe the Basic Concepts of embedded systems- **(K2).**
CO2	Describe the characteristics of Embedded Systems - **(K2)**
CO3	Explain the Architecture and Pin Description of 8051- **(K2)**
CO4	Explain various Addressing Modes and Instructions of 8051- **(K2)**
CO5	Discuss the various Interrupts , Modes of Timers/Counters in 8051**-(K2)**
CO6	Discuss the fundamentals of RTOS based embedded firmware design - **(K2)**

UNIT-I - INTRODUCTION TO EMBEDDED SYSTEMS:

Introduction to Embedded Systems, Embedded Systems vs. General Computing Systems, Classification of Embedded systems, Major application areas of embedded systems, Purpose of embedded Systems, The Typical embedded system - core of the embedded system, Difference between RISC and CISC, Types of Memories.

UNIT-II - CHARACTERISTICS OF EMBEDDED SYSTEM:

Characteristics of an embedded system, Quality attributes of embedded systems, Application-specific and Domain-Specific examples of an embedded system.

UNIT-III-8051 Micro Controller – Architecture, Pin Description

Introduction, 8051 Architecture, Registers in 8051, Pin Diagram – Description, Parallel I/O Ports and Memory Organization

UNIT-IV - 8051 Micro Controller – Addressing Modes and Instructions:

8051 Addressing Modes, 8051 Instruction Set, Instructions and Sample Programs, Stack Pointer

UNIT-V - 8051 Micro Controller – Interrupts, Timer/ Counter:

Interrupts in 8051, Timers and Counters, Timer/ Counter Modes, Serial Communication – Modes

UNIT-VI- REAL TIME OPERATING SYSTEM:

Operating System basics, Types of operating systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling, Inter Task communication.

Text Books:

1. Embedded Systems-By Shibu. K.V-Tata McGraw Hill Education Private Limited,2013.
2. Micro Controllers [Theory and Applications] – Ajay V Deshmukh – Tata McGraw-Hill Education Private Limited,2012

References:

1. The 8051 Micro Controller- Kenneth Ayala – CENGAGE- 3rd Edition
2. Embedded/Real Time Systems by KVKK Prasad by Dreamtech Publication

VIII Sem.	**Fundamentals of Digital Image & Video Processing (Open Elective-III)**	**Course Code:V18ECTOE7**	**L**	**T**	**P**	**C**
			3	**0**	**0**	**3**

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

- CO1: Analyse Image transforms for various Image processing operations**(K4)**
- CO2: Examine Spatial & frequency domain filtering like smoothing & sharpening Operations on Images**(K4)**
- CO3: Estimate Image degradation functions and Analyze various Image Restoration Techniques on Images**(K4)**
- CO4: Analyze various Image segmentation techniques**(K4)**
- CO5: Describe various Image compression techniques**(K3)**
- CO6: Explain basic concepts regarding to motion estimation, video filtering and Video standards.**(K2)**

UNIT-I

IMAGE FUNDAMENTALS & TRANSFORMS: Fundamental steps in digital image processing, components of an image processing system, image sensing and acquisition, image sampling and quantization. Two dimensional orthogonal transforms: DFT, WHT, Haar transform, DCT and DST

UNIT-II

Intensity Transformations, Spatial Filtering and frequency domain filtering: Some basic intensity transformation functions, histogram processing, fundamentals of spatial filtering, smoothing spatial filters, sharpening spatial filters, `Image smoothing and sharpening in frequency domain filtering

UNIT-III

IMAGE RESTORATION: Degradation Models, Linear Position –Invariant Degradations, Estimating the degradation function, inverse filtering, Minimum mean square error (Wiener) filtering and geometric mean filter.

UNIT-IV

IMAGESEGMENTATION: Pixelclassification,Bi-levelThresholding,Multi-levelThresholding,AdaptiveThresholding,Spectral& spatial classification, Edge detection, Hough transform, Region growing.

UNIT-V

IMAGE COMPRESSION: Compression models, Huffman Coding, Arithmetic coding, Bit plane coding, run length coding, Lossy compression: Transform coding, Image compression standards.

UNIT-VI

VIDEO PROCESSING: Representation of Digital Video, Spatio-temporal sampling, Motion Estimation. Video Filtering, Video Compression, Video coding standards.

Text Books:

1. R.C.Gonzalez, R.E.Woods, "DigitalImageProcessing",Pearson Education. 2ndedition, 2002
2. M.Tekalp,"DigitalVideoProcessing",Prentice-Hall,1995

Reference Books:

1. AnilK.Jain,"FundamentalsofDigitalImageProcessing",PrenticeHallofIndia,9th Edition, Indian Reprint, 2002.
2. B.Chanda, D.DuttaMajumder, "Digital ImageProcessingandAnalysis", PHI, 2009.
3. Bovik, "HandbookofImage&Videoprocessing",AcademicPress,2000.
4. Khalid Sayood,Introduction to data compression ,third edition, The Morgan Kaufmann publishers,2005

VIII Sem.	Embedded RTOS (Open Elective-III)	Course Code:V18ECTOE8	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

- CO1: Describe the basics of Real time OS. **[K2]**
- CO2: Explain the tasks, Interrupts, Security. **[K2]**
- CO3: Describe the basics of µCOS-II RTOS. **[K2]**
- CO4: Describe the basics of µCOS-II RTOS. **[K2]**
- CO5: Illustrate the mechanism of target image creation and porting. **[K2]**
- CO6: Explain the Application of RTOS. **[K2]**

UNIT-I: Introduction
OS Basics, Task, Process, Threads, Multiprocessing & Multitasking, Process Management, Timer Functions, Event Functions, Memory Management, Device, File and IO Systems Management, Interrupt Routines in RTOS Environment and Handling of Interrupt Source Calls.

UNIT-II: RTOS
Basic Design Using an RTOS, RTOS Task Scheduling Models, Interrupt Latency and Response of the Tasks as Performance Metrics, OS Security Issues. Basic Functions and Types of RTOS.

UNIT-III: RTOS µCOS-II
Introduction, Task Service, Task Scheduling, Memory Allocation, IPC – Semaphore, Mailbox, Queue, Interrupt Handling.

UNIT-IV: RTOS Vx Works
Introduction, Task Service, Task Scheduling, Memory Allocation, IPC – Semaphore, Mailbox, Queue, Interrupt Handling.

UNIT-V: Embedded OS & Target Image Creation
Off-The-Shelf Operating Systems, Embedded OS, Handheld OS, Operating System Software, Target Image Creation for Window XP Embedded, Porting RTOS on a Micro Controller based Development Board.

UNIT-VI: Program Modeling – Case Studies
Case study of embedded system design and coding for an Automatic Chocolate Vending Machine (ACVM) Using µCOS-II RTOS, Case study of digital camera hardware and software architecture, Using RTOS Vx Works, Case Study of Embedded System for an

Adaptive Cruise Control (ACC) System in Car, Case Study of Embedded System of Mobile Phone Software for Key Inputs.

TEXT BOOKS:

1. Shibu K V: "Introduction to Embedded Systems", Tata McGraw Hill Publications, Second Edition.
2. Dr. K.V.K.K. Prasad: "Embedded/Real-Time Systems", Dream Tech Publications, Black pad.
3. Raj Kamal: "Embedded Systems-Architecture, Programming and Design", Tata McGraw Hill Publications, Second Edition.

REFERENCES:

1. Labrosse, "Embedding system building blocks ", CMP publishers.
2. Rob Williams," Real time Systems Development", Butterworth Heinemann Publications.

			L	T	P	C
VIII Sem.	**Principles of Digital TV Engineering (Open Elective-III)**	**Course Code:V18ECTOE9**	**3**	**0**	**0**	**3**

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1:	Illustrate the fundamentals of television engineering	**[K2]**
CO2:	Explain about TV signal transmission	**[K2]**
CO3:	Explain the colour TV fundamentals	**[K2]**
CO4:	Classify Digital TV transmission standards	**[K2]**
CO5:	Explain the operation of Digital TV receiver	**[K2]**
CO6:	Describe the working of LCD and Plasma screens	**[K2]**

UNIT-I

Introduction: TV transmitter and receivers, synchronization **Television Pictures**: Geometric form and aspect ratio, image continuity, interlaced scanning, picture resolution

UNIT-II

Composite video signal: Horizontal and vertical sync details **TV Signal Transmission:** VSB transmission, standard channel BW, TV transmitter

UNIT-III

Colour Television: Perception of brightness and colours, additive colour mixing, video signals for colours, luminance signal, colour difference signals, encoding of colour difference signals, formation of chrominance signals, PAL encoder, PAL colour receiver

UNIT-IV

Digital Television Transmission Standards: ATSC terrestrial transmission standard, vestigial sideband modulation, DVB -T transmission standard, ISDB-T transmission standard

UNIT-V

Digital Television: Digital Satellite Television, Direct to Home Satellite Television, Digital TV Receiver, Merits of Digital TV Receivers

UNIT-VI

LCD Screens: LCD Technology, LCD Matrix types and operation, LCD Screens for Television, LCD color receiver

Plasma Screens: Plasma and conduction of charge, Plasma TV Screens, Plasma Color Receiver

Text Books:

1. Television engineering and video systems – R G Gupta, Tata McGraw Hill Publishers.
2. Television and Video Engineering – A.M.Dhake, 2nd Edition, Tata McGraw Hill Publishers.
3. Modern Television Practice: Transmission, Reception and Applications- R RGulati, 4th revised edition, New Age International Publishers.
4. Fundamentals of Digital Television Transmission- Gerald W. Collins, John Wiley & Sons.

References

1. Basic Television and Video Systems – Bernard Grob, McGrawHill Publishers.
2. Monochrome and Colour Television - R RGulati, New Age International Publishers.
3. Colour Television, Theory and Practice - S.P.Bali, Tata McGraw-Hill Publishers.

Annexure-EC-III

Approved Course Structure & Syllabus

COURSE STRUCTURE

(For V20 Regulation)

ECE

V20 Regulation

Semester III (Second Year)

Sl. No.	Course Category	Course Code	Course Title	Hours per Week			Credits
1.	Basic Science Courses	V20MAT03	Complex Analysis	3	0	0	3
2.	Professional Core Course	V20ECT02	Electronic Devices, Circuits & Analysis **(EDCA)**	3	0	0	3
3.	Professional Core Courses	V20MAT06	Probability Theory Stochastic Process **(PTSP)**	3	0	0	3
4.	Professional Core Courses	V20ECT04	Network Theory **(NT)**	3	0	0	3
5.	Professional Core Courses	V20ECT05	Signals & Systems **(SS)**	3	0	0	3
6.	Professional Core Courses (LAB)	V20ECL01	Electronic Devices, Circuits & Analysis Lab **(EDCA LAB)**	0	0	3	1.5
7.	Professional Core Courses (LAB)	V20ECL02	Signals & Systems Lab **(SS LAB)**	0	0	3	1.5
8.	Professional Core Courses (LAB)	V20CSL31	Data Structures Lab **(DS LAB)**	0	0	3	1.5
9	**Skill Oriented Course***	V20ECSOC01	Certificate course being offered by industries/ professional bodies/ APSSDC or any other accredited bodies	**1**	**0**	**2**	**2**
10	Mandatory Course (AICTE suggested)	V20ENT02	Professional Communication Skills **(PCS-I)**	2	0	0	0
			Total Credits				**21.5**

Semester IV (Second Year)

Sl. No.	Course Category	Course Code	Course Title	Hours			Credits
				L	T	P	
1.	Engineering Science Courses	V20EET11	Control Systems **(CS)**	3	0	0	3
2.	Basic Science Course/Prof Core Course	V20ECT07	Analog & Digital Communication **(ADC)**	3	0	0	3
3.	Professional Core Courses	V20ECT08	Digital IC Applications **(DICA)**	3	0	0	3
4.	Professional Core Courses	V20ECT09	Electro Magnetic Waves & Transmission Lines **(EMTL)**	3	0	0	3
5.	Humanities and Social Sciences	V20MBT51	Managerial Economics & Financial Analysis (**MEFA)**	3	0	0	3
6.	Engineering Science Courses/Prof Core (Interdisciplinary) (LAB)	V20CSL33	Python Programming Lab	0	0	3	1.5
7.	Professional Core Courses (LAB)	V20ECL04	Analog & Digital Communication Lab **(ADC LAB)**	0	0	3	1.5
8.	Professional Core Courses (LAB)	V20ECL05	Digital IC Applications Lab **(DICA LAB)**	0	0	3	1.5
9	**Skill Oriented Course***	V20ECSOC02	Certificate course being offered by industries/ professional bodies/ APSSDC or any other accredited bodies	**1**	**0**	**2**	**2**
10	Mandatory Course (AICTE suggested)	V20ENT03	Professional Communication Skills **(PCS-II)**	2	0	0	0
			Total Credits				**21.5**
	Internship 2 Months (Mandatory) during Summer vacation						
	Honors/Minor Courses (The Hours Distribution can be 3-0-2 or 3-1-0 also)			**4**	0	**0**	**4**

***Skill Oriented Course:**

The Student shall be given an option to choose either the skill courses being offered by the college or to choose a certificate course being offered by industries/ professional bodies/ APSSDC or any other accredited bodies as approved by the concerned BoS.

List of Skill Oriented Courses:

S. No	Name of the Proposed Course
1	PCB Design
2	Programming in Scilab
3	Programming with Arduino
4	Circuit Design & Simulation using Multisim
5	Concepts of Embedded systems
6	Internet of Things
7	Robotics
8	Hands on Graphical Programming Using Labview

III Semester SYLLABUS

III Sem.	Electronic Devices Circuits & Analysis	Course Code:V20ECT02	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of this course, the students will be able to:

- CO1: Explain the formation of p-n Junction, Discuss special semi-conductor Diodes & Explain the working principle of rectifiers with and without filters With relevant expressions and necessary comparisons**[K2]**
- CO2: Understand the construction, principle of operation of transistors, BJT and FET with their V-I characteristics in different configurations.**[K2]**
- CO3: Explain the need of transistor biasing, various biasing techniques for BJT. **[K2]**
- CO4: Analyze small signal low frequency transistor amplifier circuits using BJT In Single & Multistage.**[K2]**
- CO5: Explain the operation & Analysis of Feedback and Power amplifiers.**[K2]**

UNIT-I: Junction diode characteristics: p-n junction diode, energy band diagram of PN junction Diode, current components in PN junction Diode, law of junction, derivation of diode equation, V-I Characteristics, Diode resistance, Diode capacitance. Zener Diode, Breakdown mechanisms, UJT, Construction and characteristics

Rectifiers and Filters: Rectifier Classification, characteristics of rectifiers, Filters-Capacitor filter, Inductor filter, derivation for ripple factor in eachcase.

UNIT- II: Transistor Characteristics: BJT: Junction transistor, transistor current components, Transistor equation, Characteristics of transistor in Common Base, Common Emitter and Common Collector configurations, Early Effect.

FET: Comparison between BJT and FET.FET types, construction, operation, characteristics, MOSFET- types, construction, operation, characteristics.

UNIT- III: Transistor Biasing &Thermal Stabilization

BJT: Need for biasing, operating point, Load line analysis, BJT biasing- methods, fixed bias, collector to base bias, self-bias, Stabilization against variations in VBE, Ic, and β,Stability factors(S, S", S'"),Bias compensation.

UNIT-IV: Small Signal Analysis of BJT

Two port network, Transistor hybrid model, determination of h- parameters, Generalized Analysis of CB, CE and CC amplifiers using exact and approximate analysis,Low frequency analysis of Cascade and Cascode amplifiers.

UNIT-V: Feedback Amplifiers, Oscillators & Power Amplifiers

Feedback principle and concept, types of feedback, classification of amplifiers, feedback topologies Generalized analysis of Voltage series, current series, voltage shunt, current shunt feedback amplifiers,

Oscillators: Basic concept, Barkhausen criterion, RC oscillators (phase shift, Wien bridge), LC oscillators (Hartley, Colpitts)various classes of operation (Class A, B, AB), power efficiency calculations.

Text Books:

1. Electronic Devices and Circuits- J. Millman, C. Halkias,TMH.
2. Integrated Electronics- Jacob Millman, C. Halkies, C.D.Parikh,TMH.
3. Electronic Circuit Analysis - B.V.Rao, K.R.Rajeswari, P.C.R.Pantulu, K.B.R.Murthy, Pearson Publications

References:

1. Electronic Devices and Circuits Theory – Robert L. Boylestad and Louis Nashelsky, Pearson/Prentice Hall.
2. ElectronicCircuitAnalysisandDesign–Donald A.Neaman,McGrawHill.

III Sem.	Probability Theory & Stochastic Processes	Course Code: V20ECT03	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of this course, the students will be able to:

CO-1: Explain basic concepts of probability theory through Sets and Relative Frequency **(K2)**

CO-2: Explain the concept of a random variable, functions based on random variable like Distribution and density functions (**K2)**

CO-3: Compute the expected value, moments on one random variable **(K3)**

CO-4: Illustrate the concepts of joint distribution & density functions on multiple random Variables**(K3)**

CO-5: Compute the Temporal and Spectral characteristics of stochastic processes **(K3)**

UNIT I PROBABILITY : Probability introduced through Sets and Relative Frequency: Experiments and Sample Spaces, Discrete and Continuous Sample Spaces, Events, Probability Definitions and Axioms, Mathematical Model of Experiments, Probability as a Relative Frequency, Joint Probability, Conditional Probability, Total Probability, Bayes Theorem, Independent Events

UNIT II THE RANDOM VARIABLE: Definition of a random variable, Discrete, continuous and mixed random Variables. Distribution & density functions and its properties of a random variable. Binomial, Poisson, Uniform, Gaussian, Exponential and Rayleigh random variables. Conditional distribution and density functions and its properties.

UNIT III OPERATION ON ONE RANDOM VARIABLE – EXPECTATIONS : Introduction, expected value of a random variable, function of a random variable, moments about the origin, central moments, variance, characteristic function, moment generating function, transformations of a random variable: Monotonic transformations for a continuous random variable

UNIT IV MULTIPLE RANDOM VARIABLES : Vector random variables, joint distribution function, properties of joint distribution, marginal distribution functions, conditional distribution and density, statistical independence, sum of two random variables, sum of several random variables, central limit theorem: unequal distribution, equal distributions.
OPERATIONS ON MULTIPLE RANDOM VARIABLES: Joint moments about the origin, joint central moments, joint characteristic and moment generating functions.

UNIT V RANDOM PROCESSES – TEMPORAL CHARACTERISTICS: The random process concept, classification of processes, deterministic and nondeterministic processes, distribution and density functions, concept of Stationarity and statistical independence. First-order stationary processes, second-order and wide-sense Stationarity, nth-order and strict-sense Stationarity, time averages and Ergodicity, autocorrelation function and its properties, cross-correlation function and its properties, covariance functions.

SPECTRAL CHARACTERISTICS: The power density spectrum: properties, relationship between power density spectrum and autocorrelation function, the cross-power density spectrum, properties, relationship between cross-power density spectrum and cross-correlation function.

TEXT BOOKS:

1. Probability, Random Variables & Random Signal Principles, Peyton Z. Peebles, TMH,
4th Edition, 2001.
2. Probability, Random Variables and Stochastic Processes, Athanasios Papoulis and S. UnniKrishnaPillai, PHI, 4th Edition, 2002.
3. Probability Theory and Stochastic Processes, Y. Mallikarjuna Reddy, 4th Edition, Universities Press

Reference Books:

1. Probability Theory and Stochastic Processes – B. PrabhakaraRao, BS Publications
2. Probability and Random Processes with Applications to Signal Processing, Henry Stark
And John W. Woods, Pearson Education, 3rd Edition.
3. Schaum's Outline of Probability, Random Variables, and Random Processes.
4. An Introduction to Random Signals and Communication Theory, B.P. Lathi, International Textbook, 1968.
5. Random Process – Ludeman, John Wiley
6. Probability Theory and Random Processes, P. Ramesh Babu, McGrawHill, 2015.

III Sem.	Network Theory	Course Code: V20ECT04	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of this course, the students will be able to:

- CO1: Apply network theorems to solve the electrical circuits. **[K3]**
- CO2: Describe the steady state analysis of RLC circuits. **[K2]**
- CO3: Analyze the resonance circuits. **[K4]**
- CO4: Solve the two port network parameters. **[K3]**
- CO5: Explain RLC transient circuits. **[K2]**

UNIT – I - ELECTRICAL CIRCUITS FUNDEMENTALS AND THEOREMS:
Electric circuits: Network elements classification, Source transformation, Kirchhoff's laws, Mesh analysis and Nodal analysis problem solving with resistances only including dependent sources. **Network theorems:** Thevenin's, Norton's, Milliman's, Reciprocity, Compensation, Substitution, Superposition, Max Power Transfer, - Problem solving using dependent sources also.

UNIT – II - STEADY STATE ANALYSIS OF A.C CIRCUITS
Response to sinusoidal excitation: - pure resistance, pure inductance, pure capacitance, series R-L, R-C, R-L-C circuits, parallel R-L, R-C, R-L-C circuits. Impedance concept, phase angle, problem solving for R-L, R-C and R-L-C circuits using mesh and nodal analysis.

UNIT-III RESONANCE
Series Resonance: resonance frequency, impedance, current, power factor, bandwidth, cutoff frequencies &Q-factor.
Parallel Resonance: resonance frequency, impedance, current, power factor, bandwidth, cutoff frequencies Q-factor. Comparison of series and parallel resonance circuits and solving problems.

UNIT – IV - TWO-PORT NETWORKS
Z-parameters, Y-parameters, Transmission parameters, h-parameters, series connection, Parallel connection, Cascade connection of two port networks. Relationship of two port networks, problem solving

UNIT – V – TRANSIENTS
Initial and final condition in capacitor and inductor, Definition of time constants, R-L, R-C, R-L-C circuits with DC excitation, problem solving using R-L-C elements with DC excitation. Solutions using Laplace transform method.

TEXT BOOKS:
1. Electric Circuit Analysis by Hayt and Kimmarle, TMH.
2. Network Analysis by Van-Valkenberg, PHI.
3. Circuit Theory (Analysis and Synthesis) by ABHIJIT Chakrabarti, Dhanpat Rai&Co.

REFERENCES:
1. Basic Circuit Analysis by DR Cunninghan, Jaico Publishers.
2. Network Analysis and Filter Design by Chadha, Umesh Publications.
3. Circuits & Network Analysis & Synthesis - A.Sudhakar&Shyam MohanS.Pillai, TMH.

			L	T	P	C
III Sem.	**Signals & Systems**	**Course Code: V20ECT05**	**3**	**0**	**0**	**3**

Syllabus Details

Course Outcomes: After Successful completion of this course, the students will be able to:

CO1	Classify the signals and various operations on signals.**[K2]**
CO2	Determine the response of LTI system to any arbitrary input signal using convolution**[K2]**
CO3	Analyze the spectral characteristics of signals using Fourier series and Fourier transforms.**[K3]**
CO4	Apply the various sampling techniques on continuous time signals.**[K3]**
CO5	ApplytheconceptsofLaplacetransform/Z-transformtoanalyzecontinuous-time/discrete-timesignalsincomplexplane. **[K3]**

UNIT-I

SignalsandSystems: Continuous-timeandDiscrete-timesignals, Transformations of the independent variable, Exponential and Sinusoidal signals, the unit impulse and unit step functions, Continuous-time and Discrete-time systems and Basic System properties.

UNIT-II

Linear Time Invariant Systems (LTI systems): Discrete-time LTI systems, the convolution sum, Continuoustime LTIsystems, the convolution Integral, Properties of Linear Time-InvariantSystems.

UNIT-III

Fourier series: Fourier series representation of Continuous-time periodic signals, Convergence of the Fourier series, Properties of Continuous time Fourier series.
Fourier transform: Representation of periodic signals: The Continuous-time Fourier transform, The Fourier transform for periodic signals, Properties of the continuous time Fourier transform.

UNIT-IV

Sampling Theorem: Introduction, Sampling theorem for band limited signals-explanation, NY Quist rate, Reconstruction of a signal from its samples using Interpolation, The effect of under sampling: Aliasing, sampling techniques- impulse, natural and flat top sampling.

UNIT-V

Analysis of Continuous time and discrete time signals using Laplace Transform and Z Transform: The Laplace Transform: The Region of convergence for Laplace transforms, the Inverse Laplace transform, Properties of the Laplace transform. TheZ-Transform: The Region of Convergence for the Z-transform, The InverseZ-transform, Properties of the Z-transform.

TEXT BOOKS:

1. Signals and Systems, A.V. Oppenheim and A.S. Will sky with S. H. Nawab, Second Edition, and PHI Private limited.
2. Signals and Systems, Second Edition, S. Haykin and B. Van Veen, John Wiley & Sons.
3. B.P. Lathi, "Principles of Linear Systems and Signals", Second Edition, Oxford, 2009.

REFERENCES:

1. R.E.Zeimer, W.H.Tranter and R.D.Fannin, "Signals & Systems - Continuous and Discrete", Pearson, 2007.
2. John Alan Stuller, "An Introduction to Signals and Systems", Thomson, 2007. 40.
3. M.J.Roberts, "Signals & Systems Analysis using Transform Methods & MATLAB", Tata McGraw

III Sem.	Electronic Devices, Circuits & Analysis Lab	Course Code: V20ECL01	L	T	P	C
			0	0	3	1.5

Syllabus Details

Course Outcomes: After Successful completion of this course, the students will be able to:

CO1-Identify,Test and Describe the specifications of various components.**[K2]**

CO2-Interpret the Characteristics of various Semiconductor Devices.**[K2]**

CO3-Sketch the Regulation Characteristics of Zener Diode.**[K3]**

CO4-Examine the Performance of Rectifiers with and without Filters.**[K3]**

CO5-Sketch the Frequency Response of Amplifiers and Compute Bandwidth.**[K3]**

CO6- Construct different RC and LC oscillators using BJT based on the Frequency range.**[K3]**

PART A ELECTRONIC WORKSHOP PRACTICE

1. Identification, Specifications, Testing of R, L, C Components (Colour Codes), Potentiometers, Coils, Gang Condensers, Relays, Bread Boards.
2. Identification, Specifications and Testing of Active Devices, Diodes, BJTs, JFETs, LEDs, UJT.
3. Study and operation of Ammeters, Voltmeters, Transformers, Analog and digital Multimeter, Function generator, Regulated power supply and CRO.

PART B: List of Experiments

1. PN Junction diode characteristics
2. Zener diode characteristics
3. Rectifier (without and with c-filters)
   Part-A Half- wave Rectifier Part-B Full- wave Rectifier
4. BJT characteristics (CB Configuration Input & Output characteristics)
5. BJT characteristics (CE Configuration Input & Output characteristics)
6. FET Characteristics (CS Configuration Drain&Transfer Characteristics
7. BJT-CE Amplifier
8. RC Phase Shift Oscillator
9. Colpit’s Oscillator
10. Complementary Symmetry Class B Power Amplifier

Equipment required for EDC&Analysis Laboratory

1. Ammeters (Analog or Digital)
2. Voltmeters (Analog or Digital)
3. Active & Passive Electronic Components
4. Regulated Power supplies
5. Cathode Ray Oscilloscopes
6. Analog/ Digital function Generators
7. Digital multimeter
8. Decade resistance Boxes/Rheostats
9. Bread Boards

III Sem.	Signals & Systems Lab	Course Code: V20ECL02	L	T	P	C
			0	0	3	1.5

Syllabus Details

Course Outcomes: After Successful completion of this course, the students Will be able to:

CO1. Understand basics of MATLAB syntax, functions and programming. **[K2]**

CO2. Describe continuous-time and discrete time signals and systems. **[K2]**

CO3. Analyze the spectral characteristics of signals using Fourier analysis. **[K4]**

CO4. Analyze the systems using Laplace transform and Z-transform. **[K4]**

LIST OF EXPERIMENTS:

1. Basic operations on matrices.

2. Generation on various signals and Sequences (periodic and aperiodic), such as unit impulse,

Unit step, square, saw tooth, triangular, sinusoidal, ramp, sinc.

3. Operations on signals and sequences such as addition, multiplication, scaling, shifting,

Folding, computation of energy and average power.

4. Finding the even and odd parts of signal/sequence and real and imaginary part of signal.

5. Convolution between signals and sequences.

6. Auto correlation and cross correlation between signals and sequences.

7. Verification of linearity and time invariance properties of a given continuous /discrete

System.

8. Computation of unit sample, unit step and sinusoidal response of the given LTI system and verifying its physical Reliability and stability properties.

9. Gibbs phenomenon.

10. Finding the Fourier transform of a given signal and plotting its magnitude and phase

Spectrum.

11. Waveform synthesis using Laplace Transform.

12. Locating the zeros and poles and plotting the pole zero maps in s-plane and z-plane for the Given transfer function.

IV Semester SYLLABUS

IV Sem.	Analog & Digital Communication	Course Code:V20ECT07	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of this course, the students Will be able to:

CO1: Explain the spectral characteristics, generation and detection Techniques of Amplitude modulation techniques **(K2)**
CO2: Explain the spectral characteristics, generation and Detection techniques of angle modulation techniques **(K2)**
CO3: Illustrate different types of noise and predict its effect on Analog communication Systems. **(K3)**
CO4: Describe the generation and detection methods of various digital Modulation schemes. **(K2)**
CO5: Analyze the concepts of error control coding **(K4).**

UNIT-I

Analog Modulation – Need for modulation, AM, DSB-SC, SSB, VSB - Time domain and frequency domain description, single to NE modulation, power relations, Generation & Detection techniques, AM Transmitters, AM Receivers-Super-heterodyne receiver, IF,AGC.

UNIT-II

Angle Modulation: Phase and Frequency Modulation, Narrow band and Wideband FM, Carson's rule, Indirect and direct method of FM generation, Detection of FM, Phase locked loop, Comparison of FM and AM, FM Transmitters, FM Super-heterodyne receiver.

UNIT-III

Noise in Analog Communication system: Noise in DSB &SSB system, Noise in AM system, Noise in Angle Modulation system, Pre-emphasis and de-emphasis.

Pulse Modulation: Time Division Multiplexing, PAM, PWM, PPM-Generation and Detection.

UNIT-IV

DigitalModulationSystems: PulseModulation:Basebandsignals.Samplingprocess;QuantizationProcess;QuantizationNoise;Pulse-CodeModulation;NoiseConsiderationsinPCMSystems; Differential Pulse-Code Modulation, Delta modulation, adaptive delta modulation, Amplitude, phase and frequency shift keying schemes(ASK,PSK,FSK),introduction to M-array modulation schemes, Matched filter receivers and optimum receiver

UNIT-V

Information theory and Error control Coding: Measure of information, Entropy, Information rate, Source coding theorem, Channelcapacity–Shannon-Hartleylaw,controlCodes–Linearcodes,Cycliccodes,ConvolutionCoding-encoder, decoder-Exhaustive search and sequential method.

TEXTBOOKS:

1. SimonHaykinandMichaelMoher,"AnIntroductiontoAnalog&DigitalCommunications",2ndEd.,Wiley,(2007).
2. H Taub& D. Schilling, Gautam Sahe, "Principles of

CommunicationSystems”, TMH,3rdEdition,(2007).

3. Tomasi,Wayne,“ElectronicsCommunicationSystems-Fundamentalsthroughadvanced”,5thEdition,PearsonEducation,2009
4. Lathi,“ModernDigital&AnalogCommunicationsSystems”,2e,OxfordUniversityPress
5. R. P. Singh, S. Sapre, “Communication Systems: Analog and Digital”, Tata McGraw-Hill, 2nd edition.

REFERENCEBOOKS:

1. BruceCarlson, Paul B.Crillyand Janet C.Rutledge, “Communication Systems: An Introduction to Signals and Noise in Electrical Communications”, 4thEdition, McGraw-Hill, (2002).
2. SimonHaykin,“CommunicationSystems”,4thEdition,John Wiley&Sons,(2001)
3. NevioBenvenuto, Roberto Corvaja, TomasoErseghe, and Nicola Laurenti, “Communication Systems: Fundamentals and Design Methods”, JohnWiley & Sons, (2006).
4. SamShanmugam.K, “Digital and Analog Communication Systems”, Wiley publisher (2006).

IV Sem.	Digital IC Applications	Course Code:V20ECT08	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of this course, the students

Will be able to:

- CO1: Explain the structure of commercially available digital integrated circuit families. **[K2]**
- CO2:Learn the IEEE Standard 1076 Hardware Description Language (VHDL).**[K2]**
- CO3: Model complex digital systems at several levels of abstractions, behavioural, Structural, simulation, synthesis and rapid system prototyping.**[K2]**
- CO4: Analyze and design basic digital circuits with combinatorial and sequential logic Circuits using VHDL.**[K2]**
- CO5:Develop Programmable logic devices and memories with relevant ICs.**[K2]**

UNIT-I

Digital Logic Families and Interfacing: Introduction to logic families, CMOS logic, CMOS steady state and dynamic electrical behavior, CMOS logic families. Bipolar logic, transistor-transistor logic, TTL families, CMOS/TTL interfacing, Emitter coupled logic.

UNIT-II

Introduction to VHDL: Design flow, program structure, levels of abstraction, Elements of VHDL: Data types, data objects, operators and identifiers. Packages, Libraries and Bindings, Subprograms. VHDL Programming using structural and data flow modeling.

Behavioral Modeling: Process statement, variable assignment statement, signal assignment statement, wait statement , if statement, case statement ,null statement, loop statement, exit statement, next statement ,assertion statement, Inertial Delay Model, Transport Delay Model, Logic Simulation, Logic Synthesis, Inside a logic Synthesizer.

UNIT-III

Combinational Logic Design: Half adder, Full Adder, Ripple Adder, Binary Adder-Subtractor, Look Ahead Carry Generator, ALU, Decoders, encoders, multiplexers and DE multiplexers, parity circuits, comparators, Barrel Shifter, Simple Floating Point Encoder, Dual Priority Encoder, Design considerations of the above combinational logic circuits with relevant Digital ICs, modeling of above ICs using VHDL.

UNIT-IV

Sequential Logic Design: SSI Latches and flip flops, Shift Registers, Universal Shift Registers, Ring Counter, Johnson Counter, Ripple Counter, Design of Modulus N Synchronous Counters, Design considerations of the above sequential logic circuits with relevant Digital ICs, modelling of above ICs using VHDL.

UNIT-V

Memories:
ROM: Internal structure, 2D-Decoding, Commercial ROM types, timing and applications. Static RAM: Internal structure, SRAM timing, standard synchronous SRAMS. Dynamic RAM: Internal structure, timing, synchronous DRAMs.

Text Books:

1. Digital Design Principles & Practices – John F. Wakerly, PHI/ PearsonEducation Asia, 3rd

Ed., 2005.

2. VHDL Primer – J. Bhasker, Pearson Education/ PHI, 3rd Edition.

References:

1. Fundamentals of Digital Logic with VHDL Design- Stephen Brown, ZvonkoVranesic,

McGrawHill, 3rd Edition.

IV Sem.	Electro Magnetic Waves & Transmission Lines	Course Code:V20ECT09	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of this course, the students Will be able to:

CO1:Find static electric field intensity by using various laws of electrostatics. **[K3]**

CO2:Find static magnetic field intensity by using various laws of magneto statics and Develop the Maxwell's equations for time varying fields**. [K3]**

CO3:Calculate the Propagation Characteristics of the EM Waves in different mediums

And find Brewster angle, critical angle and total internal reflection**. [K3]**

CO4:Compute Primary and Secondary constants for a given transmission line. **[K3]**

CO5:Calculate reflection coefficient, VSWR etc. using smith chart. **[K3]**

Prerequisites: Review of Co-ordinate Systems.

UNIT-I: Electrostatics:

Coulomb's Law, Electric Field Intensity, Electric Flux Density, Gauss Law and Applications, Electric Potential, Relation between E and V, Energy Density, Convection and Conduction Currents, Dielectric Constant, Poisson's and Laplace's Equations; Capacitance – Parallel Plate, Coaxial Capacitors, Illustrative Problems.

UNIT-II: Magneto Statics:

Biot-Savart Law, Ampere's Circuital Law and Applications, Magnetic FluxDensity, Magnetic Scalar and Vector Potentials, Forces due to Magnetic Fields, Inductances and MagneticEnergy. Illustrative Problems**.**

Maxwell's Equations (Time Varying Fields):

Faraday's Law and Transformer EMF, Inconsistency of Ampere's Law and Displacement Current Density, Maxwell's Equations in Different Final Forms and Word Statements. Conditions at a Boundary Surface.

UNIT-III: EM Wave Characteristics:

Wave Equations for Conducting and Perfect Dielectric Media, Uniform Plane Waves – Definition, Relation Between E & H, Sinusoidal Variations, Wave Propagation in Lossy dielectrics, lossless dielectrics, free space, wave propagation in good conductors, Good Dielectrics, skin depth, Polarization & Types, Illustrative Problems.
Reflection and Refraction of Plane Waves – Normal and Oblique Incidences for Perfect Dielectrics, Brewster Angle, Critical Angle and Total Internal Reflection, Surface Impedance. Poynting Vector and Poynting Theorem.Illustrative Problems.

UNIT-IV: Transmission Lines - I:
Types, Applications of Transmission Lines, Equivalent Circuit, Primary & Secondary Constants, Transmission Line Equations for Finite and Infinite Lines, Characteristic Impedance, Propagation Constant, Phase and Group Velocities, , Lossless lines, Distortion less Lines, Illustrative Problems.

UNIT-V: Transmission Lines – II:
Input Impedance Relations, SC and OC Lines, Reflection Coefficient, VSWR. UHF Lines as Circuit Elements; λ/8, λ/4 and λ /2 Lines, Smith Chart – Construction and Applications, Single Stub Matching, Illustrative Problems.

TEXT BOOKS:

1. Elements of Electromagnetic – Matthew N.O. Sadiku, Oxford Univ. Press, 3rd ed., 2001.
2. Electromagnetic Waves and Radiating Systems – E.C. Jordan and K.G. Balmain, PHI,
2nd Edition, 2000.
3. Transmission Lines and Networks – UmeshSinha, SatyaPrakashan (Tech. India Publications), New Delhi, 2001.

REFERENCES:

1. Electromagnetic Fields and Wave Theory –GSN Raju, Pearson Education 2006
2. Engineering Electromagnetics – William H. Hayt Jr. and John A. Buck, TMH, 7th ed., 2006.
3. Electromagnetic Waves andTransmission Lines by Y. Mallikarjuna Reddy, Universities Press

IV Sem.	Analog & Digital Communication Lab	Course Code: V20ECL04	L	T	P	C
			0	0	3	1.5

Syllabus Details

Course Outcomes: After Successful completion of this course, the students Will be able to:

CO-1- Demonstrate the operation of various pulse modulation and demodulation Techniques.**[K3]**
CO-2 -Construct the pre-emphasis and de-emphasis circuits and verify its frequency Response.**[K3]**
CO-3 -Demonstrate the spectrum analysis of modulated signal using spectrum analyser, Operation of AGC and PLL **[K3]**
CO-4- Distinguish the Time division multiplexing and DE multiplexing, Pulse digital Modulation Techniques **[K2]**
CO-5- Distinguish generation and detection of digital modulation techniques **[K2]**
CO-6- Verify the Source encoding and decoding (Huffman Coding) technique and channel Encoding and decoding techniques. **[K3]**

List of Experiments (Twelve experiments to be done)

A. Analog Communications

1. Amplitude Modulation - Mod. &Demod.
2. AM - DSB SC - Mod. &Demod.
3. Spectrum Analysis of Modulated signal using Spectrum Analyser
4. Pre-emphasis & De-emphasis
5. Frequency Modulation - Mod. &Demod, PLL.
6. Sampling Theorem - Pulse Amplitude Modulation - Mod. &Demod.
7. PWM, PPM - Mod. &Demod.

B. Digital Communications

1. Pulse code modulation, Differential pulse code modulation.
2. Delta modulation, Companding.
3. ASK, FSK, PSK.
4. Differential phase shift keying.
5. Source Encoder and Decoder
6. Channel coding-
    i. Linear Block Code-Encoder and Decoder
    ii. Binary Cyclic Code – Encoder and Decoder
    iii. Convolution Code – Encoder and Decoder

IV Sem.	**Digital IC Application Lab**	**Course Code: V20ECL05**	**L**	**T**	**P**	**C**
			0	**0**	**3**	**1.5**

Syllabus Details

Course Outcomes: After Successful completion of this course, the students Will be able to:

CO1: Identify the importance of various tools available in XILINX ISE12.2.**[K2]**
CO2: Develop VHDL/Verilog HDL Source code and perform simulation for various Combinational logic circuits using XILINX ISE12.2.**[K3]**
CO3: Develop VHDL/Verilog HDL Source code and perform simulation for various Sequential logic circuits using XILINX ISE12.2.**[K3]**

Note: The students are required to design and draw the internal logical structure of the following Digital Integrated Circuits and to develop VHDL/Verilog HDL Source code, perform simulation using relevant simulator and analyse the obtained simulation results using necessary synthesizer.

All the experiments are required to verify and implement the logical operations on the latest FPGA Hardware in the Laboratory.

List of Experiments:

(Minimum of Ten Experiments has to be performed)

1. Realization of Logic Gates
2. Design of Full Adder
3. Design of 3 to 8 Decoder –IC 74138
4. Design of 8 to 3 Encoder (with and without priority)
5. Design of 8 x 1 Multiplexer-IC 74151 and Dual 1x 4 De-multiplexer-IC 74155
6. Design of 4-Bit comparator-IC 7485
7. Design of D-Flip-Flop-IC 7474
8. Design of 4-Bit Ripple Counter.
9. Design of Decade counter –IC 7490
10. Design of Universal Shift register.
11. Design of RAM
12. Design of ALU.

Equipment/Software required:

1. Xilinx Vivado software / Equivalent Industry Standard Software
2. Xilinx Hardware / Equivalent hardware
3. Personal computer system with necessary software to run the programsand Implement.

Annexure-04

V20 Regulation

Semester III (Second Year)

Approved List of Courses offered to EEE Department by ECE Dept.

Sl. No.		Course Code	Course Title	Hours per Week			Credits
1.	Professional Core Course	V20ECT06	Analog Electronics	3	0	0	3
2.	Professional Core Course lab	V20ECL03	Analog Electronics lab	0	0	3	1.5

III Sem.	Analog Electronics	Course Code:V20ECT06	L	T	P	C
			3	0	0	3

Syllabus

Course Outcomes:
After Successful completion of the Course, the student will be able to:

CO-1: Explain the working principle of diode and Diode rectifier circuits with and without Filters.**(K2)**

CO-2: Sketch V-I characteristics of BJT and FET in different configurations (**K3)**

CO-3: Construct wave shaping circuits for various applications **(K3)**

CO-4: Construct circuits for different applications using ICs **(K3)**

CO-5: Explain the operation of Data Converters using IC 741 OP-AMP **(K2)**

UNIT-I Junction Diode Characteristics: p-n junction diode, current components in PN junction Diode, diode current equation, V-I Characteristics, Diode resistances, Breakdown mechanisms, Zener Diode.
Rectifiers: Basic Rectifier setup**,** half wave rectifier, full wave rectifier, bridge rectifier, derivations of characteristics of rectifiers, Filters- Inductor filter, Capacitor filter, derivation for ripple factor in each case, Zener diode as Voltage Regulator.

UNIT-II Transistor Characteristics: BJT: Junction transistor, transistor current components, transistor equation, transistor configurations and characteristics of transistor in Common Base, Common Emitter and Common Collector configurations, punch through/ reach through, transistor as an amplifier.
FET: FET types, construction, operation, characteristics, parameters, MOSFET-types, construction, operation, characteristics, comparison between JFET and MOSFET.

UNIT-III Wave shaping circuits: Response of high pass and low pass RC circuits to step, pulse, Square inputs. High pass RC circuit as differentiator, low pass RC circuit as integrator. Series and shunt clippers, clipping at two independent levels, Positive and Negative Clampers.

UNIT-IV Integrated Circuits and applications: Op-amp Block Diagram, Ideal Op-amp, Equivalent Circuit, Ideal voltage transfer curve, open loop op-amp configurations. Inverting and non-inverting amplifiers, summing, scaling, averaging amplifier, integrator and differentiator, 555 timer functional block diagram, A stable and Monostable multivibrators.

UNIT-V Data Converters: Weighted resistor DAC, R-2R ladder DAC. Flash Type ADC; counter type ADC, Successive approximation ADC, Dual slope ADC, Specifications of DAC&ADC.

TEXT BOOKS:

1. Integrated Electronics- J. Millman and C.C. Halkias, TMH
2. Electronic Devices and Circuits- Salivahanan, N.Suresh Kumar, A. Vallavaraj, TMH
3. Pulse, Digital and Switching Waveforms - J. Millman and H. Taub, TMH
4. Linear Integrated Circuits – D. Roy Choudhury, 4th edition, New Age International (p) Ltd.
5. Op-Amps & Linear Integrated Circuits - Ramakanth A. Gayakwad,3rd edition, PHI.

REFERENCE BOOKS:

1. Electronic Devices and Circuits Theory – Robert L. Boylestad and Louis Nashelsky,
Pearson/Prentice Hall.
3. Pulse & Digital Circuits-BN Yoga Narasimhan, 2000,SriMaruthi Publishers, Bangalore.
4. Operational Amplifiers & Linear Integrated Circuits –Sanjay Sharma; SKKataria& Sons;2nd Edition,2010

III Sem.	Analog Electronics Lab	Course Code: V20ECL03	L	T	P	C
			0	0	3	1.5

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO-1: Interpret the Characteristics of various semiconductor devices. **(K2)**

CO-2: Examine the Performance of Rectifiers with and without Filters. **(K3)**

CO-3: Construct circuit for linear wave shaping circuits. **(K3)**

CO-4: Construct circuits for verifying linear and nonlinear applications using IC741op-amp And IC 555 timer **(K3)**

CO-5: Verify the Characteristics of 4 bit Digital to Analog Converter **(K3)**

List of Experiments: (Any 10 Experiments to be done)

1. PN Junction diode characteristics
2. Rectifiers with and without filters
   Part A: Half Wave Rectifier, Part B: Full Wave Rectifier
3. Zener diode Characteristics
   Part A: V-I characteristics, Part B: Zener diode as Voltage Regulator
4. BJT Characteristics (CE Configuration)
   Part A: Input characteristics, Part B: Input characteristics
5. JFET Characteristics (CS Configuration)
   Part A: Drain characteristics, Part B: Transfer characteristics
6. Linear Wave Shaping
   Part A: High Pass RC Circuit, Part B: Low Pass RC Circuit
7. Non-linear Wave Shaping - Clippers
   Part A: Unbiased Clippers, Part B: Biased Clippers
8. Non-linear Wave Shaping - Clampers
   Part A: Unbiased Clampers, Part B: Biased Clampers
9. Summing, Scaling, Averaging amplifiers using IC 741.
10. Differentiator and Integrator Circuits using IC 741.
11. A stable Multi vibrator using IC 555
12. . 4 bit Digital to Analog to Digital Converter

Annexure-EC-V

Approved Course structure for B. Tech ECT (V20)

COURSE STRUCTURE

(For V20 Regulation)

ECT

V20 Regulation

Semester III (Second Year)

Sl. No.	Course Category	Course Code	Course Title	Hours per Week			Credits
1.	Basic Science Courses	V20MAT03	Complex Analysis	3	0	0	3
2.	Professional Core Course	V20ECT02	Electronic Devices, Circuits & Analysis **(EDCA)**	3	0	0	3
3.	Professional Core Courses	V20MAT06	Probability Theory Stochastic Process **(PTSP)**	3	0	0	3
4.	Professional Core Courses	V20ECT04	Network Theory **(NT)**	3	0	0	3
5.	Professional Core Courses	V20ECT05	Signals & Systems **(SS)**	3	0	0	3
6.	Professional Core Courses (LAB)	V20ECL01	Electronic Devices, Circuits & Analysis Lab **(EDCA LAB)**	0	0	3	1.5
7.	Professional Core Courses (LAB)	V20ECL02	Signals & Systems Lab **(SS LAB)**	0	0	3	1.5
8.	Professional Core Courses (LAB)	V20CSL31	Data Structures Lab **(DS LAB)**	0	0	3	1.5
9	**Skill Oriented Course***		Certificate course being offered by industries/ professional bodies/ APSSDC or any other accredited bodies	**1**	**0**	**2**	**2**
10	Mandatory Course (AICTE suggested)	V20ENT02	Professional Communication Skills **(PCS-I)**	2	0	0	0
			Total Credits				**21.5**

Semester IV (Second Year)

Sl. No.	Course Category	Course Code	Course Title	Hours			Credits
				L	T	P	
1.	EngineeringScience Courses	V20EET11	Control Systems **(CS)**	3	0	0	3
2.	Basic Science Course/Prof Core Course	V20ECT07	Analog & Digital Communication **(ADC)**	3	0	0	3
3.	Professional Core Courses	V20ECT08	Digital IC Applications **(DICA)**	3	0	0	3
4.	Professional Core Courses	V20ECT09	Electro Magnetic Waves & Transmission Lines **(EMTL)**	3	0	0	3
5.	Humanities and Social Sciences	V20MBT51	Managerial Economics & Financial Analysis (**MEFA)**	3	0	0	3
6.	EngineeringScience Courses/Prof Core (Interdisciplinary) (LAB)	V20CSL32	Python Programming Lab	0	0	3	1.5
7.	Professional Core Courses (LAB)	V20ECL04	Analog & Digital Communication Lab **(ADC LAB)**	0	0	3	1.5
8.	Professional Core Courses (LAB)	V20ECL05	Digital IC Applications Lab **(DICA LAB)**	0	0	3	1.5
9	**Skill Oriented Course***		Certificate course being offered by industries/ professional bodies/ APSSDC or any other accredited bodies	**1**	**0**	**2**	**2**
10	Mandatory Course (AICTE suggested)	V20ENT03	Professional Communication Skills **(PCS-II)**	2	0	0	0
			Total Credits				**21.5**
	Internship 2 Months (Mandatory) during Summer vacation						
	Honors/Minor Courses (The Hours Distribution can be 3-0-2 or 3-1-0 also)			**4**	0	**0**	**4**

***Skill Oriented Course:**

The Student shall be given an option to choose either the skill courses being offered by the college or to choose a certificate course being offered by industries/ professional bodies/ APSSDC or any other accredited bodies as approved by the concerned BoS.

List of Skill Oriented Courses:

S. No	Name of the Proposed Course
1	PCB Design
2	Programming in Scilab
3	Programming with Arduino
4	Circuit Design & Simulation using Multisim
5	Concepts of Embedded systems
6	Internet of Things
7	Robotics
8	Hands on Graphical Programming Using Labview

Annexure-EC-VI

Approved Course structure & Syllabus for M. Tech (V21)

COURSE STRUCTURE
AND
DETAILED SYLLABUS

For

M. Tech
(Embedded Systems & VLSI)

Academic Year 2021-2022

ELECTRONICS & COMMUNICATION ENGINEERING

BRANCH

SRI VASAVI ENGINEERING COLLEGE
(AUTONOMOUS)

(Sponsored by Sri Vasavi Educational Society)
Approved by AICTE, New Delhi and Permanently Affiliated to JNTUK, Kakinada
Pedatadepalli, **TADEPALLIGUDEM – 534 101,** W.G. Dist., (A.P.)

COURSE STRUCTURE

Course Structure for
M. Tech (Embedded Systems &VLSI) w.e.f A.Y 2021-22
I Semester

Sl. No.	Course Code	Course Name	L	T	P	C
9.	V21ESVT01	System Design through VERILOG	3	-	-	3
10.	V21ESVT02	Embedded Systems Design	3	-	-	3
11.	V21ESVT03 V21ESVT04 V21ESVT05	**ELECTIVE-1** Programming Languages for Embedded Systems Parallel processing System On Chip & Applications	3	-	-	3
12.	V21ESVT06 V21ESVT07 V21ESVT08	**ELECTIVE-II** Digital System Design CPLD & FPGA Architectures & Applications VLSI Signal Processing	3	-	-	3
13.		Research methodology and IPR	2	0	0	2
14.	V21ESVL01	System Design through Verilog Lab	-	-	4	2
15.	V21ESVL02	Embedded Systems Design Lab		-	4	2
16.	Aud. 1	Audit Course 1	2	0	0	0
			16	**0**	**8**	**18**

Total Contact Hours: 24 **Total Credits: 18**

II Semester

Sl. No.	Course Code	Course Name	L	T	P	C
8.	V21ESVT09	Analog and Digital CMOS VLSI Design	3	-	-	3
9.	V21ESVT10	Real Time Operating Systems	3	-	-	3
10.	V21ESVT11 V21ESVT12 V21ESVT13	**ELECTIVE-III** MEMS Technology & Applications Design for Testability Semiconductor Memory Design And Testing	3	-	-	3
11.	V21ESVT14 V21ESVT15 V21ESVT16	**ELECTIVE-IV** Hardware Software Co-Design Embedded Computing Communication Buses and Interfaces	3	-	-	3
12.	V21ESVL03	Analog and Digital CMOS VLSI Design Lab	-	-	4	2
13.	V21ESVL04	Real time Operating Systems Lab		-	4	2
14.	V21ESVL05	Mini project	0	0	4	2
8.	Aud. 2	Audit course 2	2	0	0	MNC
			14	**0**	**12**	**18**

Total Contact Hours: 26 **Total Credits: 18**

III Semester*

Sl. No.	Course Code	Course Name	L	T	P	Credits
1.	V21ESVT17 V21ESVT18	1.IOT and its Applications 2.Low Power VLSI Design 3.MOOCs Course	3	0	0	3
2.	V21MAT02 V21MBT55	1.Operations Research 2.Cost Management of Engineering projects 3. MOOCs Course	3	0	0	3
3.	V21ESVP01	Dissertation phase-I/Industrial Project	0	0	20	10#

		(to be continued and evaluated next semester)				
Total Credits						**16**

\# Evaluated and Displayed in IV semester Marks list**.**

*Students going for Industrial project/Thesis will complete these courses through MOOCs

IV Semester

Sl. No.	**Course Code**	**Course Name**	**P.Os**	**Category**	**L**	**T**	**P**	**C**
2.	V21ESVP02	Project/Dissertation phase-II (continued from III semester)			0	0	32	16
							Total Credits	**16**

Total Credits : 66

Audit course 1&2

1. English for Research Paper Writing - V21PGENT54(BOS English)
2. Disaster Management (BOS of CIVIL) - V21STEAC1
3. Value Education (BOS English) - V21PGENT55
4. Constitution of India (BOS English) - V21PGENT56
5. Pedagogy Studies (BOS English) - V21PGENT51
6. Personality Development through Life Enlightenment Skills (BOS English) - V21PGENT52
7. Stress Management by Yoga - V21PGENT53

I Semester SYLLABUS

I Sem.	SYSTEM DESIGN THROUGH VERILOG	Course Code: V21ESVT01	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes:

- CO1: Outline basic concepts of RTL code for digital circuits **[K2]**
- CO2: Model RTL codes for digital circuit at gate and data flow level **[K3]**
- CO3: Model RTL codes for digital circuit at behavioural level **[K3]**
- CO4: Model RTL codes for digital circuit at switch level modelling and outline the concepts of task, function and complier directives **[K3]**
- CO5: Analyze Synthesize of Combinational and Sequential Circuits **[K4]**

UNIT-I

INTRODUCTIONTOVERILOG:

Verilog as HDL, Levels of design description, concurrency, module, simulation and synthesis, testbench, functional verification,programminglanguageinterface (PLI),simulationand synthesistools.

LANGUAGECONSTRUCTSANDCONVENTIONS:

Introduction, keywords, identifiers, whitespace characters, comments, numbers, strings, logic values, data types, scalars and vectors, parameters, memory, operators,systemtasks.

UNIT-II

GATELEVELMODELLING:

Introduction,AND gate primitive, module structure, other gate primitives, illustrative examples, tristate gates, arrayof instances of primitives, design of Flip flops with gate primitives, delays, strengths and contention resolution, nettypes,designofbasic circuits.

DATA FLOWLEVEL MODELLING

Introduction, continuous assignment structures, delays and continuous assignments, assignment to vectors.

UNIT-III

BEHAVIORALMODELLING:

Introduction, operationsandassignments,initial construct,alwaysconstruct,examples,assignmentswith delays, wait construct, multiple always blocks, designs at behavioral level, blocking and non-blocking assignments, the case statement, if and if else constructs, assign-De assign construct,repeat construct, FOR loop, the disable construct, While loop, Forever loop, parallel blocks, force-release construct,event.

UNIT-IV

SWITCHLEVELMODELLING

Basictransistor switches, CMOS switch, Bidirectional gates and time delays with switch primitives, instantiations withstrengthsanddelays,strengthcontentionwithtriregnets, switch level modeling for NAND, NOR and XOR.

SYSTEM TASKS, FUNCTIONS, AND COMPILER DIRECTIVES: Introduction, System Tasks and Functions, File based Tasks and Functions, Compiler Directives, Hierarchical Directives, User-defined Primitives (UDP), FSM Design (Moore and Melay Machines).

UNIT-V

SYNTHESISOFCOMBINATIONAL ANDSEQUENTIAL LOGIC USINGVERILOG: Synthesisof combinational logic: Net list of structured primitives, a set of continuous assignment statements and level sensitivecyclic behavior with examples, Synthesis of priority structures, Exploiting logic don’t care conditions. Synthesis ofsequential logic with latches: Accidental synthesis of latches and Intentional synthesis of latches, Synthesis ofsequentiallogicwithflip-flops, Synthesis of explicitstate machines.

TEXTBOOKS:

1. DesignthroughVerilogHDL—T.R.PadmanabhanandB. BalaTripuraSundari, WSE, IEEEPress, 2004.
2. AdvancedDigitalDesignwithVerilog HDL—MichaelD.Ciletti, PHI, 2005.

REFERENCES:

1. FundamentalsofLogicDesignwithVerilog—Stephen.BrownandZvonkoVranesic, TMH, 2005.
2. AVerilogPrimier—J.Bhasker, BSP, 2003.

I Sem.	EMBEDDED SYSTEM DESIGN	Course Code: V21ESVT02	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcome:

The student will be able to

- CO1: Illustrate the ARM architecture and its memory management.**(K2)**
- CO2: Describe the ARM instruction set for ARM programming.**(K2)**
- CO3: Describe Thumb instruction set for ARM programming.**(K2)**
- CO4: Explain the basics of ARM Cortex-M3**(K2)**
- CO5: Explain ARM Cortex-M3 interfacing.**(K2)**

UNIT-I:

ARM Architecture ARM Design Philosophy, Registers, PSR, Pipeline, Interrupts and Vector Table, Architecture Revision, ARM Processor Families. Introduction to ARM Cortex.

UNIT-II:

ARM Programming Model-I Instruction Set**:** Data Processing Instructions, Branch, Load, Store Instructions, PSR Instructions, Conditional Instructions.

UNIT-III:

ARM Programming Model-II Thumb Instruction Set**:** Register Usage, Other Branch Instructions, Data Processing Instructions, Single-Register and Multi Register Load-Store Instructions, Stack, Software Interrupt Instructions.

UNIT-IV

Introduction to ARM Cortex-M3 Processor-What Is the ARM Cortex-M3 Processor,Background of ARM and ARM Architecture,Instruction Set Development**,** The Thumb-2 Technology and Instruction Set Architecture**,** Cortex-M3 Processor Applications.

Cortex-M3 Basics-Registers, Operation Mode**,** Exceptions and Interrupts**,** Vector Tables**,** Stack Memory Operations, Reset Sequence

UNIT-V

Exceptions, Types, Priority, Vector Tables, Interrupt Inputs and Pending behavior, Fault
Exceptions, Supervisor call and Pendable Service Call, Nested Vectored Interrupt Controller, Basic Interrupt Configuration.

Cortex-M3 Implementation Overview-the Pipeline, A detailed block diagram, Bus Interfaces on the Cortex-M3,Other Interfaces on the Cortex-M3, the External PPB, Typical Connections,Reset Types and Reset Signals.

TEXT BOOKS:

1. ARM Systems Developer's Guides- Designing & Optimizing System Software – Andrew N. Sloss, Dominic Symes, Chris Wright, 2008, Elsevier.
2. The Definitive Guide to the ARM® Cortex-M3 Second Edition-Joseph Yiu
3. ARM System-on-chip Architecture- Stephen Bo Furber - Addison-Wesley, 2000

REFERENCE BOOKS:

1. Embedded Microcomputer Systems, Real Time Interfacing – Jonathan W. Valvano – Brookes / Cole, 1999, Thomas Learning.

I Sem.	Programming Languages for Embedded Systems	Course Code: V21ESVT03	L	T	P	C
			3	0	0	3

	(Elective-I)					

Syllabus Details

Course Outcomes:
At the end of this course, students will be able to

- CO1: Write an embedded C application of moderate complexity.
- CO2: Develop and Analyze algorithms in C++.
- CO3: Differentiate interpreted languages from compiled languages.

UNIT-I: Embedded „C‟ Programming Bitwise operations, Dynamic memory allocation, OS services.Linked stack and queue, sparsematrices, Binary tree. Interrupt handling in C, Code optimization issues.Embedded Software Development Cycle and Methods (Waterfall, Agile)

UNIT-II: Object Oriented Programming Introduction to procedural, modular, object-oriented and genericprogramming techniques, Limitations of procedural programming, objects, classes, data members,methods, data encapsulation, data abstraction and information hiding, inheritance, polymorphism

UNIT-III: CPP Programming: „cin‟, „cout‟, formatting and I/O manipulators, new and deleteoperators, Defining a class, data members and methods, „this‟ pointer, constructors, destructors, friendfunction, dynamic memory allocation

UNIT-IV: Overloading and Inheritance: Need of operator overloading, overloading the assignment,Overloading using friends, type conversions, single inheritance, base and derived classes, friendClasses, types of inheritance, hybrid inheritance, multiple inheritance, virtual base class,Polymorphism, virtual functions.

UNIT-V: Templates: Function template and class template, member function templates and templatearguments, Exception Handling: syntax for exception handling code: try-catch- throw,Multiple Exceptions.Scripting Languages:

Overview of Scripting Languages – PERL, CGI, VB Script, Java Script.
PERL: Operators, Statements Pattern Matching etc. Data Structures, Modules, Objects, TiedVariables, Inter process Communication Threads, Compilation & Line Interfacing.

Text Books:

1. Michael J. Pont, “Embedded C”, Pearson Education, 2nd Edition, 2008
2. Randal L. Schwartz, “Learning Perl”, O‟Reilly Publications, 6th Edition 2011

Reference Books:

1. A. Michael Berman, “Data structures via C++”, Oxford University Press, 2002
2. Robert Sedge wick, “Algorithms in C++”, Addison Wesley Publishing Company, 1999
3. Abraham Silberschatz, Peter B, Greg Gagne, “Operating System Concepts”, John Willey& Sons, 2005Kaufmann.

			L	T	P	C
I Sem.	**Parallel Processing (Elective I)**	**Course Code: V21ESVT04**	**3**	**0**	**0**	**3**

Syllabus Details

Course Outcomes:
At the end of this course, students will be able to

- CO1: Identify limitations of different architectures of computer
- CO2: Analysis quantitatively the performance parameters for different Architectures
- CO3: Investigate issues related to compilers and instruction set based on type of Architectures.

UNIT-I: Overview of Parallel Processing and Pipelining, Performance analysis, Scalability

UNIT-II: Principles and implementation of Pipelining, Classification of pipelining processors, Advanced pipelining techniques, Software pipelining

UNIT-III: VLIW processors Case study: Superscalar Architecture- Pentium, Intel Itanium Processor and Ultra SPARC,MIPS on FPGA, Vector and Array Processor, FFT Multiprocessor Architecture

UNIT-IV: Multithreaded Architecture, Multithreaded processors, Latency hiding techniques, Principles of multithreading, Issues and solutions

UNIT-V: Parallel Programming Techniques: Message passing program development, Synchronous and asynchronous message passing, Shared Memory Programming, Data Parallel Programming, Parallel Software Issues. Operating systems for multiprocessors systems customizing applications on parallel processing platforms

Text Books:

1. Kai Hwang, Faye A. Briggs, “Computer Architecture and Parallel Processing”, MGH International Edition
2. Kai Hwang, “Advanced Computer Architecture”, TMH
3. V. Rajaraman, L. Sivaram Murthy, “Parallel Computers”, PHI.

Reference Books:

1. William Stallings, “Computer Organization and Architecture, Designing for Performance“Prentice Hall, Sixth edition
2. Kai Hwang, ZhiweiXu, “Scalable Parallel Computing”, MGH
3. David Harris and Sarah Harris, “Digital Design and Computer Architecture”, Morgan

I Sem.	System on Chip & Applications (Elective I)	Course Code: V21ESVT05	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcome:
The student will be able to

- CO1: Describe SOC System Approach, design and its Architecture –**[K2]**
- CO2: Discuss the selection of processor and its micro architecture for SOC –**[K2]**
- CO3: Discuss Memory Design for SOC –**[K2]**
- CO4: Explain the concepts of bus models and Interconnect Architectures –**[K2]**
- CO5: Explain SOC based Applications –**[K2]**

UNIT-I
Introduction to the System Approach System Architecture, Components of the system, Hardware & Software, Processor Architectures, Memory and Addressing.System level interconnection, an approach for SOC Design, System Architecture and Complexity.

UNIT-II
Processors Introduction , Processor Selection for SOC, Basic concepts in Processor Architecture, Basic concepts in Processor Micro Architecture, Basic elements in Instruction handling. Buffers: minimizing Pipeline Delays, Branches, More Robust Processors, Vector Processors and Vector Instructions extensions, VLIW Processors, Superscalar Processors.

UNIT-III
Memory Design for SOC Overview of SOC external memory, Internal Memory, Size, Scratchpads and Cache memory, Cache Organization, Cache data, Write Policies, Strategies for line replacement at miss time, Types of Cache, Split – I, and D – Caches, Multilevel Caches, Virtual to real translation , SOC Memory System, Models of Simple Processor – memory interaction.

UNIT-IV
Interconnect Customization and Configuration Inter Connect Architectures, Bus: Basic Architectures, SOC Standard Buses, Analytic Bus Models, Using the Bus model, Effects of Bus transactions and contention time. SOC Customization: An overview, Customizing Instruction Processor, Reconfiguration Technologies, Mapping design onto Reconfigurable devices, Instance- Specific design, Customizable Soft Processor, Reconfiguration - overhead analysis and trade-off analysis on reconfigurable Parallelism.

UNIT-V
Application / Case Studies:
Zynq system on chip design – Secure Boot, Analog Data Acquisition, System Monitoring using the Zynq-7000 AP SOC Processing System with the XADC AXI Interface.
Cypress- PSoC4- Architecture, GPIO Pins and its applications - down counter, sine wave Generator using PSOC 4 device.

TEXT BOOKS:

1. Computer System Design System-on-Chip - Michael J. Flynn and Wayne Luk, Wiely India Pvt. Ltd.
2. ARM System on Chip Architecture – Steve Furber –2nd Ed., 2000, Addison Wesley Professional.
3. Embedded Processing with the ARM Cortex-A9 on the Xilinx Zynq-7000 All Programmable SoC-Louise H. Crockett Ross A. Elliot Martin A. Enderwitz Robert W. Stewart
4. Cypress PSoC User Manual

REFERENCE BOOKS:

1. Design of System on a Chip: Devices and Components – Ricardo Reis, 1st Ed., 2004, Springer
2. Co-Verification of Hardware and Software for ARM System on Chip Design (Embedded Technology) – Jason Andrews – Newnes, BK and CDROM.
3. System on Chip Verification – Methodologies and Techniques – PrakashRashinkar, Peter Paterson and Leena Singh L, 2001, Kluwer Academic Publishers.

I Sem.	Digital System Design (Elective II)	Course Code: V21ESVT06	L	T	P	C
			3	0	0	3

<u>Syllabus Details</u>

Course Outcome:

The student will be able to

- CO1: Describe the algorithms for minimization of functions
- CO2: Describe the algorithms for minimization of PLDs.
- CO3: Design large scale digital systems.
- CO4: Discuss the fault model and diagnosis in combinational and sequential Circuits.

UNIT-I: Minimization Procedures and CAMP Algorithm
Review on minimization of switching functions using tabular methods, k-map, QM algorithm, CAMP-I algorithm, Phase-I: Determination of Adjacencies, DA, CSC, SSMs and EPCs, CAMPI algorithm, Phase-II: Passport checking, Determination of SPC, CAMP-II algorithm: Determination of solution cube, Cube based operations, determination of selected cubes are wholly within the given switching function or not, Introduction to cube based algorithms.

UNIT-II: PLA Design, PLA Minimization and Folding Algorithms
Introduction to PLDs, basic configurations and advantages of PLDs, PLA-Introduction, Block diagram of PLA, size of PLA, PLA design aspects, PLA minimization algorithm (IISc algorithm), PLA folding algorithm(COMPACT algorithm)-Illustration of algorithms with suitable examples.

UNIT -III: Design of Large Scale Digital Systems
Algorithmic state machine charts-Introduction, Derivation of SM Charts, Realization of SM Chart, control implementation, control unit design, data processor design, ROM design and PAL design aspects, digital system design approaches using CPLDs, FPGAs and ASICs.

UNIT-IV: Fault Diagnosis in Combinational Circuits
Faults classes and models, fault diagnosis and testing, fault detection test, test generation, testing process, obtaining a minimal complete test set, circuit under test methods- Path sensitization method, Boolean difference method, properties of Boolean differences, Kohavi algorithm, faults in PLAs, DFT schemes, built in self-test.

UNIT-V: Fault Diagnosis in Sequential Circuits
Fault detection and location in sequential circuits, circuit test approach, initial state identification, Haming experiments, synchronizing experiments, machine identification, distinguishing experiment, adaptive distinguishing experiments.

TEXT BOOKS:

1. Logic Design Theory-N. N. Biswas, PHI
2. Switching and Finite Automata Theory-Z. Kohavi, 2nd Edition, 2001, TMH
3. Digital system Design using PLDd-Lala

REFERENCE BOOKS:

1. Fundamentals of Logic Design – Charles H. Roth, 5th Ed., Cengage Learning.
2. Digital Systems Testing and Testable Design – MironAbramovici, Melvin A. Breuer and Arthur D. Friedman- John Wiley & Sons Inc.

			L	T	P	C
I Sem.	**CPLD & FPGA Architectures and Applications (Elective II)**	**Course Code: V21ESVT07**	**3**	**0**	**0**	**3**

<u>Syllabus Details</u>

Course Outcome:

The student will be able to

- CO1: Describe the Programmable Logic Devices
- CO2: Distinguish the various types of Field Programmable Gate Arrays
- CO3: Apply the typical applications on FPGAs

UNIT-I: Introduction to Programmable Logic Devices

Introduction, Simple Programmable Logic Devices – Read Only Memories, Programmable Logic Arrays, Programmable Array Logic, Programmable Logic Devices/Generic Array Logic; Complex Programmable Logic Devices –Architecture of Xilinx Cool Runner XCR3064XL CPLD, CPLD Implementation of a Parallel Adder with Accumulation.

UNIT-II: Field Programmable Gate Arrays

Organization of FPGAs, FPGA Programming Technologies, Programmable Logic Block Architectures, Programmable Interconnects and Programmable I/O blocks in FPGAs, Dedicated Specialized Components of FPGAs and Applications of FPGAs.

UNIT –III: SRAM Programmable FPGAs:

Introduction, Programming Technology, Device Architecture, the Xilinx XC2000, XC3000 and XC4000 Architectures.

UNIT –IV: Anti-Fuse Programmed FPGAs

Introduction, Programming Technology, Device Architecture, theActel ACT1, ACT2 and ACT3 Architectures.

UNIT –V: Design Applications

General Design Issues, Counter Examples, a Fast Video Controller, A Fast DMA Controller and Designing Counters with ACT devices, Designing Adders and Accumulators with the ACT Architecture.

TEXT BOOKS:

1. Field Programmable Gate Array Technology - Stephen M. Trimberger, Springer International Edition.
2. Digital Systems Design - Charles H. Roth Jr, LizyKurian John, Cengage Learning.

REFERENCE BOOKS:

1. Field Programmable Gate Arrays - John V. Oldfield, Richard C. Dorf, Wiley India.
2. Digital Design Using Field Programmable Gate Arrays - Pak K. Chan/ SamihaMourad, Pearson Low Price Edition.
3. Digital Systems Design with FPGAs and CPLDs - Ian Grout, Elsevier, Newnes.
4. FPGA based System Design - Wayne Wolf, Prentice Hall Modern Semiconductor
Design Series.

I Sem.	VLSI Signal Processing (Elective II)	Course Code:V21ESVT08	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes
On successful completion of the module, students will be able to:

CO1:Ability to modify the existing or new DSP architectures suitable for VLSI.
CO2:Understand the concepts of folding and unfolding algorithms and applications.
CO3:Ability to implement fast convolution algorithms.
CO4:Low power design aspects of processors for signal processing and wireless Applications.

UNIT -I
Introduction to DSP: Typical DSP algorithms, DSP algorithms benefits, Representation of DSP algorithms Pipelining and Parallel Processing Introduction, Pipelining of FIR Digital filters, Parallel Processing, Pipelining and Parallel Processing

for Low Power Retiming Introduction, Definitions and Properties, Solving System of Inequalities, Retiming Techniques

UNIT –II

Folding and Unfolding: Folding- Introduction, Folding Transform, Register minimization Techniques,Register minimization in folded architectures, folding of Multi rate systems

Unfolding**-** Introduction, An Algorithm for Unfolding, Properties of Unfolding, critical Path, Unfoldingand Retiming, Applications of Unfolding

UNIT -III

Systolic Architecture Design: Introduction, Systolic Array Design Methodology, FIR Systolic Arrays,Selection of Scheduling Vector, Matrix Multiplication and 2D Systolic Array Design, Systolic Design forSpace Representations contain Delays.

UNIT -IV

Fast Convolution: Introduction – Cook-Toom Algorithm – Winogard algorithm – Iterated Convolution –Cyclic Convolution – Design of Fast Convolution algorithm by Inspection

Unit V: Digital lattice filter structures, bit level arithmetic, architecture, redundant arithmetic.Numerical strength reduction, synchronous, wave and asynchronous pipe lines, lowpower design.Low Power Design: Scaling Vs. Power Consumption, Power Analysis, Power Reduction techniques,Power Estimation Approaches

Text Books:

1. Keshab K. Parthi[A1], VLSI Digital signal processing systems, design and Implementation [A2],Wiley, Inter Science, 1999.
2. Mohammad Isamail and Terri Fiez, Analog VLSI signal and information processing, McGrawHill, 1994
3. S.Y. Kung, H.J. White House, T. Kailath, VLSI and Modern Signal Processing, Prentice Hall,1985.

I Sem.	System Design through Verilog Lab	Course Code: V21ESVL01	L	T	P	C
			0	0	4	2

Syllabus Details

COURSE OUTCOMES:

- CO1: Develop the simulation of combinational and sequential circuits using HDL Language.**[K3]**
- CO2: Develop the synthesis of combinational and sequential circuits using HDL Language.**[K3]**
- CO3: Analyze the implemented of digital logics with hardware module kit FPGA **[K4]**

The students are required to design the Verilog codes to perform the following experiments using necessary simulator (Xilinx ISE Simulator) to verify the logic functional operation and to perform the analysis with appropriate synthesizer (Xilinx ISE Synthesizer) and then verify the implemented logic function with hardware kits (FPGA kits).

The students are required to acquire the knowledge in the platform Xilinx by perform at least 10 experiments.

List of Experiments:

1) Logic gates
2) Adder-Subtractor
3) Multiplexer and DE multiplexer
4) Encoder and Decoder
5) ALU
6) Fire detection and control system using Combinational Logic Circuits
7) Flip Flops
8) LFSR
9) Up counter/Down counter
10) Synchronous RAM
11) Pattern detector using Moore/Melay machine
12) Traffic light controller using sequential logic circuit.
13) UART

I Sem.	Embedded Systems Design	Course Code: V21ESVL02	L	T	P	C
			0	0	4	2

	Lab					

Syllabus Details

Course Outcomes:

At the end of the laboratory work, students will be able to:

- **CO1:** Develop applications based on ARM Cortex-M3 processor using Cortex-M3 Development boards on the platform of co-coox and Arduino IDE.-**K3**
- **CO2:** Develop the applications based on DSP C6713 evaluation kits and using Code
Composer Studio (CCS).-**K3**

List of Assignments:
Part A:

Experiments to be carried out on Cortex-M3 development boards and using GNU Tool chain

1. Blink an LED with software delay, delay generated using the SysTick timer.
2. Control intensity of an LED using PWM implemented in software and hardware.
3. Control an LED using switch by polling method, by interrupt method and flash the LED once every five switch presses.
4. UART Echo Test.
5. Take Analog readings on rotation of rotary potentiometer connected to an ADC channel.
6. Temperature indication on an RGB LED.
7. Mimic light intensity sensed by the light sensor by varying the blinking rate of an LED.
8. Evaluate the various sleep modes by putting core in sleep and deep sleep modes.
9. System reset using watchdog timer in case something goes wrong.
10. Sample sound using a microphone and display sound levels on LEDs.

Part B:
Experiments to be carried out on DSP C6713 evaluation kits and using Code Composer Studio (CCS)

1. To develop a C code to compute Euclidian distance between any two Points.
2. To develop a C code for implementation of convolution operation.
3. To develop a C code to compute FFT.
4. To design and implement filters in C to enhance the features of given input sequence/signal.

Lab Requirements:

1. Coo-coX Software PlatForm.
2. Arduino IDE

3. Code Composer Studio(CCS)

Hardware:

1. The Development kits of ARM-Cortex Boards
2. DSP C6713 evaluation kits
3. Sensors for Interfacing
4. Serial cables, Network Cables and Recommended power Supply for the board.

II Semester SYLLABUS

II	Analog and	Course Code: V21ESVT09	L	T	P	C

Sem.	**Digital CMOS VLSI Design**		**3**	**0**	**0**	**3**

<u>Syllabus Details</u>

Course Outcomes:
At the end of the laboratory work, students will be able to:

CO1: Describe the concept of MOS structure and physical design of CMOS **(K2)**

CO2: Design the CMOS Inverters and various CMOS combinational logic circuits **(K4)**

CO3: Design the CMOS different Sequential logic circuits **(K4)**

CO4: Describe the concept of modelling of MOS and Analog CMOS Sub-Circuits **(K2)**

CO5: Describe the CMOS Op-Amps & it's Applications. **(K2)**

UNIT-I: **Review of MOS structures and Physical design flow:**
Basic MOS structure and its static behaviour, Quality metrics of a digital design: Cost,Functionality, Robustness, Power, and Delay, Stick diagram and Layout, Wire delay models.Physical design flow: Floor planning, Placement, Routing, CTS, Power analysis and IR drop estimation-static and dynamic.

UNIT-II CMOS INVERTER AND COMBINATIONAL LOGIC:
Inverter: Static CMOS inverter, Switching threshold and noise margin concepts and theirEvaluation, Dynamic behaviour, Power consumption. Combinational logic: Static CMOSdesign, Logic effort, Rationed logic, Pass transistor logic, Dynamic logic, Speed and powerdissipation in dynamic logic, Cascading dynamic gates, CMOS transmission gate logic.

UNIT-III SEQUENTIAL LOGIC:
Static latches and registers, Bi-stability principle, MUX based latches, Static SR flip-flops, Master-slave edge-triggered register, Dynamic latches and registers, Concept of pipelining, Pulse registers, and Non-bistable sequential circuit.

UNIT -IV CMOS MODELING AND ANALOG SUB- CIRCUITS
CMOS Device Modelling - Simple MOS Large-Signal Model, Other Model Parameters,Small-Signal Model for the MOS Transistor, Sub-threshold MOS Model. MOS Switch, MOSDiode, MOS Active Resistor, Current Sinks and Sources, Current Mirrors-Cascode currentMirror and Wilson Current Mirror, Current and Voltage References, Band gap Reference.

UNIT-V CMOS AMPLIFIERS:
Inverters- Active load inverter, current source inverter, push-pull inverter, DifferentialAmplifiers- large signal analysis, small signal analysis, Cascode Amplifiers, CurrentAmplifiers, Output Amplifiers, Design of CMOS Op Amps, Compensation of Op Amps,Design of Two-Stage Op Amps, Power- Supply Rejection Ratio of Two-Stage Op Amps,Cascode Op Amps, Characterization of Comparator, Two-Stage comparator design.

			L	T	P	C
II Sem.	**Real Time Operating Systems**	**Course Code: V21ESVT10**	**3**	**0**	**0**	**3**

Syllabus Details

Course Outcomes
Upon the completion of the course student will be able to

- CO1: Illustrate real time programming concepts.
- CO2: Apply RTOS functions to implement embedded applications
- CO3: Understand fundamentals of design consideration for embedded Applications.

UNIT-I
Introduction to Real-Time Operating Systems - Defining an RTOS, The scheduler, Kernel Objects and services, Key characteristics of an RTOS
Task- Defining a Task, Task States and Scheduling, Typical Task Operations, Typical Task Structure, Synchronization, Communication and Concurrency

UNIT-II
Semaphores - Defining Semaphores, Typical Semaphore Operations, Typical Semaphore Use

Message Queues - Defining Message Queues, Message Queue States, Message Queue Content, Message Queue Storage, Typical Message Queue Operations, Typical Message Queue Use, Pipes, Event Registers, Signals and condition Variables

UNIT-III
Exceptions and Interrupts - Exceptions and Interrupts, Applications of Exceptions and Interrupts, Closer look at exceptions and interrupts, processing general Exceptions, Nature of Spurious Interrupts

Timer and Timer Services - Real-Time clocks and System Clocks, Programmable Interval Timers, Timer Interrupt Service Routines.
I/O Subsystems - I/O concepts, I/O subsystems

UNIT-IV
Memory Management - Dynamic Memory Allocation in Embedded Systems, Fixed-Size Memory management in Embedded Systems, Blocking VS. Non-Blocking Memory Functions, Hardware Memory Management Units

Modularizing an application for concurrency- An outside-in approach to decompose
Applications, Guidelines and Recommendations for Identifying Concurrency, Scheduleability Analysis

UNIT-V

Synchronization and Communication - Synchronization, Communication, Resource Synchronization Methods, Critical section, Common practical design patterns, Specific Solution Design Patterns,

Common Design Problems - Resource Classification, Deadlocks, Priority Inversion.

Text Books

1. Qing Li, Caroline Yao (2003), "Real-Time Concepts for Embedded Systems", CMP Books.

Reference Books

1. Albert Cheng, (2002), "Real-Time Systems: Scheduling, Analysis and Verification", WileyInterscience.
2. Hermann Kopetz, (1997), "Real-Time Systems: Design Principles for Distributed EmbeddedApplications", Kluwer.
3. Insup Lee, Joseph Leung, and Sang Son, (2008) "Handbook of Real-Time Systems", Chapman andHall.Krishna and Kang G Shin, (2001), "Real-Time Systems", McGraw Hill.

II Sem.	MEMS Technology and its Applications (Elective-III)	Course Code: V21ESVT11	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcome:
The student will be able to

- CO1: Describe the concepts of MEMS and Microsystems.
- CO2: Describe various possible materials for MEMS based devices.
- CO3: Describe various process steps involved in fabrication of MEMS devices.
- CO4: Describe various micro sensors and micro actuators.
- CO5: Describe various MEMS devices and their applications.

UNIT-I:

MEMS AND MICROSYSTEM
Introduction to MEMS, Microsystems and microelectronics, Multidisciplinary nature of MEMS, Miniaturization and its Benefits, Scaling laws in Miniaturization, MEMS Design Considerations, Advantages of MEMS Technology, Applications of MEMS

UNIT-II:

MATERIALS FOR MEMS
Introduction, Substrates & wafers, Active Substrate Materials, Silicon as a Substrate Material, Silicon Compounds, Piezoelectric Crystals, Polymers, Packaging Materials.

UNIT-III:

MICROFABRICATION
Introduction, Fabrication Process – Wafer processing, Photolithography, Ion implantation, Oxidation, Chemical vapor deposition (CVD), Physical vapor deposition, Deposition by Epitaxy, Etching, Manufacturing Process -Bulk Micromachining, Surface Micromachining and LIGA Process, Packaging technology, System level packaging, single and multichip packaging. Microsystem packaging, interfacingsin Microsystem packaging.

UNIT-IV:

MEMS BASED SENSORS AND ACTUATORS
Introduction, working principles of Microsystem - Micro Sensors, Micro Actuators and MEMS with Micro sensors: Pressure sensors, Temperature sensors, Humidity sensors, Accelerometers, Gyroscopes, Biomedical Sensors, Chemical sensors, MEMS with micro actuators: Microgrippers, Micromotors, Micro gears and Micropumps. Microfluidics.

UNIT-V:

RF MEMS

RF MEMS devices: Switch parameters- Basics of switching - Mechanical Switches- Electronic switches for RF and microwave applications – Approaches for low-actuation-voltage switches, MEMS based Reconfigurable Antennas, Reconfigurable Filters and Phase shifters.

Textbooks:

1. Tai-Ran Hsu, MEMS and Microsystems: Design, Manufacture, and Nanoscale Engineering, 2nd Edition, John Wiley & Sons, Inc., Hoboken, New Jersey, 2008.
2. Gabriel M Rebeiz, "RF MEMS - Theory Design and Technology", John Wiley, 2004
3. Microsystem Design by Stephen D. Senturia, Springer International, Edition,2010.

Reference Books:

1. Marc Madou, ―Fundamentals of Micro Fabrication‖ CRC Press
2. Mohamed Gad-el-Hak, ―The MEMS Handbook‖, CRC Press
3. Julian W.Gardner, Vijay K.Varadan, Osama O. AwadelKarim, "Micro sensors MEMS and Smart Devices", John Wiby& sons Ltd., 2001.
4. Iannacci, J. (2013). *Practical guide to RF-MEMS*. John Wiley & Sons.

II Sem.	Design for Testability (Elective-III)	Course Code: V21ESVT12	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcome:

The students will be able to

CO1: Interpret the concepts of modelling digital circuits and simulation.

CO2: Describe modelling of faults and its testing for SSF.

CO3:Explain various techniques of testing.

UNIT-I: Modeling:

Modeling digital circuits at logic level, register level and structural level. Levels of modeling.

Logic Simulation: Types of simulation, delay models, element evaluation, hazard detection, gate level event driven simulation.

UNIT-II: Fault Modeling:

Logic fault models, fault detection and redundancy, fault equivalence and fault location. Single stuck and multiple stuck – fault models. Fault simulation applications, general techniques for combinational circuits.

UNIT-III: Testing for Single Stuck Faults (SSF):

Automated test pattern generation (ATPG/ATG) for SSFs in combinational and sequential circuits, functional testing with specific fault models. Vector simulation – ATPG vectors, formats, compaction and compression, selecting ATPG tool.

UNIT-IV: Design for Testability:

Testability trade-offs techniques. Scan architectures and testing – controllability and observeability, generic boundary scan, fully integrated scan, storage cells for scan design. Board level and system level DFT approaches. Boundary scans standards. Compression techniques – different techniques, syndrome test and signature analysis.

UNIT-V: Built-in-Self-Test (BIST):

BIST concepts and test pattern generation, specific BIST architectures – CSBL, BEST, RTS, LOCST, STUMPS, CBIST, RTD, SST, CATS, CSTP, BILBO. Brief ideas on some advanced BIST concepts and design for self-test at board level.

Reference Books

1. MironAbramovici, Melvin A.Breur, Arthur D.Friedman, Digital Systems Testing and Testable Design, Jaico Publishing House, 2001.
2. Michael L.Bushnell, VishwaniD.Agrawal, Essentials of Electronic Testing, Springer, 2000.
3. Michael D.Ciletti, Modeling, Synthesis, and Rapid Prototyping with the Verilog HDL. Prentice Hall, 1999.

			L	T	P	C
II Sem.	**Semiconductor Memory Design and Testing (Elective-III)**	**Course Code: V21ESVT13**	**3**	**0**	**0**	**3**

Syllabus Details

Course Outcome:

The students will be able to

CO1: Describe concepts of volatile and non-volatile memory technologies.

CO2: Discuss the fault modeling and testing memory devices.

CO3: Explain the reliability and radiation effects of memory devices.

CO4: Describe the advanced memory technologies.

UNIT-I: Random Access Memory Technologies

SRAM – SRAM Cell structures, MOS SRAM Architecture, MOS SRAM cell and peripheral circuit operation, Bipolar SRAM technologies, SOI technology, Advanced SRAM architectures and technologies, Application specific SRAMs, DRAM – DRAM technology development, CMOS DRAM, DRAM cell theory and advanced cell structures, BICMOS DRAM, soft error failure in DRAM, Advanced DRAM design and architecture, Application specific DRAM.

UNIT-II: Non-volatile Memories

Masked ROMs, High density ROM, PROM, Bipolar ROM, CMOS PROMS, EPROM, Floating gate EPROM cell, One time programmable EPROM, EEPROM, EEPROM technology and architecture, Non-volatile SRAM, Flash Memories (EPROM or EEPROM), advanced Flash memory architecture.

UNIT-III: Memory Fault Modeling Testing and Memory Design for Testability and Fault Tolerance

RAM fault modeling, Electrical testing, Pseudo Random testing, Megabit DRAM Testing, nonvolatile memory modeling and testing, IDDQ fault modeling and testing, Application specific memory testing, RAM fault modeling, BIST techniques for memory.

UNIT-IV: Semiconductor Memory Reliability and Radiation Effects

General reliability issues RAM failure modes and mechanism, Non-volatile memory reliability, reliability modeling and failure rate prediction, Design for Reliability, Reliability Test Structures, Reliability Screening and qualification, Radiation effects, Single Event Phenomenon (SEP), Radiation Hardening techniques, Radiation Hardening Process and Design Issues, Radiation Hardened Memory characteristics, Radiation Hardness Assurance and Testing, Radiation. Dosimetry, Water Level Radiation Testing and Test structures.

UNIT-V: Advanced Memory Technologies and High-density Memory Packing Technologies

Ferroelectric RAMs (FRAMs), GaAs FRAMs, Analog memories, magneto resistive RAMs (MRAMs), Experimental memory devices, Memory Hybrids and MCMs (2D), Memory Stacks and MCMs (3D), Memory MCM testing and reliability issues, Memory cards, High Density Memory Packaging Future Directions.

TEXT BOOKS:

1. Semiconductor Memories Technology – Ashok K. Sharma, 2002, Wiley.
2. Advanced Semiconductor Memories – Architecture, Design and Applications - Ashok
K. Sharma- 2002, Wiley.
3. Modern Semiconductor Devices for Integrated Circuits – Chenming C Hu, 1st Ed,
Prentice Hall.

II Sem.	Hardware Software Co-Design (Elective-IV)	Course Code:V21ESVT14	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcome:

The students will be able to

- CO1: Describe co-design architectures, methods and algorithms.
- CO2: Describe prototyping emulation and target architecture using embedded Systems.
- CO3: Explain the compilation techniques.
- CO4: Distinguish the various design specifications and verifications.
- CO5: Describe the system level specifications and design using languages.

UNIT-I: Co- Design Issues:

Co- Design Models, Architectures, Languages, A Generic Co-design Methodology.

Co- Synthesis Algorithms Hardware software synthesis algorithms: hardware – software partitioning distributed system co-synthesis.

UNIT-II:

Prototyping and Emulation Prototyping and emulation techniques, prototyping and emulation environments, future developments in emulation and prototyping architecture specialization techniques, system communication infrastructure

Target Architectures Architecture Specialization techniques, System Communication infrastructure, target Architecture and Application System classes, Architecture for control dominated systems (8051-Architectures for High performance control), Architecture for Data dominated systems (ADSP21060, TMS320C60) and Mixed Systems.

UNIT-III:

Compilation Techniques and Tools for Embedded Processor Architectures Modern embedded architectures, embedded software development needs, compilation technologies and practical consideration in a compiler development environment.

UNIT-IV:

Design Specification and Verification Design, co-design, the co-design computational model, concurrency coordinating con current computations, interfacing components, design verification, implementation verification, verification tools, interface verification.

UNIT-V:

Languages for System-Level Specification and Design-I System-level specification, design representation for system level synthesis, system level specification languages.

Languages for System-Level Specification and Design-II

Heterogeneous specifications and multi-language co-simulation, the cosyma system and lycos system.

TEXT BOOKS:

1. Hardware / Software Co- Design Principles and Practice – JorgenStaunstrup, Wayne Wolf – 2009, Springer.
2. Hardware / Software Co- Design - Giovanni De Micheli, MariagiovannaSami, 2002, Kluwer Academic Publishers.

REFERENCE BOOKS:

1. A Practical Introduction to Hardware/Software Co-design -Patrick R.Schaumont - 2010 – Springer Publications.

II Sem.	Embedded Computing (Elective-IV)	Course Code:V21ESVT15	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcome:
The students will be able to

- CO1: Understand the concepts of Linux OS programming –**[K2]**
- CO2: Describe the different software development tools **[K2]**
- CO3: Explain different interfacing modules – **[K2]**
- CO4: Discuss the networking basics –**[K2]**
- CO5: Explain the basic concepts of LPC17xx Microcontroller –**[K2]**

UNIT-I
Programming on Linux Platform:
System Calls, Scheduling, Memory Allocation, Timers, Basics of Embedded Linux, Root File System, Busy Box.
UNIT-II
Introduction to Software Development Tools
GNU GCC,make, gdb, static and dynamic linking, C libraries, compiler options, code optimization switches.
UNIT-III
Interfacing Modules
Sensor and actuator interface, data transfer and control, GSM module interfacing with data processing and display.
UNIT-IV
Networking Basics
Sockets, ports, UDP, TCP/IP, client server model, socket programming.
UNIT-V
LPC 17xx microcontroller- Internal memory, GPIOs, Timers, ADC, UART and other serial interfaces, PWM, RTC, WDT.

TEXT BOOKS:

1. Modern Embedded Computing - Peter Barry and Patrick Crowley, 1st Ed., Elsevier/Morgan Kaufmann, 2012.
2. Linux Application Development - Michael K. Johnson, Erik W. Troan, Adission Wesley, 1998.
3. Assembly Language for x86 Processors by Kip R. Irvine

REFERENCE BOOKS:

1. Operating System Concepts by Abraham Silberschatz, Peter B. Galvin and Greg Gagne.
2. Technical references and user manuals on www.arm.com.
3. The Design of the UNIX Operating System by Maurice J. Bach Prentice-Hall
4. UNIX Network Programming by W. Richard Stevens.

5.

II Sem.	Communication Buses and Interfaces (Elective-IV)	Course Code: V21ESVT16	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes:
At the end of the course, students will be able to:

- CO1: Select a particular serial bus suitable for a particular application.
- CO2: Develop APIs for configuration, reading and writing data onto serial bus.
- CO3: Design and develop peripherals that can be interfaced to desired serial bus.

UNIT-I
Serial Busses- Cables, Serial busses, serial versus parallel, Data and Control Signal-data frame, data rate, features Limitations and applications of RS232, RS485, I2C , SPI

UNIT-II: CAN
ARCHITECTURE- ISO 11898-2, ISO 11898-3, Data Transmission- ID allocation, Bit timing, Layers- Application layers, Object layer, Transfer layer, Physical layer, Frame formats- Data frame, Remote frame, Error frame, Over load frame, Ack slot, Inter frame spacing, Bit spacing, Applications.

UNIT-III: PCIe
Revision, Configuration space- configuration mechanism, Standardized registers, Bus enumeration, Hardware and Software implementation, Hardware protocols, Applications.

UNIT-IV: USB
Transfer Types- Control transfers, Bulk transfer, Interrupt transfer, isochronous transfer. Enumeration- Device detection, Default state, addressed state, Configured state, enumeration sequencing. Descriptor types and contents- Device descriptor, configuration descriptor, Interface descriptor, Endpoint descriptor, String descriptor.Device driver.

UNIT-V
Data streaming Serial Communication Protocol- Serial Front Panel Data Port(SFPDP) configurations, Flow control, serial FPDP transmission frames, fiber frames and copper cable.

TEXTBOOKS

1. A Comprehensive Guide to controller Area Network – Wilfried Voss, Copperhill Media
Corporation, 2nd Ed., 2005.
2. Serial Port Complete-COM Ports, USB Virtual Com Portsand Ports for Embedded
Systems- JanAxelson, Lakeview Research, 2nd Ed.,

REFERENCES

1. USB Complete – Jan Axelson, Penram Publications.
2. PCI Express Technology – Mike Jackson, Ravi Budruk, Mindshare Press.

II Sem.	Analog and Digital CMOS VLSI Design Lab	Course Code: V21ESVL03	L	T	P	C
			0	0	4	2

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

- CO1 -Analyse the Characteristics of MOS Device **(K3)**
- CO2 -Analyse the basic MOS Amplifiers and current mirrors **(K3)**
- CO3 -Design the various MOS Amplifiers. **(K4)**
- CO4 -Demonstrate various CMOS combinational Digital circuits **(K2)**
- CO5- Demonstrate various CMOS Sequential Digital circuits **(K2)**

The students are required to design and implement the Circuit and Layout of any 10Experiments using CMOS 130nm Technology with Mentor Graphics Tool/Cadence/ Synopsys/Industry Equivalent Standard Software.

List of Experiments:

1. MOS Device Characterization and parametric analysis
2. Common Source Amplifier
3. Common Source Amplifier with source degeneration
5. Simple current mirror
6. Cascade current mirror.
7. Wilson current mirror.
8. Differential Amplifier.
8. Full Adder
9. RS-Latch
10. Clock Divider
11. JK-Flip Flop
12. Synchronous Counter
13. Asynchronous Counter
14. Static RAM Cell

<table>
<tr><td rowspan="2">II Sem.</td><td rowspan="2">Real Time Operating Systems Lab</td><td rowspan="2">Course Code:V21ESVL04</td><td>L</td><td>T</td><td>P</td><td>C</td></tr>
<tr><td>0</td><td>0</td><td>4</td><td>2</td></tr>
</table>

Syllabus Details

- The Students are required to write the programs using C-Language according to the Experimentrequirements using RTOS Library Functions and macros ARM-926 developer kits and ARMCortex.
- The following experiments are required to develop the algorithms, flow diagrams, source codeand perform the compilation, execution and implement the same using necessary hardware kitsfor verification. The programs developed for the implementation should be at the level of anembedded system design.
- The students are required to perform at least SIX experiments from Part-I and TWO experimentsfrom Part-II.

List of Experiments:
Part-I:
Experiments using ARM-926 with PERFECT RTOS

1. Register a new command in CLI.
2. Create a new Task.
3. Interrupt handling.
4. Allocate resource using semaphores.
5. Share resource using MUTEX.
6. Avoid deadlock using BANKER"S algorithm.
7. Synchronize two identical threads using MONITOR.
8. Reader'sWrite's Problem for concurrent Tasks.

Part-II
Experiments on ARM-CORTEX processor using any open source RTOS. (Coo-Cox-Software-Platform)

1. Implement the interfacing of display with the ARM- CORTEX processor.
2. Interface ADC and DAC ports with the Input and Output sensitive devices.
3. Simulate the temperature DATA Logger with the SERIAL communication With PC.
4. Implement the developer board as a modem for data communication using Serial port communication between two PC"s.

Lab Requirements:
Software:

- Eclipse IDE for C and C++ (YAGARTO Eclipse IDE), Perfect RTOS Library, COO-COX Software Platform, YAGARTO TOOLS, and TFTP SERVER.
- LINUX Environment for the compilation using Eclipse IDE & Java with latest

Version.
Hardware:

- The development kits of ARM-926 Developer Kits and ARM-Cortex Boards.
- Serial Cables, Network Cables and recommended power supply for the board.

III Semester SYLLABUS

III Sem.	IoT and its Applications	Course Code: V21ESVT17	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcome: The student will be able to

- CO1: Describe M2M and IOT Technologies. **[K2]**
- CO2: Explain the layers, protocols and communication technologies in IOT. **[K2]**
- CO3: Illustrate various hardware components required for IOT applications**. [K2]**
- CO4: Discuss the cloud technologies and their services. **[K2]**
- CO5: Explain the IoT Applications. **[K2]**

UNIT-I INTRODUCTION [1, 2]
Introduction from M2M to IoT - An Architectural Overview, building architecture, Main design principles and needed capabilities, An IoT architecture outline, M2M and IoT Technology Fundamentals; Sensors, Actuators, RFID, Wireless Sensor Networks, Devices and gateways.

UNIT-II IOT PROTOCOLS & COMMUNICATION TECHNOLOGIES [2, 4]
Functionalityof Layers in IoT, IoT Connectivity – IEEE 802.15.4, Wi-Fi, Bluetooth, Zigbee, LPWAN, 5G.
Study of protocols - 6LoWPAN, CoAP, MQTT.

UNIT-III DESIGN AND DEVELOPMENT [3, 4]
Design Methodology, Embedded computing logic, IoT system building blocks, Raspberry Pi - Board details, sensor/actuator Interface using Python Programming.

UNIT-IV Cloud Computing [3, 4]
Structured Vs. Unstructured Data and Data in Motion Vs. Data in Rest, Role of Machine Learning; Data Collection, Storage and Computing Using a Cloud Platform for IoT Applications/Services, AWS for IoT – Introduction to Amazon EC2.

UNIT-V IOT APPLICATIONS [2, 3]
CASE STUDIES/INDUSTRIAL APPLICATIONS: Case Studies - Home appliances, Smart and Connected Cities, Public Safety, Agriculture, Introduction to Industry 4.0.

TEXTBOOKS:

1. Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, StamatisKarnouskos, David Boyle, “From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence”, 1st Edition, Academic Press, 2014.
2. IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet Of Things, David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry and Cisco Press 800 East 96th Street Indianapolis, Indiana 46240 USA
3. Daniel Minoli, “Building the Internet of Things with IPv6 and MIPv6: The Evolving World Of M2M Communications”, ISBN: 978-1-118- 47347-4, Willy Publications
4. IOT (Internet of Things) Programming: A Simple and Fast Way of Learning IOT by David Etter(Author)
5. Internet of Things - By Raj Kamal, McGraw-Hill Education. Copyright.

REFERENCE BOOKS:

1. From Internet of Things to Smart Cities: Enabling Technologies - edited by Hongjian
Sun, Chao Wang, Bashar I. Ahmad, CRC Press -2018.
2. Peter Waher, “Learning Internet of Things”, PACKT publishing, BIRMINGHAM
3. Bernd Scholz-Reiter, Florian Michahelles, “Architecting the Internet of Things”, ISBN
978-3-642-19156-5 e-ISBN 978-3-642-19157-2, Springer
4. Vijay Madisetti and ArshdeepBahga, “Internet of Things (A Hands-on-Approach)”, 1st
Edition, VPT, 2014.

III Sem.	Low Power VLSI Design	Course Code: V21ESVT18	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcome:

The students will be able to

- CO1: Identify various sources of power consumption
- CO2: Estimate the power consumption sing simulation and probabilistic

Approaches.

- CO3: Discuss low power design at various levels of abstraction.
- CO4: Discuss clock distribution for low power dissipation.

UNIT-I: Introduction

Need for low power VLSI chips, Sources of power dissipation. Emerging Low power approaches. Dynamic dissipation in CMOS, Transistor sizing & gate oxide thickness, Impact of technology Scaling, Technology & Device innovation.

UNIT-II: Power estimation Simulation Power analysis:

SPICE circuit simulators, gate level logic simulation, capacitive power estimation, static state power, gate level capacitance estimation, architecture level analysis, data correlation analysis in DSP systems. Monte Carlo simulation.

Probabilistic power analysis:

Random logic signals, probability & frequency, probabilistic power analysis techniques, signal entropy.

UNIT-III: Low Power Design Circuit level:

Power consumption in circuits. Flip Flops & Latches design, high capacitance nodes, low power digital cells library

Logic level:

Gate reorganization, signal gating, logic encoding, state machine encoding, pre-computation logic

UNIT-IV: Low power Architecture & Systems:

Power & performance management, switching activity reduction, parallel architecture with voltage reduction, flow graph transformation, low power arithmetic components, low power memory design.

UNIT-V: Low power Clock Distribution:

Power dissipation in clock distribution, single driver vs. distributed buffers, Zero skew vs. tolerable skew, chip & package co design of clock network

Algorithm &architectural level methodologies: Introduction, design flow, Algorithmic level analysis & optimization, Architectural level estimation & synthesis.

TEXTBOOKS:

1. Gary K. Yeap, "Practical Low Power Digital VLSI Design", KAP, 2002
2. Rabaey, Pedram, "Low power design methodologies" Kluwer Academic, 1997

REFERENCES BOOKS:

1. Kaushik Roy, Sharat Prasad, "Low-Power CMOS VLSI Circuit Design" Wiley, 2000

Annexure-VII

SRI VASAVI ENGINEERING COLLEGE (AUTONOMOUS)

(Sponsored by Sri Vasavi Educational Society)

(Approved by AICTE, New Delhi & Permanently affiliated to JNTUK, Kakinada)

(Accredited by NAAC with 'A' Grade ,Recognized by UGC under section 2(f) & 12(B))

Pedatadepalli, **TADEPALLIGUDEM – 534 101.** W.G.Dist**. (A.P)**

Department of Computer Science & Engineering (Accredited by NBA)

Dt: 03.09.2021

The 5th Meeting of Board of Studies in Department of Computer Science and Engineering is held at 02.00 PM on 02-09-2021 through online mode using,

https://us02web.zoom.us/j/86328881824

The following members attended the meeting:

S.No.	Name of the Member	Designation	Role
1.	Dr. D Jaya Kumari	Professor, HoD-CSE, SVEC	Chairperson
2.	Dr.Krishna Mohan Ankala	Professor, UCEK, Kakinada	University Nominee
3.	Dr. R.B.V. Subramanyam	Professor, Department of CSE, NIT Warangal	Academic Expert
4.	Dr. S Pallam Setty	Professor, Department of CSE, Andhra University, Vishakapatnam	Academic Expert
5.	Sri. Srinivasa Raju Vuppalapati	Senior Consultant, MSR IT Services LLP, Hitech City, Hyderabad.	Industry Expert
6.	Mr.EEdala Rambabu	microfocus, Bangalore	Alumni
7.	Sri Ch. Apparao	Technical Director	Invited Member
8.	Dr. V. Venkateswara Rao	Professor	Member
9.	Dr. G Loshma	Professor	Member
10.	Dr. V S Naresh	Professor	Member
11.	Ch. Raja Ramesh	Associate Professor	Member
12.	Dr.K. ShirinBhanu	Associate Professor	Member
13.	A. Leelavathi	Sr. Assistant Professor	Member
14.	D Anjani Suputhri Devi	Sr. Assistant Professor	Member
15.	R. LeelaPhani Kumar	Assistant Professor	Member

16.	D Sasi Rekha	Assistant Professor	Member
17.	B.SriRamya	Assistant Professor	Member
18.	G.Sriram Ganesh	Assistant Professor	Member
19.	N.V.Murali Krishna Raja	Assistant Professor	Member
20.	N. Hiranmayee	Assistant Professor	Member
21.	A Rajesh	Assistant Professor	Member
22.	Y.DivyaVani	Assistant Professor	Member
23.	K Lakshmi Narayana	Assistant Professor	Member
24.	M NageswaraRao	Assistant Professor	Member
25.	B Kiran Kumar	Assistant Professor	Member
26.	D.S L Manikanteswari	Assistant Professor	Member
27.	P Uma Sankar	Assistant Professor	Member
28.	M V V Krishna	Assistant Professor	Member
29.	M. Anantha Lakshmi	Assistant Professor	Member
30.	K Venkatesh	Assistant Professor	Member
31.	M. Satyanarayana Reddy	Assistant Professor	Member
32.	J.N. Chandra Sekhar	Assistant Professor	Member
33.	David Raju. K	Assistant Professor	Member
34.	P Suneetha	Assistant Professor	Member
35.	M Sree Radha Mangamani	Assistant Professor	Member
36.	Ch Hemanandh	Assistant Professor	Member
37.	M Chilaka Rao	Assistant Professor	Member
38.	G V Lakshmi Narayana	Assistant Professor	Member
39.	A Nageswara Rao	Assistant Professor	Member
40.	A NagaJyothi	Assistant Professor	Member
41.	G Prashanthi	Assistant Professor	Member

The following are the Minutes of the Meeting

Item No.1: Welcome note by the Chairperson BOS.

Chairperson BOS extended a formal welcome and introduced the members.

Item No.2: Progress Report of the Department

Chairperson BOS had given the Brief Progress Report of the Department.

Item No.3: Review of Course Structure for VII and VIII Semesters of B.Tech(CSE) Programme under V18 Regulation.

Reviewed the Course Structure of VII & VIII Semesters of B.Tech (CSE) Programme under V18 Regulation**.** The approved Course Structure is given in **Annexure-CS-I.**

Item No.4: Approval of Syllabi for the Proposed Courses offered in VII and VIII Semesters of B.Tech(CSE) Programme under V18 Regulation.

Approved the Syllabi for the courses offered in VII & VIII semesters of B.Tech(CSE) Programme under V18 Regulation and suggested the following changes:

SEM	Course Code	Suggestions	Inclusions / Modifications
VII	V18CST27	In AJWT Course it was suggested that AngularJS need to be replaced by Angular.	AngularJS concepts modified as Angular.

The Modified and Approved Syllabus is given in **Annexure-CS-II.**

Item No.5: Approval of Course Structure for V to VIII Semesters of B.Tech(CST) Programme under V18 Regulation.

Approved Course Structure for V to VIII Semesters for B.Tech (CST) Programme under V18 Regulation. The approved Course Structure is given in **Annexure-CS-III**.

Item No.6: Approval of Syllabi for Proposed Courses offered in V to VIII Semesters of B.Tech(CST) Programme under V18 Regulation..

Approved the syllabi for the courses offered in V to VIII semesters of B.Tech(CST) Programme under V18 Regulation and suggested the following changes:

SEM	Course Code	Suggestions	Inclusions / Modifications
VII	V18CST27	In AJWT Course it was suggested that AngularJS need to be replaced by Angular.	AngularJS concepts modified as Angular.

The Modified and Approved Syllabus is given in **Annexure-CS-IV.**

Item No.7: Approval of list of Courses offering under Open Elective-II & Open Elective-III in VII and VIII Semesters respectively under V18 Regulation for all other branches and the approval of their Syllabi.

Approved the list of Courses and Syllabi offered under Open Elective-II & Open Elective-III in VII and VIII Semesters respectively under V18 Regulation for all other branches. The approved Courses and Syllabi are given in **Annexure-CS-V.**

Item No.8: Approval of Course Structure for III to VIII Semesters of B.Tech(CSE) and B.Tech(CST) Programme under V20 Regulation.

Reviewed the Course Structure for III to VIII Semesters for B.Tech(CSE) and B.Tech(CST) Programme under V20 Regulation and suggested the following changes:

Suggestions	Inclusions / Modifications
Suggested to include UML Lab in V Semester	Incorporated UML Lab in V Semester and Merged the AI & DM Labs
In Pool of Skill Oriented Courses add Secure DevOps and remove Source Code Management Using Git & Github.	Included Secure DevOps in pool of Skill Oriented Courses.
In Open Elective replace Computer Organization and Architecture course with Some other course.	Replaced the Open Elective Computer Organization and Architecture course with Information Retrieval Systems.

The Modified and Approved Course Structure is given in **Annexure-CS-VI**.

Item No.9: Approval of Syllabi for Proposed Courses offered in III and IV Semesters of B.Tech (CSE) and B.Tech(CST) Programme under V20 Regulation.

Approved the syllabi for the courses offered in III and IV Semesters of B.Tech (CSE) and B.Tech(CST) Programme under V20 Regulation and suggested the following changes:

SEM	Course Code	Suggestions	Inclusions / Modifications
III	V20CSL03	In OOP through C++ Lab add concepts like how to debug and create libraries using GDB	Included GDB Lab Task in OOP through C++ Lab.
IV	V20CST07	In DAA Course add NP Hard & NP Complete Introduction Concepts	IncludedBasicconcepts of NP-Hard and NP-Complete problems in UNIT-V.

The Modified and Approved Syllabus is given in **Annexure-CS-VII**.

Item No.10: Approval of Proposed Courses and Syllabi for other branches under V20 Regulation.

Approved the Proposed Courses and Syllabi for other branches under V20 Regulation. The approved Courses and Syllabi are given in **Annexure-CS-VIII**.

Item No.11: Approval of Course Structure and Syllabi for I to IV Semesters of M.Tech(CS) Programme under V21 Regulation.

Approved the Course Structure and Syllabi for I to IV Semesters of M.Tech(CS) Programme under V21 Regulation and suggested the following changes:

SEM	Course Code	Suggestions	Inclusions / Modifications
I	V21CTT06 **(Program Elective-II)**	**Advanced Databases:** - Add Graph Databases / neo4j : Real Time Case Studies - Add Time series Databases: Real Time Case Studies.	Included, as per the suggestions given by the BOS Members
I	V21CTT07 **(Program Elective-II)**	**Advanced computer networks:** - Add SDN - Software Defined Networks - Real Time Case Study	Included, as per the suggestions given by the BOS Members

The Modified and Approved Course Structure and Syllabus is given in **Annexure-CS-IX.**

Dr.D Jaya Kumari

Chairperson of BOS

Annexure-CS-I

Course Structure of VII & VIII Semesters of B.Tech (CSE)

S.No.	Course Code	Category	Course	L	T	P	C
	VII – Semester						
1	V18CST27	PCC	Advanced Java and Web Technologies	3	0	0	3
2	V18MBET52	HSS	Management Science	3	0	0	3
3	**Elective – III**						
	V18CST28	PEC	1. Advanced Operating Systems	3	0	0	3
	V18CST29		2. Statistics with R Programming				
	V18CST30		3. Information Retrieval Systems				
	V18CST31		4 Human Computer Interaction				
4	**Elective – IV**						
	V18CST32	**PEC**	1.Distributed Systems	3	0	0	3
	V18CST33		2.Scripting Languages				
	V18CST34		3.Deep Learning				
	V18CST35		4.Social Networks and Semantic Web				
5	**Open Elective – II (Interdisciplinary)**	**OEC**	**OPE II(1-3)**	3	0	0	3
6	V18CSL10	PCC	Advanced Java and Web Technologies Lab	0	0	2	1
7	V18CSP01	Project	Project Work (Part-A)	0	0	06	3
Total				**15**	**0**	**08**	19

Total Contact Hours: 23

	VIII – Semester						
S.No.	**Course Code**	**Category**	**Course**	**L**	**T**	**P**	**C**
1	**Elective – V**						
	V18CST36	PEC	1. Software Project Management	3	0	0	3
	V18CST37		2. Big Data Analytics				
	V18CST38		3. Soft Computing				
	V18CST39		4. Cloud Computing				
2	**Elective – VI**			3	0	0	3
	V18CST40	PEC	1. Software Architecture and Design Patterns				
	V18CST41		2. Middleware Technologies				
	V18CST42		3. Natural Language Processing				
	V18CST43		4. Cyber Security				
3	**Open Elective – III** (**Interdisciplinary**)	OEC	**OPE III(1-3)**	3	0	0	3
4	V18CSP02	Project	Project Work (Part-B)	0	0	16	8
Total				**9**	**0**	**16**	**17**

Total Contact Hours: 25

Annexure-CS-II

Syllabus for VII & VIII Semesters of B.Tech (CSE)

VII Sem	**Advanced Java and Web Technologies**	Course Code: VI8CST27	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Illustrate the basic concepts of HTML and CSS (K2)

CO2: Develop dynamic webpages and validate with java Script. (K3)

CO3: Illustrate Extensible markup language (K2)

CO4: Illustrate the basic concepts of NODE JS and Angular. (K2)

CO5: Build database driven web applications using JSP (K3)

CO6: Develop web applications using PHP and MySQL (K3)

UNIT-I :HTML: Basic Syntax, Standard HTML Document Structure, Basic Text Markup, Images, Hypertext Links, Lists, Tables, Frames Forms.CSS: Cascading style sheets, Levels of Style Sheets, Style Specification Formats, Selector Forms.

UNIT-II: JavaScript & DHTML: Overview of JavaScript, General Syntactic Characteristics, Primitives Operations and Expressions, Screen output and Keyboard Input, Control Statements, Object creation and Modification, Arrays, Functions, Constructors, Pattern Matching using Regular Expressions, Events and Event Handling.

UNIT-III: Working with XML: Introduction, The syntax of XML, XML Document Structure, Document Type Definition (DTD), Namespaces, XML schemas, XSLT, XML Parsers - DOM and SAX.

UNIT-IV: Fundamentals of NODE JS and Angular: Understanding Node.js, Installing Node.js, Working with Node Packages, Creating a Node.js Application, Understanding Angular, Modules, Directives, Data Binding, Dependency Injection, Services, Separation of Responsibilities, Creating a Basic Angular Application.

UNIT-V: Introduction to Servlets & JSP: Introduction to servlets, Life cycle of Servlet, Limitations of servlets, Java Server Pages: JSP Overview, Components of a JSP Page: Directives, comments, Expressions, Scriptlets, Declarations, implicit objects, Database Access, session tracking.

UNIT-VI: PHP Programming: Overview of PHP, General syntactic characteristics, Primitives, operations, Expressions, Output, Control statements, Arrays, Functions, Pattern Matching, Form Handling, Cookies, Session Tracking. PHP with MySQL connectivity.

Text Books:

1. Programming the World Wide Web, 7th Edition, Robet W Sebesta, Pearson, 2013.
2. Node.js, MongoDB and Angular Web Development, 2nd Edition,Brad Dayley Brendan Dayley Caleb Dayley,Pearson Education,2018
3. JSP:The Complete reference,Phil Hanna,The McGraw-Hill Copanies,2001

Reference Books:

1. Web Technologies: HTML, JavaScript, PHP, Java, JSP, XML and AJAX, Black book, Dream Tech.
2. An Introduction to Web Design, Programming, Paul S Wang, Sanda S Katila, Cengage Learning

3. Web Technologies, 1st Edition 7th impression, Uttam K Roy, Oxford, 2012.

VII Sem	Advanced Operating Systems (**Elective – III)**	Course Code: VI8CST28	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe Architectures of Distributed Systems and Distributed Mutual Exclusion. **(K2)**
CO2: Illustrate the concepts of Deadlock Handling Strategies in Distributed Systems. **(K3)**
CO3: Explain the various Resource Management Techniques for Distributed Systems. **(K2)**
CO4: Discuss Fault Tolerance and Fault Recovery concepts in Distributed Systems . **(K2)**
CO5: Interpret the concepts of Cryptography and Data Security in Distributed Systems. **(K3)**
CO6: Describe Multiprocessor Operating System, Process Synchronization, Scheduling. **(K2)**

UNIT I: Architectures of Distributed Systems –System Architecture types - issues in distributed operating systems - communication networks - communication primitives. Distributed Mutual Exclusion - introduction - the classification of mutual exclusion and associated algorithms

UNIT II: Distributed Deadlock Detection -Introduction - deadlock handling strategies in distributed systems - issues in deadlock detection and resolution - control organizations for distributed deadlock detection - centralized and distributed deadlock detection algorithms -hierarchical deadlock detection algorithms.

UNIT III: Distributed Resource Management- Algorithms for implementing DSM - memory coherence and protocols - design issues. Distributed Scheduling - introduction - issues in load distributing - components of a load distributing algorithm - stability - load distributing algorithm – performance comparison - selecting a suitable load sharing algorithm - requirements for load distributing.

UNIT IV: Failure Recovery and Fault tolerance: Introduction- basic concepts - classification of failures - backward and forward error recovery, backward error recovery- recovery in concurrent systems - consistent set of check points - synchronous and asynchronous check pointing and recovery - check pointing for distributed database systems- recovery in replicated distributed databases.

UNIT V: Protection and Security - Preliminaries, the access matrix model and its implementations.-safety in matrix model, advanced models of protection. Data security - cryptography: Model of cryptography, conventional cryptography- modern cryptography, multipleencryptions - authentication in distributed systems.

UNIT VI: Multiprocessor Operating Systems - Basic multiprocessor system architectures - inter connection networks for multiprocessor systems .Multiprocessor Operating System - structures of multiprocessor operating system, operating system design issues- threads- process synchronization and scheduling.

Text Books:

1. Advanced Concepts in Operating Systems: Distributed, Database and Multiprocessor Operating Systems, MukeshSinghal, NiranjanG.Shivaratri,TMH, 2001.

2. Distributed Operating System-Concepts and Design,PradeepK.Sinha ,PHI, 2003.

Reference Books:

1. Modern operating system, Andrew S.Tanenbaum, PHI, 2003

2. Distributed operating system,Andrew S.Tanenbaum,Pearson education, 2003.
3. Operating System Concepts, Abraham Silberschatz; Peter Baer Galvin; Greg Gagne, Seventh Edition, John Wiley & Sons, 2004.

VII Sem	Statistics with R Programming (**Elective – III)**	Course Code: VI8CST29	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Illustrate different data structures in R. **(K2)**
CO2: Demonstrate about control statements and functions in R. **(K3)**
CO3: Compute different mathematical operations using R pre defined functions. **(K3)**

CO4: Construct and edit visualizations with R. **(K3)**
CO5: Identify appropriate statistical tests using R. **(K2)**
CO6: Examine linear and non linear models to create testable hypotheses. **(K3)**

UNIT I: Introduction and Data Structures: Introduction, How to install and run R, R Sessions, Functions, Basic Math, constants, Variables, Expressions, Reserved words in R, Arithmetic, and Boolean Operators and values, Data Types, Vectors, Advanced Data Structures: Data Frames, Lists, Matrices, Arrays, Classes.

UNIT II: Control Statements and Functions in R: R Programming Structures, Control Statements, Loops, – Looping Over Nonvector Sets,- If-Else, Default Values for Argument, return values, Deciding Whether to explicitly call return- returning Complex Objects, Functions are Objects, No Pointers in R, Recursion, A Quick sort Implementation- Extended Example: A Binary Search Tree.

UNIT III: Math and Simulation and Input/output in R: Doing Math and Simulation in R, Math Function, Extended Example Calculating Probability Cumulative Sums and Products-Minima and Maxima- Calculus, Functions for Statistical Distribution, Sorting, Linear Algebra, Operations on Vectors and Matrices, Extended Example: Vector cross Product, Set Operations. **Input /output:** Accessing the Keyboard and Monitor, Reading and writing Files

UNIT IV: Graphics: Graphics, Creating Graphs, The Workhorse of R Base Graphics, the plot() Function ,Customizing Graphs, Saving Graphs to Files.

UNIT V: Probability Distributions and Basic Statistics: Probability Distributions, Normal Distribution- Binomial Distribution- Poisson Distributions Other Distribution, Basic Statistics, Correlation and Covariance, T-Tests,-ANOVA.

UNIT VI: Linear Models in R: Linear Models, Simple Linear Regression, -Multiple Regression Generalized Linear Models, Logistic Regression, - Poisson Regression, Nonlinear Models, Splines- Decision- Random Forests.

Text Books:

1. R for Everyone, Lander, Pearson, 2^{nd} edition 2018.
2. The Art of R Programming, Norman Matloff, Cengage Learning, 2^{nd} edition, 2017.

Reference Books:

1. R Cookbook, PaulTeetor, Oreilly, 2^{nd} edition, 2017.
2. R in Action, Rob Kabacoff, Manning, 3^{rd} edition, 2019.

VII Sem	Information Retrieval Systems (**Elective – III)**	Course Code: VI8CST30	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Identify the basic concepts of information retrieval. **(K2)**
CO2: Describe the Capabilities of IRS, cataloging and indexing. **(K2)**
CO3: Explain the data structures and retrieving documents. **(K2)**
CO4: Describe the difficulty of representing and retrieving documents. **(K2)**
CO5: Explain the latest technologies for describing and searching the web. **(K2)**
CO6: Illustrate searching procedure for user-text and Information System Evaluation. **(K2)**

UNIT I: Introduction: Definition, Objectives, Functional Overview, Relationship to DBMS, Digital libraries and Data Warehouses.

UNIT II: Information Retrieval System Capabilities: Search, Browse, Miscellaneous **Cataloging and Indexing:** Objectives, Indexing Process, Automatic Indexing, Information Extraction.

UNIT III: Data Structures: Introduction, Stemming Algorithms, Inverted file structures, N-gram data structure, PAT data structure, Signature file structure, Hypertext data structure.

UNIT IV: Automatic Indexing: Classes of automatic indexing, Statistical indexing, Natural language, Concept indexing, Hypertext linkages. **Document and Term Clustering:** Introduction, Thesaurus generation, Item clustering, Hierarchy of clusters.

UNIT V: User Search Techniques: Search statements and binding, Similarity measures and ranking, Relevance feedback, Selective dissemination of information search, weighted searches of Boolean systems, Searching the Internet and hypertext. **Information Visualization:** Introduction, Cognition and perception, Information visualization technologies.

UNIT VI: Text Search Algorithms: Introduction, Software text search algorithms, Hardware text search systems. **Information System Evaluation:** Introduction, Measures used in system evaluation, Measurement example – TREC results.

Text Books:

1. Information Storage and Retrieval System: Theory and Implementation, Gerald J. Kowalski, Mark T. Maybury, 2nd edition, 2002, Kluwer Academic Press.

Reference Books:

1. Information Retrieval Data Structures and Algorithms, Frakes, W.B., Ricardo Baeza-Yates Prentice Hall.
2. Information Storage & Retrieval by Robert Korfhage – John Wiley & Sons, Wiley computer publisher, 1997.

VII Sem	Human Computer Interaction (**Elective – III)**	Course Code: VI8CST31	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe the principles and characteristics of GUI. **(K2)**
CO2: Recognize how a computer system may be modified to include human diversity. **(K2)**
CO3: Select an effective style for a specific application. **(K2)**
CO4: Discuss Screen Designing mock-ups and carry out user and expert evaluation of interfaces.**(K2)**
CO5: Explain System Menus & Navigation Schemes. **(K2)**
CO6: Discuss Device and Screen based controls. **(K2)**

UNIT I: The User Interface: Introduction, Importance of the User Interface, Importance and benefits of Good Design History of Human Computer Interface. Characteristics of Graphical and Web User Interface: Graphical User Interface, popularity of graphics, concepts of Direct Manipulation, Graphical System advantage and disadvantage, Characteristics of GUI. Web User Interface, popularity of web, Characteristics of Web Interface, Merging of Graphical Business systems& the Web, Principles of User Interface Design.

UNIT II: The User Interface Design Process: Obstacles and Pitfall in the development Process, Usability, The Design Team, Human Interaction with Computers, Important Human Characteristics in Design, Human Consideration in Design, Human Interaction Speeds, Performance versus Preference, Methods for Gaining and Understanding of Users.

UNIT III: Understanding Business Functions: Business Definitions & Requirement analysis, Determining Business Functions, Design standards or Style Guides, System Training and Documentation.

UNIT IV: Principles of Good Screen Design: Human considerations in screen Design, interface design goals, test for a good design, screen meaning and purpose, Technological considerations in Interface Design.

UNIT V: System Menus and Navigation Schemes: Structure, Functions, Context, Formatting, Phrasing and Selecting, Navigating of Menus, Kinds of Graphical Menus Windows Interface: Windows characteristic, Components of Window, Windows Presentation Styles, Types of Windows, Window Management, Websystems

UNIT VI: Device and Screen-Based Control: Device based controls, Operable Controls, Text entry/read-Only Controls, Section Controls, Combining Entry/Selection Controls, Other Operable Controls and Presentation Controls, Selecting proper controls

Text Books:

1. "The Essential Guide to User Interface Design", Wilbert O. Galitz, 2nd edition,2002,Wiley India Edition.
2. Prece, Rogers, "Sharps Interaction Design", Wiley India.
3. "Designing the user interfaces". Ben Shneidermann 3rd Edition, Pearson Education Asia.

.**Reference Books:**

1. "User Interface Design" , SorenLauesen, Pearson Education
2. "Essentials of Interaction Design", Alan Cooper, Robert Riemann, David Cronin, Wiley
3. "HumanComputer Interaction", Alan Dix, Janet Fincay, GreGoryd, Abowd, Russell, Bealg, Pearson Education.

VII Sem	Distributed Systems (**Elective – IV)**	Course Code: VI8CST32	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe distributed system and desired properties of such systems. **(K2)**
CO2: Discuss the theoretical concepts, namely, virtual time and agreement. **(K2)**
CO3: Discuss the basic concepts of distributed systems and Characteristics of IPC protocols. **(K2)**
CO4: Explain the mechanisms such as Remote procedure call (RPC/RMI) and OSS . **(K2)**
CO5: Explain the mechanisms such as file systems and P2P algorithms. **(K2)**
CO6: Discuss the Transactions and Replications in distributed systems. **(K2)**

UNIT I: Characterization of Distributed Systems: Introduction, Examples of Distributed Systems, Resource Sharing and the Web, Challenges. **System Models:** Introduction, Architectural Models- Software Layers, System Architecture, Variations, Interface and Objects, Design Requirements for Distributed Architectures, Fundamental Models- Interaction Model, Failure Model, Security Model.

UNIT II: Time and Global States: Introduction, Clocks Events and Process States, Synchronizing Physical Clocks, Logical Time and Logical Clocks, Global States, Distributed Debugging.

Coordination and Agreement: Introduction, Distributed Mutual Exclusion, Elections, Multicast Communication, Consensus and Related Problems.

UNIT III: Inter process Communication: Introduction, The API for the Internet Protocols- The Characteristics of Inter process communication, Sockets, UDP Datagram Communication, TCP Stream Communication; External Data Representation and Marshalling; Client Server Communication; Group Communication, Case Study: MPI.

UNIT IV:: Remote Invocation: Introduction, Request-reply protocols, Remote Procedure Call, Events and Notifications, **Case Study:** JAVA RMI.. **Operating System Support:** Introduction, The Operating System Layer, Protection, Processes and Threads –Address Space, Creation of a New Process, Threads.

UNIT V: Distributed File Systems: Introduction, File Service Architecture; Peer-to-Peer Systems: Introduction, Napster and its Legacy, Peer-to-Peer Middleware, Routing Overlays. **Case Study1:** Sun Network File system. **Case Study 2:** The Andrew File System.

UNIT VI: Transactions & Replications: Introduction, System Model and Group Communication, Concurrency Control in Distributed Transactions, Distributed Dead Locks, Transaction Recovery; Replication-Introduction, Passive (Primary) Replication, Active Replication.

Text Books:

1. "Distributed Systems- Concepts and Design", George Coulouris, Jean Dollimore, Tim Kindberg, Fourth Edition, Pearson Publication
2. "Distributed Computing, Principles, Algorithms and Systems", Ajay D Kshemkalyani, MukeshSighal, Cambridge.

Reference Books:

1. "Distributed Systems, Principles and Paradigms", Andrew S. Tanenbaum, Maarten Van Steen, 2d Edition, PHl.
2. "Distributed Systems, An Algorithm Approach," Sukumar Ghosh, Chapman & HalyCRC, Taylor & Fransis Group, 2007.

VII Sem	Scripting Languages (**Elective – IV**)	Course Code: VI8CST33	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Illustrate the concepts of scripting languages. **(K2)**

CO2: Develop Scripting for application using Ruby. **(K3)**

CO3: Explain the concepts of Programming in Perl. **(K2)**

CO4: Construct programs using Perl. **(K3)**

CO5: Describe TCL Scripting and their applications. **(K2)**

CO6: Discuss features of Groovy when compare with other Scripting Languages. **(K2)**

UNIT I: Introduction: Ruby, Rails, the structure and Execution of Ruby Programs, Package Management with RUBYGEMS, Ruby and web: Writing CGI scripts, cookies, Choice of Webservers, SOAP and web services. RubyTk – Simple Tk Application, widgets, Binding events, Canvas, scrolling.

UNIT II: Extending Ruby: Ruby Objects in C, the Jukebox extension, Memory allocation, Ruby TypeSystem, Embedding Ruby to Other Languages, Embedding a Ruby Interpreter.

UNIT III: Introduction to PERL and Scripting: Scripts and Programs, Origin of Scripting, Scripting Today, Characteristics of Scripting Languages, Uses for Scripting Languages, Web Scripting, and the universe of Scripting Languages. PERL- Names and Values, Variables, Scalar Expressions, Control Structures, arrays, list, hashes, strings, pattern and regular expressions, subroutines.

UNIT IV: Advanced Perl: Finer points of looping, pack and unpack, file system, eval, data structures, packages, modules, objects, interfacing to the operating system, Creating Internet ware applications, Dirty Hands Internet Programming, security Issues.

UNIT V:TCL: TCL Structure, syntax, Variables and Data in TCL, Control Flow, Data Structures, input/output, procedures, strings, patterns, files, Advance TCL- eval, source, exec and uplevel commands, Name spaces, trapping errors, event driven programs, making applications internet aware, Nuts and Bolts Internet Programming, Security Issues, C Interface.

UNIT VI: Groovy: Features of Groovy, Environment, Basic Syntax, data types, variables, operators, loops, decision making, methods, File i/o, Optionals , numbers, strings, ranges, lists, maps, date and time, Regular expressions, Exception Handling, OO concepts.

Text Books:

1. The World of Scripting Languages, David Barron, Wiley Publications.
2. Ruby Programming language by David Flanagan and Yukihiro Matsumoto O'Reilly.
3. "Programming Ruby" The Prammatic programmers guide by Dabve Thomas Second edition.

Reference Books:

1. Open Source Web Development with LAMP using Linux, Apache, MySQL, Perl and PHP, J.Lee and B.Ware (Addison Wesley) Pearson Education.
2. Perl by Example, E.Quigley, Pearson Education.
3. Programming Perl, Larry Wall T.Christiansen and J.Orwant, O'Reilly, SPD.
4. Tcl and the Tk Toolkit, Ousterhout, Pearson Education.
5. Pearl Power, J.P. Flynt, Cengage Learning.

VII Sem	Deep Learning (**Elective – IV)**	Course Code: VI8CST34	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Explain the basics of machine learning. **(K2)**

CO2: Demonstrate the working of an artificial neural network. **(K2)**

CO3: Identify various parameters and issues while training a deep neural network. **(K2)**

CO4: Explain the working of convolution neural networks. **(K2)**

CO5: Explain the working of recurrent neural networks. **(K2)**

CO6: Recognize the ways of applying deep learning techniques for complex problem-solving. **(K2)**

UNIT I: Machine Learning Basics: Learning Algorithms, Capacity, Overfitting and Underfitting, Hyper parameters and Validation Sets, Estimators, Bias and Variance, Maximum Likelihood Estimation, Bayesian Statistics, Supervised Learning Algorithms, Unsupervised Learning Algorithms, Stochastic Gradient Descent.

UNIT II: Introduction to Neural Networks: The Basic Architecture of Neural Networks- Single Computational Layer: The Perceptron, Multilayer Neural Networks; Training a Neural Network with Backpropagation, Practical Issues in Neural Network Training-The Problem of Overfitting, The Vanishing and Exploding Gradient Problems, Difficulties in Convergence, Local and Spurious Optima;

UNIT III: Training Deep Neural Networks: Introduction, Backpropagation: Backpropagation with the Computational Graph Abstraction, Dynamic Programming to the Rescue, Backpropagation with Post-Activation Variables and Pre-activation Variables, Setup and Initialization Issues, The Vanishing and Exploding Gradient Problems, Parameter-Specific Learning Rates- AdaGrad, RMSProp, AdaDelta, Adam.

UNIT IV: Convolutional Neural Networks: Introduction, The Basic Structure of a Convolutional Network- Padding, Strides, Typical Settings, The ReLU Layer, Pooling, Fully Connected Layers, The Interleaving Between Layers, Local Response Normalization, Hierarchical Feature Engineering; Training a Convolutional Network-Backpropagating Through Convolutions.

UNIT V: Recurrent Neural Networks: Introduction, The Architecture of Recurrent Neural Networks- Language Modeling Example of RNN, Backpropagation Through Time, Bidirectional Recurrent Networks, Multilayer Recurrent Networks; Long Short-Term Memory (LSTM), Gated Recurrent Units (GRUs).

UNIT VI: Applications Deep Learning: Applications of Convolutional Networks: Content-Based Image Retrieval, Object Localization, Object Detection, Natural Language and Sequence Learning; Application of Recurrent Neural Networks: Application to Automatic Image Captioning, Time-Series Forecasting and Prediction, End-to-End Speech Recognition, Handwriting Recognition.

Text Books:

1. Deep Learning, Ian Goodfellow, Ian Goodfellow, and Aaron Courville, MIT Press.
2. Neural Networks and Deep Learning, Charu C. Aggarwal, Springer.

Reference Books:

1. Neural Networks: A Systematic Introduction, Raúl Rojas, Springer.
2. Introduction to Deep Learning, Eugene Charniak, MIT Press.

VII Sem	Social Networks and semantic web (**Elective – IV)**	Course Code: VI8CST35	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Demonstrate knowledge by explaining the three different "named" generations of the web. **(K3)**
CO2: Construct a social network. **(K3)**
CO3: Relate knowledge representation methods for semantic web **(K3)**
CO4: Explain the key aspects of Web Architecture. **(K2)**
CO5: Describe web services and its Applications. **(K2)**
CO6: Develop"Linked Data" Applications using Semantic Web Technologies. **(K3)**

UNIT-I: The Semantic web: Limitations of the current Web, The semantic solution, Development of the Semantic Web, The emergence of the social web.

UNIT-II: Social Network Analysis: What is network analysis? Development of Social Network Analysis, Key concepts and measures in network analysis. Electronic sources for network analysis: Electronic discussion networks, Blogs and online communities, Web-based networks.

UNIT-III: Knowledge Representation on the Semantic Web: Ontologies and their role in the Semantic Web, Ontology languages for the semantic Web.

UNIT-IV: Modeling and Aggregating Social Network Data: State of the art in network data representation, Ontological representation of Social individuals, Ontological representation of social relationships, Aggregating and reasoning with social network data.

UNIT-V: Developing social semantic applications: Building Semantic Web applications with social network features, Flink- the social networks of the Semantic Web community, Open academia: distributed, semantic-based publication management.

UNIT-VI: Evaluation of Web-Based Social Network Extraction: Differences between survey methods and electronic data extraction, context of the empirical study, Data collection, Preparing the data, optimizing goodness of fit, Comparison across methods and networks, Predicting the goodness of fit, Evaluation through analysis.

Text Books:

1. Social Networks and the Semantic Web, PeterMika, Springer,2007.
2. Semantic Web Technologies, Trends and Research in Ontology basedsystems, J.Davies,RudiStuder,PaulWarren,JohnWiley&Sons.

Reference Books:

1. Semantic Web and Semantic Web Services –Liyang Lu Chapman and Hall/CRC Publishers, (Taylor & Francis Group)
2. Information Sharing on the semantic Web – Heiner Stuckenschmidt; Frank Van Harmelen, Springer Publications

VII Sem	Advanced Java and Web Technologies Lab	Course Code: VI8CSL10	L	T	P	C
			0	0	2	1

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Develop static web pages using HTML, CSS. **(K3)**

CO2: Demonstrate the concepts of JavaScript, DHTML & XML **(K3)**

CO3: Develop Web Applications using JSP. **(K3)**

CO4: Develop dynamic Web Applications using PHP & MySQL. **(K3)**

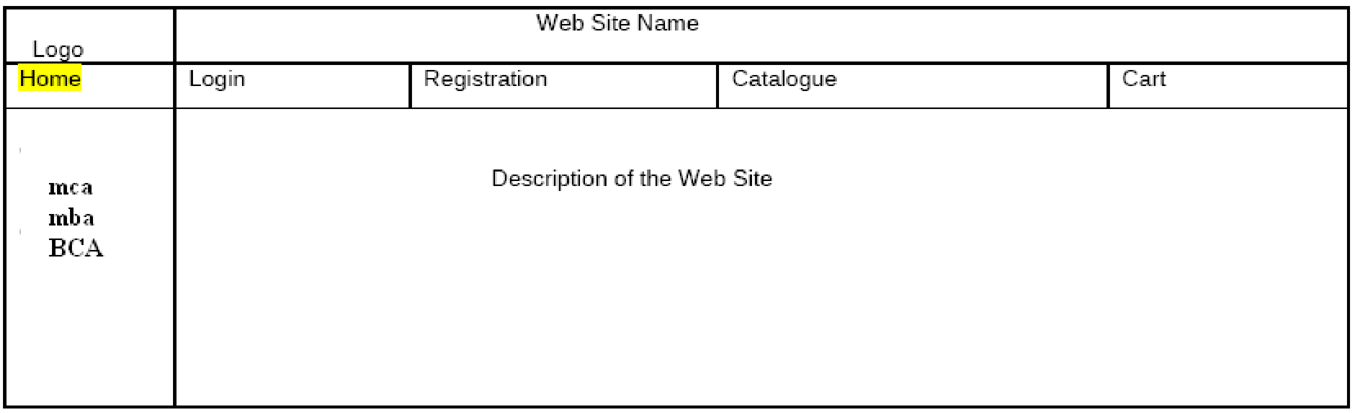
List of Experiments

1) Design the following static web pages required for an online book store web site:

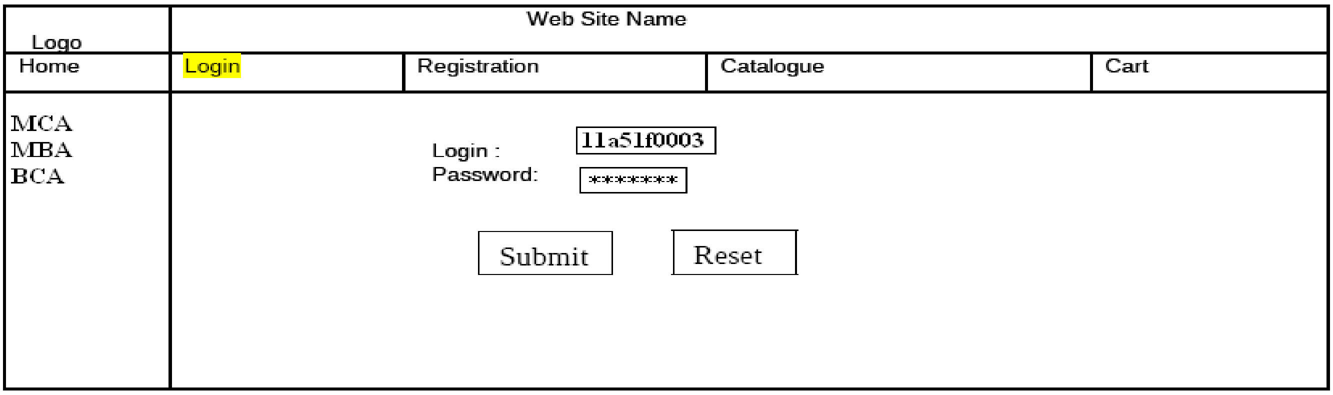
(a) **HOME PAGE:**

The static home page must contain three **frames**.

Top frame: Logo and the college name and links to Home page, Login page, Registration page, Catalogue page and Cart page (the description of these pages will be given below). Left frame: At least four links for navigation, which will display the catalogue of respective links. For e.g.: When you click the link **"MCA"** the catalogue for MCA Books should be displayed in the Right frame. Right frame: The *pages to the links in the left frame must be loaded here*. Initially this page contains description of the web site



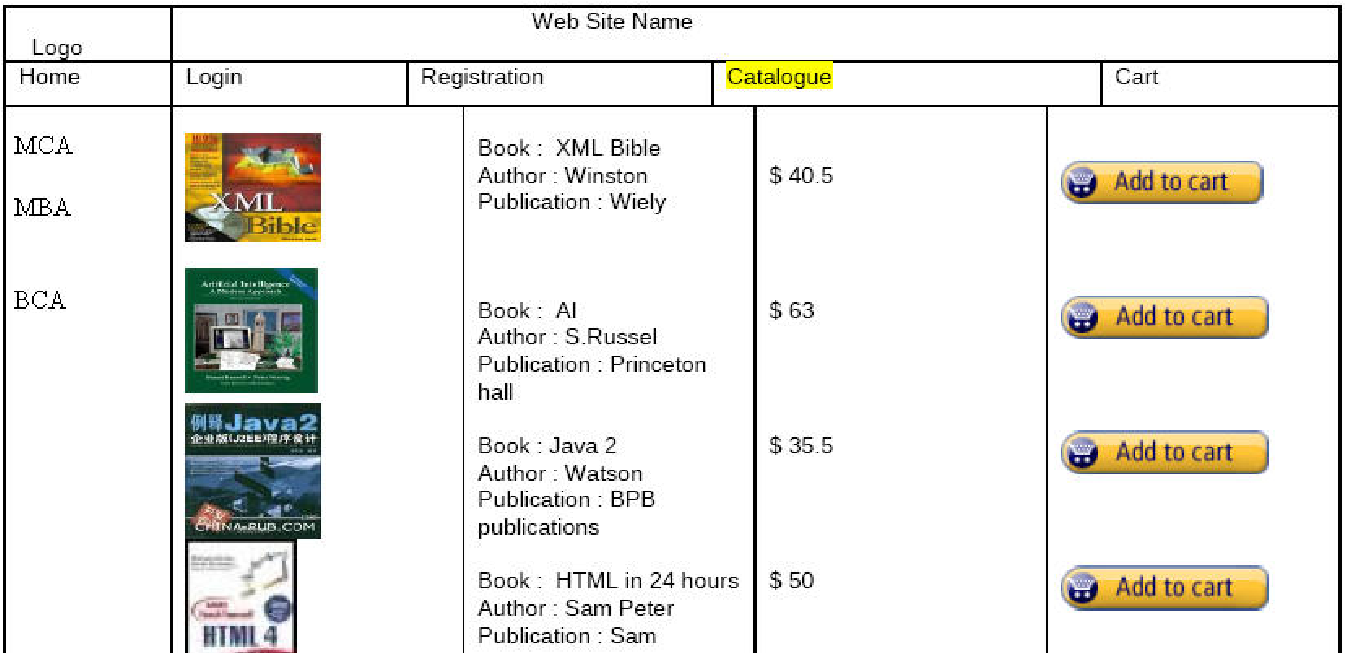
(b) **LOGIN PAGE:**



(c) **CATOLOGUE PAGE:**

The catalogue page should contain the details of all the books available in the web site in a table: The details should contain the following:

1. Snap shot of Cover Page.
2. Author Name.
3. Publisher.
4. Price.
5. Add to cart button.



(d). **REGISTRATION PAGE:**

Create a "*registration form* "with the following fields

1) Name (Text field)

2) Password (password field)

3) E-mail id (text field)

4) Phone number (text field)

5) Sex (radio button)

6) Date of birth (3 select boxes) 7) Languages known (check boxes – English, Telugu, Hindi, Tamil)

2) Design a web page using **CSS (C**ascading **S**tyle **S**heets**)** which includes the following: Use different font, styles:

In the style definition you define how each selector should work (font, color etc.).

3) Design a login page and Make use of Events to perform validation using JavaScript.

4) Demonstrate a JavaScript program to perform On Mouse over event.

5) Demonstrate the concept of Mouse events (Ex:ng-click) with the help of Angular JS.

6) Design a simple Angular JS form.

7) Write an XML file which will display the Book information which includes the following:

1) Title of the book

2) Author Name

3) ISBN number

4) Publisher name

5) Edition

6) Price

a) Write a Document Type Definition (DTD) to validate the above XML file.

b) Write a XML Schema Definition (XSD)

8) Create a simple JSP to print the current Date and Time.

9)Create JSP to insert the details of 3 or 4 users using a registration form store these values in the data base and then check the authentication of the user by entering the name and password using a login form.

10) Assume four users user1, user2, user3 and user4 having the passwords pwd1, pwd2, pwd3 and pwd4 respectively. Write a PHP for doing the following.

A)

1. Create a Cookie and add these four user id's and passwords to this Cookie.

2. Read the user id and passwords entered in the Login form (week1) and authenticate with the values (user id and passwords) available in the cookies.

If he is a valid user (i.e., user-name and password match) you should welcome him by name (user-name) else you should display "You are not an authenticated user ".

B) Use init-parameters to do the same.

11) Create a table which should contain at least the following fields: name, password, email id, phone number (these should hold the data from the registration form).

Write a PHP program to connect to that database and extract data from the tables and display them. Experiment with various SQL queries. Insert the details of the users who register with the web site, whenever a new user clicks the submit button in the registration page.

12) Insert the details of the 3 or 4 users who register with the web site by using registration form. Authenticate the user when he submits the login form using the user name and password from the database.

Reference Books:

1. Web Technologies: HTML, JavaScript, PHP, Java, JSP, XML and AJAX, Black book, Dream Tech.

2. An Introduction to Web Design, Programming, Paul S Wang, Sanda S Katila, Cengage Learning

3. Web Technologies, 1st Edition 7th impression, Uttam K Roy, Oxford, 2012.

VIII Sem	Software Project Management (**Elective – V**)	Course Code: VI8CST36	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe Software Project Management Terminology. **(K2)**
CO2: Explain various Software development process Models and software Life cycle phases. **(K2)**
CO3: Illustrate various Effort Estimation Techniques and activity network models for Software Project Planning. **(K3)**
CO4: Demonstrate Risk Management Concepts and resource allocation. **(K3)**
CO5: Explain the importance of Project monitoring and control for accomplishing project goals. **(K2)**
CO6: Describe Software Quality models. **(K2)**

UNIT I: Introduction to Software Project Management: Software Project versus other types of projects, Activities covered by Software Project Management, Categorizing projects ,Stakeholders, Objectives& goals, what is management. **Project Planning:** Step-wise planning, Identify Project Scope and objectives, Infrastructure, Project Products &deliverables, Project activities, Effort estimation.

UNIT II: Project Approach: Build or buy, **process models**: waterfall model, Prototyping, Incremental delivery model, **Agile methods**: Extreme Programming, Atern method, selecting an appropriate process model. **Lifecycle phases:** Engineering and Production stages, Inception, Elaboration, Construction, Transition phases.

UNIT III: Software effort estimation and Activity planning: Overview of Effort Estimation techniques, Function Point analysis, COCOMO. **Activity planning:** Objectives, Network planning models, forward pass and backward pass, Identify Critical path and activities.

UNIT IV: Risk Management and Resource Allocation: Introduction, Risk and its categories, Identification, Assessment, Risk Planning and management, applying PERT technique. Resource Allocation: Types of Resources, Identifying resource requirements, Resource scheduling.

UNIT V: Project Monitoring and Control: Creating framework for monitoring& control, Collecting Data, Visualizing Progress, Cost monitoring, Earned value Analysis.

UNIT VI: Software Quality: Defining Quality, Importance of quality, ISO 9126, Product Quality Vs Process Quality management. **Process Capability Models:** Capability Maturity Model, Enhancing software Quality.

Text Books:

1. Software Project Management, Bob Hughes & Mike Cotterell, 6th edition, TATA Mcgraw-Hill
2. Software Project Management, Walker Royce 2nd edition, Pearson Education.

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Reference Books:

1. Software Project Management in practice, Pankaj Jalote, 9th edition, Pearson Education.
2. Software Project Management, Joel Henry, 3rd edition, Pearson Education.

VIII Sem	Big Data Analytics (**Elective – V)**	Course Code: VI8CST37	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Discuss the challenges of Big Data using Hadoop. **(K2)**

CO2: Interpret Hadoop's architecture and core components of Hadoop Distributed File System. **(K2)**

CO3: Apply data modelling techniques to large data sets using map reduce programs. **(K3)**

CO4: Describe the Hadoop I/O classes. **(K2)**

CO5: Examine the use of Pig Framework to work with big data. **(K3)**

CO6: Develop a data analytical system using HIVE. **(K3)**

UNIT I: Introduction to Big Data: What is Big Data, Why Big Data is Important, Data Storage and Analysis, Comparison with other systems, Grid Computing. **Introduction to Hadoop:** A brief history of Hadoop, Meet Hadoop Data, Apache Hadoop and the Hadoop Ecosystem.

UNIT II: Working with Big Data & HDFS: Google File System, Hadoop Distributed File System (HDFS) –Building blocks of Hadoop (Namenode, Datanode, Secondary Namenode, JobTracker, and TaskTracker). **Introducing and Configuring Hadoop cluster:** Local distributed mode, Pseudo-distributed mode, Fully Distributed mode, Configuring XML files.

UNIT III: Writing Map Reduce Programs: A Weather Dataset –Data Format, Analyzing Data with UNIX Tools, Analyzing the Data with Hadoop-Map Reduce. **Basic programs of Hadoop Map Reduce:** Driver code,Mapper code, Reducer code, RecordReader, Combiner functions. Map Reduce Types, Input Formatclass Hierarchy, other map reduce examples (word count).

UNIT IV: Hadoop I/O: The Writable Interface, Writable Comparable and Comparators. **Writable Classes:** Writable wrappers for Java primitives, Text & Bytes Writable, NullWritable, ObjectWritable and Generic Writable, Writable collections. **Implementing a Custom Writable:** Implementing a Raw Comparator for speed, Custom comparators

UNIT V: Pig - Hadoop Programming Made Easier: Admiring the Pig Architecture, Going with the Pig Latin Application Flow, Working through the ABCs of Pig Latin, Evaluating Local and Distributed Modes of Running Pig Scripts, Checking out the Pig Script Interfaces, Scripting with Pig Latin.

UNIT VI: Applying Structure to Hadoop Data with Hive: Saying Hello to Hive, Seeing How the Hive is Put Together, Getting Started with Apache Hive, Examining the Hive Clients, Working with Hive Data Types, Creating and Managing Databases and Tables, Seeing How the Hive Data Manipulation Language Works, Querying and Analyzing Data.

Text Books:

1. Hadoop: The Definitive Guide, Tom White, O'Reilly, 3rd Edition, 2012.
2. Hadoop in Action, Chuck Lam, MANNING Publ., 2016.
3. Hadoop for Dummies, Dirk deRoos, Paul C.Zikopoulos, Roman B.Melnyk, Bruce Brown, Rafael Coss, 2014.

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Reference Books:

1. Hadoop in Practice, Alex Holmes, MANNING Publ., 2014.
2. Hadoop Map Reduce Cookbook, Srinath Perera, Thilina Gunarathne, PACKT, 2013.

<table>
<tr><td rowspan="2">VIII Sem</td><td rowspan="2">Soft Computing
(Elective – V)</td><td rowspan="2">Course Code:
VI8CST38</td><td>L</td><td>T</td><td>P</td><td>C</td></tr>
<tr><td>3</td><td>0</td><td>0</td><td>3</td></tr>
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Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Discuss about Soft Computing, Requirements and Applications of Soft Computing. **(K2)**
CO2: Discuss about various Supervised and Unsupervised Learning Networks. **(K2)**
CO3: Illustrate various Fuzzy Logic, Fuzzy Sets, Crisp sets, Fuzzification and De-fuzzification Principles. **(K2)**
CO4: Discuss about Fuzzy Arithmetic and Fuzzy measures. **(K2)**
CO5: Discuss about Genetic Algorithms and its Operators. **(K2)**
CO6: Discuss about Various Hybrid Soft Computing Techniques. (**K2)**

UNIT I: Introduction: What is Soft Computing? Difference between Hard and Soft computing, Requirements of Soft computing, Major Areas of Soft Computing, Applications of Soft Computing.

UNIT II: Associative Memory Networks: (Supervised Learning): Introduction, Training Algorithms for Pattern Association, Auto-associative Memory Network, Hetero-associative Memory Network, Bidirectional Associative Memory (BAM),Hopfield Networks, Iterative Auto-associative Memory Networks, Temporal Associative Memory Network. **Unsupervised Learning Networks:** Introduction, Fixed Weight Competitive Nets, Kohonen Self-Organizing Feature Maps, Learning Vector Quantization, Counter propagation Networks, Adaptive Resonance Theory Network.

UNIT III: Introduction to Fuzzy Logic, Classical Sets and Fuzzy Sets: Introduction to Fuzzy Logic, Classical Sets (Crisp Sets), Fuzzy Sets and Operations on Fuzzy sets-Compliment, Intersections, Unions.

Membership Function: Introduction, Features of the Membership Functions, Fuzzification, Methods of Membership Value Assignments. **Defuzzification:** Introduction, Lambda-Cuts for Fuzzy Sets (Alpha-Cuts), Lambda-Cuts for Fuzzy Relations, Defuzzification Methods

UNIT IV: Fuzzy Arithmetic and Fuzzy Measures: Introduction, Fuzzy Arithmetic, Extension Principle, Fuzzy Measures, Measures of Fuzziness, Fuzzy Integrals.

UNIT V: Genetic Algorithm: Introduction to genetic algorithm, operators in genetic algorithm, stopping condition for genetic algorithm flow.

UNIT VI: Hybrid Soft Computing Techniques: Introduction, Neuro-Fuzzy Hybrid Systems, Genetic Neuro-Hybrid Systems.

Text Books:

1. Principles of Soft Computing, S.N. Sivanandam and S.N. Deepa, 3-edition, Wiley India, 2007.
2. "Fuzzy Sets & Fuzzy Logic", G.J. Klir & B. Yuan, PHI, 1995.
3. "An Introduction to Genetic Algorithm", Melanie Mitchell, PHI, 1998.

Reference Books:

1. Neural Networks, Fuzzy Logic and Genetic Algorithms, S. Rajasekaran and G.A.V.Pai, PHI, 2003.

2. Fuzzy Logic with Engineering Applications, Timothy J.Ross, McGraw-Hill, 1997.

3. Neuro-Fuzzy and Soft Computing, J.S.R.Jang, C.T.Sun and E.Mizutani, PHI, 2004, Pearson Education.

VIII Sem	Cloud Computing (**Elective – V**)	Course Code: VI8CST39	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Outline the concepts of cloud computing architecture. **(K2)**
CO2: Describe the Virtualization concepts in different scenarios. **(K2)**
CO3: Explain the best policies for cloud deployment. **(K2)**
CO4: Illustrate the design issues of Cloud computing. **(K2)**
CO5: Illustrate the security and privacy of the data in cloud computing. **(K2)**
CO6: Demonstrate cloud instances in Amazon Web Services. **(K3)**

UNIT I: Introduction to Cloud Computing: Trends in Computing - Distributed Computing, Grid Computing, Cluster Computing, Utility Computing, Cloud Computing, Definition of Cloud Computing, Characteristics, Service Models, Deployment Models, Cloud Service Models Providers, Advantages and Disadvantages of Cloud Computing, Cloud-based Services &Applications.

UNIT II: Cloud Concepts & Technologies: Virtualization and its types, Software Defined Networking, Network Function Virtualization (NFV). **Cloud Services:** Compute Services, Storage Services, Database Services, Application Services

UNIT III: Cloud Application Design: Design Considerations for Cloud Applications, Reference Architectures for Cloud Applications, Cloud Application Design Methodologies: SOA, Cloud Component Model and MVC, Data Storage Approaches.

UNIT IV: Cloud Security: Cloud Security Architecture (CSA), Authentication, Authorization, Identity & Access Management, Data Security, Key Management.

UNIT V: Migrating into a Cloud: Broad Approaches to Migrating into the Cloud, The Seven-Step Model of Migration into a Cloud, Migration Risks and mitigation, Phases of Migrating to Cloud, benefits and risks of Migrating to Cloud.

UNIT VI: SLA Management in Cloud Computing: Service Level Agreements (SLA), Considerations for SLA, SLA Requirements, Types of SLA, Life Cycle of SLA, SLA Management in Cloud. **Case Study:** Amazon AWS: EC2, Amazon Simple DB, Amazon S3, Amazon Cloud Front and Amazon SQS.

Text Books:

1. Cloud Computing: A Hands-on Approach, ArshdeepBahga, Vijay Madisetti,Universities Press.
2. Cloud Computing: Principles and Paradigms, Rajkumar Buyya, James Broberg, Andrzej Goscinski, Wiley Publication.

Reference Books:

1. Cloud Computing – Web-Based Applications That Change the way you Work and Collaborate Online, Michael Miller, Pearson Education.
2. Cloud Computing: A Practical Approach, Anthony T. Velte, Toby J. Velte, Robert Elsenpeter, McGraw-Hill, (2010).

VIII Sem	Software Architecture & Design Patterns (**Elective – VI)**	Course Code: VI8CST40	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe Architectural Structures and Quality Attributes. (K2)

CO2: Explain the mechanism of Evaluating Architecture. (K2)

CO3: Demonstrate Creational Patterns. (K3)

CO4: Construct Structural Patterns for a given Scenario. (K3)
CO5. Construct Behavioural Patterns for a given Scenario. (K3)
CO6. Examine various Case Studies in utilizing Software Architectures. (K3)

UNIT-I: Envisioning Architecture The Architecture Business Cycle, What is Software Architecture, Architectural patterns, reference models, reference architectures, architectural structures and views. Creating and Architecture Quality Attributes, Achieving qualities, Designing the Architecture.

UNIT-II: Analyzing Architectures Architecture Evaluation, Architecture design decision making, ATAM, CBAM. Software Product Lines, Software architecture in future.

UNIT-III: Pattern Description, role in solving design problems, Selection and usage.**Creational Patterns**: Abstract factory, Builder, Factory method, Prototype, Singleton.

UNIT-IV: Structural Patterns: Adapter, Bridge, Composite, Decorator, Façade, Flyweight, PROXY.

UNIT-V: Behavioural Patterns: Chain of responsibility, command, Interpreter, iterator, mediator, memento, observer, state, strategy, template method, visitor.

UNIT-VI: Case Studies **A-7E – A case study** in utilizing architectural structures, The **World Wide Web** - a case study in Interoperability, **Air Traffic Control** – a case study in designing for high availability, **Celsius Tech** – a case study in product line development.

Text Books:

1. Software Architecture in Practice, second edition, Len Bass, Paul Clements & Rick Kazman, Pearson Education, 2003.

2. Design Patterns, Erich Gamma, Pearson Education, 1995.

Reference Books:

1. Beyond Software architecture, Luke Hohmann, Addison wesley, 2003.

2. Software architecture, David M. Dikel, David Kane and James R. Wilson, Prentice Hall PTR, 2001

3. Software Design, David Budgen, second edition, Pearson education, 2003

4. Head First Design patterns, Eric Freeman & Elisabeth Freeman, O'REILLY, 2007.

5. Design Patterns in Java, Steven John Metsker & William C. Wake, Pearson education, 2006.

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VIII Sem	Middleware Technologies (**Elective – VI)**	Course Code: VI8CST41	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Illustrate Middleware, E- Business, IT architecture, RPC, RDC. **(K2)**
CO2: Demonstrate Internet Applications and Web services. **(K2)**
CO3: Summarize Technical issues in Middleware. **(K2)**
CO4: Demonstrate the Use of Middleware in Building Distributed Technologies. **(K2)**
CO5: Identify Security Issues with Distributed Applications. **(K3)**
CO6: Apply Appropriate Middleware Technology to Develop Real Time Applications. **(K3)**

UNIT I: Introduction: Moving to e-business, what is IT architecture? Why is this different from what we did before? Rewrite or evolve?, Who develops the architecture?, Early days, Preliminaries, Remote procedure calls, Remote database access, Distributed transaction processing, Message queuing, Message queuing versus distributed transaction processing, what happened to all this technology.

UNIT II: Objects, Components and the Web: Using object middleware, Transactional component middleware- COM+, EJB, Final comments on TCM, Internet Applications. WEB SERVICES: Service concepts, Web services, and Using Web services: A pragmatic approach.

UNIT III: A Technical Summary Of Middleware: Middleware elements- The communications link, The middleware protocol, The programmatic interface, Data presentation, Server control, Naming and directory services, Security, System management, Comments on Web services, Vendor architectures- Vendor platform architectures, Vendor-distributed architectures, Using vendor architectures, Positioning, Strawman for user target architecture, Marketing, Implicit architectures, Middleware interoperability.

UNIT IV: Using Middleware to Build Distributed Applications: What is middleware for? -Support for business processes, Information retrieval, Collaboration, Tiers- The presentation tier, The processing tier, The data tier, Services versus tiers, Architectural choices - Middleware bus architectures, Hub architectures, Web services architectures, Loosely coupled versus tightly coupled.

UNIT V: Security: What security is needed, Traditional distributed system security, Web services security, Architecture and security. **Application Design and It's Architecture :** Problems with today's design approaches, Design up front or as needed?- The role of business rules, Existing systems, Reuse, Silo and monolithic development, The role of architecture, Levels of design, Reconciling design approaches.

UNIT VI: Building an IT Architecture: Case Studies – Providing an integration infrastructure, creating a service-oriented architecture, Developing a new application. What does the future hold? , The key points to remember-Middleware technology alternatives, IT architecture guideline guidelines, Distribute systems technology principals and Distribute systems implementation design.

Text Books:

1. IT Architectures and Middleware: Strategies for Building Large, Integrated Systems, Chris Britton and Peter Eye, 2nd Edition, Pearson Education.

Reference Books:

1. Middleware for Communications, Qusay H. Mahmoud,1st Edition, John Wiley and Sons.
2. Middleware Networks: Concept, Design and Deployment of Internet Infrastructure, Michah Lerner, 1st Edition, Kluwer Academic Publishers.
3. Middleware and Enterprise Integration Technologies, G. Sudha Sadasivam and Radha Shankarmani, 1st edition, Wiley, 2009.

VIII Sem	Natural Language Processing (**Elective – VI)**	Course Code: VI8CST42	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Illustrate the Syntax and semantics and Language models of Natural Language Processors. **(K2)**
CO2: Classify Morphology and Finite State Transducers, Markov Models and Entropy Models. **(K2)**
CO3: Explain about Statistical parsing and probabilistic CFGs. **(K2)**
CO4: Demonstrate semantic analysis. **(K2)**
CO5: Explain Discourse Analysis and Lexical Resources. **(K2)**
CO6: DevelopaStatisticalMethodsforRealWorldApplicationsandexploredeeplearning-basedNLP. **(K3)**

UNIT I: Introduction: Natural Language Processing tasks in syntax,semantics,andpragmatics–Issues–Applications-Theroleofmachinelearning-ProbabilityBasics–Informationtheory–Collocations-N-gram Language Models - Estimating parameters and smoothing - Evaluating language models.

UNIT II: Morphology And Part Of Speech Tagging: Linguistic essentials - Lexical syntax- Morphology and Finite State Transducers - Part of speech Tagging - Rule-Based Part of Speech Tagging - Markov Models - Hidden Markov Models – Transformation based Models - Maximum Entropy Models. Conditional Random Fields.

UNIT III: Syntax Parsing: Syntax Parsing - Grammar formalisms and tree banks - Parsing with Context Free Grammars- Features and Unification-Statistical parsing and probabilisticCFGs(PCFGs)-LexicalizedPCFGs.

UNIT IV: Semantic Analysis: Representing Meaning – Semantic Analysis - Lexical semantics –Word-sense disambiguation- Supervised – Dictionary based and Unsupervised Approaches - Compositional semantics- Semantic Role Labeling and Semantic Parsing – Discourse Analysis.

UNIT V: Discourse Analysis and Lexical Resources: Discourse segmentation, Coherence – Reference Phenomena, Anaphora Resolution using Hobbs and Centering Algorithm – Coreference Resolution – Resources: Porter Stemmer, Lemmatizer, Penn Treebank, Brills Tagger, WordNet, PropBank, FrameNet, Brown Corpus, British National Corpus (BNC).

UNIT VI: NLP Applications: Named entity recognition and relation extraction- IE using sequence labeling-Machine Translation (MT) - Basic issues in MT-Statistical translation-word alignment- phrase-based translation – Question Answering.

Text Books:

1. Daniel Jurafsky and James H. Martin Speech and Language Processing (2nd Edition), Prentice Hall; 2nd edition,2008
2. FoundationsofStatisticalNaturalLanguageProcessingbyChristopherD.Manningand Hinrich Schuetze, MIT Press,1999
3. Steven Bird, Ewan Klein and Edward Loper Natural Language Processing with Python, O'Reilly Media; 1 edition,2009
4. Roland R. Hausser, Foundations of Computational Linguistics: Human-Computer Communication in Natural Language, Paperback, MIT Press,2011

References:

1. Pierre M. Nugues, An Introduction to Language Processing with Perl and Prolog: An Outline of Theories, Implementation, and Application with Special Consideration of English, French, and German (Cognitive Technologies) Softcover reprint,2010
2. James Allen, Natural Language Understanding, Addison Wesley; 2 edition 1994
   NLTK – Natural Language Tool Kit -http://www.nltk.org/

VIII Sem	Cyber Security (**Elective – VI)**	Course Code: VI8CST43	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe about Cybercrimes. **(K2)**
CO2: Explain Cyber criminals and their attacks. **(K2)**
CO3: Illustrate Cybercrimes and security in mobile devices **(K2)**
CO4: Discuss about the Tools and methods used to overcome Cybercrimes. **(K2)**
CO5: Discuss about Cyber Laws and IT Acts. **(K2)**
CO6: Explain about Computer Forensics. **(K2)**

UNIT I: Introduction to Cybercrime: Introduction, Cybercrime: Definition and Origins of the Word, Cybercrime and Information Security Who are Cybercriminals? , Classifications of Cybercrimes, Cybercrime: The Legal Perspectives, Cybercrimes: An Indian Perspective, Cybercrime and the Indian ITA 2000, A Global Perspective on Cybercrimes, Cybercrime Era: Survival Mantra for the Netizens.

UNIT II: Cyber offenses: How Criminals Plan Them –Introduction, How Criminals Plan the Attacks, Social Engineering, Cyber stalking, Cyber cafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector Cloud Computing.

UNIT III: Cybercrime Mobile and Wireless Devices: Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit Card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication Service Security, Attacks on Mobile/CellPhones, Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile, Organizational Security Policies and Measures in Mobile Computing Era, Laptops.

UNIT IV: Tools and Methods Used in Cybercrime: Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Key loggers and Spywares, Virus and Worms, Trojan Horses and Backdoors, Steganography, DoS and DDoS Attacks, SQL Injection, Buffer Overflow, Attacks on Wireless Networks. **Phishing and Identity Theft:** Introduction, Phishing, Identity Theft (ID Theft).

UNIT V: Cybercrimes and Cyber security: The Legal Perspectives, Introduction, Why Do We Need Cyber laws: The Indian Context, The Indian IT Act, Challenges to Indian

Law and Cybercrime Scenario in India, Consequences of Not Addressing the Weakness in Information Technology Act, Digital Signatures and the Indian IT Act, Amendments to the Indian IT Act,· Cybercrime and Punishment.

UNIT VI: Understanding Computer Forensics: Introduction, Historical Background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber forensics and Digital Evidence, Forensics Analysis of E-Mail, Digital Forensics Life Cycle, Chain of Custody Concept, Network Forensics, Approaching a Computer Forensics Investigation, Computer Forensics and Steganography, Relevance of the OSI 7 Layer Model to Computer Forensics, Forensics and Social Networking Sites: The Security/Privacy Threats, Computer Forensics from Compliance Perspective, Challenges in Computer Forensics, Special Tools and Techniques, Forensics Auditing, Anti-forensics.

Text Books:

1. Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, NinaGodbole, SunitBelapure, 1st edition, Wiley.

Reference Books:

1. Principles of Information Security, MichealE.Whitman and Herbert J.Mattord, 4th edition, Cengage Learning.
2. Information Security the complete reference, Mark Rhodes, Ousley, 2nd edition, MGH.

Annexure-CS-III

Course Structure for V to VIII semesters of B.Tech (CST)

V – Semester							
S.No	**Course Code**		**Course**	**L**	**T**	**P**	**C**
1	V18CST10	PCC	Database Management Systems	3	0	0	3
2	V18CST11	PCC	Computer Networks	3	0	0	3
3	V18CST12	PCC	Operating Systems	3	0	0	3
4	V18CST13	PCC	Design and Analysis of Algorithms	3	0	0	3
5	V18CST14	PCC	Unix Programming	3	0	0	3
6	**Elective – I**						
	V18CST15	PEC	1.Advanced Computer Architecture	3	0	0	3
	V18CST16		**2**.Advanced Data Structures				
	V18CST17		3.Artificial Intelligence				
	V18CST18		4.Computer Graphics				
7	V18MBET53	HSS	Organizational Behavior	3	0	0	3
8	V18CSL06	PCC	Database Management Systems Lab	0	0	3	1.5
9	V18CSL07	PCC	Operating System and Unix Lab	0	0	3	1.5
10	V18ENT05		Professional Communication Skills -III	4	0	0	MNC
11	V18CST62		Technical Skills-III	4	0	0	MNC
Total				**29**	**0**	**6**	**24**

Total Contact Hours: 35

VI – Semester							
S.No.	**Course Code**		**Course**	**L**	**T**	**P**	**C**
1	V18CST19	PCC	Compiler Design	3	0	0	3
2	V18CST20	PCC	Data Mining	3	0	0	3
3	V18CST21	PCC	Object Oriented Analysis and Design through UML	3	0	0	3
4	V18CST22	PCC	Cryptography & Network Security	3	0	0	3
5	**Elective - II**			3	0	0	3
	V18CST23	PEC	1. Software Testing Methodologies				
	V18CST24		2. Principles of Programming Languages				
	V18CST25		3. Machine Learning				
	V18CST26		4. Image Processing				
6	**Open Elective – I (Interdisciplinary)**	**OEC**	**OPE I(1-3)**	3	0	0	3
7	V18CSL08	PCC	Object Oriented Analysis and Design through UML Lab	0	0	3	1.5
8	V18CSL09	PCC	Data Mining Lab	0	0	3	1.5
9	V18CSMPS	**Project**	Mini Project with Seminar	0	0	4	2
10	V18ENT06		Professional Communication Skills -IV	4	0	0	MNC
11	V18CST63		Technical Skills-IV	4	0	0	MNC
			Total	**26**	**0**	**10**	**23**

Total Contact Hours: 36

S.No.	VII – Semester						
	Course Code		**Course**	**L**	**T**	**P**	**C**
1	V18CST27	PCC	Advanced Java and Web Technologies	3	0	0	3
2	V18MBET52	HSS	Management Science	3	0	0	3
3	**Elective – III**						
	V18CST28	PEC	1. Advanced Operating Systems	3	0	0	3
	V18CST29		2. Statistics with R Programming				
	V18CST30		3. Information Retrieval Systems				
	V18CST31		4 Human Computer Interaction				
4	**Elective – IV**						
	V18CST32	**PEC**	1.Distributed Systems	3	0	0	3
	V18CST33		2.Scripting Languages				
	V18CST34		3.Deep Learning				
	V18CST35		4.Social Networks and semantic web				
5	**Open Elective – II (Interdisciplinary)**	**OEC**	**OPE II(1-3)**	3	0	0	3
6	V18CSL10	PCC	Advanced Java and Web Technologies Lab	0	0	2	1
7	V18CSP01	**Project**	Project Work (Part-A)	0	0	10	5
Total				**15**	**0**	**13**	21

Total Contact Hours: 28

	VIII – Semester						
S.No.	**Course Code**		**Course**	**L**	**T**	**P**	**C**
1	**Elective – V**						
	V18CST36	PEC	1. Software Project Management	3	0	0	3
	V18CST37		2. Big Data Analytics				
	V18CST38		3. Soft Computing				
	V18CST39		4. Cloud Computing				
2	**Elective – VI**			3	0	0	3
	V18CST40	PEC	1. Software Architecture and Design Patterns				
	V18CST41		2. Middleware Technologies				
	V18CST42		3. Natural Language Processing				
	V18CST43		4. Cyber Security				
3	**Open Elective – III** **(Interdisciplinary)**	**OEC**	**OPE III(1-3)**	3	0	0	3
4	V18CSP02	**Project**	Project Work (Part-B)	0	0	12	6
Total				**9**	**0**	**12**	**15**

Total Contact Hours: 21

Annexure-CS-IV

V Sem	**Database Management Systems**	Course Code: V18CST10	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Demonstrate Database Systems, various Data Models and Database Architecture. (K2)

CO2: Apply ER Modeling to Design Relational Databases for Real Time Applications. (K3)

CO3: Apply SQL Constructs to Perform Database Operations. (K3)

CO4: Apply Normalization Techniques to Refine Schema. (K3)

CO5: Explain Transaction Management and Concurrency Control. (K2)

CO6: Experiment with various database indexing techniques. (K3)

UNIT-I: An Overview of Database Systems: Managing Data, File Systems verses DBMS, Advantages of DBMS, Data Independence. **Database System Architecture:** Three Levels of Architecture, External Level, Conceptual Level, Internal Level, Structure of DBMS, The Database Management Systems and Client/Server Architecture.

UNIT-II: Database Design: The E/R Models, Database Design and Er Diagrams, Entities, Attributes, Entity Sets, Relationships and Relationship Sets, Conceptual Design with ER Models. **Relational Model:** Integrity Constraints Over Relations, Key Constraints ,Foreign Key Constraints, General Constraints, Relational Algebra-Selection and Projection, Set Operation, Renaming, Joins, Division, Relational Calculus- Tuple Relational Calculus, Domain Relational Calculus.

UNIT-III: SQL Queries, Constraints and Triggers: The Form of Basic SQL Query, Union, Intersect, Except, Nested Queries, Aggregate Operators, Null Values, Complex Integrity Constraints in SQL, Triggers and Active Database.

UNIT-IV: Schema Refinement (Normalization): Purpose of Normalization or Schema Refinement, Concept of Functional Dependency, Normal Forms based on Functional Dependency (1NF, 2NF and 3NF), Concept of Surrogate Key, Boyce-Codd Normal Form (BCNF), Lossless Join and Dependency Preserving Decomposition, Fourth Normal Form(4NF).

UNIT-V:Transaction Management: Transaction, Properties of Transactions, Transaction Log, and Transaction Management with SQL Commit, Rollback and Savepoint. Concurrency Control: Concurrency Control for Lost Updates, Uncommitted Data, Inconsistent Retrievals and the Scheduler. **Concurrency Control with Locking Methods :** Lock Granularity, Lock Types, Two Phase Locking for Ensuring Serializability, Deadlocks, Concurrency Control with Time Stamp Ordering, Transaction Recovery.

UNIT-VI: Storage and Indexing: Overview of Storages and Indexing, Data on External Storage, File Organization and Indexing, Clustered Indexing, Primary and Secondary Indexes, Index Data Structures, Hash based Indexing, Tree based Indexing, Comparison of File Organization

Text Books:

1. Introduction to Databse Systems, CJ Date,8th Edition, Pearson Education.
2. Data base Management Systems, Raghurama Krishnan, Johannes Gehrke, 3rd Edition TATA McGraw Hill.

Reference Books:

1. Data base Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition, Course Technology.
2. Fundamentals of Database Systems, ElmasriNavrate, 7th Edition, Pearson Education.
3. Database Systems - The Complete Book, H G Molina, J D Ullman, J Widom, 2ndEdition,Pearson.

V Sem	Computer Networks	Course Code: V18CST11	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Discuss fundamentals of network concepts and Reference Models.(K2)

CO2: Discuss Communication media and switching techniques.(K2)

CO3: Demonstrate Error control and protocols.(K3)

CO4: Apply Routing algorithms and congestion control algorithms.(K3)

CO5: Discuss Transport layer services and protocols. (K2)

CO6: Describe Application layer protocols.(K2)

UNIT-I: Introduction: Reference models: The OSI Reference Model- the TCP/IP Reference Model, Examples of Networks: Novell Networks, Arpanet, Internet, Network Topologies WAN, LAN, MAN.

UNIT– II: Physical Layer: Transmission Media, Multiplexing: FDM, WDM and TDM- LAN Technologies, introduction to switching: Circuit Switched Networks, Datagram Networks, and Virtual Circuit Networks.

UNIT–III: Data link layer: Design issues, Framing, Flow control, error control, error detection and correction, CRC, Checksum: idea, one's complement internet checksum, MAC: ALOHA, CSMA. Elementary Data Link Layer protocols: simplex protocol, Simplex stop and wait, Simplex protocol for Noisy Channel. Sliding window protocol: One bit, Go back N, Selective repeat-Stop and wait protocol, HDLC, point to point protocol (PPP).Piggybacking.

UNIT-IV : Network Layer : Network layer design issues- Algorithm shortest path routing, Flooding, Hierarchical routing, Broad cast, Multi cast Routing algorithms-Congestion control and algorithms, Internet Protocol (IP) Addresses, Subnet masking

UNIT–V :Transport Layer: Services, Primitives and sockets, Elements of transport protocols, Internet Transport protocols(TCP,UDP,RPC,RTTP/RTP,RTCP) Segment headers, Primitives, Control, Congestion control, Quality of Service, QoS improving techniques: Leaky Bucket and Token Bucket algorithm.

UNIT–VI: Application layer: DNS, SMTP, POP,FTP HTTP Presentation formatting. Network security: Introduction to Cryptography, Authentication, Basics of Public key and private key cryptography, digital signatures and certificates firewalls and wireless security.

Text Books:

1. Computer Networks — Andrew S Tanenbaum, 4th Edition. Pearson Education/PHI
2. Data Communications and Networks – Behrouz A. Forouzan.Third Edition TMH

References:

1. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition, Pearson Education
2. Understanding communications and Networks, 3rd Edition, W.A. Shay, Thomson

<table>
<tr><td rowspan="2">V
Sem</td><td rowspan="2">Operating Systems</td><td rowspan="2">Course
Code:
V18CST12</td><td>L</td><td>T</td><td>P</td><td>C</td></tr>
<tr><td>3</td><td>0</td><td>0</td><td>3</td></tr>
</table>

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe Operating System Services and System Calls (K2).

CO2: Illustrate Process Management Concepts and CPU Scheduling Algorithms (K3).

CO3: Demonstrate Process Synchronization primitives (K3).

CO4: Demonstrate Deadlock Prevention, Avoidance and Detection methods (K3).

CO5: Illustrate Memory Management Techniques and Page Replacement Algorithms (K3).

CO6: Describe File System Concepts and Mass Storage Structures (K2) .

UNIT-I: Introduction: Operating-System Structure, Operating-System Services, User and Operating-System Interface, System Calls, Types of System Calls.

UNIT-II: Process Management: Process Concept, Process Scheduling, Operations on Processes, Interprocess Communication. **Threads:** Overview, Multithreading Models. **CPU Scheduling:** Basic Concepts, Scheduling Criteria, Scheduling Algorithms

UNIT-III : Process Synchronization: The Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Mutex Locks, Semaphores, Classic Problems of Synchronization, Monitors

UNIT-IV: Deadlocks: System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock

UNIT-V: Memory Management Main Memory: Swapping, Contiguous Memory Allocation, Segmentation, Paging, Structure of the Page Table

Virtual Memory: Introduction, Demand Paging, Page Replacement, Allocation of Frames, Thrashing

UNIT-VI:Storage Management: Overview of Mass-Storage Structure, Disk Scheduling, File Concept, Access Methods, Directory and Disk Structure, File-System Mounting, File Allocation Methods

Text Book:

1. Operating System Concepts, AbrahamSilberschatz, ,Peter Baer Galvin,Greg Gagne, 9th Edition, John Wiley and Sons Inc., 2012

Reference Books:

1. Operating Systems – Internals and Design Principles, William Stallings, 7th Edition, Prentice Hall, 2012
2. Modern Operating Systems, Andrew S. Tanenbaum, Third Edition, Addison Wesley,2007

V Sem	Design and Analysis of Algorithms	Course Code: V18CST13	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe asymptotic notation and basic concepts of algorithms (K2).

CO2: Apply divide and conquer paradigm to solve various problems (K3).

CO3: Use greedy technique to solve various problems (K3).

CO4: Apply dynamic programming technique to various problems (K3).

CO5: Employ backtracking technique to various problems (K3).

CO6: Apply branch and bound technique to various problems (K3).

UNIT-I: Introduction: What is an Algorithm, Algorithm Specification-Pseudo code Conventions Recursive Algorithm, Performance Analysis-Space Complexity, Time Complexity, Amortized Complexity, Amortized Complexity, Asymptotic Notation, Practical Complexities, Performance Measurement.

UNIT-II: Divide and Conquer: General Method, Defective Chessboard, Binary Search, Finding the Maximum and Minimum, Merge Sort, Quick Sort-Performance Measurement, Randomized Sorting Algorithms.

UNIT-III: The Greedy Method: The General Method, Knapsack Problem, Job Sequencing with Deadlines, Minimum-cost Spanning Trees-Prim's Algorithm, Kruskal's Algorithms, An Optimal Randomized Algorithm, Optimal Merge Patterns, Single Source Shortest Paths.

UNIT-IV: Dynamic Programming: All Pairs Shortest Paths, Single Source Shortest paths General Weights, Explain Optimal Binary Search Trees, String Edition, 0/1 Knapsack, Reliability Design.

UNIT-V: Backtracking: The General Method, The 8-Queens Problem, Sum of Subsets, Graph Coloring, Hamiltonian Cycles.

UNIT-VI: Branch and Bound: The Method-Least cost (LC) Search, The 15-Puzzle: an Example, Control Abstraction for LC-Search, Bounding, FIFO Branch-and-Bound, LC Branch and Bound, 0/1 Knapsack Problem-LC Branch-and Bound Solution, FIFO Branch-and-Bound Solution, Traveling Salesperson.

Text Books:

1. Fundamentals of computer algorithms E. Horowitz S. Sahni, University Press

Reference Books:

1. Introduction to Algorithms Thomas H. Cormen, PHI Learning.
2. The Design and Analysis of Computer Algorithms, Alfred V. Aho, John E. Hopcroft, JeffreyD.Ullman.
3. Algorithm Design, Jon Kleinberg, Pearson.

V Sem	**Unix programming**	Course Code: V18CST14	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Illustrate the UNIX basics and the working of the built in commands in Unix (K2).

CO2: Demonstrate the file system and change the permissions associated with files (K2).

CO3: Develop basic programs using shell script (K3).

CO4: Demonstrate the grep family and data transforming programs sed, and awk (K2).

CO5: Construct programs for process system calls (K3).

CO6: Explain the concept of signals and its system call (K2).

UNIT I: Introduction to UNIX: The UNIX Operating System, A brief history of UNIX, The UNIX Architecture, Basic features of UNIX. General Purpose Utilities- cal, date, man, echo, bc, clear, passwd, who, whoami,unameDirectory Handling Commands: pwd, cd, mkdir, rmdir. File Handling Utilities - cat, touch, cp, ls, rm, mv, nl, pg,tar,wc Displaying Commands: more,head,tail, simple filters and commands: cmp, comm., ulink, diff, head, tail, find, cut, paste,sort, uniq, tr, finger. Disk Utilities– du, df, mount, umount.Process Utilities–ps, kill. Networking Utilities– ping, telnet, rlogin, ftp.

UNIT II : THE FILE SYSTEM : Types of Files, Directories and Files, UNIX File System, Absolute and relative pathnames, File Attributes and Permissions ,The File Command - knowing the File Type, Chmod Command- Changing File Permissions, Chown Command- Changing the Owner of a File, Chgrp Command- Changing the Group of a File. Vi editor- editing with vi, moving the cursor, editing, copying and moving text, pattern searching.

UNIT III : Introduction to Shell Programming : Shell Variables-The Export Command-The Profile File a Script Run During Starting-The First Shell Script-The read Command-Positional parameters-The $? Variable knowing the exit Status-More about the Set Command-The Exit Command-Branching Control Structures-Loop Control Structures-The Continue and Break Statement-The Expr Command: Performing Integer Arithmetic-Real Arithmetic in Shell Programs-The here Document(<<)-I/O Redirection, The Sleep Command-Debugging Scripts-The Script Command-The Eval Command-The Exec Command. Command Line Structure - Met characters.

UNIT-IV : Regular Expressions: grep, egrep, fgrep, Sed- line addressing, context addressing, text editing,substitution. **Programming with awk**: syntax of awk programming statement, structure of awk script, variables ,records fields, and special variables, patterns, operators ,simple input files, awk programming- simple awk programming, awk control structures, looping, functions in awk.

UNIT-V: Unix process: What is a process, process structure, process identifiers, starting new process, waiting for a process, zombie process, system call interface for process management - fork, vfork, exit, wait, waitpid, exec system call.

UNIT VI: Signals: Signal functions, unreliable signals, interrupted system calls, kill and raise functions, alarm, pause functions, abort, sleep functions

Text Books:

1. Introduction to Unix and shell programming, M G Venkateshmurthy, Pearson education
2. Advanced programming in the unix environment, W. Richard Stevens, 3rd Edition, Pearson Education.

References:

1. Unix and shell Programming, B.A. Forouzan& R.F. Giberg, Thomson, First Edition, NewDelhi, 2003.

V Sem	**Advanced Computer Architecture (Elective-I)**	Course Code: V18CST15	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe the basics of quantitative design and analysis (K2).

CO2: Illustrate memory hierarchy schemes (K2).

CO3: Illustrate concepts of Instruction-Level Parallelism (K2).

CO4: Explain concepts of Data-Level Parallelism (K2).

CO5: Explain concepts of Thread-Level Parallelism (K2).

CO6: Describe architectural aspects of Warehouse-Scale Computers (K2).

UNIT I: Fundamentals of Quantitative Design and Analysis: Classes of Computers, Defining Computer Architecture, Designing the Organization and Hardware to Meet Goals and Functional Requirements, Quantitative Principles of Computer Design

UNIT II: Memory Hierarchy Design: Basics of Memory Hierarchies, Advanced Optimizations of Cache Performance, Memory Technology and Optimizations, Virtual Memory and Virtual Machines.

UNIT III : Instruction-Level Parallelism: Concepts and Challenges, Basic Compiler Techniques, Reducing Branch Costs with Advanced Branch Prediction, Overcoming Data Hazards with Dynamic Scheduling, Tomasulo's Approach, Hardware-Based Speculation, Multiple Issue and Static Scheduling

UNIT IV: Data-Level Parallelism: Vector Architecture, VMIPS, Vector Processors, SIMD Instruction Set Extensions for Multimedia

UNIT V: Thread-Level Parallelism: Introduction, Centralized Shared-Memory Architectures-Multiprocessor Cache Coherence, Basic Schemes for Enforcing Coherence, Snooping Coherence Protocols

UNIT VI: Warehouse-Scale Computers: Introduction, Programming Models and Workloads for Warehouse-Scale Computers, Computer Architecture of Warehouse-Scale Computers

Text Book:

1. Computer Architecture: A Quantitative Approach, John L. Hennessy, David A. Patterson, 5th Edition, Morgan Kaufmann, Elsevier.

Reference Books:

1. Advanced Computer Architectures: A Design Space Approach, D Sima, T Fountain, P Karsuk, 1st Edition, Pearson
2. Advanced Computer Architecture, K Hwang, N Jotwani, 2nd Edition, McGraw-Hill

V Sem	Advanced Data Structures (Elective-I)	Course Code: V18CST16	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Explain external sorting method (K2).

CO2: Discuss pattern matching Algorithms (K2).

CO3: Illustrate various hash functions with appropriate examples (K3).

CO4: Illustrate various priority queues with appropriate examples (K3).

CO5: Construct self balanced tree with appropriate examples (K3).

CO6: Discuss Multiway search trees (K2).

UNIT I: SORTING: Introduction - External Sorting- K-way Merging - Buffer Handling for parallel Operation- Run Generation- Optimal Merging of Runs.

UNIT II: STRING MATCHING ALGORITHMS: The Navi String matching algorithms – The Robin-Krap algorithm – String Matching algorithm using finite automata – The Knuth Morris Pratt algorithm.

UNIT III: SKIP LIST AND HASHING: Dictionaries – ADT- Linear List representation - Skip List representation: Ideal case – Insertion and Deletion –Assigning levels – The struct skip node – The class skip list – complexity of skipList methods. Hash Table Representation: Ideal hashing – Hash functions and tables -Linear probing- Hashing with Chains

UNIT IV: PRIORITY QUEUES (HEAPS) : Definition and Applications – ADT – Linear lists – Heaps : Definition – Max heap and Min heap operations, Applications – Heap Sort – Huffman Codes.

UNIT V: EFFICIENT BINARY SEARCH TREES : Introduction to AVL Trees- Red-Black Trees- Definition- Representation of a Red- Black Tree- Searching a Red-Black Tree- Inserting into a Red Black Tree- Deletion from a Red-Black Tree- Joining Red-Black Trees, Splitting a Red-Black tree – Splay Trees – Introduction – operation – Amortized complexity.

UNIT VI: MULTIWAY SEARCH TREES : ISAM - M-Way Search Trees, Definition and Properties- Searching an M-Way Search Tree, B-Trees, Definition and Properties- search Elements in a B-tree- Insertion into B-Tree- Deletion from a B-Tree- Node Structure.

Text Books:

1. Data Structures, Algorithms and Applications in C++; SartajSahni; UniverstiyPress ; 2nd Edition.

2. Introduction to Algorithms By Thomas H Cormen, Charless E leiserson, Ronald L Rivest and Cliford Stein PHI publication Third Edition (UNIT – II)

References:

1. Data Structures, a Pseudocode Approach, Richard F Gilberg, BehrouzA Forouzan, Cengage.
2. An Introduction to Data Structures with applications By Jean Paul Trembly and Paul G Sorenson Tata McGraw Hill Second Edition
3. Fundamentals of Data Structures and algorithms by C V Sastry, Rakesh Nayak, Ch. Raja Ramesh, IK Publications, new Delhi.

<table>
<tr><td rowspan="2">V
Sem</td><td rowspan="2">Artificial Intelligence (Elective-I)</td><td rowspan="2">Course Code:
V18CST17</td><td>L</td><td>T</td><td>P</td><td>C</td></tr>
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Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Illustrate the concept of intelligent systems and current trends in AI. (K2)

CO2: Apply Problem solving, Problem reduction and Game Playing techniques in AI. (K3)

CO3: Illustrate the Logic concepts in AI. (K2)

CO4: Explain the Knowledge representation techniques in AI. (K2)

CO5: Describe Expert systems and their applications. (K2)

CO6: Illustrate Uncertainty Measures. (K2)

UNIT-I: Introduction to Artificial Intelligence: Introduction, history, intelligent systems, foundations of AI, applications, tic-tac-toe game playing, current trends in AI

UNIT-II: Problem solving: State-space Search and Control Strategies: Introduction, General Problem Solving, Characteristics of problem, Exhaustive searches, Heuristic search techniques, Iterative deepening a*, constraint satisfaction

Problem reduction and game playing: Introduction, problem reduction, game playing, alpha beta pruning, two-player perfect information games

UNIT-III: Logic concepts: Introduction, Propositional Calculus, Proportional Logic, Natural Deduction system, Axiomatic system, Semantic tableau system in proportional logic, Resolution Refutation in Propositional logic, Predicate Logic

UNIT-IV: Knowledge representation: Introduction, approaches to Knowledge representation, Knowledge representation using Semantic Networks, Extended Semantic Networks for KR, Knowledge representation using Frames

UNIT-V: Expert Systems and Applications: Introduction phases in building Expert Systems, Expert System versus Traditional Systems, Rule-based Expert Systems, Blackboard systems, Truth maintenance systems, applications of Expert Systems.

UNIT-VI: Uncertainty measure: Probability theory- Introduction, Probability Theory, Bayesian Belief networks, Certainty Factor Theory, Dempster-Shafer theory

Text Book:

1. Artificial Intelligence, Saroj Kaushik, 1st Edition, Cengage Learning.

Reference Books:

1. Artificial Intelligence, Elaine Rich, Kevin Knight, Shivashankar B Nair, 3rd Edition, Tata McGraw Hill Education Private Limited., 2009
2. Artificial Intelligence- A modern Approach, 3rd Edition, Stuart Russel, Peter Norvig, Pearson Education.

<table>
<tr><td rowspan="2">V
Sem</td><td rowspan="2">Computer Graphics (Elective-I)</td><td rowspan="2">Course Code:
V18CST18</td><td>L</td><td>T</td><td>P</td><td>C</td></tr>
<tr><td>3</td><td>0</td><td>0</td><td>3</td></tr>
</table>

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Understand the applications of computer graphics and learn basic algorithms (K2).
CO2: Analyze the concepts of 2D graphics along with transformation techniques (K3).
CO3: Understand 2D Views of objects and clipping algorithms (K2).
CO4: Illustrate 3D graphics and will get an idea about projections views of objects (K2).

CO5: Determine different visible surface detection methods (K2).
CO6: Understand different animation sequences and Color Models (K2).

UNIT I: Introduction: Application of Computer Graphics, raster scan systems, random scan systems, raster scan display processors. Output Primitives : Points and lines, line drawing algorithms(Bresenham's and DDA Line derivations and algorithms), mid-point circle and ellipse algorithms.

UNIT II: Filled area primitives: Boundary-fill and flood-fill algorithms. **2-D geometrical transforms:** Translation, scaling, rotation, reflection and shear transformations, and homogeneous coordinates, composite transforms.

UNIT III: 2-D viewing: The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Cohen-Sutherland, Sutherland – Hodgeman polygon clipping algorithm.

UNIT IV: 3-D Geometric transformations: Translation, rotation, scaling, reflection and shear transformations, composite transformations. 3D Viewing pipeline, clipping, projections (Parallel and Perspective). **3-D object representation:** Polygon surfaces, quadric surfaces, spline representation, Bezier curve and B-Spline curves.

Unit V: Visible surface detection methods: Classification, back-face detection, depth-buffer, scan-line, BSPtree methods, area sub-division.

Unit VI: Computer animation: Design of animation sequence, general computer animation functions, raster animation, computer animation languages. **Color Models** – RGB, YIQ, CMY, HSV.

Text Books:

1. Computer Graphics C version, Donald Hearn, M.Pauline Baker, Pearson

2. Computer Graphics, Schaum's outlines", Zhigand xiang,Roy Plastock, 2nd Edition,Tata Mc-Graw Hill.

3. Principles of Computer Graphics, S. Govil-Pai, 1st Edition, Springer International Edtion,2005.

Reference Books:

1. Computer Graphics Principles & practice, 2/e, Foley, VanDam, Feiner, Hughes, Pearson

2. Computer Graphics, Peter, Shirley, CENGAGE

3. Principles of Interactive Computer Graphics, Neuman , Sproul, TMH.

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V Sem	Data Base Management System Lab	Course Code: V18CSL06	L	T	P	C
			0	0	3	1.5

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Build SQL Queries and Constraints (K3).

CO2: Experiment with various Database Indexing Techniques.(K3).

CO3: Construct PL/SQL Cursors and Exceptions (K3).

CO4: Develop application programs using PL/SQL (K3).

CO5: Develop PL/SQL Functions, Procedures, Packages (K3).

CO6: Apply projections and aggregation on collection of MongoDB database (K3).

List of Experiments

Part-A

1. Queries to facilitate acquaintance of Built-In Functions, String Functions, Numeric Functions, Date Functions and Conversion Functions.

2. Queries using operators in SQL

3. Queries to Retrieve and Change Data: Select, Insert, Delete, and Update

4. Queries using Group By, Order By, and Having Clauses

5. Queries on Controlling Data: Commit, Rollback, and Save point

6. Queries to Build Report in SQL *PLUS

7. Queries for Creating, Dropping, and Altering Tables, Views, and Constraints

8. Queries on Joins and Correlated Sub-Queries

9. Queries on Working with Index, Sequence, Synonym, Controlling Access, and Locking Rows for Update, Creating Password and Security features PL/SQL.

10. Write a PL/SQL Code using Basic Variable, Anchored Declarations, and Usage of Assignment Operation.

11. Write a PL/SQL Code Bind and Substitution Variables. Printing in PL/SQL

12. Write a PL/SQL block using SQL and Control Structures in PL/SQL

13. Write a PL/SQL Code using Cursors, Exceptions and Composite Data Types

14. Write a PL/SQL Code using Procedures, Functions, and Packages FORMS

Part-B

1. Install and start MongoDB
2. Create and drop database and collection
3. Insert,update ,delete,query document
4. Projection, limiting records, sorting records and aggregation in MongoDB

Text Books:

1. Oracle Database 11g The Complete Reference by Oracle Press, Kevin Loney
2. Database Systems Using Oracle, Nilesh Shah, 2nd Edition ,PHI.
3. Introduction to SQL, Rick F Vander Lans, 4th Edition, Pearson Education.

Reference Books:

1. Introduction to SQL, Rick F. Vander Lans, 4th Edition, Pearson education.
2. Oracle PL/SQL Interactive Workbook, B. Rosenzweig and E. Silvestrova,2nd Edition, Pearson education.
3. SQL & PL/SQL for Oracle 10 g, Black Book, Dr. P. S. Deshpande, Dream Tech.

V Sem	Operating System and Unix Lab	Course Code: V18CSL07	L	T	P	C
			0	0	3	1.5

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Illustrate CPU scheduling algorithms (K3)

CO2: Apply Bankers Algorithm for Deadlock Avoidance and Deadlock Prevention (K3)

CO3: Use Page replacement algorithms for memory management (K3)

CO4: Demonstrate the basic knowledge of Linux commands and file handling utilities by using Linux shell environment. (K3)

CO5: Experiment with the concept of shell scripting programs. (K3)

CO 6: Illustrate the process of how the parent and child relationships (K3)

List of Experiments:

Part-A: OS Lab

1. Simulate the following CPU scheduling algorithms:
   a) FCFS b) SJF c) Round Robin d) Priority
2. Implement : fork (), wait (), exec() and exit () system calls
3. Simulate Producer and Consumer problem using Semaphores
4. Simulate Bankers Algorithm for Dead Lock Avoidance
5. Simulate Bankers Algorithm for Dead Lock Prevention
6. Simulate the following page replacement algorithms:
   a) FIFO b) LRU c) LFU
7. Simulate the following File allocation strategies:
   a) Sequenced b) Indexed c) Linked

Part-A: UNIX Lab

8. **Study of Unix Commands:** General Purpose Utilities, Directory Handling Commands, File Handling Utilities, Displaying Commands, Filters, Disk Utilities
9. Shell Script to list all of the directory files in a directory.
10. Shell Script to find the factorial of a given number
11. Shell Script to generate a Multiplication table.
12. Shell Script to Perform arithmetic operations
13. Implement an AWK script to count the number of lines in a file that do not contain vowels
14. Design an awk script to find the number of characters, words and lines in a file?
15. Design a C program to create a child process and allow the parent to display

"parent" and the child to display "child" on the screen

16. Demonstration of GDB tool to understand process programme.
17. Design a C program to create a Zombie Process.
18. Design a C program that illustrates how an orphan is created.

Reference Books:

1. Operating System Concepts,AbrahamSilberschatz, ,Peter Baer Galvin,Greg Gagne, 9th Edition, John Wiley and Sons Inc., 2012
2. Operating Systems – Internals and Design Principles, William Stallings, 7th Edition, Prentice Hall, 2012
3. Modern Operating Systems, Andrew S. Tanenbaum, Third Edition, Addison Wesley,2007
4. M G venkateshmurthy Introduction to Unix and shell programming Pearson education
5. W. Richard Stevens, Advanced programming in the unix environment, 3rd Edition,Pearson education.

V Sem	**Technical Skills-III**	Course Code: V18CST62	L	T	P	C
			0	0	4	MNC

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Apply fundamental data structures like List, Stack to solve real work problems in linear time i.e. O(n). (K3)

CO2: Make use of advanced data structures like queue, to solve complex problems in linear time , logarithmic time i.e. O(n) or O(nlogn).(K3)

CO3: Develop programs to solve problems by with the help of searching and sorting techniques. (K3)

CO4: Analyze linked list by comparing with Array List and develop programs to solve optimization Problems. (K4)

CO5: Experiment with types of Linked List to solve complex combinatorial problems. (K3)

CO6: Develop programs to solve complex problems by using combination of stack, Queue and List. (K3)

Data Structures

1. Problem solving using ArrayList
2. Problem solving using LinkedList
3. Problem solving using Stack
4. Problem solving using Queue
5. Problem solving using Searching
6. Problem solving using Sorting

Text Books:

1. Introduction to Algorithms, Second Edition, Thomas H. Cormen Charles E. Leiserson.
2. Data Structures and Algorithms Made Easy: Narasimha Karumanchi .
3. The Algorithm Design Manual, Springer series, Steven Skiena.

VI Sem	**Compiler Design**	Course Code: V18CST19	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe the compilation process and lexical analyzer (K2)
CO2: Construct top down parsing Techniques (K3)
CO3: Construct bottom up parsing techniques (K3)
CO4: Construct syntax directed translation (K3)
CO5: Produce intermediate code generation process and run time environments (K3)
CO6: Explain the code generation process. (K2)

UNIT-I: Introduction: Language Processors, the Structure of a Compiler. Lexical Analysis: The Role of the Lexical Analyzer, Specification of Tokens, Recognition of Tokens and the Lexical-Analyzer Generator Lex.

UNIT-II: Syntax Analysis: Definition of CFG, Lexical Versus Syntactic Analysis, Writing a Grammar- Elimination of Left Recursion, Left Factoring. Top Down Parsing: Recursive Descent Parsing, First and Follow, LL(1) Grammars, Non recursive Predictive Parsing, Error Recovery in Predictive Parsing.

UNIT-III: Bottom-Up Parsing: Bottom Up Parser Classification, Reductions, Handle Pruning, Shift-Reducing, Conflicts During Shift Reduce Parsing. Introduction to LR Parsing: Difference between LR and LL Parsers, Why LR Parsers?, Items and the LR(0) automaton, The LR-Parsing Algorithm, Constructing SLR Parsing Tables

UNIT-IV: More powerful LR parsers: construction of CLR (1), LALR Parsing tables, Comparison of all Bottom Up approaches. Semantic Analysis: Syntax Directed Definitions, Evaluation Orders for SDD's, Applications of SDT.

UNIT-V: Intermediate Code Generation: Variants of Syntax Trees, Three-Address Code, Control Flow, Back-patching. Run-Time Environments: Storage Organization, Stack Allocation of Space, Heap Management.

UNIT-VI: Code Generation: Basic Blocks and Flow Graphs, Optimization of Basic Blocks, Peephole Optimization, Register Allocation and Assignment. Machine-Independent optimizations: The Principal Sources of Optimizations, Introduction to Data-Flow Analysis.

Text Books:

1. Compilers, Principles Techniques and Tools- Alfred V Aho, Monica S Lam, Ravi Sethi, Jeffrey D. Ullman,2nded, Pearson,2007

Reference Books:

1. Principles of compiler design, V. Raghavan, 2nd ed, TMH, 2011
2. Compiler Design, K. Muneeswaran, Oxford

<table>
<tr><td rowspan="2">VI Sem</td><td rowspan="2">Data Mining</td><td>Course Code:</td><td>L</td><td>T</td><td>P</td><td>C</td></tr>
<tr><td>V18CST20</td><td>3</td><td>0</td><td>0</td><td>3</td></tr>
</table>

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Explain the concept of Data Mining and its functionalities (K2)

CO2: Discuss various Data Preprocessing Techniques (K3)

CO3: Demonstrate Association Analysis Techniques (K3)

CO4: Illustrate various Classification Techniques (K3)

CO5: Demonstrate Alternative techniques for Classification (K3)

CO6: Use different Clustering techniques to cluster data (K3)

UNIT-I : Introduction: Need for Data Mining, Knowledge Discovery from Data, Kinds of Data mined, Kinds of Patterns mined, Technologies used, Kinds of Applications targeted, Major Issues in Data Mining, Data Objects and Attribute Types, Basic Statistical Descriptions of Data, Measuring Data Similarity and Dissimilarity

UNIT-II: Data Preprocessing: Overview of Data Preprocessing, Data Cleaning, Data Integration, Data Reduction, Data Transformation and Data Discretization

UNIT-III: Mining Frequent Patterns, Associations, and Correlations: Basic Concepts, Frequent Itemset Mining Methods- Apriori Algorithm: Finding Frequent Itemsets by Confined Candidate Generation, Generating Association Rules from Frequent Itemsets, Improving the Efficiency of Apriori, Pattern-Growth Approach for Mining Frequent Itemsets

UNIT-IV: Classification: Basic Concepts, Decision Tree Induction, Attribute Selection Measures, Tree Pruning

UNIT-V: Bayes Classification Methods: Bayes' Theorem, Naive Bayesian Classification. **Bayesian Belief Networks:** Concepts and Mechanisms, Training Bayesian Belief Networks

UNIT-VI: Cluster Analysis: Basic Concepts and Methods, Partitioning Methods, Hierarchical Methods, Density Based Method-DBSCAN

Text Books:

1. Data Mining Concepts and Techniques, Jiawei Han, Micheline Kamber, Jian Pei,3rd Edition, Morgan Kaufmann Publishers

Reference Books:

1. Introduction to Data Mining, Pang-Ning Tan, Michael Steinbach, Vipin Kumar, 1st Edition, Pearson Education.
2. Data Mining and Analysis,Mohammed J Zaki, Wagner Meira JR,1st Edition, Cambridge University Press.

VI Sem	**Object Oriented Analysis and Design Through UML**	Course Code: V18CST21	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Discuss importance of modeling. [K2]

CO2: Describe classes and relationships. [K2]

CO3: Develop class diagrams and object diagrams. [K3]

CO4: Develop Interaction, Use case and Activity Diagrams. [K3]

CO5: Illustrate advanced behavioral modeling. [K3]

CO6: Develop component and deployment diagrams.[K3]

UNIT-I: Introduction to UML: Importance of modeling - Principles of modeling - Object oriented modeling - Conceptual model of the UML – Architecture - Software Development Life Cycle.

UNIT-II: Advanced Structural Modeling: Classes – Relationships - Common Mechanisms and diagrams - Advanced classes - Advanced relationships – Interfaces - Types and Roles – Packages.

UNIT-III: Class & Object Diagrams: Terms, concepts - Modeling techniques for Class Diagrams - Modeling techniques for Object Diagrams.

UNIT-IV: Basic Behavioral Modeling-I: Interactions - Interaction diagrams. **Basic Behavioral Modeling-II:** Use cases - Use case Diagrams - Activity Diagrams.

UNIT-V: Advanced Behavioral Modeling: Events and signals - State machines - Processes and Threads - Time and space - State chart diagrams.

UNIT-VI: Architectural Modeling: Component- Deployment - Component diagrams - Deployment diagrams.

Text Book:

1. The Unified Modeling Language User Guide, Grady Booch, James Rumbaugh, Ivar Jacobson, Pearson Education.

Reference Books:

1. UML 2 Toolkit, Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado, WILEY-Dreamtech India Pvt. Ltd.
2. Fundamentals of Object Oriented Design in UML, Meilir Page-Jones, Pearson Education.
3. Modeling Software Systems Using UML2, Pascal Roques, WILEY-Dreamtech IndiaPvt. Ltd.

VI Sem	Cryptography and Network Security	Course Code: V18CST22	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe the fundamentals of networks security, security architecture, threats and vulnerabilities (K2)
CO2: Discuss the mathematical support for both symmetric and asymmetric key cryptography (K2)
CO3: Discuss the concept of developing encryption and decryption algorithms (K2)
CO4: Illustrate various techniques of encryption and message authentication functions (K3)
CO5: Apply various Key management and Distribution techniques and its importance (K3)
CO6: Discuss the Need of Transport level and Email security algorithms (K2)

UNIT-I: Computer Security concepts, security services, and Active vs. Passive attacks, Security mechanisms, OSI Security Architecture, A Model for Network security, Classical Encryption Techniques, Substitution ciphers, Transposition ciphers.

UNIT-II: Introduction to Number Theory, Fermat's and Euler's Theorem, the Chinese Remainder Theorem, Euclidean Algorithm, and Modular Arithmetic.

UNIT-III: Block Ciphers, Data Encryption Standard (DES), Block Cipher Design Principles, Advanced Encryption Standard (AES), Simplified AES, Multiple Encryption and Triple DES, Pseudorandom Number Generators, Pseudorandom Number Generation Using a Block Cipher, Stream Ciphers, RC4.

UNIT-IV: RSA, Diffie-Hellman Key Exchange, Elliptic Curve Cryptography, Message Authentication Code-Message Authentication Functions, Requirements, and Security, HMAC, Hash functions, Secure Hash algorithm,SHA-512.

UNIT-V: Digital Signatures, Digital Signature Standards, Authentication Protocols, Kerberos, Key Management and Distribution, X.509 Digital Certificate, NIST Digital Signature Algorithm.

UNIT-VI: Transport Level Security: Web Security Considerations, Secure Socket Layer, Transport Layer Security. Electronic mail security: Pretty Good Privacy (PGP),S/MIME.

Text Books:

1. "Cryptography and Network Security, Principles and Practices", William Stallings Pearson Education, Sixth Edition.
2. "Network Security Essentials (Applications and Standards)", William Stallings, Pearson Education Fourth Edition.
3. Cryptography and Network Security, Behrouz A Forouzan, Debdeep Mukhopadhyay, (3e) Mc Graw Hill.

Reference Books:

1. "Network Security – PrivateCommunication in a Public World" Charlie Kaufman, Radia Perlman and Mike Speciner , Pearson/PHI.

			L	T	P	C
VI Sem	**Software Testing Methodologies (Elective-II)**	Course Code: V18CST23	3	0	0	3

<u>Syllabus Details</u>

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe Software testing objectives and methodology. (K2)

CO2: Apply various Software testing techniques. (K3)

CO3: Discuss Static testing techniques for software testing. (K2)

CO4: Differentiate software testing and debugging process. (K2)

CO5: Construct test cases by understanding test suite management. (K3)

CO6: Explain modern software testing tools to support software testing. (K2)

UNIT-I: Introduction to Software Testing: Evolution of software Testing, Myths and Facts, Goals of software Testing, Definitions of Testing, Model for Software Testing, Software Testing Terminology, Software Testing Life Cycle.

UNIT-II: Verification and Validation: Verification & Validation Activities, Verification, Verification of Requirements, Verification of High level and low level designs, How to verify code, Validation. **Dynamic Testing I:** Black Box testing techniques: Boundary Value Analysis, Equivalence Class Testing, Decision Table based Testing,

UNIT-III: Dynamic Testing II: White-Box Testing: Need of White-Box Testing, Logic coverage criteria, Basis path testing, Loop testing. **Static Testing:** Inspections, Structured Walkthroughs, Technical reviews.

UNIT-IV: Regression Testing: Progressive Vs Regressive Testing, Regression testability, Objectives of regression testing, When is Regression Testing done? Regression Testing Types, Regression testing techniques. **Debugging:** Debugging process, Techniques, correcting bugs.

UNIT-V: Efficient Test Suite Management: Why does a Test Suite grow, minimizing the Test suite and its benefits, Test suite prioritization, Types of Test case prioritization, Prioritization techniques, measuring the effectiveness of a prioritized Test Suite.

UNIT-VI: Software Quality Management: Software quality concept, Quality control and Quality Assurance, Software Quality metrics. **Automation and Testing Tools:** Need for automation, categorization of Testing tools, selection of testing tools, Overview of some commercial testing tools.

Text Books:

1. Software Testing, Principles and Practices, Naresh Chauhan, 9th Edition, Oxford Publisher.

Reference Books:

1. Software testing techniques - Boris Beizer, 2nd Edition, Dreamtech publisher.
2. Foundations of Software testing, Aditya P Mathur, 2nd ed, Pearson.
3. Software Testing- Yogesh Singh, CAMBRIDGE.

VI Sem	**Principles of Programming Languages (Elective-II)**	Course Code: V18CST24	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe Syntax and Semantics of Programming Languages (K2).

CO2: Illustrate Data, Data Types and basic statements of Programming Languages (K3).

CO3: Explain various sub programming Issues (K2).

CO4: Construct programs using Object Oriented, Concurrency and Event Handling (K3).

CO5: Distinguish Programming Languages, schemes and ML (K2).

CO6: Describe Logic Programming Languages (K2).

UNIT I: SYNTAX AND SEMANTICS: Reasons for studying Programming Languages, Programming Domains, Evolution of programming languages, describing syntax, context free grammars, attribute grammars, describing semantics, lexical analysis, parsing, recursive – decent bottom – up parsing.

UNIT II: DATA TYPES AND BASIC STATEMENTS: Introduction, primitive data types, strings, array types, associative arrays, record types, tuple types , union types, pointers and references, Arithmetic expressions, overloaded operators, type conversions, relational and Boolean expressions, assignment statements , mixed mode assignments, control structures – selection, iterations, branching, guarded Statements.

UNIT III: SUBPROGRAMS AND IMPLEMENTATIONS: Subprograms, design issues, local referencing, parameter passing, overloaded methods, generic methods, design issues for functions, semantics of call and return, implementing simple subprograms, stack and dynamic local variables, nested subprograms, blocks, dynamic scoping.

UNIT IV: OBJECT- ORIENTED PROGRAMMING,EVENT HANDLING: Object Model – Classes, Visibility and Information Hiding, Inheritance, Polymorphism, Abstract Classes, Event Handling- Mouse Clicks, Mouse Motion, Buttons, Labels, Text areas, Combo boxes, Examples.

UNIT V: FUNCTIONAL PROGRAMMING LANGUAGES: Introduction to lambda calculus, fundamentals of functional programming languages, Programming with Scheme, – Programming with ML.

UNIT VI: LOGIC PROGRAMMING LANGUAGES: Introduction to logic and Horn Clauses, logic programming – Programming in Prolog, Prolog Examples-Solving Word Puzzles, Eight Queens Problem.

Text Books:

1. Concepts of Programming Languages, Robert W. Sebesta ,Tenth Edition, Addison Wesley, 2012.
2. Programming Languages, Principles & Paradigms, 2ed, Allen B Tucker, Robert E Noonan, TMH

References:

1. The Scheme programming language, R. Kent Dybvig, Fourth Edition, MIT Press, 2009.
2. Elements of ML programming, Jeffrey D. Ullman, Second Edition, Prentice Hall, 1998.
3. The craft of Prolog, Richard A. O’Keefe MIT Press, 2009.

VI Sem	Machine Learning (Elective-II)	Course Code: V18CST25	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Demonstrate basics of Machine Learning. (K2)

CO2: Explain Various Classification Techniques. (K2)

CO3: Explain Tree Based Learning and Ensemble Learning (K2)

CO4: Demonstrate Neural Networks and Multi Layer Perceptrons. (K2)

CO5: Explain Multi Layer Perceptrons and Back Propagation (K2).

CO6: Demonstrate Dimensionality Reduction Techniques (K2).

Unit-I: Introduction: Learning: Machine Learning, Types Of Machine Learning, Supervised Learning, Regression, Classification, The Machine Learning Process. Some Terminology: Weight Space, The Curse Of Dimensionality. Knowing What You Know: Testing Machine Learning Algorithms, Over fitting, Training, Testing, And Validation Sets. Some Basic Statistics: Averages Variance And Covariance, The Bias-Variance Tradeoff.

UNIT II: Classification: The General Problem, Logistic Regression, K-Nearest Neighbor Classifiers, Support Vector Machines. Assessing Performance Of Classifiers: The Confusion Matrix, Accuracy, 0/1 Loss, Sensitivity And Specificity, The Receiver Operator Characteristic (Roc) Curve. Unbalanced Datasets Measurement: Precision, Recall And F1 Score.

UNIT-III: Ensemble Learning : Boosting, Adaboost, Stumping, Bagging , Subbagging, Random Forests.

UNIT-IV: Neural Networks: The Brain And The Neuron, Hebb's Rule, Mcculloch And Pitts Neurons, Limitations Of The Mcculloch And Pitts Neuron Model, Neural Networks, The Perceptron, The Learning Rate, The Bias Input The Perceptron Learning Algorithm, An Example Of Perceptron Learning: Logic Functions Implementation, Linear Separability, Linear Regression, Linear Regression Examples

UNIT-V: The Multi Layer Perceptron(MLP): Going Forwards, Going Backwards(Back Propagation of Errors), The MLP in practice, Examples of using the MLP: Classification and Regression, Deriving Back-Propagation.

UNIT-VI: Dimensionality Reduction: Linear Discriminant Analysis (LDA), Principal Components Analysis (PCA), Relation With The Multi-Layer Perceptron, Kernel PCA, Factor Analysis, Independent Components Analysis (ICA) Locally Linear Embedding.

Text Books:

1. Machine Learning: An Algorithmic Approach.Stephen Marsland, 2nd Edition, CRC Press.

2. A First Course in Machine Learning; Volume in Machine Learning and Pattern Recognition Series – CRC-Taylor & Francis-Chapman & Hall Rogers S., Girolami M., (2011).

Reference Books:

1. Machine Learning: The art and Science of Algorithms that Make sense of Data. Peter Flach, Cambridge, First Edition, 2012.

2. Machine Learning: Tom Mitchel, McGraw Hill Learning, 1997

VI Sem	Image Processing (Elective-II)	Course Code: V18CST26	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Illustrate the different Transforms Techniques & their use in Image Processing applications (K3).

CO2: Demonstrate Spatial & frequency domain filtering (like smoothing & sharpening operations) on

Images (K3).

CO3: Describe Restoration operations/techniques on Images (K2).

CO4: Demonstrate the Image compression Techniques and multi-resolution processing on Images (K3).

CO5: Illustrate Morphological operations on Images & Image segmentation (K3).

CO6: Illustrate the different color Image Processing Techniques on Images (K3).

UNIT-I : Introduction: Introduction to Image Processing, Fundamental steps in digital image processing, components of an image processing system, image sensing and acquisition, image sampling and quantization, some basic relationships between pixels, an introduction to the mathematical tools used in digital image processing. **Image Transforms:** Need for image transforms, Discrete Fourier transform (DFT) of one variable, Extension to functions of two variables, some properties of the 2-D Discrete Fourier transform, Importance of Phase, Walsh Transform. Hadamard transform, Haar Transform, Slant transform, Discrete Cosine transform.

UNIT-II: Intensity Transformations and Spatial Filtering: Background, Some basic intensity transformation functions, histogram processing, fundamentals of spatial filtering, smoothing spatial filters, sharpening spatial filters. **Filtering in the Frequency Domain:** Preliminary concepts, The Basics of filtering in the frequency domain, image smoothing using frequency domain filters, Image Sharpening using frequency domain filters, Selective filtering.

UNIT-III: Image Restoration and Reconstruction: A model of the image degradation / Restoration process, Noise models, restoration in the presence of noise only-Spatial Filtering, Periodic Noise Reduction by frequency domain filtering, Linear, Position –Invariant Degradations, Estimating the degradation function, Inverse filtering, Minimum mean square error (Wiener) filtering, constrained least squares filtering ,geometric mean filter .

UNIT-IV: Image compression: Fundamentals, Basic compression methods: Huffman coding, Arithmetic coding, LZW coding, Run-Length coding, Bit-Plane coding. **Wavelets and Multiresolution Processing:** Image pyramids, subband coding, Multiresolution expansions, wavelet transforms in one dimensions & two dimensions, Wavelet coding.

UNIT-V: Image segmentation: Fundamentals, point, line, edge detection, thresholding, region –based segmentation. **Morphological Image Processing:** Preliminaries, Erosion and dilation, opening and closing, basic morphological algorithms for boundary extraction, thinning, gray-scale morphology.

UNIT-VI: Color image processing: color fundamentals, color models, pseudo color image processing, basics of full color image processing, color transformations, smoothing and sharpening. Image segmentation based on color, noise in color images, color image compression.

Text Books:

1. Digital Image Processing, R. C. Gonzalez and R. E. Woods, 3rd edition, Prentice Hall, 2008.

2. Digital Image Processing, Jayaraman, S. Esakkirajan, and T. Veerakumar, Tata McGraw-Hill Education, 2011.

Reference Books:

1. Fundamentals of Digital Image Processing, Anil K.Jain, Prentice Hall of India, 9th Edition, Indian Reprint, 2002.

2. Digital Image Processing and Analysis, B.Chanda, D.Dutta Majumder, PHI, 2009.

<table>
<tr><td rowspan="2">VI Sem</td><td rowspan="2">Object Oriented Analysis and Design Through UML Lab</td><td rowspan="2">Course Code: V18CSL08</td><td>L</td><td>T</td><td>P</td><td>C</td></tr>
<tr><td>0</td><td>0</td><td>3</td><td>1.5</td></tr>
</table>

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Develop OOAD and UML concepts to identify Classes, Use Cases and their relationships (K3).

CO2: Develop Class diagrams (K3).

CO3: Develop Use case diagrams (K3).

CO4: Construct Interaction diagrams (K3).

CO5: Develop State chart, Activity diagrams (K3).

CO6: Develop Component and Deployment diagrams (K3).

List of Experiments

1. Draw basic class diagrams to identify and describe key concepts like classes, and their relationships.
2. Draw one or more Use Case diagrams for capturing and representing requirements of the system. Use case diagrams must include template showing description and steps of the Use Case for various scenarios.
3. Draw sequence diagrams OR communication diagrams with advanced notation for system to show objects and their message exchanges.
4. Draw activity diagrams to display either business flows or like flow charts.
5. Develop State chart diagrams.
6. Draw component diagrams assuming that build the system reusing existing components along with a few new ones.
7. Draw deployment diagrams to model the runtime architecture of system.
8. Design Case study on Library Management System
9. Design Case Study on Hospital Management System
10. Case study-Railway Reservation System
11. Design Case study on Library Management System using C4 Model.

Text Books:

1. The Unified Modeling Language User Guide, Grady Booch, James Rumbaugh, Ivar Jacobson, Pearson Education.

. **Reference Books:**

1. UML 2 Toolkit, Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado, WILEY-Dreamtech India Pvt. Ltd.
2. Fundamentals of Object Oriented Design in UML, Meilir Page-Jones, Pearson Education.
3. Modeling Software Systems Using UML2, Pascal Roques, WILEY- Dreamtech India Pvt. Ltd.
4. (https://c4model.com/)

VI Sem	**Data Mining Lab**	Course Code: V18CSL09	L	T	P	C
			0	0	3	1.5

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Demonstrate Data Preprocessing techniques.(K3)

CO2: Demonstrate Association Rule Mining techniques.(K3)

CO3: Demonstrate Classification techniques. (K3)

CO4: Demonstrate the Clustering techniques. (K3)

List of Experiments (Using Weka Tool):

1. Demonstrate Data Preprocessing on predefined Weka dataset labor.arff
2. Create a student.arff dataset and Demonstrate Data Preprocessing on it
3. Demonstrate Association rule process on predefined Weka dataset contactlenses.arff using apriori algorithm.
4. Create an employee.arff dataset and demonstrate Association rule process on it using apriori algorithm
5. Demonstrate Classification process on student.arff dataset using j48 algorithm
6. Create a customer.arff dataset and demonstrate Classification process on it using j48 algorithm
7. Demonstrate Classification process on employee.arff dataset using id3 algorithm
8. Demonstrate Classification process on employee.arff dataset using Naïve Bayes algorithm
9. Demonstrate Clustering process on predefined Weka dataset iris.arff using simple k-means algorithm.
10. Demonstrate Clustering process on dataset student.arff using simple k- means algorithm.

Reference Books:

1. Data Mining: Practical Machine Learning Tools and Techniques, Ian H. Witten, Eibe Frank, Mark A. Hall, 3rd Edition, Morgan Kaufmann Publishers
2. Data Mining Concepts and Techniques, Jiawei Han, Micheline Kamber, Jian Pei, 3rd Edition, Morgan Kaufmann Publishers
3. Introduction to Data Mining, Pang-Ning Tan, Michael Steinbach, Vipin Kumar, 1st Edition, Pearson Education Inc.

I Sem	**Technical Skills-IV**	Course Code: V18CST63	L	T	P	C
			0	0	4	MNC

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Demonstrate java fundamentals to solve real world computational problems. (K2)

CO2: Illustrate object orientated concepts in solving problems with reusability feature. (K2)

CO3: Apply collections on java to solve complex problems in linear time. (K3)

CO4: Make use of StringBuffer and StringBuilder to solve problems in linear and logarithmic time. (K3)

CO5: Experiment with Object Oriented concepts toreduce complexity of problems.(K3)

CO6: Develop programs to solve robust programs by using Exception Handling. (K3)

Java Programming

1. Problem solving using Control Statements
2. Problem solving using Arrays
3. Problem solving using Strings ,StringBuffer, StringBuilder
4. Problem solving using OOP Concepts
5. Problem solving using Inheritance
6. Problem solving using Polymorphism
7. Problem solving Collections (includes all)
8. Problem solving using Exception Handling

Text Books:

1. Thinking on Java - O'Reilly.
2. Java Complete Reference.
3. Effective Java. Third Edition. Joshua Bloch .

<table>
<tr><td rowspan="2">VII Sem</td><td rowspan="2">Advanced Java and Web Technologies</td><td rowspan="2">Course Code: VI8CST27</td><td>L</td><td>T</td><td>P</td><td>C</td></tr>
<tr><td>3</td><td>0</td><td>0</td><td>3</td></tr>
</table>

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Illustrate the basic concepts of HTML and CSS (K2)

CO2: Develop dynamic webpages and validate with java Script. (K3)

CO3: Illustrate the basic concepts of NODE JS and Angular. (K2)

CO4: Illustrate Extensible markup language & AJAX (K2)

CO5: Build database driven web applications using JSP (K3)

CO6: Develop web applications using PHP and MySQL (K3)

UNIT-I :HTML: Basic Syntax, Standard HTML Document Structure, Basic Text Markup, Images, Hypertext Links, Lists, Tables, Frames Forms.**CSS:** Cascading style sheets, Levels of Style Sheets, Style Specification Formats, Selector Forms, Property value forms, Font Properties, List Properties, color, Alignment of Text.

UNIT-II: JavaScript: Overview of JavaScript, General Syntactic Characteristics, Primitives Operations and Expressions, Screen output and Keyboard Input, Control Statements, Object creation and Modification, Arrays, Functions, Constructors, Pattern Matching using Regular Expressions, Events and Event Handling. **DHTML:** Positioning Moving and Changing Elements.

UNIT-III: Fundamentals of NODE JS and Angular : Understanding Node.js, Installing Node.js, Working with Node Packages, Creating a Node.js Application, Understanding Angular, Modules, Directives, Data Binding, Dependency Injection, Services, Separation of Responsibilities, Creating a Basic Angular Application.

UNIT-IV: Working with XML: Introduction, The syntax of XML,XML Document Structure, Document type Definition (DTD), Namespaces, XML schemas, XSLT, XML Processors - DOM and SAX. **AJAX A New Approach**: Overview of AJAX, Basics of AJAX.

UNIT-V: Introduction to Servlets & JSP: Introduction to servlets, Life cycle of Servlet, Limitations of servlets, Java Server Pages: JSP Overview, Components of a JSP Page: Directives, comments, Expressions, Scriptlets , Declarations, implicit objects, Database Access, session tracking.

UNIT-VI: PHP Programming: Overview of PHP, General syntactic characteristics, Primitives, operations, Expressions, Output, Control statements, Arrays, Functions, Pattern Matching, Form Handling, Cookies, Session Tracking. PHP with MySQL connectivity. Integrating PHP and AJAX.

Text Books:

4. Programming the World Wide Web, 7th Edition, Robet W Sebesta, Pearson, 2013.
5. Node.js, MongoDB and Angular Web Development, 2nd Edition,Brad Dayley Brendan Dayley Caleb Dayley,Pearson Education,2018
6. JSP:The Complete reference,Phil Hanna,The McGraw-Hill Copanies,2001

Reference Books:

2. Web Technologies: HTML, JavaScript, PHP, Java, JSP, XML and AJAX, Black book, Dream Tech.

2. An Introduction to Web Design, Programming, Paul S Wang, Sanda S Katila, Cengage

Learning

3. Web Technologies, 1st Edition 7th impression, Uttam K Roy, Oxford, 2012.

VII Sem	Advanced Operating Systems	Course Code:	L	T	P	C
	(**Elective – III)**	VI8CST28	3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe Architectures of Distributed Systems and Distributed Mutual Exclusion. **(K2)**

CO2: Illustrate the concepts of Deadlock Handling Strategies in Distributed Systems. **(K3)**

CO3: Explain the various Resource Management Techniques for Distributed Systems. **(K2)**

CO4: Discuss Fault Tolerance and Fault Recovery concepts in Distributed Systems . **(K2)**

CO5: Interpret the concepts of Cryptography and Data Security in Distributed Systems. **(K3)**

CO6: Describe Multiprocessor Operating System, Process Synchronization, Scheduling. **(K2)**

UNIT I: Architectures of Distributed Systems –System Architecture types - issues in distributed operating systems - communication networks - communication primitives. Distributed Mutual Exclusion - introduction - the classification of mutual exclusion and associated algorithms

UNIT II: Distributed Deadlock Detection -Introduction - deadlock handling strategies in distributed systems - issues in deadlock detection and resolution - control organizations for distributed deadlock detection - centralized and distributed deadlock detection algorithms - hierarchical deadlock detection algorithms.

UNIT III: Distributed Resource Management- Algorithms for implementing DSM - memory coherence and protocols - design issues. Distributed Scheduling - introduction - issues in load distributing - components of a load distributing algorithm - stability - load distributing algorithm – performance comparison - selecting a suitable load sharing algorithm - requirements for load distributing.

UNIT IV: Failure Recovery and Fault tolerance: Introduction- basic concepts - classification of failures - backward and forward error recovery, backward error recovery- recovery in concurrent systems - consistent set of check points - synchronous and asynchronous check pointing and recovery - check pointing for distributed database systems- recovery in replicated distributed databases.

UNIT V: Protection and Security - Preliminaries, the access matrix model and its implementations.-safety in matrix model, advanced models of protection. Data security - cryptography: Model of cryptography, conventional cryptography- modern cryptography, multipleencryptions - authentication in distributed systems.

UNIT VI: Multiprocessor Operating Systems - Basic multiprocessor system architectures - inter connection networks for multiprocessor systems .Multiprocessor Operating System - structures of multiprocessor operating system, operating system design issues- threads- process synchronization and scheduling.

TEXT BOOKS:

1. Advanced Concepts in Operating Systems: Distributed, Database and Multiprocessor Operating Systems, MukeshSinghal, NiranjanG.Shivaratri,TMH, 2001.

2. Distributed Operating System-Concepts and Design,PradeepK.Sinha ,PHI, 2003.

REFERENCE BOOKS:

1. Modern operating system, Andrew S.Tanenbaum, PHI, 2003

2. Distributed operating system,Andrew S.Tanenbaum,Pearson education, 2003.

3. Operating System Concepts, Abraham Silberschatz; Peter Baer Galvin; Greg Gagne, Seventh Edition, John Wiley & Sons, 2004.

VII Sem	Statistics with R Programming (**Elective – III**)	Course Code: VI8CST29	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Illustrate different data structures in R. **(K2)**
CO2: Demonstrate about control statements and functions in R. **(K3)**
CO3: Compute different mathematical operations using R pre defined functions. **(K3)**

CO4: Construct and edit visualizations with R. **(K3)**
CO5: Identify appropriate statistical tests using R. **(K2)**
CO6: Examine linear and non linear models to create testable hypotheses. **(K3)**

UNIT I: Introduction and Data Structures: Introduction, How to install and run R, R Sessions, Functions, Basic Math, constants, Variables, Expressions, Reserved words in R, Arithmetic, and Boolean Operators and values, Data Types, Vectors, Advanced Data Structures: Data Frames, Lists, Matrices, Arrays, Classes.

UNIT II: Control Statements and Functions in R: R Programming Structures, Control Statements, Loops, – Looping Over Nonvector Sets,- If-Else, Default Values for Argument, return values, Deciding Whether to explicitly call return- returning Complex Objects, Functions are Objects, No Pointers in R, Recursion, A Quick sort Implementation- Extended Example: A Binary Search Tree.

UNIT III: Math and Simulation and Input/output in R: Doing Math and Simulation in R, Math Function, Extended Example Calculating Probability Cumulative Sums and Products- Minima and Maxima- Calculus, Functions for Statistical Distribution, Sorting, Linear Algebra, Operations on Vectors and Matrices, Extended Example: Vector cross Product, Set Operations. **Input /output:** Accessing the Keyboard and Monitor, Reading and writing Files

UNIT IV: Graphics: Graphics, Creating Graphs, The Workhorse of R Base Graphics, the plot() Function ,Customizing Graphs, Saving Graphs to Files.

UNIT V: Probability Distributions and Basic Statistics: Probability Distributions, Normal Distribution- Binomial Distribution- Poisson Distributions Other Distribution, Basic Statistics, Correlation and Covariance, T-Tests,-ANOVA.

UNIT VI: Linear Models in R: Linear Models, Simple Linear Regression, -Multiple Regression Generalized Linear Models, Logistic Regression, - Poisson Regression, Nonlinear Models, Splines- Decision- Random Forests.

TEXT BOOKS:

3. R for Everyone, Lander, Pearson, 2nd edition 2018.
4. The Art of R Programming, Norman Matloff, Cengage Learning, 2nd edition, 2017.

REFERENCE BOOKS:

3. R Cookbook, PaulTeetor, Oreilly, 2nd edition, 2017.
4. R in Action, Rob Kabacoff, Manning, 3rd edition, 2019.

VII Sem	Information Retrieval Systems (**Elective – III)**	Course Code: VI8CST30	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Identify the basic concepts of information retrieval. **(K2)**
CO2: Describe the Capabilities of IRS, cataloging and indexing. **(K2)**
CO3: Explain the data structures and retrieving documents. **(K2)**
CO4: Describe the difficulty of representing and retrieving documents. **(K2)**
CO5: Explain the latest technologies for describing and searching the web. **(K2)**
CO6: Illustrate searching procedure for user-text and Information System Evaluation. **(K2)**

UNIT I: Introduction: Definition, Objectives, Functional Overview, Relationship to DBMS, Digital libraries and Data Warehouses.

UNIT II: Information Retrieval System Capabilities: Search, Browse, Miscellaneous **Cataloging and Indexing:** Objectives, Indexing Process, Automatic Indexing, Information Extraction.

UNIT III: Data Structures: Introduction, Stemming Algorithms, Inverted file structures, N-gram data structure, PAT data structure, Signature file structure, Hypertext data structure.

UNIT IV: Automatic Indexing: Classes of automatic indexing, Statistical indexing, Natural language, Concept indexing, Hypertext linkages. **Document and Term Clustering:** Introduction, Thesaurus generation, Item clustering, Hierarchy of clusters.

UNIT V: User Search Techniques: Search statements and binding, Similarity measures and ranking, Relevance feedback, Selective dissemination of information search, weighted searches of Boolean systems, Searching the Internet and hypertext. **Information Visualization:** Introduction, Cognition and perception, Information visualization technologies.

UNIT VI: Text Search Algorithms: Introduction, Software text search algorithms, Hardware text search systems. **Information System Evaluation:** Introduction, Measures used in system evaluation, Measurement example – TREC results.

Text Books:

2. Information Storage and Retrieval System: Theory and Implementation, Gerald J. Kowalski, Mark T. Maybury, 2nd edition, 2002, Kluwer Academic Press.

Reference Books:

3. Information Retrieval Data Structures and Algorithms, Frakes, W.B., Ricardo Baeza-Yates Prentice Hall.
4. Information Storage & Retrieval by Robert Korfhage – John Wiley & Sons, Wiley computer publisher, 1997.

<table>
<tr><td rowspan="2">VII Sem</td><td rowspan="2">Human Computer Interaction
(Elective – III)</td><td rowspan="2">Course Code:
VI8CST31</td><td>L</td><td>T</td><td>P</td><td>C</td></tr>
<tr><td>3</td><td>0</td><td>0</td><td>3</td></tr>
</table>

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe the principles and characteristics of GUI. **(K2)**
CO2: Recognize how a computer system may be modified to include human diversity. **(K2)**
CO3: Select an effective style for a specific application. **(K2)**
CO4: Discuss Screen Designing mock-ups and carry out user and expert evaluation of interfaces.**(K2)**
CO5: Explain System Menus & Navigation Schemes. **(K2)**
CO6: Discuss Device and Screen based controls. **(K2)**

UNIT I: The User Interface: Introduction, Importance of the User Interface, Importance and benefits of Good Design History of Human Computer Interface. Characteristics of Graphical and Web User Interface: Graphical User Interface, popularity of graphics, concepts of Direct Manipulation, Graphical System advantage and disadvantage, Characteristics of GUI. Web User Interface, popularity of web, Characteristics of Web Interface, Merging of Graphical Business systems& the Web, Principles of User Interface Design.

UNIT II: The User Interface Design Process: Obstacles and Pitfall in the development Process, Usability, The Design Team, Human Interaction with Computers, Important Human Characteristics in Design, Human Consideration in Design, Human Interaction Speeds, Performance versus Preference, Methods for Gaining and Understanding of Users.

UNIT III: Understanding Business Functions: Business Definitions & Requirement analysis, Determining Business Functions, Design standards or Style Guides, System Training and Documentation.

UNIT IV: Principles of Good Screen Design: Human considerations in screen Design, interface design goals, test for a good design, screen meaning and purpose, Technological considerations in Interface Design.

UNIT V: System Menus and Navigation Schemes: Structure, Functions, Context, Formatting, Phrasing and Selecting, Navigating of Menus, Kinds of Graphical Menus Windows Interface: Windows characteristic, Components of Window, Windows Presentation Styles, Types of Windows, Window Management, Websystems

UNIT VI: Device and Screen-Based Control: Device based controls, Operable Controls, Text entry/read-Only Controls, Section Controls, Combining Entry/Selection Controls, Other Operable Controls and Presentation Controls, Selecting proper controls

Text Books:

1. "The Essential Guide to User Interface Design", Wilbert O. Galitz, 2nd edition,2002,Wiley India Edition.
2. Prece, Rogers, "Sharps Interaction Design", Wiley India.
3. "Designing the user interfaces". Ben Shneidermann 3rd Edition, Pearson Education Asia.

.**Reference Books:**

1. "User Interface Design" , SorenLauesen, Pearson Education
2. "Essentials of Interaction Design", Alan Cooper, Robert Riemann, David Cronin, Wiley
3. "HumanComputer Interaction", Alan Dix, Janet Fincay, GreGoryd, Abowd, Russell, Bealg, Pearson Education.

VII Sem	Distributed Systems (**Elective – IV)**	Course Code: VI8CST32	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe distributed system and desired properties of such systems. **(K2)**
CO2: Discuss the theoretical concepts, namely, virtual time and agreement. **(K2)**
CO3: Discuss the basic concepts of distributed systems and Characteristics of IPC protocols. **(K2)**
CO4: Explain the mechanisms such as Remote procedure call (RPC/RMI) and OSS . **(K2)**
CO5: Explain the mechanisms such as file systems and P2P algorithms. **(K2)**
CO6: Discuss the Transactions and Replications in distributed systems. **(K2)**

UNIT I: Characterization of Distributed Systems: Introduction, Examples of Distributed Systems, Resource Sharing and the Web, Challenges. **System Models:** Introduction, Architectural Models- Software Layers, System Architecture, Variations, Interface and Objects, Design Requirements for Distributed Architectures, Fundamental Models- Interaction Model, Failure Model, Security Model.

UNIT II: Time and Global States: Introduction, Clocks Events and Process States, Synchronizing Physical Clocks, Logical Time and Logical Clocks, Global States, Distributed Debugging.

Coordination and Agreement: Introduction, Distributed Mutual Exclusion, Elections, Multicast Communication, Consensus and Related Problems.

UNIT III: Inter process Communication: Introduction, The API for the Internet Protocols- The Characteristics of Inter process communication, Sockets, UDP Datagram Communication, TCP Stream Communication; External Data Representation and Marshalling; Client Server Communication; Group Communication, Case Study: MPI.

UNIT IV:: Remote Invocation: Introduction, Request-reply protocols, Remote Procedure Call, Events and Notifications, **Case Study:** JAVA RMI.. **Operating System Support:** Introduction, The Operating System Layer, Protection, Processes and Threads –Address Space, Creation of a New Process, Threads.

UNIT V: Distributed File Systems: Introduction, File Service Architecture; Peer-to-Peer Systems: Introduction, Napster and its Legacy, Peer-to-Peer Middleware, Routing Overlays. **Case Study1:** Sun Network File system. **Case Study 2:** The Andrew File System.

UNIT VI: Transactions & Replications: Introduction, System Model and Group Communication, Concurrency Control in Distributed Transactions, Distributed Dead Locks, Transaction Recovery; Replication-Introduction, Passive (Primary) Replication, Active Replication.

Text Books:

1. "Distributed Systems- Concepts and Design", George Coulouris, Jean Dollimore, Tim Kindberg, Fourth Edition, Pearson Publication
2. "Distributed Computing, Principles, Algorithms and Systems", Ajay D Kshemkalyani, MukeshSighal, Cambridge.

Reference Books:

1. "Distributed Systems, Principles and Paradigms", Andrew S. Tanenbaum, Maarten Van Steen, 2d Edition, PHl.
2. "Distributed Systems, An Algorithm Approach," Sukumar Ghosh, Chapman & HalyCRC, Taylor & Fransis Group, 2007.

VII Sem	Scripting Languages (**Elective – IV)**	Course Code: VI8CST33	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Illustrate the concepts of scripting languages. **(K2)**

CO2: Develop Scripting for application using Ruby. **(K3)**

CO3: Explain the concepts of Programming in Perl. **(K2)**

CO4: Construct programs using Perl. **(K3)**

CO5: Describe TCL Scripting and their applications. **(K2)**

CO6: Discuss features of Groovy when compare with other Scripting Languages. **(K2)**

UNIT I: Introduction: Ruby, Rails, the structure and Execution of Ruby Programs, Package Management with RUBYGEMS, Ruby and web: Writing CGI scripts, cookies, Choice of Webservers, SOAP and web services. RubyTk – Simple Tk Application, widgets, Binding events, Canvas, scrolling.

UNIT II: Extending Ruby: Ruby Objects in C, the Jukebox extension, Memory allocation, Ruby TypeSystem, Embedding Ruby to Other Languages, Embedding a Ruby Interpreter.

UNIT III: Introduction to PERL and Scripting: Scripts and Programs, Origin of Scripting, Scripting Today, Characteristics of Scripting Languages, Uses for Scripting Languages, Web Scripting, and the universe of Scripting Languages. PERL- Names and Values, Variables, Scalar Expressions, Control Structures, arrays, list, hashes, strings, pattern and regular expressions, subroutines.

UNIT IV: Advanced Perl: Finer points of looping, pack and unpack, file system, eval, data structures, packages, modules, objects, interfacing to the operating system, Creating Internet ware applications, Dirty Hands Internet Programming, security Issues.

UNIT V:TCL: TCL Structure, syntax, Variables and Data in TCL, Control Flow, Data Structures, input/output, procedures, strings, patterns, files, Advance TCL- eval, source, exec and uplevel commands, Name spaces, trapping errors, event driven programs, making applications internet aware, Nuts and Bolts Internet Programming, Security Issues, C Interface.

UNIT VI: Groovy: Features of Groovy, Environment, Basic Syntax, data types, variables, operators, loops, decision making, methods, File i/o, Optionals , numbers, strings, ranges, lists, maps, date and time, Regular expressions, Exception Handling, OO concepts.

Text Books:

1. The World of Scripting Languages, David Barron, Wiley Publications.
2. Ruby Programming language by David Flanagan and Yukihiro Matsumoto O'Reilly.
3. "Programming Ruby" The Prammatic programmers guide by Dabve Thomas Second edition.

Reference Books:

1. Open Source Web Development with LAMP using Linux, Apache, MySQL, Perl and PHP, J.Lee and B.Ware (Addison Wesley) Pearson Education.
2. Perl by Example, E.Quigley, Pearson Education.
3. Programming Perl, Larry Wall T.Christiansen and J.Orwant, O'Reilly, SPD.
4. Tcl and the Tk Toolkit, Ousterhout, Pearson Education.
5. Pearl Power, J.P. Flynt, Cengage Learning.

<table>
<tr><td rowspan="2">VII Sem</td><td rowspan="2">Deep Learning
(Elective – IV)</td><td rowspan="2">Course Code:
VI8CST34</td><td>L</td><td>T</td><td>P</td><td>C</td></tr>
<tr><td>3</td><td>0</td><td>0</td><td>3</td></tr>
</table>

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Explain the basics of machine learning. **(K2)**

CO2: Demonstrate the working of an artificial neural network. **(K2)**

CO3: Identify various parameters and issues while training a deep neural network. **(K2)**

CO4: Explain the working of convolution neural networks. **(K2)**

CO5: Explain the working of recurrent neural networks. **(K2)**

CO6: Recognize the ways of applying deep learning techniques for complex problem-solving. **(K2)**

UNIT I: Machine Learning Basics: Learning Algorithms, Capacity, Overfitting and Underfitting, Hyper parameters and Validation Sets, Estimators, Bias and Variance, Maximum Likelihood Estimation, Bayesian Statistics, Supervised Learning Algorithms, Unsupervised Learning Algorithms, Stochastic Gradient Descent.

UNIT II: Introduction to Neural Networks: The Basic Architecture of Neural Networks- Single Computational Layer: The Perceptron, Multilayer Neural Networks; Training a Neural Network with Backpropagation, Practical Issues in Neural Network Training-The Problem of Overfitting, The Vanishing and Exploding Gradient Problems, Difficulties in Convergence, Local and Spurious Optima;

UNIT III: Training Deep Neural Networks: Introduction, Backpropagation: Backpropagation with the Computational Graph Abstraction, Dynamic Programming to the Rescue, Backpropagation with Post-Activation Variables and Pre-activation Variables, Setup and Initialization Issues, The Vanishing and Exploding Gradient Problems, Parameter-Specific Learning Rates- AdaGrad, RMSProp, AdaDelta, Adam.

UNIT IV: Convolutional Neural Networks: Introduction, The Basic Structure of a Convolutional Network- Padding, Strides, Typical Settings, The ReLU Layer, Pooling, Fully Connected Layers, The Interleaving Between Layers, Local Response Normalization, Hierarchical Feature Engineering; Training a Convolutional Network- Backpropagating Through Convolutions.

UNIT V: Recurrent Neural Networks: Introduction, The Architecture of Recurrent Neural Networks- Language Modeling Example of RNN, Backpropagation Through Time, Bidirectional Recurrent Networks, Multilayer Recurrent Networks; Long Short-Term Memory (LSTM), Gated Recurrent Units (GRUs).

UNIT VI: Applications Deep Learning: Applications of Convolutional Networks: Content-Based Image Retrieval, Object Localization, Object Detection, Natural Language and Sequence Learning; Application of Recurrent Neural Networks: Application to Automatic Image Captioning, Time-Series Forecasting and Prediction, End-to-End Speech Recognition, Handwriting Recognition.

Text Books:

1. Deep Learning, Ian Goodfellow, Ian Goodfellow, and Aaron Courville, MIT Press.
2. Neural Networks and Deep Learning, Charu C. Aggarwal, Springer.

Reference Books:

1. Neural Networks: A Systematic Introduction, Raúl Rojas, Springer.
2. Introduction to Deep Learning, Eugene Charniak, MIT Press.

VII Sem	Social Networks and semantic web (**Elective – IV)**	Course Code: VI8CST35	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Demonstrate knowledge by explaining the three different "named" generations of the web. **(K3)**
CO2: Construct a social network. **(K3)**
CO3: Relate knowledge representation methods for semantic web. **(K3)**
CO4: Explain the key aspects of Web Architecture. **(K2)**
CO5: Describe web services and its Applications. **(K2)**
CO6: Develop "Linked Data" Applications using Semantic Web Technologies. **(K3)**

UNIT-I: The Semantic web: Limitations of the current Web, The semantic solution, Development of the Semantic Web, The emergence of the social web.

UNIT-II: Social Network Analysis: What is network analysis? Development of Social Network Analysis, Key concepts and measures in network analysis. Electronic sources for network analysis: Electronic discussion networks, Blogs and online communities, Web-based networks.

UNIT-III: Knowledge Representation on the Semantic Web: Ontologies and their role in the Semantic Web, Ontology languages for the semantic Web.

UNIT-IV: Modeling and Aggregating Social Network Data: State of the art in network data representation, Ontological representation of Social individuals, Ontological representation of social relationships, Aggregating and reasoning with social network data.

UNIT-V: Developing social semantic applications: Building Semantic Web applications with social network features, Flink- the social networks of the Semantic Web community, Open academia: distributed, semantic-based publication management.

UNIT-VI: Evaluation of Web-Based Social Network Extraction: Differences between survey methods and electronic data extraction, context of the empirical study, Data collection, Preparing the data, optimizing goodness of fit, Comparison across methods and networks, Predicting the goodness of fit, Evaluation through analysis.

Text Books:

1. Social Networks and the Semantic Web, PeterMika, Springer,2007.
2. Semantic Web Technologies, Trends and Research in Ontology basedsystems, J.Davies,RudiStuder,PaulWarren,JohnWiley&Sons.

Reference Books:

1. Semantic Web and Semantic Web Services –Liyang Lu Chapman and Hall/CRC Publishers, (Taylor & Francis Group)
2. Information Sharing on the semantic Web – Heiner Stuckenschmidt; Frank Van Harmelen, Springer Publications

VII Sem	Advanced Java and Web Technologies Lab	Course Code: VI8CSL10	L	T	P	C
			0	0	2	1

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Develop static web pages using HTML, CSS. **(K3)**

CO2: Demonstrate the concepts of JavaScript, DHTML and XML. **(K3)**

CO3: Develop Web Applications using JSP. **(K3)**

CO4: Develop dynamic Web Applications using PHP & MySQL. **(K3)**

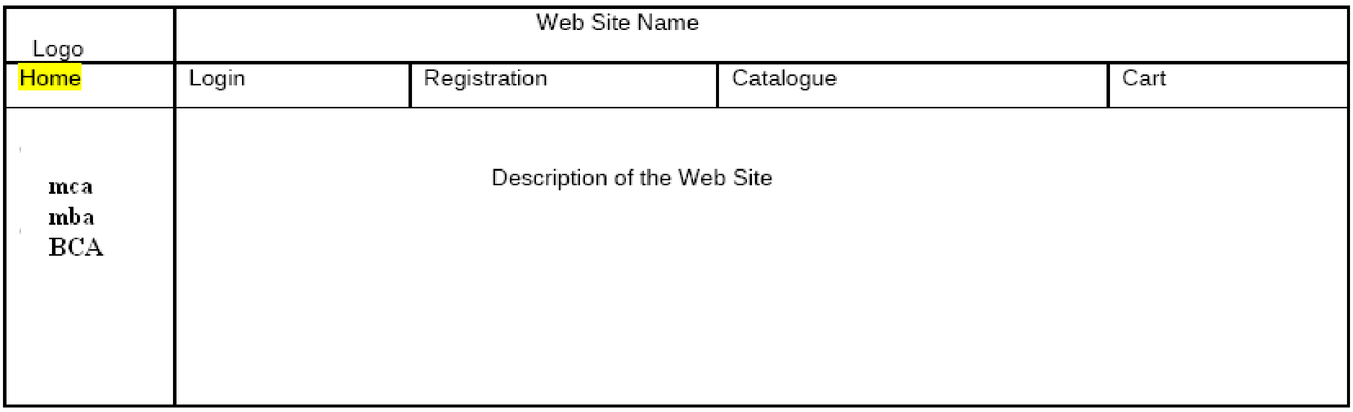
List of Experiments

1) Design the following static web pages required for an online book store web site:

(a) **HOME PAGE:**

The static home page must contain three **frames**.

Top frame: Logo and the college name and links to Home page, Login page, Registration page, Catalogue page and Cart page (the description of these pages will be given below). Left frame: At least four links for navigation, which will display the catalogue of respective links. For e.g.: When you click the link **"MCA"** the catalogue for MCA Books should be displayed in the Right frame. Right frame: The *pages to the links in the left frame must be loaded here.* Initially this page contains description of the web site



(b) **LOGIN PAGE:**

Logo	Web Site Name			
Home	Login	Registration	Catalogue	Cart
MCA MBA BCA	Login : 11a51f0003 Password: ******** Submit Reset			

(c) **CATALOGUE PAGE:**

The catalogue page should contain the details of all the books available in the web site in a table: The details should contain the following:

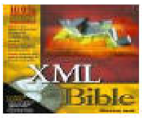
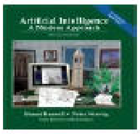
1. Snap shot of Cover Page.

2. Author Name.

3. Publisher.

4. Price.

5. Add to cart button.

Logo	Web Site Name			
Home	Login	Registration	Catalogue	Cart
MCA MBA		Book : XML Bible Author : Winston Publication : Wiely	$ 40.5	Add to cart
BCA		Book : AI Author : S.Russel Publication : Princeton hall	$ 63	Add to cart
		Book : Java 2 Author : Watson Publication : BPB publications	$ 35.5	Add to cart
		Book : HTML in 24 hours Author : Sam Peter Publication : Sam	$ 50	Add to cart

(d). **REGISTRATION PAGE:**

Create a "*registration form* "with the following fields

1) Name (Text field)

2) Password (password field)

3) E-mail id (text field)

4) Phone number (text field)

5) Sex (radio button)

6) Date of birth (3 select boxes) 7) Languages known (check boxes – English, Telugu, Hindi, Tamil)

2) Design a web page using **CSS (C**ascading **S**tyle **S**heets**)** which includes the following: Use different font, styles:

In the style definition you define how each selector should work (font, color etc.).

5) Design a login page and Make use of Events to perform validation using JavaScript.

6) Demonstrate a JavaScript program to perform On Mouse over event.

5) Demonstrate the concept of Mouse events (Ex:ng-click) with the help of Angular JS.

6) Design a simple Angular JS form.

7) Write an XML file which will display the Book information which includes the following:

1) Title of the book

2) Author Name

3) ISBN number

4) Publisher name

5) Edition

6) Price

a) Write a Document Type Definition (DTD) to validate the above XML file.

b) Write a XML Schema Definition (XSD)

8) Create a simple JSP to print the current Date and Time.

9)Create JSP to insert the details of 3 or 4 users using a registration form store these values in the data base and then check the authentication of the user by entering the name and password using a login form.

10) Assume four users user1, user2, user3 and user4 having the passwords pwd1, pwd2, pwd3 and pwd4 respectively. Write a PHP for doing the following.

A)

1. Create a Cookie and add these four user id's and passwords to this Cookie.

2. Read the user id and passwords entered in the Login form (week1) and authenticate with the values (user id and passwords) available in the cookies.

If he is a valid user (i.e., user-name and password match) you should welcome him by name (user-name) else you should display “You are not an authenticated user ”.

C) Use init-parameters to do the same.

11) Create a table which should contain at least the following fields: name, password, email id, phone number (these should hold the data from the registration form).

Write a PHP program to connect to that database and extract data from the tables and display them. Experiment with various SQL queries. Insert the details of the users who register with the web site, whenever a new user clicks the submit button in the registration page.

12) Insert the details of the 3 or 4 users who register with the web site by using registration form. Authenticate the user when he submits the login form using the user name and password from the database.

Reference Books:

1. Web Technologies: HTML, JavaScript, PHP, Java, JSP, XML and AJAX, Black book, Dream Tech.
2. An Introduction to Web Design, Programming, Paul S Wang, Sanda S Katila, Cengage Learning
3. Web Technologies, 1st Edition 7th impression, Uttam K Roy, Oxford, 2012.

VIII Sem	Software Project Management (**Elective – V)**	Course Code: VI8CST36	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe Software Project Management Terminology. **(K2)**
CO2: Explain various Software development process Models and software Life cycle phases. **(K2)**
CO3: Illustrate various Effort Estimation Techniques and activity network models for Software Project Planning. **(K3)**
CO4: Demonstrate Risk Management Concepts and resource allocation. **(K3)**
CO5: Explain the importance of Project monitoring and control for accomplishing project goals. **(K2)**
CO6: Describe Software Quality models. **(K2)**

UNIT I: Introduction to Software Project Management: Software Project versus other types of projects, Activities covered by Software Project Management, Categorizing projects ,Stakeholders, Objectives& goals, what is management. **Project Planning:** Step-wise planning, Identify Project Scope and objectives, Infrastructure, Project Products &deliverables, Project activities, Effort estimation.

UNIT II: Project Approach: Build or buy, **process models**: waterfall model, Prototyping, Incremental delivery model, **Agile methods**: Extreme Programming, Atern method, selecting an appropriate process model. **Lifecycle phases:** Engineering and Production stages, Inception, Elaboration, Construction, Transition phases.

UNIT III: Software effort estimation and Activity planning: Overview of Effort Estimation techniques, Function Point analysis, COCOMO. **Activity planning:** Objectives, Network planning models, forward pass and backward pass, Identify Critical path and activities.

UNIT IV: Risk Management and Resource Allocation: Introduction, Risk and its categories, Identification, Assessment, Risk Planning and management, applying PERT technique. Resource Allocation: Types of Resources, Identifying resource requirements, Resource scheduling.

UNIT V: Project Monitoring and Control: Creating framework for monitoring& control, Collecting Data, Visualizing Progress, Cost monitoring, Earned value Analysis.

UNIT VI: Software Quality: Defining Quality, Importance of quality, ISO 9126, Product QualityVs Process Quality management. **Process Capability Models:** Capability Maturity Model, Enhancing software Quality.

Text Books:

1. SoftwareProjectManagement, Bob Hughes & Mike Cotterell, 6th edition, TATA Mcgraw-Hill

2. Software Project Management, WalkerRoyce 2nd edition, Pearson Education.

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Reference Books:

1. Software Project Management in practice, PankajJalote, 9th edition, Pearson Education.

2. Software Project Management, Joel Henry, 3rd edition, Pearson Education.

VIII Sem	Big Data Analytics (**Elective – V)**	Course Code: VI8CST37	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Discuss the challenges of Big Data using Hadoop. **(K2)**

CO2: Interpret Hadoop's architecture and core components of Hadoop Distributed File System. **(K2)**

CO3: Apply data modelling techniques to large data sets using map reduce programs. **(K3)**

CO4: Describe the Hadoop I/O classes. **(K2)**

CO5: Examine the use of Pig Framework to work with big data. **(K3)**

CO6: Develop a data analytical system using HIVE. **(K3)**

UNIT I: Introduction to Big Data: What is Big Data, Why Big Data is Important, Data Storage and Analysis, Comparison with other systems, Grid Computing. **Introduction to Hadoop:** A brief history of Hadoop, Meet Hadoop Data, Apache Hadoop and the Hadoop Ecosystem.

UNIT II: Working with Big Data & HDFS: Google File System, Hadoop Distributed File System (HDFS) –Building blocks of Hadoop (Namenode, Datanode, Secondary Namenode, JobTracker, and TaskTracker). **Introducing and Configuring Hadoop cluster:** Local distributed mode, Pseudo-distributed mode, Fully Distributed mode, Configuring XML files.

UNIT III: Writing Map Reduce Programs: A Weather Dataset –Data Format, Analyzing Data with UNIX Tools, Analyzing the Data with Hadoop-Map Reduce. **Basic programs of Hadoop Map Reduce:** Driver code,Mapper code, Reducer code, RecordReader, Combiner functions. Map Reduce Types, Input Formatclass Hierarchy, other map reduce examples (word count).

UNIT IV: Hadoop I/O: The Writable Interface, Writable Comparable and Comparators. **Writable Classes:** Writable wrappers for Java primitives, Text & Bytes Writable, NullWritable, ObjectWritable and Generic Writable, Writable collections. **Implementing a Custom Writable:** Implementing a Raw Comparator for speed, Custom comparators

UNIT V: Pig - Hadoop Programming Made Easier: Admiring the Pig Architecture, Going with the Pig Latin Application Flow, Working through the ABCs of Pig Latin, Evaluating Local and Distributed Modes of Running Pig Scripts, Checking out the Pig Script Interfaces, Scripting with Pig Latin.

UNIT VI: Applying Structure to Hadoop Data with Hive: Saying Hello to Hive, Seeing How the Hive is Put Together, Getting Started with Apache Hive, Examining the Hive Clients, Working with Hive Data Types, Creating and Managing Databases and Tables, Seeing How the Hive Data Manipulation Language Works, Querying and Analyzing Data.

Text Books:

1. Hadoop: The Definitive Guide, Tom White, O'Reilly, 3rd Edition, 2012.
2. Hadoop in Action, Chuck Lam, MANNING Publ., 2016.
3. Hadoop for Dummies, Dirk deRoos, Paul C.Zikopoulos, Roman B.Melnyk, Bruce Brown, Rafael Coss, 2014.

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Reference Books:

1. Hadoop in Practice, Alex Holmes, MANNING Publ., 2014.
2. Hadoop Map Reduce Cookbook, Srinath Perera, Thilina Gunarathne, PACKT, 2013.

<table>
<tr><td rowspan="2">VIII Sem</td><td rowspan="2">Soft Computing
(Elective – V)</td><td rowspan="2">Course Code:
VI8CST38</td><td>L</td><td>T</td><td>P</td><td>C</td></tr>
<tr><td>3</td><td>0</td><td>0</td><td>3</td></tr>
</table>

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Discuss about Soft Computing, Requirements and Applications of Soft Computing. **(K2)**
CO2: Discuss about various Supervised and Unsupervised Learning Networks. **(K2)**
CO3: Illustrate various Fuzzy Logic, Fuzzy Sets, Crisp sets, Fuzzification and De-fuzzification Principles. **(K2)**
CO4: Discuss about Fuzzy Arithmetic and Fuzzy measures. **(K2)**
CO5: Discuss about Genetic Algorithms and its Operators. **(K2)**
CO6: Discuss about Various Hybrid Soft Computing Techniques. (**K2)**

UNIT I: Introduction: What is Soft Computing? Difference between Hard and Soft computing, Requirements of Soft computing, Major Areas of Soft Computing, Applications of Soft Computing.

UNIT II: Associative Memory Networks: (Supervised Learning): Introduction, Training Algorithms for Pattern Association, Auto-associative Memory Network, Hetero-associative Memory Network, Bidirectional Associative Memory (BAM),Hopfield Networks, Iterative Auto-associative Memory Networks, Temporal Associative Memory Network. **Unsupervised Learning Networks:** Introduction, Fixed Weight Competitive Nets, Kohonen Self-Organizing Feature Maps, Learning Vector Quantization, Counter propagation Networks, Adaptive Resonance Theory Network.

UNIT III: Introduction to Fuzzy Logic, Classical Sets and Fuzzy Sets: Introduction to Fuzzy Logic, Classical Sets (Crisp Sets), Fuzzy Sets and Operations on Fuzzy sets-Compliment, Intersections, Unions.

Membership Function: Introduction, Features of the Membership Functions, Fuzzification, Methods of Membership Value Assignments. **Defuzzification:** Introduction, Lambda-Cuts for Fuzzy Sets (Alpha-Cuts), Lambda-Cuts for Fuzzy Relations, Defuzzification Methods

UNIT IV: Fuzzy Arithmetic and Fuzzy Measures: Introduction, Fuzzy Arithmetic, Extension Principle, Fuzzy Measures, Measures of Fuzziness, Fuzzy Integrals.

UNIT V: Genetic Algorithm: Introduction to genetic algorithm, operators in genetic algorithm, stopping condition for genetic algorithm flow.

UNIT VI: Hybrid Soft Computing Techniques: Introduction, Neuro-Fuzzy Hybrid Systems, Genetic Neuro-Hybrid Systems.

Text Books:

1. Principles of Soft Computing, S.N. Sivanandam and S.N. Deepa, 3-edition, Wiley India, 2007.
2. “Fuzzy Sets & Fuzzy Logic”, G.J. Klir & B. Yuan, PHI, 1995.
3. “An Introduction to Genetic Algorithm”, Melanie Mitchell, PHI, 1998.

Reference Books:

1. Neural Networks, Fuzzy Logic and Genetic Algorithms, S. Rajasekaran and G.A.V.Pai, PHI, 2003.

2. Fuzzy Logic with Engineering Applications, Timothy J.Ross, McGraw-Hill, 1997.

3. Neuro-Fuzzy and Soft Computing, J.S.R.Jang, C.T.Sun and E.Mizutani, PHI, 2004, Pearson Education.

<table>
<tr><td rowspan="2">VIII Sem</td><td rowspan="2">Cloud Computing
(Elective – V)</td><td rowspan="2">Course Code:
VI8CST39</td><td>L</td><td>T</td><td>P</td><td>C</td></tr>
<tr><td>3</td><td>0</td><td>0</td><td>3</td></tr>
</table>

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Outline the concepts of cloud computing architecture. **(K2)**
CO2: Describe the Virtualization concepts in different scenarios. **(K2)**
CO3: Explain the best policies for cloud deployment. **(K2)**
CO4: Illustrate the design issues of Cloud computing. **(K2)**
CO5: Illustrate the security and privacy of the data in cloud computing. **(K2)**
CO6: Demonstrate cloud instances in Amazon Web Services. **(K3)**

UNIT I: Introduction to Cloud Computing: Trends in Computing - Distributed Computing, Grid Computing, Cluster Computing, Utility Computing, Cloud Computing, Definition of Cloud Computing, Characteristics, Service Models, Deployment Models, Cloud Service Models Providers, Advantages and Disadvantages of Cloud Computing, Cloud-based Services &Applications.

UNIT II: Cloud Concepts & Technologies: Virtualization and its types, Software Defined Networking, Network Function Virtualization (NFV). **Cloud Services:** Compute Services, Storage Services, Database Services, Application Services

UNIT III: Cloud Application Design: Design Considerations for Cloud Applications, Reference Architectures for Cloud Applications, Cloud Application Design Methodologies: SOA, Cloud Component Model and MVC, Data Storage Approaches.

UNIT IV: Cloud Security: Cloud Security Architecture (CSA), Authentication, Authorization, Identity & Access Management, Data Security, Key Management.

UNIT V: Migrating into a Cloud: Broad Approaches to Migrating into the Cloud, The Seven-Step Model of Migration into a Cloud, Migration Risks and mitigation, Phases of Migrating to Cloud, benefits and risks of Migrating to Cloud.

UNIT VI: SLA Management in Cloud Computing: Service Level Agreements (SLA), Considerations for SLA, SLA Requirements, Types of SLA, Life Cycle of SLA, SLA Management in Cloud. **Case Study:** Amazon AWS: EC2, Amazon Simple DB, Amazon S3, Amazon Cloud Front and Amazon SQS.

Text Books:

1. Cloud Computing: A Hands-on Approach, ArshdeepBahga, Vijay Madisetti,Universities Press.
2. Cloud Computing: Principles and Paradigms, Rajkumar Buyya, James Broberg, Andrzej Goscinski, Wiley Publication.

Reference Books:

1. Cloud Computing – Web-Based Applications That Change the way you Work and Collaborate Online, Michael Miller, Pearson Education.
2. Cloud Computing: A Practical Approach, Anthony T. Velte, Toby J. Velte, Robert Elsenpeter, McGraw-Hill, (2010).

VIII Sem	Software Architecture & Design Patterns (**Elective – VI)**	Course Code: VI8CST40	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe Architectural Structures and Quality Attributes. (K2)

CO2: Explain the mechanism of Evaluating Architecture. (K2)

CO3: Demonstrate Creational Patterns. (K3)

CO4: Construct Structural Patterns for a given Scenario. (K3)
CO5. Construct Behavioural Patterns for a given Scenario. (K3)
CO6. Examine various Case Studies in utilizing Software Architectures. (K3)

UNIT-I: Envisioning Architecture The Architecture Business Cycle, What is Software Architecture, Architectural patterns, reference models, reference architectures, architectural structures and views. Creating and Architecture Quality Attributes, Achieving qualities, Designing the Architecture.

UNIT-II: Analyzing Architectures Architecture Evaluation, Architecture design decision making, ATAM, CBAM. Software Product Lines, Software architecture in future.

UNIT-III: Pattern Description, role in solving design problems, Selection and usage.**Creational Patterns**: Abstract factory, Builder, Factory method, Prototype, Singleton.

UNIT-IV: Structural Patterns: Adapter, Bridge, Composite, Decorator, Façade, Flyweight, PROXY.

UNIT-V: Behavioural Patterns: Chain of responsibility, command, Interpreter, iterator, mediator, memento, observer, state, strategy, template method, visitor.

UNIT-VI: Case Studies **A-7E – A case study** in utilizing architectural structures, The **World Wide Web** - a case study in Interoperability, **Air Traffic Control** – a case study in designing for high availability, **Celsius Tech** – a case study in product line development.

Text Books:

1. Software Architecture in Practice, second edition, Len Bass, Paul Clements & Rick Kazman, Pearson Education, 2003.

2. Design Patterns, Erich Gamma, Pearson Education, 1995.

Reference Books:

1. Beyond Software architecture, Luke Hohmann, Addison wesley, 2003.

2. Software architecture, David M. Dikel, David Kane and James R. Wilson, Prentice Hall PTR, 2001

3. Software Design, David Budgen, second edition, Pearson education, 2003

4. Head First Design patterns, Eric Freeman & Elisabeth Freeman, O'REILLY, 2007.

5. Design Patterns in Java, Steven John Metsker & William C. Wake, Pearson education, 2006.

VIII Sem	Middleware Technologies (**Elective – VI)**	Course Code: VI8CST41	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Illustrate Middleware, E- Business, IT architecture, RPC, RDC. **(K2)**
CO2: Demonstrate Internet Applications and Web services. **(K2)**
CO3: Summarize Technical issues in Middleware. **(K2)**
CO4: Demonstrate the Use of Middleware in Building Distributed Technologies. **(K2)**
CO5: Identify Security Issues with Distributed Applications. **(K3)**

CO6: Apply Appropriate Middleware Technology to Develop Real Time Applications. **(K3)**

UNIT I: Introduction: Moving to e-business, what is IT architecture? Why is this different from what we did before? Rewrite or evolve?, Who develops the architecture?, Early days, Preliminaries, Remote procedure calls, Remote database access, Distributed transaction processing, Message queuing, Message queuing versus distributed transaction processing, what happened to all this technology.

UNIT II: Objects, Components and the Web: Using object middleware, Transactional component middleware- COM+, EJB, Final comments on TCM, Internet Applications. WEB SERVICES: Service concepts, Web services, and Using Web services: A pragmatic approach.

UNIT III: A Technical Summary Of Middleware: Middleware elements- The communications link, The middleware protocol, The programmatic interface, Data presentation, Server control, Naming and directory services, Security, System management, Comments on Web services, Vendor architectures- Vendor platform architectures, Vendor-distributed architectures, Using vendor architectures, Positioning, Strawman for user target architecture, Marketing, Implicit architectures, Middleware interoperability.

UNIT IV: Using Middleware to Build Distributed Applications: What is middleware for? - Support for business processes, Information retrieval, Collaboration, Tiers- The presentation tier, The processing tier, The data tier, Services versus tiers, Architectural choices - Middleware bus architectures, Hub architectures, Web services architectures, Loosely coupled versus tightly coupled.

UNIT V: Security: What security is needed, Traditional distributed system security, Web services security, Architecture and security. **Application Design and It's Architecture :** Problems with today's design approaches, Design up front or as needed?- The role of business rules, Existing systems, Reuse, Silo and monolithic development, The role of architecture, Levels of design, Reconciling design approaches.

UNIT VI: Building an IT Architecture: Case Studies – Providing an integration infrastructure, creating a service-oriented architecture, Developing a new application. What does the future hold? , The key points to remember-Middleware technology alternatives, IT architecture guideline guidelines, Distribute systems technology principals and Distribute systems implementation design.

Text Books:

1. IT Architectures and Middleware: Strategies for Building Large, Integrated Systems, Chris Britton and Peter Eye, 2nd Edition, Pearson Education.

Reference Books:

1. Middleware for Communications, Qusay H. Mahmoud,1st Edition, John Wiley and Sons.
2. Middleware Networks: Concept, Design and Deployment of Internet Infrastructure, Michah Lerner, 1st Edition, Kluwer Academic Publishers.
3. Middleware and Enterprise Integration Technologies, G. Sudha Sadasivam and Radha Shankarmani, 1st edition, Wiley, 2009.

VIII Sem	Natural Language Processing (**Elective – VI**)	Course Code: VI8CST42	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Illustrate the Syntax and semantics and Language models of Natural Language Processors. **(K2)**
CO2: Classify Morphology and Finite State Transducers, Markov Models and Entropy Models. **(K2)**
CO3: Explain about Statistical parsing and probabilistic CFGs. **(K2)**
CO4: Demonstrate semantic analysis. **(K2)**
CO5: Explain Discourse Analysis and Lexical Resources. **(K2)**
CO6: DevelopaStatisticalMethodsforRealWorldApplicationsandexploredeeplearning-basedNLP. **(K3)**

UNIT I: Introduction: Natural Language Processing tasks in syntax, semantics, andpragmatics –Issues –Applications- The role of machine learning-Probability Basics– Information theory– Collocations- N-gram Language Models - Estimating parameters and smoothing - Evaluating language models.

UNIT II: Morphology And Part Of Speech Tagging: Linguistic essentials - Lexical syntax- Morphology and Finite State Transducers - Part of speech Tagging - Rule-Based Part of Speech Tagging - Markov Models - Hidden Markov Models – Transformation based Models - Maximum Entropy Models. Conditional Random Fields.

UNIT III: Syntax Parsing: Syntax Parsing - Grammar formalisms and tree banks - Parsing with Context Free Grammars- Features and Unification-Statistical parsing and probabilisticCFGs(PCFGs)-LexicalizedPCFGs.

UNIT IV: Semantic Analysis: Representing Meaning – Semantic Analysis - Lexical semantics –Word-sense disambiguation- Supervised – Dictionary based and Unsupervised Approaches - Compositional semantics- Semantic Role Labeling and Semantic Parsing – Discourse Analysis.

UNIT V: Discourse Analysis and Lexical Resources: Discourse segmentation, Coherence – Reference Phenomena, Anaphora Resolution using Hobbs and Centering Algorithm – Coreference Resolution – Resources: Porter Stemmer, Lemmatizer, Penn Treebank, Brills Tagger, WordNet, PropBank, FrameNet, Brown Corpus, British National Corpus (BNC).

UNIT VI: NLP Applications: Named entity recognition and relation extraction- IE using sequence labeling-Machine Translation (MT) - Basic issues in MT-Statistical translation-word alignment- phrase-based translation – Question Answering.

Text Books:

1. Daniel Jurafsky and James H. Martin Speech and Language Processing (2nd Edition), Prentice Hall; 2nd edition,2008
2. FoundationsofStatisticalNaturalLanguageProcessingbyChristopherD.Manningand Hinrich Schuetze, MIT Press,1999
3. Steven Bird, Ewan Klein and Edward Loper Natural Language Processing with Python, O'Reilly Media; 1 edition,2009
4. Roland R. Hausser, Foundations of Computational Linguistics: Human-Computer Communication in Natural Language, Paperback, MIT Press,2011

References:

1. Pierre M. Nugues, An Introduction to Language Processing with Perl and Prolog: An Outline of Theories, Implementation, and Application with Special Consideration of English, French, and German (Cognitive Technologies) Softcover reprint,2010
2. James Allen, Natural Language Understanding, Addison Wesley; 2 edition 1994
   a. NLTK – Natural Language Tool Kit -http://www.nltk.org/

VIII Sem	Cyber Security (**Elective – VI**)	Course Code: VI8CST43	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe about Cybercrimes. **(K2)**
CO2: Explain Cyber criminals and their attacks. **(K2)**
CO3: Illustrate Cybercrimes and security in mobile devices **(K2)**
CO4: Discuss about the Tools and methods used to overcome Cybercrimes. **(K2)**
CO5: Discuss about Cyber Laws and IT Acts. **(K2)**
CO6: Explain about Computer Forensics. **(K2)**

UNIT I: Introduction to Cybercrime: Introduction, Cybercrime: Definition and Origins of the Word, Cybercrime and Information Security Who are Cybercriminals? , Classifications of Cybercrimes, Cybercrime: The Legal Perspectives, Cybercrimes: An Indian Perspective, Cybercrime and the Indian ITA 2000, A Global Perspective on Cybercrimes, Cybercrime Era: Survival Mantra for the Netizens.

UNIT II: Cyber offenses: How Criminals Plan Them –Introduction, How Criminals Plan the Attacks, Social Engineering, Cyber stalking, Cyber cafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack VectorCloud Computing.

UNIT III: Cybercrime Mobile and Wireless Devices: Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit Card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication Service Security, Attacks on Mobile/CellPhones, Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile, Organizational Security Policies and Measures in Mobile Computing Era, Laptops.

UNIT IV: Tools and Methods Used in Cybercrime: Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Key loggers and Spywares, Virus and Worms, Trojan Horses and Backdoors, Steganography, DoS and DDoSAttacks, SQL Injection, Buffer Overflow, Attacks on Wireless Networks. **Phishing and Identity Theft:** Introduction, Phishing, Identity Theft (ID Theft).

UNIT V: Cybercrimes and Cyber security: The Legal Perspectives, Introduction, Why Do We Need Cyber laws: The Indian Context, The Indian IT Act, Challenges to Indian Law and Cybercrime Scenario in India, Consequences of Not Addressing the Weakness in Information Technology Act, Digital Signatures and the Indian IT Act, Amendments to the Indian IT Act,· Cybercrime and Punishment.

UNIT VI: Understanding Computer Forensics: Introduction, Historical Background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber forensics and Digital Evidence, Forensics Analysis of E-Mail, Digital Forensics Life Cycle, Chain of Custody Concept, Network Forensics, Approaching a Computer Forensics Investigation, Computer Forensics and Steganography, Relevance of the OSI 7 Layer Model to Computer Forensics, Forensics and Social Networking Sites: The Security/Privacy Threats, Computer Forensics from Compliance Perspective, Challenges in Computer Forensics, Special Tools and Techniques, Forensics Auditing, Anti-forensics.

Text Books:

1. Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, NinaGodbole, SunitBelapure, 1stedition, Wiley.

Reference Books:

1. Principles of Information Security, MichealE.Whitman and Herbert J.Mattord, 4th edition, Cengage Learning.
2. Information Security the complete reference, Mark Rhodes, Ousley, 2nd edition, MGH.

Annexure-CS-V

List of Open Elective Courses offered by CSE for Other Branches

SEM	Course Code	Course
Open Elective-II		
VII SEM	V18CSTOE04	1. Operating Systems
	V18CSTOE05	2. Artificial Intelligence
	V18CSTOE06	3. Java Programming
Open Elective-III		
VIII SEM	V18CSTOE07	1.Software Testing Methodologies
	V18CSTOE08	2. Cyber Security
	V18CSTOE09	3. Computer Graphics

VII Sem	Operating Systems **(Open Elective-II)**	Course Code: V18CSTOE04	L	T	P	C
			3	0	0	3

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe Operating System Services and System Calls. **(K2)**

CO2: Illustrate Process Management Concepts and CPU Scheduling Algorithms. **(K3)**

CO3: Demonstrate Process Synchronization primitives. **(K3)**

CO4: Demonstrate Deadlock Prevention, Avoidance and Detection methods. **(K3)**

CO5: Illustrate Memory Management Techniques and Page Replacement Algorithms. **(K3)**

CO6: Describe File System Concepts and Mass Storage Structures. **(K2)**

UNIT-I: Introduction: Operating-System Structure, Operating-System Services, User and Operating-System Interface, System Calls, Types of System Calls.

UNIT-II: Process Management: Process Concept, Process Scheduling, Operations on Processes, Interprocess Communication. **Threads:** Overview, Multithreading Models. **CPU Scheduling:** Basic Concepts, Scheduling Criteria, Scheduling Algorithms

UNIT-III : Process Synchronization: The Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Mutex Locks, Semaphores, Classic Problems of Synchronization, Monitors

UNIT-IV: Deadlocks: System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock

UNIT-V: Memory Management Main Memory: Swapping, Contiguous Memory Allocation, Segmentation, Paging, Structure of the Page Table

Virtual Memory: Introduction, Demand Paging, Page Replacement, Allocation of Frames, Thrashing

UNIT-VI: Storage Management : Overview of Mass-Storage Structure, Disk Scheduling, File Concept, Access Methods, Directory and Disk Structure, File-System Mounting, File Allocation Methods

Text Book:

1. Operating System Concepts, Abraham Silberschatz, ,Peter Baer Galvin,Greg Gagne, 9th Edition, John Wiley and Sons Inc., 2012

Reference Books:

1. Operating Systems – Internals and Design Principles, William Stallings, 7th Edition, Prentice Hall, 2012

2. Modern Operating Systems, Andrew S. Tanenbaum, Third Edition, Addison Wesley,2007

<table>
<tr><td rowspan="2">VII
Sem</td><td rowspan="2">Artificial Intelligence
(Open Elective-II)</td><td rowspan="2">Course Code:
V18CSTOE05</td><td>L</td><td>T</td><td>P</td><td>C</td></tr>
<tr><td>3</td><td>0</td><td>0</td><td>3</td></tr>
</table>

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Illustrate the concept of intelligent systems and current trends in AI. **(K2)**

CO2: Apply Problem solving, Problem reduction and Game Playing techniques in AI. **(K3)**

CO3: Illustrate the Logic concepts in AI. **(K2)**

CO4: Explain the Knowledge representation techniques in AI. **(K2)**

CO5: Describe Expert systems and their applications. **(K2)**

CO6: Illustrate Uncertainty Measures. **(K2)**

UNIT-I: Introduction to Artificial Intelligence: Introduction, history, intelligent systems, foundations of AI, applications, tic-tac-toe game playing, current trends in AI

UNIT-II: Problem solving: State-space Search and Control Strategies: Introduction, General Problem Solving, Characteristics of problem, Exhaustive searches, Heuristic search techniques, Iterative deepening a*, constraint satisfaction

Problem reduction and game playing: Introduction, problem reduction, game playing, alpha beta pruning, two-player perfect information games

UNIT-III: Logic concepts: Introduction, Propositional Calculus, Proportional Logic, Natural Deduction system, Axiomatic system, Semantic tableau system in proportional logic, Resolution Refutation in Propositional logic, Predicate Logic

UNIT-IV: Knowledge representation: Introduction, approaches to Knowledge representation, Knowledge representation using Semantic Networks, Extended Semantic Networks for KR, Knowledge representation using Frames

UNIT-V: Expert Systems and Applications: Introduction phases in building Expert Systems, Expert System versus Traditional Systems, Rule-based Expert Systems, Blackboard systems, Truth maintenance systems, applications of Expert Systems.

UNIT-VI: Uncertainty measure: Probability theory- Introduction, Probability Theory, Bayesian Belief networks, Certainty Factor Theory, Dempster-Shafer theory

Text Book:

Artificial Intelligence, Saroj Kaushik, 1st Edition, Cengage Learning.

Reference Books:

Artificial Intelligence, Elaine Rich, Kevin Knight, Shivashankar B Nair, 3rd Edition, Tata McGraw Hill Education Private Limited., 2009

Artificial Intelligence- A modern Approach, 3rd Edition, Stuart Russel, Peter Norvig, Pearson Education.

VII Sem	**JAVA PROGRAMMING** **(Open Elective-II)**	Course Code: **V18CSTOE06**	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe Java Virtual Machine and Type casting. (**K2**)
CO2: Demonstrate Concepts like Constructors, Arrays, Nested Classes and Command Line Arguments. (**K3**)
CO3: Implement Concepts of Inheritance and Exception Handling. (**K3**)
CO4: Develop programs on Multi-Threading and Files. (**K3**)
CO5: Demonstrate Applet Programming and AWT Components. (**K3**)
CO6: Describe Event Handling and Swings. (**K3**)

UNIT-I: Introduction to Java: Introduction to Object Oriented Paradigm, Concepts of OOP, Applications of OOP, History of Java, Java Features, JVM, Program Structure. Variables, Primitive Data Types, Constants, Operators, Expressions, Precedence rules and Associativity, Primitive type conversion and Casting, Control Structures.
UNIT-II: Classes and Objects: Classes and objects, Class declaration, Creating objects, Methods, Constructors and Constructor Overloading, Importance of Static Keyword and Examples, this Keyword, Arrays, Command Line Arguments, Nested Classes.
UNIT-III: Inheritance and Exception Handling: Inheritance, super Keyword, final Keyword, Method Overriding and Abstract Class. Interfaces, Creating Packages, Using Packages, Importance of Class path. Exception Handling, Importance of try, catch, throw, throws and finally Block.
UNIT-IV: Multithreading and Files: Introduction, Thread Lifecycle, Creation of Threads, Thread Priorities, Thread Synchronization, Communication between Threads. Reading Data from Files and Writing Data to Files, Random Access Files.
UNIT-V: Applet Programming and AWT: Applet Class, Applet Lifecycle, Applet Programs. Introduction to AWT, Components and Containers, Button, Label, Checkbox, Radio Buttons, List Boxes, Layouts, Menu and Scrollbar.
UNIT-VI: Event Handling and Swings: Event Handling : Event Delegation Model, Sources of Events, Event Listeners, Adapter Classes, InnerClasses. Introduction to Swings.

Text Books:

1. Java Proramming, E.Balagurusamy, 4thEdition , TMH.
2. The complete Reference Java, 8thEdition, Herbert Schildt, TMH.
3. Introduction to java programming ,Y Daniel Liang, 7thEdition, Pearson.

Reference books:

1. Core Java: An Integrated Approach , R Nageswara Rao, 7th Edition, Dream Tech
2. Head First Java , Kathy Sierra and Bert Bates, 2nd Edition O'reilly

VIII Sem	Software Testing Methodologies **(Open Elective-III)**	Course Code: V18CSTOE07	L	T	P	C
			3	0	0	3

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe Software testing objectives and methodology. **(K2)**

CO2: Apply various Software testing techniques. **(K3)**

CO3: Discuss Static testing techniques for software testing. **(K2)**

CO4: Differentiate software testing and debugging process. **(K2)**

CO5: Construct test cases by understanding test suite management. **(K3)**

CO6: Explain modern software testing tools to support software testing. **(K2)**

UNIT-I: Introduction to Software Testing: Evolution of software Testing, Myths and Facts, Goals of software Testing, Definitions of Testing, Model for Software Testing, Software Testing Terminology, Software Testing Life Cycle.

UNIT-II: Verification and Validation: Verification & Validation Activities, Verification, Verification of Requirements, Verification of High level and low level designs, How to verify code, Validation. **Dynamic Testing I:** Black Box testing techniques: Boundary Value Analysis, Equivalence Class Testing, Decision Table based Testing,

UNIT-III: Dynamic Testing II: White-Box Testing: Need of White-Box Testing, Logic coverage criteria, Basis path testing, Loop testing. **Static Testing:** Inspections, Structured Walkthroughs, Technical reviews.

UNIT-IV: Regression Testing: Progressive Vs Regressive Testing, Regression testability, Objectives of regression testing, When is Regression Testing done? Regression Testing Types, Regression testing techniques. **Debugging:** Debugging process, Techniques, correcting bugs.

UNIT-V: Efficient Test Suite Management: Why does a Test Suite grow, minimizing the Test suite and its benefits, Test suite prioritization, Types of Test case prioritization, Prioritization techniques, measuring the effectiveness of a prioritized Test Suite.

UNIT-VI: Software Quality Management: Software quality concept, Quality control and Quality Assurance, Software Quality metrics. **Automation and Testing Tools:** Need for automation, categorization of Testing tools, selection of testing tools, Overview of some commercial testing tools.

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Text Books:

1. Software Testing, Principles and Practices, Naresh Chauhan, 9th Edition, Oxford Publisher.

Reference Books:

1. Software testing techniques - Boris Beizer, 2nd Edition, Dreamtech publisher..
2. Foundations of Software testing, Aditya P Mathur, 2nd ed, Pearson.
3. Software Testing- Yogesh Singh, CAMBRIDGE.

VIII Sem	Cyber Security **(Open Elective – III)**	Course Code: VI8CSTOE08	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe about Cybercrimes. **(K2)**
CO2: Explain Cyber criminals and their attacks. **(K2)**
CO3: Illustrate Cybercrimes and security in mobile devices **(K2)**
CO4: Discuss about the Tools and methods used to overcome Cybercrimes. **(K2)**
CO5: Discuss about Cyber Laws and IT Acts. **(K2)**
CO6: Explain about Computer Forensics. **(K2)**

UNIT I: Introduction to Cybercrime: Introduction, Cybercrime: Definition and Origins of the Word, Cybercrime and Information Security Who are Cybercriminals? , Classifications of Cybercrimes, Cybercrime: The Legal Perspectives, Cybercrimes: An Indian Perspective, Cybercrime and the Indian ITA 2000, A Global Perspective on Cybercrimes, Cybercrime Era: Survival Mantra for the Netizens.

UNIT II: Cyber offenses: How Criminals Plan Them –Introduction, How Criminals Plan the Attacks, Social Engineering, Cyber stalking, Cyber cafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector Cloud Computing.

UNIT III: Cybercrime Mobile and Wireless Devices: Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit Card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication Service Security, Attacks on Mobile/CellPhones, Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile, Organizational Security Policies and Measures in Mobile Computing Era, Laptops.

UNIT IV: Tools and Methods Used in Cybercrime: Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Key loggers and Spywares, Virus and Worms, Trojan Horses and Backdoors, Steganography, DoS and DDoS Attacks, SQL Injection, Buffer Overflow, Attacks on Wireless Networks. **Phishing and Identity Theft:** Introduction, Phishing, Identity Theft (ID Theft).

UNIT V: Cybercrimes and Cyber security: The Legal Perspectives, Introduction, Why Do We Need Cyber laws: The Indian Context, The Indian IT Act, Challenges to Indian Law and Cybercrime Scenario in India, Consequences of Not Addressing the Weakness in Information Technology Act, Digital Signatures and the Indian IT Act, Amendments to the Indian IT Act,· Cybercrime and Punishment.

UNIT VI: Understanding Computer Forensics: Introduction, Historical Background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber forensics and Digital Evidence, Forensics Analysis of E-Mail, Digital Forensics Life Cycle, Chain of Custody Concept, Network Forensics, Approaching a Computer Forensics Investigation, Computer Forensics and Steganography, Relevance of the OSI 7 Layer Model to Computer Forensics, Forensics and Social Networking Sites: The Security/Privacy Threats, Computer Forensics from Compliance Perspective, Challenges in Computer Forensics, Special Tools and Techniques, Forensics Auditing, Anti-forensics.

Text Books:

1. Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, NinaGodbole, SunitBelapure, 1stedition, Wiley.

Reference Books:

1. Principles of Information Security, MichealE.Whitman and Herbert J.Mattord, 4th edition, Cengage Learning.
2. Information Security the complete reference, Mark Rhodes, Ousley, 2nd edition, MGH.

VII Sem	Computer Graphics **(Open Elective-III)**	Course Code: V18CSTOE09	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Understand the applications of computer graphics and learn basic algorithms. **(K2)**
CO2: Analyze the concepts of 2D graphics along with transformation techniques. **(K3)**
CO3: Understand 2D Views of objects and clipping algorithms. **(K2)**
CO4: Illustrate 3D graphics and will get an idea about projections views of objects. **(K2)**

CO5: Determine different visible surface detection methods. **(K2)**
CO6: Understand different animation sequences and Color Models. **(K2)**

UNIT I: Introduction: Application of Computer Graphics, raster scan systems, random scan systems, raster scan display processors. Output Primitives : Points and lines, line drawing algorithms(Bresenham's and DDA Line derivations and algorithms), mid-point circle and ellipse algorithms.

UNIT II: Filled area primitives: Boundary-fill and flood-fill algorithms. **2-D geometrical transforms:** Translation, scaling, rotation, reflection and shear transformations, and homogeneous coordinates, composite transforms.

UNIT III: 2-D viewing: The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Cohen-Sutherland, Sutherland – Hodgeman polygon clipping algorithm.

UNIT IV: 3-D Geometric transformations: Translation, rotation, scaling, reflection and shear transformations, composite transformations. 3D Viewing pipeline, clipping, projections (Parallel and Perspective). **3-D object representation:** Polygon surfaces, quadric surfaces, spline representation, Bezier curve and B-Spline curves.

Unit V: Visible surface detection methods: Classification, back-face detection, depth-buffer, scan-line, BSP tree methods, area sub-division.

Unit VI: Computer animation: Design of animation sequence, general computer animation functions, raster animation, computer animation languages. **Color Models** – RGB, YIQ, CMY, HSV.

Text Books:

1. Computer Graphics C version, Donald Hearn, M.Pauline Baker, Pearson

2. Computer Graphics, Schaum's outlines", Zhigand xiang,Roy Plastock, 2nd Edition,Tata Mc-Graw Hill Edition.

3. Principles of Computer Graphics, S. Govil-Pai, 1st Edition, Springer International Edtion,2005.

Reference Books:

1. Computer Graphics Principles & practice, 2/e, Foley, VanDam, Feiner, Hughes, Pearson

2. Computer Graphics, Peter, Shirley, CENGAGE

3. Principles of Interactive Computer Graphics, Neuman , Sproul, TMH.

SRI VASAVI ENGINEERING COLLEGE (Autonomous)

(Permanent Affiliation to JNTUK, Kakinada), PEDATADEPALLI, TADEPALLIGUDEM-534 101

Department of Computer Science and Engineering

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Department of Computer Science and Technology

Annexure-CS-VI

Curricular Components (V20 Regulation)

SEMESTER-III (SECOND YEAR)

S.No.	Course Work-Subject Area	Credits as per AICTE	% of Range as per UGC	APSCHE	Total No.of Credits	% of Credits
1	Humanities and Social Sciences **(HSS)**	12	10-15%	10.5	12	7.5%
2	Basic Sciences **(BSC)**	25	15-20%	21	19.5	12.187%
3	Engineering Sciences **(ESC)**	24	10-20%	24	24	15%
4	Professional Core **(PCC)**	48	25-35%	51	51	31.875%
5	Professional Electives **(PEC)**	18	8-12%	15	15	9.375%
6	Open Electives **(OEC)**	18	5-10%	12	12	7.5%
7	Other (Project, Internship etc.)	15	8-10%	16.5	16.5	10.312%
8	Mandatory Non-Credit Courses**(MNC)**	-	-	Non-Credit	-	
9	Skill Oriented Courses **(SO)**	-		10	10	6.25%
	Total :	**160**		**160**	**160**	

S.No.	Code	Name of the Course		L	T	P	C
1	V20MBT51	Managerial Economics and Financial Analysis	HSS	3	-	-	3
2	V20MAT07	Mathematical Foundation Of Computer Science	ESC	3	-	-	3
3	V20CST03	OOPs Through C++	PCC	3	-	-	3
4	V20CST04	Data Structures	PCC	3	-	-	3
5	V20CST05	Computer Organization and Architecture	ESC	3	-	-	3
6	V20CSL03	OOPs Through C++ Lab	PCC	-	-	3	1.5
7	V20CSL04	Data Structures Lab	PCC	-	-	3	1.5
8	V20CSL05	Linux Shell Scripting Lab	PCC	-	-	3	1.5
9		**Skill Oriented Course - I**	**SO**	**1**	**0**	**2**	**2**
Total:				**18**	**0**	**11**	**21.5**
10		Professional Communication Skills -I	MNC	2	-	-	0

SEMESTER - IV (SECOND YEAR)

S.No.	Code	Name of the Course		L	T	P	C
1	V20CST07	Design and Analysis of Algorithms	PCC	3	-	-	3
2	V20CST08	Software Engineering	PCC	3	-	-	3
3	V20CST09	Database Management Systems	PCC	3	-	-	3
4	V20CST10	Java Programming	PCC	3	-	-	3
5	V20MAT04	Probability and Statistics	BSC	**3**	-	-	**3**
6	V20CSL06	Statistical Visualization using R Lab	BSC	-	-	3	1.5
7	V20CSL07	Database Management Systems Lab	PCC	-	-	3	1.5
8	V20CSL08	Java Programming Lab	PCC	-	-	3	1.5
9		**Skill Oriented Course - II**	SO	1	-	2	2
			Total:	**18**	**0**	**11**	**21.5**
10		Professional Communication Skills - II	**MNC**	**2**	**-**	**-**	**0**
Student have to do Mini Project / Internship (2 Months) during summer							

V SEMESTER (THIRD YEAR)

S.No.	**Code**	**Name of the Course**		**L**	**T**	**P**	**C**
1		Data Mining	PCC	3	-	-	3
2		Operating Systems	PCC	3	-	-	3
3		Artificial Intelligence	PCC	3	-	-	3
4		**Open Elective -I**	OEC /JOE	3	-	-	3
5		**Professional Elective-I** i) Automata and Compiler Design ii) Principles of Programming Languages iii) Information Retrieval Systems iv) Computer Graphics	PEC	**3**	-	-	**3**
6		Data Mining Lab & Artificial Intelligence Lab	PCC	-	-	3	1.5
7		Unified Modeling Language Lab	PCC	-	-	3	1.5
9		**Skill Oriented Course - III**	SO/SS	1	-	2	2
10		Mini Project / Internship*	Internship	-	-	3	1.5
			Total:	**16**	**0**	**11**	**21.5**
11			**MNC**	**2**	**-**	**-**	**0**

*Internship has to be done after IV SEM during summer

VI SEMESTER (THIRD YEAR)

S.No.	Code	Name of the Course		L	T	P	C
1		Computer Networks	PCC	3	-	-	3
2		Machine Learning	PCC	3	-	-	3
3		Web Technologies	PCC	3	-	-	3
4		**Professional Elective-II** i) Software Testing Methodologies ii) Advanced Data Structures iii) Data Science iv) Cloud Computing	PEC	3	-	-	3
5		**Open Elective -II**	OEC /JOE	3	-	-	3
6		Computer Networks Lab	PCC	-	-	3	1.5
7		Web Technologies Lab	PCC	-	-	3	1.5
8		Machine Learning Lab	PCC	-	-	3	1.5
9		**Skill Oriented Course - IV**	SO/SS	**1**	**0**	**2**	**2**
			Total:	**16**	**0**	**11**	**21.5**
Student have to do Mini Project / Internship (2 Months) during summer							

VII SEMESTER(FOURTH YEAR)

S.No.	Code	Name of the Course		L	T	P	C
1		**Professional Elective-III** i) Object Oriented Analysis and Design ii) BigData Analytics iii) Deep Learning iv) Human Computer Interaction	PEC	3	-	-	3
2		**Professional Elective-IV** i) Distributed Systems ii) NoSQL Databases iii) Soft Computing iv) Cryptography &Network Security	PEC	3	-	-	3
3		**Professional Elective-V** i) Software Project Management ii) Scripting Languages iii) Natural Language Processing iv) Social Networks and Semantic Web	PEC	3	-	-	3
4		**Open Elective -III**	OEC /JOE	3	-	-	3
5		**Open Elective -IV**	OEC /JOE	3	-	-	3
6			***HSS Elective**	3	-	-	3
7		**Skill Oriented Course - V**	SO/SS	1	-	1	2
8		Mini Project /Internship*	Internship	-	-	6	3
			Total:	**19**	-	1	**23**
9		Honors/Minors Courses		4	-	-	4
10		MOOCs/Lab related to Honors/Minors Course		-	-	2	2

*Internship has to be done after VI SEM during summer

VIII SEMESTER (FOURTH YEAR)

S.No.	Code	Name of the Course		L	T	P	C
1		Internship/ Industrial Training /Practical training	PRO	-	-	4	2
2		Major Project (6 Months)	PRO			20	10
			Total:	**-**	**-**	**24**	**12**

SKILL ORIENTED COURSES

PROFESSIONAL ELECTIVE STREAMS

	THREAD 1 Systems and Software Architecture	THREAD 2 Programming / Databases	THREAD 3 Data Science and Machine Learning	THREAD 4 Applications and Networking
Professional Elective-1	Automata and Compiler Design	Principles of Programming Languages	Information Retrieval Systems	Computer Graphics
Professional Elective-2	Software Testing Methodologies	Advanced Data Structures	Data Science	Cloud Computing
Professional Elective-3	Object Oriented Analysis and Design	Big Data Analytics	Deep Learning	Human Computer Interaction
Professional Elective-4	Distributed Systems	NoSQL Databases	Soft Computing	Cryptography &Network Security
Professional Elective-5	Software Project Management	Scripting Languages	Natural Language Processing	Social Networks and Semantic web

List of Open Elective Courses for other Branches

S.No.	Code	Name of the Course
1	V20CSS01	Mobile Application Development
2	V20CSS02	Mean Stack Technologies
3	V20CSS03	Secure DevOps
4	V20CSS04	AWS Cloud Computing
5	V20CSS05	Web Development using Django
6	V20CSS06	Game Development using Buildbox
7	V20CSS07	Game Programming

	Course Code	Name of the Course
Open Elective -I	V18CSTOE01 V18CSTOE02 V18CSTOE03	i) Python Programming ii) Operating Systems iii) Software Engineering
Open Elective -II	V18CSTOE04 V18CSTOE05	i) Object Oriented Programming through Java ii) Computer Graphics iii) Software Testing Methodologies

	V18CSTOE06	
Open Elective -III	V18CSTOE07 V18CSTOE08 V18CSTOE09	i) Linux Shell Scripting ii) Computer Networks iii) Cyber Security
Open Elective -IV	V18CSTOE10 V18CSTOE11 V18CSTOE12	i) Database Management Systems ii) Human Computer Interaction iii) Information Retrieval System

Annexure-CS-VII

III Sem	**OOPs Through C++**	**Course Code:** V20CST03	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Differentiate Procedural Oriented Programming and Object-Oriented Programming. **(K2)**
CO2: Develop programs using Classes and Objects. **(K3)**
CO3: Demonstrate Constructors, destructors & Operator-Overloading. **(K3)**
CO4: Construct Classes using inheritance and Exceptions. **(K3)**
CO5: Demonstrate Files and Generic Programming. **(K3)**

Syllabus

Unit-I: Introduction to Object-Oriented Programming – Programming Paradigms, Data Types, Variables, Constants, Operators,Decision Statements &Control Structures, Arrays, Namespace, Default Arguments, Constant Arguments, Parameter passing techniques, Features of Object-Oriented Programming.

Unit-II: Introduction to Classes and Objects: Defining Classes & Objects, Access specifiers, Scope Resolution Operator, Static Member variables, Static Member Functions, Array of Objects. Inline Functions, Overloading Member Functions, Objects as Function Arguments, Friend Functions, Friend Class, Local Class, Empty Class, Nested Classes, Return by Reference.

Unit-III: Introduction to Constructors: Characteristics, Constructor with Default Arguments, Parameterized Constructors, Overloading Constructors, Copy Constructor, Dynamic Constructors and Destructors, Anonymous Objects. Introduction to operator Overloading, Rules for Overloading Operators, Overloading Unary & Binary Operators, this keyword, Constraint on Increment and Decrement Operators, Overloading with Friend Functions, Type Conversions.

Unit-IV: Inheritance: Base class and Derived class, Single Inheritance, Multiple Inheritance, Multilevel Inheritance, Hierarchical Inheritance, Hybrid Inheritance, Virtual Base Classes, Constructor in Derived Classes. qualifier classes, Significance of Virtual Functions, Early Vs Late Binding, Pure Virtual Functions, Virtual Destructor. **Exception handling:** Principles of Exception Handling, Keywords, Exception Handling Mechanism, Multiple Catch Statements, Catching Multiple Exceptions, Re-throwing Exception.

Unit-V: Files: File Opening Modes, File Stream Classes, I/O manipulators, Classes for File Handling, Sequential Access Files, Random Access Files, Error Handling Functions.
Generic Programming with Templates: Need for Templates, Class Templates, Function Templates, overloading Template Functions. Introduction to Standard Template Library, Sequential Containers & Associative Containers.

Text Books:

1. Programming in C++, Ashok N Kamthane, 2nd Edition, Pearson.
2. C++ How to Program, Paul J. Deitel, Harvey Deitel, 6th edition, PHI publication.

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Reference Books:

1. Object Oriented Programming C++, Joyce Farrell, Cengage.
2. Mastering C++, Venugopal, Raj Kumar, Ravi Kumar, TMH.
3. The Complete Reference C++, HerbertSchildt, 4th Edition, Mcgraw Hill.
4. Object Oriented Programming With C++, R. Subburaj, Vikas Publishing House.

III Sem	**Data Structures**	Course Code: V20CST04	L	T	P	C
			3	1	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Illustrate the time and space complexities for searching and sorting algorithms. **(K2)**

CO2: Demonstrate linked lists and their applications. **(K3)**

CO3: Demonstrate Stacks and Queues. **(K3)**

CO4: Illustrate basic operations on binary trees. **(K3)**

CO5: Demonstrate Graphs and their applications. **(K3)**

Syllabus

Unit-I: Introduction, searching and sorting: Introduction to Data Structures, Types of Data Structures, Performance Analysis: Space complexity, time complexity, asymptotic notation. **Searching:** Linear, Binary and Fibonacci search. **Sorting**: Bubble sort, Selection sort, Insertion sort, radix sort, quick sort, and merge sort.

Unit-II: Single linked list: Representation of node, operations on single linked list, **Double linked list:** Representation of node, operations on double linked list. **Circular linked List:** Representation of node and its operations.

Unit-III: Stacks: Definition, Stack ADT, array representation, linked list representation, Towers of Hanoi, infix to postfix conversion, expression evaluation. **Queues:** definition, Queue ADT, Array representation, linked list representation, operations on queues, Applications of Queues, Circular Queue.

Unit-IV: Trees: Introduction: Terminology, representation of trees, **Binary trees:** abstract data type, Properties of binary trees, binary tree representation, **Tree Traversals:** Inorder, Preorder, Postorder. **Binary search trees:** Definition, searching BST, insert into BST, delete from a BST, Height of a BST.

Unit-V: Graph: Introduction, definition, types of Graphs, Graph Representation, operations. **Graph Traversal Techniques:** Breadth First Search, Depth First Search **Spanning Trees:** minimum cost spanning tree, Prim's and Kruskal's algorithms, Single source shortest Path and all pair shortest path algorithms.

Text Books:

1. Data Structures, algorithms and applications in C, SartajSahni, Universities press, Second Edition.
2. Fundamentals of Data Structures in C, Ellis Horowitz, SartajSahni and Dinesh Mehta, 2nd Edition, Universities Press (India) Pvt. Ltd.

Reference Books:

1. An Introduction to Data Structures with Application, Jean-Paul Tremblay , Paul Sorenson, Second Edition.
2. Fundamentals of Data Structures and algorithms by C V Sastry, Rakesh Nayak, Ch. Raja Ramesh, IK Publications, new Delhi.
3. Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.
4. Problem solving with C++, The OOP, Fourth edition, W.Savitch, Pearson education.

III Sem	Computer Organization and Architecture	Course Code: V20CST05	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Illustrate Basic structure of Computers, Instruction types and their addressing modes. **(K2)**
CO2: Describe the different modes of Input / Output transfer. **(K2)**
CO3: Illustrate different types of Memory. **(K2)**
CO4: Describe the different types of Control Unit techniques. **(K2)**
CO5: Explain the Concepts of Pipelining and Parallel Processing **(K2)**

Syllabus

Unit-I: Introduction: Functional Units, Basic Operational Concepts, Bus Structures.
Instruction Sequencing and Addressing Modes: Instructions and Instruction Sequencing, Addressing modes, Basic Input/output Operations.

Unit-II: Input/output Organization: Accessing Input/output devices, Interrupts- Interrupt Hardware, Enabling and Disabling Interrupts, Handling Multiple Devices, Direct Memory Access, Buses- Synchronous and Asynchronous.

Unit-III: Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory, Associative memory, Cache Memory. (Morris Mano)

Unit-IV: Processing Unit: Fundamental Concepts, Execution of a Complete Instruction, Multiple-Bus Organization, Hardwired Control, Microprogrammed Control-Microinstructions, Microprogram Sequencing.

Unit-V: Pipelining: Basic Concepts, Data Hazards, Instruction Hazards
Parallelism: Parallel processing challenges – Flynn's classification – SISD, MIMD, SIMD, SPMD, and Vector Architectures - Hardware multithreading – Multi-core processors and other Shared Memory Multiprocessors - Introduction to Graphics Processing Units, Clusters, Warehouse Scale Computers and other Message-Passing Multiprocessors.

Text Books:

1. Computer Organization, Carl Hamacher, ZvonkoVranesic, SafwatZaky, 5th Edition, McGraw Hill Education.Computer System Architecture, M. Morris Mano, 3rd Edition, Pearson Education..
   David A. Patterson and John L. Hennessy, Computer Organization and Design: The Hardware/Software Interface, Fifth Edition, Morgan Kaufmann / Elsevier, 2014.

Reference Books:

1. Computer Organization and Architecture, William Stallings, 10th Edition, Pearson Education.
2. Computer Architecture and Organization, John P. Hayes, 3rd Edition, McGraw Hill Education.

III Sem	OOPs Through C++ Lab	Course Code: V20CSL03	L	T	P	C
			0	0	3	1.5

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: DevelopPrograms onClasses and Objects. (K3)

CO2: Demonstrate Constructors, Destructors and Operator-Overloading, Inheritance and Polymorphism. (K3)

CO3: Develop programs to handle Exceptions & Files. (K3)

CO4: Demonstrate Generic Programming. (K3)

LIST OF EXPERIMENTS:

1. Demonstrate how to debug basic programs using GDB compiler.
2. Develop programs on control structures.
3. Construct programs for following concepts.
   a) Default Arguments b) Constant Arguments c)Reference Arguments
4. Construct programs for following concepts.
   a) Classes & Objects b) Inline functions
   c) Static Member functions d) Overloading of Member Functions
5. Develop programs for following concepts.
   a) Objects as Function Arguments b) Friend Functions, Friend class
   c) Local class d) Empty Class& Nested Classes
6. Develop programs for following concepts.
   a) Default constructor b) Constructor with arguments c) Copy constructor
7. Construct programs for following concepts.
   a) Binary b) Unary c) new d) delete
8. Construct programs for following concepts.
   a) Single b) Multilevel c) Hierarchical d) Hybrid
9. Demonstrate the use of Virtual Functions &Virtual Base class.
10. Develop programs to handle following Exceptions.
    a) Division-by-zero b) Overflow in an array
11. Develop programs for following file handling operations.
    a) Copying text files b) Displaying the contents of the file

12. Demonstrate Class template and Function Template.
13. Demonstrate Sequential Containers & Associative Containers.

Text Books:

1. Programming in C++, Ashok N Kamthane, 2nd Edition, Pearson.
2. C++ How to Program, Paul J. Deitel, Harvey Deitel, 6th Edition, PHI publication.

III Sem	**Data Structures Lab**	Course Code: V20CSL04	L	T	P	C
			0	0	3	1.5

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Construct Programs on Sorting and Searching Techniques. **[K3]**

CO2: Illustrate Various Operations On Linked Lists. **[K3]**

CO3: Develop Programs On Stacks, Queues and Their Applications. **[K3]**

CO4: Develop Various Operations on Trees and Graphs **[K3]**

LIST OF EXPERIMENTS:

1. Practice following Sorting Techniques
   (A) Selection Sort (B) Quick Sort (C)Merge Sort
2. Practice following Searching Methods
   (A) Linear Search (B) Binary Search.
3. Develop program for
   Single Linked List and Its Operations. (Create, Insert, Delete, Display)
4. Develop program for Double Linked List and Its Operations.
5. Construct Stack along with their operations using Arrays.
6. Construct Queue along with their operations using Arrays.
7. Develop Circular Queue using Arrays.
8. Construct Queue along with their operations using Single Linked List.
9. Construct Binary Search Tree and Its Operations using double linked list.
10. Demonstrate Depth First Search and Breadth First Search Algorithm.
11. Develop Minimum Spanning Tree using Prim's Algorithm.
12. Develop Minimum Spanning Tree Kruskal's Algorithm.

Text books:

1. Data Structures, algorithms and applications in C++, SartajSahni, Universities press, Second Edition.
2. Fundamentals of Data Structures in C++, Ellis Horowitz, SartajSahni and Dinesh Mehta, 2nd Edition, Universities Press (India) Pvt. Ltd.

Reference Books:

1. An Introduction to Data Structures with Application, Jean-Paul Tremblay , Paul Sorenson, Second Edition.
2. Fundamentals of Data Structures and algorithms by C V Sastry, RakeshNayak, Ch. Raja Ramesh, IK Publications, new Delhi.
3. Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.
4. Problem solving with C++, The OOP, Fourth edition, W.Savitch, Pearson education.

III Sem	**Linux Shell Scripting Lab**	Course Code: V20CSL05	L	T	P	C
			0	0	3	1.5

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Demonstrate the basic knowledge of Linux commands and utilities by using Linux shell environment **(K3)**

CO2: Experiment with the Concept of shell Programming on Files and Directories **(K3)**

CO3: Experiment with the Concept of shell Programming on File Permissions **(K3)**

CO4: Experiment with the Concept of shell Programming on Conditional Statements **(K3)**

CO5: Experiment with the Concept of shell Programming on Looping Statements **(K3)**

LIST OF EXPERIMENTS:

1. Experiment the following Unix Commands:
   a) **General Purpose Utilities:** cal, date,man,who.
   b) **Directory Handling Commands:** pwd,cd,mkdir,rmdir.
   c) **File Handling Utilities:** cat,cp,ls,rm,nl,wc
   d) **Displaying Commands:** head, tail
   e) **Filters:** cmp,comm.,diff,sort,uniq
   f) **Disk Utilities:** du,df
2. Develop a Shell Program to Display all the words which are entered as command line arguments.
3. Develop a shell script that Changes Permissions of files in PWD as rwx for users.
4. Develop a shell script to print the list of all sub directories in the current directory.
5. Develop a Shell Program which receives any year from the keyboard and determine whether the year is leap year or not. If no argument is supplied the current year should be assumed.
6. Develop a shell script which takes two file names as arguments-If their contents are same then delete the second file.
7. Develop a shell script to print the given number in the reversed order.
8. Develop a shell script to print first 25 Fibbonacci numbers.
9. Develop a shell script to print the Prime numbers between the specified range.

10. Develop a shell script to delete all lines containing the word 'unix' in the files supplied as arguments.
11. Develop a shell script Menu driven program which has the following options.

    i) contents of /etc/passwd

    ii) list of users who have currently logged in.

    iii) present working directory.   iv) exit.

Text Books:

1. UNIX and Shell Programming: A Textbook, Behrouz A. Forouzan | Richard F. Gilberg, Cengage Learning
2. UNIX : Concepts and Applications, Sumithaba Das, 4th Edition, Tata McGrawHill.
3. Unix & Shell Programming, M.G.Venkatesh Murthy, Pearson Education
4. Unix shells by example,4th Edition Ellie Quigley, Pearson Education.

IV SEM	**Design and Analysis of Algorithms**	Course Code: V20CST07	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: At the end of the Course student will be able to:

CO1: Demonstrate asymptotic notation and divide and conquer technique. **(K3)**
CO2: Use greedy technique to solve various problems. **(K3)**
CO3: Demonstrate dynamic programming technique to various problems. **(K3)**
CO4: Develop algorithms using backtracking technique. **(K3)**
CO5: Demonstrate branch and bound technique to various problems. **(K3)**

Unit-I: Introduction: What is an Algorithm, Algorithm Specification-Pseudo code Conventions Recursive Algorithms, Performance Analysis-Space Complexity, Time Complexity, Asymptotic Notation, Practical Complexities, Performance Measurement.

Divide and Conquer: General Method, Binary Search, Finding the Maximum and Minimum, Merge Sort, Quick Sort-Performance Measurement,

Unit-II: The Greedy Method: The General Method, Knapsack Problem, Job Sequencing with Deadlines, Minimum-cost Spanning Trees-Prim's Algorithm, Kruskal's Algorithms, Optimal Merge Patterns, Single Source Shortest Paths.

Unit-III: Dynamic Programming: All Pairs Shortest Paths, Single Source Shortest paths General Weights, Explain Optimal Binary Search Trees, String Edition, 0/1 Knapsack, Reliability Design.

Unit-IV: Backtracking: The General Method, 8-Queens Problem, Sum of Subsets, Graph Coloring, and Hamiltonian Cycles.

UNIT-V: Branch and Bound: The Method-Least cost (LC) Search, The 15-Puzzle: an Example, Control Abstraction for LC-Search, Bounding, FIFO Branch-and-Bound, LC Branch and Bound, 0/1 Knapsack Problem-LC Branch-and Bound Solution, FIFO Branch-and-Bound Solution, Traveling Salesperson. Basic Concepts of NP-hard and NP-complete problems.

Text Books:

1. Fundamentals of computer algorithms E. Horowitz S. Sahni, University Press.

Reference Books:

1. Introduction to Algorithms Thomas H. Cormen, PHI Learning.

2. The Design and Analysis of Computer Algorithms, Alfred V. Aho, John E. Hopcroft, Jeffrey D.Ullman.

3. Fundamentals of Data Structures and algorithms by C V Sastry, Rakesh Nayak, Ch. Raja Ramesh,

Distributed by WILEY publications, New Delhi.

4. Algorithm Design, Jon Kleinberg, Pearson.

IV Sem	**Software Engineering**	Course Code:	L	T	P	C
		V20CST08	3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Demonstrate the Software Development life cycle Models. **(K3)**

CO2: Illustrate the Requirements engineering process and SRS document. **(K3)**

CO3: Develop the Software Architecture and Design Modeling. **(K3)**

CO4: Apply the Coding & Testing techniques and Risk management strategies. **(K3)**

CO5: Describe Project estimation techniques and Quality Management& Metrics. **(K2)**

Unit-I: Software and Software Engineering: The Nature of Software, Software Engineering, Software Process, Software Engineering Practice, Software Myths. **Software process models:** Waterfall model, Prototyping, Iterative development, Unified process, RAD model, Spiral model, and agile process.

Unit-II: Software Requirements: Functional and non-functional requirements, User requirements, System requirements, Interface specification, SRS document. **Requirements engineering process:** Feasibility studies, Requirements elicitation and analysis, Requirements validation, Requirements management.

Unit-III: Software Architecture: Role of software architecture, Architecture views, components and connector view, Cohesion and Coupling, documenting architecture design. **Design:** Design concepts, Function-oriented design, object-oriented design, UML diagrams, and Data flow diagram.

Unit-IV: Coding and Testing: Programming principles and guidelines, incrementally developing code. Testing concepts, testing process, Black-box & White-box testing. **Risk management**: Reactive vs. Proactive Risk strategies, Software risks, Risk identification, Risk projection, Risk refinement, RMMM Plan.

Unit-V: Software Project Estimation & Maintenance: Decomposition techniques, Empirical Estimation Models, Maintenance Process, Reengineering, Configuration Management. Metrics for Products & Quality Management: Software Measurement, Metrics for software quality, Quality concepts, Software Reviews, Formal technical reviews, SEI-CMM Model, Six Sigma and ISO 9000 quality standards.

Text Books:

1. Software Engineering, A practitioner's Approach- Roger S.Pressman, 7th Edition, McGrawHill International Edition.
2. Software Engineering- Ian Sommerville, 9th Edition, Pearson education.Software Engineering, A Precise approach, PankajJalote, Wiley

Reference Books:

1. CMMI and Six Sigma: Partners in Process Improvement, Jeannine M. Siviy,M. Lynn Penn, Robert W. Stoddard, 1st edition, Addison Wesley;
2. SoftwareEngineeringprinciplesandpractice,WSJawadekar, 3rdEdition,TMH.

V Sem	Database Management Systems	Course Code: V20CST09	L	T	P	C
			3	0	0	3

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe Database systems, various Data models and Database architecture. (K2)
CO2: Develop various real time applications using Relational algebra and Relational calculus. (K3)
CO3: Apply various Normalization techniques to refine schema. (K3)
CO4: Explain Transaction management and Concurrency control. (K2)
CO5: Illustrate various Database indexing techniques. (K2)

UNIT-I: An Overview of Database Systems: Managing data, File systems verses DBMS, Advantages of DBMS, Data models, Levels of abstraction in a DBMS, Data independence, Structure of a DBMS, Client/Server Architecture, E.F.Codd Rules.

Database Design: Database design and ER Diagrams, Entities, Attributes, Entity sets, Relationships and Relationship sets, Conceptual design with ER Models.

UNIT-II: Relational Model: Integrity constraints over relations, Key constraints, Foreign key constraints, General constraints, Enforcing integrity constraints, Querying relational data

Relational Algebra: Selection and Projection, set operation, renaming, Joins, Division, Introduction to Views, destroying/altering Tables and Views

Relational Calculus: Tuple Relational Calculus, Domain Relational Calculus.

UNIT-III: SQL Queries, Constraints and Triggers: The Form of Basic SQL Query, Union, Intersect, Except, Nested Queries, Aggregate Operators, Null Values, Complex Integrity Constraints in SQL, Triggers and active data bases.

Schema Refinement (Normalization): Problems caused by redundancy, Decompositions, purpose of Normalizion, Schema refinement, Concept of functional dependency, Normal forms based on functional dependency (1NF, 2NF and 3NF), Concept of Surrogate key, Boyce-Codd Normal Form (BCNF), Lossless Join and Dependency preserving decomposition, Fourth Normal Form(4NF).

UNIT-IV: Transaction Management: Transaction, Properties of Transactions, Transaction Log, and Transaction management with SQL commit, rollback and savepoint.

Concurrency Control: Concurrency Control for Lost updates, Uncommitted data, Inconsistent retrievals and the Scheduler.

Concurrency Control with Locking Methods : Lock granularity, Lock types, Two phase locking for ensuring serializability, Deadlocks, Concurrency control with Time stamp ordering, Transaction recovery.

UNIT-V: Storage and Indexing: Overview of Storages and Indexing, Data on external storage, File organization and indexing, Clustered indexing, Primary and secondary indexes, Index data structures, Hash based indexing, Tree based indexing, Comparison of file organization

Text Books:

1. Database Management Systems, Raghu Ramakrishnan, Johannes Gehrke, 3rd Edition TATA McGraw Hill.
2. An Introduction to Database Systems, C.J Date,A.Kannan,S.J Swamynathan 8th Edition, Pearson Education

Reference Books:

1. Database Systems-Design, Implementation and Management, Peter Rob &Carlos Coronel 7th Edition, Course Technology Inc.
2. Fundamentals of Database Systems, Ramez Elmasri,Shamkant B. Navathe ,7th Edition, Pearson Education.
3. Database Systems - The Complete Book, Hector Garcia- Molina, Jeffry D Ullman, Jennifer Widom, 2nd Edition, Pearson.

IV Sem	**Java Programming**	Course Code:	L	T	P	C
		V20CST08	3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe Java Virtual Machine and Type casting. [K2]

CO2: Demonstrate Concepts like Constructors, Arrays, Nested Classes and Command Line Arguments. [K3]

CO3: Implement Concepts of Inheritance and Exception Handling [K3]

CO4: Develop programs on Multi-Threading and Files [K3]

CO5: Implement Event Handling and Swings. [K3]

Syllabus

UNIT-I: Introduction to Java: Introduction to Object Oriented Paradigm, Concepts of OOP, Applications of OOP, History of Java, Java Features, JVM, Program Structure. Variables, Primitive Data Types, Constants, String class, Primitive type conversion and Casting, Control Structures.

UNIT-II:ClassesandObjects: Classesandobjects,Classdeclaration,Creatingobjects, Methods, Constructors and Constructor Overloading, Importance of Static Keyword and Examples, this Keyword, Arrays, Command Line Arguments, Nested Classes, Garbage Collector.

UNIT-III: Inheritance and Exception Handling: Inheritance, super Keyword, final Keyword, Method Overriding and Abstract Class. Interfaces, Creating Packages, Using Packages, Importance of Class path. Exception Handling, Importance of try, catch, throw, throws and finally Block.

UNIT-IV: Multithreading and Files: Introduction, Thread Lifecycle, Creation of Threads, Thread Priorities, Thread Synchronization, Communication between Threads. Reading Data from Files and Writing Data to Files, Random Access Files.

UNIT-V: Event Handling and Swings: Introduction to AWT and Applets. Swings: Introduction, Components, Button, Label, Checkbox, List Boxes, Menu and Scrollbar, Layout Managers. **Event Handling :** Event Delegation Model, Sources of Events, Event Listeners, Adapter Classes.

Text Books:

1. Java Programming, E. Balagurusamy, 4thEdition, TMH.
2. The complete Reference Java, 8thEdition, Herbert Schildt,TMH.
3. Introduction to java programming, Y Daniel Liang, 7 Edition,Pearson.

Reference books:

1. Core Java: An Integrated Approach , R Nageswara Rao, 7thEdition, Dream Tech
2. Head First Java , Kathy Sierra and Bert Bates, 2nd Edition O'reilly

IV Sem	**Statistical Visualization using R Lab**	Course Code: V20CSL06	L	T	P	C
			0	0	3	1.5

Syllabus Details

Course Outcomes: At the end of the Course student will be able to:

CO1: Employ math and simulation in R [**K2**]
CO2: Demonstrate various types of data structures in R **[K3]**
CO3: Apply appropriate control structures to solve a particular Programming problem **[K3]**

CO4: Use R to graphically visualize data and results of statistical calculations **[K3]**

LIST OF EXPERIMENTS:

1. Demonstrate the basic math functions in R
2. Demonstrate Vector operations in R
3. Demonstrate Matrix operations in R
4. Demonstrate Array operations in R
5. Demonstrate Data frames in R
6. Demonstrate Lists in R
7. Illustrate the following controls statements in R
   a. if and else b. ifelse c. switch
8. Demonstrate for and while loops in R
9. Demonstrate importing and exporting data using R
10. Illustrate the descriptive statistics using summary() in R
11. Demonstrate the following statistical distribution functions in R:
    a. Normal Distribution
    b. Binomial Distribution
    c. Poisson Distribution
    d. Chi Square Distribution
12. Illustrate the following basic graphics in R:
    a. Bar plots
    b. Pie Charts
    c. Histograms
    d. Kernel density plots
    e. Boxplots
    f. Dotplots
13. Illustrate the Correlation and Covariance analysis using R
14. Illustrate the different types of t-tests using R
15. Illustrate the ANOVA test using R

Text Books:

1. R for Everyone, Jared P Lander, Pearson
2. R in Action,Rob I Kabacoff, Manning

Reference Book:

1. The Art of R Programming, Norman Matloff, No Starch Press

IV Sem	**Data Base Management System Lab**	Course Code: V20CSL07	L	T	P	C
			0	0	3	1.5

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1:	Construct SQL queries to perform different database operations.	(K3)
CO2:	Experiment with various constraints and Database Indexing Techniques.	(K3)
CO3:	Construct PL/SQL Cursors and Exceptions	(K3)
CO4:	Develop PL/SQL Functions, Procedures and Packages	(K3)
CO5:	Apply basic operations on collections of Mongo DB database	(K3)

<u>List of Experiments</u>

Part-A

1. Construct SQL queries to facilitate acquaintance of Built-In Functions, String Functions, Numeric Functions, Date Functions and Conversion Functions.
2. Construct SQL queries using Operators.
3. Construct SQL queries to Retrieve and Change Data: Select, Insert, Delete, and Update
4. Construct SQL queries using Group By, Order By, and Having Clauses.
5. Construct SQL queries on Controlling data: commit, rollback, and savepoint
6. Construct report using SQL *PLUS
7. Construct SQL queries for Creating, Dropping, and Altering Tables, Views, and Constraints
8. Construct SQL queries on Joins and Correlated Subqueries
9. Demonstrate Index,Sequence and Synonym.
10. Demonstrate Controlling access,locking rows for update and security features.

<u>PL/SQL</u>

11. Demonstrate Basic Variables, Anchored Declarations, and Usage of Assignment Operation Using PL SQL block
12. Demonstrate Bind and Substitution Variables using PL SQL block
13. Demonstrate Control Structures in PL SQL
14. Demonstrate Cursors, Exceptions and Composite Data Types in PL SQL.
15. Demonstrate Procedures, Functions, and Packages in PLSQL.

Part-B

1. Demonstrate the installation of Mongo DB database.
2. Demonstrate Creating and dropping database, collection in Mongodb.
3. Demonstrate Insertion, updation and deletion operations in Mongodb database.
4. Construct queries for Projection, limiting records, sorting records and aggregation in Mongodb database.

Text Books:

1. Oracle Database 11g The Complete Reference by Oracle Press, Kevin Loney
2. Database Systems Using Oracle, Nilesh Shah, 2nd Edition, PHI.
3. Introduction to SQL, Rick F Van der Lans, 4th Edition, Pearson Education.

Reference Books:

1. Oracle PL/SQL Interactive Workbook, B. Rosenzweig and E. Silvestrova,2nd Edition, Pearson education.
2. SQL & PL/SQL for Oracle 10 g, Black Book, Dr. P. S. Deshpande, Dream Tech.

<table>
<tr><td rowspan="2">IV Sem</td><td rowspan="2">Java Programming Lab</td><td>Course Code:</td><td>L</td><td>T</td><td>P</td><td>C</td></tr>
<tr><td>V20CSL08</td><td>0</td><td>0</td><td>3</td><td>1.5</td></tr>
</table>

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Demonstrate Programs on Classes, Objects, Constructors and Arrays. **(K3)**

CO2: Demonstrate Inheritance and Exception Handling. **(K3)**

CO3: Implement programs on Multi-Threading and File Handling. **(K3)**

CO4: Implement Event handling using Swings. **(K3)**

List of Experiments

1. Develop programs on Control Structures and Type Conversions in java.
2. Develop programs using various String handling functions
3. Construct programs using the following concepts:
   a) Classes & Objects b) Usage of static c)Constructors
4. Construct programs using the following concepts.
   a) Arrays b) Nested Classes c) Command Line Arguments
5. Construct programs using the following concepts.
   a) Inheritance b) Usage of super c)Method Overriding
6. Construct programs using the following concepts.
   a) Usage of final b) Abstract class c)Interfaces
7. Implement the programs using the concepts
   a) Packages b) Exception Handling.
8. Implement the programs on Multi-Threading.
   a) Multiple Threads on Single Object b) Thread Deadlock
9. Construct a program that shows Inter-thread Communication
10. Construct programs to perform read and write operations on files.
    a) Sequential Files b) Random Access files
11. Develop GUI using Swings.
12. Construct programs on Event Handling using Listener Interfaces.

Text books:

1. The complete Reference Java, 8th Edition, Herbert Schildt, TMH.
2. Introduction to java programming, Y Daniel Liang, 7 Edition, Pearson.

Annexure-CS-VIII

Proposed Courses and Syllabi for other Branches under V20 Regulation

S.No.	Course Code	Course Name
1	V20CSL31	Data Structures Lab
2	V20CSL33	Python Programming Lab
3	V20CSL32	Object-Oriented Programming Through Java Lab

Syllabus Details

			L	T	P	C
	DATA STRUCTURES LAB	Course Code: V20CSL31	0	1	3	1.5
Branch	Common to ECE, EEE,ECT, CIVIL and MECH					

Course Outcomes:

CO1: Construct Sorting and searching methods. (K3)
CO2: Implement programs using Singly Linked Lists, Double Linked List. (K3)
CO3: Construct Basic Data Structures, Stacks, Queues and Applications. (K3)

CO4: construct Binary search tree (K3)
CO5: Implement various graph operations and shortest path algorithm. (K3)

List of Experiments

1. Bubble sort, Insertion sort, Selection sort, Quick sort, Merge sort.

   Programs to implement the following sorting techniques
   a) Selection sort b) Quick sort c) Merge sort

2. Linear search and Binary search.
   Programs to implement the following searching methods
   a) Linear search b) Binary search.

3. Basic Terminology, Classification of Data Structures, Operation on Data Structures. **Arrays**: Representation of arrays - Polynomial representation, Addition of two polynomials.

   A Program to implement addition of two polynomials. (using arrays).

4. single linked list Representation of node, operations on single linked list,
   A Program to implement single linked list and its operations. (create, insert, delete, display, reverse list)

5. **Double linked list**: operations like insert delete and display.
   A Program to implement double linked list and its operations.

6. **Stacks:** Introduction, Array representation, Operations, linked list representation, operation on linked stacks
   A Program to implement stack operations using arrays.
7. **Queues:** Introduction, Array representation, linked list representation, operation on queues, types of queues
   A Program to implement queue operations using arrays.
8. Applications of Stacks
   A Program to convert infix expression to postfix expression.

9. Introduction, Terminology, Representation of Trees, types of trees, **Binary Trees:** Properties of Binary Trees, Tree Traversals. **Binary Search Tree:** Introduction, Creation, insertion, delete, display.

   A Program to implement Binary search Tree and its operations.
10. **Graphs:** Introduction, Terminology, **Graph Traversal techniques**: Depth First Search, Breadth First Search
   A Program to implement graph traversal algorithms (BFS & DFS).

Text Books:

1. Data Structures, algorithms and applications in C++, Sartaj Sahni, Universities press, Second Edition.
2. Fundamentals of Data Structures in C++, Ellis Horowitz, Sartaj Sahni and Dinesh Mehta, 2nd Edition, Universities Press (India) Pvt. Ltd.

Reference Books:

1. An Introduction to Data Structures with Application, Jean-Paul Tremblay , Paul Sorenson, Second Edition.
2. Fundamentals of Data Structures and algorithms by C V Sastry, Rakesh Nayak, Ch. Raja Ramesh, IK Publications, new Delhi.
3. Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.
4. Problem solving with C++, The OOP, Fourth edition, W.Savitch, Pearson education.

	PYTHON PROGRAMMING LAB	Course Code: V20CSL32	L	T	P	C
			0	1	3	1.5
Branch	Common to ECE, EEE,ECT, CIVIL and MECH					

Syllabus Details

1. Course Outcomes:Upon completion of the course, students will be able to

CO1: Demonstrate Basic Python Programs (K3)
CO2: Construct control structures in python (K3)
CO3: Demonstrate functions and packages. (K3)
CO4: Construct python programs using structured data types. (K3)
CO5: Demonstrate Text Files (K3)

2. Syllabus

Basics of python programming: Features of python – History of Python - The Future of Python installation and execution - Data types – Identifiers - variables – type conversions-Literal Constants – Numbers – Strings. I/O statements.Operators and expressions, operator precedence – expression evaluation.

Exercise 1 - Basics
a) A sample Python Script using command prompt, Python Command Line and IDLE
b) A program to purposefully raise an Indentation Error and correct it

Exercise 2 - Operations
a) A program to compute distance between two points taking input from the user (Pythagorean Theorem)
b) A program on add.py that takes 2 numbers as command line arguments and prints its sum.

Decision Control statements: conditional (if), alternative (if-else), chained conditional (if-elif-else); **Iteration:** while loop, for loop, nested for loop, range function, break, continue and pass statements.

Exercise - 3 Control Flow
a) A Program to implement for checking whether the given number is a even number or not.
b) A program to construct reverse the digits of a given number and add it to the original, If the sum is not a palindrome repeat this procedure.
c) A program using a while loop that asks the user for a number, and prints a countdown from that number to zero.

Exercise 4 - Control Flow – Continued

a) A program to construct the following pattern, using a nested for loop.

```
*
* *
* * *
* * * *
* * * * *
* * * *
* * *
* *
*
```

b) By considering the terms in the Fibonacci sequence whose values do not exceed four million, find the sum of the even-valued terms.

Functions and modules : Introduction - Function Definition - Function Call – argument types- Scope and Lifetime - The return statement - More on Defining Functions - Lambda Functions or Anonymous Functions.

Exercise - 5 – Problem Solving using Functions
a) Find mean, median, mode for the given set of numbers passed as arguments to a function
b) Develop a function nearly_equal to test whether two strings are nearly equal. Two strings a and b are nearly equal when a can be generated by a single mutation on b.
c) Develop a Recursive Function to find the Factorial of a given number .
d) Develop function to compute gcd, lcm of two numbers. Each function shouldn't exceed one line.
Lists: list operations, list slices, list methods, mutability, cloning lists, list parameters. **Tuples**: tuple assignment, tuple as return value. **Set:** Set Creation, Set Operations. **Dictionaries**: Creation, operations; comprehension, operations on strings.

Exercise - 6 Structured Data types
a) a program to count the number of strings where the string length is 2 or more and the first and last character are same from a given list of strings.
b) a program to develop unzip a list of tuples into individual lists and convert them into dictionary.

Exercise – 7 Structured Data types Continued
a) A program to count the numbers of characters in the string and store them in a dictionary data structure
b) a program to use split and join methods in the string and trace a birthday with a dictionary data structure.
Documentation Strings- Modules – Packages

Exercise - 8– Modules
a) Install packages requests, flask and explore them using (pip)
b) A program to implement a script that imports requests and fetch content from the page. Eg. (Wiki)
c) Develop a simple script that serves a simple HTTP Response and a simple HTML Page

Introduction - Types of files - Text files - reading and writing files

Exercise - 9 Files
a) a program to count frequency of characters in a given file. Can you use character frequency to tell whether the given file is a Python program file, C program file or a text file?
b) a program to compute the number of characters, words and lines in a file.

Classes, Methods, Constructor, Inheritance, Overriding Methods, Data hiding

Exercise - 10 OOP
a) Class variables and instance variable and illustration of self variable
i) Robot
ii) ATM Machine

Text Books:

1. "Python Programming using problem solving Approach" ReemaThareja, Oxford University Press – 2017.
2. Python with Machine Learning by A.Krishna Mohan, Karunakar & T.Murali Mohan by S. Chand Publisher-2018.

	OBJECT-ORIENTED PROGRAMMING THROUGH JAVA LAB	Course Code: V20CSL33	L	T	P	C
			0	1	3	1.5
Branch	Common to ECE, EEE,ECT, CIVIL and MECH					

Syllabus Details

Course Outcomes: After the completion of this course, students will be able to

CO1: Use code editors and JDK tools to write, compile, and run Java programs.
CO2: Use control statements and arrays while programming.
CO3: Develop programs using classes and objects.
CO4: Use inheritance, interfaces and packages while developing programs in Java.
CO5: Apply exception-handling mechanism.
CO6: Develop multithreaded programs.

Syllabus:

CYCLE–I:Overview of Object-oriented Programming: Introduction to Object-oriented Programming, Principles of Object-oriented Programming Languages, and Applications of OOP.

Introduction to Java: History of Java, Java Features, Java Virtual Machine, Java Program Structure, Literals, Identifiers, Primitive Data types, Variables, Operators and Expressions, Operator Precedence and Associativity, Type Conversion and Casting.

Exercises

a) Develop a Java program to display the default values of all primitive data types of Java.
b) Construct a Java program that calculates the area of a triangle, given the lengths of all three sides.

Area $=\sqrt{(S(S-a)(S-b)(S-c))}$, where S = (a+b+c)/2.

CYCLE– II: Control Statements: Conditional Statements - if, switch; Iteration Statements - while, do-while, for, for-each version of for; Jump Statements - break, continue, return.

Arrays: Introduction to Arrays, Array Declaration and Initialization, One-Dimensional Arrays, Multi-Dimensional Arrays, Basic String Handling.

Exercises

a) Develop a Java program that displays
   i) The roots of a quadratic equation $ax^2+bx+c=0$
   ii) The nature of roots by calculating the discriminate D.
b) N bikers compete in a race such that they drive at a constant speed, which may or may not be the same as the other. To qualify the race, the speed of a racer must be more than the average speed of all N racers. Take as input, the speed of each racer and print back the speed of qualifying racers.
c) Develop a Java program that displays the name of the day, based on the value of day, using the switch statement.
d) Develop a Java program to search for an element in a given list of elements using Linear Search.
e) Develop a Java program to perform multiplication of two matrices.
f) Develop a Java program using StringBuffer to perform various operations on a string.

CYCLE– III: Introduction to Classes and Objects: General Form of a Class, Methods, Declaring Objects using new, Constructors, this Keyword, Understanding static, Method and Constructor Overloading, Using Command-Line Arguments, Garbage Collection.

Exercises

a) Construct a Java program to demonstrate class mechanism - Create a class that contains variables, methods, constructors and invoke those methods inside main().
b) Develop a Java program demonstrating the use of static variables, methods.
c) Develop a Java program demonstrating the use of this keyword.
d) Develop a Java program that implements method overloading.
e) Develop a Java program that implements constructor overloading.
f) Develop a Java program demonstrating the use of command-line arguments.

CYCLE– IV: Inheritance: Access Control, Introduction to Inheritance, Types of Inheritance, Using super, Method Overriding and Dynamic Method Dispatch, Using final, Abstract Classes.
Interfaces: Defining and Implementing Interfaces.**Packages:** Creating Packages, Importing Packages, Importance of CLASSPATH.

Exercises

a) Construct a Java program to demonstrate single inheritance.
b) Construct a Java program to demonstrate multi-level inheritance.
c) Construct a Java program that illustrates the use of super.
d) Develop a Java program that illustrates runtime polymorphism.
e) Develop a Java program that uses an abstract class to find areas of different shapes.
f) Develop a Java program using interfaces. In addition, use interfaces to achieve multiple inheritance.
g) Construct a Java program that creates a user-defined package. Use the package by importing it in another Java program.

CYCLE– V: Exception Handling: Exception-Handling Fundamentals, Using try and catch, Using throw, Using throws and finally, User-defined Exceptions.

Exercises

a) Develop a Java program to demonstrate exception-handling mechanism using try/catch. Use multiple catch clauses.
b) Construct a Java program for illustrating the use of throw.
c) Construct a Java program for illustrating the use of finally.
d) Construct a java program for demonstrating the creation and use of user-defined exceptions.

CYCLE– VI: Multithreading: Introduction to Multithreading, Creation of Threads, Thread Life Cycle, isAlive() and join(), Thread Synchronization, and Interthread Communication.

Exercises

a) Construct a Java program that creates threads by extending Thread class. The first thread displays “Good Morning” every 1 second, the second thread displays “Hello” every 2 seconds and thethird displays “Welcome” every 3 seconds.
b) Use Runnable to develop a Java program for the above problem.
c) Construct a java program illustrating isAlive() and join().
d) Develop a Java program to solve producer consumer problem using thread synchronization.

TEXT BOOKS:

1. Java: The Complete Reference; 8th edition; Herbert Schildt; TMH.
2. Programming in Java;2nd edition; SachinMalhotra, SaurabhChoudhary; Oxford University Press.
3. Core JAVA, An Integrated Approach; Dr. R. Nageswara Rao; Dreamtech Press.

Annexure-CS-IX

COURSE STRUCTURE AND DETAILED SYLLABUS

COMPUTER SCIENCE

For

M.Tech., COMPUTER SCIENCE

(Applicable for batches admitted from 2021-2022)

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M.Tech(CS) Programme Course Structure

(With effect from **2021-22** Admitted Batch onwards**)**

SEMESTER-I

S.No.	Course Code	Course	L	T	P	C
1	V21CTT01	**Program Core-1** Mathematical Foundations of Computer Science	3	-	-	3
2	V21CTT02	**Program Core-2** Advanced Data Structures	3	-	-	3
3	**Program Elective-I**		3	-	-	3
	V21CTT03	1. Advanced Operating Systems				
	V21CTT04	2. Advanced Computer Architecture				
	V21CTT05	3. Parallel Computing				
4	**Program Elective-II**		3	-	-	3
	V21CTT06	1. Advanced Databases				
	V21CTT07	2. Advanced Computer Networks				
	V21CTT08	3. Object Oriented Software Engineering				
5		Research Methodology and IPR	2	-	-	2
6	V21CTL01	**Laboratory-1** Advanced Data Structures Lab	-	-	4	2
7	**Laboratory-2:** Advanced Computing Lab-1***(Lab programs based on elective taken by student may be offered)***		-	-	4	2
	V21CTL02	Advanced Operating Systems				
	V21CTL03	Parallel Computing				
	V21CTL04	Advanced Computer Networks				
	V21CTL05	Object Oriented Software Engineering				
8		**Audit Course-1***	2	-	-	0
Total Credits			**16**	**0**	**8**	**18**

Student has to choose any one audit course listed below

SEMESTER-II

S.No.	Course Code	Course	L	T	P	C
1	V21CTT09	**Program Core-3** Web Technologies	3	-	-	3
2	V21CTT10	**Program Core-4** Data Science through Python Programming	3	-	-	3
3	**Program Elective-III**		3	-	-	3
	V21CTT11	1. Machine Learning				
	V21CTT12	2. Ad hoc and Sensor Networks				
	V21CTT13	3. Internet of Things				
4	**Program Elective-IV**		3	-	-	3
	V21CTT14	1. Principles of Cyber Security				
	V21CTT15	2. Cloud Computing				
	V21CTT16	3. Natural Language Processing				
7	V21CTL06	Advanced Web Technologies Lab	-	-	4	2
8	V21CTL07	Data Science Applications with Python Lab	-	-	4	2
9	V21CTM01	Mini Project with Seminar	2	-	-	2
10		**Audit Course-2***	2	0	0	0
Total Credits			**16**	**0**	**8**	**18**

****Student has to choose any one audit course listed below***

Audit Course 1 & 2:

1. English for Research Paper Writing - V21PGENT54(BOS English)
2. Disaster Management (BOS of CIVIL) - V21STEAC1
3. Value Education (BOS English) - V21PGENT55
4. Constitution of India (BOS English) - V21PGENT56
5. Pedagogy Studies (BOS English) - V21PGENT51
6. Personality Development through Life Enlightenment Skills (BOS English) - V21PGENT52
7. Stress Management by Yoga - V21PGENT53

M.Tech(CS) Programme Course Structure

(With effect from **2021-22** Admitted Batch onwards**)**

SEMESTER-III

S.No.	Course Code	Course	L	T	P	C
1	**Program Elective-V**		3	-	-	3
		1. MOOCS-1 through NPTEL/ SWAYAM12 Week Program related to the programme which is not listed in the course structure				
	V21CTT18	2. Mobile Applications and Development				
	V21CTT19	3. Big Data Analytics				
2	**Open Elective**		3	-	-	3
		MOOCs-2 Through NPTEL /SWAYAM - Any 12 week course on Engineering/ Management/ Mathematics offered by other than parent department				
	V21MAT02	Operations Research				
	V21MBT56	Cost Management of Engineering Projects				
3	V21CTP01	Dissertation-I/Industrial Project #	-	-	-	10
Total Credits						16

#Students going for Industrial Project/Thesis will complete these courses through MOOCs

SEMESTER-IV

S.No.	Course Code	Course	L	T	P	C
1	V21CTP02	Dissertation-II	-	-	-	16
Total Credits						16

			L	T	P	C
I-I	**Mathematical Foundations of Computer Science**	Course Code: **V21CTT01**	3	0	0	3

Course Outcomes: After completion of course, students would be able to

CO1: Demonstrate skills in solving mathematical problems, mathematical principles and logic. (K3)
CO2: Demonstrate the basic concepts associated with set theory, relations, functions and their applications (K3)
CO3: Illustrate algebraic structures and concepts associated with Number Theory and their applications in computer science. (K3)
CO4: Manipulate and consider data numerically by using combinatorics. (K3)
CO5: Solve recurrence relations using various methods apply techniques of graphs for real-time problems(K3)

UNIT I: **Mathematical Logic**-Propositional Calculus: Statements and Notations, Connectives, Well Formed Formulas, Truth Tables, Tautologies, Equivalence of Formulas, Duality Law, Tautological Implications, Normal Forms, Theory of Inference for Statement Calculus, Consistency of Premises, Indirect Method of Proof. Predicate Calculus: Predicative Logic, Statement Functions, Variables and Quantifiers, Free and Bound Variables, Inference Theory for Predicate Calculus.

UNIT II: **Set Theory-**Introduction, Operations on Binary Sets, Principle of Inclusion and Exclusion, *Relations:* Properties of Binary Relations, Relation Matrix and Digraph, Operations on Relations, Partition and Covering, Transitive Closure, Equivalence, Compatibility and Partial Ordering Relations, Hasse Diagrams, *Functions:* Bijective Functions, Composition of Functions, Inverse Functions, Permutation Functions, Recursive Functions, Lattice and its Properties.

UNIT III: **Algebraic Structures and Number Theory-** *Algebraic Structures:* Algebraic Systems, Examples, General Properties, Semi Groups and Monoids, Homomorphism of Semi Groups and Monoids, Group, Subgroup, Abelian Group, Homomorphism, Isomorphism, *Number Theory:* Properties of Integers, Division Theorem, The Greatest Common Divisor, Euclidean Algorithm, Least Common Multiple, Testing for Prime Numbers, The Fundamental Theorem of Arithmetic, Modular Arithmetic (Fermat's Theorem and Euler's Theorem).

UNIT IV: **Combinatorics-** Basic of Counting, Permutations, Permutations with Repetitions, Circular Permutations, Restricted Permutations, Combinations, Restricted Combinations, Generating Functions of Permutations and Combinations, Binomial and Multinomial Coefficients, Binomial and Multinomial Theorems, The Principles of Inclusion–Exclusion, Pigeonhole Principle and its Application.

UNIT V: **Recurrence Relations-**Generating Functions, Function of Sequences, Partial Fractions, Calculating Coefficient of Generating Functions, Recurrence Relations, Formulation as Recurrence Relations, Solving Recurrence Relations by Substitution and Generating Functions, Method of Characteristic Roots, Solving Inhomogeneous Recurrence Relations, **Graph Theory:** Basic Concepts of Graphs, Sub graphs, Matrix Representation of Graphs: Adjacency Matrices, Incidence Matrices, Isomorphic Graphs, Paths and Circuits, Eulerian and Hamiltonian Graphs, Multigraphs, Planar Graphs, Euler's Formula, Graph Colouring and Covering, Chromatic Number, Spanning Trees, Algorithms for Spanning Trees (Problems Only and Theorems without Proofs).

Text Books:

1. Discrete Mathematical Structures with Applications to Computer Science, J.P. Tremblay and P. Manohar, Tata McGraw Hill.
2. Elements of Discrete Mathematics-A Computer Oriented Approach, C. L. Liu and D. P. Mohapatra, 3rd Edition, Tata McGraw Hill.
3. Discrete Mathematics and its Applications with Combinatorics and Graph Theory, K. H. Rosen, 7th Edition, Tata McGraw Hill.

Reference Books:

1. Discrete Mathematics for Computer Scientists and Mathematicians, J. L. Mott, A. Kandel, T. P. Baker, 2nd Edition, Prentice Hall of India.
2. Discrete Mathematical Structures, Bernand Kolman, Robert C. Busby, Sharon Cutler Ross, PHI.
3. Discrete Mathematics, S. K. Chakraborthy and B.K. Sarkar, Oxford, 2011.

I-I	**Advanced Data Structures**	Course Code: **V21CTT02**	**L**	**T**	**P**	**C**
			3	0	0	3

Course Outcomes: After completion of course, students would be able to

CO1: Select appropriate data structures as applied to specified problem definition. (**K2)**

CO2: Apply data structures such as linked list and trees on necessary applications. (**K3)**

CO3: Practice all data structures like stacks, queues, trees, graphs and compare their performance. **(K3)**

CO4: Discuss operations like searching, insertion, deletion and traversing on various data structures. (**K2)**

CO5: Apply data structures into the applications such as binary search trees, AVL, Red black trees. (**K3)**

UNIT I: **Arrays** Abstract Data Types and the C++ Class, The Array as an Abstract Data Type, The Polynomial Abstract Data type, Spares Matrices, Introduction- Sparse Matrix Representation- Transposing a Matrix- Matrix Multiplication, Representation of Arrays. **Stacks And Queues-** Templates in C++, The Stack Abstract Data Type, The Queue Abstract Data Type, Subtyping and Inheritance in C++, Evaluation of Expressions, Expression- Postfix Notation- Infix to Postfix.

UNIT II: **Linked Lists** Single Linked List and Chains, Representing Chains in C++, The Template Class Chain, Circular Lists, Available Space Lists, Linked Stacks and Queues, Polynomials, Equivalence Classes, Sparse Matrices, Doubly Linked Lists, Generalized Lists, Representation of Generalized Lists, **Trees** Introduction, Binary Trees, Binary Tree Traversal and Tree Iterators- Introduction, In order, Preorder, Post order Traversal, Thread Binary Trees, Heaps, Binary Search Trees.

UNIT III: **Graphs** The Graph Abstract Data Type, Elementary Graph Operation, Minimum Cost Spanning Trees, Shortest Paths and Transitive Closure, **Hashing**-Introduction, Static Hashing, Dynamic Hashing.

UNIT IV: **Priority Queues** Binomial heaps, Fibonacci Heaps, Symmetric Min-Max Heaps, **Efficient Binary Search Trees** Optimal Binary Search Trees, AVL trees, Red-Black Trees, Splay Trees.

UNIT V: **Multiyway Search Trees** m-way Search Trees, B- Trees, B+- Trees **Digital Search Trees** Digital Search Trees, Binary Tries and Patricia, Multiway Tries

Text Books:

1. Data structures, Algorithms and Applications in C++, S.Sahni, 2nd edition, Universities Press, Pvt. Ltd.
2. Data structures and Algorithm Analysis in C++, Mark Allen Weiss, Pearson Education. Ltd., Second Edition.
3. Data structures and Algorithms in C++, Michael T.Goodrich, R.Tamassia and Mount, Wiley student edition, John Wiley and Sons.

Reference Books:

1. Data structures and algorithms in C++, 3rd Edition, Adam Drozdek, Thomson
2. Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.
3. Problem solving with C++, The OOP, Fourth edition, W.Savitch, Pearson education.

I-I	**Advanced Operating Systems** (Elective-I)	Course Code: **V21CTT03**	**L**	**T**	**P**	**C**
			3	0	0	3

Course Outcomes: After completion of course, students would be able to

CO1: Explain architectures and issues in Distributed Operating Systems.(K2)

CO2: Illustrate different Distributed Mutual Exclusion Algorithms and Distributed Deadlock Algorithms. (K3)

CO3: Demonstrate Distributed Scheduling Algorithm and Distributed Shared Memory.(K3)

CO4: Apply various Cryptographic Algorithms for the protection of given data.(K3)

CO5: Demonstrate Multiprocessor Scheduling Algorithms and Concurrency Control Algorithms.(K3)

UNIT-I: **Architectures of Distributed Systems**: System Architecture Types, Distributed Operating Systems, Issues in Distributed Operating Systems. **Theoretical Foundations:** Inherent Limitations of a Distributed System, Lamport's Logical clocks, Vector Clocks, Global State, and Termination Detection.

UNIT-II: **Distributed Mutual Exclusion:** The classification of Mutual Exclusion Algorithms, Preliminaries, Non-Token-Based Algorithms, Lamport's Algorithm, The Ricart-Agrawala Algorithm, Token-Based Algorithms, Suzuki-kasami's Broadcast Algorithm, Singhal's Heuristic Algorithm. **Distributed Deadlock Detection:** Resource Vs Communication Deadlocks, A graph– theoretic Model, Deadlock handling strategies in Distributed Systems, Control Organizations for Distributed Deadlock Detection, Centralized Deadlock Detection Algorithms, Distributed Deadlock Detection Algorithms- A Path-Pushing, Edge-Chasing, Hierarchical Deadlock Detection Algorithms. **Agreement protocols**: The System Model, The Byzantine Agreement Problem, The Consensus Problem.

UNIT-III: **Distributed File Systems**: Mechanisms for Building Distributed File Systems, Design Issues. **Distributed Shared Memory**: Algorithms for Implementing DSM, Memory Coherence, Coherence Protocols, Design Issues. **Distributed Scheduling:** Issues in Load Distributing, Components of a Load Distributing Algorithm, Stability, Load Distributing Algorithms, Performance Comparison.

UNIT-IV: **Failure Recovery**: Backward and Forward Error Recovery, Consistent Set of Checkpoints, Synchronous and Asynchronous check Pointing and Recovery. **Fault Tolerance**: Commit Protocols, Non-blocking Commit Protocols, Voting Protocols. **Resource Protection and Security:** The Access Matrix Model. **Cryptography**: Private Key: Data Encryption Standard, Public Key Cryptography.

UNIT-V: **Multiprocessor System Architectures**: Basic Multiprocessor System Architectures, Interconnection Networks for Multiprocessor Systems, Caching, Hypercube Architectures. **Multiprocessor Operating Systems:** Threads, Process Synchronization, Processor Scheduling. **Database Operating Systems:** Concurrence Control Model of Database systems, Problem of Concurrency Control, Distributed Database Systems. **Concurrency Control Algorithms**: Lock Based Algorithms, Timestamp Based Algorithms.

TEXT BOOKS:

1. "Advanced concepts in operating systems: Distributed, Database and multiprocessor operating systems", Mukesh Singhal, Niranjan G.Shivaratri, TMH, 2001.

REFERENCE BOOKS:

1. "Modern operating system", Andrew S.Tanenbaum, PHI, 2003
2. "Distributed operating system-Concepts and design", Pradeep K.Sinha, PHI, 2003.
3. "Distributed operating system", Andrew S.Tanenbaum, Pearson education, 2003.

I-I	**Advanced Computer Architecture** (Elective-I)	Course Code: **V21CTT04**	**L**	**T**	**P**	**C**
			3	0	0	3

Course Outcomes: After completion of course, students would be able to

CO1: Classify the types of computers, and new trends and developments in computer architecture**.** **(K2)**
CO2: Describe pipelining, instruction set architectures, memory addressing. **(K2)**
CO3: Demonstrate exploiting ILP using dynamic scheduling, multiple issue, and speculation**.** **(K3)**
CO4: Demonstrate the various techniques to enhance a processors ability to exploit Instruction level parallelism (ILP), and its challenges**.** **(K3)**
CO5: Illustrate multithreading by using ILP and supporting thread-level parallelism (TLP). **(K3)**

UNIT I: **Fundamentals of Computer Design**-Fundamentals of Computer design, Changing faces of computing and task of computer designer, Technology trends, Cost price and their trends, Measuring and reporting performance, Quantitative principles of computer design, Amdahl's law, Instruction set principles and examples- Introduction, Classifying instruction set- Memory addressing- type and size of operands, Operations in the instruction set.

UNIT II: **Pipelines-** Introduction, Basic RISC instruction set, Simple implementation of RISC instruction set, Classic five stage pipe lined RISC processor, Basic performance issues in pipelining, Pipeline hazards, Reducing pipeline branch penalties, **Memory Hierarchy Design-** Introduction, Review of ABC of cache, Cache performance, Reducing cache miss penalty, Virtual memory.

UNIT III: **Instruction** Level Parallelism the Hardware Approach: Instruction- Level parallelism, Dynamic scheduling, Dynamic scheduling using Tomasulo's approach, Branch prediction, high performance instruction delivery- hardware based speculation.

UNIT IV: ILP Software
Approach Basic compiler level techniques, Static branch prediction, VLIW approach, Exploiting ILP, Parallelism at compile time, Cross cutting issues - Hardware versus Software.

UNIT V: **Multi Processors and Thread Level Parallelism:**
Multi Processors and Thread level Parallelism- Introduction, Characteristics of application domain, Systematic shared memory architecture, Distributed shared– memory architecture, Synchronization, **Inter Connection and Networks-** Introduction, Interconnection network media, Practical issues in interconnecting networks, Examples of inter connection, Cluster, Designing of clusters, **Intel Architecture-** Intel IA-64 ILP in embedded and mobile markets Fallacies and pit falls.

Text Books:

1. JohnL. Hennessy, David A.Patterson –Computer Architecture: A Quantitative Approach, 3rd Edition, An Imprint of Elsevier.

References:

1. John P.Shen and Miikko H.Lipasti – Modern Processor Design: Fundamentals of Super Scalar Processors
2. Computer Architecture and Parallel Processing – Kai Hwang, Faye A.Brigs., MC Graw Hill.
3. Advanced Computer Architecture – A Design Space Approach – Dezso Sima, Terence Fountain, Peter Kacsuk , Pearson Ed

I-I	**Parallel Computing** (Elective-I)	Course Code: **V21CTT05**	**L**	**T**	**P**	**C**
			3	0	0	3

Course Outcomes: After completion of course, students would be able to

CO1: Describe different parallel architectures; inter-connect networks, programming models, and algorithms for common operations such as matrix-vector multiplication. **(K2**)
CO2: Develop an efficient parallel algorithm to solve it. **(K3)**
CO3: Illustrate a parallel algorithm time complexity as a function of the problem size and number of processors. **(K3)**
CO4: Illustrate Matrix Multiplication and Sorting Techniques. **(K3)**
CO5: Explain parallel algorithm using MPI, Open MP, pthreads, or a combination of MPI and Open MP. **(K2)**

UNIT I: **History-** Introduction, Modern Scientific Method, Evolution of Supercomputing, Modem Parallel Computers, Seeking Concurrency, Data Clustering, Programming Parallel Computers. **Parallel Architectures:** Introduction, Interconnection Networks, Processor Arrays, Multiprocessors, Multi computers, Flynn's Taxonomy

UNIT II: **Parallel Algorithm Design-** Introduction, The Task/Channel Model, Foster's Design Methodology, Boundary Value Problem ,Finding the Maximum, The n-Body Problem, Adding Data Input, **Message-Passing Programming-** Introduction, The Message-Passing Model, The Message-Passing Interface , Circuit Satisfiability, Introducing Collective Communication, Benchmarking Parallel Performance.

UNIT III: **The Sieve of Eratosthenes-**Introduction, Sequential Algorithm, Sources of Parallelism, Data Decomposition options, Developing the Paralle1 Algorithm, Analysis of Parallel Sieve Algorithm, Documenting the Parallel Program, Benchmarking, Improvements, **Performance Analysis-** Introduction, Speedup and Efficiency, Amdahl's Law, Gustafson-Barsis's Law, The Karp-Flatt Metric, The Iso-efficiency Metric.

UNIT IV: **Matrix Multiplication,** Introduction, Sequential Matrix Multiplication, Row wise Block-Striped Parallel Algorithm, Cannon's Algorithm, Solving Linear Systems, Back Substitution, Gaussian Elimination, Iterative Methods, **Sorting** Introduction, Quick sort, A Parallel Quick sort Algorithm, Hyper quick sort Algorithm, Parallel Sorting by Regular Sampling.

UNIT V: **Shared-Memory Programming –** Introduction, The Shared-Memory Model, Parallel for Loops, Declaring Private Variables, Critical section, Reductions, Performance Improvements, More General Data Parallelism, Functional Parallelism, **Combining MPI and OpenMP** -Introduction, Conjugate Gradient Method, Jacobi Method.

Text Books:

1. Parallel Programming in C with MPI and OpenMP Michael J, Quinn Oregon State University.

Reference books:

1. Distributed and Cloud Computing: From Parallel Processing to the Internet of Things 1st Edition, Kai Hwang , Jack Dongarra, Geoffrey C. Fox

I-I	**Advanced Databases** (Elective-II)	Course Code: **V21CTT06**	**L**	**T**	**P**	**C**
			3	0	0	3

Course Outcomes: After completion of course, students would be able to

CO1: Explain Distributed Database Process, Architecture, and Design Principles. **(K2)**
CO2: Apply Distributed Query Optimization Techniques and Algorithms. **(K3)**
CO3: Illustrate and apply Concurrency Control and Reliability Techniques. **(K3)**
CO4: Illustrate Need of Complex Data type like ORDBMS and OODBMS. **(K3)**
CO5: Identify Emerging Database Models and case study on Time Series Database. **(K2)**

UNIT I: Database Analysis and Design Techniques: Review of basic Database Concepts, Database Design Methodologies. ER Modeling: Specialization, Generalization, Aggregation, Normalization Theory. Database Implementation using UML: Introduction to UML, Structure diagrams, behavioral diagrams, object oriented analysis, class diagram, Advanced Transaction Processing and Concurrency Control: Transaction Concepts, Concurrency Control: Locking Methods, Time stamping Methods, Optimistic Methods for Concurrency Control, Concurrency Control in Distributed Systems.

UNIT II: Query Compiler: Introduction, parsing, generating logical query plan from parse tree. Query Processing: Physical-Query-plan Operators. Operations: selection, sorting, join, project, set. Query Evaluation: Introduction, Approaches to QE, Transformation of relational expressions in Query optimization, heuristic optimization, cost estimation for various operations, transformation rule.

UNIT III: Distributed Database Centralized DBMS and Distributed DBMS, functions and architecture of a DDBMS, Distributed Data Storage, Transparency issues in DDBMS, Query Processing DDBMS, Distributed transaction Management and Protocols, Distributed Concurrency Control and Deadlock Management.

UNIT IV: Object Oriented Database Limitations of RDBMS, Need of Complex Datatype, Data Definition, ODBMS Fundamentals, issues in OODBMS, Object- oriented database design. Comparison of ORDBMS and OODBMS.

UNIT V: Emerging Database Models, Technologies and Applications Multimedia database-Emergence, difference from other data types, structure, deductive databases, GIS and spatial databases, Knowledge database, Information Visualization, Wireless Networks and databases, Personal database, Digital libraries, web databases, case studies.
Time Series Database(TSD): Time Series Database, Importance of TSD, TSD Vs Relational DB, RTA and TSD, TSD as stream processing solution.

Text Books:

1. Advanced database management system by RiniChkrabarti and Shibhadra Dasgupta, Dreamtech.
2. Distributed Databases by Ozsu and Valduriez ,Pearson Education.

Reference Books**:**

1. Fundamentals of Database Systems by Ramez Elmasri, Shamkant Navathe, Pearson Education
2. Database System Concepts by Abraham Silberschatz, Henry F. Korth, S. Sudarshan, Tata McGraw-Hill.
3. https://www.xenonstack.com/insights/time-series-databases-in-real-time-analytics

I-I	**Advanced Computer Networks** (Elective-II)	Course Code: **V21CTT07**	**L**	**T**	**P**	**C**
			3	0	0	3

Course Outcomes: After completion of course, students would be able to

CO1: Describe the functionalities and services provided by the network layer. (K2)

CO2: Apply IP addressing for the given network. (K3)

CO3: Select the transport protocol appropriate for a given application. (K3)

CO4: Discriminate between different types of multimedia communications. (K2)

CO5: Describe the working, types and challenges involved in Adhoc networks & SDN. (K2)

UNIT I: **Network layer-**Network Layer design issues: store-and forward packet switching, services provided transport layers, implementation connection less services, implementation connection oriented services, comparison of virtual – circuit and datagram subnets. **Routing Algorithm** –shortest path routing, flooding, distance vector routing, link state routing, Hierarchical routing, Broadcast routing, Multicasting routing, routing for mobiles Hosts, routing in Adhoc networks, **Congestion control algorithms**-Load shedding, Congestion control in Data gram Subnet.

UNIT II: **IPV4 Address** address space, notations, classful addressing, classless addressing network addressing translation(NAT) , **IPV6 Address** structure address space, **Internetworking** need for network layer internet as a data gram, internet as connection less network. **IPV4** datagram, Fragmentation, checksum, options. **IPV6** Advantages, packet format, extension Headers, Transition form IPV4 to IPV6

UNIT III: **Process to process delivery:** client/server paradigm, multiplexing and demultiplexing, connectionless versus connection oriented services, reliable versus reliable. **UDP:** well known ports for UDP, user data gram, check sum, UDP operation, and uses of UDP **TCP:** TCP services, TCP features, segement, A TCP connection, Flow control, error control, congestion control. **SCTP:** SCTP services SCTP features, packet format, An SCTP association, flow control, error control. **Congestioncontrol**: open loop congestion control, closedloop congestion control, Congestion control in TCP, frame relay, **Quality Of Service**: flow characteristics, flow classes **Techniques To Improve QOS**: scheduling, traffic shaping, resource reservation, admission control.

UNIT IV: **Multimedia-** introduction digital a audio , Audio compression, streaming audio, internet radio, voice over IP, introduction to video, video compression, video on demand, the MBone-the multicast back bone

UNIT V: **Emerging trends Computer Networks- Mobile Ad hoc networks**: applications of Ad hoc networks, challenges and issues in MANETS,MAC layers issues, routing protocols in MANET, transport layer issues, Ad Hoc networks security. **Wireless sensors networks:** WSN functioning, operation system support in sensor devices, WSN Characteristics, sensor network operation, sensor Architecture: cluster management; **Wireless mesh networks** WMN design, Issues in WMNs;

Software-defined networking (SDN): importance of SDN, working principle of SDN, Benefits of SDN, SDN vs Traditional Networking, Different models of SDN.

Text Books:

1. Data communications and networking 4th edition Behrouz A Fourzan, TMH.
2. Computer networks 4th edition Andrew S Tanenbaum, Pearson.
3. Computer networks, Mayank Dave, CENGAGE.

Reference Books:

1. Computer Networks, A system Approach, 5th ed, Larry L Peterson and Bruce S Davie, Elsevier.
2. https://www.vmware.com/topics/glossary/content/software-defined-networking.

			L	T	P	C
I-I	**Object Oriented Software Engineering** (Elective-II)	Course Code: **V21CTT08**	**3**	**0**	**0**	**3**

Course Outcomes: After completion of course, students would be able to

CO1: Apply the Object Oriented Software-Development Process to design software. (K3)
CO2: Illustrate the Object Oriented Software Architecture & Design patterns. (K3)
CO3: Examine theDesign and Plan software solutions to problems using an object-oriented Testing strategies. (K4)
CO4: Illustrate the Object Oriented metrics for designing the projects. (K3)
CO5: Develop the CASE Tools
& Integrated CASE environments for Object Oriented Software. (K3)

UNIT I: Introduction to Software Engineering: Software, Software Crisis, Software Engineering definition, Evolution of Software Engineering Methodologies, Software Engineering Challenges. Software Processes: Software Process, Process Classification, Phased development life cycle, Software Development Process Models- Process, use, applicability and Advantages/limitations.

UNIT II: Object oriented Paradigm, Object oriented Concepts, Classes, Objects, Attributes, Methods and services, Messages, Encapsulation, Inheritance, Polymorphism, Identifying the elements of object model, management of object oriented Software projects, Object Oriented Analysis, Domain Analysis, Generic Components of OOA model,, OOA Process, Object Relationship model, Object Behavior Model, Object Oriented Design: Design for Object- Oriented systems, The Generic components of the OO design model, The System design process, The Object design process, Design Patterns, Object Oriented Programming.

UNIT III: Object Oriented testing: Broadening the view of Testing, Testing of OOA and OOD models, Object-Oriented testing strategies, Test case design for OO software, testing methods applicable at the class level, Interclass test case design

UNIT IV: Technical Metrics for Object Oriented Systems: The Intent of Object Oriented metrics, The distinguishing Characteristics, Metrics for the OO Design model, Class-Oriented metrics, Operation-Oriented Metrics, Metrics foe Object Oriented testing, Metrics for Object Oriented projects

UNIT V: Computer-Aided Software Engineering: What is CASE?, Building blocks for CASE, A taxonomy of CASE tools, Integrated CASE environments, The Integration Architecture, The CASE Repository

Text Books:

1. Object Oriented and Classical Software Engineering, 7/e, Stephen R. Schach, TMH.
2. Object oriented and Classical Software Engineering, Timothy Lethbridge, Robert Laganiere, TMH
3. Software Engineering by Roger S Pressman, Tata McGraw Hill.

Reference Books:

1. Component based Software Engineering: ivica Crnkovic, Springer.

I-I	**Advanced Data Structures Lab**	Course Code: **V21CTL01**	**L**	**T**	**P**	**C**
			0	**0**	**4**	**2**

Course Outcomes: After completion of course, students would be able to

CO1: Develop solutions for a range of problems using object oriented programming. (**K3)**

CO2: Practice complex problems using advanced data structures like arrays, stacks, queues, linked lists, graphs and trees. **(K3)**

CO3: Practice operations like searching, insertion, deletion and traversing on various data structures. (**K3)**

CO4: Apply data structures into the applications such as binary search trees, AVL, Red black trees. (**K3)**

CO5: Differentiate various hash functions. (**K2)**

List of Experiments

Experiment 1:

Develop a program to implement Polynomial additions using Arrays.

Experiment 2:

Develop a program to implement Polynomial additions using linked lists.

Experiment 3:

Develop a program to implement Multi Stack ADT using Arrays with the basic operations as Create(), IsEmpty(), Push(), Pop(), IsFull() with appropriate prototype to a functions.

Experiment 4:

Develop a program to implement Queue ADT using Linked list with the basic functions of Create(), IsEmpty(), Insert(), Delete() and IsFull() with suitable prototype to a functions.

Experiment 5:

Develop a program to transfer data from stack to queue.

Experiment 6:

Develop a program to implement the following ADT using Linked list with the basic functions of Create(), IsEmpty(), Insert(), Delete() and IsFull() with suitable prototype to a functions.

i) Double Ended Queue (Dequeues)
ii) Circular Queues

Experiment 7:

Develop a program to generate the binary tree from the given inorder, preorder and post order traversal.

Experiment 8:

Develop a program to implement insertion, deletion and display operation in Min- Max Heap for the given data as integers.

Experiment 9:

Develop a program for Binary Search Tree to implement following operations:

a) Insertion
b) Deletion
   i. Delete node with only child
   ii. Delete node with both children
c) Finding an element
d) Finding Min element
e) Finding Max element
f) Left child of the given node
g) Right child of the given node
h) Finding the number of nodes, leaves nodes, full nodes, ancestors, descendants

Experiment 10:

Develop a program to implement BFS and DFS for a Graph.

Experiment 11:

Develop a program to implement to generate a min-cost spanning tree

a) Kruskal's algorithm
b) Prim's algorithm

Experiment 12:

Develop a program to store k keys into an array of size n at the location computed using a hash function, loc = key % n, where k<=n and k takes values from [1 to m], m>n. To handle the collisions use the following collision resolution techniques,

a) Linear probing
b) Quadratic probing
c) Double hashing/rehashing

Experiment 13:

Develop a program for AVL Tree to implement following operations: (For nodes as integers)

a) Insertion: Test program for all cases (LL, RR, RL, LR rotation)
b) Deletion: Test Program for all cases (R0, R1, R-1, L0, L1, L-1)
c) Display: using set notation

Experiment 14:

Develop a program to generate the B-tree of order 2-3 for a given list of integers.

Experiment 15:

Develop a program to perform string matching using Boyer-Moore algorithm.

Text Books:

1. Data structures, Algorithms and Applications in C++, S.Sahni, 2nd edition, Universities Press, Pvt. Ltd.
2. Data structures and Algorithm Analysis in C++, Mark Allen Weiss, Pearson Education. Ltd., Second Edition.
3. Data structures and Algorithms in C++, Michael T.Goodrich, R.Tamassia and Mount, Wiley student edition, John Wiley and Sons.

Reference Books:

1. Data structures and algorithms in C++, 3rd Edition, Adam Drozdek, Thomson
2. Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.
3. Problem solving with C++, The OOP, Fourth edition, W.Savitch, Pearson education.

Advanced Computing Lab-1

NOTE: **Lab programs based on elective taken by student may be offered.**

I-I	Advanced Operating Systems Lab	Course Code: **V21CTL02**	L	T	P	C
			0	**0**	**4**	**2**

Course Outcomes: After completion of course, students would be able to

CO1: Demonstrate deadlock avoidance and detection algorithms in a distributed environment (K3)
CO2: Demonstrate efficient clock synchronization and election algorithms. (K3)
CO3: Describe Client server architecture (K2)

List of Experiments

Experiment 1: **Develop a program to implement Deadlocks through Simulation.**

Experiment 2: **Develop a Case Study of 3 tier client server architecture.**

Experiment 3: **Develop a Case study on Client and RMI Server.**

Experiment 4: **Develop a program to implement any one Election algorithms.**

Experiment 5: **Develop a program to show the software simulation for Clock Synchronization in Distributed System using Lamport's Algorithm.**

Experiment 6: **Develop a program to implement Banker's Algorithm for avoiding Deadlock.**

TEXT BOOKS:

1. "Advanced concepts in operating systems: Distributed, Database and multiprocessor operating systems", Mukesh Singhal, Niranjan G.Shivaratri, TMH, 2001.

REFERENCE BOOKS:

1. "Modern operating system", Andrew S.Tanenbaum, PHI, 2003
2. "Distributed operating system-Concepts and design", Pradeep K.Sinha, PHI, 2003.
3. "Distributed operating system", Andrew S.Tanenbaum, Pearson education, 2003.

I-I	**Parallel Computing Lab**	Course Code: **V21CTL03**	L	T	P	C
			0	**0**	**4**	**2**

Course Outcomes: After completion of course, students would be able to

CO1: Develop an efficient parallel algorithm to solve it. (K3)

CO2: Use parallel algorithm using MPI, OpenMP, pthreads, or a combination of MPI and OpenMP.(K3)

List of Experiments

Experiment 1: Develop a parallel program that computes the sum 1+2+------+ in the following

Manner. Each process I assigns the value i+1 to an integer, and then the processes perform a sum reduction. As a way of double-checking the result, process 0 should also compute and print the value p(p+1)/2.

Experiment 2: Implement A print number is a positive integer evenly divisible by exactly two positive integers: itself and .The first five prime numbers are 2,3,5,7 and 11. Sometimes two consecutive odd numbers are both prime. For example, the odd integers following 3,5 and 11 are all prime numbers. However, the odd integer following 7 is not a prime number. Write a parallel program to determine, for all integers less then 1,000,000, the number of times that two consecutive odd integers are both prime.

Experiment 3: Develop a program implementing the parallel matrix multiplication algorithm.

Experiment 4: Develop a MPI program implementing consecutive gradient.

Experiment 5: Develop a MPI program to implementing Quick sort.

Text Books:

1. Parallel Programming in C with MPI and OpenMP Michael J, Quinn Oregon State University.

Reference books:

2. Distributed and Cloud Computing: From Parallel Processing to the Internet of Things 1st Edition, Kai Hwang , Jack Dongarra, Geoffrey C. Fox

I-I	**Advanced Computer Networks Lab**	Course Code: **V21CTL04**	L	T	P	C
			0	**0**	**4**	**2**

Course Outcomes: After completion of course, students would be able to

CO1: Demonstrate various routing protocols. (K3)

CO2: Develop sub netting and addressing IP. (K3)

CO3: Develop emerging trends and security issues in computer Networks. (K3)

List of Experiments

Experiment 1:

Configuration of IP addressing for a given scenario for a given set of topologies.

Experiment 2:

Configure a DHCP Server to serve contiguous IP addresses to a pool of four IP devices with a default gateway and a default DNS address. Integrate the DHCP server with a BOOTP demon to automatically serve Windows and Linux OS Binaries based on client MAC address.

Experiment 3:

Configure, implement and debug the following: Use open source tools for debugging and diagnostics.

a) ARP/RARP protocols

b) RIP routing protocols

c) BGP routing

d) OSPF routing protocols

e) Static routes (check using netstat)

Text Books:

1. Data communications and networking 4th edition Behrouz A Fourzan, TMH
2. Computer networks 4th edition Andrew S Tanenbaum, Pearson
3. Computer networks, Mayank Dave, CENGAGE

Reference Books:

1. Computer Networks, A system Approach, 5th ed, Larry L Peterson and Bruce S Davie, Elsevier

I-I	**Object Oriented Software**	Course	L	T	P	C

	Engineering Lab	Code: **V21CTL05**	**0**	**0**	**4**	**2**

Course Outcomes: After completion of course, students would be able to

CO1: Apply software solutions to problems using an object-oriented strategy. **(K3)**

CO2: Construct the object oriented software systems Model using Unified Modeling Language (UML). **(K3)**

List of Experiments

Experiments 1:

Develop the following for the given project

a) Define the problem statement, Software Requirement Specification, entity relationship diagram,

b) Dataflow diagrams for level 0 and level 1,

c) Draw use-case diagram

d) Draw the activity diagram of all use cases.

e) Draw sequence diagram of all use cases

f) Draw collaboration diagram of all use cases, and Assign objects in Sequence diagram to classes and make class diagrams.

Text Books:

1. Object Oriented and Classical Software Engineering, 7/e, Stephen R. Schach, TMH.
2. Object oriented and Classical Software Engineering, Timothy Lethbridge, Robert Laganiere, TMH
3. Software Engineering by Roger S Pressman, Tata McGraw Hill.

Reference Books:

1. Component based Software Engineering: ivica Crnkovic, Springer.

I-II	**Web Technologies**	Course Code: **V21CTT09**	**L**	**T**	**P**	**C**
			3	0	0	3

Course Outcomes: After completion of course, students would be able to

CO1: Demonstrate the basics of JavaScript. (K3)

CO2: Illustrate the concepts of XML and AJAX. (K3)

CO3: Produce Dynamic web pages with PHP and MySQL. (K3)

CO4: Use PERL to retrieve documents from the web. (K3)

CO5: Describe the fundamentals of RUBY Programming. (K2)

Syllabus:

UNIT-I: **Java script-** The Basic of Java script: Objects, Primitives Operations and Expressions, Screen Output and Keyboard Input, Control Statements, Object Creation and Modification, Arrays, Functions, Constructors, Pattern Matching using Regular Expressions

UNIT-II: **XML-** Document type Definition, XML schemas, Document object model, XSLT, DOM and SAX Approaches, **AJAX A New Approach:** Introduction to AJAX, Integrating PHP and AJAX.

UNIT-III: **PHP Programming- Introducing PHP:** Creating PHP script, Running PHP script. **Working with variables and constants:** Using variables, Using constants, Data types, Operators. **Controlling program flow:** Conditional statements, Control statements, Arrays, functions. Working with forms and Databases such as MySQL.

UNIT-IV: PERL- Introduction to PERL, Operators and if statements, Program design and control structures, Arrays, Hashs and File handling, Regular expressions, Subroutines, Retrieving documents from the web with Perl.

UNIT-V: RUBY: Introduction to Ruby, Variables, types, simple I/O, Control, Arrays, Hashes, Methods, Classes, Iterators, Pattern Matching. Overview of Rails.

TEXT BOOKS:

1. Programming the World Wide Web, Robet W Sebesta, 7ed, Pearson.
2. Web Technologies, Uttam K Roy, Oxford

Reference Book:

1. The Web Warrior Guide to Web Programming, Bai, Ekedahl, Farrelll, Gosselin, Zak, Karparhi, Maclntyre, Morrissey, Cengage.
2. Programming world wide web-Sebesta, Pearson Education, 2007.
3. Core SERVLETS AND JAVA SERVER PAGES VOLUME 1: CORE TECHNOLOGIES By Marty Hall and Larry Brown Pearson Internet and World Wide Web – How to program by Dietel and Nieto PHI/Pearson Education Asia.

I-II	**Data Science through Python Programming**	Course Code: **V21CTT10**	**L**	**T**	**P**	**C**
			3	**0**	**0**	**3**

Course Outcomes: After completion of course, students would be able to

CO1: Illustrate the python basics and the working of various built-in objects in Python. (K2)

CO2: Describe the process of data collection using python. (K2)

CO3: Manipulate data using Pandas and NumPy libraries of python. (K3)

CO4: Apply various techniques for cleaning and pre-processing the data. (K3)

CO5: Demonstrate data visualization techniques using python matplotlib. (K3)

Syllabus:

UNIT I: **PYTHON Basics and Programming Concepts:** Introducing Python, Types and Operations - Numbers, Strings, Lists, Tuples, Dictionaries, Files, Numeric Types, Dynamic Typing; Statements and Syntax - Assignments, Expressions, Statements, Loops, iterations, comprehensions; Functions - Function Basics, Scopes, Arguments, Advanced Functions; Modules - Module Coding Basics, Module Packages, Advanced Module Topics; Classes and OOP - Class, Operator Overloading, Class Designing; Exceptions and Tools - Exception Basics, Exception Coding Details, Exception Objects, Designing With Exceptions, Parallel System Tools

UNIT II: **GUI Programming:** Graphical User Interface - Python gui development options, Adding Widgets, GUI Coding Techniques, Customizing Widgets; Internet Programming - Network Scripting, Client-Side scripting, Pymailgui client, server-side scripting, Pymailcgi server; Tools and Techniques - databases and persistence, data structures, text and language, python/c integration

UNIT III: **Pandas and NumPy:** Numpy Basics - Fast Element wise array functions, Multidimensional Array, Data Processing using arrays, file i/o with arrays; Pandas - Data Structures, Essential Functionality, Summarizing and Computing Descriptive Statistics, Handling Missing Data, Hierarchical Indexing

UNIT IV: **Data Preprocessing:** Data Loading, Storage, and FileFormats - Reading and Writing data in text format, binary data formats, interacting with html and web apis, interacting with databases; Data Wrangling: Clean, Transform, Merge, Reshape - Combining and Merging Data Sets, Reshaping and Pivoting, Data Transformation, String Manipulation; Data Aggregation and Group Operations – Group by Mechanics, Data Aggregation, Groupby Operations and and Transformations, Pivot Tables and Cross- Tabulation

UNIT V: **Data Visualization:** A Brief matplotlib API Primer, Plotting Functions in pandas, Time Series, Financial and Economic Data Applications

Text Books:

1. Learning Python , O'Reilly, Mark Lutz
2. Programming Python, O'Reilly, Mark Lutz
3. Python For Data Analysis (O'Reilly, Wes Mckinney)

Reference Text Books:

1. Python: The Complete Reference, Martin C. Brown, McGraw Hill Education
2. Head First Python, Paul Barry, O'Reilly

I-II	**Machine Learning** (Elective –III)	Course Code: **V21CTT11**	**L**	**T**	**P**	**C**
			3	0	0	3

Course Outcomes: After completion of course, students would be able to

CO1: Describe Knowledge for Productive use of Machine Learning and Diversity of Data (K2)
CO2: Demonstrate on Supervised and Computational Learning (K3)
CO3: Illustrate on Statistics in learning techniques and Logistic Regression (K3)
CO4: Illustrate on Support Vector Machines and Perceptron Algorithm (K3)
CO5: Construct a Multilayer Perceptron Networks and classification of decision tree (K3)

UNIT-I: **Introduction-**Towards Intelligent Machines, Well posed Problems, Example of Applications in diverse fields, Data Representation, Domain Knowledge for Productive use of Machine Learning, Diversity of Data: Structured / Unstructured, Forms of Learning, Machine Learning and Data Mining, Basic Linear Algebra in Machine Learning Techniques.

UNIT-II: **Supervised Learning-** Rationale and Basics: Learning from Observations, Bias and Why Learning Works: Computational Learning Theory, Occam's Razor Principle and Overfitting Avoidance Heuristic Search in inductive Learning, Estimating Generalization Errors, Metrics for assessing regression, Metris for assessing classification.

UNIT-III: **Statistical Learning-** Machine Learning and Inferential Statistical Analysis, Descriptive Statistics in learning techniques, Bayesian Reasoning: A probabilistic approach to inference, K-Nearest Neighbor Classifier. Discriminant functions and regression functions, Linear Regression with Least Square Error Criterion, Logistic Regression for Classification Tasks, Fisher's Linear Discriminant and Thresholding for Classification, Minimum Description Length Principle.

UNIT-IV: **Support Vector Machines (SVM)-** Introduction, Linear Discriminant Functions for Binary Classification, Perceptron Algorithm, Large Margin Classifier for linearly seperable data, Linear Soft Margin Classifier for Overlapping Classes, Kernel Induced Feature Spaces, Nonlinear Classifier, Regression by Support vector Machines.

Learning with Neural Networks: Towards Cognitive Machine, Neuron Models, Network Architectures, Perceptrons, Linear neuron and the Widrow-Hoff Learning Rule, The error correction delta rule.

UNIT -V: Multilayer Perceptron Networks and error back propagation algorithm, Radial Basis Functions Networks. **Decision Tree Learning**: Introduction, Example of classification decision tree, measures of impurity for evaluating splits in decision trees, ID3, C4.5, and CART decision trees, pruning the tree, strengths and weakness of decision tree approach.

Textbooks:

1. Applied Machine Learning,1e, M.Gopal, Mc Graw Hill Education, 2018

Reference Books

1. Kevin Murphy, Machine Learning: A Probabilistic Perspective, MIT Press, 2012
2. Trevor Hastie, Robert Tibshirani, Jerome Friedman, The Elements of Statistical Learning, Springer 2009 (freely available online)
3. Christopher Bishop, Pattern Recognition and Machine Learning, Springer, 2007.

<table>
<tr><td rowspan="2">I-II</td><td rowspan="2">Ad Hoc & Sensor Networks
(Elective –III)</td><td rowspan="2">Course Code:
V21CTT12</td><td>L</td><td>T</td><td>P</td><td>C</td></tr>
<tr><td>3</td><td>0</td><td>0</td><td>3</td></tr>
</table>

Course Outcomes: After completion of course, students would be able to

CO1: Explain the Fundamental Concepts and applications of ad hoc and wireless sensor networks (K2)
CO2 : Describe the MAC protocol issues of ad hoc networks (K2)
CO3 : Describe routing protocols for ad hoc wireless networks with respect to TCP design issues (K2)
CO4 : Explain the concepts of network architecture and MAC layer protocol for WSN (K2)
CO5 : Discuss the WSN routing issues by considering QoS measurements (K2)

UNIT I: **Introduction :** Fundamentals of Wireless Communication Technology, The Electromagnetic Spectrum, Radio propagation Mechanisms ,Characteristics of the Wireless channel mobile ad hoc networks (MANETs), **Wireless Sensor Networks (WSNs):** concepts and architectures, Applications of Ad Hoc and Sensor Networks, Design Challenges in Ad hoc and Sensor Networks.

UNIT II: **MAC Protocols For Ad Hoc Wireless Networks:** Issues in designing a MAC Protocol, Issues in Designing a MAC Protocol for Ad Hoc Wireless Networks, Design Goals of a MAC Protocol for Ad Hoc Wireless Networks, Classification of MAC Protocols, Contention based protocols, Contention based protocols with Reservation Mechanisms, Contention based protocols with Scheduling Mechanisms, Multi channel MAC - IEEE 802.11.

UNIT III: **Routing Protocols And Transport Layer In Ad Hoc Wireless Networks**: Routing Protocol: Issues in designing a routing protocol for Ad hoc networks, Classification, proactive routing, reactive routing (on-demand), hybrid routing, Transport Layer protocol for Ad hoc networks, Design Goals of a Transport Layer Protocol for Ad Hoc Wireless Networks, Classification of Transport Layer solutions- TCP over Ad hoc wireless, Network Security, Security in Ad Hoc Wireless Networks, Network Security Requirements.

UNIT IV: **Wireless Sensor Networks (WSNS) And Mac Protocols**: Single node architecture - hardware and software components of a sensor node, **WSN Network architecture:** typical network architectures, data relaying and aggregation strategies, **MAC layer protocols:** self-organizing, Hybrid TDMA/FDMA and CSMA based MAC -IEEE 802.15.4.

UNIT V: **WSN Routing, Localization & Qos:** Issues in WSN routing, OLSR, Localization, Indoor and Sensor Network Localization, absolute and relative localization, triangulation, QOS in WSN, Energy Efficient Design, Synchronization.

Text Books:

1. "Ad Hoc Wireless Networks: Architectures and Protocols ", C. Siva Ram Murthy, and B. S. Manoj, Pearson Education, 2008
2. “Wireless Adhoc and Sensor Networks”, Labiod. H, Wiley, 1st edition-2008
3. “Wireless ad -hoc and sensor Networks: theory and applications”, Li, X, Cambridge University Press, fifth edition-2008.

Reference Books:

1. “Ad Hoc & Sensor Networks: Theory and Applications”, 2nd edition, Carlos De MoraisCordeiro, Dharma Prakash Agrawal ,World Scientific Publishing Company, 2011
2. "Wireless Sensor Networks", Feng Zhao and LeonidesGuibas,Elsevier Publication 2nd edition-2004
3. “Protocols and Architectures for Wireless Sensor Networks”, Holger Karl and Andreas Willig,Wiley, 2005 (soft copy available)
4. “Wireless Sensor Networks Technology, Protocols, and Applications”, KazemSohraby, Daniel Minoli, &TaiebZnati, John Wiley, 2007. (soft copy available)

I-II	**Internet of Things** (Elective –III)	Course Code: **V21CTT13**	**L**	**T**	**P**	**C**
			3	0	0	3

Course Outcomes: After completion of course, students would be able to

CO1: Describe the term 'internet of things' in different contexts. (K2)
CO2: Develop various protocols for IoT. (K3)
CO3: Develop a PoC of an IoT system using Rasperry Pi/Arduino (K3)
CO4: Apply data analytics and use cloud offerings related to IoT. (K3)
CO5: Demonstrate applications of IoT in real time scenario (K3)

UNIT I: **FUNDAMENTALS OF IoT:** Evolution of Internet of Things, Enabling Technologies, IoT Architectures,oneM2M, IoT World Forum (IoTWF) and Alternative IoT models, Simplified IoT Architecture and Core IoT Functional Stack, Fog, Edge and Cloud in IoT, Functional blocks of an IoT ecosystem, Sensors, Actuators, Smart Objects and Connecting Smart Objects

UNIT II: **IoT PROTOCOLS:** IT Access Technologies: Physical and MAC layers, topology and Security of IEEE 802.15.4, 802.15.4g, 802.15.4e, 1901.2a, 802.11ah and Lora WAN, Network Layer: IP versions, Constrained Nodes and Constrained Networks, Optimizing IP for IoT: From 6LoWPAN to 6Lo, Routing over Low Power and Lossy Networks, Application Transport Methods: Supervisory Control and Data Acquisition, Application Layer Protocols: CoAP and MQTT. Bluetooth Smart Connectivity-Overview, Key Versions, BLE-Bluetooth Low Energy Protocol, Low Energy Architecture.

UNIT III: **DESIGN AND DEVELOPMENT:** Design Methodology, Embedded computing logic,Microcontroller, System on Chips, IoT system building blocks, Arduino, Board details, IDE programming, Raspberry Pi, Interfaces and Raspberry Pi with Python Programming.

UNIT IV: **Arm Based Embedded System Design:** ARM Cortex-A class processor, Embedded Devices-ARM Cortex-M Class processor, Networking-Bluetooth Smart Technology **Introduction to embedded systems**: CPUs vs MCU's vs Embedded Systems, Examples, Options for Building Embedded Systems, Features of Embedded Systems, Building Embedded Systems, Building Embedded Systems using MCUs, Introduction to mbedTM Platform

UNIT V: **CASE STUDIES/INDUSTRIAL APPLICATIONS:** Cisco IoT system, IBM Watson IoT platform, Manufacturing, Converged Plant wide Ethernet Model (CPwE), Power Utility Industry, Grid Blocks Reference Model, Smart and Connected Cities: Layered architecture, Smart Lighting, Smart Parking Architecture and Smart Traffic Control.

Text Books:

1. IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things, David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry, Cisco Press, 2017
2. The Definitive Guide to ARM Cortex-M3 and M4 Processors, 3rd Edition, Joseph Yiu

Reference Books:

1. Internet of Things – A hands-on approach, Arshdeep Bahga, Vijay Madisetti, Universities Press, 2015
2. The Internet of Things – Key applications and Protocols, Olivier Hersent, David Boswarthick, Omar Elloumi and Wiley, 2012 (for Unit 2).
3. “From Machine-to-Machine to the Internet of Things – Introduction to a New Age of Intelligence”, Jan Ho¨ ller, Vlasios Tsiatsis, Catherine Mulligan, Stamatis, Karnouskos, Stefan Avesand. David Boyle and Elsevier, 2014.
4. Architecting the Internet of Things, Dieter Uckelmann, Mark Harrison, Michahelles and Florian (Eds), Springer, 2011.
5. Recipes to Begin, Expand, and Enhance Your Projects, 2nd Edition, Michael Margolis, Arduino Cookbook and O’Reilly Media, 2011.
6. Cortex–A series Programmer’s Guide for ARMv7-A by Arm http://infocenter.arm.com/help/index.jsp?topic=/com.arm.doc.den0013d/index.htmlc

I-II	**Principles of Cyber Security** (Elective-IV)	Course Code: **V21CTT14**	**L**	**T**	**P**	**C**
			3	0	0	3

Course Outcomes: After completion of course, students would be able to

CO1: Apply cyber security architecture principles. (K3)

CO2: Describe risk management processes and practices (K2).

CO3: Construct cyber security incidents to apply appropriate response (K3)

CO4: Differentiate system and application security threats and vulnerabilities. (K2)

CO5: Identify security tools and hardening techniques. (K1)

UNIT–I: **Introduction to Cyber security-** Cyber security objectives**,** Cyber security roles**,** Differences between Information Security & Cyber security, **Cyber security Principles-**Confidentiality, integrity, &availability Authentication & non- repudiation.

UNIT–II: **Information Security (IS) within Lifecycle Management-**Lifecycle management landscape, Security architecture processes, Security architecture tools, Intermediate lifecycle management concepts, **Risks & Vulnerabilities-**Basics of risk management**,** Operational threat environments**,** Classes of attacks.

UNIT–III: **Incident Response-** Incident categories**,** Incident response Incident recovery, and **Operational security protection**: Digital and data assets, ports and protocols, Protection technologies, Identity and access Management, configuration management.

UNIT–IV: **Threat Detection and Evaluation (DE): Monitoring-** Vulnerability Management, Security Logs and Alerts, Monitoring Tools and Appliances**. Analysis-** Network traffic Analysis, packet capture and analysis .

UNIT–V: **Introduction to backdoor System and security-**Introduction to metasploit, Backdoor, demilitarized zone(DMZ),Digital Signature, Brief study on Hardening of operating system.

Text Books:

1. NASSCOM: Security Analyst Student Hand Book Dec 2015.
2. Information Security Management Principles Updated Edition by David Alexander, Amanda Finch, David Sutton ,Published by BCS, June 2013.

Reference Books:

1. CSX- cyber security fundamentals 2nd edition, Published by ISACA, Cyber security, Network Security, Data Governance Security.

<table>
<tr><td rowspan="2">I-II</td><td rowspan="2">Cloud Computing (Elective –IV)</td><td rowspan="2">Course Code: V21CTT15</td><td>L</td><td>T</td><td>P</td><td>C</td></tr>
<tr><td>3</td><td>0</td><td>0</td><td>3</td></tr>
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Course Outcomes: After completion of course, students would be able to

CO1: Interpret the key dimensions of the challenge of Cloud Computing (K2)

CO2: Examine the economics, financial and technological implications for selecting cloud computing for own organization. (K3)

CO3: Explain the financial, technological, and organizational capacity of employer's for actively initiating and installing cloud-based applications (K2)

CO4: Examine the own organizations' needs for capacity building and training in cloud computing- related IT areas. (K3)

CO5: Illustrate Virtualization for Data-Center Automation. (K2)

SYLLABUS:

UNIT I: **Introduction:** Network centric computing, Network centric content, peer-to –peer systems, cloud computing delivery models and services, Ethical issues, Vulnerabilities, Major challenges for cloud computing. **Parallel and Distributed Systems:** Introduction, architecture, distributed systems, communication protocols, logical clocks, message delivery rules, concurrency, model concurrency with Petri Nets.

UNIT II: **Cloud Infrastructure:** At Amazon, The Google Perspective, Microsoft Windows Azure, Open Source Software Platforms, Cloud storage diversity, Inter cloud, energy use and ecological impact, responsibility sharing, user experience, Software licensing, **Cloud Computing:** Applications and Paradigms: Challenges for cloud, existing cloud applications and new opportunities, architectural styles, workflows, The Zookeeper, The Map Reduce Program model, HPC on cloud, biological research.

UNIT III: **Cloud Resource virtualization:** Virtualization, layering and virtualization, virtual machine monitors, virtual machines, virtualization-full and para, performance and security isolation, hardware support for virtualization, Case Study: Xen, vBlades, **Cloud Resource Management and Scheduling**: Policies and Mechanisms, Applications of control theory to task scheduling, Stability of a two-level resource allocation architecture, feedback control based on dynamic thresholds, coordination, resource bundling, scheduling algorithms, fair queuing, start time fair queuing, cloud scheduling subject to deadlines, Scheduling Map Reduce applications, Resource management and dynamic application scaling.

UNIT IV: **Storage Systems:** Evolution of storage technology, storage models, file systems and database, distributed file systems, general parallel file systems. Google file system. Apache Hadoop, Big Table, Megastore (text book 1), Amazon Simple Storage Service(S3) (Text book 2), **Cloud Security:** Cloud security risks, security – a top concern for cloud users, privacy and privacy impact assessment, trust, OS security, Virtual machine security, Security risks.

UNIT V: **Cloud Application Development:** Amazon Web Services : EC2 – instances, connecting clients, security rules, launching, usage of S3 in Java, Installing Simple Notification Service on Ubuntu 10.04, Installing Hadoop on Eclipse, Cloud based simulation of a Distributed trust algorithm, Cloud service for adaptive data streaming (Text Book 1), **Google:** Google App Engine, Google Web Toolkit (Text Book 2), **Microsoft:** Azure Services Platform, Windows live, Exchange Online, Share Point Services, Microsoft Dynamics CRM (Text Book 2).

Text Books:

1. Cloud Computing, Theory and Practice, Dan C Marinescu, MK Elsevier
2. Cloud Computing, A Practical Approach, Anthony T Velte, Toby J Velte, Robert Elsenpeter, TMH

Reference book:

Mastering Cloud Computing, Foundations and Application Programming, Raj Kumar Buyya, Christen vecctiola, S Tammarai selvi, TMH

I-II	**Natural Language Processing** (Elective –IV)	Course Code: **V21CTT16**	**L**	**T**	**P**	**C**
			3	**0**	**0**	**3**

Course Outcomes: After completion of course, students would be able to

CO1: Explain approaches to syntax and semantics in NLP. (K2)
CO2: Demonstrate approaches to discourse, generation, dialogue and summarization within NLP. (K3)
CO3: Explain current methods for statistical approaches to machine translation. (K2)
CO4: Identify machine learning techniques used in NLP, including hidden Markov models and probabilistic (K2)
CO5: Explain context-free grammars, clustering and unsupervised methods, log-linear and discriminative models, and the EM algorithm as applied within NLP (K2)

UNIT-I: **Introduction:** NLP tasks in syntax, semantics, and pragmatics. Applications such as information extraction, question answering, and machine translation. The problem of ambiguity. The role of machine learning. Brief history of the field.

UNIT-II: **N-gram Language Models:** The role of language models, Simple Ngram models. Estimating parameters and smoothing. Evaluating language models. **Part of Speech Tagging and Sequence Labeling:** Lexical syntax. Hidden Markov Models. Maximum Entropy Models. Conditional Random Fields

UNIT-III: **Syntactic parsing:** Grammar formalisms and tree banks. Efficient parsing for context-free grammars (CFGs). Statistical parsing and probabilistic CFGs (PCFGs). Lexicalized PCFGs.

UNIT-IV: **Semantic Analysis:** Lexical semantics and word-sense disambiguation. Compositional semantics. Semantic Role Labeling and Semantic Parsing.

UNIT- V: **Information Extraction (IE) and Machine Translation (MT):**
Named entity recognition and relation extraction. IE using sequence labeling. Basic issues in MT. Statistical translation, word alignment, phrase based translation, and synchronous grammars. Dialogues: Turns and utterances, grounding, dialogue acts and structures Natural Language Generation: Introduction to language generation, architecture, discourse planning (text schemata, rhetorical relations).

Text Books:
1. D. Jurafsky & J. H. Martin – "Speech and Language Processing – An introduction to Language processing, Computational Linguistics, and Speech Recognition", Pearson Education

References:
1. Allen, James. 1995. – "Natural Language Understanding". Benjamin/ Cummings, 2ed.
2. Bharathi, A., Vineet Chaitanya and Rajeev Sangal. 1995. Natural Language Processing- "A Pananian Perspective". Prentice Hll India, Eastern Economy Edition.
3. Eugene Cherniak: "Statistical Language Learning", MIT Press, 1993.
4. Manning, Christopher and Heinrich Schutze. 1999. "Foundations of Statistical Natural Language Processing". MIT Press.

I-II	**Advanced Web Technologies Lab**	Course Code: **V21CTL06**	**L**	**T**	**P**	**C**
			0	**0**	**4**	**2**

Course Outcomes: After completion of course, students would be able to

CO1: Develop static web pages using HTML, CSS. **(K3)**

CO2: Demonstrate the concepts of JavaScript and DHTML. **(K2)**

CO3: Demonstrate the basic concepts of PHP and JSP. **(K2)**

CO4: Demonstrate the concepts of Extensible markup language & AJAX. **(K2)**

CO5: Develop dynamic Web Applications using PHP & MySQL. **(K3)**

<u>List of Experiments</u>

1. a) Create a Simple HTML home page provides links to move to other pages like hobbies, educational info, personal info etc.
   b) Create a HTML program to illustrate the use of frame and frameset tags of HTML.
   c) Create a HTML Program which use a HTML controls to create a student information form to collect student's information like name, address, phone, email, sex, birth date, hobbies etc.
2. a) Create a webpage which displays "Hello World" with font size 20 pixels, bold format, in "Times New Roman" font and green in color using inline CSS, embedded CSS and external CSS.
   b) Create a webpage which displays the class time table and apply the following effects on the table:

   - For the table header apply *blue* as the background color and *white* for the color of the text in the table header.
   - Display *day names* (Mon, Tue etc...) in bold format with the first letter in the day name in uppercase.
   - Display *lunch* slightly in bigger font other than the remaining text.

   c) Create a webpage to manage personal details like name, class, qualifications, photo, address etc., using tables and other suitable HTML tags. Apply the following style information:

   - Display the heading of the page in *Times New Roman* font and with 24px size.
   - Align all the field names like Name, Class, Photo etc to *right* in the table.
   - Apply *light blue* as background color for the left side cells in the table which contains field names like Name, Class etc...
   - Also display your college logo as background image in the top right position of the web page.

   d) Create a web page containing two images, where one image overlaps another image by using the *z-index* CSS property.

3. a) Create a HTML Program which demonstrates loops like for loop, do while, while in java script.
   b) Create a HTML Program which demonstrates the use of functions in java script.
   c) Create a HTML Program which demonstrates various events like onclick,

ondbclick, onfocus, onblur, onchange, onmouseover, onmouseover, window event, onload, onunload event.

d) Create a HTML Program to create various functions and sub routines to validate the data entered by user in form.

4. a) Create a program to illustrate the concept of associative array in PHP.
   b) Create PHP program to implement the concept of Session management.
   c) Create a PHP program to display student information in webpage. Student‘s data is stored in My SQL database.
   d) Create a PHP program to insert student information from HTML form. Student‘s data is stored in My SQL database.
5. a) Create a well-formed XML document.
   b) Create a valid XML document using DTD.
   c) Create a valid XML document using XML Schema.
   d) Create a XML document which contains details of cars and display the same as a table using XSLT.
   e) Write a Java program to parse the XML document containing car details using SAX API.
6. a) Create a servlet to display "Hello World" in the browser.
   b) Create a servlet to store email-id as an initialization parameter and print the same email-id by reading the initialization parameter from the web.xml file.
   c) Create a servlet to retrieve name and branch details from a html page and print the same using the servlet.
   e) Create a HTML page which accepts book id, book name and book price and a submit button. When the user clicks the submit button, all the values assigned to the previous text fields must be stored in a session object and the control forwards to another servlet where the values stored in the session are retrieved and displayed.
7. a) Create a JSP page to display "Hello World" in the browser.
   b) Create a JSP page to store email-id as an initialization parameter and print the same email-id by reading the initialization parameter from the web.xml file.
   c) Create a JSP page to retrieve name and branch details from a html page and print the same using a servlet.
   d) Create a HTML page which accepts book id, book name and book price and a submit button. When the user clicks the submit button, all the values assigned to the previous text fields must be stored in a session object and the control forwards to a JSP page where the values stored in the session are retrieved and displayed.
8. Create a HTML page which accepts student regd.no. and prints the results of that student by retrieving the results from the database. Use AJAX to display the "please wait..." while the server is processing the request and print the result of the student when the server returns the result. Server resource can be either servlet or JSP or PHP

Reference Books:

1. *Java server programming java JavaEE5 Black Book‖*, Kogent Solutions Dreamtech Press, Inc, ISBN-13 9788177228359 ISBN-10 8177228358, 2008.
2. *AJAX black book‖*, new edition, Kogent Solutions Inc, Dreamtech Press, ISBN:10- 81-7722-838-2ISBN:13-978-81-7722-838-063. Jonathan Chaffer, Karl Swedberg, *―Learning jQuery‖*, 3rd Edition , , ISBN 13: 9781849516549, 2011
3. Chris Bates,*Web Programming- building internet applications*, 2nd edition, WILEY Dreamtech, 2006
4. Patrick Naughton and Herbert Schildt, The *complete Reference Java seventhEdition*,TMH, 2007
5. Hans Bergsten, Java *Server Pages*, SPD O‗Reilly, 2000
6. Java Server Programming ,Ivan Bayross and others,The X Team,SPD
7. Web Warrior Guide to Web Programmming-Bai/Ekedaw-Thomas
8. Beginning Web Programming-Jon Duckett WROX.
9. Java Server Pages, Pekowsky, Pearson.
10. Java Script,D.Flanagan,O‗Reilly, SPD.

I-II	**Data Science Applications with Python Lab**	Course Code: **V21CTL07**	**L**	**T**	**P**	**C**
			0	**0**	**4**	**2**

Course Outcomes: After completion of course, students would be able to

CO1: Use data science operations like data collection, management and storing. (K3)
CO2: Apply Python programming concepts in data science, including their real-world applications. (K3)
CO3: Develop data collection and management scripts using Python Pandas. (K3)

List of Experiments

Experiment 1:
Develop a Python Program to Find the Sum of the Series: 1 + 1/2 + 1/3 + .. + 1/N

Experiment 2:
Develop a Python Program to Split the array and add the first part to the end

Experiment 3:
Develop a Python Program to Create a List of Tuples with the First Element as the Number and Second Element as the Square of the Number

Experiment 4:
Develop a Python program to count number of vowels using sets in given string

Experiment 5:
Develop a program to implement permutation of a given string using inbuilt function.

Experiment 6:
Develop a python program to sort list of dictionaries by values in Python – Using lambda function.

Experiment 7:
Develop a Python Program for following sorting:
i. Quick Sort ii. Heap Sort

Experiment 8:
Develop a Python Program to Reverse a String Using Recursion

Experiment 9:
Develop a Python Program to Count the Number of Words in a Text File

Experiment 10:
Develop a Python Program to Read the Contents of a File in Reverse Order

Experiment 11:
Develop a program to Merge and Join DataFrames with Pandas in Python

Experiment 12:
Develop a program to implement Merge and Join Data Frames with Python Pandas

Experiment 13:
Develop a Python Program to Append the Contents of One File to Another File

Experiment 14:

Explain how to install and Load CSV files to Python Pandas

Text Books:

1. Learning Python , O'Reilly, Mark Lutz
2. Programming Python, O'Reilly, Mark Lutz
3. Python For Data Analysis (O'Reilly, Wes Mckinney)

II-I	**Mobile Applications and Development** (Elective-V)	Course Code: **V21CTT18**	**L**	**T**	**P**	**C**
			3	**0**	**0**	**3**

Course Outcomes: After completion of course, students would be able to

CO1: Describe Installation and configuration of Android application development tools. (K2)

CO2: Develop applications using services and publishing android applications. (K3)

CO3: Demonstrate Android software development tools. (K3)

CO4: Illustrate debugging programs running on mobile devices. (K2)

CO5: Develop Android applications using server-less database like SQLite. (K3)

Unit I: **Introduction to Android:** The Android 4.1 jelly Bean SDK, Understanding the Android Software Stack, installing the Android SDK, Creating Android Virtual Devices, Creating the First Android Project, Using the Text view Control, Using the Android Emulator, The Android Debug Bridge(ADB), Launching Android Applications on a Handset.

Unit II: **Basic Widgets:** Understanding the Role of Android Application Components, Understanding the Utility of Android API, Overview of the Android Project Files, Understanding Activities, Role of the Android Manifest File, Creating the User Interface, Commonly Used Layouts and Controls, Event Handling, Displaying Messages Through Toast, Creating and Starting an Activity, Using the Edit Text Control, Choosing Options with Checkbox, Choosing Mutually Exclusive Items Using Radio Buttons.

Unit III: **Building Blocks for Android Application Design:** Introduction to Layouts, Linear Layout, Relative Layout, Absolute Layout, Using Image View, Frame Layout, Table Layout, Grid Layout, Adapting to Screen orientation. Utilizing Resources and Media Resources, Creating Values Resources, Using Drawable Resources, Switching States with Toggle Buttons, Creating an Images Switcher Application, Scrolling Through Scroll View, playing Audio, Playing Video, Displaying Progress with Progress Bar, Using Assets.

Unit IV: **Using Selection widgets and Debugging:** Using List View, Using the Spinner control, Using the GridView Control, Creating an Image Gallery Using the ViewPager Control, Using the Debugging Tool: Dalvik Debug Monitor Service(DDMS), Debugging Application, Using the Debug Perspective. Displaying And Fetching Information Using Dialogs and Fragments: What Are Dialogs?, Selecting the Date and Time in One Application, Fragments, Creating Fragments with java Code, Creating Special Fragments

Unit V: **Building Menus and Storing Data:** Creating Interface Menus and Action Bars, Menus and Their Types, Creating Menus Through XML, Creating Menus Through Coding, Applying a Context Menu to a List View, Using the Action Bar, Replacing a Menu with the Action Bar, Creating a Tabbed Action Bar, Creating a Drop-Down List Action Bar Using Databases: Using the SQLiteOpenHelperclasss, Accessing Databases with the ADB, Creating a Data Entry Form, Communicating with SMS and Emails: Understanding Broadcast Receivers, Using the Notification System, Sending SMS Messages with Java Code, Receiving SMS Messages, Sending Email, Working With Telephony Manager.

Text Books

1. Android Programming by B.M Harwani, Pearson Education, 2013.

References Text Books:

1. Android application Development for Java Programmers, James C Sheusi, Cengage Learning
2. Android In Action by w.Frank Ableson, Robi Sen, Chris King, C. Enrique Ortiz., Dreamtech.
3. Professional Android 4 applications development, Reto Meier, Wiley India, 2012.
4. Beginning Android 4 applications development, Wei- Meng Lee, Wiley India,2013.

II-I	**Big Data Analytics** (Elective-V)	Course Code: **V21CTT19**	L	T	P	C
			3	0	0	3

Course Outcomes: After completion of course, students would be able to

CO1: Illustrate big data and its use cases from selected business domains. (K3)
CO2: Interpret and summarize No SQL and Cassandra (K3)
CO3: Discuss the HADOOP and Map Reduce technologies associated with big data analytics and explore on Big Data applications Using Hive. (K2)
CO4: Define the use of Apache Spark, RDDs etc. to work with datasets. (K1)
CO5: Assess real time processing with Spark Streaming. (K3)

Syllabus:

UNIT I: What is big data, why big data, convergence of key trends, unstructured data, industry examples of big data, web analytics, big data and marketing, fraud and big data, risk and big data, credit risk management, big data and algorithmic trading, big data and healthcare, big data in medicine, advertising and big data, big data technologies, introduction to Hadoop, open source technologies, cloud and big data, mobile business intelligence, Crowd sourcing analytics, inter and trans firewall analytics.

UNIT II: Introduction to NoSQL, aggregate data models, aggregates, key-value and document data models, relationships, graph databases, schema less databases, materialized views, distribution models, sharding, master-slave replication, peer-peer replication, sharding and replication, consistency, relaxing consistency, version stamps, Working with Cassandra ,Table creation, loading and reading data.

UNIT III: Data formats, analyzing data with Hadoop, scaling out, Architecture of Hadoop distributed file system (HDFS), fault tolerance ,with data replication, High availability, Data locality , Map Reduce Architecture, Process flow, Java interface, data flow, Hadoop I/O, data integrity, compression, serialization. Introduction to Hive, data types and file formats, HiveQL data definition, HiveQL data manipulation, Logical joins, Window functions, Optimization, Table partitioning, Bucketing, Indexing, Join strategies.

UNIT IV: Apache spark- Advantages over Hadoop, lazy evaluation, In memory processing, DAG, Spark context, Spark Session, RDD, Transformations- Narrow and Wide, Actions, Data frames ,RDD to Data frames, Catalyst optimizer, Data Frame Transformations, Working with Dates and Timestamps, Working with Nulls in Data, Working with Complex Types, Working with JSON, Grouping, Window Functions, Joins, Data Sources, Broadcast Variables, Accumulators, Deploying Spark- On-Premises Cluster Deployments, Cluster Managers- Standalone Mode, Spark on YARN , Spark Logs, The Spark UI- Spark UI History Server, Debugging and Spark First Aid

UNIT V: Spark-Performance Tuning, Stream Processing Fundamentals, Event-Time and State full Processing - Event Time, State full Processing, Windows on Event Time-Tumbling Windows, Handling Late Data with Watermarks, Dropping Duplicates in a Stream, Structured Streaming Basics - Core Concepts, Structured Streaming in Action, Transformations on Streams, Input and Output.

Text Books:

1. Big Data, Big Analytics: Emerging, Michael Minnelli, Michelle Chambers, and Ambiga Dhiraj
2. SPARK: The Definitive Guide, Bill Chambers & Matei Zaharia, O'Reilly, 2018 Edition
3. Business Intelligence and Analytic Trends for Today's Businesses", Wiley, 2013
4. P. J. Sadalage and M. Fowler, "NoSQL Distilled: A Brief Guide to the Emerging World Polyglot Persistence", Addison-Wesley Professional, 2012
5. Tom White, "Hadoop: The Definitive Guide", Third Edition, O'Reilly, 2012

Reference Books:

1. "Hadoop Operations", O'Reilly, Eric Sammer, 2012
2. "Programming Hive", O'Reilly, E. Capriolo, D. Wampler, and J. Rutherglen, 2012
3. "HBase: The Definitive Guide", O'Reilly, Lars George, 2011
4. "Cassandra: The Definitive Guide", O'Reilly, Eben Hewitt, 2010
5. "Programming Pig", O'Reilly, Alan Gates, 2011.

Annexure-VIII

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Pedatadepalli, **TADEPALLIGUDEM – 534 101.** W.G.Dist. **(A.P)**

Minutes of the 5th Meeting of Board of Studies in Mathematics held on 27-09-2021 at 2:00 PM through online zoom meeting.

S.No	Name of the Member	Designation & Address	Designation on
1	Sri. N Raja Sekhar	Assoc. Professor & HOD	Chairman
2	Prof. G.V.S.R.Deekshitulu	Professor, Department of Mathematics, UCEK, JNTUK, Kakinada	University Nominee
3	Dr. K.K.M. Sarma	Professor, Department of Mathematics, Andhra University, Visakhapatnam	Council Nominee
4	Prof. Y.N.Reddy	Professor, Department of Mathematics, NIT Warangal	Council Nominee
5	Dr. T.S.R Murthy	Professor of Mathematics, Sri Vishnu Engineering College for Women,	Academician
6	Sri SK Dhana Prasad	Assistant.Professor of Mathematics, Section Head	Member
7	Smt.B.Adi Lakshmi	Assistant.Professor of Mathematics	Member
8	Smt.G S Prasanthi	Assistant.Professor of Mathematics	Member
9	Sri.A Kiran Kumar	Assistant.Professor of Mathematics	Member
10	Sri.D.N.V.Rama Krishna	Assistant.Professor of Mathematics	Member
11	Smt.B.V.D. Santhi	Assistant.Professor of Mathematics	Member
12	Smt.Dr.N.N.V.Sakuntala	Assistant.Professor of Mathematics	Member
13	Sri.V.Srinivas Rao	Assistant.Professor of Mathematics	Member
14	Sri.T.D.Rama Krishna	Assistant.Professor of Mathematics	Member
15	Sri P.Someswarara Rao	Aptitude Trainer	Member
16	Sri JNV Somayajulu	Aptitude Trainer	Member

Members present:

The following items are discussed in the meeting:

Item No-1: Introducing the members of BOS by the chairman.

The chairman of BOS extended a formal welcome and introduced the members.

Item No.2: Syllabi for the courses offered in B.Tech & M.Tech Programmes.

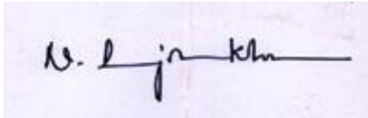
The detailed syllabi for the following courses of B.Tech and M.Tech under V20 and V21 regulations respectively (i.e. for 2020-21 and 2021-2022 batch students) along with prescribed text books have been presented.

S. NO	COURSE NAME	COURSE CODE	PROGRAMME	SEMESTER	BRANCHES	REMARKS
1	Complex Analysis	V20MAT03	B.TECH	III	ECE ,ECT	
2	Probability and Statistics	V20MAT04	B.TECH	III	CE	
				IV	CSE,CST,ME	
3	Transform Calculus	V20MAT05	B.TECH	III	EEE	
4	Probability Theory & Stochastic Processes	V20MAT06	B.TECH	III	ECE & ECT	
5	Mathematical Foundation of Computer Science	V20MAT07	B.TECH	III	CSE , CST	
6	Operations Research	V20MAT08	B.TECH	V	EEE	
				VII	ME	
7	Professional communication skills-II	V20ENT03	B.TECH	IV	Common to all	
8	Professional communication skills-III	V20ENT04	B.TECH	V	Common to all	
9	Analytical and Numerical methods for Structural Engineering	V21MAT01	M.TECH	I	CE- Structural Engineering	Elective
10	Operations Research	V21MAT02	M.TECH	III	Common to all	Open elective

With minor changes, the syllabi for the courses mentioned above have been approved. The approved syllabi for the courses are given in annexure-I to X

Item No.3: The members of BOS recommended 4th Mathematics paper ,Operations Research (course code V20MAT08) for CIVIL Engineering to fulfill the required number of credits of Basic Sciences .

<u>Item No.4</u>: The members also suggested to mention the required number of lecture hours CO wise.



Chairman

Board of Studies, Mathematics

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Annexure-Maths - I

Year/Sem	**B.Tech III Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	**V20**	**3**	**-**	**-**	**3**	**V20MAT03**
Name of the Course	**COMPLEX ANALYSIS**					
Branch	**ECE & ECT**					

Course Outcomes: At the end of the course student will be able to:

CO1: Evaluate improper integrals using special functions

CO2: Define the analytic function and find harmonic conjugate

CO3: Apply Cauchy's theorem and its variants in evaluating line integrals and find Taylor's and Laurent's series expansions for complex functions.

CO4: Calculate residues and real definite integrals.

CO5: Understand the idea of transformation.

UNIT – I **(10 hrs)**

Special functions: Definition of improper integral- Gamma and Beta functions – their properties – evaluation of improper integrals.

UNIT-II **(8 hrs)**

Functions of a complex variable – Continuity – Differentiability – Analyticity – Properties(without proofs) – Cauchy - Riemann equations in Cartesian form. Harmonic and conjugate harmonic functions – Milne – Thomson method.

UNIT-III **(12 hrs)**

Complex integration: Line integral – evaluation along a path and by definite integration – Cauchy's integral theorem – Cauchy's integral formula – Generalized integral formula.

(statements of theorems only)

Complex power series: Radius of convergence – Expansion in Taylor's series, Maclaurin's series and Laurent series - singular point –isolated singular point – pole of order m – essential singularity.

UNIT-IV **(10 hrs)**

Residue – Evaluation of residue by formula and by Laurent series - Residue theorem(without proof) Evaluation of integrals of the type

a) Improper real integrals $\int_{-\infty}^{\infty} f(x)dx$ (b) $\int_{c}^{c+2\pi} f(\cos\theta, \sin\theta)d\theta$

(c) $\int_{-\infty}^{\infty} e^{imx} f(x)dx$

UNIT-V **(8 hrs)**

Conformal mapping: Transformation by e^z , lnz, z^2, z^n (n positive integer), sin z, cos z,

z + a/z. Translation, rotation, inversion and bilinear transformation – fixed point – cross ratio – properties.

Text Books:

1. B. V. Raman, Tata Mc Graw Hill, A text Book of Engineering Mathematics.

2. N.P.Bali, Engineering Mathematics, Lakshmi Publications.

3. B.S.Grewal, Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.

References:

1. Erwin Kreyszig, Wiley India Pvt. Ltd, Advanced Engineering Mathematics.

2. Churchill, Complex Variables and applications.

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Annexure-Maths-II

Year/Sem	B.Tech (III & IV Sem)	L	T	P	C	COURSE CODE
Regulation	**V20**	**3**	**-**	**-**	**3**	VI8MAT04
Name of the Course	**PROBABILITY AND STATISTICS**					
Branches	CIVIL, ME, CSE & CST					

Pre requisites: Probability, Conditional Probability, Baye's theorem on probability

Course Outcomes: At the end of the Course student will be able to:

CO1: Find the Expectation of Random variables
CO2: Apply probability distribution to real time problems
CO3: Plot a best fit curve to an experimental data and find the correlation and regression
CO4: Create good estimators to various parameters
CO5: Apply the principles of Statistical Inference to practical problems

Unit-I: Random Variables and Expectation: **(10 hrs)**

Random Variables: Discrete and continuous - Probability function – density and distribution function,Expectation of a Random Variable, Moments, Chebychev's Inequality (Without proof).

Unit-II: Probability Distributions **(10 hrs)**

Probability distributions: Binomial, Poisson and Normal - Evaluation of statistical parameters: Mean, Variance and their properties, Introduction to Exponential, Gamma and Weibull distributions

Unit-III: Bivariate Distributions **(8 hrs)**

Curve fitting by the method of Least squares- Fitting of straight line, parabola and exponential curves, Simple Correlation and Regression – Rank correlation.

Unit-IV: Sampling Distribution and Estimation **(8 hrs)**

Introduction –Sampling distribution of means with known and unknown standard deviation

Estimation: Criteria of a good estimator, point and interval estimators for means and proportions

Unit-V: Tests of Hypothesis **(12 hrs)**

Introduction-Type-I, Type-II Errors, Maximum Error, one–tail, two-tail tests, Test of significance: Large sample test for single proportion, difference of proportions, single mean, difference of means.

Test of significance: Small sample test for single mean, difference of means and test of ratio of variances (F-Test) - Chi-square test for goodness of fit and independence of attributes.

Text Books:

1. **B. V. Ramana**, A text Book of Engineering Mathematics, Tata McGraw Hill.

2. **Miller & Freund's**, Probability & Statistics for Engineers – Eighth Edition, Richard. A. Johnson

References Books:

1. **S. Ross,** "A First Course in Probability", Pearson Education India, 2002.

2. **Dr.T.S.R.Murthy**, Probability and Statistics for Engineers, BS Publications.

3. **T. Veerarajan**, "Engineering Mathematics", Tata McGraw-Hill, New Delhi, 2010.

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Annexure-Maths -III

Year/Sem	B.Tech III Sem	L	T	P	C	COURSE CODE
Regulation	V20	3	-	-	3	V20MAT05
Name of the Course	Transform Calculus					
Branch	EEE					

Course Outcomes: At the end of the course student will be able to:

CO1: find the integrals using Laplace transforms

CO2: apply the Laplace transform for solving differential equations

CO3: apply the Z- transform for solving difference equations

CO4: find the Fourier series of periodic signals

CO5: find the Fourier transforms of given function

Unit-I: Laplace Transforms **(9 hrs)**

Laplace transforms-introduction– Definition and Laplace transforms of standard functions– properties (without proof)-Shifting theorems (without proof) – Transforms of derivatives and integrals – Unit step function –Dirac's delta function - Periodic function.

Unit-II: Inverse Laplace Transforms and Applications **(9 hrs)**

Inverse Laplace transforms –properties(without proof) - inverse laplace transforms of derivatives and integrals - Convolution theorem (without proof).

Applications: Solving ordinary differential equations (initial value problems) using Laplace transforms.

Unit-III: Z – Transforms **(12 hrs)**

Z – Transforms – Properties (without proofs) – Damping Rule – Shifting Rule – Initial and Final value Theorems (without proofs) – Inverse Z- Transforms-properties (without proofs) – Convolution Theorem (without proof)

Applications: Solutions of Difference equation by Z - transforms.

Unit – IV: Fourier series **(9 hrs)**

Fourier series – Determination of Fourier Coefficients – Fourier series – even and odd functions – Fourier series in an arbitrary interval – Half –range sine and cosine series.

Unit –V: Fourier Transforms **(9 hrs)**

Fourier Integral Theorem (only statement) – Fourier sine and cosine Integrals – Fourier Transform – sine and cosine Transforms – Properties (without proofs) – Inverse Transforms.

Text Books:

1. B.S.Grewal, Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.

2. N.P.Bali, Engineering Mathematics, Lakshmi Publications.

3. B. V. Raman, Tata Mc Graw Hill, A text Book of Engineering Mathematics.

References:

1. Erwin Kreyszig, Wiley India Pvt. Ltd, Advanced Engineering Mathematics.

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Annexure-Maths -IV

Semester	B.Tech III Sem	L	T	P	C	COURSE CODE
Regulation	V20	3	0	-	3	V20MAT06
Name of the Course	Probability Theory & Stochastic Processes					
Branches	ECE, ECT					

Course Outcomes: After Successful completion of this course, the students will be able to:

COX	Course Outcomes	KX
CO1	Explain basic concepts of probability theory through Sets and Relative Frequency	K2
CO2	Explain the concept of a random variable, functions based on random variable like Distribution and density functions	K2
CO3	Compute the expected value, moments on one random variable	K3
CO4	Illustrate the concepts of joint distribution & density functions on multiple random Variables	K3
CO5	Compute the Temporal and Spectral characteristics of stochastic processes	K3

UNIT I PROBABILITY : (8 hrs)

Probability introduced through Sets and Relative Frequency: Experiments and Sample Spaces, Discrete and Continuous Sample Spaces, Events, Probability Definitions and Axioms, Mathematical Model of Experiments, Probability as a Relative Frequency, Joint Probability, Conditional Probability, Total Probability, Bayes Theorem, Independent Events

UNIT II (10 hrs)

THE RANDOM VARIABLE: Definition of a random variable, Discrete, continuous and mixed random Variables. Distribution & density functions and its properties of arandom variable.Binomial, Poisson, Uniform, Gaussian, Exponential and Rayleigh random variables.Conditional distribution and density functions and its properties.

UNIT III **(10 hrs)**

OPERATION ON ONE RANDOM VARIABLE – EXPECTATIONS : Introduction, expected value of a random variable, function of a random variable, moments about the origin, central moments, variance, characteristic function, moment generating function, transformations of a random variable: Monotonic transformations for a continuous random variable

UNIT IV **(10 hrs)**

MULTIPLE RANDOM VARIABLES : Vector random variables, joint distribution function, properties of joint distribution, marginal distribution functions, conditional distribution and density, statistical independence, sum of two random variables, sum of several random variables, central limit theorem: unequal distribution, equal distributions.

OPERATIONS ON MULTIPLE RANDOM VARIABLES: Joint moments about the origin, joint central moments, joint characteristic and moment generating functions.

UNIT V **(10 hrs)**

RANDOM PROCESSES – TEMPORAL CHARACTERISTICS: The random process concept, classification of processes, deterministic and nondeterministic processes, distribution and density functions, concept of Stationarity and statistical independence. First-order stationary processes, second-order and wide-sense Stationarity, nth-order and strict-sense Stationarity, time averages and Ergodicity, autocorrelation function and its properties, cross-correlation function and its properties, covariance functions.

SPECTRAL CHARACTERISTICS: The power density spectrum: properties, relationship between power density spectrum and autocorrelation function, the cross-power density spectrum, properties, relationship between cross-power density spectrum and cross-correlation function.

TEXT BOOKS:

1. Probability, Random Variables & Random Signal Principles, Peyton Z. Peebles, TMH, 4th Edition, 2001.
2. Probability, Random Variables and Stochastic Processes, Athanasios Papoulis and S.UnniKrishnaPillai, PHI, 4th Edition, 2002.
3. Probability Theory and Stochastic Processes, Y. Mallikarjuna Reddy, 4th Edition, Universities Press

Reference Books:

1. Probability Theory and Stochastic Processes – B. PrabhakaraRao, BS Publications
2. Probability and Random Processes with Applications to Signal Processing, Henry Stark And John W. Woods, Pearson Education, 3rd Edition.
3. Schaum's Outline of Probability, Random Variables, and Random Processes.
4. An Introduction to Random Signals and Communication Theory, B.P. Lathi, International Textbook, 1968.
5. Random Process – Ludeman, John Wiley
6. Probability Theory and Random Processes, P. Ramesh Babu, McGrawHill, 2015.

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Annexure-Maths-V

Semester	B.Tech III Sem	L	T	P	C	COURSE CODE
Regulation	V20	3	0	-	3	V20MAT07
Name of the ourse	Mathematical Foundation of Computer Science					
Branches	CSE, CST					

Course Outcomes: At the end of the Course student will be able to:

COX	Course Outcomes	KX
CO1	Demonstrate the concepts associated with propositions and mathematical logic	K3
CO2	Demonstrate the basic concepts associated with relations, functions and their applications	K3
CO3	Solve recurrence relations using various methods	K3
CO4	Apply techniques of graphs for real-time problems	K3
CO5	Construct minimal spanning tree by using different algorithms	K3

Syllabus

UNIT-I : Mathematical Logic **(10 hrs)**

Statements and Notation , Connectives, Well Formed Formulas ,Truth tables, Tautologies, Equivalence of formulas, Tautological Implications, Normal forms, Theory of inference for Statement Calculus, Indirect Method of Proof. Predicate calculus-Predicates, quantifiers, universe of discourse.

UNIT-II: Set Theory and Relations: **(10 hrs)**

Operations on Sets, Principle of Inclusion and Exclusion, Relations, Properties of Binary Relations in a set, Transitive Closure, Relation Matrix and Digraph, Equivalence, Partial Ordering Relations, Hasse Diagrams, Lattice and its Properties, Functions, Bijective Functions, Composition of Functions.

Unit 3: Recurrence relations **(10 hrs)**

Generating Function of Sequences, Calculating Coefficient of generating functions, Recurrence relations, solving recurrence relation by substitution and Generating functions, the method of Characteristic roots, Solution of Inhomogeneous Recurrence Relation.

UNIT-4 Graph Theory: **(10 hrs)**

Basic Concepts of graph, Representing graphs, Sub graphs, Isomorphic graphs, Paths and Circuits, Eulerian and Hamiltonian Graphs, Planar graphs, Graph Coloring, Chromatic Number. (Theorems without proofs)

Unit 5: Trees **(8 hrs)**

Spanning Trees, minimal Spanning Trees, BFS, DFS, Kruskal's Algorithm, Prim's Algorithm, Binary trees, Planar Graphs.

TEXT BOOKS:

1. Discrete Mathematical Structures with Applications to Computer Science, J. P. Tremblay and P. Manohar, 1st Edition, Tata McGraw Hill.
2. Discrete Mathematics and its Applications with Combinatorics and Graph Theory, K. H.Rosen, 7th Edition, Tata McGraw Hill.
3. Discrete Mathematics for Computer Scientists and Mathematicians, J. L. Mott, A. Kandel, T.P. Baker, 2nd Edition, Prentice Hall of India.

REFERENCE BOOKS:

1. Elements of Discrete Mathematics -A Computer Oriented Approach, C. L. Liu and D. P. Mohapatra, 3rdEdition, Tata McGraw Hill.
2. Discrete Mathematics with Combinatorics and Graph Theory, Santha, 1st Edition Cengage Learning.

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Pedatadepalli, **TADEPALLIGUDEM–534 101.**W.G.Dist. **(A.P)**

Annexure-Maths-VI

Semester	B.Tech	L	T	P	C	Course Code
Regulation	V20	3	0	0	3	V20MAT08
Name of the Course	Operations Research					
Branch	EEE & ME					

Course Outcomes:

After successful completion of the course, the student will be able to

CO1	Understand the formulating of LPP and solve LPP by Simplex methods, artificial variables techniques.	K2
CO2	Solve Transportation and assignment problems.	K3
CO3	Explain the concept of Sequencing and replacement of item.	K2
CO4	Apply the principles of game theory to real world competitive situations	K3
CO5	Understand the concept of queues with single server,	K2

UNIT – I **(10 hrs)**

HISTORICAL OVERVIEW – Definition and scope– types of operation research models – applications.

LINEAR PROGRAMMING: Problem formulation – graphical solution – simplex method – artificial variables techniques - big-M method.

UNIT – II **(10 hrs)**

TRANSPORTATION PROBLEM: Formulation – optimal solution, unbalanced transportation problem – degeneracy

ASSIGNMENT PROBLEM: Introduction, optimal solution, Traveling Salesman problem.

UNIT – III **(9 hrs)**

SEQUENCING – Introduction – flow –shop sequencing – *n* jobs through two machines – *n* jobs through three machines

REPLACEMENT: Introduction – replacement of items that deteriorate with time – when money value is not counted and counted – replacement of items that fail completely, group replacement

UNIT – IV **(10 hrs)**

THEORY OF GAMES: Introduction – mini. max (max. mini) – criterion and optimal strategy – solution of games with saddle points – rectangular games without saddle points – 2 x 2 games – dominance principle – m x 2 & 2 x n games -graphical method.

UNIT – V **(9 hrs)**

WAITING LINES: Introduction – single channel – poison arrivals – exponential service times – with infinite population and finite population models

.

TEXT BOOKS:

1. Operations Research / S.D.Sharma-Kedarnath

2. Operations Research by R. Pannerselvam; Publisher: Prentice Hall International.

REFERENCES:

1. Introduction to O.R/Hiller & Libermann (TMH).
2. Operations Research / A.M.Natarajan, P. Balasubramani, A. Tamilarasi / Pearson Education.
3. Operations Research: Methods & Problems / Maurice Saseini, Arhur Yaspan & Lawrence Friedman.

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Syllabus for the Regulation Year 2021-22 (Common to all Branches)

Professional Communication Skills – II

B.Tech IV Semester

Annexure-Maths-VII

S.No	Course Code	Course Name	L	T	P	C
1	V20ENT03	**Professional Communication Skills - II**		2 +2	-	MNC

	After successful completion of the course, students will be able to	Knowledge Level
CO1	Demonstrate grammatical competence, analyze noun and pronoun dispositions, classify various kinds of verbs, adjectives and adverbs and identify errors in sentences; distinguish the subtle meanings of various words in different contexts, recognize similar words as well as words with contrast meanings and use them appropriately. (K3)	K2
CO2	Organize individual words into one whole sentence using new vocabulary and focus on the error analysis of prepositions and conjunctions, build conversations which befit the situations and develop pre-reading strategies to improve comprehension skills. Distinguish and acquire knowledge of using words of the same category in a sentence and learn new words that promote communicative finesse. Find errors in sentences where the modifiers are misplaced and put them at the appropriate place, use hit pair words and send an email that is concise and lucid.	K3
CO3	Recognize the easiest and best possible way of solving problems in the area of Number and Letter Series, Analogy, Classification, Coding & Decoding Symbols, Ranking and Analytical Reasoning.	K4

CO4	Investigate the different types of logics involved in Mirror and Water Images, Logical Reasoning & Arithmetic Reasoning.	K4
CO5	Find the common traps in the questions and errors likely to be made from the concepts of Blood Relations, Directions, Average, Clock and Calendar, Data Sufficiency, Permutations-Combinations and Probability.	K3

UNIT – I **(12 hrs)**

ERROR ANALYSIS: Nouns & Pronouns – Singular & Plural – Kinds of Nouns & Pronouns-Collective Nouns - Personal and Reflexive Pronouns. Subject – Verb agreement. Adjectives – Adverbs – role of modifiers – place of Adjectives– Adverbs of frequency.

VOCABULARY : Word Power Made Easy Sessions 15- 30, Antonyms and Synonyms and One word substitutes

EXPANSION OF PROVERBS: Meaning – interpretation – explanation**.**

UNIT – II **(12 hrs)**

ERROR ANALYSIS: Prepositions - kinds of prepositions –appropriate use - conjunctions –sub-ordinating– coordinating.

ROLE PLAY: Day to day situations - practical approach – real life experiences.

READING COMPREHENSION: Reading as a skill – quick reading - analyzing – answering **-**

Skimming – scanning - summarizing – problem solving.

ERROR ANALYSIS: Parallel grammatical forms – same grammatical structures. Dangling modifiers – misplacement of modifiers – arrangement.

SENTENCE IMPROVEMENT: Better choice – error-free sentences – effective – syntax**.**

EMAIL WRITING: Format – method of exchanging – technicalities.

UNIT – III **(12 hrs)**

Number And Letter Series, Coding & Decoding, Analogy,Classification Ranking. (K1)

Problems of how to find the next number in the series, Finding the missing number and related sums, Sums related to Classification, Sums related to letter series, Relation between number series and letter series, Finding odd one out from groups, Identify the rank in different places.

UNIT-IV **(12 hrs)**

Problems On Ages& Numbers, Mirror And Water Images, Logical Reasoning & Arithmetic Reasoning.(K4)

Definition and concept of Venn Diagram – its applications. statements – Affirmations, Denials and Contradictions. Sums related to Ages & numbers. Problems on ages with different logics. Identifying the images of water and Mirror.

UNIT-V **(12 hrs)**

Blood Relations, Directions, Average, Clock And Calendar, Data Sufficiency, Permutations-Combinations And Probability.(K3)

Deriving the formula to find the angle between hands for the given time, History of calendar-, Finding the day for the given date, Problems related to directions. Difference between words Permutation and Combinations – Various cases - Real Time Scenarios. Concept of Probability – - Conjunctions – Rules & Cases of Probability.

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1. Verma Shalini. Common Errors In English (2016).S Chand & Company
2. Sharon Weiner Green M.A & Ira K. Wolf Ph.D.Barron's GRE (2015). Barrons Educational Series
3. Paul D.S. Advanced English Grammar with Answers (2007) Published by Cambridge University Press..
4. Work book -1 on Aptitude Prepared by T & P cell, Sri Vasavi Engineering College.
5. Kundan & Tyra. Magical Book on Quicker Maths(20013). Published by Tyra & Kundan
6. Kundan & Tyra.Practice Book on Quicker Maths (2009). Published by Tyra & Kundan
7. R.S. Agarwal .Non Verbal Reasoning.Sultan Chand Publications

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Syllabus for the Regulation Year 2021-22 (Common to all Branches)

Professional Communication Skills – III

B.Tech V Semester

Annexure-Maths-VIII

S.No	Course Code	Course Name	L	T	P	C
1	V20ENT04	**Professional Communication Skills - III**		2+2	-	MNC

	After successful completion of the course, the students will be able to	Knowledge Level
CO1	Distinguish the subtle meanings of various words in different contexts, recognize similar words as well as words with contrast meanings and use them appropriately. Express writer's tone and relevant ideas using different types of writing skills and prepare resume to showcase skills and accomplishments.Organize thoughts in the discussions and express views without reticence.Develop the ability to write different types of essays in a structured way, maintaining cohesion and logic	**K4**
CO2	Identify the central theme and arrange the scrambled sentences into a meaningful passage.Draft emails with appropriate subject-lines and relevant content.Compare different pairs of words, recognize the relationship between the head words and the options to siphon correct analogy Choose an appropriate word to make a sentence meaningful.Infer the meaning of the picture by thinking out of the box and speak without inhibitions and face interviews with aplomb.	**K2**
CO3	Analyze appropriate methods of logical thinking on Ratio and Proportion, Partnership, LCM and HCF, Number System, Areas & Volumes.	**K4**
CO4	Demonstrate problem solving skills through the concepts of Percentages, Profit and loss, Simple Interest & Compound Interest and Allegation.	**K3**
CO5	Calculate the end results of Cubes, Dice and Data Analysis, Time & Work, Time & Distance, Race & Games.	**K4**

SYLLABUS

UNIT – I **(12 hrs)**

VOCABULARY – MODEL RESUMES & SPEAKING

500 words (PIC-VOC) -Meaning – contextual Usage - Prefix – Suffix – Root words. Resume writing-Model Resume-Introducing different formats-Tailoring resume as per job description. Paragraph writing- Essay writing- Types of Essays- Strategies – Cause and effect signals – support signals – contrast signals. Watch a video and respond

Group Discussion – Types of GD – Dos & Don'ts , JAM , Presentation Skills, Designing Advertisements

UNIT – II **(12 hrs)**

GRAMMAR, WRITING & SPEAKING SKILLS

Tenses – Simple – Continuous – perfect – perfect continuous - voice – Active & Passive -Para jumbles – Strategies – Directional words – central theme-Email writing– Types -- Dos and Don'ts- **VERBAL ABILITY- ANALOGIES- INTERVIEW SKILLS- CREATIVE THINKING**

ANALOGIES: Strategies - Recognize common relationship types. Synonyms – Antonyms - Create a general sentence - Use the correct part of speech - Beware of homonyms.Equalizing the sentences-scrambled sentences. Interview Skills – Personal Interview – Skype Interview – Telephone Interview – Mock Interviews. Creative thinking – Picture Interpretation -Creative writing

UNIT – III **(12 hrs)**

Ratio & Proportion, Partnership, LCM & HCF and Areas & Volumes

Introducing the concept of ratio in three different methods, a method to compute and compare two ratios – The effect of increase or decrease of a quantity on the ratio – The meaning of proportion and Problems related to Ratio and Proportion. Improve problem solving skills through Lcm & Hcf.

UNIT – IV **(12 hrs)**

Percentages, Profit and Loss, Simple and Compound Interest, Allegation & Mixtures

Definition of Simple and Compound Interest. Formulas of Applications – Difference between Simple and Compound interest – Rate of Increase or Decrease Population – Expected values of Maturity. Calculate percentages on different situations, using in profit and loss. Identifying difference between Cost price, Selling Price and Marked Price, Finding Discounts, using the method of allegation.

UNIT – V **(12 hrs)**

Time, Work and Distance, Cubes, Dice and Data Analysis

Men- Days -work –completion- Capability Ratio among Men, Women and Children – Application of time in Pipes and Cistern. Work Progress in positive and negative effects. Relation among Time, Speed and Distance – Concepts of Relative speed and Average Speed – Ideas about Boats and Streams and Races of Games. Calculate the end results of Cubes and Dice.

References

- Dr.Sujani Tata et al., Pic Voc (2015) – Published by Sri Vasavi Engineering College
- Lewis Norman, Word Power Made Easy (2008). Goyal Publishers & Distributors Pvt. Ltd.
- Dr.Shalini Verma, Reetesh Anand, Word Power Made Handy(2017). S Chand Publications.
- R S Aggarwal,Objective General English (2017). S Chand Publications.
- Sunita Mishra & C.Muralikrishna, Communication Skills for Engineers (2006). Dorling Kindersley (India) Pvt. Ltd., licensees of Pearson Education in South Asia.
- Charles W Hanson. Resume: Writing 2020 The Ultimate Guide to Writing a Resume that Lands YOU the Job! (2019).
- Raymond Murphy. Essential Grammar in Use (1985).Cambridge University Press
- Seely John. The Oxford Guide to Writing & Speaking (2004). Oxford University Press.
- Jain,T.S. & Gupta. , 2010, Interviews and Group Discussions, Upkar's Publications.
- Training & Placement cell, 2020, Workbook -1 on Aptitude, Sri Vasavi Engineering College.
- M Tyra, 2013, Magical Book on Quicker maths, BSC Publications.
- K Kundan & M Tyra, 2009, Practice Book on Quicker Maths, BSC Publications.
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- Dr. RS. Agarwal, 2017, A modern approach to verbal & on verbal reasoning, Sultan Chand Publications.

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- https://www.questionpaper.org/

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Annexure-Maths-IX

Year/Sem	**M.Tech I Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation / Year	V21 / 2021-2022	3	0	0	3	V21MAT01
Name of the Course	**ANALYTICAL& NUMERICAL METHODS FOR STRUCTURAL ENGINEERING (Elective)**					
Branch	STRUCTURAL ENGINEERING					

Course Outcomes: Upon successful completion of this course, the students will be able to

CO1: apply Laplace transform methods on heat conduction problems (K3)

CO2: Apply the principles and techniques of Elliptic Equations-Laplace equation (K3)

CO3: Develop the principles and techniques of Integral Equations (K3)

CO4: Adopt the principles and techniques of Finite Difference and their Applications (K3)

CO5: Apply the principles and techniques of Numerical Integration (K3)

UNIT I **(10 hrs)**

Transform Methods- Laplace transform methods for one-dimensional wave equation - Displacements in a long string - Longitudinal vibration of an elastic bar - Fourier transforms methods for one-dimensional heat conduction problems in infinite and semi-infinite rod

UNIT II **(10 hrs)**

Elliptic Equations-Laplace equation - Properties of harmonic functions - Fourier transform methods for Laplace equation-Calculus Of Variations- Variation and its properties - Euler's equation - Functionals dependent on first and higher order derivatives - Functionals dependenton functions of several independent variables - Some applications - Direct methods - Ritz and Kantorovich methods

UNIT III **(9 hrs)**

Integral Equations- Fredholm and Volterra integral equations - Relation between differential and integral equations - Green's function -Fredholm equation with separable kernel - Iterative method for solving equations of second kind

UNIT IV **(9 hrs)**

Finite Difference and their Applications: Introduction- Differentiation formulas by Interpolating parabolas – Backward and forward and central differences- Derivation of Differentiation formulas using Taylor series- Boundary conditions- Beam deflection – Solution of characteristic value problems - Richardson's extrapolation - Use of unevenly spaced pivotal points- Integration formulae by interpolating parabolas- Numerical solution to spatial differential equations – Application to Simply Supported Beams, Columns & rectangular Plates.

UNIT V **(10 hrs)**

Numerical Differentiation: Difference methods based on undetermined coefficients- optimum choice of step length– Partial differentiation.
Numerical Integration: Method based on interpolation-method based on undetermined coefficient – Gauss – Lagrange interpolation method- Radaua integration method- composite integration method – Double integration using Trapezoidal and Simpson's method – New Marks Method and Application to Beams – Calculations of Slopes & Deflections.

Textbooks:

1. Introduction to Partial Differential Equations, Sankar Rao. K, PHI, New Delhi, 1995
2. Numerical Methods For Scientific and Engineering Computations. M. K. Jain- S. R. K. Iyengar – R. K. Jain, New Age International (p) Ltd., Publishers.
3. Numerical Methods for Engineering Problems N. Krishna Raju, K.U. Muthu Macmillan Publishers

References:

1. Differential Equations and Calculus of Variations Elsgolts. L, Mir Publishers, Moscow, 1966
2. Fundamentals of Mathematical Statistics Gupta. S.C, & Kapoor. V.K, Sultan Chand & Sons, Reprint 1999.
3. Higher Engineering Maths for Engg. And Sciences Venkataraman. M. K, National Publishing Company, Chennai
4. Elements of Partial Differential Equations, Sneddon. I.N, Mc Graw Hill, 1986
5. Computer based numerical analysis by Dr. M. Shanta Kumar, Khanna Book publishers New Delhi.

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Annexure- Mahts -X

Year/Sem	**M.Tech III Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V21	3	-	-	3	V21MAT02
Name of the Course	**OPERATIONS RESEARCH (Open Elective)**					
Branch	Common To All					

Course Outcomes: Upon the completion of the course the students will be able to

CO 1: solve the linear programming problem.

CO 2: solve Transportation and Assignment problems.

CO 3: apply sequencing techniques to create the jobs.

CO 4: solve problems of waiting lines.

CO 5: apply the principles of Game theory to real world competitive situations.

UNIT-I: **(10 hrs)**

Introduction to Operations Research: Basics definition, scope, objectives, phases, models and limitations of Operations Research. Linear Programming Problem – Formulation of LPP,Graphical solution of LPP. Simplex Method, Artificial variables, big-M method, degeneracy and unbound solutions.

UNIT-II: **(10 hrs)**

Transportation Problem. Formulation, solution, unbalanced Transportation problem. Finding basic feasible solutions – Northwest corner rule, least cost method and Vogel's approximation method. Optimality test: the stepping stone method and MODI method.

UNIT-III: **(10 hrs)**

Assignment model. Formulation. Hungarian method for optimal solution. Solving unbalanced problem. Traveling salesman problem and assignment problem Sequencing models. Solution of Sequencing Problem – Processing n Jobs through 2 Machines – Processing n Jobs through 3 Machines – Processing 2 Jobs through m machines – Processing n Jobs through m Machines.

UNIT-IV: **(9 hrs)**

Queuing Theory**:** Introduction – Single Channel – Poisson arrivals – exponential service times – with infinite population and finite population models – multi channel – poisson arrivals – exponential service times with infinite population single channel poisson arrivals

UNIT-V: **(9 hrs)**

Game Theory: Introduction – Minimax and Maximin – Criterion and optimal strategy – Solution of games with saddle points – Rectangular games without saddle points –algebraic method – Graphical Method (m x 2, 2 x n methods) – dominance principle .

TEXT BOOKS:

1. Operations Research by J.K.Sharma; Publisher: Mac Milan.
2. A. M. Natarajan, P.Balasubramani, A.Tamilarasi, Operations Research by Publisher: Pearson Education.

REFERENCES:

1. Operations Research by R.Pannerselvam; Publisher: Prentice Hall international.
2. P.Sankar Iyer, "Operations Research" Tata McGraw- Hill, 2008.
3. S.D.Sharma Operations Research; Kedarnath
4. Wayne L. Winston, Jeffrey B.Goldbary, Operations Research Thomson / Brooks/Cole Publication.

ANNEXURE-IX

MINUTES OF THE 5th BOS OF ENGLISH ON 20-09-2021.

The 5th BOS Meeting of English was held online at 11am, 20-09-2021 using the Zoom link :

https://us02web.zoom.us/j/87068834452?pwd=OHk1WHgvdU5SbTVCREdjeEdXd3lLZz09

AGENDA OF THE MEETING

1. Opening Remarks by BOS Chairperson.

2. To discuss and finalize the syllabi of Professional Communication Skills-I{**V20ENT02**} Professional Communication Skills- II {**V20ENT03**}& Professional Communication Skills-III{{**V20ENT04**} for III, IV & V Semesters of B.Tech .,for the Academic Year 2021-2022 & 2022 -2023.

3.To discuss and finalize the syllabus of Constitution of India (V20ENT11) for the Academic Year 2021-2022 & 2022 -2023.

4.To discuss and finalize the syllabi of Audit Courses for M.Tech students namely, Pedagogy Studies(V21PGENT51**)** ,Personality Development through Life Enlightenment Skills (V21PGENT52**)**,Stress Management by Yoga Course (V21PGENT53), English for Research Paper Writing (V21PGENT54**)**, Value Education (V21PGENT55).

MINUTES

- The syllabi of Professional Communication Skills-I{**V20ENT02**} Professional Communication Skills- II {**V20ENT03**}& Professional Communication Skills-III{{**V20ENT04**} for III, IV & V Semesters of B.Tech , was approved by the members of BOS of English.
- The syllabus of Constitution of India (V20ENT11) for B.Tech , was approved by the members of BOS of English.
- The syllabi of Audit Courses for M.Tech students namely, Pedagogy Studies(V21PGENT51**)** ,Personality Development through Life Enlightenment Skills (V21PGENT52**)**,Stress Management by Yoga Course (V21PGENT53), English for Research Paper Writing (V21PGENT54**)**, Value Education (V21PGENT55) was approved by the BOS members.
- The members of the BOS suggested renaming the audit course " English for Research Paper Writing" as "Research Paper Writing - Conventions & Structures" if possible.
- The syllabus of Audit course for M.Tech students " Constitution of India" (V21PGENT56) was mailed to the BOS members and their approval for the

same was received by 3.10’21.

Members Present

English BOS Members

1.Chairperson of BOS

Dr. T Sujani, Assoc. Professor of English

Sri Vasavi Engineering College

2.Dr.D.KesavaRao
(Council Nominee)

Professor of English, NIT Warangal

3. Prof.K.Sree Ramesh
(Council Nominee)

Professor of English and Principal, College of Arts and Commerce
Adikavi Nannaya University

Rajamahendravarm

4. Dr.Purna Chandra Rao
(University Nominee)
Assoc.Professor of English,

PVP Siddhartha Institute of Technology,Vijayawada .

Faculty Present

1. Dr.K. Venkata Rao
2. B.AnandaRao
3. K.V.Rama Rao
4. K.Radha Madhavi
5. Tanuja .Ch
6. Aparanjani.U
7. G.Srinivasa Rao
8. A.Kiranmayee
9. M.Naresh
10. M.Venkata Ramana
11. G.Ch.S.Madhusudhana Rao
12. D.Satish

Annexures of Syllabi

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Syllabus for the Regulation Year 2019-2020 (Common to all Branches)

Professional Communication Skills - I

B.Tech IIISemester

S.No	Course Code	Course Name	L	T	P	C
1	V20ENT02	**Professional Communication Skills - I**		3	-	MNC

Students will be able to

CO1: Use vocabulary in regular chores of life with accuracy, make meaningful sentences, and describe people and their traits vividly. (K3)

CO2: Distinguish between places of pilgrimage and holiday spots; describe incidents, things and process; and frame questions, statements and expressions. (K4)

CO3: Demonstrate their knowledge of idioms which are similar to those of native speakers while speaking and writing and use phrases clearly and precisely to articulate their views that compare and contrast indianisms with native expressions and avoid common errors. (K3)

CO 4: Employ the vocabulary of netizens with ease and walk through the letters and emails for effective official correspondence and infer the accurate meaning of the homophones that are often confusing. (K3)

CO5: Summarize their profile; introduce themselves as well as others by incorporating their accomplishments and Sketch stories and anecdotes in an interesting and engaging manner that arouses curiosity of the audience. (K5)

Syllabus

UNIT – I

BUILDING VOCABULARY FOR DAILY ACTIVITIES

NAMES: Things- Kitchen Utensils – Occupation- tools – spices- vegetables –flowers - sciences of study – Professions .

Framing Questions – statements – expressions related to the Vocabulary taught

PEOPLE : Describing people - Physical characteristics,-Mental attributes – various professions

Framing Questions – statements – expressions related to the Vocabulary taught

ACTIVITY : Related to the topics learnt in Unit – 1

No. of hours required - 10

UNIT – II

BUILDING VOCABULARY FOR PLACES, THINGS & PROCESS

PLACES: Describing favourite place – famous place- Places of Pilgrimage

THINGS: Describing a thing- Describe an incident or an event

PROCESS: Describe a process –Recipe – experiment –Entrance test application

Framing Questions – statements – expressions related to the Vocabulary taught

ACTIVITY : Related to the topics learnt in Unit – II

No. of hours required - 10

UNIT – III

NATIVE EXPRESSIONS – Idioms and Phrases – in day to day activities for different occasions - Usage written & spoken –

PHRASES with as—as expressions – used to compare & contrast

COMMON MISTAKES- in spoken & written

INDIANISMS- Most often used expressions – accepted in India – found place in Dictionary

ACTIVITY : Related to the topics learnt in Unit – III

No. of hours required - 10

UNIT -IV

NET VOCABULARY: Acronyms and abbreviations that are most often used
HOMOPHONES : Words often confused – Spelling & Pronunciation
Letter Writing : Formal & Informal- Letters for all occasions
Email Writing : Business mails – project status mails – informative mails
ACTIVITY : Related to the topics learnt in Unit – IV
No. of hours required - 10
UNIT –V

SELF-INTRODUCTION: Basic information - Academic and personal - interests– strengths and weaknesses – goal.

PROFILE BUILDING: Resume writing – CV Building – Types

STORYTELLING WITH CREATIVITY: Reading and Narrating a story – narrating anecdotes

ACTIVITY : Related to the topics learnt in Unit – V
No. of hours required - 10

REFERENCES:

- Lewis Norman, Word Power Made Easy (2008). Goyal Publishers & Distributors Pvt. Ltd.
- Sunita Mishra & C.Muralikrishna, Communication Skills for Engineers (2006). Dorling Kindersley (India) Pvt. Ltd., licensees of Pearson Education in South Asia.
- Chaturvedi PD & Chaturvedi Mukesh, Business Communication (2006). Dorling Kindersley (India) Pvt. Ltd., licensees of Pearson Education in South Asia.
- Joshi Manik, Popular English Idioms and Phrases: English Idiomatic Expressions (2013).
- Joshi Manik, Homonyms, Homophones and Homographs: Vocabulary Building (2014).
- Gupta S.C. A Handbook for Letter Writing (2018).Arihant Publishers
- Lisa McGrimmon, The Resume Writing Guide: A Step-by-Step Workbook for Creating a Winning Resume (2013). CareerChoiceGuide; 2nd edition.
- Sawhney, Clifford. Improve your Word Power (2013). V&S Publishers

Web References: (NET Vocabulary)

- https://www.grammarly.com/blog/texting-abbreviations/
- https://www.slicktext.com/blog/2019/02/text-abbreviations-guide/
- https://www.webopedia.com/reference/text-abbreviations/

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Syllabus for the Regulation Year 2021-22 (Common to all Branches)

Professional Communication Skills – II

B.Tech IV Semester

S.No	Course Code	Course Name	L	T	P	C
1	V20ENT03	**Professional Communication Skills - II**		2 +2	-	MNC

	After successful completion of the course, students will be able to	Knowledge Level
CO1	Demonstrate grammatical competence, analyze noun and pronoun dispositions, classify various kinds of verbs, adjectives and adverbs and identify errors in sentences; distinguish the subtle meanings of various words in different contexts, recognize similar words as well as words with contrast meanings and use them appropriately. (K3)	K2
CO2	Organize individual words into one whole sentence using new vocabulary and focus on the error analysis of prepositions and conjunctions, build conversations which befit the situations and develop pre-reading strategies to improve comprehension skills. Distinguish and acquire knowledge of using words of the same category in a sentence and learn new words that promote communicative finesse. Find errors in sentences where the modifiers are misplaced and put them at the appropriate place, use hit pair words and send an email that is concise and lucid.	K3

CO3	Recognize the easiest and best possible way of solving problems in the area of Number and Letter Series, Analogy, Classification, Coding & Decoding Symbols, Ranking and Analytical Reasoning.	K4
CO4	Investigate the different types of logics involved in Mirror and Water Images, Logical Reasoning & Arithmetic Reasoning.	K4
CO5	Find the common traps in the questions and errors likely to be made from the concepts of Blood Relations, Directions, Average, Clock and Calendar, Data Sufficiency, Permutations-Combinations and Probability.	K3

UNIT – I

ERROR ANALYSIS: Nouns & Pronouns – Singular & Plural – Kinds of Nouns & Pronouns- Collective Nouns - Personal and Reflexive Pronouns. Subject – Verb agreement. Adjectives – Adverbs – role of modifiers – place of Adjectives– Adverbs of frequency.

VOCABULARY : Word Power Made Easy Sessions 15- 30, Antonyms and Synonyms and One word substitutes

EXPANSION OF PROVERBS: Meaning – interpretation – explanation**.**

UNIT – II

ERROR ANALYSIS: Prepositions - kinds of prepositions –appropriate use - conjunctions –sub- ordinating– coordinating.

ROLE PLAY: Day to day situations - practical approach – real life experiences.

READING COMPREHENSION: Reading as a skill – quick reading - analyzing – answering **-**

Skimming – scanning - summarizing – problem solving.

ERROR ANALYSIS: Parallel grammatical forms – same grammatical structures. Dangling modifiers – misplacement of modifiers – arrangement.

SENTENCE IMPROVEMENT: Better choice – error-free sentences – effective – syntax**.**

EMAIL WRITING: Format – method of exchanging – technicalities.

UNIT – III

Number And Letter Series, Coding & Decoding, Analogy,Classification Ranking. (K1)

Problems of how to find the next number in the series, Finding the missing number and related sums, Sums related to Classification, Sums related to letter series, Relation between number series and letter series, Finding odd one out from groups, Identify the rank in different places.

UNIT-IV

Problems On Ages& Numbers, Mirror And Water Images, Logical Reasoning & Arithmetic Reasoning.(K4)

Definition and concept of Venn Diagram – its applications. statements – Affirmations, Denials and Contradictions. Sums related to Ages & numbers. Problems on ages with different logics. Identifying the images of water and Mirror.

UNIT-V

Blood Relations, Directions, Average, Clock And Calendar, Data Sufficiency, Permutations- Combinations And Probability.(K3)

Deriving the formula to find the angle between hands for the given time, History of calendar-, Finding the day for the given date, Problems related to directions. Difference between words Permutation and Combinations – Various cases - Real Time Scenarios. Concept of Probability – - Conjunctions – Rules & Cases of Probability.

References

1. Verma Shalini. Common Errors In English (2016).S Chand & Company
2. Sharon Weiner Green M.A & Ira K. Wolf Ph.D.Barron's GRE (2015). Barrons Educational Series
3. Paul D.S. Advanced English Grammar with Answers (2007) Published by Cambridge University Press..
4. Work book -1 on Aptitude Prepared by T & P cell, Sri Vasavi Engineering College.
5. Kundan & Tyra. Magical Book on Quicker Maths(20013). Published by Tyra & Kundan
6. Kundan & Tyra.Practice Book on Quicker Maths (2009). Published by Tyra & Kundan
7. R.S. Agarwal .Non Verbal Reasoning.Sultan Chand Publications

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https://www.questionpaper.org/

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Syllabus for the Regulation Year 2021-22 (Common to all Branches)
Professional Communication Skills – III
B.Tech V Semester

S.No	Course Code	Course Name	L	T	P	C
1	V20ENT04	**Professional Communication Skills - III**		2+2	-	MNC

	After successful completion of the course, the students will be able to	Knowledge Level
CO1	Distinguish the subtle meanings of various words in different contexts, recognize similar words as well as words with contrast meanings and use them appropriately. Express writer's tone and relevant ideas using different types of writing skills and prepare resume to showcase skills and accomplishments.Organize thoughts in the discussions and express views without reticence.Develop the ability to write different types of essays in a structured way, maintaining cohesion and logic	**K4**
CO2	Identify the central theme and arrange the scrambled sentences into a meaningful passage.Draft emails with appropriate subject-lines and relevant content.Compare different pairs of words, recognize the relationship between the head words and the options to siphon correct analogy Choose an appropriate word to make a sentence meaningful.Infer the meaning of the picture by thinking out of the box and speak without inhibitions and face interviews with aplomb.	**K2**
CO3	Analyze appropriate methods of logical thinking on Ratio and Proportion, Partnership, LCM and HCF, Number System, Areas & Volumes.	**K4**
CO4	Demonstrate problem solving skills through the concepts of Percentages, Profit and loss, Simple Interest & Compound Interest and Allegation.	**K3**
CO5	Calculate the end results of Cubes, Dice and Data Analysis, Time & Work, Time & Distance, Race & Games.	**K4**

SYLLABUS

UNIT – I

VOCABULARY – MODEL RESUMES & SPEAKING

500 words (PIC-VOC) -Meaning – contextual Usage - Prefix – Suffix – Root words. Resume writing-Model Resume-Introducing different formats-Tailoring resume as per job description. Paragraph writing- Essay writing- Types of Essays- Strategies – Cause and effect signals – support signals – contrast signals. Watch a video and respond

Group Discussion – Types of GD – Dos & Don'ts , JAM , Presentation Skills, Designing Advertisements

UNIT – II

GRAMMAR, WRITING & SPEAKING SKILLS

Tenses – Simple – Continuous – perfect – perfect continuous - voice – Active & Passive -Para jumbles – Strategies – Directional words – central theme-Email writing– Types -- Dos and Don'ts- **VERBAL ABILITY- ANALOGIES- INTERVIEW SKILLS- CREATIVE THINKING**

ANALOGIES: Strategies - Recognize common relationship types. Synonyms – Antonyms - Create a general sentence - Use the correct part of speech - Beware of homonyms.Equalizing the sentences- scrambled sentences. Interview Skills – Personal Interview – Skype Interview – Telephone Interview – Mock Interviews. Creative thinking – Picture Interpretation -Creative writing

UNIT – III

Ratio & Proportion, Partnership, LCM & HCF and Areas & Volumes

Introducing the concept of ratio in three different methods, a method to compute and compare two ratios – The effect of increase or decrease of a quantity on the ratio – The meaning of proportion and Problems related to Ratio and Proportion. Improve problem solving skills through Lcm & Hcf.

UNIT - IV

Percentages, Profit and Loss, Simple and Compound Interest, Allegation & Mixtures

Definition of Simple and Compound Interest. Formulas of Applications – Difference between Simple and Compound interest – Rate of Increase or Decrease Population – Expected values of Maturity. Calculate percentages on different situations, using in profit and loss. Identifying difference between Cost price, Selling Price and Marked Price, Finding Discounts, using the method of allegation.

UNIT – V

Time, Work and Distance, Cubes, Dice and Data Analysis

Men- Days -work –completion- Capability Ratio among Men, Women and Children – Application of time in Pipes and Cistern. Work Progress in positive and negative effects. Relation among Time, Speed and Distance – Concepts of Relative speed and Average Speed – Ideas about Boats and Streams and Races of Games. Calculate the end results of Cubes and Dice.

References

- Dr.Sujani Tata et al., Pic Voc (2015) – Published by Sri Vasavi Engineering College
- Lewis Norman, Word Power Made Easy (2008). Goyal Publishers & Distributors Pvt. Ltd.
- Dr.Shalini Verma, Reetesh Anand, Word Power Made Handy(2017). S Chand Publications.
- R S Aggarwal,Objective General English (2017). S Chand Publications.
- Sunita Mishra & C.Muralikrishna, Communication Skills for Engineers (2006). Dorling Kindersley (India) Pvt. Ltd., licensees of Pearson Education in South Asia.
- Charles W Hanson. Resume: Writing 2020 The Ultimate Guide to Writing a Resume that Lands YOU the Job! (2019).
- Raymond Murphy. Essential Grammar in Use (1985).Cambridge University Press
- Seely John. The Oxford Guide to Writing & Speaking (2004). Oxford University Press.
- Jain,T.S. & Gupta. , 2010, Interviews and Group Discussions, Upkar's Publications.
- Training & Placement cell, 2020, Workbook -1 on Aptitude, Sri Vasavi Engineering College.
- M Tyra, 2013, Magical Book on Quicker maths, BSC Publications.
- K Kundan & M Tyra, 2009, Practice Book on Quicker Maths, BSC Publications.
- Dr. RS. Agarwal , 2017, Quantitative Aptitude, Sultan Chand Publications
- Dr. RS. Agarwal, 2017, A modern approach to verbal & on verbal reasoning, Sultan Chand Publications.

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Syllabus for the Regulation Year 2021-22 (Common to all Branches)

B.Tech ECE,& ECT (III Sem), CSE, CST, & ME (IV Sem), Civil (V Sem)

S.No	Course Code	Course Name	L	T	P	C
1	V20ENT11	**CONSTITUTION OF INDIA**	-	2	-	MNC

COURSE OUTCOMES

	After successful completion of the course, students will be able to	**Knowledge Level**
CO1	Describe various stages in the composition of the Indian Constitution	K2
CO2	Develop awareness about citizenship- Fundamental rights	K3
CO3	Explain the fundamental duties and build up their civic sense	K2
CO4	Sketch the specific roles of heads of Nation and the functioning of legislative bodies.	K3
CO5	Assess the role of local self-government in strengthening democracy	K3

Syllabus

Unit-I

Constitution of India

a) Preparation of Indian constitution by Constituent Assembly of India.
b) Preamble or Philosophy of the Indian Constitution.
c) Salient features of the Indian constitution.

Unit–II

a) Citizenship in India.
b) Fundamental Rights - their importance & Limitations.

Unit-III

a) Fundamental Duties and their importance.
b) Directive principles of the state policy and their implementation.

Unit-IV

Parliamentary form of Government in India.

1. Union Executive

a) President of India- Powers and functions.
b) Vice-President - Powers and functions.
c) Prime Minister and Council of Minister - Powers and functions.

2. Union Legislature

a) Rajya Sabha – Powers and Functions.
b) Lok Sabha- Powers and Functions.

3. Judiciary – Supreme Court of India - Powers and Functions.

Unit-V

a) Amending Procedure- Important Constitutional Amendments – 42^{nd}, 44 Constitutional Amendment Acts.
b) Local Self–government in India 73^{rd} & 74^{th} Constitutional Amendment Acts.

Reference Books:

1. D D Basu-Introduction to the Constitution of India – 18^{th} Edition. Prentice – Hall of India Private Ltd-New Delhi-1998
2. Granville Austin (1972) the Indian Constitution, Cornerstone of a Nation, Oxford university Press, New Delhi
3. Madhavkhosla (2012) the Indian Constitution, Oxford University Press, New Delhi
4. Granville Austin (1999) Working a Democratic Constitution; A History of the Indian Experience, Oxford University Press, New Delhi
5. Zoya Hasan, Sridharan E and Sudharshan R (Eds) 2002 India's living Constitution, Permanent black, New Delhi
6. Baxi Upendra (1980) the Indian Supreme Court and Politics, Eastern Book Co, Lucknow.

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Department of Basic Sciences & Humanities

V21PGENT51	PEDAGOGY STUDIES	L	T	P	C
		0	2	0	

COURSE OUTCOMES

	After successful completion of the course, the students will be able to	Knowledge Level
CO1	Identify various theories of learning and recognize Research questions with an overview of methodology and searching.	**K2**
CO2	Review Pedagogical practices used by teacher in both formal and informal classroom and design curriculum	**K2**
CO3	Examine how teacher education and the school curriculum support effective pedagogy along with various pedagogical approaches and theories.	**K3**
CO4	Show peer support for professional development and support from head teacher to develop curriculum and assessment. Find out the barriers involved in learning	**K3**
CO5	Find out the gaps and give directions for research design as per context.	**K3**

AUDIT 1 and 2: PEDAGOGY STUDIES

Units	Content	Hours
1	**Introduction and Methodology:** ● Aims and rationale, Policy background, Conceptual framework and terminology ● Theories of learning, Curriculum, Teacher education. ● Conceptual framework, Research questions. ● Overview of methodology and Searching.	4
2	● Thematic overview: Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries. ● Curriculum, Teacher education.	2
3	● Evidence on the effectiveness of pedagogical practices ● Methodology for the in depth stage: quality assessment of included studies ● How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy? ● Theory of change. ● Strength and nature of the body of evidence for effective pedagogical practices. ● Pedagogic theory and pedagogical approaches. ● Teachers' attitudes and beliefs and Pedagogic strategies.	4
4	● Professional development: alignment with classroom practices and follow-up support ● Peer support ● Support from the head teacher and the community. ● Curriculum and assessment ● Barriers to learning: limited resources and large class sizes	4

5	**Research gaps and future directions** • Research design • Contexts • Pedagogy • Teacher education • Curriculum and assessment • Dissemination and research impact	2

Suggested reading

1. Ackers J, Hardman F (2001) Classroom interaction in Kenyan primary schools, Compare, 31 (2): 245-261.

2. Agrawal M (2004) Curricular reform in schools: The importance of evaluation, Journal of
Curriculum Studies, 36 (3): 361-379.

3. Akyeampong K (2003) Teacher training in Ghana - does it count? Multi-site teacher education research project (MUSTER) country report 1. London: DFID.

4. Akyeampong K, Lussier K, Pryor J, Westbrook J (2013) Improving teaching and learning of basic maths and reading in Africa: Does teacher preparation count? International Journal Educational Development, 33 (3): 272–282.

5. Alexander RJ (2001) Culture and pedagogy: International comparisons in primary
education. Oxford and Boston: Blackwell.

6. ChavanM(2003)ReadIndia:Amassscale,rapid,„learningtoread‟campaign.
7. www.pratham.org/images/resource%20working%20paper%202.pdf.

1. What pedagogical practices are being used by teachers in formal and informal classrooms in developing countries?

2. What is the evidence on the effectiveness of these pedagogical practices, in what conditions, and with what population of learners?

3. How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy?

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V21PGENT52	PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS	L	T	P	C
		0	2	0	

COURSE OUTCOMES

	After successful completion of the course, the students will be able to	Knowledge Level
CO1	Relate Neetishatakam in developing versatile personality of students.	**K1**
CO2	Employ Bhagavad Gita to lead the nation and mankind to peace and prosperity.	**K3**
CO3	Connect students to Bhagavad Gita in order to develop personality and achieve highest goals in life.	**K4**

Syllabus

Unit	Content		Hours
1	Neetisatakam-Holistic development of personality		8
	·	Verses- 19,20,21,22 (wisdom)	
	·	Verses- 29,31,32 (pride & heroism)	
	·	Verses- 26,28,63,65 (virtue)	
	·	Verses- 52,53,59(dont"s)	
	·	Verses- 71,73,75,78(do"s)	

2	·	Approach to day to day work and duties.	8	
	·	Shrimad Bhagavad Gita: Chapter 2-Verses 41, 47,48,		
	·	Chapter 3-Verses 13, 21, 27, 35, Chapter 6-Verses 5,13,17, 23, 35,		
	·	Chapter 18-Verses 45, 46, 48.		
3	·	Statements of basic knowledge.	8	
	·	Shrimad Bhagwad Geeta: Chapter2-Verses 56, 62, 68		
	·	Chapter 12 -Verses 13, 14, 15, 16,17, 18		
	·	Personality of Role model. Shrimad Bhagwad Geeta: Chapter2-		
		Verses 17, Chapter 3-Verses 36,37,42,		
	·	Chapter 4-Verses 18, 38,39		
	·	Chapter18 – Verses 37,38,63		

Suggested reading

1. "SrimadBhagavadGita"bySwamiSwarupananda Advaita Ashram (Publication Department), Kolkata

2. Bhartrihari‟s Three Satakam (Niti-sringar-vairagya) by P.Gopinath, Rashtriya Sanskrit Sansthanam, New Delhi.

Course Outcomes

Students will be able to

1. Study of Shrimad-Bhagwad-Geeta will help the student in developing his personality and achieve the highest goal in life

2. The person who has studied Geeta will lead the nation and mankind to peace and prosperity
Study of Neetishatakam will help in developing versatile personality of students

V21PGENT53	STRESS MANAGEMENT BY YOGA COURSE	L	T	P	C
		0	2	0	

COURSE OUTCOMES

	After successful completion of the course, the students will be able to	Knowledge Level
CO1	Define 8 parts of Yoga (Ashtanga)	**K1**
CO2	Discuss Yam and Niyam along with Dos and Don'ts in life. Interpret Ahimsa, satya, astheya, brahmacharya and aparigraha along with other concepts.	**K2**
CO3	Practice Asan and Pranayam. Examine various yoga poses and their benefits for mind and body.	**K3**

Syllabus

Unit	Content	Hours
1	· Definitions of Eight parts of yoga. (Ashtanga)	8
2	YamandNiyam.Do`sandDon‟t‟sinlife. i) Ahinsa, satya, astheya, bramhacharya and aparigraha ii) Shaucha, santosh, tapa, swadhyay, ishwarpranidhan	8
3	● Asan and Pranayam 1.Various yog poses and their benefits for mind & body 2.Regularization of breathing techniques and its effects-Types of pranayam	8

Suggested reading			

1. "YogicAsanas for Group Tarining-Part-I":JanardanSwamiYogabhyasiMandal,Nagpur
2. "Rajayoga or conquering the Internal Nature" by Swami Vivekananda, Advaita Ashrama (Publication Department), Kolkata

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V21PGENT54	ENGLISH FOR RESEARCH PAPER WRITING	L	T	P	C
		0	2	0	

		Knowledge Level
CO1	Present planning and preparation for breaking up long sentences by following word order and structuring paragraphs and sentences to avoid ambiguity and vagueness.	**K1**
CO2	Clarify his/her findings by criticizing, hedging and paraphrasing to avoid plagiarism in writing the sections of the paper.	**K2**
CO3	Construct the ability to review literature, methods, results, discussions and the final check.	**K3**
CO4	Develop the key skills needed to write Title, Abstract, Introduction and Review of literature for a research paper.	**K3**
CO5	Demonstrate the skills needed to write methods, results, the discussion and conclusions for Research Write-ups.	**K3**
CO6	Employ useful phrases that ensure a paper for the first-time publication.	**K3**

COURSE OUTCOMES

Syllabus

Units	Contents	Hours
1	Planning and Preparation, Word Order, Breaking up Long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness.	4
2	Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticising, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts. Introduction	4
3	Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check	4
4	Key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature.	4
5	Skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions.	4
6	Useful phrases, how to ensure paper is as good as it could possibly be the first- time submission.	4

Suggested Studies:

1. Goldbort R (2006) Writing for Science, Yale University Press (available on Google Books)

2. Day R (2006) How to Write and Publish a Scientific Paper, Cambridge University Press

3. Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM. Highman‟sbook.

4. Adrian Wallwork , English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011

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V21PGENT55	**VALUE EDUCATION**	**L**	**T**	**P**	**C**
		0	**2**	**0**	

		Knowledge Level
CO1	Enumerate the societal values and Individual attitudes that lead to value based judgments	**K1**
CO2	Explain the need for value education that incorporates self-discipline, confidence, honesty and patriotism	**K2**
CO3	Develop the inner and external personality that transforms individual into a man of character	**K3**
CO4	Distinguish between character and competence, self-management and good health, mind your mind and self-control	**K4**

Syllabus

Unit		**Content**	**Hours**	
1	·	Values and self-development –Social values and individual attitudes.	4	
		Work ethics, Indian vision of humanism.		
	·	Moral and non- moral valuation. Standards and principles.		
	·	Value judgements		
2	·	Importance of cultivation of values.	6	

	·	Sense of duty. Devotion, Self-reliance. Confidence, Concentration.		
		Truthfulness, Cleanliness.		
	·	Honesty, Humanity. Power of faith, National Unity.		
	·	Patriotism.Love for nature ,Discipline		
3	·	Personality and Behavior Development - Soul and Scientific attitude.	6	
		Positive Thinking. Integrity and discipline.		
	·	Punctuality, Love and Kindness.		
	·	Avoid fault Thinking.		
	·	Free from anger, Dignity of labour.		
	·	Universal brotherhood and religious tolerance.		
	·	True friendship.		
	·	Happiness Vs suffering, love for truth.		
	·	Aware of self-destructive habits.		
	·	Association and Cooperation.		
	·	Doing best for saving nature		
4	·	Character and Competence –Holy books vs Blind faith.	6	
	·	Self-management and Good health.		
	·	Science of reincarnation.		
	·	Equality, Nonviolence ,Humility, Role of Women.		
	·	All religions and same message.		
	·	Mind your Mind, Self-control.		
	·	Honesty, Studying effectively		

Suggested reading

1 Chakroborty, S.K. “Values and Ethics for organizations Theory and practice”, Oxford University Press, New Delhi

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		L	T	P	C
V21PGENT51	**PEDAGOGY STUDIES**	**0**	**2**	**0**	

COURSE OUTCOMES

	After successful completion of the course, the students will be able to	Knowledge Level
CO1	Identify various theories of learning and recognize Research questions with an overview of methodology and searching.	**K2**
CO2	Review Pedagogical practices used by teacher in both formal and informal classroom and design curriculum	**K2**
CO3	Examine how teacher education and the school curriculum support effective pedagogy along with various pedagogical approaches and theories.	**K3**
CO4	Show peer support for professional development and support from head teacher to develop curriculum and assessment. Find out the barriers involved in learning	**K3**
CO5	Find out the gaps and give directions for research design as per context.	**K3**

AUDIT 1 and 2: PEDAGOGY STUDIES

Units	Content	Hours
1	**Introduction and Methodology:** ● Aims and rationale, Policy background, Conceptual framework and terminology ● Theories of learning, Curriculum, Teacher education. ● Conceptual framework, Research questions. ● Overview of methodology and Searching.	4
2	● Thematic overview: Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries. ● Curriculum, Teacher education.	2
3	● Evidence on the effectiveness of pedagogical practices ● Methodology for the in depth stage: quality assessment of included studies ● How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy? ● Theory of change. ● Strength and nature of the body of evidence for effective pedagogical practices. ● Pedagogic theory and pedagogical approaches. ● Teachers' attitudes and beliefs and Pedagogic strategies.	4
4	● Professional development: alignment with classroom practices and follow-up support ● Peer support ● Support from the head teacher and the community. ● Curriculum and assessment ● Barriers to learning: limited resources and large class sizes	4

5	**Research gaps and future directions** • Research design • Contexts • Pedagogy • Teacher education • Curriculum and assessment • Dissemination and research impact	2

Suggested reading

1. Ackers J, Hardman F (2001) Classroom interaction in Kenyan primary schools, Compare, 31 (2): 245-261.

2. Agrawal M (2004) Curricular reform in schools: The importance of evaluation, Journal of
Curriculum Studies, 36 (3): 361-379.

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4. Akyeampong K, Lussier K, Pryor J, Westbrook J (2013) Improving teaching and learning of basic maths and reading in Africa: Does teacher preparation count? International Journal Educational Development, 33 (3): 272–282.

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6. ChavanM(2003)ReadIndia:Amassscale,rapid,„learningtoread"campaign.
7. www.pratham.org/images/resource%20working%20paper%202.pdf.

1. What pedagogical practices are being used by teachers in formal and informal classrooms in developing countries?

2. What is the evidence on the effectiveness of these pedagogical practices, in what conditions, and with what population of learners?

3. How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy?

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Department of Basic Sciences & Humanities

V21PGENT52	**PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS**	**L**	**T**	**P**	**C**
		0	**2**	**0**	

COURSE OUTCOMES

	After successful completion of the course, the students will be able to	Knowledge Level
CO1	Relate Neetishatakam in developing versatile personality of students.	**K1**
CO2	Employ Bhagavad Gita to lead the nation and mankind to peace and prosperity.	**K3**
CO3	Connect students to Bhagavad Gita in order to develop personality and achieve highest goals in life.	**K4**

Syllabus

Unit	Content		Hours
1	Neetisatakam-Holistic development of personality		8
	·	Verses- 19,20,21,22 (wisdom)	
	·	Verses- 29,31,32 (pride & heroism)	
	·	Verses- 26,28,63,65 (virtue)	
	·	Verses- 52,53,59(dont"s)	

	·	Verses- 71,73,75,78(do‟s)		
2	·	Approach to day to day work and duties.	8	
	·	Shrimad Bhagavad Gita: Chapter 2-Verses 41, 47,48,		
	·	Chapter 3-Verses 13, 21, 27, 35, Chapter 6-Verses 5,13,17, 23, 35,		
	·	Chapter 18-Verses 45, 46, 48.		
3	·	Statements of basic knowledge.	8	
	·	Shrimad Bhagwad Geeta: Chapter2-Verses 56, 62, 68		
	·	Chapter 12 -Verses 13, 14, 15, 16,17, 18		
	·	Personality of Role model. Shrimad Bhagwad Geeta: Chapter2-		
	·	Verses 17, Chapter 3-Verses 36,37,42,		
		Chapter 4-Verses 18, 38,39		
	·	Chapter18 – Verses 37,38,63		

Suggested reading

1. “SrimadBhagavadGita”bySwamiSwarupananda Advaita Ashram (Publication Department), Kolkata

2. Bhartrihari‟s Three Satakam (Niti-sringar-vairagya) by P.Gopinath, Rashtriya Sanskrit Sansthanam, New Delhi.

Course Outcomes

Students will be able to

1. Study of Shrimad-Bhagwad-Geeta will help the student in developing his personality and achieve the highest goal in life

2. The person who has studied Geeta will lead the nation and mankind to peace and prosperity
Study of Neetishatakam will help in developing versatile personality of students

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		L	T	P	C
V21PGENT53	**STRESS MANAGEMENT BY YOGA COURSE**	**0**	**2**	**0**	

COURSE OUTCOMES

	After successful completion of the course, the students will be able to	Knowledge Level
CO1	Define 8 parts of Yoga (Ashtanga)	**K1**
CO2	Discuss Yam and Niyam along with Dos and Don'ts in life. Interpret Ahimsa, satya, astheya, brahmacharya and aparigraha along with other concepts.	**K2**
CO3	Practice Asan and Pranayam. Examine various yoga poses and their benefits for mind and body.	**K3**

Syllabus

Unit	Content	Hours
1	· Definitions of Eight parts of yoga. (Ashtanga)	8
2	YamandNiyam.Do`sandDon"t"sinlife. i) Ahinsa, satya, astheya, bramhacharya and aparigraha ii) Shaucha, santosh, tapa, swadhyay, ishwarpranidhan	8
3	● Asan and Pranayam 1.Various yog poses and their benefits for mind & body 2.Regularization of breathing techniques and its effects-Types of pranayam	8

Suggested reading			

1. “YogicAsanas for Group Tarining-Part-I”:JanardanSwamiYogabhyasiMandal,Nagpur
2. “Rajayoga or conquering the Internal Nature” by Swami Vivekananda, Advaita

Ashrama (Publication Department), Kolkata

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V21PGENT54	ENGLISH FOR RESEARCH PAPER WRITING	L	T	P	C
		0	2	0	

		Knowledge Level
CO1	Present planning and preparation for breaking up long sentences by following word order and structuring paragraphs and sentences to avoid ambiguity and vagueness.	**K1**
CO2	Clarify his/her findings by criticizing, hedging and paraphrasing to avoid plagiarism in writing the sections of the paper.	**K2**
CO3	Construct the ability to review literature, methods, results, discussions and the final check.	**K3**
CO4	Develop the key skills needed to write Title, Abstract, Introduction and Review of literature for a research paper.	**K3**
CO5	Demonstrate the skills needed to write methods, results, the discussion and conclusions for Research Write-ups.	**K3**
CO6	Employ useful phrases that ensure a paper for the first-time publication.	**K3**

COURSE OUTCOMES

Syllabus

Units	Contents	Hours
1	Planning and Preparation, Word Order, Breaking up Long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness.	4
2	Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticising, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts. Introduction	4
3	Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check	4
4	Key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature.	4
5	Skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions.	4
6	Useful phrases, how to ensure paper is as good as it could possibly be the first- time submission.	4

Suggested Studies:

1. Goldbort R (2006) Writing for Science, Yale University Press (available on Google Books)

2. Day R (2006) How to Write and Publish a Scientific Paper, Cambridge University Press

3. Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM. Highman‟sbook.

4. Adrian Wallwork , English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011

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V21PGENT55	**VALUE EDUCATION**	**L**	**T**	**P**	**C**
		0	**2**	**0**	

		Knowledge Level
CO1	Enumerate the societal values and Individual attitudes that lead to value based judgments	**K1**
CO2	Explain the need for value education that incorporates self-discipline, confidence, honesty and patriotism	**K2**
CO3	Develop the inner and external personality that transforms individual into a man of character	**K3**
CO4	Distinguish between character and competence, self-management and good health, mind your mind and self-control	**K4**

Syllabus

Unit		Content	Hours	
1	·	Values and self-development –Social values and individual attitudes.	4	
		Work ethics, Indian vision of humanism.		
	·	Moral and non- moral valuation. Standards and principles.		
	·	Value judgements		
2	·	Importance of cultivation of values.	6	
	·	Sense of duty. Devotion, Self-reliance. Confidence, Concentration.		
		Truthfulness, Cleanliness.		
	·	Honesty, Humanity. Power of faith, National Unity.		
	·	Patriotism.Love for nature ,Discipline		
3	·	Personality and Behavior Development - Soul and Scientific attitude.	6	
		Positive Thinking. Integrity and discipline.		
	·	Punctuality, Love and Kindness.		
	·	Avoid fault Thinking.		
	·	Free from anger, Dignity of labour.		
	·	Universal brotherhood and religious tolerance.		
	·	True friendship.		
	·	Happiness Vs suffering, love for truth.		
	·	Aware of self-destructive habits.		
	·	Association and Cooperation.		
	·	Doing best for saving nature		
4	·	Character and Competence –Holy books vs Blind faith.	6	
	·	Self-management and Good health.		
	·	Science of reincarnation.		

	·	Equality, Nonviolence ,Humility, Role of Women.		
	·	All religions and same message.		
	·	Mind your Mind, Self-control.		
	·	Honesty, Studying effectively		

Suggested reading

1 Chakroborty, S.K. “Values and Ethics for organizations Theory and practice”, Oxford University Press, New Delhi

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Syllabus for the Regulation Year 2021-2022
(Common to all branches)

S. No	Course code	Course Name	L	T	P	C
1	V21PGENT56	CONSTITUTION OF INDIA		2		MNC

AUDIT 1 and 2: CONSTITUTION OF INDIA

Course Outcomes:

	After successful completion of this course, Students will be able to:	Knowledge Level
CO1	Explain various stages in the composition of the Indian Constitution	[K2]
CO2	Describe the objectives in Preamble for preparation of the Indian Constitution.	[K2]
CO3	Develop their civic sense by understanding their primary rights and duties.	[K3]
CO4	Explain the specific roles of heads of Nation and the functioning of Legislative bodies.	[K2]
CO5	Express the role of local self-government in strengthening democracy.	[K2]
CO6	Develop an awareness on various Constitutional bodies for conducting Elections in India.	[K3]

Syllabus

Unit	Content	Hours
1	***History of Making of the Indian Constitution:** History. Drafting Committee, (Composition & Working)	4
2	*** Philosophy of the Indian Constitution:** Preamble Salient Features	4
3	***Contours of Constitutional Rights & Duties:** Fundamental Rights Right to Equality Right to Freedom Right against Exploitation Right to Freedom of Religion Cultural and Educational Rights Right to Constitutional Remedies Directive Principles of State Policy Fundamental Duties.	4
4	***Organs of Governance:** Parliament Composition Qualifications and Disqualifications Powers and Functions Powers and Functions of Executive: President Governor Council of Ministers Judiciary, Appointment and Transfer of Judges, Qualifications Powers and Functions	4

5	***Local Administration:** District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CE of Municipal Corporation. Pachayati raj: Introduction, PRI: ZilaPachayat. Elected officials and their roles, CEO ZilaPachayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy	**4**
6	***Election Commission:** Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners. State Election Commission: Role and Functioning. Institute and Bodies for the welfare of SC/ST/OBC and women.	**4**

Reference Books:

1. The Constitution of India, 1950 (Bare Act), Government Publication.

2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.

3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.

4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

1. Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.

2. Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.

3. Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.

4. Discuss the passage of the Hindu Code Bill of 1956.

Annexure-X

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Department of Management Studies (MBA)

Minutes of the 4th Board of Studies meeting of Management Studies held on 01-09-2021

The following are the members who attended for the meeting.

S.No	Name of the member	Designation	
1	Dr.G.V.Subba Raju	Professor Sri Vasavi Engg.College	Chairman BOS
2	Prof. B. Amarnath	Former Professor, Department of Management Studies Sri Venkateswara University. Tirupathi.	Council Nominee
3	Dr.J.N.V.Raghu Ram	Associate Professor, Department of Technology & Management, VIT, Vellore	Council Nominee
4	Sri. P.S.Varma	Former D G M, Coromandel International Limited, Kakinada	Industry expert
5	Sri Satyanarayana Ruttala	Senior Manager, Ericsson India Global Services Pvt., Ltd., Bangalore	Alumni
Department of Management Studies, Sri Vasavi Engineering College members			
6	D. Naveen Kumar	Asst. Professor & HOD	Member
7	Dr. S. Krishna Murthy Naidu	Associate Professor	Member
8	D.Satyanarayana	Sr. Asst.Professor	Member
9	Dr.K.Rambabu	Asst. Professor	Member
10	K.Vinay Kumar	Asst. Professor	Member
11	T.Dileep	Asst. Professor	Member
12	K.Pavan Kumar	Asst. Professor	Member
13	K.Suji	Asst. Professor	Member
14	B.Aruna	Asst. Professor	Member

15	P.Bharath Kumar	Asst. Professor	Member
16	K.Murali Krishna	Asst. Professor	Member
17	P.Devi	Asst. Professor	Member
18	Dr.K.Pulla Rao	Asst. Professor	Member
19	K.Lalitha Bhavani	Asst. Professor	Member

The Chairman of the BOS Extended a formal welcome to the members and handed over the proceedings to the Head of the Department.

Minutes of the 4th BOS Meeting

Item No.1:

- **Reviewed and approved the MBA Course Structure under V21 Regulations.**
  The Chairman of BOS proposed the New course structure under V21 Regulations. After considering the suggestions made by all BOS members the course structure was modified accordingly and was approved by BOS. The approved course structure was enclosed under **Annexure-MBA- I**

Item No.2:

- **Reviewed and approved the syllabi for the Courses offered in 1st and 2nd Semesters under V21 Regulations.**
  The Chairman of BOS proposed the New Syllabi under V21 Regulations. After considering the suggestions made by all BOS members the Syllabi was modified accordingly and was approved by BOS. The approved Syllabi was enclosed under **Annexure-MBA- II**

Item No.3:

- **To design and approve the Syllabus for Managerial Economics and Financial Analysis for Engineering Branches under V20 Regulations.**
  The Syllabi of Managerial Economics and Financial Analysis under V20 Regulations has been approved by BOS. The approved Syllabi was enclosed under **Annexure-MBA- III**

Item No.4:

- **To design and approve the syllabus for Cost Management of Engineering Projects and Research Methodology and IPR for M.Tech Courses under V21 Regulations.**

  The Syllabi of Cost Management of Engineering Projects and Research Methodology and IPR under V21 Regulations has been approved by BOS. The approved Syllabi was enclosed under **Annexure-MBA- IV**

Item No.5:

- **Review of MBA Results**

  The semester wise result of MBA 2018 admitted batch (All semesters) and the results of MBA 2019 admitted batch (1,2 & 3 Semesters) were presented before the BOS and they expressed their satisfaction towards the progress report. The details are attached under **Annexure-MBA- V**

Annexure-MBA- I

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Department of Management Studies (MBA)

Course Structure MBA (Regular) – V21 Regulations

(Effective for the students admitted into first year from the Academic Year 2021-2022)

Semester-I

SNo	Course Code	Course	L	P	C	I	E	TM
1	V21MBT01	Management Theory & Organizational Behaviour	4	--	4	30	70	100
2	V21MBT02	Managerial Economics	4	--	4	30	70	100
3	V21MBT03	Accounting for Managers	4	--	4	30	70	100
4	V21MBT04	Legal & Business Environment	4	--	4	30	70	100
5	V21MBT05	Business Communication	4	--	4	30	70	100
6	V21MBT06	Quantitative Analysis for Business Decisions	4	--	4	30	70	100
7	V21MBL01	Business Communication & Soft Skills Lab	---	4	2	20	30	50
		TOTAL	24	4	26	200	450	650

Semester-II

SNo	Course Code	Course	L	P	C	I	E	TM
1	V21MBT07	Financial Management	4	--	4	30	70	100
2	V21MBT08	Human Resource Management	4	--	4	30	70	100
3	V21MBT09	Marketing Management	4	--	4	30	70	100
4	V21MBT10	Production and Operations Management	4	--	4	30	70	100
5	V21MBT11	Business Research & Statistical Analysis	4	--	4	30	70	100
6	V21MBT12	Business Ethics & Corporate Governance	4	--	4	30	70	100
7	V21MBT13	Entrepreneurship Development	4	--	4	30	70	100
8	V21MBL02	IT Lab		4	2	20	30	50
		TOTAL	28	4	30	230	520	750

Semester-III

SNo	Course Code	Course	L	P	C	I	E	TM
1	V21MBT14	Business Policy & Corporate Strategy	4	--	4	30	70	100
I		**Marketing Specialization-1**						
1		Elective-1	4	--	3	30	70	100
2		Elective-2	4	--	3	30	70	100
3		Elective-3	4	--	3	30	70	100
II		**Finance Specialization-2**						
1		Elective-1	4	--	3	30	70	100
2		Elective-2	4	--	3	30	70	100
3		Elective-3	4	--	3	30	70	100
III		**HRM Specialization-3**						
1		Elective-1	4	--	3	30	70	100
2		Elective-2	4	--	3	30	70	100
3		Elective-3	4	--	3	30	70	100
		TOTAL	28	--	22	210	490	700

Semester-IV

SNo	Course Code	Course	L	P	C	I	E	TM
1	V21MBT24	Logistics & Supply Chain Management	4	--	4	30	70	100
I		**Marketing Specialization-1**						
1		Elective-4	4	--	3	30	70	100
2		Elective-5	4	--	3	30	70	100
3		Elective-6	4	--	3	30	70	100
II		**Finance Specialization-2**						
1		Elective-4	4	--	3	30	70	100
2		Elective-5	4	--	3	30	70	100
3		Elective-6	4	--	3	30	70	100
III		**HRM Specialization-3**						
1		Elective-4	4	--	3	30	70	100
2		Elective-5	4	--	3	30	70	100
3		Elective-6	4	--	3	30	70	100
	V21MBP02	Industrial Project & Viva voce	--	--	6	40	60	100
		TOTAL	28	--	28	250	550	800
		GRAND TOTAL	**108**	**08**	**106**	**890**	**2010**	**2900**

L-LECTURE HOURS, P-PRACTICAL HOURS, C-CREDITS, I-INTERNAL MARKS, E-EXTERNAL MARKS, TM-TOTAL MARKS

Dual Specialization:

The Specialization papers will be offered in the areas of Marketing, Finance, and Human Resource Management (HRM). The students should choose any **Two** of the listed Specialization areas in the beginning of the third semester of MBA. Specialization will be offered subject to a minimum of 20 students.

Semester-III

Specialization I: Marketing

S.No.	***Course Code***	***Course***
1	V21MBT15	Consumer Behavior
2	V21MBT16	Retail Management
3	V21MBT17	Digital & Social Media Marketing

Specialization II: Finance

S.No.	***Course Code***	***Course***
1	V21MBT18	Security Analysis & Portfolio Management
2	V21MBT19	Banking & Insurance Management
3	V21MBT20	Business Taxation & Planning

Specialization III: HRM

S.No.	***Course Code***	***Course***
1	V21MBT21	Labour Welfare & Legislations
2	V21MBT22	Performance Evaluation & Compensation Management
3	V21MBT23	Strategic Human Resource Management

Semester-IV

Specialization I: Marketing

S.No.	***Course Code***	***Course***
4	V21MBT25	Sales and Distribution Management
5	V21MBT26	Services Marketing
6	V21MBT27	Advertising & Brand Management

Specialization II: Finance

S.No.	***Course Code***	***Course***
4	V21MBT28	Financial Derivatives
5	V21MBT29	Financial Markets & Services
6	V21MBT30	Advanced Management Accounting

Specialization III: HRM

S.No.	***Course Code***	***Course***
4	V21MBT31	Human Resource Metrics & Analytics
5	V21MBT32	Management of Industrial Relations
6	V21MBT33	International Human Resource Management

Annexure-MBA- II

MBA Syllabus

MBA: First Year - First semester

V21MBT01: MANAGEMENT THEORY & ORGANIZATIONAL BEHAVIOUR

(Effective for the students admitted into first year from the Academic Year 2021-2022)

L	T	P	C
4	0	0	4

Course Outcomes:

Students are able to....

1. Understand the fundamentals of management and develop holistic perspective towards an organization. (K1)
2. Construct the models of decision making and controlling in an organizational context. (K2)
3. Describe various dimensions of individual behavior. (K1)
4. Identify the dynamics of group and also emerge as a good team member.(K2)
5. Demonstrate their leadership qualities and understand the culture of an organization. (K3)
6. Apply Managerial concepts for solving Business Management problems.(K3)

****

Unit-I:
Role of Management – Concept – Significance – Functions – Principles of Management - Patterns of Management: Scientific – Behavioral – Systems – Contingency

Unit-II:
Decision Making and Controlling – Process – Techniques. Planning – Process – Problems- Making it Effective. Controlling - System of Controlling – Controlling Techniques – Making Controlling Effective.

Unit-III:
Organizational Behavior – Introduction to OB – Organizing Process – Departmentation Types – Making Organizing Effective - Understanding Individual Behavior – Perception – Learning – Personality Types – Johari window- Transactional Analysis

Unit-IV:
Group Dynamics and Motivation – Benefits of Groups – Types of Groups – Group Formation and Development, Motivation – Concept of Motivation - Motivational Theories of Maslow, Herzberg, David Mc Clelland, and Porter and Lawler

Unit-V:
Leadership and Organizational Culture and Climate: Leadership – Theories of Leadership - Managerial Grid – Transactional vs. Transformational Leadership – Qualities of good Leader, Change Management – Conflict Management.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. Essentials of Management- An International Perspective, 8th Edition, Koontz & Werich, TMH
2. Management: Text & Cases, 2nd Edition, Satya Raju & Parthasarthy ,PHI
3. Business Organization and Principles of Management, A. Roy, TMH
4. Management, Text & Cases, V.S. P. Rao &Harikrishna, Excel Books,2009
5. Mgmt. Concept & Strategies, Chandan, Vikas Publications
6. Management Science, Rao, Scitech
7. Principal & Practice of Management. Ghanekar, EPH,2005
8. Principal & Practice of Management, Amrita Singh, EPH
9. Organizational Behavior, Stephen P. Robbins,16th Edition, Pearson Education.
10. Organizational Behaviour,4th Edition, S.S.Khanka, S.Chand,2002
11. Organizational Behavior 1st Edition, Mishra .M.N ,Vikas Publishing
12. Organizational behavior, Pierce Gardner, Cengage, Weihrich&Aryasri, TMH,2009.
13. Organizational Behaviour, Subbarao P, Third Revised Edition, Himalaya Publishing House,2017.
14. Organizational Behaviour, Sarma, Jaico Publications,2009.

MBA: First Year - First semester

V21MBT02: MANAGERIAL ECONOMICS

(Effective for the students admitted into first year from the Academic Year 2021-2022)

L	T	P	C
4	0	0	4

Course Outcomes:

Students are able to….

1. Describe the concepts of Managerial economics in managerial decision making. (K1)
2. Infer the relationship between Price, demand & supply and determine changes in market equilibrium. (K2)
3. Explain the relationship between inputs and productivity using various production functions and their applicability in real world business. (K2)
4. Describe various cost structures and determine the relationship between costs and output in short and long run. (K2)
5. Describe the profit maximizing price and output in various competitive markets in short and long run. (K2)
6. Interpret problems related to Micro Economics and Business by studying practical cases. (K3)

****

UNIT 1:
Introduction to Managerial Economics: Definition, Nature and Scope, Relationship with other areas in Economics, The role of managerial economist. Concept of opportunity cost, Incremental
concept, time perspective, Risk & uncertainty.

UNIT 2:
Demand Analysis: Elasticity of demand, types and significance of Elasticity of Demand - Measurement of price Elasticity of Demand – law of Supply, Elasticity of Supply -Need for Demand forecasting, forecasting techniques.

UNIT 3:
Production Analysis: Production function, Marginal Rate of Technical Substitution, Production function with one/two variables, Cobb-Douglas Production Function, Returns to Scale and Laws of returns.

UNIT 4:
Cost and Revenue Analysis: Cost concepts, determinants of cost, cost – output relationship in the short run and long run – Modern development in cost theory – Envelop shaped long run curve- Total, Average and Marginal cost and revenue curves– Cost - Volume – Profit analysis

UNIT 5:
Market Structure and Pricing practices: Features and Types of different Markets – Price- Output
determination in Perfect competition, Monopoly, Monopolistic competition and Oligopoly both in the long run and short run. Pricing methods in practice –- Managerial Theories of a firm. .

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References

1. Paul, Koushil: "**Managerial Economics**", Cengage Learning, New Delhi,
2. Siddiqui S A,Siddiqui A S: "**Managerial Economics**", and Financial Analysis", New Age
International Publishers, New Delhi, 2008.
3. Vanita Agarwal: "**Managerial Economics**", Pearson, New Delhi, 2013.
4. Dominick Salvatore: "**Managerial Economics**", Oxford University Press, New Delhi,2010.
5. D.L. Ahuja: "**Managerial Economics**", S. Chand & Company ltd,New Delhi-55.
6. O'Sullivan, Sheffrin, Perez "Micro Economics: Principles, Applications and Tools", Pearson
Education.
7. Mithani D M: "**Managerial Economics**", Himalaya Publishing House, Mumbai, 2008.
8. Atmanand: "**Managerial Economics**", Excel Publications. New Delhi, 2012.
9. Varshney, R.L and Maheswari, K L: "**Managerial Economics**", Sultan Chand and Sons, New
Delhi, 2002.
10. Narayanan Nadar E, Vijayan S: "**Managerial Economics**", PHI Private Limited, New
Delhi,2009.

MBA: First Year - First semester

V21MBT03: ACCOUNTING FOR MANAGERS

(Effective for the students admitted into first year from the Academic Year 2021-2022)

L	T	P	C
4	0	0	4

Course Outcomes:

Students are able to….

1. Understand Nature, objectives and principles of financial accounting. (K1)
2. Prepare the financial statements of organization. (K3)
3. Apply various tools to analysis the financial position of the organization. (K3)
4. Describe the fundamental concepts of cost accounting which help the organization in decision making. (K2)
5. Quote the contemporary practices in the area of financial accounting. (K1)
6. Interpret problems related to Accountancy by studying practical cases. (K3)

****

Unit-I:

Introduction to Financial Accounting: Definition – Nature – Scope - Objectives – Users of Accounting Information – Accounting Principles: Concepts and Conventions – Accounting Standards. **Branches of Accounting:** Financial Accounting – Cost Accounting – Management Accounting.

Unit-II:

Accounting Cycle & Preparation of Financial Statements: Book keeping, **Double Entry System, Classification of Accounts – Journal – ledger and Trial Balance preparation**. Capital and Revenue Expenditure. **Preparation** of Final Accounts: Trading, profit and loss account and Balance Sheet – Straight line and diminishing balance methods of depreciation. (Simple Problems)

Unit-III:

Financial Statement Analysis: Comparative - Common size, Trend Analysis, Ratio Analysis – Funds Flow Statement Analysis – Cash Flow Statement Analysis (Simple problems)

Unit-IV:

Cost Accounting for Managerial Decisions: Meaning of Cost, Costing, cost accounting, Classification of Costs, Elements of Cost and Preparation of Cost Sheet. Marginal Costing: Break Even Analysis (Simple problems)

Unit–V:

Contemporary Developments in Accounting: Window Dressing, Methods of Window dressing, **Ethical issues in preparation of accounts.** Human Resource

Accounting - Responsibility Accounting – Reporting to Management (Theory) – Automation of accounting function

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. G .Prasad& V. Chandra Sekhara Rao, Accounting for managers, jai Bharat publications.
2. Jelsy Joseph Kuppapally – Accounting for Managers – PHI (2008).
3. I.M. Pandey: Management Accounting, Third Revised Edition, Vikas Publishing House. New Delhi.
4. Jawaharlal, Accounting for Management, Himalaya, Mumbai,2012
5. Khan and Jain, Management Accounting, 5th Edition, Tata Mc Graw Hill, Delhi.
6. Gupta R.L. and Radhaswamy M: Advanced Accountancy, Sultan Chand Publications-2014.
7. Maheswari S.N: Advanced Accountancy, 5th Edition, Vikas Publishing House. New Delhi.
8. Grewal T.S. Introduction to Accountancy, 2009, S Chand Publishers

MBA: First Year - First semester
V21MBT04: LEGAL AND BUSINESS ENVIRONMENT
(Effective for the students admitted into first year from the Academic Year 2021-2022)

L	T	P	C
4	0	0	4

Course Outcomes:

Students are able to....

1. Describe the basic concept of Business & its influencing factors. (K2)
2. Understand the implications of various policies and Acts pertaining to Business . (K2)
3. Recognize various sections under IC and NI ACT. (K2)
4. Identify various sections under sale of goods Act. (K2)
5. Understand the insights related to company and Partnership Act. (K2)
6. Interpret problems related to Business by studying practical cases. (K3)

****

Unit-I:
Introduction: Concept of Business Environment-Definition-Characteristics- Micro and Macro Environmental factors. Role of WTO, World Bank and IMF in world trade.

Unit-II:
Economic & Business Environment: Industrial Policy, 1991; Liberalisation, Privatisation and Globalisation- Foreign Trade policy – Consumer Protection Act; Consumer Rights and redressal Mechanism; Disinvestment and privatization of PSUs, Industrial sickness in India .

Unit-III:
Legal Environment: Indian Contract Act, 1872 – Classification of contracts - Essentials of valid contract – Breach of contract and remedies. Negotiable Instruments Act, 1881 – Kinds of Negotiable Instruments – Presentation and discharge of Negotiable Instruments.

Unit-IV:
Sales of Goods Act: Distinction between Sales and Agreement to Sell – Conditions and Warranties – Performance of Contract of Sale –Transfer of Ownership – Rights of an Unpaid Seller..

Unit-V:
Company and Partnership Act: Company Act 2013: Nature and Types of Companies – Formation – Memorandum of Association-Articles of Association –Kinds of Shares –Duties of Directors-Winding up. Indian partnership Act 1932 – Duties and Rights of partners – Dissolution.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. Dutt, Ruddar& KPM Sundaram, Indian Economy, S. Chand & Co. New Delhi,2016
2. Misra&Puri, Indian Economy, Himalaya Publishing House, Delhi,2015
3. Ahuja, H. L., Economic Environment of Business,7th Edition, S. Chand & Co, New Delhi
4. Adhikari,M., Economic Environment of Business, Sultan Chand & Sons, Delhi,2012
5. Fernando, A. C., Business Environment, Pearson, Delhi,2016
6. Ashwathappa, K, Essentials of Business Environment, Himalaya, Delhi,2018.
7. The Economic Times, Financial Express, Business Standard, Dailies

MBA: First Year - First semester

V21MBT05: BUSINESS COMMUNICATION

(Effective for the students admitted into first year from the Academic Year 2021-2022)

L	T	P	C
4	0	0	4

Course Outcomes:

Students are able to....

1. Understand the communication process, importance and its classification. (K2)
2. Classify among various organizational communication models. (K2)
3. Identify various influencing factors of interpersonal communication. (K2)
4. Apply various business writing skills. (K3)
5. Prepare reports for different occasions. (K3)
6. Interpret problems related to Communication by studying practical cases. (K3)

****

UNIT 1:
Role of Communication in Business: Objective of Communication – The Process of Human Communication – Media of Communication - Written Communication - Oral Communication – Visual Communication - Audio Visual Communication – Silence - Developing Listening Skills – Improving Non-verbal communication skills – Cross Cultural Communication – problems and challenges.

UNIT 2:
Managing Organization Communication: Formal and Informal Communication - intrapersonal
Communication – Models for Inter Personal Communication - Exchange Theory, Johari Window and Transactional Analysis.

UNIT 3:
Motivational factors to influence Interpersonal Communication: Inter-Personal communication – Role of Emotion in Inter Personal Communication – Communication Styles – Barriers to Communication – gateways to Effective Interpersonal Communication.

UNIT 4:
Business Writing Skills: Significance of Business Correspondence – Preparing agenda for meetings, recording minutes of meeting, Letter Writing (Employment related correspondence, Correspondence with Govt./Authorities, Office Orders, Enquiries and Replies), Press release, Writing CV - Telephone Communication – email and SMS etiquette.

UNIT 5:
Report Writing – Meaning and Significance-Structure of Reports - Negative, Persuasive and Special Reporting: Informal Report – Proposals, Formal Reports. Techniques of Presentation – Types of Presentation.
Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1) C.S.G. Krishnamacharyulu and Lalitha Rama Krishnan, Business Communication, Himalaya Publishing House, Mumbai,2016.
2) Urmila Rani and S. M. Roy, Business Communication, Himalaya Publishing House.
3) Nirmala Sing, Business Communication, Deep and Deep Publications Pvt. Ltd..
4) R. K. Madhukar, Business Communication, VIKAS Publications,2018.
5) Business and Professional Communication, Texas Aandm. Sage Publications ,2017
6) The Basics of Communication, Steve Duck, Sage Publications,2012
7) Professional Speaking Skills, Aruna koneru, Oxford University Press,2015
8) English Grammar, RajeevanKaral, Oxford University Press
9) Spoken English, Sabina Pillai, Oxford University Press,2016.

MBA: First Year - First semester

V21MBT06: QUANTITATIVE ANALYSIS FOR BUSINESS DECISIONS

(Effective for the students admitted into first year from the Academic Year 2021-2022)

L	T	P	C
4	0	0	4

Course Outcomes:

Students are able to....

1. Recall their basic knowledge of statistics, probability and probability distributions. (K1)
2. Interpret decisions making process and familiar with various supporting tools for decision making. (K2)
3. Apply Linear Programming models for various managerial problems. (K3)
4. Employ organizational resources using Transportation and Assignment models. Formulate strategies using Game theory. (K3)
5. Apply project management techniques like PERT and CPM. (K3)
6. Interpret problems related to practical assignments. (K3)

****

UNIT 1:
Basic Measures of Central Tendency – Measures of Dispersion –Simple Correlation and Regression analysis - Concept of Probability- Probability Rules – Joint and Marginal Probability – Baye'sTheorem- Probability Distributions- Binomial, Poisson, Normal and Probability Distributions.

UNIT 2:
Introduction to Operations Research. Decision Theory: Steps involved in Decision Making, different environments in which decisions are made, Criteria for Decision Making, Decision making under uncertainty, Decision making under conditions of Risk-Utility as a decision criterion, Decision trees, Graphic displays of the decision making process.

UNIT 3:
Linear Programming: Formation of mathematical modeling, Graphical method, the Simplex Method; Justification, interpretation of Significance of All Elements in the Simplex Tableau. (Simple problems).

UNIT 4:
Transportation, Assignment Models & Game theory: Definition and application of the transportation model, solution of the transportation problem, the Assignment Model, Traveling Salesman Problem. Game Theory: Introduction – Two Person Zero-Sum Games, Pure Strategies, Games with Saddle Point, Mixed strategies, Rules of Dominance, Solution Methods of Games without Saddle point – Algebraic, matrix and arithmetic methods.

UNIT 5:

Network Analysis: Concepts of PERT & CPM.- Importance and Differences – Procedure for Drawing networks – identifying critical path – probability of completing the project within given time - project crashing –optimum cost and optimum duration..

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References

1. N.D.Vohra: "***Quantitative Techniques in Management***", Tata-McGraw Hill Private Limited, New Delhi, 2011.
2. J. K. Sharma, "***Operations Research: Theory and Applications***", Macmillan Gupta S.P:"***Statistical Methods***", S. Chand and Sons, New Delhi,
3. Anand Sharma: "**Quantitative Techniques for Business decision Making**", HimalayaPublishers, New Delhi,2012;
4. D P Apte: "***Operation Research and Quantitative Techniques***", Excel Publication, New Delhi,2013
5. Hamdy, A.Taha: "***Operations Research: An Introduction***", Prentice-Hall of India, New Delhi2003.
6. Anderson: "**Quantitative Methods for Business**", Cengage Learning, New Delhi 2013
7. Sancheti, Dc & VK Kapoor, "**Business Mathematics**", S Chand and Sons, New Delhi

MBA: First Year - First semester
V21MBL01: BUSINESS COMMUNICATION AND SOFT SKILLS LAB
(Effective for the students admitted into first year from the Academic Year 2021-2022)

L	T	P	C
0	0	4	2

Course Outcomes:

Students are able to....

1. Infer the core functioning of a Team and basic flow of communication. (K2)
2. Identify the key gestures and postures of an Individual. (K2)
3. Prepare Business correspondence letters and can prepare reports. (K3)
4. Present a topic before gatherings. (K1)
5. Interpret the importance of basic soft skills in practical context. (K3)

Unit – I

Communication and Team work: Objectives of Communication-Process of Communication- Types of communication; Team work – stages of team formation

LAB: LISTENING AND SPEAKING SKILLS- Conversational skills (formal and informal) – group discussion. Listening to lectures, discussions, talk shows, news programmes, dialogues from TV/radio/Ted talk/Podcast – watching videos on interesting events on YouTube.(Presenting before the class). Team games.

Unit – II

Non verbal communication and Body Language: Kinesics, Proxemics, handshakes, appropriate body language and mannerisms for interviews: business etiquettes- across different cultures.

LAB: Understanding Body Language Aspects and presenting oneself to an interviewer, Proper handshakes.

Unit – III

Written communication: mechanics of writing, report writing- business correspondence-business letter format- Meetings and managing meetings- Resume writing-Formats and Skills.

LAB: Writing job applications – cover letter – resume – emails – letters – memos – reports – blogs – writing for publications.

Unit- IV

Presentation skills: prerequisites of effective presentation, format of presentation; Assertiveness –strategies of assertive behavior; Communication skills for group discussion and interviews, Interview Techniques.

LAB: Designing presentations and enhancing presentation skills.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. Mallika Nawal: ―Business Communication‖, Cengage Learning, New Delhi, 2012.
2. Edwin A. Gerloff, Jerry C. Wofford, Robert Cummins Organisational communication: The key stone to managerial effectiveness.
3. Meenakshi Rama: ―Business Communication‖, Oxford University Press, NewDelhi
4. C.S.G. Krishnamacharyulu and Dr. Lalitha Ramakrishnan, Business Communication, Himalaya Publishing House, Mumbai
5. Paul Turner: ―Organisational Communication‖, JAICO Publishing House, New Delhi.
6. SathyaSwaroopDebasish, Bhagaban Das‖ ―Business Communication‖, PHIPrivate Limited, New Delhi, 2009.
7. R.K.Madhukar: ―Business Communication‖, Vikas Publishing House, New Delhi, 2012.
8. Kelly M Quintanilla, Shawn T.Wahl:―Business and Professional Communication‖, SAGE,New Delhi, 2012.
9. Sangita Mehta, NeetyKaushish: ―Business Communication‖, University Science Press, New Delhi, 2010.
10. Anjali Ghanekar: ―Business Communication Skills‖, Everest Publishing House, New Delhi,2011

MBA: First Year - Second semester

V21MBT07: FINANCIAL MANAGEMENT

(Effective for the students admitted into first year from the Academic Year 2021-2022)

L	T	P	C
4	0	0	4

Course Outcomes:

Students are able to....

1. Understood the fundamental concepts of financial Management. (K2)
2. Construct optimal capital structure by identification of financial sources and evaluating cost of capital. (K2)
3. Identify long term investment projects by applying capital budgeting techniques. (K2)
4. Understood the concept of dividend decisions and able to measure the dividend. (K2)
5. Apply the concepts of working capital, cash, and receivables management. (K3)
6. Interpret problems related to Business Finance by studying practical cases.(K3)

****

UNIT 1:
Financial Management: Concept - Nature and Scope - Evolution of financial Management objectives of financial Management - Profit maximization- Wealth maximization and EPS maximization – Major decisions of financial manager Challenges of Financial manager in contemporary scenario.

UNIT-II
Financing Decisions: Sources of finance - Concept of leverages - Operating, Financial and combined leverages - financial effects of leverages –EBIT – EPS analysis. Cost of Capital: Marginal vs Weighted Average Cost of Capital – Theories of Capital Structure.

UNIT -III
Investment Decisions: Concept and Techniques of Time Value of Money – Nature and Significance of Investment Decision – Estimation of Cash flows – Capital Budgeting Process – Techniques of Investment Appraisal – Discounting and Non Discounting Methods.

UNIT-IV
Dividend Decisions: Meaning and Significance – Major forms of dividends – Theories of Dividends – Determinants of Dividend – Dividend Policy and Models of Dividend valuation (Walter & Gordon models) – Bonus Shares –Stock Splits – Dividend policies of Indian Corporate.

UNIT-V

Liquidity Decisions: Meaning - Classification and Significance of Working Capital – Components of Working Capital – Factors determining the Working Capital – Estimating Working Capital requirement – Cash Management Models – Accounts Receivables –Credit Policies.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. P.Vijaya Kumar, P.S. Ravindra, Kiran Kumar, "Financial Management", Himalaya Publishing House PVT Ltd, 2014.
2. Rajiv Srivastava, Anil Misra: "**Financial Management**", Oxford University Press, New Delhi,2012
3. Brigham,E.F: "**Financial Management Theory and Practice**", Cengae Learning, New Delhi, 2013
4. Prasanna Chandra: "**Financial Management Theory and Practice**", Tata McGrawHill 2011.
5. I.M. Pandey: "**Financial Management",** Vikas Publishers, New Delhi, 2013.
6. RM Srivastava, Financial Management, Himalaya Publishing house, 4th edition.
7. Khan and Jain: Financial Management, Tata McGraw Hill, New Delhi,
8. Pradip Kumar Sinha: "**Financial Management**", Excel Books, New Delhi, 2009.
9. Vyuptakesh Sharan: "**Fundamentals Financial Management**", Pearson, New Delhi, 2012.

MBA: First Year - Second semester

V21MBT08: HUMAN RESOURCE MANAGEMENT

(Effective for the students admitted into first year from the Academic Year 2021-2022)

L	T	P	C
4	0	0	4

Course Outcomes:

Students are able to....

1. Understand the fundamentals of HRM with a global perspective. (K2)
2. Estimate the type and number of personnel required to the organization in future by considering the demand and supply of manpower. (K2)
3. Apply various methods of performance evaluation to assess the performance of employees. (K3)
4. Identify the compensation system that conforms to the legal framework. (K2)
5. Understand the functionality of trade unions and also have ability to balance between work and life. (K2)
6. Interpret problems related to Human Resources by studying practical cases. (K3)

****

UNIT 1:
HRM: Significance - Definition and Functions – evolution of HRM- Principles - Ethical Aspects
of HRM- - HR policies, Strategies to increase firm performance - Role and position of HR department - HRM at global perspective challenges – cross-cultural problems – emerging trends in HRM.

UNIT 2:
Investment perspectives of HRM: HR Planning – Demand and Supply forecasting- Recruitment and Selection- Sources of recruitment - Tests and Interview Techniques – Training and Development – Methods and techniques – Training evaluation - retention - Job Analysis –job description and specifications - Management development - HRD concepts.

UNIT 3:
Performance Evaluation: Importance – Methods – Traditional and Modern methods – Latest trends in performance appraisal - Career Development and Counseling- Compensation, Concepts and Principles- Influencing Factors-.

UNIT 4:

Wage and Salary Administration: Concept- Wage Structure- Wage and Salary Policies- Legal
Frame Work- Determinants of Payment of Wages- Wage Differentials - Job Evaluation- Incentive Payment Systems. Welfare management: Nature and concepts – statutory and non-statutory welfare measures – incentive mechanisms-Fringe Benefits-ESOPs - Current Trends in Compensation- Methods of Payments - compensation mechanisms at international level

UNIT 5:

Managing Industrial Relations: Trade Unions - Employee Participation Schemes-Collective Bargaining–Grievances and disputes resolution mechanisms – Safety at work – nature and importance – work hazards – safety mechanisms- Quality of Work Life (QWL).

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References

1. K Aswathappa: "***Human Resource and Personnel Management***", Tata McGraw Hill, New Delhi, 2013
2. N.Sambasiva Rao and Dr. Nirmal Kumar: "**Human Resource Management and Industrial Relations**", Himalaya Publishing House, Mumbai
3. Mathis, Jackson, Tripathy: "***Human Resource Management: Asouth-Asin Perspective***", Cengage Learning, New Delhi, 2013
4. Subba Rao P: "***Personnel and Human Resource Management-Text and Cases***", Himalaya Publications, Mumbai, 2013.
5. Madhurima Lall, Sakina Qasim Zasidi: "**Human Resource Management**", Excel Books, New Delhi, 2010

MBA: First Year - Second semester

V21MBT09: MARKETING MANAGEMENT

(Effective for the students admitted into first year from the Academic Year 2021-2022)

L	T	P	C
4	0	0	4

Course Outcomes:

Students are able to....

1. Understand the Basic marketing concepts. (K1)
2. Classify between the market Segmentation and Positioning strategies. (K2)
3. Identify various pricing methods and pricing strategies.(K2)
4. Demonstrate the various communication tools in marketing.(K3)
5. Estimate the distribution Strategies required for effective marketing chain.(K2)
6. Apply marketing concepts in solving marketing problems of organizations. (K3)

****

UNIT -I

Introduction to Marketing: Needs - Wants – Demands - Products - Exchange - Transactions - Concept of Market and Marketing and Marketing Mix - Production Concept- Product Concept - Sales and Marketing Concept - Societal Marketing Concept-Green Marketing concept - Indian Marketing Environment.

UNIT -II

Market Segmentation, Targeting and Positioning: Identification of Market Segments - Consumer and Institutional/corporate Clientele - Segmenting Consumer Markets - Segmentation Basis – Evaluation and Selection of Target Markets – Positioning significance - Developing and Communicating a Positioning Strategy.

UNIT -III

Product and Pricing Aspects: Product – Product Mix - Product Life cycle - Branding- Pricing- Objectives of Pricing - Methods of Pricing - Selecting the Final price - Adopting price - Initiating the price cuts - Imitating price increases-Responding to Competitor's price changes.

UNIT -IV

Marketing Communication: Communication Process – Communication Mix – Integrated Marketing Communication - Managing Advertising Sales Promotion - Public relations and Direct Marketing - Sales force– Determining the Sales Force Size - Sales force Compensation.

UNIT -V

Distribution, Marketing Organization and Control: Channels of Distribution- Intensive, Selective and Exclusive Distribution- Organizing the Marketing Department - Marketing Implementation - Control of Marketing Performance - Annual Plan Control - Profitability Control - Efficiency Control - Strategic Control.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References

1. Phillip Kotler: —Marketing Management —, Pearson Publishers, New Delhi, 2013.
2. Rajan Saxena: —Marketing Management‖, Tata McGraw Hill, New Delhi, 2012.
3. V S Ramaswamy & S Namakumari, Marketing Management Global Perspective Indian Context 4th Edition, Mac Millan Publishers 2009.
4. Tapan K Panda: "Marketing Management‖, Excel Books, New Delhi, 2012
5. Paul Baines, Chris Fill, Kelly Page Adapted by Sinha K: —Marketing‖, Oxford University Press, Chennai, 2013

MBA: First Year - Second semester

V21MBT10: PRODUCTION & OPERATIONS MANAGEMENT

(Effective for the students admitted into first year from the Academic Year 2021-2022)

L	T	P	C
4	0	0	4

Course Outcomes:

Students are able to....

1) Understand the evolution and fundamental concepts of production and operations management. (K2)
2) Understand the production planning and control strategies. (K2)
3) Assess the concepts of Waste Management, Quality Assurance, Quality Circles and application of various Statistical Quality Control techniques. (K3)
4) Understand basic concepts of Quality Improvement tools like six sigma, ISO 9000-2000 clauses and coverage and factors effecting Productivity. (K2)
5) Apply various stores management and Inventory Control techniques. (K3)
6) Interpret problems related to Operations Management by studying practical cases. (K3)

****

UNIT 1:
Introduction: Overview & Definition of Production and Operations Management- Nature and Scope of Production and Operations Management-Historical Evolution – Role & responsibilities of the production manager - Types of Manufacturing Processes.

UNIT 2:
Production Planning and Control: Stages in PPC – Gantt – PPC in Mass, Batch, and Job Order
Manufacturing- Aggregate planning and Master Scheduling, MRP, CRP. Maintenance management & Industrial Safety. Plant Location & Layout Planning- Factors influencing location - types of layouts. Capacity Planning – Optimal Production Strategies: Scheduling and Sequencing of Operations. Work Design: Method Study and Work Measurement – Work Sampling.

UNIT 3:
Managing of Work Environment: –Automation --Technology Management – Waste Management. Quality Assurance and Quality Circles – Statistical Quality Control – Control Charts for Variables- Average, Range and Control charts for Attributes. Acceptance Sampling Plans.

UNIT 4:

Quality Improvement: Basic concepts of quality, dimensions of quality, Juran's quality trilogy,
Deming's 14 principles, Quality improvement and cost reduction, ISO 9000-2000 clauses & coverage. Six Sigma, Productivity –factors affecting productivity, measurement & improvements
in productivity - new product development and design - stages & techniques. Total Productive Maintenance (TPM).

UNIT 5:

Stores Management: Purchase functions and Procedure - Objectives of Stores Management – Requirements for efficient-Management of Stores – safety stock-Different Systems of Inventory Control -Inventory control techniques- EOQ, ABC, VED and FNSD analysis- JIT, VMI

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References

1. Panner Selvem: "**Production and Operation Management**", Prentice Hall of India, NewDelhi, 2012.
2. K.Aswathappa, K. Shridhara: "**Production & Operation Management**", Himalaya Publishing House, New Delhi, 2012
3. Ajay K Garg: "**Production and Operation Management**", TMH, New Delhi,2012
4. Deepak Kumar Battacharya: "**Production & Operation Management**", University Press, New Delhi, 2012
5. AlanMuhlemann, JohnOakland,jasti Katyayani: "**Production and Operation Management**", Pearson, New Delhi,2013
6. O.P.Khanna, " Industrial Engineering and Management" Dhanpad Rai Publications

MBA: First Year - Second semester

V21MBT11: BUSINESS RESEARCH & STATSTICAL ANALYSIS

(Effective for the students admitted into first year from the Academic Year 2021-2022)

L	T	P	C
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Course Outcomes:

Students are able to....

1. Understand the concept of research, research process in detail. (K1)
2. Understand various scaling techniques and research report preparation process. (K2)
3. Apply various statistical tools to test hypothesis. (K3)
4. Describe Bivariate and Multivariate analysis concepts. (K2)
5. Apply SPSS for Hypothesis testing. (K3)
6. Interpret problems related to Business Research by studying practical cases. (K3)

****

UNIT 1:
Introduction: Nature and Importance of research, the role of business research, Research process, types of research, Defining Research Problem. Research Design – Types of Research design-Sampling and Sampling Design – Sampling Methods – Probability and Non probability sampling. Discussion on primary data and secondary data, tools and techniques of collecting data. Methods of collecting data-Designing of Questionnaire.

UNIT 2:
Measurement and Scaling – Nominal Scale – Ordinal Scale –Interval Scale – Ratio Scale – Guttman Scale – Likert Scale – Schematic Differential Scale. Editing – Coding – Classification of Data – Tabulation and Graphic representation of data.

UNIT 3:
Data Analysis: Formulation of hypothesis-types of hypothesis- Null and Alternate - Type I and Type II errors, Large Sample Vs Small Sample; Procedure for testing of Hypothesis –parametric tests ; Z tests – One mean – Two mean – one Proportion – Two Proportion tests, t- distribution tests – One mean, Two mean & paired tests.

UNIT 4:
F- test and ANOVA – Calculation of F Value - one way (Completely Randomized Design) and two ways tests (Randomized Block Design) - Chi - Square tests - Goodness of fit- test for Independence of attributes – Concepts of Bivariate and Multivariate analysis.

UNIT 5:

Research Report Writing: Structure and components of Research reports, Types of reports, characteristics of good report. Format & common content's in reports. Preparation & Presentation of reports. Introduction to basics of SPSS

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References

1. Navdeep and Guptha : "**Statistical Techniques & Research Methodology**", Kalyani Publishers
2. Willam G.Zikmund, Adhkari: "***Business Research Methods***", Cengage Learning, New Delhi, 2013.
3. S.Shajahan: "***Research Methods for management***", JAICO Publishing House, New Delhi, 2009.
4. UWE FLICK: "**Introducing *Research Methodology***", SAGE, New Delhi,2012.
5. Cooper R.Donald and Schindler S. Pamela: "***Business Research Methods***", 9/e, Tata MCGraw Hill, New Delhi.
6. M.V.Kulkarni: "**Research Methodology**" , Everest Publishing House, New Delhi, 2010.
7. Sachdeva: "***Business Research Methods***", Himalaya Publishing House, Mumbai, 2011.
8. Ranjit Kumar: "**Research Methodology",** Pearson,New Delhi,2012.
9. Deepak Chawla , Neena Sondhi: "**Research Methodology, Concepts and Cases**" Vikas Publishing House, New Delhi, 2011.
10. Alan Bryman, Emma Bell: "**Business Research Methods**", Oxford University Press, New Delhi, 2011.

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MBA: First Year - Second semester

V21MBT12: BUSINESS ETHICS & CORPORATE GOVERNANCE

(Effective for the students admitted into first year from the Academic Year 2021-2022)

L	T	P	C
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COURSE OUTCOMES:

Students are able to....

1. Understand the importance of ethics and ethical practices at work place. (K2)
2. Recall various factors influencing Business ethics in India. Also get understanding of various scams. (K1)
3. Understand the ethical practices in functional areas such as Marketing, Hrm & Finance. (K2)
4. Understand the overview of corporate governance in India. (K2)
5. Report various governance issues related to Directors and Auditors. (K2)
6. Interpret problems related to Business Ethics by studying practical cases. (K3)

****

UNIT 1:
Importance of Business Ethics: Values and Ethics- Business Ethics and Law – Ethics in Work Place – Ethical Decision Making- Theories of Business Ethics – Management and Ethics- Indian Ethical Traditions.

UNIT 2:
Impact of Globalization on Indian Business Ethics: Reasons for Unethical Practices among Indian companies – Development of Indian Capital Markets – Various studies on Ethical Attitudes of Managers Major Indian Scams.

UNIT 3:
Ethics in Marketing, HRM and Finance: Product safety and Pricing-Ethical responsibility in Product- Advertising and Target Marketing Ethics of sales, advertising and product placement and Consumer Autonomy. Ethics in HRM & Finance – HR related ethical issues - Institutional Culture – Frauds in Banks - Measures against Bank Frauds – Frauds in Insurance sector.

UNIT 4:
Corporate Governance: An overview – Theory and Practice of Governance- Indian model of Governance- Good Corporate Governance – Land marks in emergence of Governance OECD Principles – Sarbanes-Oxley Act 2002- SEBI Initiatives.

UNIT 5:
Corporate Governance Indian Scenario: Role of Government in Ensuring Corporate Governance – Governance issues relating to Board of Directors – Duties and responsibilities of Auditors – Governance under limited competition – Role of Media – Corporate Governance in Developing and Transiting Economies.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. S.K.Mandal: “Ethics in Business and Corporate Governance”, TMH, New Delhi, 2012.
2. Marianne M Jennings: “Cases in Business Ethics”, Cengage Learning, New Delhi, 2012.
3. S.Prabhakaran: “Business Ethics and Corporate Governance”, Excel Books, New Delhi, 2011.
4. N.Balasubramanyam: “A Case Book on Corporate Governance and Stewardship”, TMH., New Delhi, 2011.
5. A.C.Fernando: “Business Ethics and Corporate Governance”, Pearson Publishers, New Delhi, 2013.

MBA: First Year - Second semester
V21MBT13: ENTREPRENEURSHIP DEVELOPMENT
(Effective for the students admitted into first year from the Academic Year 2021-2022)

L	T	P	C
4	0	0	4

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO1: Understand the foundations of Entrepreneurship and its importance. (K1)

CO2: Develop viable business ideas and understand entrepreneurial eco system. (K3)

CO3: Develop new projects and preparation of detailed project report. (K3)

CO4: Understand the importance of MSME's in the economic development of a nation. (K2)

CO5: Identify various sources of Entrepreneurial support organizations. (K2)

CO6: Interpret problems related to Entrepreneurs by studying practical cases. (K3)

UNIT 1

Entrepreneurship: Importance and growth - Characteristics and Qualities of Entrepreneur- Role of Entrepreneurship, Ethics and Social Responsibilities. Women Entrepreneurship: Role & Importance, Problems of Women Entrepreneurs, Opportunities for women entrepreneurs – corporate entrepreneurship – mobility of entrepreneur – entrepreneurial motivation.

UNIT2

Innovation: Sources of business idea-Idea generation- Ideal validation- idea screening process- market sizing techniques- innovation and creativity for aspiring entrepreneurs- incubation- startup eco system

UNIT 3

Planning and Evaluation of Projects: Growth of Firm – Project identification and selection - Factors inducing growth- - Project Feasibility Study – Elements of a project report- preparation of DPR. Post Planning of Project-Project Planning and Control.

UNIT 4

Small and Micro Enterprises: Importance, definition of Tiny, Micro, Small and medium scale units – policies and their support to MSMEs - growth and growth strategies – registration process of MSME- MSMED Act 2006.

UNIT 5

Institutional Support to Entrepreneur and MSMEs: Role of Government - Role of SIDBI, - Central Government Institutions – SIDO, NSIC, EDII, AISSIB, DST. State Government Institutions - DIC, TCOs, Commercial Banks.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References

1. Arya Kumar: “Entrepreneurship”, Pearson, Publishing House, New Delhi, 2012.
2. VSP Rao, Kuratko: “Entrepreneurship’, Cengage Learning, NewDelhi,
3. K.Ramachandran: “Entrepreneurship Development”, TMH, New Delhi, 2012
4. B.Janakiram, M Rizwana: “Entrepreneurship Development” Excel Books, New Delhi, 2011 Rajeev Roy: “Entrepreneurship”, Oxford University Press, NewDelhi, 2012
5. P.C.Shejwalkar: “Entrepreneurship Development”, Everest Publishing House, NewDelhi, 2011

MBA: First Year - First semester

V21MBL02: INFORMATION TECHNOLOGY LAB (100% Lab)

(Effective for the students admitted into first year from the Academic Year 2021-2022)

L	T	P	C
0	0	4	2

Course Outcomes:

Students are able to...

1. **P**repare various office reports using MS-Office. (K3)
2. **U**nderstand the basics of SPSS and descriptive and inferential Statistical techniques using SPSS (K2)
3. Employ math and simulation in R (K3

UNIT-I:

Introduction to MS-Office: Introduction to various softwares used in business & their significance in the current business environment. Introduction to MS Office and its application in preparation of reports.

UNIT-II:

Introduction to SPSS: Overview of SPSS: Mouse and keyboard processing, frequently used dialog boxes, Editing output, Printing results, Creating and editing a data file. Managing Data: Listing cases, replacing missing values, computing new variables, recording variables, exploring data, selecting cases, sorting cases, Merging files.

Graphs & Frequencies: Creating and editing graphs and charts - Frequencies, bar charts, histograms, percentiles.

Descriptive Statistics: Measures of central tendency, variability, deviation from normality, size and stability. Cross Tabulation and chi-square analysis, The means Procedure. Bivariate Correlation: Bivariate Correlation, Partial Correlations and the correlation matrix.

UNIT-III:

R Programming:

1. Demonstrate Vector, Matrix & Array operations in R, Demonstrate Data frames and Lists in R
2. Illustrate ‘if and else’, ‘if else’, & ‘switch’ control statements in R
3. Demonstrate ‘for and while loops’, ‘Importing and exporting data’ in R
4. Illustrate the descriptive statistics using summary() in R
5. Illustrate Bar Plots, Pie Charts & Histograms using R

Text Books:

1. Shelly, Cashman: “Microsoft copies 2007”, Cengage Learning, New Delhi. 2012
2. Oracle Database 11g The Complete Reference by Oracle Press, Kevin Loney
3. R for Everyone, Jared P Lander, Pearson
4. R in Action,Rob I Kabacoff, Manning

References

1. Shelly, Cashman: “Microsoft copies 2007”, Cengage Learning, New Delhi. 2012

Annexure-MBA- III

V20MBT51: MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS

(Effective for the students admitted into first year from the Academic Year 2020-2021)
(Common to all Engineering Branches under V20 Regulations)

L	T	P	C
3	0	0	3

COURSE OUTCOMES:

CO1: Understand the basic concepts of managerial economics, demand, elasticity of demand and methods of demand forecasting. (K2)

CO2: Interpret production concept, least cost combinations and various costs concepts in decision making. (K3)

CO3: Differentiate various Markets and Pricing methods along with Business Cycles (K2)

CO4: Prepare financial statements and its analysis. (K3)

CO5: Assess various investment project proposals with the help of Capital Budgeting techniques for decision making. (K3)

Unit-I

Introduction to Managerial Economics and demand Analysis: Definition of Managerial Economics and Scope-Managerial Economics and its relation with other subjects-Concept of Demand-Types-Determinants-Law of Demand its Exceptions-Elasticity of Demand-Types and Measurement- Demand forecasting and its Measuring Methods.

Unit-II

Production and Cost Analysis: Production function-Iso-quants and Iso-cost-Law of Variable proportions- Cobb-Douglas Production function-Economies of Scale-Cost Concepts-Opportunity Cost-Fixed vs Variable Costs-Explicit Costs vs Implicit Costs- Cost Volume Profit analysis- Determination of Break-Even Point- BEP Chart (Simple Problems).

Unit-III

Introduction To Markets, Pricing Policies & forms of Organizations and Business Cycles: Market Structures: Perfect Competition, Monopoly, Monopolistic and Oligopoly – Features – Price, Out-put Determination – Methods of Pricing: Evolution of Business Forms - Features of Sole Trader – Partnership – Joint Stock Company – State/Public Enterprises. Business Cycles – Meaning and Features – Phases of Business Cycle.

Unit-IV

Introduction to Accounting & Financing Analysis: Introduction to Double Entry System – Preparation of Financial Statements- Trading Account, Profit & Loss Account and Balance Sheet - Ratio Analysis – (Simple Problems).

Unit-V

Capital and Capital Budgeting: Capital Budgeting: Meaning of Capital-Capitalization-Meaning of Capital Budgeting-Need for Capital Budgeting-Techniques of Capital Budgeting-Traditional and Modern Methods.

TEXT BOOKS

III Semester	Cost Management of Engineering Projects(Open Elective)	Course code: V21MBT56	L-T-P 3-0-0	Credit 3

1. Dr. N. AppaRao, Dr. P. Vijay Kumar: 'Managerial Economics and Financial Analysis', Cengage Publications, New Delhi – 2011
2. Dr. A. R. Aryasri – Managerial Economics and Financial Analysis, TMH 2011
3. Prof. J.V.Prabhakararao, Prof. P. Venkatarao. 'Managerial Economics and Financial Analysis', Ravindra Publication.

REFERENCES:

1. Dr. B. Kuberudu and Dr. T. V. Ramana: Managerial Economics & Financial Analysis, Himalaya Publishing House, 2014.
2. V. Maheswari: Managerial Economics, Sultan Chand.2014
3. Suma Damodaran: Managerial Economics, Oxford 2011.
4. VanithaAgarwal: Managerial Economics, Pearson Publications 2011.
5. Sanjay Dhameja: Financial Accounting for Managers, Pearson
. 6. Maheswari: Financial Accounting, Vikas Publications.
7. S. A. Siddiqui& A. S. Siddiqui: Managerial Economics and Financial Analysis, New Age
International Publishers, 2012
8. Ramesh Singh, Indian Economy, 7th Edn., TMH2015
9. Pankaj Tandon A Text Book of Microeconomic Theory, Sage Publishers, 2015
10. Shailaja Gajjala and Usha Munipalle, Univerties press, 201

Annexure-MBA- IV

Pre-requisite: MEFA & Management Science

Course Outcomes: At the end of the course, students should be able to

- Understand the cost management process and various costs involved in a project (K2)
- Understand various aspects of a project and related processes. (K2)
- Analyze the concepts of Break even and CVP analysis. (K3)
- Demonstrate quality management techniques besides budgeting strategies (K2)
- Apply quantitative techniques for cost management (K4)

Unit 1: Introduction and Overview of the Strategic Cost Management Process: Cost concepts in decision-making; relevant cost, Differential cost, Marginal cost, Incremental cost and Opportunity cost. Objectives of Costing System; Creation of a Database for operational control; Provision of data for Decision-Making.

Unit 2 : Project Management: Meaning, Different types of projects. **Various stages of projectexecution**: conception to commissioning, Project execution as a conglomeration of technical and nontechnical activities, Detailed Engineering activities, Pre project execution, main clearances and documents. **Project team**: Role of each member, Importance of Project site. Project contracts: Types and its contents. CPM & PERT Techniques.

Unit 3: Cost Behavior and Profit Planning: Marginal Costing, Distinction between Marginal Costing and Absorption Costing; Break-even Analysis, Cost-Volume-Profit Analysis, Standard Costing and Variance Analysis.

Unit 4:Quality management and Budgeting strategies: Pareto Analysis, Target costing, Life Cycle Costing, Just-in-time approach, Material Requirement Planning, Enterprise Resource Planning, Total Quality Management and Theory of constraints. Activity-Based Cost Management, Bench Marking; Balanced Score Card and Value-Chain Analysis. **Budgetary Control**; Flexible Budgets; Performance budgets; Zero-based budgets. Measurement of Divisional profitabilitypricing & decisions including transfer pricing.

Unit 5: Quantitative techniques for cost management, Linear Programming, Transportation problems, Assignment problems, Simulation, Learning Curve Theory

Reference Books:

6. Cost Accounting A Managerial Emphasis, Prentice Hall of India, New Delhi
7. Charles T. Horngren and George Foster, Advanced Management Accounting
8. Robert S Kaplan Anthony A. Alkinson, Management & Cost Accounting
9. Ashish K. Bhattacharya, Principles & Practices of Cost Accounting A. H. Wheeler publisher
10. N.D. Vohra, Quantitative Techniques in Management, Tata McGraw Hill Book Co. Ltd.

I-I	Research Methodology and IPR	Course Code: V21MBT55	L	T	P	C
			2	0	0	2

Course Outcomes: After completion of course, students would be able to

CO1: Discuss different methodologies and techniques used in research work. (K2)
CO2: Explain basic computer skills necessary for the conduct of research. (K2)
CO3: Assess the basic function and working of analytical instruments used in research. (K3)
CO4: Practice the required numerical skills necessary to carry out research. (K3)
CO5: Demonstrate a capacity to identify, apply and assess ownership rights and marketing protection under intellectual property law as applicable to information, ideas, new products and product marketing. (K3)

UNIT 1: Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations

UNIT 2: Effective literature studies approaches, analysis Plagiarism, Research ethics, Effective technicalwriting, how to write report, Paper Developing a Research Proposal, Format of research proposal,a presentation and assessment by a review committee

UNIT 3: Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting andDevelopment: technological research, innovation, patenting, development. International Scenario:International cooperation on Intellectual Property. Procedure for grants of patents, Patentingunder PCT.

UNIT 4: Patent Rights: Scope of Patent Rights. Licensing and transfer of technology.Patent informationand databases.Geographical Indications.

UNIT 5: New Developments in IPR: Administration of Patent System. New developments in IPR; IPR ofBiological Systems, Computer Software etc.Traditional knowledge Case Studies, IPR and IITs.

REFERENCES:

(1) Stuart Melville and Wayne Goddard, “Research methodology: an introduction for science& engineering students’”
(2) Wayne Goddard and Stuart Melville, “Research Methodology: An Introduction”
(3) Ranjit Kumar, 2nd Edition, “Research Methodology: A Step by Step Guide for beginners”
(4) Halbert, “Resisting Intellectual Property”, Taylor & Francis Ltd ,2007.
(5) Mayall, “Industrial Design”, McGraw Hill, 1992.
(6) Niebel, “Product Design”, McGraw Hill, 1974.
(7) Asimov, “Introduction to Design”, Prentice Hall, 1962.
(8) Robert P. Merges, Peter S. Menell, Mark A. Lemley, “ Intellectual Property in New Technological Age”, 2016.
(9) T. Ramappa, “Intellectual Property Rights Under WTO”, S. Chand, 2008

Annexure-MBA- V

RESULT ANALYSIS OF MBA 2018 ADMITTED BATCH

NAME OF THE EXAM: **MBA I Semester Regular. December – 2018**

S. No.	Programme	Appeared	Passed	Fail	Pass %	Single Course Failures	Pass % (If single Course failures could be avoided)
1.	MBA	58	43	15	74.14	10	91.38

NAME OF THE EXAM: **MBA II Semester Regular. May – 2019**

S. No.	Programme	Appeared	Passed	Fail	Pass %	Single Course Failures	Pass % (If single Course failures could be avoided)
1.	MBA	57	46	11	80.7	9	96.49

NAME OF THE EXAM: **MBA III Semester Regular. December – 2019**

S. No.	Programme	Appeared	Passed	Fail	Pass %	Single Course Failures	Pass % (If single Course failures could be avoided)
1.	MBA	54	45	9	83.33	9	100

NAME OF THE EXAM: **MBA IV Semester (V18) Regular. September – 2020**

S. No.	Programme	Appeared	Passed	Fail	Pass %
1.	MBA	54	48	6	88.89

RESULT ANALYSIS OF MBA 2019 ADMITTED BATCH

NAME OF THE EXAM: **MBA I Semester Regular. February – 2020**

S. No.	Programme	Appeared	Passed	Fail	Pass %
1.	MBA	61	57	4	93.44

NAME OF THE EXAM: **MBA II Semester Regular. November – 2020**

S. No.	Programme	Appeared	Passed	Fail	Pass %
1.	MBA	62	58	4	93.55

NAME OF THE EXAM: **MBA III Semester Regular. March – 2021**

S. No.	Programme	Appeared	Passed	Fail	Pass %
1.	MBA	62	60	2	96.77

All BOS members expressed their satisfaction on the pass percentage and performance of students in examinations.

Dr. G.V.Subba Raju
Chairman
BOS in Management Studies

Annexure-XI

Minutes of the Meeting of the Result Committee

The Sri Vasavi Engineering College (Autonomous) result committee meeting was held on 16-03-2021 by 10:30 AM at Chief Controller of Examination's Cabin @ Examination Section Block
The following members were present in the meeting.

S.No	Name	Designation	Member Role
1.	Dr.Guduru VNSR Ratnakara Rao	Principal	Chairman
2.	Dr.M.Thamarai	Prof./ECE- SVEC(A8)	Member
3.	Mr.Ch.V.S.R.Gopala Krishna	Deputy CoE; SVEC(A8)	Member

The following are the minutes of the results committee meeting.

Item#1: M Tech III Semester regular and supplementary examination results February 2021 for the ac. year 2020-21.

The summary of the results

a. Branch Wise Performance Analysis

S.No	Branch	Registered	Passed	Fail	%Pass
1.	STE	1	0	1	0
2.	VLSI&ES	2	2	0	100.00
3.	PSC&AE	1	1	0	100.00
4.	CSE	2	2	0	100.00
	Overall	**6**	**5**	**1**	**83.33**

b. Course Wise Performance Analysis

S.No	Course Code	Course	Registered	Passed	Fail	%pass
1.	V18PST43	MOOCS	1	1	0	100
2.	V18PST44	COMPREHENSIVE VIVA-VOCE	1	1	0	100
3.	V18CTT43	MOOCS	2	2	0	100
4.	V18CTT44	COMPREHENSIVE VIVA-VOCE	2	2	0	100
5.	V18VLT43	MOOCS	2	2	0	100
6.	V18VLT44	COMPREHENSIVE VIVA-VOCE	2	2	0	100

7.	V18SET43	MOOCs	1	0	1	0
8.	V18SET44	COMPREHENSIVE VIVA-VOCE	1	1	0	100

Details enclosed in annexure-1

- The committee has approved the results and accorded the permission for publication of the same.

S.No	Name	Designation	Member Role	Signature
1.	Dr.GuduruVNSRRatnakara Rao	Principal, SVEC(A8)	Chairman	
2.	Dr.M.Thamarai	Professor/ECE, SVEC(A8)	Member	
3.	Mr.Ch.V.S.R.Gopala Krishna	Deputy CoE, SVEC(A8)	Member	

Minutes of the Meeting of the Result Committee

The Sri Vasavi Engineering College (Autonomous) result committee meeting was held on 16-06-2021 at 8:00 PM through online mode using Zoom application.

Link: https://us02web.zoom.us/j/94705318642

The following members were present in the meeting.

S.No	Name	Designation	Member Role
1.	Dr.Guduru VNSR Ratnakara Rao	Principal	Chairman
2.	Dr.M.Thamarai	Prof./ECE- SVEC(A8)	Member
3.	Mr V.S.R.Gopala Krishna Ch	Deputy CoE; SVEC(A8)	Member

The following are the minutes of the results committee meeting.

Item#1: MBA III Semester (V18) regular and Supplementary results March 2021 for the ac. year 2020-21.

The summary of the results

a. Programme Wise Performance Analysis

S.No	Branch	Appeared	Passed	Fail	Pass
1	MBA	59	56	3	94.92
Overall		**59**	**56**	**3**	**94.92**

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Registered	Passed	Fail	Pass %
1.	V18MBT14	BUSINESS POLICY & CORPORATE STRATEGY	59	59	0	100
2.	V18MBT15	ENTREPRENEURSHIP DEVELOPMENT	59	59	0	100
3.	V18MBT16	E-BUSINESS	59	58	1	98.31
4.	V18MBT17	CONSUMER BEHAVIOR	8	8	0	100
5.	V18MBT21	SECURITY ANALYSIS & PORTFOLIO MANAGEMENT	33	33	0	100
6.	V18MBT25	HUMAN RESOURCE PLANNING & DEVELOPMENT	18	18	0	100
7.	V18MBT18	RETAIL MANAGEMENT	8	8	0	100
8.	V18MBT22	ADVANCE MANAGEMENT ACCOUNTING	33	33	0	100
9.	V18MBT26	COMPENSATION AND REWARD MANAGEMENT	18	18	0	100
10.	V18MBT19	INTEGRATED MARKETING COMMUNICATION	8	7	1	87.50
11.	V18MBT23	FINANCIAL MARKETS & SERVICES	33	33	0	100
12.	V18MBT27	PERFORMANCE MANAGEMENT	18	17	1	94.44
13.	V18MBT20	PRODUCT & BRAND MANAGEMENT	8	8	0	100
14.	V18MBT24	BANKING & INSURANCE MANAGEMENT	33	33	0	100

15.	V18MBT28	STRATEGIC HUMAN RESOURCE MANAGEMENT	18	18	0	100
16.	V18MBP01	MINI PROJECT	59	59	0	100
17.	V18MBM0 1	MOOCS	59	59	0	100
18.	V18MAT07	EMPLOYABILITY SKILLS III (APTITUDE-I)	59	57	2	96.61

Details enclosed in annexure-I

- The committee has approved the results and accorded the permission for publication of the same.

S.No	Name	Designation	Member Role	Signature
1.	Dr.GuduruVNSRRatnakara Rao	Principal	Chairman	
2.	Dr.M.Thamarai	Professor/ECE	Member	
3.	Mr.V.S.R.Gopala Krishna Ch	Deputy CoE	Member	

Minutes of the Meeting of the Result Committee

The Sri Vasavi Engineering College (Autonomous) result committee meeting was held on 15-07-2021 by 03:30 PM at Chief Controller of Examination's Cabin @ Examination Section Block

The following members were present in the meeting.

S.No	Name	Designation	Member Role
1.	Dr.GuduruVNSRRatnakara Rao	Principal	Chairman
2.	Dr.M.Thamarai	Prof./ECE- SVEC(A8)	Member
3.	Mr.Ch.V.S.R.Gopala Krishna	Deputy CoE; SVEC(A8)	Member

The following are the minutes of the results committee meeting.

Item#1 : B.Tech V Semester regular examination march 2021 results for the ac. year 2020-21.

The summary of the results

a. Branch Wise Performance Analysis

S.No	Branch	Registered	Passed	Fail	Pass
1	CE	62	26	36	41.94
2	EEE	119	73	46	61.34
3	ME	125	66	59	52.80
4	ECE	197	131	66	66.50
5	CSE	253	197	56	77.87
Overall		**756**	**493**	**263**	**65.21**

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Appear ed	Passed	Fail	Pass Percentage
1.	V18CET15	STRUCTURAL ANALYSIS–I	62	54	8	87.10
2.	V18CET16	GEOTECHNICAL TECHNICAL ENGINEERING-I	62	32	30	51.16
3.	V18CET17	HYDROLOGY & WATER RESOURCES ENGINEERING	62	51	11	82.26
4.	V18CET18	DESIGN OF REINFORCED CONCRETE STRUCTURES	62	53	9	85.48
5.	V18CET19	TRANSPORTATION ENGINEERING–I	62	52	10	83.87
6.	V18CET33	RS&GIS	62	59	3	95.16
7.	V18CEL07	TRANSPORTATION ENGINEERING LAB	62	60	2	96.77

8.	V18CEL08	GEOTECHNICAL ENGINEERING LAB	62	60	2	96.77
9.	V18ENT11	CONSTITUTION OF INDIA	62	32	30	51.61
10.	V18ENT05	PROFESSIONAL COMMUNICATION SKILLS–III	62	56	6	90.32
11.	V18EET12	SWITCHGEAR & PROTECTION	119	112	7	94.11
12.	V18EET13	POWER ELECTRONICS	119	114	5	95.79
13.	V18EET14	POWER SYSTEM ANALYSIS	119	108	11	90.75
14.	V18EET15	CONTROL SYSTEMS	119	93	26	78.15
15.	V18EET16	SIGNALS & SYSTEMS	119	81	38	68.06
16.	V18MBT51	MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS	119	112	7	94.11
17.	V18EEL06	ELECTRICAL MACHINES LABORATORY-II	119	116	3	97.47
18.	V18EEL07	CONTROL SYSTEMS LABORATORY	119	117	2	98.31
19.	V18ENT05	PROFESSIONAL COMMUNICATION SKILLS-III	119	114	5	95.79
20.	V18MET13	HEAT TRANSFER	125	87	38	69.6
21.	V18MET37	INTERNAL COMBUSTION ENGINES	125	93	32	74.4
22.	V18MET15	THEORY OF MACHINES–II	125	93	32	74.4
23.	V18MET16	DESIGN OF MACHINE ELEMENTS-I	125	74	51	59.2
24.	V18MET17	METAL CUTTING & MACHINE TOOLS	125	106	19	84.8
25.	V18MEL10	THERMAL ENGINEERING LAB	125	121	4	96.8
26.	V18MEL16	METAL CUTTING & MACHINE TOOLS LAB	125	122	3	97.6
27.	V18CSL05	PYTHON PROGRAMMING LAB	125	122	3	97.6
28.	V18MET46	INTELLECTUAL PROPERTY RIGHTS AND PATENTS	125	107	18	85.6
29.	V18ENT05	PROFESSIONAL COMMUNICATION SKILLS-III	125	108	17	86.4
30.	V18CST81	DATA STRUCTURES & ALGORITHMS	197	189	8	95.94
31.	V18ECT11	VLSI DESIGN	197	169	28	85.79
32.	V18ECT12	MICROPROCESSORS & MICROCONTROLLERS	197	176	21	89.34
33.	V18EET15	CONTROL SYSTEMS	197	150	47	76.14
34.	V18ECT13	ANTENNA & WAVE PROPAGATION	197	164	33	83.25
35.	V18ECT15	ENGINEER & SOCIETY	197	187	10	94.92
36.	V18CSL34	DATA STRUCTURES& ALGORITHMS LAB	197	193	4	97.97

37.	V18ECL07	MICROPROCESSOR &MICROPROCONTROLLERS LAB	197	192	5	97.46
38.	V18ECL08	VLSI DESIGN LAB	197	192	5	97.46
39.	V18ECMOOCs	MOOCS COURSE	197	190	7	96.45
40.	V18ENT05	PROFESSIONAL COMMUNICATION SKILLS-III	197	185	12	93.91
41.	V18CST10	DATABASE MANAGEMENT SYSTEMS	253	226	27	89.33
42.	V18CST11	COMPUTER NETWORKS	253	235	18	92.89
43.	V18CST12	OPERATING SYSTEMS	253	230	23	90.91
44.	V18CST13	DESIGN AND ANALYSIS OF ALGORITHMS	253	219	34	86.56
45.	V18CST14	UNIX PROGRAMMING	253	230	23	90.91
46.	V18CST17	ARTIFICIAL INTELLIGENCE	229	203	26	88.65
47.	V18CST18	COMPUTER GRAPHICS	24	24	0	100.00
48.	V18MBT53	ORGANIZATIONAL BEHAVIOR	253	236	17	93.28
49.	V18CSL06	DATABASE MANAGEMENT SYSTEMS LAB	253	252	1	99.60
50.	V18CSL07	OPERATING SYSTEM AND UNIX LAB	253	252	1	99.60
51.	V18ENT05	PROFESSIONAL COMMUNICATION SKILLS–III	253	240	13	94.86
52.	V18CST62	TECHNICAL SKILLS-III	253	252	1	99.60

Details enclosed in annexure-1

- The committee has approved the results and accorded the permission for publication of the same.

S.No	Name	Designation	Member Role	Signature
1.	Dr.GuduruVNSRRatnakara Rao	Principal, SVEC(A8)	Chairman	
2.	Dr.M.Thamarai	Professor/ECE, SVEC(A8)	Member	
3.	Mr.Ch.V.S.R.Gopala Krishna	Deputy CoE, SVEC(A8)	Member	

Minutes of the Meeting of the Result Committee

The Sri Vasavi Engineering College (Autonomous) result committee meeting was held on 29-07-2021 by 10:30 AM at Chief Controller of Examination's Cabin @ Examination Section Block

The following members were present in the meeting.

S.No	Name	Designation	Member Role
1.	Dr.GuduruVNSRRatnakara Rao	Principal	Chairman
2.	Dr.M.Thamarai	Prof./ECE- SVEC(A8)	Member
3.	Mr.Ch.V.S.R.Gopala Krishna	Deputy CoE; SVEC(A8)	Member

The following are the minutes of the results committee meeting.

Item#1: B.Tech III Semester regular and supplementary examination results march 2021 for the ac. year 2020-21.

The summary of the results

a. Branch Wise Performance Analysis

S.No	Branch	Registered	Passed	Fail	Pass
1	CE	66	51	15	77.27
2	ECT	58	36	22	62.07
3	EEE	112	70	42	62.50
4	ME	117	76	41	64.96
5	ECE	208	138	70	66.35
6	CSE	279	219	60	78.49
7	CST	60	37	23	61.67
Overall		**900**	**627**	**273**	**69.67**

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Appeared	Passed	Fail	Pass Percentage
1.	V18CET04	STRENGTH OF MATERIALS-I	82	57	25	69.51
2.	V18CET36	BUILDING MATERIALS PLANNING & CONSTRUCTION	70	67	3	95.71
3.	V18CET10	INTRODUCTION TO FLUID MECHANICS	76	71	5	93.42
4.	V18CET35	PRINCIPLES OF ENVIRONMENTAL SCIENCE & ENGINEERING	69	67	2	97.10

5.	V18MAT04	PROBABILITY AND STATISTICS	533	502	31	94.18
6.	V18EET01	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	74	60	14	81.08
7.	V18CEL02	MATERIAL TESTING LAB	66	65	1	98.48
8.	V18EEL01	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB	66	65	1	98.48
9.	V18ENT03	PROFESSIONAL COMMUNICATION SKILLS-1	902	877	25	97.23
10.	V18EET03	ELECTRICAL CIRCUIT ANALYSIS-1	113	79	34	69.91
11.	V18ECT05	ANALOG ELECTRONICS	124	99	25	79.84
12.	V18EET04	ELECTRICAL MACHINES-1	114	98	16	85.96
13.	V18EET05	ELECTRO MAGNETIC FIELDS	116	91	25	78.45
14.	V18EET06	ELECTRICAL AND ELECTRONIC MEASUREMENTS	118	98	20	83.05
15.	V18CSL31	DATA STRUCTURES & ALGORITHMS LAB	112	106	6	94.64
16.	V18ECL03	ANALOG ELECTRONICS LABORATORY	112	107	5	95.54
17.	V18ENT12	PROFESSIONAL ETHICS & HUMAN VALUES	112	106	6	94.64
18.	V18MET03	ENGINEERING MECHANICS	124	106	18	85.48
19.	V18MET04	THERMODYNAMICS	142	94	48	66.20
20.	V18MET05	FLUID MECHANICS & FLUID MACHINES	128	92	36	71.88
21.	V18MET09	MATERIALS ENGINEERING	129	101	28	78.29
22.	V18MEL02	MACHINE DRAWING	118	117	1	99.15
23.	V18MEL03	FLUID MECHANICS & FLUID MACHINES LAB	118	116	2	98.31
24.	V18ECT01	ELECTRONICS DEVICES & CIRCUITS	298	238	60	79.87
25.	V18ECT02	DIGITAL SYSTEM DESIGN	280	227	53	81.07
26.	V18ECT03	SIGNAL & SYSTEMS	293	228	65	77.82
27.	V18ECT04	NETWORK THEORY	293	211	82	72.01
28.	V18MBT51	MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS	271	242	29	89.30
29.	V18ECL01	ELECTRONICS DEVICES & CIRCUITS LAB	269	261	8	97.03
30.	V18ECL02	DIGITAL SYSTEM DESIGN LAB	270	263	7	97.41
31.	V18ENT11	CONSTITUTION OF INDIA	289	208	81	71.97
32.	V18ECT06	DIGITAL ELECTRONICS	360	288	72	80.00

33.	V18CST02	DATA STRUCTURES AND ALGORITHMS	358	314	44	87.71
34.	V18CST03	DISCRETE MATHEMATICS	354	312	42	88.14
35.	V18CST04	OBJECT ORIENTED PROGRAMMING FOR PROBLEM SOLVING	352	282	70	80.11
36.	V18ECL04	DIGITAL ELECTRONICS LAB	339	333	6	98.23
37.	V18CSL02	DATA STRUCTURES AND ALGORITHMS LAB	339	330	9	97.35
38.	V18CSL03	OBJECT ORIENTED PROGRAMMING FOR PROBLEM SOLVING LAB	339	333	6	98.23
39.	V18CST60	TECHNICAL SKILLS-1	339	333	6	98.23

Details enclosed in annexure-1

- The committee has approved the results and accorded the permission for publication of the same.

S.No	Name	Designation	Member Role	Signature
1.	Dr.GuduruVNSRRatnakara Rao	Principal, SVEC(A8)	Chairman	
2.	Dr.M.Thamarai	Professor/ECE, SVEC(A8)	Member	
3.	Mr.Ch.V.S.R.Gopala Krishna	Deputy CoE, SVEC(A8)	Member	

Minutes of the Meeting of the Result Committee

The Sri Vasavi Engineering College (Autonomous) result committee meeting was held on 20-09-2021 at 4:00 PM through online mode using Zoom application.

Link: https://us02web.zoom.us/j/81705930843

The following members were present in the meeting.

S.No	Name	Designation	Member Role
1.	Dr.GuduruVNSRRatnakara Rao	Principal	Chairman
2.	Dr. K. Venkata Reddy	Controller of Examinations-JNTU Kakinada	University Nominee
3.	Dr.M.Thamarai	Prof./ECE- SVEC(A8)	Member
4.	Mr.Ch.V.S.R.Gopala Krishna	Deputy CoE; SVEC(A8)	Member

The following are the minutes of the results committee meeting.

Item#1 : B.Tech I Semester results for the ac. year 2020-21.

The summary of the results

a. Branch Wise Performance Analysis

S.No	Branch	Registered	Passed	Fail	Pass %
1	CE	45	10	35	22.22
2	ECT	62	48	14	77.42
3	EEE	93	54	39	58.06
4	ME	90	20	70	22.22
5	ECE	192	154	38	80.21
6	CSE	257	196	61	76.26
7	CST	65	51	14	78.46
Overall		**804**	**533**	**271**	**66.29**

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Appeared	Passed	Fail	Pass Percentage
1.	V20CST01	PROGRAMMING IN C FOR PROBLEM SOLVING	550	370	180	67.27
2.	V20MET01	ENGINEERING GRAPHICS	389	316	73	81.23
3.	V20CHT01	ENGINEERING CHEMISTRY	415	348	67	83.86
4.	V20PHT01	ENGINEERING PHYSICS	389	331	58	85.09
5.	V20MAT01	LINEAR ALGEBRA AND DIFFERENTIAL EQUATIONS	804	716	88	89.05
6.	V20EET01	BASIC ELECTRICAL ENGINEERING	254	229	25	90.16
7.	V20CHT02	ENVIRONMENTAL STUDIES	389	351	38	90.23
8.	V20EEL01	BASIC ELECTRICAL ENGINEERING LAB	254	245	9	96.46
9.	V20PHL01	ENGINEERING PHYSICS LAB	389	376	13	96.66

10.	V20CSL01	PROGRAMMING LAB IN C FOR PROBLEM SOLVING	550	533	17	96.91
11.	V20ENL01	HONE YOUR COMMUNICATION SKILLS LAB-I	804	787	17	97.89
12.	V20ENT01	ENGLISH FOR PROFESSIONAL ENHANCEMENT	804	787	17	97.89
13.	V20CHL01	ENGINEERING CHEMISTRY LAB	415	409	6	98.55
14.	V20MEL01	ENGINEERING WORKSHOP	415	409	6	98.55

Details enclosed in annexure-1

Item#2 :M.Tech I Semester results for the ac. year 2020-21.

The summary of the results

a. Specialization Wise Performance Analysis

S.No	Specialization	Registered	Passed	Fail	Pass%
1	MD	5	4	1	80.00
2	PSC&AE	5	4	1	80.00
3	STE	4	1	3	25.00
4	VLSI&ES	16	13	3	81.25
5	CSE	8	3	5	37.50
Overall		**38**	**25**	**13**	**65.79**

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Appeared	Passed	Fail	Pass Percentage
1.	V18SET01	THEORY OF ELASTICITY	4	1	3	25
2.	V18CTT06	MACHINE LEARNING	8	4	4	50
3.	V18SET02	MATRIX ANALYSIS OF STRUCTURES	4	2	2	50
4.	V18SET05	SUB-STRUCTURE DESIGN	4	2	2	50
5.	V18CTT04	ADVANCED OPERATING SYSTEMS	8	5	3	62.5
6.	V18CTT05	ADVANCED DATA STRUCTURES AND ALGORITHMS ANALYSIS	8	5	3	62.5
7.	V18CTT01	OBJECT ORIENTED SOFTWARE ENGINEERING	8	6	2	75
8.	V18MAT05	ADVANCED MATHEMATICS	4	3	1	75
9.	V18SET03	STRUCTURAL DYNAMICS	4	3	1	75
10.	V18MDT03	MECHANICAL VIBRATIONS	5	4	1	80
11.	V18PST02	ADVANCED COMPUTER METHODS IN POWER SYSTEMS	5	4	1	80
12.	V18VLT03	CMOS ANALOG IC DESIGN	16	13	3	81.25
13.	V18VLT04	EMBEDDED SYSTEMS DESIGN-I	16	13	3	81.25
14.	V18VLT07	SYSTEM ON CHIP	16	13	3	81.25
15.	V18VLT10	CPLD & FPGA ARCHITECURES AND APPLICATIONS	16	13	3	81.25
16.	V18VLT01	DIGITAL SYSTEM DESIGN	16	14	2	87.5
17.	V18VLT02	VLSI TECHNOLOGY AND DESIGN	16	14	2	87.5
18.	V18VLL01	VLSI LAB	16	15	1	93.75
19.	V18CTL01	NOSQL DATABASE LAB	8	8	0	100
20.	V18CTL02	ADVANCED DATA STRUCTURES AND ALGORITHM ANALYSIS LAB	8	8	0	100
21.	V18CTT02	NOSQL DATABASE	8	8	0	100
22.	V18CTT03	ADVANCED COMPUTER ARCHITECTURE	8	8	0	100
23.	V18MAT06	COMPUTATIONAL METHODS IN ENGINEERING	5	5	0	100
24.	V18MDL01	MACHINE DYNAMICS LAB	5	5	0	100
25.	V18MDT01	ADVANCED MECHANICS OF SOLIDS	5	5	0	100
26.	V18MDT02	ADVANCED MECHANISMS	5	5	0	100
27.	V18MDT05	PRODUCT DESIGN	5	5	0	100
28.	V18MDT10	DESIGN FOR MANUFACTURING & ASSEMBLY	5	5	0	100
29.	V18PSL01	POWER SYSTEMS LAB-I	5	5	0	100

30.	V18PST01	POWER SYSTEM OPERATION & CONTROL	5	5	0	100
31.	V18PST03	ADVANCED POWER SYSTEM PROTECTION	5	5	0	100
32.	V18PST04	MICRO CONTROLLERS AND APPLICATION	5	5	0	100
33.	V18PST07	ELECTRICAL DISTRIBUTION SYSTEMS	5	5	0	100
34.	V18PST10	POWER QUALITY	5	5	0	100
35.	V18SEL01	ADVANCED STRUCTURAL ENGINEERING LABORATORY	4	4	0	100
36.	V18SET07	REPAIR & REHABILITATION OF STRUCTURES	4	4	0	100

Details enclosed in annexure-2

Item#3 : MBA I Semester results for the ac. year 2020-21.

The summary of the results

Programme Wise Performance Analysis

Programme	Registered	Passed	Fail	Pass
MBA	93	83	10	**89.25**

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Appeared	Passed	Fail	Pass Percentage
1.	V18ENT13	EMPLOYABILITY SKILLS-I (ENGLISH COMMUNICATION SKILLS)	95	88	7	92.63
2.	V18MBT04	INDIAN ECONOMY & POLICY	93	87	6	93.55
3.	V18MBT05	BUSINESS COMMUNICATION	94	90	4	95.74
4.	V18MBT01	MANAGEMENT THEORY & ORGANIZATIONAL BEHAVIOUR	93	90	3	96.77
5.	V18MBT02	MANAGERIAL ECONOMICS	93	90	3	96.77
6.	V18MBT03	ACCOUNTING FOR MANAGERS	93	90	3	96.77
7.	V18MBT06	QUANTITATIVE ANALYSIS FOR BUSINESS DECISIONS	93	92	1	98.92
8.	V18MBL01	IT-LAB	93	93	0	100

Details enclosed in annexure-3

- The committee has approved the results and accorded the permission for publication of the same.

S.No	Name	Designation	Member Role	Signature
1.	Dr.GuduruVNSRRatnakara Rao	Principal, SVEC(A8)	Chairman	
2.	Dr. K. Venkata Reddy	Controller of Examinations-JNTU Kakinada	University Nominee	
3.	Dr.M.Thamarai	Professor/ECE, SVEC(A8)	Member	
4.	Mr.Ch.V.S.R.Gopala Krishna	Deputy CoE, SVEC(A8)	Member	

Minutes of the Meeting of the Result Committee

The Sri Vasavi Engineering College (Autonomous) result committee meeting was held on 30-10-2021 at 3:30 PM through online mode using Zoom application.

Link: https://us02web.zoom.us/j/83898435966

The following members were present in the meeting

S.No	Name	Designation	Member Role
1.	Dr.Guduru VNSRRatnakara Rao	Principal	Chairman
2.	Dr. R. Madhu	Addl. Controller of Examinations-JNTUK Kakinada	University Nominee
3.	Dr.M.Thamarai	Prof./ECE- SVEC(A8)	Member
4.	Mr.V.S.R.Gopala KrishnaChalla	Controller of Examinations; SVEC(A8)	Member
5.	Mr. G.V. Subrahmanyam	Dy. CoE; SVEC(A8)	Member

The following are the minutes of the results committee meeting.

Item#1:B.Tech IV Semester results for the ac. year 2020-21.

The summary of the results

a. Branch Wise Performance Analysis

S.No	Branch	Registered	Passed	Fail	Pass
1	CE	64	51	13	79.69
2	ECT	57	45	12	78.95
3	EEE	108	77	31	71.30
4	ME	116	79	37	68.10
5	ECE	205	143	62	69.76
6	CSE	275	197	78	71.64
7	CST	60	29	31	48.33
Overall		**885**	**621**	**264**	**70.17**

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Appeared	Pass	Fail	Pass Percentage
1.	V18MET07	APPLIED THERMODYNAMICS	142	92	50	64.79
2.	V18CST09	PYTHON PROGRAMMING	363	256	107	70.52
3.	V18MET06	THEORY OF MACHINES-I	138	102	36	73.91
4.	V18EET08	DIGITAL ELECTRONICS	112	83	29	74.11
5.	V18MET08	MECHANICS OF SOLIDS	135	102	33	75.56
6.	V18CET13	STRENGTH OF MATERIALS-II	84	65	19	77.38
7.	V18CST05	COMPUTER ORGANIZATION	357	284	73	79.55
8.	V18MET11	INSTRUMENTATION & CONTROL SYSTEMS	127	103	24	81.1
9.	V18ECT09	PROBABILITY THEORY & STOCHASTIC PROCESS	277	229	48	82.67
10.	V18ECT07	ANALOG & DIGITAL COMMUNICATIONS	273	226	47	82.78
11.	V18ECT08	ANALOG CIRCUITS	278	234	44	84.17
12.	V18ENT11	CONSTITUTION OF INDIA	521	440	81	84.45
13.	V18CST07	FORMAL LANGUAGES AND AUTOMATA THEORY	351	301	50	85.75
14.	V18ECT10	ELECTROMAGNETIC WAVES & TRANSMISSION LINES	280	243	37	86.79
15.	V18EET10	ELECTRICAL POWER GENERATION ANDTRANSMISSION	115	101	14	87.83
16.	V18CST08	JAVA PROGRAMMING	349	309	40	88.54
17.	V18CST06	SOFTWARE ENGINEERING	342	303	39	88.6
18.	V18EET09	ELECTRICAL MACHINES-II	117	105	12	89.74
19.	V18MBT51	MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS	344	317	27	92.15
20.	V18MAT03	MATHEMATICS-III	269	250	19	92.94
21.	V18MET14	MANUFACTURING PROCESSES	121	113	8	93.39
22.	V18MBT51	MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS	65	61	4	93.85
23.	V18EET07	ELECTRICAL CIRCUIT ANALYSIS-II	108	102	6	94.44
24.	V18CET08	ENGINEERING GEOLOGY	66	63	3	95.45
25.	V18CET14	HYDRAULIC ENGINEERING	67	64	3	95.52
26.	V18CET11	SURVEYING AND GEOMATICS	68	65	3	95.59
27.	V18ENT04	PROFESSIONAL COMMUNICATION SKILLS-II	832	804	28	96.63
28.	V18MAT04	PROBABILITY & STATISTICS	108	105	3	97.22
29.	V18CSL32	OBJECT ORIENTED PROGRAMMING THROUGH JAVALAB	262	257	5	98.09
30.	V18EET11	ELECTRICAL SAFETY & IE RULES	108	106	2	98.15
31.	V18ENT04	PROFESSIONAL COMMUNICATION SKILLS–II	60	59	1	98.33
32.	V18CEL03	CONCRETE TECHNOLOGY LAB	64	63	1	98.44
33.	V18CEL04	SURVEYING LAB	64	63	1	98.44
34.	V18CEL05	FLUID MECHANICS AND HYDRALIC MACHINERY LAB	64	63	1	98.44

S. No	Course Code	Course Name	Appeared	Pass	Fail	Pass Percentage
35.	V18CEL06	ENGINEERING GEOLOGY LAB	64	63	1	98.44
36.	V18CSL05	PYTHON PROGRAMMING LAB	335	330	5	98.51
37.	V18CET09	CONCRETE TECHNOLOGY	70	69	1	98.57
38.	V18CSL04	JAVA PROGRAMMING LAB	335	331	4	98.81
39.	V18CSL33	PYTHON PROGRAMMING LAB	108	107	1	99.07
40.	V18EEL04	ELECTRICAL CIRCUITS & MEASUREMENTSLABORATORY	108	107	1	99.07
41.	V18EEL05	ELECTRICAL MACHINES LABORATORY-I	108	107	1	99.07
42.	V18CST61	TECHNICAL SKILLS-II	335	332	3	99.1
43.	V18MEL05	MECHANICS OF SOLIDS & MATERIALS ENGINEERINGLAB	116	115	1	99.14
44.	V18ECL05	COMMUNICATIONS LAB	262	261	1	99.62
45.	V18ECL06	ANALOG CIRCUITS LAB	262	261	1	99.62
46.	V18MEL11	MANUFACTURING PROCESS LAB	116	116	0	100

Details enclosed in **Annexure-1**

Item#2:B.Tech VI Semester results for the ac. year 2020-21.

a. Branch Wise Performance Analysis

S.No	Branch	Registered	Passed	Fail	Pass
1	CE	60	37	23	61.67
2	EEE	118	98	20	83.05
3	ME	121	95	26	78.51
4	ECE	193	147	46	76.17
5	CSE	251	199	52	79.28
Overall		**743**	**576**	**167**	**77.52**

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Appeared	Passed	Fail	Pass %
1.	V18CET20	STRUCTURAL ANALYSIS–II	60	45	15	75
2.	V18CSTOE1	DATA BASE MANAGEMENT SYSTEMS	58	44	14	75.86
3.	V18ECT17	MICROWAVE ENGINEERING	193	161	32	83.42
4.	V18CET22	DESIGN OF STEEL STRUCTURES	60	51	9	85
5.	V18ECT16	DIGITAL SIGNAL PROCESSING	193	166	27	86.01
6.	V18CSTOE3	PYTHON PROGRAMMING	253	220	33	86.96
7.	V18EET18	UTILIZATION OF ELECTRICAL ENERGY	58	51	7	87.93
8.	V18CST19	COMPILER DESIGN	251	221	30	88.05
9.	V18CST25	MACHINE LEARNING	244	215	29	88.11
10.	V18CST20	DATA MINING	251	222	29	88.45
11.	V18MET19	ROBOTICS	121	110	11	90.91
12.	V18CST21	OBJECT ORIENTED ANALYSIS AND DESIGNTHROUGH UML	251	230	21	91.63
13.	V18MET18	DESIGN OF MACHINE ELEMENTS–II	121	111	10	91.74
14.	V18CST22	CRYPTOGRAPHY & NETWORK SECURITY	251	231	20	92.03
15.	V18ECT19	CMOS DIGITAL IC DESIGN	62	58	4	93.55
16.	V18ECT23	MICROPROCESSORS & MICROCONTROLLERS	118	111	7	94.07
17.	V18ECTOE1	INTERNET OF THINGS	432	414	18	95.83
18.	V18MBT51	MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS	121	116	5	95.87
19.	V18ECT18	EMBEDDED SYSTEMS-I	131	126	5	96.18
20.	V18CST11	COMPUTER NETWORKS	193	186	7	96.37
21.	V18CET24	ENVIRONMENTAL ENGINEERING-I	60	58	2	96.67
22.	V18MET10	METROLOGY	121	117	4	96.69
23.	V18EET24	ELECTRICAL ENERGY CONSERVATION, MANAGEMENT& AUDITING	118	115	3	97.46
24.	V18ENT06	PROFESSIONAL COMMUNICATION SKILLS –IV	311	305	6	98.07
25.	V18ENT06	PROFESSIONAL COMMUNICATION SKILLS-IV	314	308	6	98.09
26.	V18ENT06	PROFESSIONAL COMMUNICATION SKILLS– IV	118	116	2	98.31
27.	V18CET23	TRANSPORTATION ENGINEERING-II	60	59	1	98.33
28.	V18CET21	GEOTECHNICAL ENGINEERING–II	60	59	1	98.33
29.	V18CEL10	CAD & GIS LAB	60	59	1	98.33
30.	V18MBT52	MANAGEMENT SCIENCE	193	190	3	98.45
31.	V18CSL08	OBJECT ORIENTED ANALYSIS AND DESIGNTHROUGH UML LAB	251	248	3	98.8
32.	V18ECL10	MICROPROCESSORS & MICROCONTROLLERSLABORATORY	118	117	1	99.15
33.	V18EET17	ELECTRICAL DRIVES	118	117	1	99.15
34.	V18MEL08	THEORY OF MACHINES LAB	121	120	1	99.17
35.	V18MEL09	HEAT TRANSFER LAB	121	120	1	99.17

S. No	Course Code	Course Name	Appeared	Passed	Fail	Pass %
36.	V18CSMPS	MINI PROJECT WITH SEMINAR	251	249	2	99.2
37.	V18CSL35	COMPUTER NETWORKS LAB	193	192	1	99.48
38.	V18ECL09	DIGITAL SIGNAL PROCESSING LAB	193	192	1	99.48
39.	V18CSL09	DATA MINING LAB	251	250	1	99.6
40.	V18CST23	SOFTWARE TESTING METHODOLOGIES	7	7	0	100
41.	V18CST63	TECHNICAL SKILLS-IV	251	251	0	100
42.	V18CEL09	ENVIRONMENTAL ENGINEERING LAB	60	60	0	100
43.	V18EEL08	POWER ELECTRONICS LABORATORY	118	118	0	100
44.	V18EEL09	ELECTRICAL SIMULATION LABORATORY	118	118	0	100
45.	V18EET20	RENEWABLE ENERGY SYSTEMS	60	60	0	100
46.	V18MEL06	METROLOGY AND INSTRUMENTATION & CONTROLSYSTEMS LAB	121	121	0	100

Details enclosed in **Annexure-2**

Item#3:MBAIV Semester results for the ac. year 2020-21.

a. Program Wise Performance Analysis

S.No	Program	Registered	Passed	Fail	Pass
1	MBA	59	51	8	86.44
Overall		**59**	**51**	**8**	**86.44**

b. Course Wise Performance Analysis

S No	Course Code	Course Name	Appeared	Passed	Fail	Pass Percentage
1.	V18MAT08	EMPLOYABILITY SKILLS-IV (APTITUDE-2)	59	53	6	89.83
2.	V18MBP02	MAJOR PROJECT & VIVA VOCE	59	59	0	100
3.	V18MBT29	LOGISTICS & SUPPLY CHAIN MANAGEMENT	59	58	1	98.31
4.	V18MBT30	BUSINESS ANALYTICS	59	59	0	100
5.	V18MBT31	SERVICES MARKETING	8	8	0	100
6.	V18MBT32	SALES AND DISTRIBUTION MANAGEMENT	8	8	0	100
7.	V18MBT33	DIGITAL & SOCIAL MEDIA MARKETING	8	8	0	100
8.	V18MBT34	INTERNATIONAL MARKETING MANAGEMENT	8	8	0	100
9.	V18MBT35	FINANCIAL DERIVATIVES	33	32	1	96.97
10.	V18MBT36	PROJECT APPRAISAL AND FINANCE	33	33	0	100
11.	V18MBT37	BUSINESS TAXATION & PLANNING	33	33	0	100
12.	V18MBT38	INTERNATIONAL FINANCIAL MANAGEMENT	33	33	0	100
13.	V18MBT39	ORGANIZATIONAL CHANGE & DEVELOPMENT	18	18	0	100
14.	V18MBT40	MANAGEMENT OF INDUSTRIAL RELATIONS	18	18	0	100

S No	Course Code	Course Name	Appeared	Passed	Fail	Pass Percentage
15.	V18MBT41	LABOR WELFARE & LEGISLATION	18	18	0	100
16.	V18MBT42	INTERNATIONAL HRM	18	18	0	100

Details enclosed in **Annexure-3**

Item#4:M.TechIV Semester results for the ac. year 2020-21.

a. Specialization Wise Performance Analysis

S.No	Specialization	Registered	Passed	Fail	Pass
1	STE	1	1	0	100.00
2	VLSI&ES	2	2	0	100.00
Overall		3	3	0	100.00

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Appeared	Passed	Fail	Pass %
1.	V18SEL05	PROJECT WORK	1	1	0	100
2.	V18VLL05	PROJECT WORK	2	2	0	100

Details enclosed in **Annexure-4**

- The committee has approved the results and accorded the permission for publication of the same.

S.No	Name	Designation	Member Role	Signature
1.	Dr.Guduru VNSRRatnakara Rao	Principal	Chairman	
2.	Dr. R. Madhu	Addl. Controller of Examinations - JNTUK Kakinada	University Nominee	
3.	Dr.M.Thamarai	Prof./ECE- SVEC(A8)	Member	
4.	Mr.Ch.V.S.R.Gopala Krishna	Controller of Examinations; SVEC(A8)	Member	
5.	Mr. G.V. Subrahmanyam	Dy. CoE; SVEC(A8)	Member	

Minutes of the Meeting of the Result Committee

The Sri Vasavi Engineering College (Autonomous) result committee meeting was held on 16-11-2021 at 3:00 PM through online mode using Zoom application.

Link: https://us02web.zoom.us/j/84779132453

The following members were present in the meeting.

S.No	Name	Designation	Member Role
1.	Dr.Guduru VNSR Ratnakara Rao	Principal	Chairman
2.	Dr. R Madhu	Addl.Controller of Examinations-JNTU Kakinada	University Nominee
3.	Dr.M.Thamarai	Prof./ECE- SVEC(A8)	Member
4.	Mr V.S.R.Gopala Krishna Ch	CoE; SVEC(A8)	Member
5.	Mr G V Subrahmanyam	Deputy CoE; SVEC(A8)	Member

The following are the minutes of the results committee meeting.

Item#1: B.Tech V Semester (V18) Supplementary results September 2021 for the ac. year 2020-21.

The summary of the results

a. Branch Wise Performance Analysis

S. No	Branch	No of Students Registered	No. of Courses			Course Wise Pass %
			Registered	Passed	Fail	
1.	CE	33	85	43	42	50.59
2.	EEE	42	90	64	26	71.11
3.	ME	53	165	89	76	53.94
4.	ECE	56	123	63	60	51.22
5.	CSE	48	148	49	99	33.11
Overall		**232**	**611**	**308**	**303**	**50.41**

b. Course Wise Performance Analysis

S. No	Branch	Course Code	Course Name	Registered	Passed	Fail	Pass %
1.	CE	V18CET15	STRUCTURAL ANALYSIS-I	6	2	4	33.33
2.	CE	V18CET16	GEOTECHNICAL ENGINEERING-I	26	14	12	53.85
3.	CE	V18CET17	HYDROLOGY & WATER RESOURCES ENGINEERING	9	3	6	33.33
4.	CE	V18CET18	DESIGN OF REINFORCED CONCRETE STRUCTURES	7	0	7	0
5.	CE	V18CET19	TRANSPORTATION ENGINEERING-I	7	2	5	28.57
6.	CE	V18CET33	RS&GIS	1	0	1	0
7.	CE	V18ENT05	PROFESSIONAL COMMUNICATION SKILLS-III	3	3	0	100
8.	CE	V18ENT11	CONSTITUTION OF INDIA	26	19	7	73.08
9.	EEE	V18EEL06	ELECTRICAL MACHINES LABORATORY-II	2	2	0	100
10.	EEE	V18EEL07	CONTROL SYSTEMS LABORATORY	1	0	1	0
11.	EEE	V18EET12	SWITCHGEAR & PROTECTION	6	3	3	50
12.	EEE	V18EET13	POWER ELECTRONICS	4	4	0	100
13.	EEE	V18EET14	POWER SYSTEM ANALYSIS	9	1	8	11.11
14.	EEE	V18EET15	CONTROL SYSTEMS	23	17	6	73.91
15.	EEE	V18EET16	SIGNALS & SYSTEMS	35	28	7	80
16.	EEE	V18ENT05	PROFESSIONAL COMMUNICATION SKILLS-III	4	4	0	100
17.	EEE	V18MBT51	MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS	6	5	1	83.33
18.	ME	V18ENT05	PROFESSIONAL COMMUNICATION SKILLS-III	13	11	2	84.62
19.	ME	V18MET13	HEAT TRANSFER	32	12	20	37.5
20.	ME	V18MET15	THEORY OF MACHINES-II	25	4	21	16
21.	ME	V18MET16	DESIGN OF MACHINE ELEMENTS-I	44	29	15	65.91
22.	ME	V18MET17	METAL CUTTING & MACHINE TOOLS	13	9	4	69.23
23.	ME	V18MET37	INTERNAL COMBUSTION ENGINES	26	15	11	57.69
24.	ME	V18MET46	INTELLECTUAL PROPERTY RIGHTS AND PATENTS	12	9	3	75
25.	ECE	V18CSL34	DATA STRUCTURES & ALGORITHMS LAB	1	1	0	100
26.	ECE	V18CST81	DATA STRUCTURES & ALGORITHMS	5	4	1	80
27.	ECE	V18ECL07	MICROPROCESSOR & MICROPROCONTROLLERS LAB	1	1	0	100
28.	ECE	V18ECL08	VLSI DESIGN LAB	2	2	0	100
29.	ECE	V18ECMOOCS	MOOCS COURSE	2	2	0	100
30.	ECE	V18ECT11	VLSI DESIGN	21	13	8	61.9
31.	ECE	V18ECT12	MICROPROCESSORS & MICROCONTROLLERS	15	2	13	13.33
32.	ECE	V18ECT13	ANTENNA & WAVE PROPAGATION	25	10	15	40
33.	ECE	V18ECT15	ENGINEER & SOCIETY	4	2	2	50
34.	ECE	V18EET15	CONTROL SYSTEMS	40	19	21	47.5
35.	ECE	V18ENT05	PROFESSIONAL COMMUNICATION SKILLS-III	7	7	0	100
36.	CSE	V18CST10	DATABASE MANAGEMENT SYSTEMS	23	7	16	30.43
37.	CSE	V18CST11	COMPUTER NETWORKS	17	9	8	52.94
38.	CSE	V18CST12	OPERATING SYSTEMS	18	5	13	27.78
39.	CSE	V18CST13	DESIGN AND ANALYSIS OF ALGORITHMS	27	7	20	25.93
40.	CSE	V18CST14	UNIX PROGRAMMING	19	7	12	36.84

Details enclosed in annexure-I

Item#2: Revaluation results of B.Tech I Semester Regular examinations – July-2021 for the ac. year 2020-21.

The summary of the results

a. Branch Wise Performance Analysis

S. No.	Branch	Revaluation(No of Courses)			
		Applied	Change	No Change	Pass %
1.	CE	3	0	3	0
2.	EEE	4	0	4	0
3.	ME	3	3	0	100
4.	ECE	12	3	9	25
5.	CSE	24	6	18	25
6.	CST	1	1	0	100
7.	ECT	0	0	0	0
Overall		**47**	**13**	**34**	**27.65**

b. Course Wise Performance Analysis

S.No	Course Code	Course Name	Applied	Change	No Change
1	V20CHT01	ENGINEERING CHEMISTRY	10	3	7
2	V20CHT02	ENVIRONMENTAL STUDIES	2	1	1
3	V20CST01	PROGRAMMING IN C FOR PROBLEM SOLVING	17	3	14
4	V20EET01	BASIC ELECTRICAL ENGINEERING	5	0	5
5	V20ENT01	ENGLISH FOR PROFESSIONAL ENHANCEMENT	1	0	1
6	V20MAT01	LINEAR ALGEBRA AND DIFFERENTIAL EQUATIONS	6	4	2
7	V20MET01	ENGINEERING GRAPHICS	1	0	1
8	V20PHT01	ENGINEERING PHYSICS	5	2	3
Total No of Courses Applied			**47**	**13**	**34**

Details enclosed in annexure-II

Item#3: Revaluation results of MBA I Semester Regular examinations – July-2021 for the ac. year 2020-21..

The summary of the results

a. Programme Wise Performance Analysis

S. No.	Program	Revaluation (No of Courses)			
		Applied	Change	No Change	Change %
1.	MBA	4	3	1	75.00

b. Course Wise Performance Analysis

S No	Course Code	Course Name	Applied	Chan ge	No Change
1.	V18MBT04	INDIAN ECONOMY & POLICY	1	1	0
2.	V18MBT05	BUSINESS COMMUNICATION	2	2	0
3.	V18ENT13	EMPLOYABILITY SKILLS-I (ENGLISH COMMUNICATION SKILLS)	1	0	1

Details enclosed in annexure-III

Item#4: Revaluation results of M Tech I Semester Regular examinations – July-2021 for the ac. year 2020-21.

The summary of the results

a.Specliziation Wise Performance Analysis

S. No.	Specialization	Revaluation (No of Courses)			
		Applied	Change	No Change	Change %
1.	MD	4	4	0	100
2.	PSC&AE	0	0	0	0
3.	STE	9	4	5	44.44
4.	VLSI&ES	2	1	1	50.00
5.	CSE	0	0	0	0
Overall		**15**	**9**	**6**	**60.00%**

b. Course Wise Performance Analysis

S No	Specialization	Course Code	Course Name	Applied	Change	No Change
1.	MD	V18MDT02	ADVANCED MECHANISMS	3	3	0
2.	MD	V18MDT03	MECHANICAL VIBRATIONS	1	1	0
3.	STE	V18MAT05	ADVANCED MATHEMATICS	1	1	0
4.	STE	V18SET01	THEORY OF ELASTICITY	3	1	2
5.	STE	V18SET02	MATRIX ANALYSIS OF STRUCTURES	2	1	1
6.	STE	V18SET03	STRUCTURAL DYNAMICS	1	0	1
7.	STE	V18SET05	SUB-STRUCTURE DESIGN	2	1	1
8.	VLSI&ES	V18VLT04	EMBEDDED SYSTEMS DESIGN-I	1	1	0
9.	VLSI&ES	V18VLT10	CPLD & FPGA ARCHITECURES AND APPLICATIONS	1	0	1
Overall				**15**	**9**	**6**

Details enclosed in annexure-IV

Item#5: Revaluation results of MBA IV Semester Regular examinations – August-2021 for the ac. year 2020-21.

The summary of the results

a.Programme Wise Performance Analysis

S. No.	Program	Revaluation (No of Courses)			
		Applied	Change	No Change	Change %
1.	MBA	1	0	1	0

b. Course Wise Performance Analysis

S No	Course Code	Course Name	Applied	Change	No Change
1.	V18MAT08	EMPLOYABILITY SKILLS-IV (APTITUDE-2)	1	0	1

Details enclosed in annexure-V

- The committee has approved the results and accorded the permission for publication of the same.

S.No	Name	Designation	Member Role	Signature
1.	Dr.GuduruVNSRRatnakara Rao	Principal, SVEC(A8)	Chairman	
2.	Dr. R Madhu	Addl.Controller of Examinations-JNTU Kakinada	University Nominee	
3.	Dr.M.Thamarai	Professor/ECE, SVEC(A8)	Member	
4.	Mr.V.S.R.Gopala Krishna Ch	CoE, SVEC(A8)	Member	
5.	Mr G V Subrahmanyam	Deputy CoE,SVEC(A8)	Member	

Minutes of the Meeting of the Result Committee

The Sri Vasavi Engineering College (Autonomous) result committee meeting was held on 27-11-2021 at 3:30 PM through online mode using Zoom application.

Link: https://us02web.zoom.us/j/82507559610

The following members were present in the meeting.

S.No	Name	Designation	Member Role
1.	Dr.Guduru VNSR Ratnakara Rao	Principal	Chairman
2.	Dr. R Madhu	Addl.Controller of Examinations-JNTU Kakinada	University Nominee
3.	Dr.M.Thamarai	Prof./ECE- SVEC(A8)	Member
4.	Mr V.S.R.Gopala Krishna Ch	CoE; SVEC(A8)	Member

Members Absent

S.No	Name	Designation	Member Role
1.	Mr G V Subrahmanyam	Dy. CoE; SVEC(A8)	Member

The following are the minutes of the results committee meeting.

Item#1: B.Tech II Semester (V20) regular results September 2021 for the ac. year 2020-21.

The summary of the results

a. Branch Wise Performance Analysis

S.No	Branch	Registered	Passed	Fail	Pass
1	CE	44	18	26	40.91
2	ECT	61	41	20	67.21
3	EEE	91	43	48	47.25
4	ME	89	32	57	35.96
5	ECE	192	142	50	73.96
6	CSE	257	201	56	78.21
7	CST	65	47	18	72.31
Overall		**799**	**524**	**275**	**65.58**

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Appeared	Pass	Fail	Pass %
1.	V20EET03	ELECTRICAL CIRCUIT ANALYSIS-I	91	53	38	58.24
2.	V20MET02	ENGINEERING MECHANICS	133	87	46	65.41
3.	V20EET02	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	133	97	36	72.93
4.	V20ECT01	SWITCHING THEORY AND LOGIC DESIGN	666	545	121	81.83
5.	V20MAT02	NUMERICAL METHODS AND VECTOR CALCULUS	799	666	133	83.35
6.	V20CHT01	ENGINEERING CHEMISTRY	386	337	49	87.31
7.	V20CST01	PROGRAMMING IN C FOR PROBLEM SOLVING	253	224	29	88.54
8.	V20EEL02	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB	133	122	11	91.73
9.	V20CST02	PYTHON PROGRAMMING	322	298	24	92.55
10.	V20PHT01	ENGINEERING PHYSICS	413	394	19	95.4
11.	V20MET01	ENGINEERING GRAPHICS	413	396	17	95.88
12.	V20CHT02	ENVIRONMENTAL STUDIES	413	397	16	96.13
13.	V20EEL03	ELECTRICAL ENGINEERING WORKSHOP	91	89	2	97.8
14.	V20MEL01	ENGINEERING WORKSHOP	386	379	7	98.19
15.	V20CSL01	PROGRAMMING LAB IN C FOR PROBLEM SOLVING	253	249	4	98.42
16.	V20CHL01	ENGINEERING CHEMISTRY LAB	386	380	6	98.45
17.	V20ENL02	HONE YOUR COMMUNICATION SKILLS LAB-II	799	789	10	98.75

18.	V20PHL01	ENGINEERING PHYSICS LAB	413	409	4	99.03
19.	V20CSL02	PYTHON PROGRAMMING LAB	322	319	3	99.07

Details enclosed in annexure-I

Item#2: MBA II Semester (V18) regular and supplementary results September 2021 for the ac. year 2020-21.

The summary of the results

a. Program Wise Performance Analysis

S.No	Branch	Registered	Passed	Fail	Pass
1	MBA	92	87	5	94.57
Overall		**92**	**87**	**5**	**94.57**

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Appeared	Passed	Fail	Pass %
1.	V18ENT14	EMPLOYABILITY SKILLS-II (SOFTSKILLS)	92	88	4	95.65
2.	V18MBT13	BUSINESS ETHICS & CORPORATE GOVERNANCE	92	91	1	98.91
3.	V18MBT10	PRODUCTION AND OPERATIONS MANAGEMENT	92	91	1	98.91
4.	V18MBT12	LEGAL ENVIRONMENT FOR BUSINESS	92	92	0	100
5.	V18MBT11	BUSINESS RESEARCH & STATISTICAL ANALYSIS	92	92	0	100
6.	V18MBT09	MARKETING MANAGEMENT	92	92	0	100
7.	V18MBT08	HUMAN RESOURCE MANAGEMENT	92	92	0	100
8.	V18MBT07	FINANCIAL MANAGEMENT	92	92	0	100

Details enclosed in annexure-II

Item#3: M Tech II Semester (V18) regular and supplementary results September 2021 for the ac. year 2020-21.
The summary of the results

a.Specialization Wise Performance Analysis

S.No	Branch	Registered	Passed	Fail	Pass
1	MD	5	4	1	80.00
2	STE	4	1	3	25.00
3	VLSI&ES	14	14	0	100.00
4	PSC&AE	5	5	0	100.00
5	MCS	8	8	0	100.00
Overall		**36**	**32**	**4**	**88.89**

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Appeared	Pass	Fail	Pass %
1.	V18SET12	STABILITY OF STRUCTURES	4	2	2	50
2.	V18SEL02	CAD LABORATORY	4	2	2	50
3.	V18SET19	EARTH RETAINING STRUCTURES	4	2	2	50
4.	V18SET10	FINITE ELEMENT METHOD	4	3	1	75
5.	V18SET16	ADVANCED CONCRETE TECHNOLOGY	4	3	1	75
6.	V18MDT14	FINITE ELEMENT METHOD	5	4	1	80
7.	V18MDT13	THEORY OF PLASTICITY	5	4	1	80
8.	V18CTT11	CYBER SECURITY	9	8	1	88.89
9.	V18CTT08	ADVANCED WED TECHNOLOGIES	9	8	1	88.89
10.	V18MDT12	OPTIMIZATION AND RELIABILITY	5	5	0	100
11.	V18MDT42	SEMINAR-II	5	5	0	100
12.	V18MDT22	MECHTRONICS	5	5	0	100
13.	V18MDT16	TRIBOLOGY	5	5	0	100
14.	V18MDT15	DESIGN WITH ADVANCED MATERIALS	5	5	0	100
15.	V18MDL02	DESIGN PRACTICE LAB	5	5	0	100
16.	V18CTT07	DATA SCIENCE	8	8	0	100
17.	V18CTT10	INTERNET OF THINGS	8	8	0	100
18.	V18PSL02	POWER SYSTEMS LAB-II	5	5	0	100
19.	V18PST16	REAL TIME CONTROL OF POWER SYSTEMS	5	5	0	100
20.	V18CTT09	CLOUD COMPUTING	8	8	0	100
21.	V18CTT42	SEMINAR-II	8	8	0	100
22.	V18CTT17	MOBILE COMPUTING	8	8	0	100
23.	V18CTL04	ADVANCED WEB TECHNOLOGIES LAB	8	8	0	100
24.	V18SET13	THEORY OF PLATES AND SHELLS	4	4	0	100
25.	V18VLT23	DESIGN FOR INTERNET OF THINGS	14	14	0	100
26.	V18VLT18	CMOS MIXED SIGNAL CIRCUIT DESIGN	14	14	0	100
27.	V18VLT16	EMBEDDED REAL TIME SYSTEMS	14	14	0	100
28.	V18VLT15	EMBEDDED SYSTEM DESIGN-II	14	14	0	100
29.	V18VLT14	CMOS DIGITAL IC DESIGN	14	14	0	100
30.	V18VLT13	DESIGN FOR TESTABILITY	14	14	0	100
31.	V18PST14	POWER SYSTEM DYNAMICS & STABILITY	5	5	0	100
32.	V18SET42	SEMINAR-II	4	4	0	100
33.	V18PST13	MODERN CONTROL THEORY	5	5	0	100
34.	V18SET11	EARTH QUAKE RESISTANT DESIGN	4	4	0	100
35.	V18PST42	SEMINAR-II	5	5	0	100
36.	V18PST24	HVDC & FACTS	5	5	0	100
37.	V18PST18	POWER SYSTEM DEREGULATION	5	5	0	100
38.	V18VLT42	SEMINAR-II	14	14	0	100
39.	V18PST15	SOLAR & WIND ENERGY	5	5	0	100
40.	V18CTL03	DATA SCIENCE LAB	8	8	0	100
41.	V18VLL02	EMBEDDED SYSTEM DESIGN LAB	14	14	0	100

Details enclosed in annexure-III

Item#4: B Tech III Semester (V18) Supplementary examinations – October-2021 for the ac. year 2020-21.

The summary of the results

a.Branch Wise Performance Analysis

S. No	Branch	No of Students Registered	No. of Courses			Course Wise Pass %
			Registered	Passed	Fail	
1.	CE	30	47	9	38	19.15
2.	EEE	41	95	41	54	43.16
3.	ME	70	153	55	98	35.95
4.	ECE	105	318	135	183	42.45
5.	CSE	77	157	61	96	38.85
6.	CST	19	45	15	30	33.33
7.	ECT	20	51	32	19	62.75
Overall		**362**	**866**	**348**	**518**	**40.18**

b. Course Wise Performance Analysis

S. No	Branch	Course Code	Course Name	Registered	Pass	Fail	Pass %
1.	CE	V18CEL02	MATERIAL TESTING LAB	1	0	1	0
2.	CE	V18CET04	STRENGTH OF MATERIALS-I	24	3	21	12.5
3.	CE	V18CET10	INTRODUCTION TO FLUID MECHANICS	6	3	3	50
4.	CE	V18CET35	PRINCIPLES OF ENVIRONMENTAL SCIENCE & ENGINEERING	1	0	1	0
5.	CE	V18CET36	BUILDING MATERIALS PLANNING & CONSTRUCTION	2	0	2	0
6.	CE	V18EEL01	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB	1	0	1	0
7.	CE	V18EET01	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	10	2	8	20
8.	CE	V18MAT04	PROBABILITY AND STATISTICS	2	1	1	50
9.	EEE	V18CSL31	DATA STRUCTURES & ALGORITHMS LAB	2	2	0	100
10.	EEE	V18ECT05	ANALOG ELECTRONICS	20	0	20	0
11.	EEE	V18EET03	ELECTRICAL CIRCUIT ANALYSIS-1	29	27	2	93.1
12.	EEE	V18EET04	ELECTRICAL MACHINES-1	11	1	10	9.09
13.	EEE	V18EET05	ELECTRO MAGNETIC FIELDS	17	5	12	29.41
14.	EEE	V18EET06	ELECTRICAL AND ELECTRONIC MEASUREMENTS	15	5	10	33.33
15.	EEE	V18ENT12	PROFESSIONAL ETHICS & HUMAN VALUES	1	1	0	100
16.	ME	V18ENT03	PROFESSIONAL COMMUNICATION SKILLS-1	4	3	1	75
17.	ME	V18MAT04	PROBABILITY & STATISTICS	7	5	2	71.43
18.	ME	V18MET03	ENGINEERING MECHANICS	24	7	17	29.17

19.	ME	V18MET04	THERMODYNAMICS	52	23	29	44.23
20.	ME	V18MET05	FLUID MECHANICS & FLUID MACHINES	32	10	22	31.25
21.	ME	V18MET09	MATERIALS ENGINEERING	34	7	27	20.59
22.	ECE	V18ECL01	ELECTRONICS DEVICES & CIRCUITS LAB	2	1	1	50
23.	ECE	V18ECL02	DIGITAL SYSTEM DESIGN LAB	5	5	0	100
24.	ECE	V18ECT01	ELECTRONICS DEVICES & CIRCUITS	52	16	36	30.77
25.	ECE	V18ECT02	DIGITAL SYSTEM DESIGN	47	29	18	61.7
26.	ECE	V18ECT03	SIGNALS & SYSTEMS	57	7	50	12.28
27.	ECE	V18ECT04	NETWORK THEORY	65	22	43	33.85
28.	ECE	V18ENT11	CONSTITUTION OF INDIA	67	45	22	67.16
29.	ECE	V18MBT51	MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS	23	10	13	43.48
30.	CSE	V18CST02	DATA STRUCTURES AND ALGORITHMS	26	11	15	42.31
31.	CSE	V18CST03	DISCRETE MATHEMATICS	25	9	16	36
32.	CSE	V18CST04	OBJECT ORIENTED PROGRAMMING FOR PROBLEM SOLVING	45	25	20	55.56
33.	CSE	V18CST60	TECHNICAL SKILLS-1	1	1	0	100
34.	CSE	V18ECT06	DIGITAL ELECTRONICS	49	14	35	28.57
35.	CSE	V18ENT03	PROFESSIONAL COMMUNICATION SKILLS-1	1	0	1	0
36.	CSE	V18MAT04	PROBABILITY & STATISTICS	10	1	9	10
37.	CST	V18CSL02	DATA STRUCTURES AND ALGORITHMS LAB	2	2	0	100
38.	CST	V18CST02	DATA STRUCTURES AND ALGORITHMS	9	4	5	44.44
39.	CST	V18CST03	DISCRETE MATHEMATICS	4	0	4	0

Details enclosed in annexure-IV

Item#5: B Tech I Semester (V18) Supplementary examinations – October-2021 for the ac. year 2020-21.

The summary of the results

a.Branch Wise Performance Analysis

S. No	Branch	No of Students Registered	No. of Courses			Course Wise Pass %
			Registered	Passed	Fail	
1.	CE	11	13	4	9	30.77
2.	EEE	15	19	5	14	26.32
3.	ME	10	14	0	14	0
4.	ECE	22	42	4	38	9.52
5.	CSE	22	36	6	30	16.67
6.	CST	7	15	1	14	6.67
7.	ECT	8	13	6	7	46.15
Overall		**95**	**152**	**26**	**126**	**17.11**

b. Course Wise Performance Analysis

S. No	Branch	Course Code	Course Name	Appeared	Passed	Fail	Pass %
1.	CE	V18CHT01	ENGINEERING CHEMISTRY	4	0	4	0
2.	CE	V18CST01	PROGRAMMING IN C FOR PROBLEM SOLVING	9	4	5	44.44
3.	EEE	V18CHT01	ENGINEERING CHEMISTRY	3	0	3	0
4.	EEE	V18CST01	PROGRAMMING IN C FOR PROBLEM SOLVING	9	2	7	22.22
5.	EEE	V18MAT01	ENGINEERING MATHEMATICS – I	1	1	0	100
6.	EEE	V18MET01	ENGINEERING GRAPHICS	6	2	4	33.33
7.	ME	V18CHT02	ENVIRONMENTAL STUDIES	1	0	1	0
8.	ME	V18EET01	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	8	0	8	0
9.	ME	V18MAT01	ENGINEERING MATHEMATICS – I	1	0	1	0
10.	ME	V18PHT01	OPTICS AND WAVES	4	0	4	0
11.	ECE	V18CHT01	ENGINEERING CHEMISTRY	16	2	14	12.5
12.	ECE	V18CSL01	PROGRAMMING LAB IN C FOR PROBLEM SOLVING	1	0	1	0
13.	ECE	V18CST01	PROGRAMMING IN C FOR PROBLEM SOLVING	16	2	14	12.5
14.	ECE	V18MAT01	ENGINEERING MATHEMATICS – I	2	0	2	0
15.	ECE	V18MET01	ENGINEERING GRAPHICS	7	0	7	0
16.	CSE	V18CHT02	ENVIRONMENTAL STUDIES	6	1	5	16.67
17.	CSE	V18EET01	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	13	0	13	0
18.	CSE	V18MAT01	ENGINEERING MATHEMATICS – I	4	2	2	50
19.	CSE	V18PHT02	OPTO ELECTRONICS AND SEMI CONDUCTORS	13	3	10	23.08
20.	CST	V18CHT02	ENVIRONMENTAL STUDIES	3	1	2	33.33
21.	CST	V18EET01	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	4	0	4	0
22.	CST	V18MAT01	ENGINEERING MATHEMATICS-I	4	0	4	0
23.	CST	V18PHT02	OPTO ELECTRONICS AND SEMI CONDUCTORS	4	0	4	0
24.	ECT	V18CHT01	ENGINEERING CHEMISTRY	1	0	1	0
25.	ECT	V18CST01	PROGRAMMING IN C FOR PROBLEM SOLVING	8	3	5	37.5
26.	ECT	V18MAT01	ENGINEERING MATHEMATICS-I	1	1	0	100
27.	ECT	V18MET01	ENGINEERING GRAPHICS	3	2	1	66.67

Details enclosed in annexure-V

Item#6: B Tech II Semester (V18) Supplementary examinations – October-2021 for the ac. year 2020-21.

The summary of the results

a.Branch Wise Performance Analysis

S. No	Branch	No of Students Registered	No. of Courses			Course Wise Pass %
			Registered	Passed	Fail	
1.	CE	6	8	5	3	62.5
2.	EEE	8	12	4	8	33.33
3.	ME	41	77	19	58	24.68
4.	ECE	15	21	4	17	19.05
5.	CSE	43	71	13	58	18.31
6.	CST	11	21	5	16	23.81
7.	ECT	2	3	1	2	33.33
Overall		**126**	**213**	**51**	**162**	**23.94**

b. Course Wise Performance Analysis

S. No	Branch	Course Code	Course Name	Registered	Pass	Fail	Pass %
1.	CE	V18ENT02	ENGLISH-II	1	1	0	100
2.	CE	V18MET03	ENGINEERING MECHANICS	5	3	2	60
3.	CE	V18PHT01	OPTICS AND WAVES	2	1	1	50
4.	EEE	V18MAT02	ENGINEERING MATHEMATICS-II	1	0	1	0
5.	EEE	V18MET02	INTRODUCTION TO ENGINEERING MECHANICS	7	0	7	0
6.	EEE	V18PHT02	OPTO ELECTRONICS AND SEMI CONDUCTORS	4	4	0	100
7.	ME	V18CHT01	ENGINEERING CHEMISTRY	20	1	19	5
8.	ME	V18CSL01	PROGRAMMING LAB IN C FOR PROBLEM SOLVING	1	1	0	100
9.	ME	V18CST01	PROGRAMMING IN C FOR PROBLEM SOLVING	32	6	26	18.75
10.	ME	V18ENT02	ENGLISH-II	2	0	2	0
11.	ME	V18MAT02	ENGINEERING MATHEMATICS-II	4	2	2	50
12.	ME	V18MET01	ENGINEERING GRAPHICS	18	9	9	50
13.	ECE	V18CHT02	ENVIRONMENTAL STUDIES	4	1	3	25
14.	ECE	V18EET02	BASIC ELECTRICAL ENGINEERING	8	1	7	12.5
15.	ECE	V18ENL02	ENGLISH COMMUNICATION SKILLS LAB-II	1	1	0	100
16.	ECE	V18MAT02	ENGINEERING MATHEMATICS-II	3	1	2	33.33
17.	ECE	V18PHT02	OPTO ELECTRONICS AND SEMI CONDUCTORS	5	0	5	0
18.	CSE	V18CHT01	ENGINEERING CHEMISTRY	22	1	21	4.55
19.	CSE	V18CST01	PROGRAMMING IN C FOR PROBLEM SOLVING	23	3	20	13.04
20.	CSE	V18MAT02	ENGINEERING MATHEMATICS-II	1	0	1	0
21.	CSE	V18MET01	ENGINEERING GRAPHICS	25	9	16	36
22.	CST	V18CHT01	ENGINEERING CHEMISTRY	4	0	4	0
23.	CST	V18CST01	PROGRAMMING IN C FOR PROBLEM SOLVING	4	2	2	50
24.	CST	V18MAT02	ENGINEERING MATHEMATICS-II	4	2	2	50

25.	CST	V18MET01	ENGINEERING GRAPHICS	9	1	8	11.11
26.	ECT	V18MAT02	ENGINEERING MATHEMATICS-II	1	1	0	100
27.	ECT	V18PHT02	OPTO ELECTRONICS AND SEMI CONDUCTORS	2	0	2	0

Details enclosed in annexure-VI

Item#7: Revaluation results of B.Tech IV Semester (V18) Regular and supplementary examinations – Aug-2021 for the ac. year 2020-21.

The summary of the results

a. Branch Wise Performance Analysis

S. No.	Branch	Revaluation(No of Courses)			
		Applied	Change	No Change	Pass %
1.	CE	7	1	6	16.66
2.	EEE	6	1	5	16.66
3.	ME	7	1	6	16.66
4.	ECE	25	8	17	32.0
5.	CSE	35	11	24	31.4
6.	CST	8	4	4	50.0
7.	ECT	12	2	10	16.66
Overall		**100**	**28**	**72**	**28.00**

b. Course Wise Performance Analysis

S. No	Branch	Course Code	Course Name	Applied	Change	No change
1.	CE	V18CET11	SURVEYING AND GEOMATICS	1	1	0
2.	CE	V18CET13	STRENGTH OF MATERIALS-II	5	1	4
3.	CE	V18MBT51	MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS	3	1	2
4.	EEE	V18EET07	ELECTRICAL CIRCUIT ANALYSIS-II	2	0	2
5.	EEE	V18EET08	DIGITAL ELECTRONICS	2	0	2
6.	EEE	V18EET09	ELECTRICAL MACHINES-II	1	0	1
7.	EEE	V18EET10	ELECTRICAL POWER GENERATION AND TRANSMISSION	1	1	0
8.	ME	V18MET06	THEORY OF MACHINES-I	1	1	0
9.	ME	V18MET07	APPLIED THERMODYNAMICS	3	0	3

10.	ME	V18MET08	MECHANICS OF SOLIDS	1	0	1
11.	ME	V18MET11	INSTRUMENTATION & CONTROL SYSTEMS	1	0	1
12.	ECE	V18ECT07	ANALOG & DIGITAL COMMUNICATIONS	6	0	6
13.	ECE	V18ECT08	ANALOG CIRCUITS	5	1	4
14.	ECE	V18ECT09	PROBABILITY THEORY & STOCHASTIC PROCESS	7	2	5
15.	ECE	V18ECT10	ELECTROMAGNETIC WAVES & TRANSMISSION LINES	5	3	2
16.	ECE	V18MAT03	MATHEMATICS-III	2	2	0
18.	CSE	V18ENT11	CONSTITUTION OF INDIA	5	0	5
19.	CSE	V18CST05	COMPUTER ORGANIZATION	9	3	6
20.	CSE	V18CST07	FORMAL LANGUAGES AND AUTOMATA THEORY	3	0	3
21.	CSE	V18CST08	JAVA PROGRAMMING	4	2	2
22.	CSE	V18CST09	PYTHON PROGRAMMING	13	5	8
23.	CST	V18CST05	COMPUTER ORGANIZATION	1	1	0
24.	CST	V18CST06	SOFTWARE ENGINEERING	2	1	1
25.	CST	V18CST08	JAVA PROGRAMMING	1	0	1
27.	CST	V18CST09	PYTHON PROGRAMMING	4	2	2
28.	ECT	V18ECT07	ANALOG & DIGITAL COMMUNICATIONS	4	1	3
29.	ECT	V18ECT08	ANALOG CIRCUITS	6	1	5
30.	ECT	V18ECT10	ELECTROMAGNETIC WAVES & TRANSMISSION LINES	2	0	2

Details enclosed in annexure-VII

Item#8: Revaluation results of B.Tech VI Semester (V18) Regular examinations – Aug-2021 for the ac. year 2020-21.

The summary of the results

a. Branch Wise Performance Analysis

S. No.	Branch	Revaluation(No of Courses)			
		Applied	Change	No Change	Pass %
1.	CE	17	5	10	29.46
2.	EEE	1	1	0	100
3.	ME	2	0	2	---
4.	ECE	11	5	6	45.45
5.	CSE	20	15	5	75

Overall	**51**	**26**	**25**	**50.98**

b. Course Wise Performance Analysis

S. No	Branch	Course Code	Course Name	Applied	Change	No change
1.	CE	V18CET20	STRUCTURAL ANALYSIS–II	6	3	3
2.	CE	V18CET22	DESIGN OF STEEL STRUCTURES	5	0	5
3.	CE	V18CET23	TRANSPORTATION ENGINEERING-II	1	0	1
4.	CE	V18CSTOE3	PYTHON PROGRAMMING	5	2	3
5.	EEE	V18CSTOE1	DATA BASE MANAGEMENT SYSTEMS	1	1	0
6.	ME	V18MET18	DESIGN OF MACHINE ELEMENTS–II	2	0	2
7.	ECE	V18ECT16	DIGITAL SIGNAL PROCESSING	2	1	1
8.	ECE	V18ECT17	MICROWAVE ENGINEERING	9	4	5
9.	CSE	V18CST19	COMPILER DESIGN	7	7	0
10.	CSE	V18CST20	DATA MINING	4	2	2
11.	CSE	V18CST21	OBJECT ORIENTED ANALYSIS AND DESIGN THROUGH UML	2	2	0
12.	CSE	V18CST22	CRYPTOGRAPHY & NETWORK SECURITY	4	2	2
13.	CSE	V18CST25	MACHINE LEARNING	3	2	1

Details enclosed in annexure-VIII

Item#9: Revaluation results of B.Tech V Semester (V18) Supplementary examinations – Oct-2021 for the ac. year 2020-21.

The summary of the results

a. Branch Wise Performance Analysis

S. No.	Branch	Revaluation(No of Courses)			
		Applied	Change	No Change	Pass %
1.	CE	5	1	4	20.00
2.	ECE	3	0	3	---
Overall		**51**	**26**	**25**	**50.98**

b. Course Wise Performance Analysis

S. No	Branch	Course Code	Course Name	Applied	Change	No change
1.	CE	V18ENT11	CONSTITUTION OF INDIA	1	1	0
2.	CE	V18CET16	GEOTECHNICAL ENGINEERING-I	2	1	1
3.	CE	V18CET18	DESIGN OF REINFORCED CONCRETE STRUCTURES	1	0	1
4.	CE	V18CET19	TRANSPORTATION ENGINEERING-I	1	0	1
7.	ECE	V18ECT12	MICROPROCESSORS & MICROCONTROLLERS	1	0	1
8.	ECE	V18ECT13	ANTENNA & WAVE PROPAGATION	1	0	1
9.	ECE	V18ECT15	ENGINEER & SOCIETY	1	0	1

Details enclosed in annexure-IX

- The committee has approved the results and accorded the permission for publication of the same.

S.No	Name	Designation	Member Role	Signature
1.	Dr.GuduruVNSRRatnakara Rao	Principal, SVEC(A8)	Chairman	
2.	Dr. R Madhu	Addl.Controller of Examinations-JNTU Kakinada	University Nominee	
3.	Dr.M.Thamarai	Professor/ECE, SVEC(A8)	Member	
4.	Mr.V.S.R.Gopala Krishna Ch	CoE, SVEC(A8)	Member	

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SRI VASAVI ENGINEERING COLLEGE (Autonomous)

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|Accredited by NAAC with 'A' Grade |&| Accredited by NBA |
Approved by AICTE, New Delhi and Permanently Affiliated to JNTUK, Kakinada
Pedatadepalli, TADEPALLIGUDEM – 534 101, W.G. Dist, (A.P.)

Dt: 01/02/2022

Minutes of the Meeting of the Result Committee

The Sri Vasavi Engineering College (Autonomous) result committee meeting was held on 26-01-2022 at 3:00 PM through online mode using Zoom application.

Link: https://us02web.zoom.us/j/82961054514

The following members were present in the meeting.

S.No	Name	Designation	Member Role
4.	Dr. Guduru VNSR Ratnakara Rao	Principal, SVEC(A8)	Chairman
5.	Dr. R. Madhu	Addl. Controller of Examinations - JNTU Kakinada	University Nominee
6.	Dr. M. Thamarai	Professor/ECE, SVEC(A8)	Member
7.	Mr. VSR Gopala Krishna Ch.	CoE, SVEC(A8)	Member
8.	Mr. G.V. Subrahmanyam	Dy. CoE; SVEC(A8)	Member

The following are the minutes of the results committee meeting.

Item#1: B.Tech I Semester (V20) Supplementary results November 2021 for the ac. year 2020-21.

The summary of the results

a. Branch Wise Performance Analysis

S. No	Branch	No of Students Registered	No. of Courses			Course Wise Pass %
			Registered	Passed	Fail	
1.	CE	33	80	61	19	**76.3**
2.	EEE	38	76	56	20	**73.7**
3.	ME	66	176	150	26	**85.2**
4.	ECE	36	84	48	36	**57.1**
5.	CSE	57	92	69	23	**75.0**
6.	CST	11	26	17	9	**65.4**

7.	ECT	13	26	21	5	**80.8**
Overall		**254**	**560**	**422**	**138**	**75.4**

b. Course Wise Performance Analysis

S. No	Branch	Course Code	Course Name	Registered	Pass	Fail	Pass %
1.	CE	V20CHT02	ENVIRONMENTAL STUDIES	9	4	5	44.44
2.		V20CSL01	PROGRAMMING LAB IN C FOR PROBLEM SOLVING	3	3	0	100
3.		V20CST01	PROGRAMMING IN C FOR PROBLEM SOLVING	31	29	2	93.55
4.		V20ENL01	HONE YOUR COMMUNICATIONS SKILLS LAB-I	3	3	0	100
5.		V20ENT01	ENGLISH FOR PROFESSIONAL ENHANCEMENT	2	2	0	100
6.		V20MAT01	LINEAR ALGEBRA AND DIFFERENTIAL EQUATIONS	10	7	3	70
7.		V20MET01	ENGINEERING GRAPHICS	12	3	9	25
8.		V20PHL01	ENGINEERING PHYSICS LAB	3	2	1	66.67
9.		V20PHT01	ENGINEERING PHYSICS	7	5	2	71.43
10.	EEE	V20CHL01	ENGINEERING CHEMISTRY LAB	2	2	0	100
11.		V20CHT01	ENGINEERING CHEMISTRY	23	13	10	56.52
12.		V20CSL01	PROGRAMMING LAB IN C FOR PROBLEM SOLVING	4	4	0	100
13.		V20CST01	PROGRAMMING IN C FOR PROBLEM SOLVING	33	25	8	75.76
14.		V20ENL01	HONE YOUR COMMUNICATION SKILLS LAB-I	2	2	0	100
15.		V20ENT01	ENGLISH FOR PROFESSIONAL ENHANCEMENT	1	1	0	100
16.		V20MAT01	LINEAR ALGEBRA AND DIFFERENTIAL EQUATIONS	9	7	2	77.78
17.		V20MEL01	ENGINEERING WORKSHOP	2	2	0	100
18.	ME	V20CHT02	ENVIRONMENTAL STUDIES	14	8	6	57.14
19.		V20CSL01	PROGRAMMING LAB IN C FOR PROBLEM SOLVING	5	4	1	80.00
20.		V20CST01	PROGRAMMING IN C FOR PROBLEM SOLVING	52	51	1	98.08
21.		V20ENL01	HONE YOUR COMMUNICATIONS SKILLS LAB-I	4	4	0	100
22.		V20ENT01	ENGLISH FOR PROFESSIONAL ENHANCEMENT	5	5	0	100
23.		V20MAT01	LINEAR ALGEBRA AND DIFFERENTIAL EQUATIONS	31	29	2	93.55
24.		V20MET01	ENGINEERING GRAPHICS	38	28	10	73.68
25.		V20PHL01	ENGINEERING PHYSICS LAB	4	4	0	100
26.		V20PHT01	ENGINEERING PHYSICS	23	17	6	73.91
27.	ECE	V20CHT02	ENVIRONMENTAL STUDIES	8	2	6	25.00
28.		V20EEL01	BASIC ELECTRICAL ENGINEERING LAB	6	6	0	100
29.		V20EET01	BASIC ELECTRICAL ENGINEERING	18	9	9	50
30.		V20ENL01	HONE YOUR COMMUNICATION SKILLS LAB-I	3	3	0	100
31.		V20ENT01	ENGLISH FOR PROFESSIONAL ENHANCEMENT	3	2	1	66.67
32.		V20MAT01	LINEAR ALGEBRA AND DIFFERENTIAL EQUATIONS	11	5	6	45.45
33.		V20MET01	ENGINEERING GRAPHICS	14	7	7	50
34.		V20PHL01	ENGINEERING PHYSICS LAB	3	3	0	100
35.		V20PHT01	ENGINEERING PHYSICS	18	11	7	61.11
36.		V20CHL01	ENGINEERING CHEMISTRY LAB	2	2	0	100
37.		V20CHT01	ENGINEERING CHEMISTRY	32	16	16	50
38.		V20CSL01	PROGRAMMING LAB IN C FOR PROBLEM SOLVING	1	1	0	100

39.	CSE	V20CST01	PROGRAMMING IN C FOR PROBLEM SOLVING	46	42	4	91.30
40.		V20ENL01	HONE YOUR COMMUNICATION SKILLS LAB-I	1	1	0	100
41.		V20ENT01	ENGLISH FOR PROFESSIONAL ENHANCEMENT	1	1	0	100
42.		V20MAT01	LINEAR ALGEBRA AND DIFFERENTIAL EQUATIONS	7	4	3	57.14
43.		V20MEL01	ENGINEERING WORKSHOP	2	2	0	100
44.	CST	V20CHL01	ENGINEERING CHEMISTRY LAB	1	1	0	100
45.		V20CHT01	ENGINEERING CHEMISTRY	7	6	1	85.71
46.		V20CSL01	PROGRAMMING LAB IN C FOR PROBLEM SOLVING	1	0	1	0.00
47.	CST	V20CST01	PROGRAMMING IN C FOR PROBLEM SOLVING	9	5	4	55.56
48.		V20ENL01	HONE YOUR COMMUNICATION SKILLS LAB-I	1	1	0	100
49.		V20ENT01	ENGLISH FOR PROFESSIONAL ENHANCEMENT	1	1	0	100
50.		V20MAT01	LINEAR ALGEBRA AND DIFFERENTIAL EQUATIONS	5	2	3	40
51.		V20MEL01	ENGINEERING WORKSHOP	1	1	0	100
52.	ECT	V20CHT02	ENVIRONMENTAL STUDIES	2	2	0	100
53.		V20EEL01	BASIC ELECTRICAL ENGINEERING LAB	3	3	0	100
54.		V20EET01	BASIC ELECTRICAL ENGINEERING	6	5	1	83.33
55.		V20ENL01	HONE YOUR COMMUNICATION SKILLS LAB-I	1	1	0	100
56.		V20ENT01	ENGLISH FOR PROFESSIONAL ENHANCEMENT	1	1	0	100
57.		V20MAT01	LINEAR ALGEBRA AND DIFFERENTIAL EQUATIONS	3	2	1	66.67
58.		V20MET01	ENGINEERING GRAPHICS	5	2	3	40
59.		V20PHL01	ENGINEERING PHYSICS LAB	1	1	0	100
60.		V20PHT01	ENGINEERING PHYSICS	4	4	0	100

Details enclosed in annexure-I

Item#2: MBA I Semester (V18) supplementary results November 2021 for the ac. year 2020-21.

The summary of the results

a. Program Wise Performance Analysis

S. No	Program	No of Students Registered	No. of Courses			Course Wise Pass %
			Registered	Passed	Fail	
1.	MBA	07	15	11	04	**73.3**

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Registered	Pass	Fail	Pass %
1.	V18MBT01	MANAGEMENT THEORY & ORGANIZATIONAL BEHAVIOUR	2	2	0	100
2.	V18MBT02	MANAGERIAL ECONOMICS	2	1	1	50
3.	V18MBT03	ACCOUNTING FOR MANAGERS	2	2	0	100
4.	V18MBT04	INDIAN ECONOMY & POLICY	4	4	0	100
5.	V18MBT05	BUSINESS COMMUNICATION	1	1	0	100
6.	V18ENT13	EMPLOYABILITY SKILLS-I (ENGLISH COMMUNICATION SKILLS)	4	1	3	25

Details enclosed in annexure-II

Item#3: M Tech I Semester (V18) supplementary results November 2021 for the ac. year 2020-21.

The summary of the results

a. Specialization Wise Performance Analysis

S. No	Specialization	No of Students Registered	No. of Courses			Course Wise Pass %
			Registered	Passed	Fail	
1.	PSCA	01	01	01	00	**100**
2.	CSE	06	11	08	03	**72.7**
3.	VLSI & ES	01	06	06	00	**100**
4.	SE	02	05	03	02	**60**
Overall		**10**	23	18	05	**78.26**

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Registered	Pass	Fail	Pass %
1.	V18PST02	ADVANCED COMPUTER METHODS IN POWER SYSTEMS	1	1	0	100
2.	V18CTT01	OBJECT ORIENTED SOFTWARE ENGINEERING	1	1	0	100
3.	V18CTT04	ADVANCED OPERATING SYSTEMS	4	3	1	75
4.	V18CTT05	ADVANCED DATA STRUCTURES AND ALGORITHMS ANALYSIS	3	1	2	33.33
5.	V18CTT06	MACHINE LEARNING	3	3	0	100
6.	V18VLT01	DIGITAL SYSTEM DESIGN	1	1	0	100
7.	V18VLT02	VLSI TECHNOLOGY AND DESIGN	1	1	0	100
8.	V18VLT03	CMOS ANALOG IC DESIGN	1	1	0	100
9.	V18VLT04	EMBEDDED SYSTEMS DESIGN-I	1	1	0	100
10.	V18VLT07	SYSTEM ON CHIP	1	1	0	100
11.	V18VLT10	CPLD & FPGA ARCHITECURES AND APPLICATIONS	1	1	0	100
12.	V18SET01	THEORY OF ELASTICITY	2	2	0	100
13.	V18SET02	MATRIX ANALYSIS OF STRUCTURES	1	1	0	100
14.	V18SET03	STRUCTURAL DYNAMICS	1	0	1	0
15.	V18SET05	SUB-STRUCTURE DESIGN	1	0	1	0

Details enclosed in annexure-III

Item#4: MBA IV Semester (V18) Supplementary examinations – November-2021 for the ac. year 2020-21.

The summary of the results

a. Program Wise Performance Analysis

S. No	Program	No. of Courses			Course Wise Pass %
		Registered	Passed	Fail	
1.	MBA	8	8	0	**100**

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Registered	Pass	Fail	Pass %
1.	V18MAT08	EMPLOYABILITY SKILLS-IV (APTITUDE-2)	6	6	0	100
2.	V18MBT29	LOGISTICS & SUPPLY CHAIN MANAGEMENT	1	1	0	100
3.	V18MBT35	FINANCIAL DERIVATIVES	1	1	0	100

Details enclosed in annexure-IV

Item#5: Revaluation results of B Tech III Semester (V18) Supplementary examinations – September-2021 for the ac. year 2020-21.

The summary of the results

a. Branch Wise Performance Analysis

S. No.	Branch	Revaluation(No of Courses)			
		Applied	Change	No Change	Pass %
1.	CE	3	0	3	---
2.	EEE	3	0	3	---
3.	ME	4	1	3	25.0
4.	ECE	17	1	16	5.88
5.	CSE	9	0	9	---
6.	CST	5	0	5	---
7.	ECT	2	0	2	---

b. Course Wise Performance Analysis

S.No	Course Code	Course Name	Applied	Change	No Change
1.	V18CET04	Strength Of Materials-I	2	---	2
2.	V18CST02	Data Structures And Algorithms	2	---	2
3.	V18CST04	Object Oriented Programming For Problem Solving	9	---	9
4.	V18ECT01	Electronics Devices & Circuits	5	1	4
5.	V18ECT02	Digital System Design	1	---	1
6.	V18ECT03	Signals & Systems	4	---	4
7.	V18ECT04	Network Theory	4	---	4
8.	V18ECT05	Analog Electronics	1	---	1
9.	V18ECT06	Digital Electronics	3	---	3

10.	V18EET01	Basic Electrical and Electronics Engineering	1	---	1
11.	V18EET05	Electro Magnetic Fields	1	---	1
12.	V18EET06	Electrical And Electronic Measurements	1	---	1
13.	V18ENT11	Constitution Of India	4	---	4
14.	V18MBT51	Managerial Economics & Financial Analysis	1	---	1
15.	V18MET05	Fluid Mechanics & Fluid Machines	2	1	1
16.	V18MET09	Materials Engineering	2	---	2
		Total No of Courses Applied:	**43**	**2**	**41**

Details enclosed in annexure-V

Item#6: **Revaluation results of B Tech II Semester (V18 & V20) Regular and Supplementary examinations – September-2021 for the ac. year 2020-21.**

The summary of the results

a. Branch Wise Performance Analysis

S. No.	Branch	Revaluation			
		Applied	Chang e	No Change	Pass %
1.	CE	--	--	--	---
2.	EEE	4	0	4	---
3.	ME	18	4	14	22.22
4.	ECE	18	6	12	33.33
5.	CSE	19	5	14	26.32
6.	CST	6	2	4	33.33
7.	ECT	15	7	8	46.67

b. Course Wise Performance Analysis

S.No	Course Code	Course Name	Applied	Change	No Change
1.	V18CHT01	ENGINEERING CHEMISTRY	1	---	1
2.	V18CST01	PROGRAMMING IN C FOR PROBLEM SOLVING	2	1	1
3.	V18MAT02	ENGINEERING MATHEMATICS-II	1	1	---
4.	V18MET01	ENGINEERING GRAPHICS	1	1	---
5.	V18MET03	ENGINEERING MECHANICS	1	---	1
6.	V18PHT02	OPTO ELECTRONICS AND SEMI CONDUCTORS	1	1	---
7.	V20CHT01	ENGINEERING CHEMISTRY	19	9	10
8.	V20CHT02	ENVIRONMENTAL STUDIES	1	1	---
9.	V20CST01	PROGRAMMING IN C FOR PROBLEM SOLVING	16	6	10
10.	V20CST02	PYTHON PROGRAMMING	5	3	2
11.	V20ECT01	SWITCHING THEORY AND LOGIC DESIGN	30	5	25

12.	V20EET02	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	3	---	3
13.	V20EET03	ELECTRICAL CIRCUIT ANALYSIS-I	2	---	2
14.	V20MAT02	NUMERICAL METHODS AND VECTOR CALCULUS	18	8	10
15.	V20MET02	ENGINEERING MECHANICS	5	---	5
16.	V20PHT01	ENGINEERING PHYSICS	2	---	2
Total No of Courses Applied			**108**	**36**	**72**

Details enclosed in annexure-VI

Item#7: Revaluation results of B.Tech I Semester (V18) supplementary examinations – September-2021 for the ac. year 2020-21.

The summary of the results

a. Branch Wise Performance Analysis

S. No.	Branch	Revaluation(No of Courses)			
		Applied	Change	No Change	Pass %
1.	CE	1	0	1	--
2.	ECE	1	0	1	---

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Applied	Change	No change
1.	V18CST01	PROGRAMMING IN C FOR PROBLEM SOLVING	2	0	2

Details enclosed in annexure-VII

Item#8: Revaluation results of MBA II Semester (V18) Regular and Supplementary examinations – September-2021 for the ac. year 2020-21.

The summary of the results

a. Branch Wise Performance Analysis

S. No.	Branch	Revaluation(No of Courses)			
		Applied	Change	No Change	Pass %
1.	MBA	2	1	0	50

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Applied	Change	No change
1.	V18ENT14	EMPLOYABILITY SKILLS-II (SOFTSKILLS)	1	0	1
2.	V18MBT13	BUSINESS ETHICS & CORPORATE GOVERNANCE	1	1	0

Details enclosed in annexure-VIII

Item#9: Revaluation results of M.Tech II Semester (V18) Regular and Supplementary examinations – Sept-2021 for the ac. year 2020-21.

The summary of the results

a. Branch Wise Performance Analysis

S. No.	Branch	Revaluation (No of Courses)			
		Applied	Change	No Change	Pass %
1.	STE	2	1	1	50.00

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Applied	Change	No change
1.	V18SET12	STABILITY OF STRUCTURES	1	0	1
2.	V18SET10	FINITE ELEMENT METHOD	1	0	1

Details enclosed in annexure-IX

The committee has approved the results and accorded the permission for publication of the same.

S.No	Name	Designation	Member Role	Signature
1.	Dr. Guduru VNSR Ratnakara Rao	Principal, SVEC(A8)	Chairman	
2.	Dr. R. Madhu	Addl. Controller of Examinations-JNTU Kakinada	University Nominee	
3.	Dr. M. Thamarai	Professor/ECE, SVEC(A8)	Member	
4.	Mr. VSR Gopala Krishna Ch.	CoE, SVEC(A8)	Member	
5.	Mr. G.V. Subrahmanyam	Dy. CoE; SVEC(A8)	Member	

*   *   *

Annexure-XII

Amendments to UG V18 Academic regulations

1. **As per V18 regulations vide item no:7.3 & 7.4:**

   A student shall be promoted from II year (IV Semester) to III year (V Semester) if he/she earns 50% of the total credits specified up to and including IV semester examinations.

   A student shall be promoted from III year(VI semester) to IV year(VII semester) only if he earns 50 % of the credits specified up to and including III year I semester

   This is amended as follows

   If the number of credits required to promote is not a whole number, the credits are rounded to next higher digit / whole number

   No minimum credits required for promotion from IV semester to V semester, for the academic year 2021-2022 only, as a special case due to COVID-19.

   No minimum credits required for promotion from VI semester to VII semester, for the academic year 2021-2022 only, as a special case due to COVID-19.

2. **Proposed changes for internal evaluations of IV semester and VI semester UG students during academic year 2020-2021.**

   Comprehensive Test: The Comprehensive examination is conducted for 60 marks and scaled down to 10 marks covering the total syllabus.

   Comprehensive marks will be awarded based up on the performance in Mid-I & Mid-II examinations-Best out of two mid exams will be scaled down to 10 marks.

Annexure-XIII

List of BOS members for AI & ML B.Tech Course

S.No.	Name of the BOS Member	Role	Details
1.	**Dr. D. Haritha,** Professor of CSE, UCEK, JNTUK	University Nominee	Email : harithadasari9@yahoo.com Phone : 9440810901
2.	**Dr. Nagesh Bhattu Sristy,** Assistant Professor, Department of CSE, NIT-AP.	Academic Expert	Email : nageshbhattu@nitandhra.ac.in Phone : 9441955120
3.	**Dr. K. Venkata Rao**, Professor Department of CS&SE, AU College of Engineering, Visakhapatnam	Academic Expert	Email : professor_venkat@yahoo.com Phone :8008683906
4.	**Mr. Mbm Raju**	Industry Expert1	Email: raju.mbm@tcs.com
5.	**Mr.Vinay Kumar** Director XpertBridge, Hyderabad	Industry Expert2	Email : vinaykumarvk@gmail.com Phone : 9885313991
6.	**Mr. M Jnana Surya Prakasha Rao** BI Technical Consultant Pragmasys consulting LLP Gurgaon	Alumni	Email : surya.prakash@pragmasys.in,sprakash.jspl@gmail.com Phone :9948888340

List of above BOS members Sl No. 2 to 6 is already communicated to members of Academic Council on 11th November 2021.

Sl.no. 1 is nominated by affiliating university (JNTUK) wide reference
Lr. No. JNTUK/DAP/Sri Vasavi EC(A8)/ Nominees / 2021, dated 21/12/2021

Annexure-XIV

Minutes of the First Board of Studies of CSE (AI) and AIML

The First Meeting of BOS, B.Tech in CSE(AI) and B.Tech in AI&ML is held at 11:00 AM Through online mode on 31.12.2021(Friday) using the following link:

https://us02web.zoom.us/j/81026816076

The following members attended the meeting:

S.No.	Name of the Member	Designation	Role
1.	Dr. D Jaya Kumari	Professor, HoD-CSE, SVEC	Chairperson
2.	Dr.Dasari Haritha	Professor &HOD, UCEK, Kakinada	University Nominee
3.	Dr Nagesh Bhattu Sristy	Asst.Professor, Department of CSE, NIT- AP	Academic Expert
4.	Dr. K. Venkata Rao	Professor, Department of CS&SE,Andhra University, Vishakapatnam	Academic Expert
5.	Sri. Vinay Kumar	Director,XpertBridge, Hyderabad.	Industry Expert
6.	Sri. M Jnana Surya Prakasha Rao	Pragmasys consulting LLP, Gurgaon	Alumni
7.	Dr. G Loshma	Professor	Member
8.	Dr. V S Naresh	Professor	Member
9.	Ch. Raja Ramesh	Associate Professor	Member
10.	Dr.K. ShirinBhanu	Associate Professor	Member
11.	Dr.P Laxmikanth	Associate Professor	Member
12.	A. Leelavathi	Sr. Assistant Professor	Member
13.	D Anjani Suputhri Devi	Sr. Assistant Professor	Member
14.	B.SriRamya	Assistant Professor	Member
15.	G.Sriram Ganesh	Assistant Professor	Member
16.	M S Kumar Reddy	Assistant Professor	Member
17.	M Sree Radha Mangamani	Assistant Professor	Member

Members Absent:

S.No.	Name of the Member	Designation	Role
1.	Mbm Raju	Head, Strategic Initiatives And Isu / Branch OperationsTata Consultancy Services	Industry Expert

Item No. 1: Introducing members of BOS.

The HOD extended a formal welcome and introduced the members.

Item No. 2: Approval of Course Structure and Syllabus for I and II Semesters of B.Tech inCSE(AI) and B.Tech in AI&ML Programmes under V20 Regulation.

Approved the Course Structure and Syllabus for I and II Semesters of B.Tech in CSE(AI) andB.Tech in AI&ML Programmes under V20 Regulation and suggested the following changes:

SEM	Course Code	Suggestions	Inclusions / Modifications
II	V20CSL04	In Data Structures Lab course it was suggested that include Stacks using Linked List	Included as an Add on Experiment

The Approved and Modified Course Structure and Syllabus is given in **Annexure-CAI-I**

Chairperson of BOS
(Dr.D Jaya Kumari)

Head of the Department
Dept. of Computer Science & Engineering
Sri Vasavi Engineering College
TADEPALLIGUDEM-534 101

Annexure-CAI-I

SRI VASAVI ENGINEERING COLLEGE (Autonomous)

(Permanent Affiliation to JNTUK, Kakinada), PEDATADEPALLI, TADEPALLIGUDEM-534 101

Department of Computer Science and Engineering

B.Tech CSE(Artificial Intelligence) &

B.Tech (Artificial Intelligence& Machine Learning)

SEMESTER – I (FIRST YEAR)

S.No.	Course Code	Name of the Course	L	T	P	C
1	V20MAT01	Linear Algebra and Differential Equations	3	-	-	3
2	V20MAT09	Descriptive Statistics	3	-	-	3
3	V20ENT01	English for Professional Enhancement	3	-	-	3
4	V20AIL01	Computer Engineering Workshop	**1**	-	4	**3**
5	V20CST01	Programming in „C" for problem Solving	3	-	-	3
6	V20ENL01	Hone Your Communication Skills Lab -I	-	-	3	1.5
7	V20AIL02	Statistical Visualization using R Lab	-	-	3	1.5
8	V20CSL01	Programming Lab in „C" for problem Solving	-	-	3	1.5
		Total:	13	-	13	19.5

Total Contact Hours: **26** Total Credits: **19.5**

SEMESTER – II (FIRST YEAR)

S.No.	Course Code	Name of the Course	L	T	P	C
1	V20MAT10	Integral Transformations and Vector Calculus	3	-	-	3
2	V20CST02	Python Programming	3	-	-	3
3	V20ECT01	Switching Theory and Logic Design	3	-	-	3
4	V20CST04	Data Structures	3	-	-	3
5	V20AIT01	Introduction to Artificial Intelligence	3	-	-	3
6	V20CSL02	Python Programming Lab	-	-	3	1.5
7	V20CSL04	Data Structures Lab	-	-	3	1.5
8	V20ENL02	Hone Your Communication Skills Lab -II	-	-	3	1.5
9	V20CHT02	Environmental Science	2	-	-	0
		Total:	17		09	19.5

Total Contact Hours: 26 **Total Credits:** 19.5

SYLLABUS

Semester	I Sem	L	T	P	C	COURSE CODE
Regulation	V20	1	-	4	3	V20AIL01
Name of the Course	Computer Engineering Workshop					
Branch	Common to B.Tech CSE(AI) and B.Tech(AI & ML)					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Identify, assemble and update the components of a computer. **(K2)**
CO2: Practice disassembling and assembling components and execution ofcomputer applications, services and systems. **(K3)**
CO3: Make use of tools for converting pdf to word and vice versa. **(K6)**
CO4: Develop presentation, documents and small applications using productivity tools such as word processor, presentation tools, spreadsheets, HTML, LaTex**.** **(K3)**

LIST OF EXPERIMENTS

Note: Faculty to consolidate the workshop manuals using the textbook and references

Task 1: Identification of the peripherals of a computer - Prepare a report containing the block diagram of the computer along with the configuration of each component and its functionality. Describe about various I/O Devices and its usage.

Task 2: Practicing disassembling and assembling components of a PC

Task 3: Installation of Device Drivers, MS Windows, Linux Operating systems and Disk Partitioning, dual boating with Windows and Linux

Task 4: Introduction to Memory and Storage Devices, I/O Port, Assemblers, Compilers, Interpreters, Linkers and Loaders.

Task 5: Demonstration of Hardware and Software Troubleshooting

Task 6: Surfing the Web using Web Browsers, Awareness of various threats on the Internet and its solutions, Search engines and usage of various search engines, Need of anti-virus, Installation of anti-virus, configuring personal firewall and windows update.(Students should get connected to their Local Area Network and access the Internet. In the process they should configure the TCP/IP setting and demonstrate how to access the websites and email. Students customize their web browsers using bookmarks, search toolbars and pop up blockers) Productivity Tools:

Task 7: basic HTML tags, Introduction to HTML5 and its tags, Introduction to CSS3 and its properties. Preparation of a simple website/ homepage,

Assignment: Develop your home page using HTML Consisting of your photo, name, address and education details as a table and your skill set as a list.
Features to be covered:- Layouts, Inserting text objects, Editing text objects, Inserting Tables, Working with menu objects, Inserting pages, Hyper linking, Renaming, deleting, modifying pages, etc.,

Task 8: Demonstration and Practice of various features of Microsoft Word
Assignment: 1. Create a project certificate.
2. Creating a news letter
Features to be covered:-Formatting Fonts, Paragraphs, Text effects, Spacing, Borders and Colors, Header and Footer, Date and Time option, tables, Images, Bullets and Numbering, Table of Content, Newspaper columns, Drawing toolbar and Word Art and Mail Merge in word etc.,
Task 9: Demonstration and Practice of various features
Microsoft Excel Assignment:
1. Creating a scheduler
2. Calculating GPA
3. Calculating Total, average of marks in various subjects and ranks of students based on marks.

Features to be covered:- Format Cells, Summation, auto fill, Formatting Text, Cell Referencing, Formulae in excel, Charts, Renaming and Inserting worksheets, etc.,
Task 10: Demonstration and Practice of various features Microsoft Power Point
Features to be covered:- Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Hyperlinks Tables and Charts, Master Layouts, Types of views, Inserting – Background, textures, Design Templates, etc.,
Task 11: Demonstration and Practice of various features LaTeX – document preparation, presentation (Features covered in Task 9 and Task 11 need to be explored in LaTex)
Task 12: Tools for converting word to pdf and pdf to word

Task 13: Internet of Things (IoT): IoT fundamentals, applications, protocols, communication models, architecture, IoT devices.

Reference Books:

1 Computer Fundamentals, Anita Goel, Pearson India Education, 2017
2 PC Hardware Trouble Shooting Made Easy, TMH
3 Upgrading and Repairing PCs, 18th Edition, Scott Mueller, QUE, Pearson, 2008
4 LaTeX Companion – Leslie Lamport, PHI/Pearson
5 Introducing HTML5, Bruce Lawson, Remy Sharp, 2nd Edition, Pearson, 2012
6 Teach yourself HTML in 24 hours, By Techmedia
7 HTML 5 and CSS 3.0 to the Real World by Alexis Goldstein, Sitepoint publication.
8 Internet of Things, Technologies, Applications, Challenges and Solutions, B K Tripathy, J Anuradha, CRC Press
9 Comdex Information Technology Course Tool Kit, Vikas Gupta, Wiley Dreamtech.
10 IT Essentials PC Hardware and Software Companion Guide Third Edition by David Anfinson and Ken Quamme, CISCO Press, Pearson Education.
11 Essential Computer and IT Fundamentals for Engineering and Science Students, Dr. N. B. Venkateswarlu, S. Chand Publishers.

Semester	**I Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	3	-	-	3	V20CST01
Name of the Course	**Programming in 'C' for problem Solving**					
Branch	Common to B.Tech CSE(AI) and B.Tech(AI & ML)					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe various problem solving strategies such as Algorithms and Flowcharts.**(K2)** **CO2:** Develop various programming constructs using Control Structures. **(K3)**
CO3: Construct Programs using modular programming approach. **(K3)**
CO4: Illustrate the usage of Arrays, String and pointers. **(K3)**
CO5: Construct Programs using Structures, Unions and Files. **(K3)**

UNIT-I: Problem solving concepts: Algorithms, Flow-charts, Types of Programming Languages, Compiler, Assembler and Linker, Testing and Debugging a program. **Introduction to C Programming:** Overview and importance of C, C Program Structure, Creation and Compilation of C Programs, Identifiers, Variables, Data types, Constants, Declarations, **Input and output statements:** Input and output functions..

UNIT-II: Operators: Arithmetic, relational and logical operators, increment and decrement operators, conditional operator, assignment operator, bitwise operators, special operators, expressions, Precedence, Associatively, Order of evaluation, Type conversion, Programming Examples. **Control Structures:** Conditional statements - If-else, Switch-case constructs, Loops - while, do-while, for.

UNIT-III: Functions: Top down approach of problem solving, standard library functions, user defined functions, parameter passing - call by value, call by reference, return statement, passing arrays as parameters to functions, recursion. **Storage Classes:** Scope and extent, Storage Classes - auto, extern, static and register.
Understanding pointers: Accessing the address of a variable, declaring pointer variables, initialization of pointer variables, accessing a variable through its pointer, pointer arithmetic.

UNIT-IV: Arrays: Single-Dimensional Arrays, multi-Dimensional Arrays, initialization and accessing individual elements. **Strings** in C- Concepts, string handling functions. Pointer and arrays, pointers and character strings, array of pointers. **Dynamic Memory Allocation**: calloc(), malloc() and free()

UNIT-V: Structures: Defining, declaring, initialization, accessing, comparing, operations on individual members, array of structures, structures within structures, structures and functions, bit fields, Programming Examples. **Unions:** Definition – difference between structures and unions – declaring and accessing unions. Pointers and structures – self-referential structures.

File Processing: Creating and Opening a file, file opening modes, closing a file, input/output operations on files, error handling during I/O operations, random access to files, Command line arguments. Programming Examples.

Text Books:

1. Programming in ANSI C by E Balagursamy, McGraw Hill, 8th Edition.

Reference Books:

1. Let Us C, YashavantKanetkar, BPB Publications, 15th Edition
2. Programming in C, ReemaThareja, Oxford.
3. Programming with C, Second edition, Byron S Gottfried, Tata McGrawhill
4. Problem Solving and Programm design in C, Hanly J R &Koffman E.B, Pearson Education, 2009.
5. Programming in C, PradipDey, ManasGhosh, Oxford University Press, 2007.
6. Problem Solving Using C: Structured Programming Techniques, YukselUckan.
7. C Programming, A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE.
8. Computer Programming in C – Kerninghan& Ritchie, PHI
9. C: The Complete Reference: Herbert Schildt, Osborne/Mcgraw Hill, Inc.

Semester	**I Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	-	-	3	1.5	V20AIL02
Name of the Course	**Statistical Visualization using R Lab**					
Branch	Common to B.Tech CSE(AI) and B.Tech(AI & ML)					

Syllabus Details

Course Outcomes: At the end of the Course student will be able to:

CO1: Employ math and simulation in R.**(K2)**

CO2: Demonstrate various types of data structures in R. **(K3)**

CO3: Apply appropriate control structures to solve a particular Programming problem. (**K3)**

CO4: Use R to graphically visualize data and results of statistical calculations. **(K3)**

LIST OF EXPERIMENTS

1. Demonstrate the basic math functions in R
2. Demonstrate Vector operations in R
3. Demonstrate Matrix operations in R
4. Demonstrate Array operations in R
5. Demonstrate Data frames in R
6. Demonstrate Lists in R
7. Illustrate the following controls statements in R
   a. if and else   b. ifelse   c. switch
8. Demonstrate for and while loops in R
9. Demonstrate importing and exporting data using R
10. Illustrate the descriptive statistics using summary() in R
11. Demonstrate the following statistical distribution functions in R:
    a. Normal Distribution
    b. Binomial Distribution
    c. Poisson Distribution
    d. Chi Square Distribution
12. Illustrate the following basic graphics in R:
    a. Bar plots
    b. Pie Charts
    c. Histograms
    d. Kernel density plots
    e. Boxplots
    f. Dotplots

13. Illustrate the Correlation and Covariance analysis using R
14. Illustrate the different types of t-tests using R
15. Illustrate the ANOVA test using R

Text Books:

1. R for Everyone, Jared P Lander, Pearson
2. R in Action,Rob I Kabacoff, Manning

Reference Book:

1. The Art of R Programming, Norman Matloff, No Starch Press

Semester	I Sem	L	T	P	C	COURSE CODE
Regulation	V20	-	-	3	1.5	V20CSL01
Name of the Course	Programming Lab in 'C' for problem Solving					
Branch	Common to All					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Demonstrate problem solving techniques using Control Structures.**(K3)**

CO2: Construct Programmes using the concepts of Arrays, Strings and Pointers. **(K3)**

CO3: Apply the concepts of Functions, Structures and Unions.**(K3)**

CO4: Use various file processing operations to develop real-time applications. **(K4)**

LIST OF EXPERIMENTS

Tutorial 1: Problem solving using computers.

Lab1: Familiarization with programming environment.

Tutorial 2: Variable types and type conversions.

Lab 2: Simple computational problems using arithmetic expressions.

Tutorial 3: Branching and logical expressions.

Lab 3: Problems involving if-then-else structures switch – case.

Tutorial 4: Loops, while and for loops.

Lab 4: Iterative problems e.g. sum of series.

Tutorial 5: Functions call by value, call by reference

Lab 5: Simple functions.

Tutorial 6: Recursion, structure of recursive calls.

Lab 6: Recursive functions.

Tutorial 7: Pointers.

Lab 7: Programming with pointers.

Tutorial 8: 1D Arrays: searching, sorting.

Lab 8: 1D Array manipulation.

Tutorial 9: 2D arrays.

Lab 9: Matrix problems.

Tutorial 10: String handling.

Lab 10: String handling functions.

Tutorial 11: Structures, unions and dynamic memory allocation.

Lab 11: Structures & unions.

Tutorial 12: File handling, command line arguments.

Lab 12: File operations.

Text Books:

1. Programming in Ansi C by E Balagursamy, McGraw Hill, Eight Edition.

Reference Books:

1. Mastering C, K.R. Venugopal and S.R. Prasad, TMH Publishers.
2. Computer Programming in C, V. Rajaraman, PHI.
3. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
4. C- The Complete Reference, Herbert Schildt, Osborne/Mcgraw Hill, Inc.
5. Programming with C, Byron S Gottfried, Second edition, Tata McGrawhill.
6. Programming in C, ReemaThareja, Oxford.
7. Problem Solving and Program design in C, Hanly J R &Koffman E.B, Pearson Education, 2009
8. Programming and Problem Solving Using C, ISRD Group, Tata McGraw Hill, 2008

Semester	**II Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	3	-	-	3	V20CST02
Name of the Course	**Python Programming**					
Branch	Common to B.Tech CSE(AI) and B.Tech(AI & ML)					

Syllabus Details

Course Outcomes: Upon completion of the course, students will be able to

CO1: Illustrate basic concepts of Python Programming. **(K2)**

CO2: Describe control structures in python. **(K2)**

CO3: Construct python programs using structured data types. **(K3)**

CO4: Demonstrate functions and packages (**K3)**

CO5: Develop programs on Files, Exception handling and OOPs concepts. **(K3)**

UNIT-I: Introduction to Python, Data Types & Operators: Basics of python programming: Features of python – History of Python - Python installation and execution - Data types – Identifiers - variables – type conversions- Literals, Constants – Numbers – Strings. I/O statements.Operators and expressions, operator precedence – expression evaluation.

UNIT-II: Control Structures: Decision Control statements: conditional (if), alternative (if- else), chained conditional (if-elif-else); **Iteration:** while loop, for loop, nested for loop, range function, break, continue and pass statements.

UNIT-III: Structured Data Types: Lists: list operations, list slices, list methods, cloning lists, list parameters. **Tuples**: tuple assignment, tuple as return value. **Set:** Set Creation, Set Operations. **Dictionaries**: Creation, operations; comprehension, operations on strings.

UNIT-IV:Functions& modules: Introduction - Function Declaration &Definition - Function Call – Variable Scope and Lifetime - The return statement-More on Defining Functions - Lambda Functions or Anonymous Functions - Documentation Strings- Modules – Packages.

UNIT-V: Files & Exception Handling: Introduction - Types of files - Text files - reading andwriting files; Errors and exceptions handling.

OOPS concepts Classes, Methods, Constructor, Inheritance, Overriding Methods, Data hiding,TKINTER.

Text Books:

1. "Python Programming using problem solving Approach" ReemaThareja, Oxford University Press – 2017.
2. Python with Machine Learning by "A.Krishna Mohan, Karunakar&T.Murali Mohan" by S. Chand Publisher-2018.

Reference Books:

1. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist„„, 2nd edition, Updated for Python 3, Shroff /O„Reilly Publishers, 2016 (http://greenteapress.com/wp/think- python)
2. Guido van Rossum and Fred L. Drake Jr, ―An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.
3. John V Guttag, ―Introduction to Computation and Programming Using Python„„, Revised and expanded Edition, MIT Press , 2013.

Semester	II Sem	L	T	P	C	COURSE CODE
Regulation	V20	3	-	-	3	V20CST04
Name of the Course	Data Structures					
Branch	Common to B.Tech CSE(AI) and B.Tech(AI & ML)					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Illustrate the time and space complexities for searching and sorting algorithms. **(K2)**
CO2: Demonstrate linked lists and their applications. **(K3)**
CO3: Demonstrate linear data structure. . **(K3)**
CO4: Illustrate basic operations on binary trees. **(K3)**
CO5: Demonstrate Graphs and their applications. **(K3)**

Unit-I: Introduction, searching and sorting: Introduction to Data Structures, Types of Data Structures, Performance Analysis: Space complexity, time complexity, asymptotic notation. **Searching:** Linear, Binary and Fibonacci search. **Sorting**: Bubble sort, Selection sort, Insertion sort, radix sort, quick sort, and merge sort.
Hashing: Introduction, Key Terms and Issues, Hash Functions, Collision Resolution Strategies.

Unit-II: Single linked list: Representation of node, operations on single linked list, **Double linked list:** Representation of node, operations on double linked list. **Circular linked List:** Representation of node and its operations.

Unit-III: Stacks: Definition, Stack ADT, array representation, linked list representation, Towers of Hanoi, infix to postfix conversion, expression evaluation. **Queues:** Definition, Queue ADT, Array representation, linked list representation, operations on queues, Applications of Queues, Circular Queue.

Unit-IV: Trees: Introduction: Terminology, representation of trees, **Binary Trees:** abstract data type, Properties of binary trees, binary tree representation, **Tree Traversals:** Inorder, Preorder, Postorder. **Binary search trees:** Definition, searching BST, insert into BST, delete from a BST, Height of a BST, Introduction to Binary Heaps.

Unit-V: Graph: Introduction, definition, types of Graphs, Graph Representation, operations. **Graph Traversal Techniques:** Breadth First Search, Depth First Search. **Spanning Trees:** minimum cost spanning tree, Prim"s and Kruskal"s algorithms, Single source shortest Path and all pair shortest path algorithms.

Text Books:

1. Data Structures, algorithms and applications in C, SartajSahni, Universities press, Second Edition.
2. Fundamentals of Data Structures in C, Ellis Horowitz, SartajSahni and Dinesh Mehta, 2nd Edition, Universities Press (India) Pvt. Ltd.

Reference Books:

1. Hashing: Data Structures using C++ by Varsha H Patil, Oxford publications.
2. An Introduction to Data Structures with Application, Jean-Paul Tremblay , Paul Sorenson, Second Edition.
3. Fundamentals of Data Structures and algorithms by C V Sastry, RakeshNayak, Ch. Raja Ramesh, IK Publications, new Delhi.
4. Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.
5. Problem solving with C++, The OOP, Fourth edition, W.Savitch, Pearson education.

Semester	**II Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	3	-	-	3	V20AIT01
Name of the Course	**Introduction to Artificial Intelligence**					
Branch	Common to B.Tech CSE(AI) and B.Tech(AI & ML)					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Discuss the concepts of AI Foundation. **(K2)**
CO2: Illustrate the basics of Machine Learning. **(K2)**
CO3: Explain various Classification Techniques. **(K2)**
CO4: Illustrate the working of Recommendation System. **(K2)**
CO5: Describe the applications of AI and ML. **(K2)**

UNIT-I: Introduction: What is AI? Foundations of AI: Philosophy, Mathematics, Economics, Neuroscience, Psychology, Computer Engineering; The History of AI, The State of the Art, Agents and Environments.

UNIT-II: Machine learning: Introduction, Learning: Machine Learning, Types of Machine Learning, Supervised Learning: Classification, Regression, The Machine Learning Process, Testing Machine LearningAlgorithms, Some Basic Statistics.

UNIT-III: Classification: General Approach to Classification, Probabilistic Classifier: Bayes Classifier, Non-Probabilistic Classifier: KNN Classifier, Decision Tree, Accessing Performance of a Classifier: Accuracy, Loss, Confusion Matrix.

UNIT-IV: Recommendation Systems: A Model for recommendation Systems: The utility matrix, long tail, Applications if Recommendation Systems; Content-Based Recommendations: Item Profiles, Discovering Features of Documents, Obtaining Item Features from Tags, Representing Item Profiles, User Profiles, Recommending Items Users based on Content.

UNIT-V: Applications of AI and ML: Anomaly Detection, Bio Medical Applications, Natural Language Processing, Chatbots, Computer Vision.

Textbooks:

1. Artificial Intelligence: A Modern Approach, Stuart Russell and Peter Norvig, 3rd Ed., Pearson Education. *(Unit I)*
2. Machine Learning: An Algorithmic Perspective, Stephen Marsland, 2nd Ed., CRC Press. *(Unit II,III)*
3. Mining Massive Datasets, Jure Leskovec, Anand Rajaraman, Jeff Ullman, 3rd Ed., Stanford University. *(Unit IV)*
4. Machine Learning and its Applications, Peter Wlodarczak, CRC Press. *(Unit V)*
5. Getting Started with Artificial Intelligence: A Practical Guide to Building Enterprise Applications, Tom Markiewicz and Josh Zheng, 1st Ed., O‟Reilly. *(Unit V).*

Semester	**II Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	-	-	3	1.5	V20CSL02
Name of the Course	**Python Programming Lab**					
Branch	Common to CSE,CST,CSE(AI) and B.Tech(AI & ML)					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Demonstrate Basic Python Programs. **(K3)**

CO2: Construct control structures in python **(K3)**
CO3: Demonstrate functions and packages. **(K3)**
CO4: Construct python programs using structured data types. **(K3)**
CO5: Construct programs using Text Files and exception handling. **(K3)**

LIST OF EXPERIMENTS

Exercise 1 - Basics

a) A sample Python Script using command prompt, Python Command Line and IDLE

b) A program to purposefully raise an Indentation Error and correct it

Exercise 2 - Operations

a) A program to compute distance between two points taking input from the user (PythagoreanTheorem)

b) A program on add.py that takes 2 numbers as command line arguments and prints its sum.

Exercise - 3 Control Flow

a) A Program to implement for checking whether the given number is a even number or not.

b) A program to construct reverse the digits of a given number and add it to the original, If the sum isnot a palindrome repeat this procedure.

c) A program using a while loop that asks the user for a number, and prints a countdown from thatnumber to zero.

Exercise 4 - Control Flow – Continued

a) A program to construct the following pattern, using a nested for loop.

```
    *
   * *
  * * *
 * * * *
* * * * *
 * * * *
  * * *
   * *
    *
```

b) By considering the terms in the Fibonacci sequence whose values do not exceed four million,findthe sum of the even-valued terms.

Exercise - 5 Structured Data types

a) A program to count the number of strings where the string length is 2 or more and the first and lastcharacter are same from a given list of strings.

b) a program to develop unzip a list of tuples into individual lists and convert them into dictionary.

Exercise – 6Structured Data types Continued

a) A program to count the numbers of characters in the string and store them in a dictionary data structure

b) A program to use split and join methods in the string and trace a birthday with a dictionary datastructure.

Exercise - 7 – Problem Solving using Functions

a) Find mean, median, mode for the given set of numbers passed as arguments to a function

b) Develop a function nearly_equal to test whether two strings are nearly equal. Two strings a and b arenearly equal when a can be generated by a single mutation on b.

c) Develop a Recursive Function to find the Factorial of a given number.

d) Develop function to compute gcd, lcm of two numbers. Each function shouldn"t exceed one line.

Exercise - 8– Modules

a) Install packages requests, flask and explore themusing (pip)

b) A program to implement a script that imports requests and fetch content from the page. Eg. (Wiki)

c) Develop a simple script that serves a simple HTTPResponse and a simple HTML Page

Exercise - 9 Files

a) A program to count frequency of characters in a given file. Can you use character frequency to tellwhether the given file is a Python program file, C program file or a text file?

b) A program to compute the number of characters, words and lines in a file.

Exercise - 10 OOP

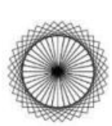
a) Class variables and instance variable and illustration of self-variable

i) Robot

ii) ATM Machine

Exercise - 11 GUI, Graphics

1. Develop a GUI for an Expression
2. A program to implement the following figures using turtle



Text Books:

1. "Python Programming using problem solving Approach" ReemaThareja, Oxford University Press– 2017.
2. Python with Machine Learning by "A.Krishna Mohan, Karunakar&T.Murali Mohan" by S. ChandPublisher-2018.

Semester	II Sem	L	T	P	C	COURSE CODE
Regulation	V20	-	-	3	1.5	V20CSL04
Name of the Course	Data Structures Lab					
Branch	Common to CSE,CST,CSE(AI) and B.Tech(AI & ML)					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Construct Programs on Sorting and Searching Techniques. **(K3)**

CO2: Illustrate various operations on Linked Lists. **(K3)**

CO3: Develop Programs on Stacks, Queues and their Applications. **(K3)**

CO4: Develop various operations on Trees and Graphs **(K3)**

LIST OF EXPERIMENTS

1. Practice following Sorting Techniques
   (A) Selection Sort (B) Quick Sort (C) Merge Sort
2. Practice following Searching Methods
   (A) Linear Search (B) Binary Search.
3. Develop program for Single Linked List and its Operations.(Create, Insert, Delete, Display)
4. Develop program for Double Linked List and its Operations.
5. Construct Stack along with their operations using Arrays.
6. Construct Queue along with their operations using Arrays.
7. Develop Circular Queue using Arrays.
8. Construct Queue along with their operations using Single Linked List.
9. Construct Binary Search Tree and Its Operations using double linked list.
10. Demonstrate Depth First Search and Breadth First Search Algorithm.
11. Develop Minimum Spanning Tree using Prim‟s Algorithm.
12. Develop Minimum Spanning Tree Kruskal‟s Algorithm.

Add on Experiments:

1. Construct stack along with their operations using Single Linked List.

2. Implement Topological Sort.

Text books:

1. Data Structures, algorithms and applications in C++, SartajSahni, Universities press, Second Edition.
2. Fundamentals of Data Structures in C++, Ellis Horowitz, SartajSahni and Dinesh Mehta, 2nd Edition, Universities Press (India) Pvt. Ltd.

Reference Books:

1. An Introduction to Data Structures with Application, Jean-Paul Tremblay , Paul Sorenson, Second Edition.
2. Fundamentals of Data Structures and algorithms by C V Sastry, RakeshNayak, Ch. RajaRamesh, IK Publications, new Delhi.
3. Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.
4. Problem solving with C++, The OOP, Fourth edition, W.Savitch, Pearson education.

Annexure-XV(a)

List of students admitted in 2018 eligible to award MBA Degree

S. No	Htno	Regulation	Secured Credits	Req Credits	CGPA	Overal Result
1	18A81E0001	V18	113	113	7.23	Pass
2	18A81E0002	V18	113	113	6.65	Pass
3	18A81E0003	V18	113	113	7.45	Pass
4	18A81E0004	V18	113	113	7.43	Pass
5	18A81E0005	V18	113	113	7.30	Pass
6	18A81E0006	V18	113	113	7.04	Pass
7	18A81E0007	V18	113	113	7.23	Pass
8	18A81E0008	V18	113	113	6.92	Pass
9	18A81E0009	V18	113	113	6.74	Pass
10	18A81E0010	V18	113	113	8.06	Pass
11	18A81E0011	V18	113	113	8.31	Pass
12	18A81E0012	V18	113	113	8.06	Pass
13	18A81E0013	V18	113	113	7.93	Pass
14	18A81E0014	V18	113	113	7.49	Pass
15	18A81E0015	V18	113	113	6.97	Pass
16	18A81E0016	V18	113	113	7.35	Pass
17	18A81E0017	V18	113	113	7.79	Pass
18	18A81E0018	V18	113	113	7.95	Pass
19	18A81E0019	V18	113	113	6.92	Pass
20	18A81E0020	V18	113	113	7.50	Pass
21	18A81E0022	V18	113	113	7.62	Pass
22	18A81E0023	V18	113	113	7.24	Pass
23	18A81E0025	V18	113	113	8.97	Pass
24	18A81E0026	V18	113	113	6.85	Pass
25	18A81E0027	V18	113	113	7.79	Pass
26	18A81E0028	V18	113	113	6.46	Pass
27	18A81E0029	V18	113	113	7.16	Pass
28	18A81E0030	V18	113	113	8.20	Pass
29	18A81E0032	V18	113	113	8.23	Pass
30	18A81E0034	V18	113	113	8.41	Pass
31	18A81E0035	V18	113	113	8.00	Pass
32	18A81E0036	V18	113	113	7.93	Pass
33	18A81E0037	V18	113	113	7.70	Pass
34	18A81E0038	V18	113	113	7.70	Pass
35	18A81E0041	V18	113	113	8.42	Pass
36	18A81E0042	V18	113	113	7.55	Pass
37	18A81E0043	V18	113	113	8.28	Pass
38	18A81E0044	V18	113	113	7.47	Pass
39	18A81E0045	V18	113	113	8.03	Pass

40	18A81E0047	V18	113	113	8.66	Pass
41	18A81E0048	V18	113	113	7.31	Pass
42	18A81E0049	V18	113	113	8.55	Pass
43	18A81E0050	V18	113	113	7.99	Pass
44	18A81E0051	V18	113	113	8.01	Pass
45	18A81E0052	V18	113	113	8.69	Pass
46	18A81E0053	V18	113	113	7.60	Pass
47	18A81E0054	V18	113	113	7.27	Pass
48	18A81E0055	V18	113	113	7.22	Pass
49	18A81E0056	V18	113	113	8.13	Pass
50	18A81E0058	V18	113	113	7.57	Pass
51	18A81E0060	V18	113	113	7.50	Pass
52	18A81E0061	V18	113	113	7.10	Pass

List of students admitted in 2019 eligible to award MBA Degree

S. No	Htno	Regulation	Secured Credits	Req Credits	CGPA	Overal Result
1.	19A81E0001	V18	113	113	8.30	Pass
2.	19A81E0002	V18	113	113	7.61	Pass
3.	19A81E0003	V18	113	113	8.09	Pass
4.	19A81E0004	V18	113	113	7.96	Pass
5.	19A81E0005	V18	113	113	7.92	Pass
6.	19A81E0006	V18	113	113	8.01	Pass
7.	19A81E0007	V18	113	113	8.80	Pass
8.	19A81E0008	V18	113	113	7.78	Pass
9.	19A81E0009	V18	113	113	8.59	Pass
10.	19A81E0010	V18	113	113	7.69	Pass
11.	19A81E0011	V18	113	113	7.83	Pass
12.	19A81E0012	V18	113	113	8.15	Pass
13.	19A81E0013	V18	113	113	6.98	Pass
14.	19A81E0015	V18	113	113	8.95	Pass
15.	19A81E0017	V18	113	113	8.14	Pass
16.	19A81E0018	V18	113	113	8.49	Pass
17.	19A81E0019	V18	113	113	8.81	Pass
18.	19A81E0020	V18	113	113	7.58	Pass
19.	19A81E0022	V18	113	113	8.59	Pass
20.	19A81E0024	V18	113	113	8.06	Pass
21.	19A81E0026	V18	113	113	8.40	Pass
22.	19A81E0027	V18	113	113	7.44	Pass
23.	19A81E0028	V18	113	113	7.55	Pass
24.	19A81E0030	V18	113	113	7.19	Pass
25.	19A81E0031	V18	113	113	7.19	Pass

26.	19A81E0032	V18	113	113	8.26	Pass
27.	19A81E0033	V18	113	113	7.51	Pass
28.	19A81E0034	V18	113	113	7.94	Pass
29.	19A81E0035	V18	113	113	8.15	Pass
30.	19A81E0036	V18	113	113	8.36	Pass
31.	19A81E0037	V18	113	113	8.13	Pass
32.	19A81E0038	V18	113	113	7.19	Pass
33.	19A81E0039	V18	113	113	7.42	Pass
34.	19A81E0040	V18	113	113	8.54	Pass
35.	19A81E0041	V18	113	113	7.74	Pass
36.	19A81E0042	V18	113	113	7.16	Pass
37.	19A81E0044	V18	113	113	7.12	Pass
38.	19A81E0045	V18	113	113	6.73	Pass
39.	19A81E0047	V18	113	113	8.47	Pass
40.	19A81E0048	V18	113	113	8.49	Pass
41.	19A81E0049	V18	113	113	8.33	Pass
42.	19A81E0050	V18	113	113	7.93	Pass
43.	19A81E0052	V18	113	113	8.19	Pass
44.	19A81E0053	V18	113	113	7.80	Pass
45.	19A81E0054	V18	113	113	7.94	Pass
46.	19A81E0055	V18	113	113	7.97	Pass
47.	19A81E0057	V18	113	113	7.55	Pass
48.	19A81E0058	V18	113	113	7.65	Pass
49.	19A81E0059	V18	113	113	7.96	Pass
50.	19A81E0060	V18	113	113	8.17	Pass
51.	19A81E0061	V18	113	113	7.47	Pass
52.	19A81E0062	V18	113	113	7.99	Pass
53.	19A81E0063	V18	113	113	7.65	Pass
54.	19A81E0064	V18	113	113	7.34	Pass
55.	19A81E0066	V18	113	113	7.56	Pass
56.	19A81E0068	V18	113	113	8.37	Pass
57.	19A81E0069	V18	113	113	8.04	Pass

Annexure-XV(b)

List of students admitted in 2018 eligible to award M.Tech Degree

S. No	Htno	Regulation	Secured Credits	Req Credits	CGPA	Overal Result
1.	18A81D1502	V18	70	70	8.19	Pass
2.	18A81D1505	V18	70	70	8.01	Pass
3.	18A81D1508	V18	70	70	8.47	Pass
4.	18A81D5301	V18	70	70	9.19	Pass
5.	18A81D5302	V18	70	70	9.37	Pass
6.	18A81D5303	V18	70	70	8.61	Pass
7.	18A81D5801	V18	70	70	9.00	Pass
8.	18A81D5802	V18	70	70	8.27	Pass
9.	18A81D5803	V18	70	70	8.67	Pass
10.	18A81D5804	V18	70	70	8.76	Pass
11.	18A81D5805	V18	70	70	8.97	Pass
12.	18A81D6802	V18	70	70	8.36	Pass
13.	18A81D8701	V18	70	70	8.26	Pass
14.	18A81D8702	V18	70	70	8.77	Pass
15.	18A81D8703	V18	70	70	8.51	Pass
16.	18A81D8706	V18	70	70	8.79	Pass
17.	18A81D1501	V18	70	70	8.44	Pass

List of students admitted in 2019 eligible to award M.Tech Degree

S. No	Htno	Regulation	Secured Credits	Req Credits	CGPA	Overal Result
1.	19A81D6802	V18	70	70	8.61	Pass
2.	19A81D6803	V18	70	70	9.21	Pass

Sri Vasavi Engineering College (Autonomous)

(Sponsored by Sri Vasavi Educational Society)
(Approved by AICTE, New Delhi & Permanently affiliated to JNTUK, Kakinada)
(Accreted by NBA & NAAC with 'A' Grade)
Pedatadepalli, Tadepalligudem, W.G.Dt, A.P-534101

Seventh Meeting of the College Academic Council

Agenda

Item No.1: Welcoming the members.

Item No.2: To review the progress of the institute

Item No.3: To approve the minutes of the previous meeting.
(The details are given in **Annexure-I** Page No. 2)

Item No.4: To approve the minutes of the meeting of BOS of various departments.

- **a.** Minutes of 5th BOS meeting of Civil Engineering Department.
  (Details are given in **Annexure-II** Page No. 4)
- **b.** Minutes of 6th BOS meeting of Electrical & Electronics Engineering.
  (Details are given in **Annexure-III** Page No. 108)
- **c.** Minutes of 6th BOS meeting of Mechanical Engineering.
  (Details are given in **Annexure-IV** Page No. 202)
- **d.** Minutes of 6th BOS meeting of Electronics & Communiction Engineering.
  (Details are given in **Annexure-V** Page No. 286)
- **e.** Minutes of 6th BOS meeting Computer Science and Engineering.
  (Details are given in **Annexure-VI** Page No.386)
- **f.** Minutes of 2nd BOS meeting CSE(AI) and AI & ML
  (Details are given in **Annexure-VII** Page No. 471)
- **g.** Minutes of 5th BOS meeting of MBA.
  (Details are given in **Annexure-VIII** Page No.507)

Item No.5: To approve the minutes Results committee. (Details are given in **Annexure-IX** Page No.552)

Item No.6: To Aprove the list of students' eligible to award B Tech degree admitted in 2018 (detais are given in **Annexure-X** Page No.663)

Item No.7: To approve the academic calendars for A.Y.2022-2023 (detais are given in **Annexure-XI** Page No.710)

Item No.8: Any other item permission of the chair.

Annexure-I

Action taken report on the Minutes of the sixth Academic Council Meeting held on 05/02/2022.

Item No.1: Welcoming the members.

Principal **Prof.Guduru VNSR Ratnakara Rao** welcomed the members and chaired the meeting.

Item No.2: Review the progress of the institute

Principal presented the progress of the institute since last council meeting and appreciated by all the members of the committee.

Ite m No.3: Approve the minutes of the previous meeting.

To council approve the action taken report presented.

Item No.4:

a. Approve V21 regulations for the award of M.Tech degree.
The approved V21 regulations for M.Tech students admitted from 2021-22 academic year.

b. Approve course structure for Various Specializations of M.Tech programme under V21 Regulations.

c. Approve V21 regulations & course structure for the award of MBA degree.
The council approved V21 regulations for M.Tech and MBA and their course structures. The institute following the same.

Item No.5: Approve the minutes of the meeting of BOS of various departments.

The council approved the minutes of the meeting of BOS of various department.

Item No.6: Approve the minutes of Results committee.

The committee reviewed the minutes of result committee meetings held from last council meeting and approved.

Item No.7: Amendments to **UG V18 Academic Regulations**

The proposed ammendments are approved by the council.

Item No.8: Nominate BOS members for **AI & ML.**

The council approved the BOS members.

Item No.9: Minutes of 1st meeting **CSE (AI) and AI&ML.**

The committee approved the minutes of BOS of CSE (AI) and AI&ML.

Item No.10: Any other item with the permission of the chair.

a. List of eligible students to award MBA degree admitted in 2018 and 2019. The council approved the students eligible to to award MBA degree admitted in 2018 & 2019.

b. List of eligible students to award M.Tech degree admitted in 2018 and 2019.
The council approved the students eligible to award M.Tech degree admitted in 2018 & 2019.

The meeting concluded with vote of thanks by the member secretary.

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SRI VASAVI ENGINEERING COLLEGE (AUTONOMOUS)

(Sponsored by Sri Vasavi Educational Society)
Approved by AICTE, New Delhi and Permanently Affiliated to JNTUK, Kakinada
Pedatadepalli, **TADEPALLIGUDEM – 534 101,** W.G. Dist, (A.P.)
Department of Civil Engineering

Dtd: 20.08.2022

Minutes of the BOS Meeting

Fifth BOS Meeting of Civil Engineering Department was held in online mode through Zoom platform (Meeting ID: 847 3592 7977) on 18.08.2022 at 10:30 AM in the presence of the following members.

Sl.No	Name	Designation	Role
1	Dr. G. Radhakrishnan	Professor, Head, Dept. of CE, SVEC, Pedatadepalli	Chairperson
2	Dr. P. Subba Rao	Professor and Director of Faculty Development Centre, JNTUK, Kakinada	Member and Subject Expert
3	Dr. C. B. Kameswara Rao	Professor of CE, NIT Warangal	Member and Subject Expert
4	Dr. M. Kumar	Professor of CE, Osmania University	Member and Subject Expert
5	Mr. Nagareddayya Subbagari	General Manager, Corporate QA/QC, M/S My Home Construction Pvt. Ltd., Hyderabad	Member and Industry Expert
6	Mr. T. Raj kumar	Research Scholar, Dept. of CE, NIT, Andhra Pradesh	Member and Alumni
7	Dr. CH. Rambabu	Professor of EEE and Dean, Student Affairs, SVEC, Pedatadepalli	Dean, Student Affairs
8	Mr. V. L. D. Prasad Reddy	Asst. Professor, Dept. of CE, SVEC	Member and Faculty of Civil Engineering
9	Mr. T Naga Seshu Babu	Asst. Professor, Dept. of CE, SVEC	Member and Faculty of Civil Engineering
10	Mr. B Hema Sundar	Asst. Professor, Dept. of CE, SVEC	Member and Faculty of Civil Engineering
11	Mr. K. Gowtham Kumar	Asst. Professor, Dept. of CE, SVEC	Member and Faculty of Civil Engineering

Following are the minutes of the BOS Meeting:

1. The proposed course structure and syllabus of V, VI, VII & VIII semesters V20 Regulation is approved and the same have to be followed for the academic years 2022-23 and 2023-24.
2. Basic core courses should not be included in list of professional elective courses. Each professional Elective Course should contain advanced courses of all specializations.
3. Course Structure of V semester
    - Course related to Geotechnical Engineering specialization have to be included in the list of Professional Elective Course I
4. Course Structure of VI semester
    - Course related to Geotechnical Engineering specialization have to be included in the list of Professional Elective Course II
5. Course Structure of VII semester
    - The core course i) Estimation Specification and Contracts and ii) Construction Project Planning and Systems have to be excluded from the list of Professional Elective Courses arranged as a single Professional Core Course or Professional Core Course Lab.
    - Courses like i) PRECAST AND PREFABRICATED STRUCTURES ii) METRO SYSTEMS ENGINEERING iii) QUALITY ASSURANCE AND QUALITY CONTROL have to be included in the list of Professional Elective Courses
6. Course Structure of VIII semester
    - Project should contain practical hours of 24 to accommodate the allotted 12 credits.
    - To the possible extent project should carried from the field activity.
7. Syllabus have to designed keeping in view of GATE, IES and Public Service Commission exams
8. Knowledge Levels of higher order have to be maintained in the syllabuses of all courses.
9. Volume and Year of Publication of references and textbooks have to be included in syllabuses
10. NPTEL courses may also be included in Profession Elective Courses

11. Syllabus of V semester
    - Concept of MATRIX METHODS has to be included in the syllabus of Structural Analysis – II.
    - Concept of Green Concrete could be included in the syllabus of Advanced Concrete Technology
    - Rapid Chloride Permeability, Water Penetration Depth Test, Initial surface absorption, water, chloride and sulphate absorption tests could be included in Advanced Concrete Technology
    - Pedestrian paths, bicycle paths studies, sky walk planning and parking management could be included in Unit II of Traffic Engineering & Management course.
    - Level of service concept, Flexible Progressive System, Rotary Planning and Design as per IRC to be included in Unit IV of Traffic Engineering & Management course.
12. As a matter of completeness minor degree courses have to be announced.
13. Dept should contain licensed software's of courses mentioned under Skill Oriented Courses.

CHAIRPERSON OF BOS

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SRI VASAVI ENGINEERING COLLEGE
(AUTONOMOUS)
(Sponsored by Sri Vasavi Educational Society)
Approved by AICTE, New Delhi and Permanently Affiliated to JNTUK, Kakinada
Pedatadepalli, **TADEPALLIGUDEM – 534 101,** W.G. Dist, (A.P.)
Department of Civil Engineering

5th MEETING BOARD OF STUDIES

Agenda:

1. **Opening remarks by BOS Chairperson**
2. **Review of course structure for V,VI,VII & VIII semesters of B. Tech V20 Regulation**
   The proposed course structure of V,VI,VII & VIII semesters B.Tech under V20 Regulation is given in Annexure I.
3. **Approval of syllabi for the courses offered in** V,VI,VII & VIII **semesters**
   The syllabi for various courses offered in V,VI,VII & VIII semesters B.Tech under V20 Regulation are given in Annexure II.
4. **Approval of list of courses offering under Open Elective & Mandatory Courses in** V,VI,VII & VIII **Semesters to other branches and the approval of their detailed syllabi.**
   The details are given in Annexure III.
5. **Any other item with the permission of chair.**

CHAIRPERSON OF BOS

ANNEXURE - I

COURSE STRUCTURE APPROVED IN 2ND JOINT BOS MEETING (28/12/2020)

(For 2020 – 2021 Admitted Batch) – V20 Regulation

I SEMESTER

S.No	Course Code	Course Title	Hours per week			Credits
			L	T	P	
1	V20MAT01	Linear Algebra and Differential Equations	3	0	0	3
2	V20PHT01	Engineering Physics	3	0	0	3
3	V20ENT01	English for Professional Enhancement	3	0	0	3
4	V20MEL01	Engineering Graphics	1	0	4	3
5	V20CST01	Programming in C for problem solving	3	0	0	3
6	V20ENL01	Hone Your Communications Skills Lab-I	0	0	3	1.5
7	V20PHL01	Engineering Physics Lab	0	0	3	1.5
8	V20CSL01	Programming lab in C for problem solving	0	0	3	1.5
9	V20CHT02	Environmental Studies	2	0	0	-
		Total	15	0	13	19.5

Total Contact Hours : 28 Total Credits : 19.5

II SEMESTER

S.No	Course Code	Course Title	Hours per week			Credits
			L	T	P	
1	V20MAT02	Numerical Methods and Vector Calculus	3	0	0	3
2	V20CHT01	Engineering Chemistry	3	0	0	3
3	V20MET01	Engineering Mechanics	3	0	0	3
4	V20EET02	Basic Electrical and Electronics Engineering	3	0	0	3
5	V20MEL02	Engineering Workshop	1	0	4	3
6	V20EEL02	Basic Electrical and Electronics Engineering Lab	0	0	3	1.5
7	V20CHL01	Engineering Chemistry Lab	0	0	3	1.5
8	V20ENL02	Hone Your Communications Skills Lab-II	0	0	3	1.5
		Total	13	0	13	19.5

Total Contact Hours : 26 Total Credits : 19.5

COURSE STRUCTURE APPROVED IN 4TH BOS MEETING (28/08/2021)

III SEMESTER

S.No	Course Code	Course Title	Hours per week L	T	P	Credits
1	V20MAT04	Probability & Statistics (BOS of Maths)	3	0	0	3
2	V20CET01	Strength of Materials	3	0	0	3
3	V20CET02	Fluid Mechanics & Hydraulics	3	0	0	3
4	V20CET03	Surveying and Geomatics	3	0	0	3
5	V20CET04	Building Materials & Concrete Technology	3	0	0	3
6	V20CEL01	Strength of Materials Lab	0	0	3	1.5
7	V20CEL02	Surveying Lab	0	0	3	1.5
8	V20CEL03	Concrete Technology Lab	0	0	3	1.5
9	V20SOC01	Skill Oriented Course (Certificate course offered by Industries/Professional Bodies/APSSDC or any other accredited bodies)	1	0	2	2
10	V20ENT02	Professional Communication Skills-I (MNC) (BOS of Eng)	2	0	0	0
		Total	18	0	11	21.5

Total Contact Hours : 29 Total Credits : 21.5

IV SEMESTER

S.No	Course Code	Course Title	Hours per week L	T	P	Credits
1	V20CET05	Engineering Geology	3	0	0	3
2	V20CET06	Structural Analysis - I	3	0	0	3
3	V20CET07	Water Resources Engineering	3	0	0	3
4	V20CET08	Transportation Engineering	3	0	0	3
5	V20MBT51	Managerial Economics Financial Analysis (BOS of MBA)	3	0	0	3
6	V20CEL04	Engineering Geology Lab	0	0	3	1.5
7	V20CEL05	FM & Hydraulic Machinery Lab	0	0	3	1.5
8	V20CEL06	Transportation Engineering Lab	0	0	3	1.5
9	V20SOC02	Skill Oriented Course (Certificate course offered by Industries/Professional Bodies/APSSDC or any other accredited bodies)	1	0	2	2
10	V20ENT03	Professional Communication Skills-II (MNC) (BOS of Eng)	2	0	0	0
Total			18	0	11	21.5

Total Contact Hours : 29 Total Credits : 21.5

Internship for 2 months/Mini Project is mandatory during summer vacation and is evaluated in V semester.

COURSE STRUCTURE PROPOSED FOR APPROVAL IN 5TH BOS MEETING

V SEMESTER

S.No	Course Code	Course Title	Hours per week			Credits
			L	T	P	
1	V20CET09	Structural Analysis - II	3	0	0	3
2	V20CET10	Geotechnical Engineering	3	0	0	3
3	V20CET11	Design of Reinforced Concrete Structures	3	0	0	3
4	V20CET12 V20CET13 V20CET14 V20CET15 V20CET16	Professional Elective Course I 1. Advanced Concrete Technology 2. Irrigation Engineering 3. Traffic Engineering & Management 4. Air Pollution and Control 5. Geo Environmental Engineering	3	0	0	3
5		Open Elective Course I / Job Oriented Elective	0	0	6	3
6	V20CEL07	Geotechnical Engineering Lab	0	0	3	1.5
7	V20CEL08	Structural detailing using Auto CAD Lab	0	0	3	1.5
8	V20SOC03	Skill Advanced Course /Soft Skills Course	1	0	2	2
9	V20ENT04	Professional Communication Skills-III (MNC) (BOS of English)	2	0	0	0
10	V20CESI1	Summer Internship / Mini Project	0	0	0	1.5
		Total	15	0	14	21.5

Total Contact Hours : 27 Total Credits : 21.5

VI SEMESTER

S.No	Course Code	Course Title	Hours per week			Credits
			L	T	P	
1	V20CET17	Design of Steel Structures	3	0	0	3
2	V20CET18	Foundation Engineering	3	0	0	3
3	V20CET19	Environmental Engineering	3	0	0	3
4	V20CET20 V20CET21 V20CET22 V20CET23 V20CET24	Professional Elective Course – II 1. Bridge Engineering 2. Earth Retaining structures 3. Urban Hydrology and Hydraulics 4. Pavement Analysis and Design 5. Remote sensing and GIS	3	0	0	3
5		Open Elective Course – II/Job Oriented Elective	3	0	0	3
6	V20CEL09	Environmental Engineering Lab	0	0	3	1.5
7	V20CEL10	CAD & GIS Lab	0	0	3	1.5
8	V20CEL11	Estimation, Contracts and Construction Management Lab	0	0	3	1.5
9	V20SOC04	Skill Advanced Course /Soft Skills Course	1	0	2	2
10	V20CEMC01	Intellectual Property Rights & Patents (MNC)	2	0	0	0
		Total	18	0	11	21.5

Total Contact Hours: 30 Total Credits : 21.5

Internship 2 months / Mini Project is mandatory during summer vacation and is evaluated in VII semester.

VII SEMESTER

S.No	Course Code	Course Title	Hours per week L	T	P	Credits
1	V20CET25 V20CET26 V20CET27 V20CET28 V20CET29	Professional Elective Course III 1. Pre stressed Concrete 2. Advanced Foundation Engineering 3. Ground Water Development 4. Highway Construction and Management 5. Environmental Impact Assessment and Management	3	0	0	3
2	V20CET30 V20CET31 V20CET32 V20CET33 V20CET34	Professional Elective Course IV 1. Finite Element Methods 2. Engineering with Geo-synthetics 3. Urban Transportation Planning 4. Solid Waste Management 5. Prefabricated Structures	3	0	0	3
3	V20CET35 V20CET36 V20CET37 V20CET38 V20CET39	Professional Elective Course V 1. Earthquake Engineering 2. Ground Improvement Techniques 3. Rural Water Supply and onsite sanitation Systems 4. Metro Systems and Engineering 5. Architecture and Town Planning	3	0	0	3
4		Open Elective Course III / Job oriented	3	0	0	3
5		Open Elective Course IV / Job oriented	3	0	0	3
6	V20MBT54	Humanities and Social Science Elective Universal Human Values-II (BOS of MBA)	3	0	0	3
7	V20SOC05	Skill Advanced Course	1	0	2	2
8	V20CESI2	Summer Internship / Mini Project	0	0	0	3
		Total	19	0	2	23

Total Contact Hours : 23 Total Credits : 23

VIII SEMESTER

S.No	Course Code	Course Title	Hours per week			Credits
			L	T	P	
1		Project work, seminar and internship in industry	0	0	24	12
		Total	0	0	24	12

Total Contact Hours: 0 Total Credits: 12

Skill Oriented Courses
1. Total Station 2. 2D Drafting & 3D Modeling 3. Building Planning and Drawing 4. Building Information Modeling 5. Revit Architecture Software 6. Advanced C 7. ETABS Software 8. Primavera Software

ANNEXURE – II

SYLLABI OF V to VIII SEMESTERS OF B.TECH COURSES FOR THE ACADEMIC YEAR 2022-23 & 2023-24

V SEMESTER – SYLLABUS

Sem	V Sem	L	T	P	C	COURSE CODE
Regulation	V20	3	0	0	3	V20CET09
Name of the Course	STRUCTURAL ANALYSIS – II					
Branch	CIVIL ENGINEERING					

Course Outcomes:
Upon successful completion of this course the student will be able to
- Compute the moments and reactions for two hinged and three hinged arches (K3)
- Analyze the continuous beams using Moment distribution and Kani's methods (K4)
- Assess the load distribution in different components of Suspension bridges (K3)
- Analyze the structure for Lateral loads using different methods (K4)
- Compute the moments and forces using matrix methods (K3)

SYLLABUS

UNIT I
Three Hinged Arches: Elastic theory of arches – Eddy's theorem – Determination of horizontal thrust, bending moment, normal thrust and radial shear – effect of temperature, Hinges with support at different levels.
Two Hinged Arches: Determination of horizontal thrust, bending moment, normal thrust and radial shear – Rib shortening and temperature stresses.

UNIT II
Moment Distribution Method: Introduction Stiffness and carry over factors – Distribution factors – Analysis of continuous beams with and without sinking of supports.
Kani's Method: Introduction – Rotational factor, Analysis of continuous beams – including settlement of supports.

UNIT III
Cable Structures and Suspension Bridges: Introduction, characteristics of cable, analysis of cables subjected to concentrated and uniformly distributed loads, anchor cable, temperature stresses, analysis of simple suspension bridge.

UNIT IV
Lateral Load Analysis on Frames: Approximate Methods, Portal Method and Cantilever Method, Computational techniques, algorithms.

UNIT V

Introduction to Matrix Methods: Flexibility methods: Introduction, application to continuous beams (maximum of two unknowns). Stiffness method: Introduction, application to continuous beams (maximum of two unknowns).

Text Books:

1. Structural Analysis, T. S. Thandavamoorthy, Oxford university press, India.
2. Structural Analysis, R.C. Hibbeler, Pearson Education, India
3. Theory of Structures – II, B. C. Punmia, Jain & Jain, Laxmi Publications, India.
4. Structural Analysis, C.S. Reddy, Tata Mc-Graw hill, New Delhi.
5. Structural Analysis - Vol. I and II,S.S.Bhavikatti,Vikas Publishing House,New Delhi.

References:

1. Intermediate Structural Analysis, C. K. Wang, Tata McGraw Hill, India
2. Theory of structures, Ramamuratam, Dhanpatrai Publications.
3. Analysis of structures, Vazrani & Ratwani – Khanna Publications.
4. Comprehensive Structural Analysis-Vol. I & 2, R. Vaidyanathan & P. Perumal- Laxmi Publications Pvt. Ltd., New Delhi
5. Structural Analysis I, P.N. Chandramouli. Yesdee Publishing Pvt Limited
6. Structural Analysis, Aslam Kassimali, Cengage Learning
7. Matrix Methods of Structural Analysis, P.N. Godbole, R. S. Sonaparote, PHI Learning Pvt Limited

Sem	V Sem	L	T	P	C	COURSE CODE
Regulation	V20	3	0	0	3	V20CET10
Name of the Course	GEOTECHNICAL ENGINEERING					
Branch	CIVIL ENGINEERING					

Course Outcomes:
Upon successful completion of this course the student will be able to

- Develop the inter-relationships between various parameters of the soils (K3)
- Assess the permeability of soils having different properties (K3)
- Employ different methods to know the stress distribution in soils (K3)
- Interpret different parameters related to compaction and consolidation of soils (K3)
- Examine the stress strain behavior of soils under various drainage conditions (K3)

SYLLABUS

UNIT I
Soil Properties and Classification: Soil formation – soil structure and clay mineralogy – Adsorbed water – Mass- volume relationship –Relative density, Index Properties of Soils, Grain size analysis – Sieve and Hydrometer methods – consistency limits and indices – Various Types of soil Classifications – Unified soil classification and I.S. Soil classification.

UNIT II
Permeability: Soil water – capillary rise – One dimensioned flow of water through soils – Darcy's law- permeability – Factors affecting –laboratory determination of coefficient of permeability –Permeability of layered systems. Total, neutral and effective stresses – quick sand condition – 2-D flow and Laplace's equation - Seepage through soils – Flow nets: Characteristics and Uses.

UNIT III
Stress Distribution in Soils: Stresses induced by applied loads - Boussinesq's and Westergaard's theories for point loads and areas of different shapes– Newmark'sinfluence chart – 2:1 stress distribution method.

UNIT IV
Compaction: Mechanism of compaction – factors affecting – effects of compaction on soil properties - compaction control.
Consolidation: Compressibility of soils – e-p and e-log p curves – Stress history – Concept of consolidation - Spring Analogy - Terzaghi's theory of one-dimensional Consolidation – Time rate of consolidation and degree of consolidation – Determination of coefficient of consolidation (cv) - Over consolidated and normally consolidated clays.

UNIT V
Shear Strength of Soils: Basic mechanism of shear strength - Mohr – Coulomb Failure theories – Stress-Strain behavior of Sands - Critical Void Ratio – Stress-

Strain behavior of clays – Shear Strength determination- various drainage conditions.

Text Books:

1. "Basic and Applied Soil Mechanics", Gopal Ranjan and A. S. R. Rao, New Age International Publishers.
2. "Soil Mechanics and Foundation Engineering", V. N. S. Murthy, CBS publishers.
3. "Soil Mechanics and Foundations", B.C. Punmia, Laxmi Publications.

References:

1. "Fundamentals of Soil Mechanics", D. W. Taylor, Wiley.
2. "An introduction to Geotechnical Engineering", Holtz and Kovacs; Prentice Hall.
3. "Fundamentals of Geotechnical Engineering", B M Das, Cengage Learning, New Delhi.

Sem	V Sem	L	T	P	C	COURSE CODE
Regulation	V20	3	0	0	3	V20CET11
Name of the Course	DESIGN OF REINFORCED CONCRETE STRUCTURES					
Branch	CIVIL ENGINEERING					

Course Outcomes:
Upon successful completion of this course the student will be able to

- Design the beams in working stress and limit state methods (K5)
- Design the doubly reinforced and flanged (T and L) beam sections for flexure (K5)
- Design the continuous beams for shear and bond (K5)
- Design the one way, two way slabs and stair case of buildings (K5)
- Design the columns and footings of the structures (K5)

SYLLABUS

UNIT I
Introduction of Reinforced concrete: Structural elements- Loads on structures- Strength and serviceability - Methods of design - Working stress method- design constants - neutral axis - moment of resistance for different sections- Design of singly beams- Concepts of limit state design - Partial load and safety factors - stress-strain curves for cold worked deformed bars and mild steel bars. Assumptions in limit state design – stress - block parameters – limiting moment of Resistance. Codes of practice.

UNIT II
Design for Flexure: Limit state analysis and design of singly reinforced sections- effective depth- Moment of Resistance- Doubly reinforced and flanged (T and L) beam sections- Minimum depth for a given capacity- Limiting Percentage of Steel- Minimum Tension Reinforcement-Maximum Flexural Steel- Design of Flanged Sections (T&L)- Effective width of flange –Behavior- Analysis and Design.

UNIT III
Design for Shear and Bond and continuous beams: Limit state analysis and design of section for shear – concept of bond, anchorage and development length, I.S. code provisions.
Design examples in simply supported and continuous beams, detailing. Limit state design for serviceability: Deflection, cracking and code provision.

UNIT IV
Slabs: Classification of slabs, design of one - way slabs, one way continuous slab using IS Coefficients (Conventional) – Design of two - way slabs-simply supported and various edge conditions using IS Coefficients, Design of Stair Case.

UNIT V

Design of Compression members and footings: Effective length of a column, Design of short and long columns – under axial loads, uniaxial bending and biaxial bending – IS Code provisions.

Footings: Different types of footings – Design of isolated footings – square, rectangular.

NOTE:

All units i.e. from unit II to unit VI are to be taught in Limit State Design.
Following sheets should be prepared by the students.

Sheets-1 Reinforcement detailing of T-beams, L-beams and continuous beams.
Sheets-2 Reinforcement detailing of beam with all details.
Sheets-3 Detailing of one-way, two-way and continuous slabs.
Sheets-4 Reinforcement detailing of columns.
Sheets-5 Reinforcement detailing of isolated footings.

Examination Pattern:

Internal Examination Pattern:

The total internal marks are distributed in three components as follows:
Descriptive (subjective type) examination : 15 marks
Detailing sheets(For above) : 10 marks
Assignment : 05 marks

Text Books:

1. "Limit State Design", A. K. Jain
2. "Design of Reinforced concrete Structures", N. Subrahmanyian.
3. "Reinforced concrete", Vol.1., H. J. Shah, Charotar publishing house Pvt. Ltd.

References:

1. "R C C Design", B.C Punmia, A. K. Jain and A. K Jain. Lakshmi Publications
2. "Reinforced Concrete Structures", N. Krishna Raju and R. N. Pranesh, New Age Publications.
3. "Reinforced Concrete Structures", S. Unnikrishna Pillai and Devdas Menon, Tata Mc.Graw Hill, New Delhi.
4. IS 456-2000, Code of practice for Reinforced Concrete Structures.
5. IS 875, Code of Practice for Design Loads.
6. SP-16, Design Aids for Reinforced Concrete.

Sem	V Sem	L	T	P	C	COURSE CODE
Regulation	V20	3	0	0	3	V20CET12
Name of the Course	**ADVANCED CONCRETE TECHNOLOGY (Professional Elective -1)**					
Branch	CIVIL ENGINEERING					

Course Outcomes

Upon successful completion of course the students will be able to

- Relate the material characteristics and their influence on concrete (K3)
- Predict concrete behavior based on its durability properties (K3)
- Illustrate mix proportioning of different types of concretes and their testing (K3)
- Select the suitable concrete based on their specific application (K3)
- Employ suitable concreting methods to place the concrete based on requirement (K3)

SYLLABUS

UNIT I

Ingredients of Concrete: Cement –chemical composition and their importance, hydration of cement, types of cement, testing of cement.

Fine aggregate: Functions, requirement, Alternatives to River sand, M-sand introduction and manufacturing.

Coarse aggregate: Importance of size, shape and texture. Grading and blending of aggregate, testing on aggregate, requirement, Recycled aggregates Water – qualities of water.

Chemical admixtures: Plasticizers, accelerators, retarders and air entraining agents.

Mineral admixtures: Pozzolanic and cementitious materials, Fly ash, GGBS, silica fumes, Metakaolin and rice husk ash, Green concrete.

UNIT II

Durability of Concrete: Durability, Transport mechanism of fluids and gases in concrete, cracking in concrete - corrosion and carbonation induced cracking, Alkali Aggregate Reaction, degradation by freeze and thaw, chloride attack, sulphate and sea water attack (marine conditions). Hot and cold weather concreting, water penetration and rapid curing tests.

UNIT III

Concrete Mix Design: Design of concrete mixes by IS code method - ACI method Design of high strength concrete mixes, design of fly-ash cement concrete mixes, design of high density concrete mixes.

Testing of Concrete: Test methods: Analysis of fresh concrete, Accelerated testing methods, Tests on hardened concrete, Core cutting and testing, partially destructive testing, Non-destructive testing of concrete structure

UNIT IV

Special Concrete: Lightweight concrete, autoclaved aerated concrete, no-fines concrete, lightweight aggregate concrete and foamed concrete, High strength concrete, refractory concrete, high density and radiation-shielding concrete, polymer concrete, fibre-reinforced concrete, mortars, renders, recycled concrete, Ferro Cement, Self Compacting Concrete.

UNIT V

Special processes and technology for particular types of structure: Sprayed concrete, underwater concrete, grouts, grouting and grouted concrete, mass concrete, slip form construction, pumped concrete, concrete for liquid retaining structures, vacuum process

Text Books:

1. Neville, A.M., Properties of Concrete, Pearson Education Asia (P) Ltd, England, 2000.
2. Concrete Technology, Gambhir M.L, Tata McGraw Hill
3. Concrete Technology, M.S.Shetty, S.Chand& Company New Delhi
4. Concrete microstructure, properties & materials, P.Kumar Mehata, Paulo & J.M. Monteiro,
5. Light Weight Concrete, Short & Kenniburg, Asia Publishing House, Bombay

References:

1. N. V. Nayak, A. K. Jain Handbook on Advanced Concrete Technology, ISBN: 978-81-8487-186-9
2. Job Thomas, “Concrete Technology”, CENGAGE Learning,2015.
3. IS 4926 (2003): Code of Practice Ready-Mixed Concrete [CED 2: Cement and Concrete] Criteria for RMC Production Control, Basic Level Certification for Production Control of Ready Mixed Concrete BMTPC.
4. Specification and Guidelines for Self-Compacting Concrete, EFNARC, Association House.

Sem	V Sem	L	T	P	C	COURSE CODE
Regulation	V20	3	0	0	3	V20CET13
Name of the Course	IRRIGATION ENGINEERING (Professional Elective -1)					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of the course, the student will be able to**:**

- Interpret the quality of irrigation water and water requirements (K2)
- Design the erodible and non-erodible canals using different theories (K5)
- Asses different irrigation canal structures (K3)
- Relate the diversion head works and their components (K3)
- Analyze the stability of Gravity and Earth dams (K3)

SYLLABUS

UNIT I

Irrigation & Water Requirements: Definition – Importance of Irrigation in India – Advantages and Dis advantages – Types of Irrigation – Quality of Irrigation water - Different types of crops and crop seasons- Soil, water and plant relationship-Irrigation efficiencies -Crop water requirement-Duty and Delta-Factors affecting duty-Depth and Frequency of Irrigation-crop rotation.

UNIT II

Canals: Classification-Alluvial and Non Alluvial canals-Design of non-erodible canals-Different command areas-Methods of economic section and maximum permissible velocity-Design of erodible canals-Kennedy's silt theory and Lacey's regime theory.

UNIT III

Canal structures: Falls-Types and location- Design principle of Sarda type wall and straight glacis wall

Regulators: Head and cross regulators –design principles

Cross Drainage works: Design principles of aqueduct- siphon aqueduct-super passage

UNIT IV

Diversion Head Works: Types of diversion head works-Weirs and Barrages-Layout of diversion head works-components- causes and failures of weirs on permeable foundations-Bligh's creep theory-Khosla's theory-exit gradient.

UNIT V

Reservoir planning: Site selection-Types of dams- selection of type of dam-selection of site for a dam.

Gravity Dams: Forces acting on gravity dam-causes of failure of gravity dam-elementary profile and practical profile of gravity dam-limiting height of dam-stability analysis-drainage galleries.

Earthen Dams: Types of earthen dams-causes of failure-criteria for safe design-seepage-measures of control of seepage filters.

Text Books:

1. Irrigation Engineering and Hydraulic structures, Santosh Kumar Garg, Khanna Publishers.
2. Irrigation and Water power Engineering, B.C. Punmia, Pande B.B. Lal, Ashok Kumar Jain, Arun Kumar Jain, Lakshmi Publications Ltd.
3. Water resources and Irrigation engineering by Sri Krishna publications.

References:

1. Irrigation and Water Resources Engineering, Asawa G L (2013), New Age International Publishers.
2. Irrigation Water Resources and Water Power Engineering, Modi P N (2011), Standard book House, New Delhi.
3. Irrigation and Drainage Engineering" by Peter Waller and Muluneh Yitayew

Sem	V Sem	L	T	P	C	COURSE CODE
Regulation	V20	3	0	0	3	V20CET14
Name of the Course	TRAFFIC ENGINEERING AND MANAGEMENT (Professional Elective –I)					
Branch	CIVIL ENGINEERING					

Course Outcomes:
Upon successful completion of the course the student will be able to:

- Understand basics principles of Traffic Engineering (K2)
- Analyze parking data and model accidents (K3)
- Determine traffic capacity and level of service (K3)
- Design of Signalized systems and Rotary Intersections (K5)
- Employ engineering techniques to achieve safe and efficient movement of people and goods on roadways (K3)

SYLLABUS

UNIT I
Traffic Studies (Part- I) : Basic principles of Traffic, Volume, Speed and Density; Definitions and their interrelationships; Traffic Volume studies - Objectives, Methods of Volume counts, Presentation of Volume Data; Speed studies- Types of Speeds, Objectives, Methods of speed studies, Presentation of speed data. Delay Studies; Head ways and Gap Studies - Headway and Gap acceptance, Origin and Destination Studies.

UNIT II
Traffic Studies (Part-II) : Parking Studies: parameters of parking, definitions, Parking inventory study, Parking survey by Patrolling method; Analysis of Parking Survey data; Parking Management
Accident studies - Causative factors of Road accidents, Accident data collection: Road Safety Auditing, Measures to increase Road safety. Pedestrian studies, Bicycle path studies, sky walk planning.

UNIT III
Capacity and LOS Analysis: Introduction to Traffic capacity, Analysis concepts, Level of Service, Basic definitions, Factors affecting Capacity and LOS as per Indo-HCM,Capacity of Urban/Rural Highway, With or without access control, Basic freeway segments-Service flow rate of LOS, Lane width or Lateral clearance adjustment; Heavy vehicle adjustment; Driver population adjustment.

UNIT IV
Design of Signal and Intersections: Fixed Time signals, Determination of Optimum Cycle length and Signalsetting for Fixed Time signals, Flexible progressive system, Warrants for Signals, Signal Coordination.
Rotary planning , Rotary Design as per IRC:65, Weaving angles, Entry width, Exit Radius, Capacity of Rotary, Types of interchanges, Implementation.

UNIT V

Transportation System Management: Measures for Improving vehicular flow – one way Streets, Signal Improvement, Transit Stop Relocation, Reversible lanes - Reducing Peak Period Traffic - Strategies for working hours, Congestion Pricing, Differential Toll Policies.

Text Books:

1. Traffic Engineering and Transportation Planning – L.R. Kadiyali, Khanna Publishers
2. Principles of Highways Engineering and Traffic Analysis - Fred Mannering & Walter Kilareski, John Wiley & Sons Publication.
3. Transportation Engineering - An Introduction - C. Jotin Khisty, Prentice Hall Publication.

References:

1. Fundamentals of Transportation Engineering - C. S. Papacostas, Prentice Hall India.
2. Traffic Engineering - Theory & Practice - Louis J. Pignataro, Prentice Hall Publication.
3. Traffic Engineering by Roger P. Roess, William R. Mc. Shane, Elena S. Prassas , Prentice Hall, 1977.
4. IRC-65-2017: Guidelines for Planning and Design of Roundabouts (First Revision)
5. IRC-93-1985: Guidelines for design and installation of road traffic signals
6. Indian Highway capacity manual (Indo-HCM) – 2017, Published by CSIR-CRRI, New Delhi.

Sem	**V Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	3	0	0	3	V20CET15
Name of the Course	**AIR POLLUTION AND CONTROL (Professional Elective –I)**					
Branch	CIVIL ENGINEERING					

Course Outcomes:
Upon successful completion of this course, the students will be able to:
- Asses the pollutants and ambient quality of air (K3)
- Illustrate the plume behavior in a prevailing environmental condition (K3)
- Examine carbon credits for various day to day activities(K3)
- Select proper technique to control the air particulates (K3
- Choose appropriate in plant control measures for different emissions (K3)

SYLLABUS:

UNIT I
Air Pollution: Sampling and analysis of air pollutants, conversion of ppm into µg/m3. Definition of terms related to air pollution and control - secondary pollutants – Indoor air pollution – Ozone holes and Climate Change and its impact - Carbon Trade.

UNIT II
Meteorology and Air Pollution: Properties of atmosphere: Heat, Pressure, Wind forces, Moisture and relative Humidity, Lapse Rates - Influence of Terrain and Meteorological phenomena on plume behaviour and Air Quality - Wind rose diagrams and Isopleths Plume Rise Models

UNIT III
Ambient Air Quality Management: Monitoring of SPM - RPM SO2; NOx and CO - Stack Monitoring for flue gases - Micro-meteorological monitoring – Noise Monitoring - Weather Station. Emission Standards- Gaussian Model for Plume Dispersion

UNIT IV
Air Pollution Control: Control of particulates – Control at Sources, Process Changes, Equipment modifications, Design and operation of control Equipments – Settling Chambers, Cyclone separators –Fabric filters–Scrubbers, Electrostatic precipitators

UNIT V
Air Pollution Control Methods: Control of NOx and SOx emissions – Environmental friendly fuels - In-plant Control Measures, process changes, methods of removal and recycling. Environmental criteria for setting industries and green belts.

Text Books:
1. Air Pollution and Control, K.V.S.G. Murali Krishna, Laxmi Publications, New Delhi, 2015

2. Air Pollution, M. N. Rao and H. V. N. Rao, Tata McGraw Hill Company.
3. Environmental Science and Engineering by J.G. Henry and G.W. Heinke – Pearson Education.

References:

1. An Introduction to Air pollution, R. K. Trivedy and P.K. Goel, B.S. Publications.
2. Air Pollution by Wark and Warner - Harper & Row, New York.

Sem	V Sem	L	T	P	C	COURSE CODE
Regulation	V20	3	0	0	3	V20CET16
Name of the Course	GEO-ENVIRONMENTAL ENGINEERING (Professional Elective –I)					
Branch	CIVIL ENGINEERING					

Course Outcomes:
Upon successful completion of this course the student will be able to

- Identify the Geo-environmental pollutants and their governing factors (K2)
- Employ the techniques for safe disposal of waste (K3)
- Relate the sub surface contamination transport (K3)
- Practice the utilization of solid waste for soil stabilization (K3)
- Select different remediation techniques to improve contaminated soil (K3)

SYLLABUS
UNIT I
Introduction to Geo Environmental Engineering: Environmental cycle – Sources, production and classification of waste – Causes of soil pollution – Factors governing soil pollution interaction clay minerals - Failures of foundation due to waste movement.

UNIT II
Safe Disposal of Waste: Site selection for landfills – Characterization of land fill sites and waste – Risk assessment – Stability of landfills – Current practice of waste disposal – Monitoring facilities – Passive containment system – Application of geosynthetics in solid waste management – Rigid or flexible liners.

UNIT III
Transport Of Contaminants : Contaminant transport in sub surface - Advection, Diffusion, Dispersion – Governing equations – Contaminant transformation – Sorption – Biodegradation – Ion exchange – Precipitation – Hydrological consideration in land fill design – Ground water pollution.

UNIT IV
Stabilization: Solidification of wastes – Micro and macro encapsulation – Absorption, Adsorption, Precipitation – Detoxification – Mechanism of stabilization – Organic and inorganic stabilization – Utilization of solid waste for soil improvement – case studies.

UNIT V
Remediation of Contaminated Soils: Exsitu and Insitu remediation- Solidification, bio-remediation, incineration, soil washing, phyto remediation, soil heating, vetrification, bio-venting.

Text Books:

1. Hari D. Sharma and Krishna R. Reddy, "Geo-Environmental Engineering" – John Wiley and Sons, INC, USA, 2004.
2. Daniel B.E., "Geotechnical Practice for waste disposal", Chapman & Hall, London 1993.

3. Manoj Datta," Waste Disposal in Engineered landfills", Narosa Publishing House, 1997.
4. Manoj Datta, B.P. Parida, B.K. Guha, "Industrial Solid Waste Management and Landfilling Practice", Narosa Publishing House, 1999.

References

1. Westlake, K, "Landfill Waste pollution and Control", Albion Publishing Ltd., England, 1995.
2. Wentz, C.A., "Hazardous Waste Management", McGraw Hill, Singapore, 1989
3. Proceedings of the International symposium on "Environmental Geotechnology" (Vol.I and II). Environmental Publishing Company, 1986 and 1989.
4. Ott, W.R., "Environmental indices, Theory and Practice", Ann Arbor, 1978.
5. Fried, J.J., "Ground Water Pollution", Elsevier, 1975.
6. ASTM Special Tech. Publication 874, Hydraulic Barrier in Soil and Rock, 1985.
7. Lagrega, M.D., Buckinham, P.L. and Evans, J.C., "Hazardous Waste Management" McGraw Hill Inc. Singapore, 1994.

Sem	V Sem	L	T	P	C	COURSE CODE
Regulation	V20	0	0	3	1.5	V20CEL07
Name of the Course	GEOTECHNICAL ENGINEERING LAB					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of this course the student will be able to

- Employ index properties required for classification of soils (K3)
- Find the permeability of different soils using different tests (K3)
- Predict the compaction, consolidation and swelling characteristics of the soils (K3)
- Compute the strength properties of soils (K3)

List of Experiments

1. Specific gravity, G
2. Atterberg's Limits.
3. Field density-Core cutter and Sand replacement methods
4. Grain size analysis by sieving
5. Hydrometer Analysis Test
6. Permeability of soil - Constant and Variable head tests
7. Compaction test
8. Consolidation test (to be demonstrated)
9. Direct Shear test
10. Triaxial Compression test (UU Test)
11. Unconfined Compression test
12. Vane Shear test
13. Differential free swell (DFS)
14. CBR Test

List Of Equipments

1. Casagrande's liquid limit apparatus.
2. Apparatus for plastic and shrinkage limits
3. Field density apparatus for
   a) Core cutter method
   b) Sand replacement method
4. Set of sieves: 4.75 mm, 2 mm, 1 mm, 0.6 mm, 0.42 mm, 0.3 mm, 0.15 mm, and 0.075 mm.
5. Hydrometer
6. Permeability apparatus for
   a) Constant head test
   b) Variable head test
7. Universal auto compactor for I.S light and heavy compaction tests.
8. Shaking table, funnel for sand raining technique.
9. Apparatus for CBR test

10. 10 tons loading frame with proving rings of 0.5 tons and 5 tons capacity
11. One dimensional consolation test apparatus with all accessories.
12. Triaxial cell with provision for accommodating 38 mm dia specimens.
13. Box shear test apparatus
14. Laboratory vane shear apparatus.
15. Hot air ovens (range of temperature 500 - 1500C

References:

1. Determination of Soil Properties, J. E. Bowles.
2. IS:2720 – Relevant Parts of Bureau of Indian Standards, New Delhi.

Sem	V Sem	L	T	P	C	COURSE CODE
Regulation Year	V203	0	0	3	1.5	V20CEL08
Name of the Course	**STRUCTURAL DETAILING USING AUTO CAD**					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of this course the student will be able to

- Employ detailing of different building components (K3)
- Employ detailing of retaining walls (K3)
- Employ detailing of water tanks (K3)
- Employ detailing of septic tank (K3)

AutoCAD (2 Drafting)

1. Detailing of slab (One way & two way slabs)
2. Detailing of stair case (dog legged stair case)
3. Detailing of foundation (isolated, combined foundation)
4. Detailing of beams and columns in frame
5. Detailing of retaining wall (gravity)
6. Detailing of column base
7. Detailing of roof truss (king and queen post)
8. Detailing of box culvert
9. Detailing of water tank
10. Detailing of septic tank

VI SEMESTER – SYLLABUS

Sem	VI Sem	L	T	P	C	COURSE CODE
Regulation	V20	3	0	0	3	V20CET17
Name of the Course	DESIGN OF STEEL STRUCURES					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of this course the student will be able to

- Design the riveted, bolted and welded connection (K5)
- Design the beams against deflection, shear, buckling, and bearing (K5)
- Design of tension, compression and roof trusses for different loading conditions (K5)
- Design the compression members and column foundations (K5)
- Design the plate girder and gantry girder (K5)

SYLLABUS

UNIT I

Connections: Introduction - Properties of structural steel - IS Rolled sections - I.S Specifications - Lap and Butt connections (Revited and Bolted connections) - Eccentric connections.

Welded connections: Introduction - Advantages and disadvantages of welding- Strength of welds - Butt and fillet welds - Permissible stresses - IS Code requirements - Design of Butt and fillet weld subjected to moment acting in the plane and at right angles to the plane of the joints.

UNIT II

Beams: Allowable stresses - Design requirements as per IS Code-Design of simple and compound beams - Curtailment of flange plates - Beam to beam connection - check for deflection, shear, buckling, and bearing - Design of laterally unsupported beams.

UNIT III

Tension Members: Introduction to different modes of failures - gross section yielding - Net Section rupture and block shear failure - Determine the design strength due to yielding of gross section - rupture of critical section and block shear - Design of tension members.

Compression Members: Effective length of columns - Slenderness ratio - permissible stresses - Design of compression members, Design of Struts.

Roof Trusses: Different types of trusses – Design loads – Load combinations as per IS Code recommendations, structural details –Design of simple roof trusses involving the design of purlins, members and joints.

UNIT IV

Built up compression members: Design of lacings and battens. Design Splicing of columns.

Design of Column Foundations: Introduction - Design of slab base - Design of gusset base- Column bases subjected to moment.

UNIT V

Design of Plate Girder: Introduction - Design consideration - IS Code recommendations - Design of plate girder - Welded -curtailment of flange plates and stiffeners - splicing and connections.

Design of Gantry Girder: Introduction - Impact factors - longitudinal forces- Design of Gantry girders.

NOTE:

All units i.e. from unit II to unit-VI to be taught in Limit State method only. Welding Connections should be used from Unit II – Unit V.

The students should prepare the following sheets.

Sheets-1 Detailing of steel members Connection.
Sheets-2 Detailing of beams including curtailment of flange plates.
Sheets-3 Detailing of Column including lacing and battens.
Sheets-4 Detailing of Column bases, slab base and gusseted base.
Sheets-5 Detailing of Plate girder including curtailment, splicing and stiffeners.

EXAMINATION PATTERN:

Internal Examination Pattern:

The total internal marks are distributed in three components as follows:

Descriptive (subjective type) examination : 15 marks
Detailing sheets(For above) : 10 marks
Assignment : 05 marks

Text Books:

1. Design of steel structures, S.K. Duggal, Tata McGraw Hill, and New Delhi.
2. Design of steel structures, S.S.Bavakatti, I.K.International Publishing House Pvt. Ltd.
3. Steel Structures Design and Practice, N.Subramanian, Oxford University Press.
4. Design of Steel Structures, Ramachandra, Scientific Publishers Journals Dept.

References:

1. Structural Design in Steel, Sarwar Alam Raz, New Age International Publishers, New Delhi.
2. Design of Steel Structures, P. Dayaratnam, S. Chand Publishers.
3. Design of Steel Structures, M.Raghupathi, Tata Mc. Graw-Hill.
4. Structural Design and Drawing, N. Krishna Raju, University Press.
5. IS: 800- 2007, General construction in steel-Code of practice.
6. IS: 875-1987, Code of Practice for Design Loads.
7. Steel Tables

Sem	VI Sem	L	T	P	C	COURSE CODE
Regulation	V20	3	0	0	3	V20CET18
Name of the Course	FOUNDATION ENGINEERING					
Branch	CIVIL ENGINEERING					

Course Outcomes:
Upon successful completion of this course the student will be able to

- Employ the soil exploration and carryout the field testing (K3)
- Examine the slope stability and earth pressures using different theories (K3)
- Determine the bearing capacity of shallow foundations using bearing capacity criteria (K4)
- Determine the bearing capacity of shallow foundations using settlement criteria (K4)
- Design the deep foundations for different loading and soil conditions (K5)

SYLLABUS

UNIT I
Soil Exploration: Need, Methods of soil exploration – Boring and Sampling methods, Field tests, Penetration Tests, Pressure meter, planning of programme and preparation of soil investigation report.

UNIT II
Slope Stability: Infinite and finite earth slopes in sand and clay, types of failures, factor of safety of infinite slopes, stability analysis by Swedish arc method, standard method of slices ,Taylor's Stability Number, Stability of slopes of dams and embankments – different conditions.
Earth-Pressure theories: Rankine's& Coulomb's theory of earth pressure, Culmann's graphical method, earth pressures in layered soils.

UNIT III
Shallow Foundations – Bearing Capacity Criteria: Types of foundations and factors to be considered in their location , Bearing capacity – criteria for determination of bearing capacity – factors influencing bearing capacity, analytical methods to determine bearing capacity – Terzaghi's theory ,IS Methods.

UNIT IV
Shallow Foundations – Settlement Criteria: Safe bearing pressure based on N-value, allowable bearing pressure; safe bearing capacity and settlement from plate load test – Types of foundation settlements and their determination - allowable settlements of structures.

UNIT V
Deep Foundations: Pile foundation, Types of piles, Load carrying capacity of piles based on static pile formulae, Dynamic pile formulae, Pile load tests, Load carrying capacity of pile groups in sands and clays.

Well Foundations: Types, Different shapes of well, Components of well–functions, forces acting on well foundations, Design Criteria –Determination of staining thickness and plug - construction and Sinking of wells, Tilt and shift.

Text Books:

1. Principles of Foundation Engineering, Das, B.M., (2011), 6th edition Cengage learning.
2. Basic and Applied Soil Mechanics, Gopal Ranjan& A.S.R. Rao, New Age International Pvt. Ltd, (2004).
3. Soil Mechanics and Foundations, B.C.Punmia, Laxmi Publictions.

References:

1. Foundation Analysis and Design, Bowles, J.E., McGraw-Hill Publishing Company, Newyork.
2. Theory and Practice of Foundation Design, N.N.SOM & S.C.DAS PHI Learning Private limited.

Sem	VI Sem	L	T	P	C	COURSE CODE
Regulation	V20	3	0	0	3	V20CET19
Name of the Course	ENVIRONMENTAL ENGINEERING					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of this course, the students will be able to:

- Clarify the protected water supply systems and their importance (K2)
- Assess different sources of water and proper intake structures (K3)
- Select suitable primary treatment process based on the quality of raw water (K3)
- Select suitable secondary treatment process (K3)
- Employ proper distribution system (K3)

UNIT I

Protected Water Supply systems: Importance and Necessity, Water borne diseases, Flow chart of public water supply system, Role of Environmental Engineer, Agency activities. Water Demand and Quantity Estimation: Estimation of water demand for a town or city, Per capita Demand and factors influencing it - Types of water demands and its variations- factors affecting water demand, Design Period, Factors affecting the Design period, Population Forecasting

UNIT II

Sources of Water: Lakes, Rivers, Impounding Reservoirs, comparison of sources with reference to quality, quantity and other considerations- Capacity of storage reservoirs, Mass curve analysis. Groundwater sources of water: Types of water bearing formations, springs, Wells and Infiltration galleries, Yields from infiltration galleries. Collection and Conveyance of Water: Factors governing the selection of the intake structure, Types of Intakes. Conveyance of Water: Gravity and Pressure conduits.

UNIT III

Quality Analysis and Primary Treatment of Water: Characteristics of water– Physical, Chemical and Biological- Analysis of Water – Physical, Chemical and Biological characteristics.
Flowchart of water treatment plant, Primary Treatment methods - Theory and Design of Sedimentation, Coagulation, Sedimentation with Coagulation

UNIT IV

Secondary Treatment of Water: Filtration – types of filters – Design and working principles; Theory of disinfection-Chlorination and other Disinfection methods, Softening of Water, Removal of color and odours - Iron and Manganese removal –

Adsorption-fluoridation and deflouridation–aeration– Reverse Osmosis-Iron exchange–Ultra filtration.

UNIT V

Distribution of Water: Requirements- Methods of Distribution system, Layouts of Distribution networks, Pressures in the distribution layouts, Analysis of Distribution networks: Hardy Cross and equivalent pipe methods -Components of Distribution system: valves such as sluice valves, air valves, scour valves and check valves, hydrants, water meters and Pipes –Laying and testing of pipe lines-selection of pipe materials, pipe joints.

Text Books:

1. Elements of Environmental Engineering by K.N. Duggal, S. Chand Company Ltd., New Delhi, 2012.
2. Water Supply Engineering by Dr. P.N. Modi, Standard book house, 4th edition (2015)
3. Water Supply Engineering by B.C. Punmia, Laxmi publications, volume-I
4. Water supply and sanitary engineering by S. C. Rangwala, Charotar publishing house, 29th edition (2016)

References:

1. Water supply engineering by S. K. Garg , Khanna publishers, ,33rd edition (2010)
2. Environmental Engineering by Howard S. Peavy, Donald R. Rowe (2017) Mc-Graw-Hill Book Company, New Delhi, 1985.
3. IS 10500:2012, Drinking water specification.
4. IS: 3052 (Part-08), Methods of sampling and Test (physical and chemical) for water and wastewater.

Sem	VI Sem	L	T	P	C	COURSE CODE
Regulation	V20	3	0	0	3	V20CET20
Name of the Course	BRIDGE ENGINEERING (Professional Elective - II)					
Branch	CIVIL ENGINEERING					

Course Outcomes:
Upon successful completion the course the student will be able to

- Generalize different types of bridges, loading standards and end conditions (K2)
- Assess different reactions and moments in the T beam bridge (K3)
- Design of pier and abutment caps of bridges (K5)
- Design of well foundation with different parameters of sub soil (K5)
- Outline the effectiveness of different bearings of a bridge (K4)

UNIT I
Introduction: Bridges- Types- Slab bridges, T Beam, Arch bridges, Cable Stayed bridges, prestressed concrete bridges, Truss Bridges, Culverts, - Nomenclature- Selection of Bridge Site- Economical span- Abutments pier and end connections- types of foundations- Open, Pile, Well Foundations, Bearings – Types- Introduction to Loading standards- Railway and IRC Loading

UNIT II
T-Beam Bridge: Pigeaud's method for computation of slab moments; Courbon's method for computation of moments in girders; Design of simply supported T-beam bridge.

UNIT III
Sub Structure for Bridges: Pier and abutment caps; Materials for piers and abutments, Design of pier; Design of abutment; Backfill behind abutment; approach slab.

UNIT IV
Foundations for Bridges: scour at abutments and piers; Grip length; Types of foundations; Design of well foundation.
Box Culverts: Loading – Analysis and Design- Reinforcement detailing

UNIT V
Bearings for Bridges: Importance of bearings; bearings for slab bridge; bearings for girder bridges; Expansion bearings; Fixed bearings; Design of elastomeric pad bearing.

Text Books:

1. Essentials of Bridge Engineering by Dr. Johnson Victor; Oxford & IBH publishing Co. Pvt.Ltd
2. Cable supported bridges, concepts and design by N J Gimsing. John Willey and Sons

3. Design of Bridges, N. Krishna Raju, Tata McGraw Hill

References:

1. Design of Bridge Structures by T. R Jagadeesh, M.A Jayaram, Prentice Hall of India Pvt. Ltd.
2. Design of Concrete Bridges, Aswini, Vazirani, Ratwani
3. Bridge Engineering by S.Ponnuswamy

Sem	VII Sem	L	T	P	C	COURSE CODE
Regulation	V20	3	0	0	3	V20CET21
Name of the Course	**EARTH RETAINING STRUCTURES (Professional Elective – II)**					
Branch	CIVIL ENGINEERING					

Course Outcomes:
Upon successful completion of this course, the students will be able to

- Compute the lateral earth pressures associated with different earth systems (K3)
- Assess the failure criterion and stability requirements of retaining wall (K3)
- Analyze the sheet pile structure for both external and internal stability (K4)
- Apply the knowledge of reinforced earth in designing earth retaining systems (K3)
- Relate different methods for the stability of braced cuts and cofferdams (K3)

SYLLABUS

UNIT I
Earth pressures: Different types and their coefficients; Classical Theories of Earth pressure – Rankine's and Coulomb's Theories for Active and Passive earth pressure; Computation of Lateral Earth Pressure in Homogeneous and Layered soils; Graphical solutions for Coulomb's Theory in active and passive conditions.

UNIT II
Retaining walls: Types, Type of Failures of Retaining Walls – Stability requirements –Drainage behind Retaining walls – Provision of Joints – Relief Shells.

UNIT III
Sheet Pile Structures: Types of Sheet piles – Cantilever sheet piles in sands and clays – Anchored sheet piles – Free earth and Fixed earth support methods – Rowe's moment reduction method – Location of anchors and Design of Anchorage system.

UNIT IV
Soil reinforcement: Reinforced earth - Different components – their functions – Design principles of reinforced earth retaining walls.

UNIT V
Braced cuts and Cofferdams: Lateral Pressure in Braced cuts – Design of Various Components of a Braced cut – Stability of Braced cuts – Bottom Heave in cuts. – Types of cofferdam, suitability, merits and demerits – Design of single – wall cofferdams and their stability aspects – TVA method and Cummins' methods.

Text Books:

1. Principles of Foundation Engineering by Braja M Das, Cengage Learning
2. Foundation analysis and design by Bowles, J.E., McGraw Hill
3. Soil Mechanics in Engineering Practice – Terzaghi, K and Ralph B. Peck, John Wile & Sons.

References:

1. Earth Pressure and Earth Retaining Structures by Chris RI Clayton, Rick I woods, Andrew J Bond and Jarbas Milititsky, CRC Press, Taylor and Francis Group, New York.
2. Analysis and Design of Foundations and Retaining Structures, Samsher Prakash
3. Gopal Ranjan and Swami Saran, Saritha Prakashan Publishers, New Delhi.
4. NPTEL course materials on Geo-synthetics and Earth Retaining Structures

Sem	VI Sem	L	T	P	C	COURSE CODE
Regulation	V20	3	0	0	3	V20CET22
Name of the Course	**URBAN HYDROLOGY & HYDRAULICS (Professional Elective – II)**					
Branch	CIVIL ENGINEERING					

Course Outcomes:
Upon successful completion of this course, the students will be able to

- Develop the drainage systems corresponding to the trends in urbanization (K3)
- Assess the urban drainage flow pattern (K3)
- Select suitable elements of drainage system (K3)
- Relate the detention and retention facilities of storm water (K3)
- Prepare typical drainage master plan for an urbanized area (K3)

SYLLABUS

UNIT I
Introduction: Urbanization and its effect on water cycle – urban hydrologic cycle – Trends in urbanization – Effect of urbanization on hydrology
Precipitation Analysis: Importance of short duration of rainfall and runoff data, methods of estimation of time of concentration for design of urban drainage systems, design storms for urban drainage systems.

UNIT II
Approaches to urban drainage: Time of concentration, peak flow estimation approaches, rational method, NRCS curve number approach, runoff quantity and quality, wastewater and storm water reuse, major and minor systems.

UNIT III
Elements of drainage systems: Open channel, underground drains, appurtenances, pumping, source control.

UNIT IV
Analysis and Management: Storm water drainage structures, design of storm water network- Best Management Practices–detention and retention facilities, swales, constructed wetlands, models available for storm water management.

UNIT V
Master drainage plans: Issues to be concentrated upon – typical urban drainage master plan, interrelation between water resources investigation and urban planning processes, planning objectives, comprehensive planning, use of models in planning.

Text Books:
1. Manual on Drainage in Urbanised area, Geiger W. F., J Marsalek, W. J. Rawls and F.C. Zuidema, (1987 - 2 volumes), UNESCO,
2. Urban Hydrology, Hall M J (1984), Elsevier Applied Science Publisher.
3. Hydrology – Quantity and Quality Analysis, Wanielista M P and Eaglin (1997), Wiley and Sons

4. Urban Hydrology, Hydraulics and Storm water Quality: Engineering Applications and Computer Modelling, Akan A.O and R.L. Houghtalen (2006), Wiley International.

References:

1. Storm water Detention for Drainage, Stahre P and Urbonas B (1990), Water Quality and CSO Management, Prentice Hall.
2. Urban water cycle processes and interactions, Marsalek et. al. (2006), Publication No. 78, UNESCO, Paris(http://www.bvsde.paho.org/bvsacd/cd63/149460E.pdf)
3. Frontiers in Urban Water Management – Deadlock or Hope, by Maksimovic C and J A Tejada-Guibert (2001), IWA Publishing

Sem	VI Sem	L	T	P	C	COURSE CODE
Regulation	V20	3	0	0	3	V20CET23
Name of the Course	PAVEMENT ANALYSIS AND DESIGN (Professional Elective – II)					
Branch	CIVIL ENGINEERING					

Course Outcomes:
Upon successful completion of this course the student will be able to

- Employ different factors influencing the flexible pavement design (K3)
- Employ different factors influencing the rigid pavement design (K3)
- Analyze stresses and strains in flexible and rigid pavement using different theories (K3)
- Design a flexible pavement using Asphalt Institute, and AASHTO methods (K5)
- Design a rigid pavement using AASHTO methods (K5)

SYLLABUS
UNIT I
Factors Affecting Flexible Pavement Design: Variables Considered in Pavement Design, Types of Pavements, Functions of Individual Layers, EAL and ESWL Concepts, Traffic Analysis: ADT, AADT, Truck Factor, Growth Factor, Lane Distributions & Vehicle Damage Factors, Effect of Transient & Moving Loads.

UNIT II
Factors Affecting Rigid Pavement Design: Rigid pavement layers**,** Classification of Axle Types of Rigid Chassis and Articulated Commercial Vehicles, Legal Axle and Gross Weights on Single and Multiple Units, Tire Pressure, Contact Pressure,

UNIT III
Stresses in Flexible and Rigid Pavement: Visco-Elastic Theory and Assumptions, Layered Systems Concepts, Stress Solutions for One, Two and Three Layered Systems, Fundamental Design Concepts, Westergaard's Theory and Assumptions, Stresses due to Curling, Stresses and Deflections due to Loading, Frictional Stresses, and Stresses in Dowel Bars & Tie Bars

UNIT IV
Design of Flexible Pavements: Factors effecting Design. Deflection studies in Flexible Pavements. Present Serviceability Index, Pavement Performance and methods- AASHTO and Asphalt Institute Method.

UNIT V
Design of Rigid Pavements: Factors effecting Design – Wheel load & its repetition, subgrade strength & proportion, strength of concrete- modulus of elasticity, Reinforcement in slab, Design of joints. Design of Dowel bars, Design of Tie bars. AASHTO methods of Rigid Pavement design.

Text Books:

1. Principles of Pavement Design, Yoder.J. &Witzorac Mathew, W. John Wiley & Sons Inc
2. Pavement Analysis & Design, Yang H. Huang, Prentice Hall Inc.

3. AASHTO Pavement Design Guide (1993)

References:

1. Design of Functional Pavements, Nai C. Yang, McGraw Hill Publications
2. Concrete Pavements, AF Stock, Elsevier, Applied Science Publishers.
3. Pavement and Surfacing for Highway & Airports, Micheal Sargious, Applied Science Publishers Limited.
4. IRC: 37 & 58 Codes for Flexible and Rigid Pavements Design.

Sem	VI Sem	L	T	P	C	COURSE CODE
Regulation	V20	3	0	0	3	V20CET24
Name of the Course	**REMOTE SENSING AND GEOGRAPHICAL INFORMATION SYSTEM (Professional Elective – II)**					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of this course the student will be able to

- Generalize the basic principles of Remote Sensing and GIS, including ground, air and satellite based sensor platforms (K2)
- Interpret the aerial photographs and satellite imageries (K2)
- Relate the process of data entry and preparation (K3)
- Examine the Spatial Data for a variety of applications (K3)
- Employ RS and GIS for diverse applications (K3)

SYLLABUS

UNIT I

Introduction to Remote Sensing: Basic concepts of remote sensing, electromagnetic radiation, electromagnetic spectrum, interaction with atmosphere, energy interaction with the earth surfaces, Characteristics of remote sensing systems.

Sensors and platforms: Introduction, types of sensors, airborne remote sensing, space borne remote sensing, image data characteristics, digital image data formats-band interleaved by pixel, band interleaved by line, band sequential, IRS, LANDSAT, SPOT, MODIS, ASTER,RISAT and CARTOSAT.

UNIT II

Image analysis: Introduction, elements of visual interpretations, digital image processing- image preprocessing, image enhancement, image classification, supervised classification, unsupervised classification.

UNIT III

Geographic Information System: Introduction, key components, application areas of GIS, map projections.

Data entry and preparation: spatial data input, raster data models, vector data models.

UNIT IV

Spatial data analysis: Introduction, overlay function-vector overlay operations, raster overlay operations, arithmetic operators, comparison and logical operators, conditional expressions, overlay using a decision table, network analysis-optimal path finding, network allocation, network tracing and buffer analysis.

UNIT V

RS and GIS Applications: Land cover and land use, agriculture, forestry, geology, geomorphology, urban applications.

Applications of Hydrology, Water Resources and Disaster Management: Food zoning and mapping, groundwater prospects and potential recharge zones, watershed management and disaster management with case studies.

Text Books:

1. "Remote sensing and GIS", Bhatta, B., Oxford University Press, 2008.
2. "Remote Sensing and Geographical Information Systems", Anji Reddy, M., B S Publications, 2008.
3. "Basics of Remote Sensing and GIS" Kumar. S., Laxmi Publications,

References:

1. "Fundamentals of Remote Sensing", George Joseph, Universities Press, 2013.
2. "Concepts and Techniques of Geographical Information System", Chor Pang Lo and Yeung, A.K.W., Prentice Hall, India, 2006.
3. "Remote Sensing and its Applications", Narayan L.R.A, Universities Press, 2012.
4. "Introduction to Geographic Information Systems", Kand Tsung Chang, McGraw Hill Higher Education, 2009.
5. "Basics of Remote sensing & GIS", Kumar, S., Laxmi Publications, New Delhi, 2005.
6. "Principals of Geographical Information Systems", Burrough, P.A and McDonnell, R.A. Oxford University Press, 1998.
7. "Remote Sensing", Schowenger, R. A., Elsevier publishers, 2006.
8. "Remote Sensing and Image Interpretation", Lillesand, T.M, Kiefer, R.W. and Chipman, J.W., Wiley India Pvt. Ltd., New Delhi, 2013.
9. "Fundamentals of Geographic Information Systems", Demers, M.N, Wiley India Pvt. Ltd, 2013

Sem	VI Sem	L	T	P	C	COURSE CODE
Regulation	V20	0	0	3	1.5	V20CEL09
Name of the Course	ENVIRONMENTAL ENGINEERING LAB					
Branch	CIVIL ENGINEERING					

Course outcomes:

Upon successful completion of this course the student will be able to

- Illustrate the characteristics of water and waste water (K3)
- Predict the portability of water (K3)
- Examine the condition of water based on the tested parameters (K3)
- Determine the dissolved oxygen, BOD and COD of water (K4)

List of Experiments:

1. Sampling of water for testing (Demonstration)
2. Determination of alkalinity or acidity
3. Determination of chlorides in water and soil
4. Determination and estimation of total solids, organic and inorganic solids, settle able solids
5. Determination of Iron
6. Determination of pH and Electrical Conductivity of water and soil
7. Determination of Optimum coagulant dose
8. Determination of Chlorine demand
9. Determination and estimation of total hardness – calcium and magnesium
10. Determination of N, P, K values in solid waste
11. Physical parameters – Temperature, colour, odour, turbidity, taste.
12. Presumptive Coliform test
13. Determination of Dissolved Oxygen and BOD
14. Determination of COD

List of Equipments:

1. pH Meter
2. Turbidity Meter
3. Conductivity Meter
4. Hot Air Oven
5. Muffle Furnace
6. Dissolved Oxygen Meter
7. U-V Visible Spectrophotometer
8. COD Reflux Apparatus
9. Jar Test Apparatus
10. BOD Incubator
11. Autoclave
12. Hazens Apparatus
13. Imhoff Cone

References:

1. “Standard methods for analysis of water and waste water”, APHA.
2. “Chemical analysis of water and soil”, Murali Krishna, KVSG., Reem publications, New Delhi.

Sem	VI Sem	L	T	P	C	COURSE CODE
Regulation	V20	0	0	3	1.5	V20CEL10
Name of the Course	CAD & GIS LAB					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of this course the student will be able to

- Design 2D and 3D frames using STAAD PRO (K3)
- Design the retaining wall and simple towers using STAAD PRO (K3)
- Create thematic maps with relevant features (K5)
- Develop digital elevation models using GIS software (K3)

Note: Conduct any 10 experiments, 5 each from CADD software and GIS software.

COMPUTER AIDED DESIGN AND DRAWING SOFTWARE:

- STAAD PRO
- STRAAP
- STUDDS

List Of Experiments

- 2-D Frame Analysis and Design
- Steel Tabular Truss Analysis and Design
- 3-D Frame Analysis and Design
- Retaining Wall Analysis and Design
- Simple Tower Analysis and Design.
- Analysis of beam with different end conditions
- Analysis of multistoried building design
- Analysis of space stress
- Wind analysis of tall structure
- Analysis and design of elevated water tank

GEOGRAPHICAL INFORMATION SYSTEM SOFTWARE:

- Arc GIS 9.0
- ERDAS 8.7
- Mapinfo 6.5

List Of Experiments

- Georeferencing-toposheet
- Georeferencing-satellite image
- Creating a layer stack
- Extracting features-digitizing
- Map layout and analysis
- Raster supervised classification
- Raster unsupervised classification
- Raster Analysis- Urban Development
- Raster Analysis- Water bodies

- Creation of thematic maps.
- Estimation of features and interpretation
- Vector Analysis – Route Map
- Vector Analysis – village/ place/ point identification
- Creation of DEM (Digital Elevation Model)

References:

1. Computer aided design lab (Civil) Engineering by shesha Prakash and suresh S.
2. Concept and Techniques of GIS' by C.P.L.O. Albert, K.W. Yong, Printice Hall Publishers.

Sem	VI Sem	L	T	P	C	COURSECODE
Regulation	V20	0	0	3	1.5	V20CEL11
Name of the Course	**ESTIMATION, CONTRACTS & CONSTRUCTION MANAGEMENT LAB**					
Branch	CIVIL ENGINEERING					

Course Outcomes:
Upon successful completion of this course the student will be able to

- Estimate the quantities of different items of construction work (K2)
- Analyze the cost of different items of construction work (K3)
- Compute the quantities for earth work of roads, canals (K3)
- Relate the specification of different works and make contract documents (K3)
- Employ different techniques in the process of construction planning and management (K3)

List of Work Practices

- Estimation of building using Individual Wall Method (two or more rooms)
- Estimation of building using Center Line Method (two or more rooms)
- Schedule of bar bending for beams and slab
- Earthwork estimation using different methods
  - Mid-sectional area method,
  - Mean sectional area method,
  - Trapezoidal rule,
  - Prismoidal rule
- Valuation of various items of work
- Preparation of Contract Document
- Project Network Techniques
  - Bar Chart
  - Programme Evaluation and Review Technique
  - Critical Path Method
- Detailed study on Earth Work, Hoisting and Concreting Equipment's

References:

1. "Estimating and Costing" by B.N.Dutta, UBS publishers, 2000.
2. "Estimating and Costing" by G.S.Birdie.
3. "Method of Measurement of Building & Civil Engg Works – IS1200 (Parts I to XXV-1974) "Estimation, Costing and Specifications" by M.Chakraborthi, Laxmi Publications.

Sem	**VI Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	2	0	0	0	V20CEMC01
Name of the Course	**INTELLECTUAL PROPERTY RIGHTS & PATENTS**					
Branch	**CIVIL ENGINEERING**					

Course Outcomes:
Upon successful completion of this course the student will be able to

- Describe the need of Intellectual Property Rights (K2)
- Generalize different issues regarding Copy Rights (K2)
- Employ the procedure for Patent registration and granting (K3)
- Discuss the importance of Trademark and its related issues (K2)
- Recognize the significance of Trade Secrets in Industry (K2)

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SYLLABUS

UNIT I
Introduction to Intellectual Property Rights (IPR): Introduction to IPR, Evolutionary Past, Concept of IPR – Purpose of IPR, Types of IPR, WIPO -TRIPS, Nature of IPR, Patents, Trademarks, Copyrights, Neighboring Rights, Agencies responsible for IPR - Infringement, Use and Misuse of Intellectual Property Rights.

UNIT II
Copyrights: Introduction to Copyrights – Principles of Copyright Protection – Law Relating to Copyrights - Copyright Ownership – Transfer and Duration – Copyright Registration – Limitations – Infringement of Copyright – Relief and Remedy – Semiconductor Chip Protection Act.

UNIT III
Patents: Introduction to Patents - Laws Relating to Patents in India – Patent Requirements – Product Patent and Process Patent - Patent Registration and Granting of Patent -Exclusive Rights – Limitations - Ownership and Transfer — Revocation of Patent – Patent Appellate Board - Infringement of Patent – Compulsory Licensing – Software Protection and Computer related Innovations.

UNIT IV
Trademarks: Introduction to Trademarks – Laws Relating to Trademarks – Functions of Trademark – – Trade Mark Registration – Trade Mark Maintenance – Transfer of rights – Deceptive Similarities - Likelihood of Confusion - Dilution of Ownership – Trademarks Claims and Infringement – Remedies – Passing Off Action.

UNIT V
Trade Secrets: Introduction to Trade Secrets – General Principles - Laws Relating to Trade Secrets - Maintaining Trade Secret – Physical Security – Employee Access Limitation – Employee Confidentiality Agreements – Breach of Contract –Law of

Unfair Competition – Trade Secret Litigation – Applying State Law, Cyber Law and Cyber Crime

Text Books:

1. Intellectual Property Rights (Patents & Cyber Law), Dr. A. Srinivas. Oxford University Press, New Delhi.
2. PrabhuddhaGanguli: Intellectual Property Rights, Tata Mc-Graw –Hill, New Delhi
3. R.Radha Krishnan, S.Balasubramanian: Intellectual Property Rights, Excel Books. New Delhi.

References:

1. Deborah E.Bouchoux: Intellectual Property, Cengage Learning, New Delhi.
2. Richard Stim: Intellectual Property, Cengage Learning, New Delhi.
3. Kompal Bansal &Parishit Bansal Fundamentals of IPR for Engineers, B. S. Publications (Press).
4. Cyber Law - Texts & Cases, South-Western's Special Topics Collections.
5. M.Ashok Kumar and MohdIqbal Ali: Intellectual Property Rights, Serials Pub.

VII SEMESTER – SYLLABUS

Sem	VII Sem	L	T	P	C	COURSE CODE
Regulation	V20	3	0	0	3	V20CET25
Name of the Course	PRESTRESSED CONCRETE (Professional Elective – III)					
Branch	CIVIL ENGINEERING					

COURSE OUTCOMES:
Upon the successful completion of course students will be able to

- Discuss the basic concepts of prestressing system (K2)
- Analyze the effective prestress and bending stresses (K4)
- Analyze the deflections and flexural strength of prestressed concrete beams (K4)
- Analyze the prestressed concrete beams under Shear and torsion (K4)
- Design the end zone of prestressed concrete members (K5)

UNIT I
Introduction: Basic concepts of prestressing; Need for High strength steel and High strength concrete. Terminology; Advantages and Applications of Prestressed Concretes, Materials for prestressed Concrete: High strength concrete; High tensile steel.
Prestressing Systems: Prestressing Systems- Introduction, Tensioning devices, Pre-tensioning Systems, Post tensioning Systems

UNIT II
Analysis of Prestress and Bending Stresses: Basic assumptions; Analysis of prestress; Resultant stresses at a section; Pressure (Thrust) line and internal resisting couple; Concept of Load balancing.
Losses of Prestress: Nature of losses of prestress; Loss due to elastic deformation of concrete, shrinkage of concrete, creep of concrete, relaxation of stress in steel, friction and anchorage slip; Total losses allowed for in design.

UNIT III
Deflections of Prestressed Concrete Members: Importance of control of deflections; Factors influencing deflections; Short term deflections of un-cracked members; Effect of tendon profile on deflections.
Limit State of Collapse: Flexural Strength of Prestressed Concrete Sections: Ultimate flexural strength of rectangular sections and T-sections using simplified IS code recommendations.

UNIT IV
Limit State of Collapse: Shear Resistance of Prestressed Concrete Members: Shear and principal stresses; Shear- IS Code recommendations: Ultimate shear resistance of prestressed concrete members; Design of shear reinforcement.
Torsional Resistance of Prestressed Concrete Members: Design of reinforcements for torsion, shear and bending.

UNIT V

Design of End Blocks: Transmission of prestress in pretensioned members; Transmission length; Anchorage stress in post tensioned members; Bearing stress and bursting tensile force stresses in end blocks-Methods. IS Code provision for the design of end block reinforcement.

Text Books: (supplemented with IS: 1343)

1. Prestressed Concrete by N. Krishna Raju; Tata Mc.Graw - Hill Publishing Company Limited, New Delhi.
2. Pre-stressed Concrete- P. Dayarathnam: Oxford and IBH Publishing Co.
3. Prestressed Concrete, S. Ramamrutham

References:

1. Prestressed concrete by N. Rajagopalan; Narosa Publishing House.
2. Design of pre-stressed concrete structures- T.Y. Lin and Ned H. Burns - John Wiley & Sons, New York.
3. Fundamental of pre-stressed concrete- N.C. Sinha & S.K. Roy
4. Prestressed Concrete, T. Y. Lin & Burns, Wiley Publications

Sem	VII Sem	L	T	P	C	COURSE CODE
Regulation	V20	3	0	0	3	V20CET26
Name of the Course	ADVANCED FOUNDATION ENGINEERING (Professional Elective – III)					
Branch	CIVIL ENGINEERING					

Course Outcomes:
Upon successful completion of this course, the student will be able to

- Illustrate the safe bearing capacity and settlement of footings subjected to different types of loading (K3)
- Employ suitable techniques for proportioning the foundations laid on different soils strata (K3)
- Assess the forces acting on Earth Retaining Structures using different earth pressure theories (K3)
- Predict the load carrying capacity, pull-out capacity, negative skin friction of piles and their settlements (K3)
- Interpret different foundation practices in expansive soils (K3)

SYLLABUS

UNIT I
Bearing capacity of Foundation: using general bearing capacity equation–Meyerhof's, Brinch Hansen's and Vesic's methods-Bearing capacity of Layered Soils: Strong layer over weak layer, Weak layer on strong layer.
Settlement analysis: Immediate settlement, consolidate settlement, corrections, settlement of footings resting on granular soils and clay soils – Schmertmann & Hartman method – Janbu's method.

UNIT II
Mat foundations: Purpose and types of isolated and combined footings – Mats/Rafts – Proportioning of footings – Ultimate bearing capacity of mat foundations – allowable bearing capacity of mats founded in clays and granular soils– compensated rafts.

UNIT III
Earth-retaining structures: cantilever sheet piles – anchored bulkheads – fixed and free earth support methods – design of anchors – braced excavations – function of different components– forces in ties – stability against bottom heave.

UNIT IV
Pile foundations: single pile versus group of piles – load-carrying capacity of pile groups – negative skin friction (NSF) -settlement of pile groups in sands and clays – laterally loaded piles in granular soils – Reese and Matlock method – laterally loaded piles in cohesive soils– Davisson and Gill method – Broms'analysis.

UNIT V

Foundations in expansive soils: definitions of swell potential and swelling pressure – determination of free swell index – factors affecting swell potential and swelling pressure – foundation practices – sand cushion method – CNS layer - drilled piers and belled piers– under-reamed piles – moisture control methods.

Text Books:

1. Principles of Foundation Engineering, B M Das, CENTAG Learning
2. Soil Mechanics and Foundation Engineering, V N S Murthy, CBS Publishers
3. Basic and applied soil mechanics by Gopal Ranjan and ASR Rao, New Age Publishers

References:

1. Foundation Analysis and Design, J.E.Bowles, JohnWiley
2. Foundation Design, W.C.Teng, Prentice Hall Publishers
3. Analysis and Design of Foundations and Retaining Structures by Prakash S edited by Saritha Prakashan

Sem	VII Sem	L	T	P	C	COURSE CODE
Regulation	V20	3	0	0	3	V20CET27
Name of the Course	**GROUND WATER DEVELOPMENT (Professional Elective – III)**					
Branch	CIVIL ENGINEERING					

Course Outcomes:
Upon successful completion of this course the student will be able to

- Estimate aquifer parameters and its yield (K2)
- Design the wells and its associated components (K5)
- Generalize the well construction, development and its maintenance (K3)
- Organize the process of artificial recharge for increasing ground water potential (K3)
- Interpret geophysical exploration data for aquifers and their sources (K3)

SYLLABUS

UNIT I
Ground water and Well Hydraulics: Hydrologic Cycle -Groundwater in the hydrologic cycle, groundwater occurrence, aquifer parameters and their determination, general groundwater flow equation - Steady radial flow and unsteady radial flow to a well in confined and unconfined aquifers, Theis solution, Jocob and Chow's methods, Leaky aquifers.

UNIT II
Well Design: Water well design-well diameter, well depth, well screen-screen length, slot size, screen diameter and screen selection, design of collector wells, infiltration gallery.

UNIT III
Well Construction and Development: Water wells, drilling methods-rotary drilling, percussion drilling, well construction-installation of well screens-pull-back method, open- hole, bail-down and wash-down methods, well development-mechanical surging using compressed air, high velocity jetting of water, over pumping and backwashing, well completion, well disinfection, well maintenance.

UNIT IV
Artificial Recharge: Concept of artificial recharge of groundwater, recharge methods-basin, Stream-channel, ditch and furrow, flooding and recharge well methods, recharge mounds and induced recharge.
Saline Water Intrusion: Occurrence of saline water intrusion, Ghyben- Herzberg relation, Shape of interface, control of saline water intrusion.

UNIT V
Geophysics: Surface methods of exploration of groundwater – Electrical resistivity and Seismic refraction methods, Sub-surface methods – Geophysical logging and resistivity logging, Aerial Photogrammetry applications.

Text Books:

1. 'Ground water' by Raghunath H M, New Age International Publishers, 2005.
2. 'Ground water Hydrology' by Todd D.K., Wiley India Pvt Ltd., 2014.
3. 'Ground water Hydrology' by Todd D K and L W Mays, CBSPublications, 2005.

References:

1. 'Groundwater Assessment and Management' by Karanth K R, Tata Mc Graw Hill Publishing Co., 1987.
2. 'Groundwater Hydrology' by Bouwer H, McGraw Hill Book Company, 1978.
3. 'Groundwater Systems Planning and Management' by Willis R and W.W.G. Yeh, Prentice Hall Inc., 1986.
4. 'Groundwater Resources Evaluation' by Walton W C, McGraw Hill Book Company, 1978.

Sem	VII Sem	L	T	P	C	COURSE CODE
Regulation	V20	3	0	0	3	V20CET28
Name of the Course	HIGHWAY CONSTRUCTION AND MANAGEMENT (Professional Elective – III)					
Branch	CIVIL ENGINEERING					

Course Outcomes:
Upon the successful completion of course students will be able to
- Employ techniques in the planning of Base, Subbase and Shoulders of pavement (K2)
- Prepare a methodology in the laying of bituminous pavements (K3)
- Relate different concepts in the construction of Cement Concrete Pavements (K3)
- Prepare a procedure for the maintenance of Cement Concrete Pavements(K3)
- Develop proper Pavement Management Systems (K3)

SYLLABUS

UNIT I
Construction of Base, Subbase and Shoulders: Roadway and Drain Excavation, Excavation and Blasting, Embankment Construction, Construction of Gravel Base, Cement Stabilized Sub- Bases, WBM Bases, Wet Mix Construction; Crushed Cement Bases, Shoulder Construction.

UNIT II
Bituminous Construction: Preparation and Laying of Tack Coat; Bituminous Macadam, Penetration Macadam, Built up Spray Grout, Open Graded Premix, Mix Seal, Semi-Dense Asphalt Concrete-Interface Treatments and Overlay Construction, IRC Specifications.

UNIT III
Cement Concrete pavement Construction: Cement Concrete Pavement Analysis - Construction of Cement Roads, Manual, and Mechanical Methods, Joints in Concrete and Reinforced Concrete Pavement and Overlay Construction.

UNIT IV
Bituminous and Cement Concrete pavement Maintenance: Repair of surface layer, Base layer, sub base layer, Sub grade, Maintenance of Concrete slab, Dry Lean concrete sub base layer and Subgrade in concrete pavement.

UNIT V
Pavement Management Systems: Pavement Management Systems- Components, structure, data requirements, Project level and Network level needs, Pavement performance prediction – concepts, modelling techniques, Budget forecasting for maintenance and rehabilitation.

Text Books :
1. Highway Engineering, Khanna S. K., Justo C. E. G and Veeraragavan A, Nem Chand Bros., Roorkee.

2. Ralph C.G. Haas, W. Ronald Hudson and Zanieswki “Modern Pavement Management”, Mc Graw Hill and Co,1994
3. Principles of Highway Engineering, Kadiyali L. R, Khanna Publishers, New Delhi.
4. MORTH - Specifications.

References:

1. Principles of Transportation Engineering, Partha Chakroborthy and Animesh Das, PHI Learning Private Limited, Delhi.
2. Transportation Engineering - An Introduction, Jotin Khisty C, Prentice Hall, Englewood Cliffs, New Jersey.
3. Transportation Engineering and Planning, Papacostas C.S. and P.D. Prevedouros, Prentice Hall of India Pvt.Ltd; New Delhi.

Sem	**VII Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	3	0	0	3	V20CET29
Name of the Course	**ENVIRONMENTAL IMPACT ASSESSMENT AND MANAGEMENT (Professional Elective – III)**					
Branch	CIVIL ENGINEERING					

Course Outcomes:
Upon successful completion of the course, the student will be able to

- Prepare different reports related to EMP, EIS, and EIA (K3)
- Select an appropriate EIA methodology (K2)
- Assess the Impact of development activities and land use (K3)
- Employ in procuring the natural resources and assessment of Eco system (K3)
- Develop the EIA notifications and reports (K3)

SYLLABUS

UNIT I
Basic concept of EIA: Elements of EIA-factors affecting EIA-Initial environmental Examination-life cycle analysis preparation of Environmental Base map-Classification of environmental parameters role of stakeholders in the EIA preparation stages in EIA

UNIT II
E I A Methodologies: introduction, Criteria for the selection of EIA Methodology, E I A methods, Ad-hoc methods, matrix methods, Network method Environmental Media Quality Index method, overlay methods, cost/benefit Analysis – EIS and EMP

UNIT III
Impact of Developmental Activities and Land use: Introduction and Methodology for the assessment of soil and ground water, Delineation of study area, Identification of actives- application of remote sensing and GIS for EIA.

UNIT IV
Procurement of natural resources and assessment of eco system: Procurement of relevant soil quality, Impact prediction, Assessment of Impact significance, Identification and Incorporation of mitigation measures - E I A with reference to surface water, Air and Biological environment – wild life - deforestation
Environmental Risk Assessment and management: Risk assessment and treatment of uncertainty-key stages

UNIT V

EIA notification: EIA notification by Ministry of Environment and Forest (Govt. of India): Provisions in the EIA notification, procedure for environmental clearance, and procedure for conducting environmental impact assessment report- evaluation of EIA report. Environmental legislation objectives, evaluation of Audit data and preparation of Audit report. Post Audit activities, Concept of ISO and ISO 14000, Case studies and preparation of Environmental Impact assessment statement for various Industries.

Text Books:

1. Environmental Impact Assessment, Canter Larry W., McGraw-Hill education Edi (1996)
2. Environmental Impact Assessment Methodologies, Y.Anjaneyulu, B. S. Publication, Sultan Bazar, Hyderabad.
3. Environmental Impact Assessment and Management, B B Hosetti, A.Kumar, Daya Publishing House (2014)

References:

1. Environmental Science and Engineering, J. Glynn and Gary W. Hein Ke PrenticeHall Publishers
2. Environmental Science and Engineering, Suresh K. Dhaneja, S. K. ,Katania& Sons Publication., New Delhi.
3. Environmental Pollution and Control, H. S. Bhatia, Galgotia Publication (P) Ltd, Delhi

Sem	**VII Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	3	0	0	3	V20CET30
Name of the Course	**FINITE ELEMENT METHOD (Professional Elective – IV)**					
Branch	CIVIL ENGINEERING					

Course Outcomes:
Upon successful completion of the course, the student will be able to

- Generalize the concept of Finite Element Method (K2)
- Employ different formulation techniques of FEM to the engineering problems (K3)
- Assess one dimensional solid elements of various practical problems (K3)
- Analyze different components of framed structure (K4)
- Analyze the two and three dimensional solids using FEM (K4)

SYLLABUS

UNIT I
Introduction to Finite Element Analysis: Basic Concepts of Finite Element Analysis - Introduction to Elasticity -Steps in Finite Element Analysis

UNIT II
Finite Element Formulation Techniques: Virtual Work and Variational Principle - Galerkin Method- Finite Element Method: Displacement Approach -Stiffness Matrix and Boundary Conditions

UNIT III
Element Properties: Natural Coordinates -Triangular Elements - Rectangular Elements - Lagrange and Serendipity Elements -Solid Elements - Isoparametric Formulation -Stiffness Matrix of Isoparametric Elements - Numerical Integration: One Dimensional - Numerical Integration: Two and Three Dimensional- Worked out Examples

UNIT IV
Analysis of Frame Structures: Stiffness of Truss Members -Analysis of Truss - Stiffness of Beam Members - Finite Element Analysis of Continuous Beam -Plane Frame Analysis - Analysis of Grid and Space Frame

UNIT V
FEM for Two and Three Dimensional Solids: Constant Strain Triangle - Linear Strain Triangle - Rectangular Elements - Numerical Evaluation of Element Stiffness - Computation of Stresses, Geometric Nonlinearity and Static Condensation - Axisymmetric Element - Finite Element Formulation of Axisymmetric Element - Finite Element Formulation for 3 Dimensional- Elements Worked out Examples

Text Books:

1. Introduction to Finite Elements in Engineering, Tirupati R. Chandrupatla, Ashok D. Belgundu, PHI publications.
2. A first course in the Finite Element Method, Dary L. Logan, Thomson Publications.
3. The Finite Element Method- Zinkiewicz, O.C. and Taylor, R.L , Oxford .
4. Finite Element Analysis Theory and Programming- Krishnamoorthy, C.S, Tata McGraw-Hill Education.

References:

1. Concepts and applications of Finite Element Analysis, Robert D. Cook, Michael E Plesha, John Wiley & sons Publication .
2. Introduction to Finite Element Method, Desai & Abel CBS Publication.
3. Introduction to Finite Element Method- P.N. Godbole, I K International Publishing House Pvt. Ltd.
4. The Finite Element Method in Engineering- S.S. Rao, Butterworth-Heinemann;
5. An Introduction to Finite Element Method- Reddy, J. N., McGraw-Hill Education

Sem	VII Sem	L	T	P	C	COURSE CODE
Regulation	V20	3	0	0	3	V20CET31
Name of the Course	**ENGINEERING WITH GEO-SYNTHETICS (Professional Elective – IV)**					
Branch	CIVIL ENGINEERING					

Course Outcomes:
Upon successful completion of this course, the students will be able to

- Relate the need and demand of geo-synthetic materials in the field of geotechnical related works (K3)
- Apply the geotextiles and geogrids to practical problems (K3)
- Interpret the functions and applications of Geomembranes and Geocomposites (K3)
- Assess the internal and external stability of Reinforced Earth Retaining Wall (K3)
- Examine the applications of geo-synthetics in road construction (K3)

SYLLABUS

UNIT I
Geosynthetics: Introduction to Geosynthetics – Basic description – Polymeric materials– Uses and Applications, Properties of Geotextiles – Geogrids – Geomembranes – Geocomposites.

UNIT-II
Geotextiles: Design criteria for Separation – Reinforcement – Stabilization – Filtration – Drainage and Moisture barriers.
Natural Geotextiles: Natural fibres as geotextiles- factors governing the use jute fibres-coir geotextiles-bamboo/timber-combination of geotextiles.
Geogrids: Designing for Reinforcement – Stabilization – Designing Gabions – Construction methods.

UNIT-III
Geomembranes: Pond Liners – Covers for Reservoirs – Canal Liners – Landfill Liners– Caps and closures, moisture barriers.
Geocomposites: An added advantage – Geocomposites in Separation – Reinforcement – Filtration – Geocomposites as Geowebs and Geocells.

UNIT-IV
Reinforced Earth Retaining Walls: Components - External stability – Internal stability - Design of reinforced earth walls with strip, sheet and grid reinforcement.

UNIT-V
Use of Geosynthetics in Roads: Geosynthetics in road ways- applications role of subgrade conditions-design criteria-survivability-application in paved roads.

Text Books:

1. Designing with Geosynthetics by Robert M. Koerner, Prantice Hall, Eaglewood Cliffs, NJ.
2. An Introduction to Soil Reinforcement and Geosynthetics' by G.L.Sivakumar Babu (2009), Universities Press (India) Pvt. Ltd.
3. Engineering with Geosynthetics', by G. Venkatappa Rao and GVS Suryanarayana Raju – Tata McGraw Hill Publishing Company Limited – New Delhi.

References:

1. 'Construction and Geotechnical Engineering using Synthetic Fabries' by Robert M. Koerner and Josoph P. Welsh. John Willey and Sons, New York.
2. 'Foundation Analysis and Design' by J.E. Bowles McGraw Hill Publications.

Sem	VII Sem	L	T	P	C	COURSE CODE
Regulation	V20	3	0	0	3	V20CET32
Name of the Course	URBAN TRANSPORTATION PLANNING (Professional Elective – IV)					
Branch	CIVIL ENGINEERING					

Course Outcomes:
Upon successful completion of this course, the students will be able to

- Employ the Urban Transportation Problems & Travel Demand (K3)
- Relate the techniques in the data collection for planning the network (K3)
- Develop various models for trip generation, trip distribution and traffic assignment (K3)
- Prepare various alternative transportation proposals (K3)
- Solve the traffic assignment for transport network (K5)

SYLLABUS

UNIT I
Urban Transportation Problems & Travel Demand: Urban Issues, Travel Characteristics, Evolution of Planning Process, Supply and Demand – Systems approach; Trends, Overall Planning process, Long term Vs Short term planning, Demand Function, Independent Variables, Travel Attributes, Assumptions in Demand Estimation, Sequential, and Simultaneous Approaches, Aggregate and Disaggregate Techniques.

UNIT II
Data Collection and Inventories: Collection of data – Organisation of surveys and Analysis, Study Area, Zoning, Types and Sources of Data, Road Side Interviews, Home Interview Surveys, Commercial Vehicle Surveys, Sampling Techniques, Expansion Factors, Accuracy Checks, Use of Secondary Sources, Economic data – Income – Population – Employment – Vehicle Owner Ship.

UNIT III
Trip Generation & Distribution: UTPS Approach, Trip Generation Analysis: Zonal Models, Category Analysis, Household Models, Trip Attraction models, Commercial Trip Rates; Trip Distribution: Growth Factor Methods, Gravity Models, Opportunity Models, Time Function Iteration Models.

UNIT IV
Mode Choice Analysis: Mode Choice Behaviour, Competing Modes, Mode Split Curves, Aggregate and Disaggregate Approaches; Discrete Choice Analysis, Choice sets, Maximum Utility, Probabilistic Models: Binary Logit, Multinomial Logit Model – IIA property; Aggregation

UNIT V
Traffic Assignment: Diversion Curves; Basic Elements of Transport Networks, Coding, Route Properties, Path Building Criteria, Skimming Tree, All-or-Nothing Assignment, Capacity Restraint Techniques, Reallocation of Assigned Volumes, Equilibrium Assignment.

Corridor Identification, Plan Preparation & Evaluation: Master plans, Selection of Corridor, Corridor Identification, Corridor deficiency Analysis; Travel Forecasts to Evaluate Alternative Improvements, Impacts of New Development on Transportation Facilities. Pivot Point Analysis, Environmental and Energy Analysis; Case studies

Text Books:

1. Introduction to Urban System Planning, Hutchinson, B.G., McGraw Hill.
2. Transportation Engineering - An Introduction, Khisty C.J., Prentice Hall

References:

1. Introduction to Transportation Planning, Bruton M.J., Hutchinson of London.
2. Fundamentals of Transportation Planning, Papacostas, Tata McGraw Hill
3. Urban Transportation Planning: A decision oriented Approach, Mayer M and Miller E, McGraw Hill
4. Traffic Engineering and Transportation Planning, Kadiyali.L.R., Khanna Publishers, New Delhi.
5. Metropolitan Transportation Planning, Dicky, J.W., Tata McGraw Hill

Sem	VII Sem	L	T	P	C	COURSE CODE
Regulation	V20	3	0	0	3	V20CET33
Name of the Course	SOLID WASTE MANAGEMENT (Professional Elective – IV)					
Branch	CIVIL ENGINEERING					

Course Outcomes:
Upon successful completion of this course, the students will be able to

- Relate the factors influencing generation of solid waste and its management (K3)
- Assess the basic elements for managing the Solid Waste (K3)
- Develop different methods for transportation and transformation of solid waste (K3)
- Prepare different methods for processing and treatment of municipal solid waste (K3)
- Find suitable disposal methods with respect to solid waste (K3)

SYLLABUS

UNIT I
Introduction to Solid Waste Management: Goals and objectives of solid waste management, Classification of Solid Waste – Factors Influencing generation of solid waste – sampling and characterization –Future changes in waste composition, major legislation, monitoring responsibilities.

UNIT II
Basic Elements In Solid Waste Management: Elements and their inter relationship – principles of solid waste management- onsite handling, storage and processing of solid waste Collection of Solid Waste: Types and methods of waste collection systems, analysis of collection system – optimization of collection routes.

UNIT III
Transportation and Transformation of Solid Waste: Need for transfer operation, compaction of solid waste – transport means and methods, transfer station types and design requirements.
Unit operations used for separation and transformation: shredding – materials separation and recovery, source reduction and waste minimization.

UNIT IV
Processing and Treatment: Processing of solid waste – Waste transformation through combustion and composting, anaerobic methods for materials recovery and treatment – Energy recovery – biogas generation and cleaning– Incinerators.

UNIT V
Disposal of Solid Waste: Methods of Disposal, Landfills: Site selection, design and operation, drainage and leachate collection systems –designated waste landfill remediation.

Text Books:

1. “Integrated Solid Waste Management”, George Techobanoglous, McGraw Hill Publication, 1993
2. “Environmental Engineering”, Gerard Kiely, McGraw Hill Publication, 2007
3. “Environmental Science and Engineering”, J Glynn Henry,. Gary W.Heinke, Prentice-Hall of India Pvt Ltd, 1996

References:

1. “Solid Waste Engineering”, Vesilind, P.A., Worrell, W., Reinhart, D., Cenage learning, New Delhi, 2004
2. “Hazardous Waste Management”, Charles A. Wentz., McGraw Hill Publication, 1995.
3. “Introduction to Environmental Engineering” Mackenzie L Davis, David A.Cornwell, McGraw Hill Publication, 2017

Sem	VII Sem	L	T	P	C	COURSE CODE
Regulation	V20	3	0	0	3	V20CET34
Name of the Course	**PREFABIRCATED STURCTURES (Professional Elective – IV)**					
Branch	CIVIL ENGINEERING					

Course Outcomes:
Upon successful completion of this course the student will be able to

- Relate the principles of prefabrication, production and erection processes (K3)
- Practice different ways to utilize prefabricated components (K3)
- Design the prefabricated components to mount on the precast concrete system (K5)
- Prepare types of joints and connections to accommodate in precast system (K3)
- Use codal provisions to avoid progressive collapse to abnormal loads (K3)

SYLLABUS

UNIT I
Introduction: Need for prefabrication – Principles of prefabrication – Modular coordination – Standardization – Materials – Systems – Production – Transportation – Erection.

UNIT II
Prefabricated Components: Behavior and types of structural components – Large panel systems – roof and floor slabs – Walls panels - Beams - Columns - Shear walls

UNIT III
Design Principles: Design philosophy- Design of cross section based on efficiency of material used – Problems in design because of joint flexibility – Allowance for joint deformation - Demountable precast concrete systems.

UNIT IV
Joints and Connections in Structural Members: Types of Joints – based on action of forces - compression joints - shear joints - tension joints - based on function - construction, contraction, expansion, Design of expansion joints - Dimensions and detailing - Types of sealants - Types of structural connections - Beam to Column - Column to Column - Beam to Beam - Column to foundation.

UNIT V
Design for Abnormal Loads: Progressive collapse – Codal provisions – Equivalent design loads for considering abnormal effects such as earthquakes, cyclones, etc., - Importance of avoidance of progressive collapse.

Text Books:

1. "Prefabrication with Concrete", Bruggeling A.S. G and Huyghe G.F., A.A. Balkema Publishers, USA,1991.
2. "Precast Concrete- Materials, Manufacture, Properties And Usage", Lewitt,M., Applied Science Publishers, London and New Jersey, 1982.
3. "Precast Concrete Structures", Bachmann, H. and Steinle, A., Ernst &Sohn, Berlin, 2011.

References:

1. "Manual of precast concrete construction", Koncz T., Vol. I, II and III, Bauverlag, GMBH, 1976.
2. "Handbook on Precast Concrete Buildings", Indian Concrete Institute, 2016.
3. "Structural design manual", Precast concrete connection details, Society for the studies in the use of precast concrete, Netherland BetorVerlag, 2009

Sem	VII Sem	L	T	P	C	COURSE CODE
Regulation	V20	3	0	0	3	V20CET35
Name of the Course	EARTHQUAKE ENGINEERING (Professional Elective – V)					
Branch	CIVIL ENGINEERING					

Course Outcomes
At the end of the course the student will be able to

- Discuss the basic concept and characteristics of earth quakes (K2)
- Examine the ground motion and seismic hazard (K3)
- Assess the frequency of wave propagation in different mediums (K3)
- Illustrate the behavior and resistive forces generated in the structure during earthquake (K3)
- Relate the possibility of liquefaction and ground improvement for remediation of seismic hazards (K3)

SYLLABUS

UNIT I
Introduction to Dynamic Loads: Static Load v/s Dynamic Load, Types of Dynamic forces, Force Control and Displacement Control.
Seismology and Earthquakes: Introduction, Seismic Hazards, seismic waves, internal structure of earth, Continental drift and plate tectonics, faults, elastics rebound theory, geometric notations, location of earthquakes, size of earthquakes.

UNIT II
Strong Ground Motion: Strong ground motion measurement, ground motion parameters, estimation of ground motion parameters.
Seismic Hazard Analysis: Identification and Evaluation of Earthquake Sources, deterministic seismic hazard analysis, probabilistic seismic hazard analysis.

UNIT III
Wave Propagation: Waves in unbounded media, waves in a semi – infinite body, waves in a layered media, attenuation of stress waves.
Artificial Ground Motion Generation: Modification of actual ground motion records, time –domain generation, frequency domain generation.

UNIT IV
Behavior of Structures: During Earthquake and Earthquake Resistant Features of Structure Inertia forces in structures, Behavior of Masonry Structures, Behavior of RC Structures

UNIT V

Liquefaction: Flow liquefaction, cyclic mobility, evaluation of liquefaction hazards, liquefaction susceptibility, initiation of liquefaction, effects of liquefaction.

Soil Improvement for Remediation of Seismic Hazards: Densification techniques, Reinforcement Techniques, Grouting and Mixing techniques, Drainage techniques.

Text Books:

1. Earthquake Resistant Design of Structures By Pankaj Agarwal & Manish Shrikhande, PHI Publications
2. S. K. Duggal; Earthquake Resistance Design of Structures; Oxford University Press, New Delhi.
3. K. Chopra; Dynamics of Structures, Pearson, New Delhi
4. Park & Pauly; Behavior of R.C Structures
5. Geotechnical Earthquake Engineering by Steven L. Kramer, prentice Hall

Reference Books:

1. IS: 1893 (Part-I) 2002, Criteria for Earthquake Resistant Design General Provision to Building.
2. S: 13920 (1993), Code of Practice for Ductile Detailing of RC Structures
3. IS: 4326 (1993), Code of Practice for Earthquake Resistant Design and Construction of Buildings
4. IS: 13827 (1993), Improving Earthquake Resistance of Earthen Buildings
5. IS: 13828 (1993), Guide lines for Improving Earthquake Resistance of low Strength Masonry Buildings.
6. S S Rao; Mechanical Vibration; Pearson, New Delhi.

Sem	VII	L	T	P	C	COURSE CODE
Regulation	V20	3	0	0	3	V20CET36
Name of the Course	GROUND IMPROVEMENT TECHNIQUES (Professional Elective – V)					
Branch	CIVIL ENGINEERING					

Course Outcomes:
Upon successful completion of this course the student will be able to

- Employ the in-situ densification methods at ground surface and at depth (K3)
- Relate the importance of dewatering and different methods of stabilization (K3)
- Illustrate the reinforced earth technology and soil nailing to obviate the problems posed by conventional retaining walls (K3)
- Use the geosynthetics to improve the engineering performance of soils (K3)
- Select different techniques of grouting to solve the ground problems (K3)

SYLLABUS

UNIT I
In situ densification methods: In situ densification of granular soils-vibration at ground surface and at depth, impact at ground and at depth – in situ densification of cohesive soils – pre loading – vertical drains – sand drains and geo drains – stone columns.

UNIT II
Dewatering: Sumps and interceptor ditches – single and multi stage well points – vacuum well points – horizontal wells– electro osmosis
Stabilization of soils: Methods of soil stabilization – mechanical – cement – lime – bitumen and polymer stabilization – use of industrial wastes like fly ash and granulated blast furnace slag.

UNIT III
Reinforced earth: Principles – components of reinforced earth –stability checks – soil nailing

UNIT IV
Geosynthetics: Geotextiles – types – functions, properties and applications – geogrids, geomembranes and gabions – properties and applications.

UNIT V
Grouting: Objectives of grouting – grouts and their applications – methods of grouting – stage of grouting.

Text Books:

1. Ground Improvement Techniques, Purushotham Raj, Laxmi Publications, New Delhi.
2. Ground Improvement Techniques, Nihar Ranjan Patro, Vikas Publishing House (p) limited , New Delhi.
3. An introduction to Soil Reinforcement and Geosynthetics, G. L. Siva Kumar Babu, Universities Press.

References:

1. Ground Improvement, M.P.Moseley, Blackie Academic and Professional, USA
2. Designing with Geosynethetics, R. M Koerner, Prentice Hall
3. Engineering Principles of Ground Modification by Manfred R. Hausmann,McGraw-Hill Inc.,

Sem	VII Sem	L	T	P	C	COURSE CODE
Regulation	V20	3	0	0	3	V20CET37
Name of the Course	**RURAL WATER SUPPLY AND ONSITE SANITATION SYSTEMS (Professional Elective – V)**					
Branch	CIVIL ENGINEERING					

Course Outcomes:
Upon the successful completion of course students will be able to

- Generalize the concept and scope of sanitation in rural areas (K2)
- Apply suitable methods of water treatment for rural areas (K3)
- Develop the water distribution system in rural areas (K3)
- Relate the different public sanitation methods in rural areas and industrial zones (K3)
- Relate different methods of solid waste management in rural areas (K3)

SYLLABUS

UNIT I
Concept of environmental and scope of sanitation in rural areas: Magnitude of problem of water supply and sanitation – population to be covered and difficulties National policy, Various approaches for planning of water supply systems in rural areas, Selection and development of preferred sources of water, springs, wells and infiltration galleries, collection of raw water from surface source.

UNIT II
Specific problems: Specific problems in rural water supply and treatment e.g. iron, manganese, fluorides etc., Low cost treatment, appropriate technology for water supply and sanitation, Improvised method and compact system of treatment of surface and ground waters such as MB settlers, slow and sand filter, chlorine diffusion cartridge etc., Water supply through spot sources, hand pumps, open dug –well.

UNIT III
Planning of distribution system in rural areas: Water supply during fairs, festivals and emergencies, Treatment and disposal of wastewater/sewage, various method of collection and disposal of night soil

UNIT IV
Rural sanitation and industrial hygiene: Simple wastewater treatment system for rural areas and small communities such as stabilization ponds, septic tanks, soakage pits etc., Occupational Hazards- Schools- Public Buildings- Hospitals- Eating establishments- Swimming pools – cleanliness and maintenance and comfort- Industrial plant sanitation

UNIT V
Solids Waste: Collection, Transfer, Transport and deposit of solid waste management, composting, land filling.

Text Books:

1. "Water Supply and Sanitary Engineering" by Rangwala, Charotar Publishing House Pvt Ltd.,
2. "Water Supply and Sanitary Engineering" by G.S.Birdie and J.S.Birdie, Dhanpat Rai Publishing Company

References:

1. "Manual of water supply and treatment", 3rd edition, CPHEEO, GOI, New Delhi.
2. "Solid Waste Engineering", Vesilind, P.A., Worrell, W., Reinhart, D., Cenage learning, New Delhi, 2004

Sem	VIISem	L	T	P	C	COURSE CODE
Regulation	V20	3	0	0	3	V20CET38
Name of the Course	METRO SYSTEMS AND ENGINEERING (Professional Elective – V)					
Branch	CIVIL ENGINEERING					

Course Outcomes:
Upon successful completion of this course the student will be able to

- Generalize different Metro Systems and their planning (K2)
- Relate construction methods of elevated and under ground stations (K3)
- Employ the construction quality and safety systems (K3)
- Illustrate the methods to utilize electronic signaling systems and automatic fare collection systems (K3)
- Organize the mechanical and electrical work of different systems (K3)

SYLLABUS

UNIT I
General: Overview of Metro Systems; Need for Metros; Routing studies; Basic Planning and
Financials

UNIT II
Construction Methods: Civil Engineering- Overview and construction methods for elevated and underground stations; Viaduct spans and bridges; Underground tunnels; Depots; Commercial and Service buildings, Initial Surveys & Investigations;

UNIT III
Quality & Safety Systems: Basics of Construction Planning & Management, Construction Quality & Safety Systems, Traffic integration, multimodal transfers and pedestrian facilities; Environmental and social safe guards; Track systems-permanent way. Facilities Management

UNIT IV
Operation Control Center: Electronics and Communication Engineering- Signaling systems; Automatic fare collection; Operation Control Centre (OCC and BCC); SCADA and other control systems; Platform Screen Doors.

UNIT V
Mechanical & Rolling Stock: Mechanical & TVS, AC: Rolling stock, vehicle dynamics and structure; Tunnel Ventilation systems; Air conditioning for stations and buildings; Fire control systems; Lifts and Escalators.
Electrical: OHE, Traction Power; Substations- TSS and ASS; Power SCADA; Standby and Back - up systems; Green buildings, Carbon credits and clear air mechanics.

Text Books:

1. "Metro Rail in India for Urban Mobility", by MM Agarwal, Sudhir Chandra and KK Miglani – Prabha& Co, 2021
2. "World Metro Systems", Paul Garbutt, Capital Transport Pub; 2nd Edition, 1997.

References:

1. General & Technical information of Hyderabad Metro
2. General & Technical information of Delhi Metro

Sem	VII Sem	L	T	P	C	COURSE CODE
Regulation	V20	3	0	0	3	V20CET39
Name of the Course	ARCHITECTURE AND TOWN PLANNING (Professional Elective – V)					
Branch	CIVIL ENGINEERING					

Course Outcomes:
Upon successful completion of this course the student will be able to

- Distinguish architectural styles of eastern and western world (K2)
- Understand the importance of Orders of architecture (K2)
- Develop spaces of buildings using design concepts, planning principles (K3)
- Relate the present town planning from ancient times to modern times.
- Interpret the town planning standards, landscaping features and regulations controlling expansion of the towns and the cities (K3)

SYLLABUS:

UNIT I
History of Architecture: Western Architecture: Egyptian, Greek, Roman Architectures- Orders. Indian Architecture: Vedic age, Indus valley civilization– Buddhist period: Stambas, Stupa, Toranas, Chaityas, Viharas – Hindu temples: Dravidian and Indo Aryan Styles-Temple of Aihole, Madurai, Bhuvaneshwar, Mount Abu. Indo Sarsanic (Islamic) Architecture: Mosque - Palace - Fort - Tomb.

UNIT II
Architectural Design: Principles of designing – Composition of Plan – relationship between plan and elevation- building elements, form, surface texture, mass, line, color, tone- Principles of Composition: Unity, contrast, proportion, scale, balance, circulation, rhythm, character, expression.

UNIT III
Principles of Planning: Principles of planning a residence- site selection, site orientation- aspect, prospect, grouping, circulation, privacy, furniture requirements, services and other factors. Post-classic Architecture: Introduction of post-classic architecture contribution of eminent architects to modern period-Edward Lutyens, Le Corbusier, Frank Lloyd Wrigt, Walter Groping.

UNIT IV
Historical Back Ground of Town Planning: Town planning in India – Town plans of mythological Manasa - Town plans of ancient towns: Harappa, Mohenjodaro, Pataliputra, Delhi, Acropolis (Greece), Jerusalem, Mecca, Rome, London.

UNIT V
Modern Town Planning: Zoning- Roads and road traffic- Housing- Slums, Parks, Play grounds- Public Utility Services- Surveys and maps for planning Neighborhood Planning. Standards of Town planning: Planning new towns, planning standards and specifications, national and regional planning, town planning and legislation planning regulations and limitations.
Land Scaping and Expansion of Towns: Land scaping for the towns, horizontal and vertical expansion of towns- garden cities, satellite towns floating towns- sky scrapers-pyramidal cities.

Text Books:

1. 'The great ages of World Architecture' by G.K. Hiraskar.
2. 'Planning and Design of Buildings by Section of Architecture' by Y. S. Sane., Civil Engineering 142
3. 'Professional Practice' by G.K. Krishnamurthy, S.V. Ravindra, PHI Learning, New Delhi.
4. 'Indian Architecture – Vol. I & II' by Percy Brown, Taraporevala Publications, Bombay.
5. 'Fundamentals of Town Planning' by G.K. Haraskar.

References:

1. 'Drafting and Design for Architecture' by Hepler, Cengage Learning
2. 'Architect's Portable Handbook' by John Patten Guthrie – Mc Graw Hill International Publications.
3. 'Modern Ideal Homes for India' by R. S. Deshpande.
4. 'Town and County Planning' by A.J.Brown and H.M.Sherrard.
5. 'Town Design' by Federik Glbbard, Architectural press, London.

ANNEXURE - III

COURSES OFFERED UNDER OPEN ELECTIVE IN V, VI & VII SEMESTER TO OTHER BRANCHES

Name of the Course	Course code
1. Repair and Rehabilitation of Structures	V20CEOE01
2. Ground Improvement Techniques	V20CEOE02
3. Environmental Pollution and Control	V20CEOE03
4. Building Materials and Construction	V20CEOE04
5. Remote Sensing and GIS	V20CEOE05
6. Solid Waste Management	V20CEOE06
7. Disaster Management	V20CEOE07
8. Water Quality and Conservation Systems	V20CEOE08

COURSES OFFERED UNDER MANDATORY COURSES IN V, VI & VII SEMESTER TO OTHER BRANCHES

Name of the Course	Course code
1. Intellectual Property Rights & Patents	V20CEMC01
2. Professional Ethics & Human Values	V20CEMC02

Open Elective -I

Sem	**V/VI/VII**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	3	0	0	3	V20CEOE01
Name of the Course	**REPAIR AND REHABILITATION OF STRUCTURES**					
Branch	EXCEPT CE					

Course Outcomes:
Upon the successful completion of course students will be able to

- Develop various maintenance and repair strategies (K2)
- Evaluate the existing buildings through field investigations (K2)
- Understand and use the different techniques for structural rehabilitation and various techniques of repair (K2)
- Understand the importance of advanced concretes mixes(K2)
- Understand the importance of high performance concretes(K2)

SYLLABUS

UNIT I
Deterioration of Structures and diagnosis: Distress in Structures – Causes and Prevention. Mechanism of Damage – Types of Damage, Non Destructive Testing, Corrosion of Steel Reinforcement – Causes – Mechanism and Prevention. Damage of Structures due to Fire – Fire Rating of Structures – Inspection and Testing – Symptoms and Diagnosis of Distress – Damage assessment –

UNIT II
Materials for repair and rehabilitation: Admixtures- types of admixtures - purposes of using admixtures- chemical composition- Natural admixtures - Fibres- wraps- Glass and Carbon fibre wraps- Steel Plates

UNIT III
Strengthening and stabilization: Techniques- design considerations-Beam shear capacity strengthening - Shear Transfer strengthening-stress reduction techniques- Column strengthening-flexural strengthening - Connection stabilization and strengthening, Crack stabilization

UNIT IV
Special Concretes: Fibre reinforced concrete: Properties of constituent materials- Mechanical properties of fiber reinforced concrete- applications of fibre reinforced concretes-Light weight concrete- properties of light weight concrete- No fines concrete- design of light weight concrete- Flyash concrete - classification of flyash- Properties of flyash concrete

UNIT V
High performance concretes: Introduction- Development of high performance concretes- Materials of high performance concretes- Properties of high performance concretes- Self Consolidating concrete-properties-qualifications.

Text Books:
1. Maintenance and Repair of Civil Structures, B.L. Gupta and Amit Gupta, Standard Publications.
2. Concrete Technology by A.R. Santa Kumar, Oxford University press
3. Concrete technology by Neville and J J Brooks, Pearson publications, 2nd edition

References:
1. Concrete technology by M S Shetty, S. Chand publications (2006).
2. Defects and Deterioration in Buildings, EF & N Spon, London
3. Non-Destructive Evaluation of Concrete Structures by Bungey – Surrey University Press
4. Concrete Repair and Maintenance Illustrated, RS Means Company Inc W.H.Ranso, (1981)
5. Building Failures: Diagnosis and Avoidance, EF & N Spon, London, B.A. Richardson, (1991)

Sem	**V/VI/VII**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	3	0	0	3	V20CEOE02
Name of the Course	**GROUND IMPROVEMENT TECHNIQUES**					
Branch	EXCEPT CE					

Course Outcomes:
Upon successful completion of this course the student will be able to

- Employ the in-situ densification methods at ground surface and at depth (K3)
- Relate the importance of dewatering and different methods of stabilization (K3)
- Illustrate the reinforced earth technology and soil nailing to obviate the problems posed by conventional retaining walls (K3)
- Use the geosynthetics to improve the engineering performance of soils (K3)
- Select different techniques of grouting to solve the ground problems (K3)

SYLLABUS

UNIT I
In situ densification methods: In situ densification of granular soils- vibration at ground surface and at depth, impact at ground and at depth – in situ densification of cohesive soils – pre loading – vertical drains – sand drains and geo drains – stone columns.

UNIT II
Dewatering: Sumps and interceptor ditches – single and multi stage well points – vacuum well points – horizontal wells– electro osmosis
Stabilization of soils: Methods of soil stabilization – mechanical – cement – lime – bitumen and polymer stabilization – use of industrial wastes like fly ash and granulated blast furnace slag.

UNIT III
Reinforced earth: Principles – components of reinforced earth –stability checks – soil nailing

UNIT IV
Geosynthetics: Geotextiles – types – functions, properties and applications – geogrids , geomembranes and gabions – properties and applications.

UNIT V
Grouting: Objectives of grouting – grouts and their applications – methods of grouting – stage of grouting.

Text Books:

1. Ground Improvement Techniques, Purushotham Raj, Laxmi Publications, New Delhi.
2. Ground Improvement Techniques, Nihar Ranjan Patro, Vikas Publishing House (p) limited , New Delhi.
3. An introduction to Soil Reinforcement and Geosynthetics, G. L. Siva Kumar Babu, Universities Press.

References:

1. Ground Improvement, M.P.Moseley, Blackie Academic and Professional, USA
2. Designing with Geosynethetics, R. M Koerner, Prentice Hall
3. Engineering Principles of Ground Modification by Manfred R. Hausmann,McGraw-Hill Inc.,

Sem	**V/VI/VII**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	3	0	0	3	V20CEOE03
Name of the Course	**ENVIRONMENTAL POLLUTION AND CONTROL**					
Branch	EXCEPT CE NG					

Course Outcomes:
Upon successful completion of this course the student will be able to

- Describe the air pollution and its control methods (K2)
- Explain industrial waste water and ways to control it (K3)
- Generalize the solid, hazardous waste and control methods (K2)
- Illustrate the importance of Environmental sanitation methods (K2)
- Illustrate the importance of Sustainable development (K3)

SYLLABUS

UNIT I
Air Pollution: Air pollution Control Methods–Particulate control devices – Methods of Controlling Gaseous Emissions – Air quality standards.Noise Pollution: Noise standards, Measurement and control methods

UNIT II
Industrial wastewater Management: Strategies for pollution control – Volume and Strength reduction-Recirculation of industrial waste water – Effluent standards.

UNIT III
Solid Waste Management: Solid waste characteristics –on-site handling and collection – separation and processing -Solid waste disposal method
Hazardous Waste: Characterization – Nuclear waste – Biomedical wastes – Electronic wastes – Chemical wastes – Treatment and management of hazardous waste-Disposal methods.

UNIT IV
Environmental Sanitation: Environmental Sanitation Methods for Hostels and Hotels, Hospitals, Swimming pools and public bathing places, social gatherings (melas and fares), Schools and Institutions, Rural Sanitation-low cost waste disposal methods.

UNIT V
Sustainable Development: Definition- elements of sustainable developments-Indicators of sustainable development- Sustainability Strategies- sustainable development.

Text Books:

1. Environmental Engineering, by Ruth F. Weiner and Robin Matthews – 4th Edition Elesevier, 2003.
2. Environmental Science and Engineering by J.G. Henry and G.W. Heinke – Pearson Education.
3. Environmental Engineering by Mackenzie L Davis & David A Cornwell. McGraw Hill Publishing.

References:

1. Solid Waste Engineering, Vesilind, P.A., Worrell, W., Reinhart, D., Cenage learning, New Delhi, 2004
2. Hazardous Waste Management, Charles A. Wentz, McGraw Hill Publication, 1995.

Sem	**V/VI/VII**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	3	0	0	3	V20CEOE04
Name of the Course	**BUILDING MATERIALS AND CONSTRUCTION**					
Branch	EXCEPT CE					

Course Outcomes:
After successful completion of the course, the student will be able to:

- Describe different building materials and their importance in building construction (K2)
- Relate various components of cement and lime (K3)
- Generalize the brick and stone masonry in construction (K2)
- Interpret different aggregates and their specifications (K2)
- Describe the importance of different building components (K2)

SYLLABUS

UNIT I
Stones, Bricks and Tiles: Building stones – classifications and quarrying – properties –structural requirements and dressing. Bricks – Composition of Brick earth – manufacture and structural requirements, Fly ash, Ceramics, Timber, Aluminum, Glass, Paints and Plastics: Wood - structure – types and properties– seasoning – defects; alternate materials for Timber–GI/ fibre – reinforced glass bricks, steel & aluminum, Plastics.

UNIT II
Cement & Admixtures: Ingredients of cement – manufacture – Chemical composition – Hydration - field & lab tests, Admixtures – mineral & chemical admixtures – uses, Various ingredients of lime – Constituents of lime stone – classification of lime – various methods of manufacture of lime

UNIT III
Mortars: Lime and Cement Mortars.
Masonry: Brick masonry – types – bonds; Stone masonry – types; Composite masonry – Brick- stone composite; Concrete, Reinforced brick. Cavity and partition walls, Finishing‘s, Plastering, Pointing, Painting, Claddings – Types – Tiles – ACP.

UNIT IV
Aggregates: Classification of aggregate – Coarse and fine aggregates- particle shape and texture – Bond and Strength of aggregate – Specific gravity – Bulk Density, porosity and absorption – Moisture content of Aggregate- Bulking of sand – Sieve analysis.
Miscellaneous materials: Bitumen and asphaltic materials, structural steel and other metals, geo textiles, carbon composites including properties and uses.

UNIT V
Building Components: Lintels, Arches, walls, vaults – stair cases – types of floors, types of roofs – flat, curved, trussed. Foundations – types; Damp Proof Course; Joinery – doors – windows – materials – types.
Form work: Types: Requirements – Standards – Scaffolding.

Text Books:
1. Building Materials and Construction – Arora & Bindra, Dhanpat Roy Publications. 2010,5th edition.
2. Building Materials, M. L. Gambhir, Tata McGraw Hill Publishing Co. Ltd. New Delhi. 2014,5th edition,.
3. Building Construction by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain – Laxmi Publications (P) ltd., New Delhi. 2016,11th edition.
4. Building Materials, S. S. Bhavikatti, Vikas publications House private ltd. 2012, 1st edition.
5. Building Construction, S. S. Bhavikatti, Vikas publications House private ltd. 2012, 1st edition.
6. Building planning and drawing,Dr.N.Kumara swamy,A.kameswara Rao, 2012, 6th edition.

References:
1. Building Materials and Construction by G C Sahu, Joygopal Jena McGraw hill Pvt Ltd 2017,1st edition.
2. Building Materials by Duggal, New Age International. 2012 ,4th edition.
3. Building Materials by P. C. Varghese, PHI. 2015, 2nd edition.
4. Building Construction by PC Varghese PHI. 2007, 1st edition.
5. Construction Technology – Vol – I & II by R. Chubby, Longman UK.1987, 2nd edition.
6. Alternate Building Materials and Technology, Jagadish, Venkatarama Reddy and others; New Age Publications.2017 ,2nd edition

Sem	**V/VI/VII**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	3	0	0	3	V20CEOE05
Name of the Course	**REMOTE SENSING AND GEOGRAPHICAL INFORMATION SYSTEM**					
Branch	EXCEPT CE					

Course Outcomes:

Upon successful completion of this course the student will be able to

- Generalize the basic principles of Remote Sensing and GIS, including ground, air and satellite based sensor platforms (K2)
- Interpret the aerial photographs and satellite imageries (K2)
- Relate the process of data entry and preparation (K3)
- Examine the Spatial Data for a variety of applications (K3)
- Employ RS and GIS for diverse applications (K3)

SYLLABUS

UNIT I

Introduction to Remote Sensing: Basic concepts of remote sensing, electromagnetic radiation, electromagnetic spectrum, interaction with atmosphere, energy interaction with the earth surfaces, Characteristics of remote sensing systems.

Sensors and platforms: Introduction, types of sensors, airborne remote sensing, space borne remote sensing, image data characteristics, digital image data formats-band interleaved by pixel, band interleaved by line, band sequential, IRS, LANDSAT, SPOT, MODIS, ASTER,RISAT and CARTOSAT.

UNIT II

Image analysis: Introduction, elements of visual interpretations, digital image processing- image preprocessing, image enhancement, image classification, supervised classification, unsupervised classification.

UNIT III

Geographic Information System: Introduction, key components, application areas of GIS, map projections.

Data entry and preparation: spatial data input, raster data models, vector data models.

UNIT IV

Spatial data analysis: Introduction, overlay function-vector overlay operations, raster overlay operations, arithmetic operators, comparison and logical operators, conditional expressions, overlay using a decision table, network analysis-optimal path finding, network allocation, network tracing and buffer analysis.

UNIT V

RS and GIS Applications: Land cover and land use, agriculture, forestry, geology, geomorphology, urban applications.

Applications of Hydrology, Water Resources and Disaster Management: Food zoning and mapping, groundwater prospects and potential recharge zones, watershed management and disaster management with case studies.

Text Books:

1. "Remote sensing and GIS", Bhatta, B., Oxford University Press, 2008.
2. "Remote Sensing and Geographical Information Systems", Anji Reddy, M., B S Publications, 2008.
3. "Basics of Remote Sensing and GIS" Kumar. S., Laxmi Publications,

References:

1. "Fundamentals of Remote Sensing", George Joseph, Universities Press, 2013.
2. "Concepts and Techniques of Geographical Information System", Chor Pang Lo and Yeung, A.K.W., Prentice Hall, India, 2006.
3. "Remote Sensing and its Applications", Narayan L.R.A, Universities Press, 2012.
4. "Introduction to Geographic Information Systems", Kand Tsung Chang, McGraw Hill Higher Education, 2009.
5. "Basics of Remote sensing & GIS", Kumar, S., Laxmi Publications, New Delhi, 2005.
6. "Principals of Geographical Information Systems", Burrough, P.A and McDonnell, R.A. Oxford University Press, 1998.
7. "Remote Sensing", Schowenger, R. A., Elsevier publishers, 2006.
8. "Remote Sensing and Image Interpretation", Lillesand, T.M, Kiefer, R.W. and Chipman, J.W., Wiley India Pvt. Ltd., New Delhi, 2013.
9. "Fundamentals of Geographic Information Systems", Demers, M.N, Wiley India Pvt. Ltd, 2013

Sem	V/VI/VII	L	T	P	C	COURSE CODE
Regulation	V20	3	0	0	3	V20CEOE06
Name of the Course	SOLID WASTE MANAGEMENT					
Branch	EXCEPT CE					

Course Outcomes:
Upon successful completion of this course, the students will be able to

- Generalize Solid Waste and its management (K2)
- Assess different elements for managing Solid Waste (K3)
- Employ different methods for transportation and transformation of solid waste (K3)
- Organize different methods for processing and treatment of municipal solid waste (K3)
- Practice suitable disposal methods with respect to solid waste (K3)

SYLLABUS

UNIT I
Introduction to Solid Waste Management: Goals and objectives of solid waste management, Classification of Solid Waste – Factors Influencing generation of solid waste – sampling and characterization –Future changes in waste composition, major legislation, monitoring responsibilities.

UNIT II
Basic Elements In Solid Waste Management: Elements and their inter relationship – principles of solid waste management- onsite handling, storage and processing of solid waste Collection of Solid Waste: Types and methods of waste collection systems, analysis of collection system – optimization of collection routes.

UNIT III
Transportation and Transformation of Solid Waste: Need for transfer operation, compaction of solid waste – transport means and methods, transfer station types and design requirements.
Unit operations used for separation and transformation: shredding – materials separation and recovery, source reduction and waste minimization.

UNIT IV
Processing and Treatment: Processing of solid waste – Waste transformation through combustion and composting, anaerobic methods for materials recovery and treatment – Energy recovery – biogas generation and cleaning– Incinerators.

UNIT V

Disposal of Solid Waste: Methods of Disposal, Landfills: Site selection, design and operation, drainage and leachate collection systems –designated waste landfill remediation.

Text Books:

4. “Integrated Solid Waste Management”, George Techobanoglous, McGraw Hill Publication, 1993
5. “Environmental Engineering”, Gerard Kiely, McGraw Hill Publication, 2007
6. “Environmental Science and Engineering”, J Glynn Henry,. Gary W.Heinke, Prentice-Hall of India Pvt Ltd, 1996

References:

3. “Solid Waste Engineering”, Vesilind, P.A., Worrell, W., Reinhart, D., Cenage learning, New Delhi, 2004
4. “Hazardous Waste Management”, Charles A. Wentz., McGraw Hill Publication, 1995.
4. “Introduction to Environmental Engineering” Mackenzie L Davis, David A.Cornwell, McGraw Hill Publication, 2017

Sem	V/VI/VII	L	T	P	C	COURSE CODE
Regulation	V20	3	0	0	3	V20CEOE07
Name of the Course	DISASTER MANAGEMENT					
Branch	EXCEPT CE					

Course Outcomes:
Upon successful completion of this course the student will be able to

- Describe different natural hazards and disaster management (K2)
- Generalize the risk and vulnerability of disaster (K2)
- Illustrate the role of technology in disaster management (K3)
- Relate the importance of education and community preparedness to disaster recovery (K3)
- Organize the multi-sectional issues created by disaster (K2)

UNIT I
Natural Hazards and Disaster Management: Introduction of DM Disaster Management cycle – Five priorities for action- Case study methods of the following: floods, droughts – Earthquakes – global warming, cyclones & Tsunamis – Post Tsunami hazards along the Indian coast – landslides. Fire hazards – transport hazard dynamics – solid waste management – post disaster – bio terrotirism - rail and air craft's accidents-Management of these disasters

UNIT II
Risk and Vulnerability: – Building codes and land use planning – social vulnerability – environmental vulnerability -Financial management of disaster.

UNIT III
Role of Technology in Disaster Managements: Disaster management for infra structures, taxonomy of infra structure - mitigation programme for earth quakes –geospatial information in agriculture drought assessment-multimedia technology in disaster risk management and training-transformable indigenous knowledge in disaster reduction.

UNIT IV
Education and Community Preparedness: Education in disaster risk reduction-Essentials of school disaster education-Community capacity and disaster resilience-Community based disaster recovery -Community based disaster management and social capital-Designing resilience- building.

UNIT V
Multi-sectional Issues: Impact of disaster on poverty and deprivation-Climate change adaptation and human health -Exposure , health hazards and environmental risk-Forest management and disaster risk reduction - The Red cross and red crescent movement.

Text Books:

1. Disaster Management – Global Challenges and Local Solutions' by Rajib shah & R R Krishnamurthy(2009),Universities press.
2. Disaster Science & Management' by Tushar Bhattacharya, Tata McGraw Hill Education Pvt. Ltd., New Delhi.
3. Disaster Management – Future Challenges and Opportunities' by Jagbir Singh (2007), I K International Publishing House Pvt. Ltd.

Reference Books:

1. 'Disaster Management' edited by H K Gupta (2003), Universities press.
2. Natural Hazards and Disaster Management, Vulnerability and Mitigation by RB Singh
3. Disaster Management by Harish K.Gupta

Sem	**V/VI/VII**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	3	0	0	3	V20CEOE08
Name of the Course	**WATER QUALITY AND CONSERVATION SYSTEMS**					
Branch	EXCEPT CE					

Course Outcomes:
Upon successful completion of the course, the student will be able to

- Describe different parameters of Engineering Hydrology (K2)
- Relate different sources of surface and ground water (K3)
- Assess the importance of water supply systems and quality of water in reference to IS and WHO standards (K3)
- Develop different systems of plumbing (K3)
- Employ different conservation techniques (K3)

SYLLABUS

UNIT I
Introduction to Hydrology: Engineering hydrology, applications, Hydrologic cycle, evaporation, evapotranspiration, precipitation, run off, infiltration, hydrological data-sources

UNIT II
Sources of Water: Surface water, Lakes, Rivers, Reservoirs, comparison of sources with reference to quality, quantity and other considerations.
Groundwater, types of water bearing formations, springs, Wells and Infiltration galleries, Yields from infiltration galleries.

UNIT III
Importance of Protected Water: Supply systems, Flow chart of public water supply system, Water borne diseases, Estimation of water usages in different purpose.

Quality and Analysis of Water: Characteristics of water–Physical, Chemical and Biological-Analysis of Water – Physical, Chemical and Biological characteristics, Comparison of sources with reference to quality- I.S. Drinking water quality standards and WHO guidelines for drinking water.

UNIT IV
Plumbing Systems: Systems of plumbing-types of pipes and sanitary fittings and other accessories–one pipe and two pipe systems – Design parameters and factors.

UNIT V
Water conservation: importance and necessity, objectives, systems-rainwater harvesting, recharge pits, watershed.

Text Books:
1. Environmental Engineering – Howard S. Peavy, Donald R. Rowe, Teorge George Tchobanoglus – Mc-Graw-Hill Book Company, New Delhi, 1985
2. Elements of Environmental Engineering, K. N. Duggal, S. Chand & Company Ltd. New Delhi, 2012.
3. Water Supply and Sanitary Engineering – G. S. Birdie and J. S. Birdie

References:
1. Water Supply Engineering – P. N. Modi.
2. Water Supply Engineering – B. C. Punmia
3. Water Supply and Sanitary Engineering – G. S. Birdie and J. S. Birdie

Sem	VI Sem	L	T	P	C	COURSE CODE
Regulation	V20	2	0	0	0	V20CEMC01
Name of the Course	INTELLECTUAL PROPERTY RIGHTS & PATENTS					
Branch	Common to All Branches					

Course Outcomes:
Upon successful completion of this course the student will be able to
- Describe the need of Intellectual Property Rights (K2)
- Generalize different issues regarding Copy Rights (K2)
- Employ the procedure for Patent registration and granting (K3)
- Discuss the importance of Trademark and its related issues (K2)
- Recognize the significance of Trade Secrets in Industry (K2)

SYLLABUS

UNIT I
Introduction to Intellectual Property Rights (IPR): Introduction to IPR, Evolutionary Past, Concept of IPR – Purpose of IPR, Types of IPR, WIPO - TRIPS, Nature of IPR, Patents, Trademarks, Copyrights, Neighboring Rights, Agencies responsible for IPR - Infringement, Use and Misuse of Intellectual Property Rights.

UNIT II
Copyrights: Introduction to Copyrights – Principles of Copyright Protection – Law Relating to Copyrights - Copyright Ownership – Transfer and Duration – Copyright Registration – Limitations – Infringement of Copyright – Relief and Remedy – Semiconductor Chip Protection Act.

UNIT III
Patents: Introduction to Patents - Laws Relating to Patents in India – Patent Requirements – Product Patent and Process Patent - Patent Registration and Granting of Patent -Exclusive Rights – Limitations - Ownership and Transfer – – Revocation of Patent – Patent Appellate Board - Infringement of Patent – Compulsory Licensing – Software Protection and Computer related Innovations.

UNIT IV
Trademarks: Introduction to Trademarks – Laws Relating to Trademarks – Functions of Trademark – – Trade Mark Registration – Trade Mark Maintenance – Transfer of rights – Deceptive Similarities - Likelihood of Confusion - Dilution of Ownership – Trademarks Claims and Infringement – Remedies – Passing Off Action.

UNIT V

Trade Secrets: Introduction to Trade Secrets – General Principles - Laws Relating to Trade Secrets - Maintaining Trade Secret – Physical Security – Employee Access Limitation – Employee Confidentiality Agreements – Breach of Contract –Law of Unfair Competition – Trade Secret Litigation – Applying State Law, Cyber Law and Cyber Crime

Text Books:

1. Intellectual Property Rights (Patents & Cyber Law), Dr. A. Srinivas. Oxford University Press, New Delhi.
2. PrabhuddhaGanguli: Intellectual Property Rights, Tata Mc-Graw – Hill, New Delhi
3. R.Radha Krishnan, S.Balasubramanian: Intellectual Property Rights, Excel Books. New Delhi.

References:

1. Deborah E.Bouchoux: Intellectual Property, Cengage Learning, New Delhi.
2. Richard Stim: Intellectual Property, Cengage Learning, New Delhi.
3. Kompal Bansal &Parishit Bansal Fundamentals of IPR for Engineers, B. S. Publications (Press).
4. Cyber Law - Texts & Cases, South-Western’s Special Topics Collections.
5. M.Ashok Kumar and MohdIqbal Ali: Intellectual Property Rights, Serials Pub.

Sem	**VI Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	2	0	0	0	V20CEMC02
Name of the Course	**PROFESSIONAL ETHICS AND HUMAN VALUES**					
Branch	**Common to All Branches**					

Course Outcomes:

Upon successful completion of this course the student will be able to

- Discuss the importance of human values and their context (K2)
- Generalize the professional ethics and norms of engineering practice (K2)
- Review the contextual knowledge of engineering as social experimentation (K2)
- Identify the engineer's responsibility for Safety & Risks (K2)
- Clarify the professional rights & responsibilities at global level (K2)

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UNIT I

Human Values: Morals, Values and Ethics – Integrity – Work Ethics – Service Learning –Civic Virtue – Respect for others – Living Peacefully – Caring – Sharing –Honesty –Courage – Value time – Co-operation – Commitment – Empathy –Self-confidence–Spirituality-Character.

UNIT II

Engineering Ethics: The History of Ethics, Purposes for Engineering Ethics, Consensus and Controversy, Professional and Professionalism, Professional Roles to be played by an Engineer –Self Interest, Customs and Religion, Uses of Ethical Theories, Professional Ethics, Types of Inquiry in Engineering Ethics.

UNIT III

Engineering as Social Experimentation: Comparison with Standard Experiments –now ledge gained–Conscientiousness–Relevant Information–Learning from the Past–Engineers as Managers, Consultants, and Leaders – Accountability – Role of Codes– odes and Experimental Nature of Engineering.

UNIT IV

Engineers' Responsibility for Safety and Risk: Safety and Risk, Concept of Safety – Types of Risks – Voluntary v/s Involuntary Risk- Short term v/s long term Consequences, Delayed v/s Immediate Risk- Safety and the Engineer – Designing for Safety – Risk-Benefit Analysis-Accidents.

UNIT V

Engineers' Responsibilities, Rights & Global Issues: Collegiality, Senses of Loyalty, professionalism and Loyalty, Professional Rights & Responsibilities– confidential and proprietary information, Bribes/Gifts, Whistle Blowing. Globalization- Cross-culture Issues, Environmental Ethics, Computer Ethics, Weapons Development Ethics and Research Ethics, Intellectual Property Rights.

Text Books:

1. "Engineering Ethics and Human Values" by M. Govindarajan, S.Natarajan and V.S.Senthil Kumar- PHILearningPvt.Ltd-2009.
2. "Professional Ethics and Morals" by Prof.A.R.Aryasri, Dharanikota Suyodhana-Maruthi Publications.
3. "Professional Ethics and Human Values" by A.Alavudeen, R.Kalil Rahman and M.Jayakumaran- Laxmi Publications.

References:

1. "Professional Ethics and Human Values"by Prof.D.R.Kiran.
2. "Indian Culture,Values and Professional Ethics"by PSRMurthy-BS Publication.
3. "Ethics in Engineering" by Mike W.Martin and Roland Schinzinger–TMH.

SRI VASAVI ENGINEERING COLLEGE

(AUTONOMOUS)

(Sponsored by Sri Vasavi Educational Society)
(Approved by AICTE, New Delhi &Recognized by UGC under section 2(f) & 12(B))
(Permanently affiliated to JNTUK, Kakinada, Accredited by NBA and NAAC with 'A' Grade)
Pedatadepalli, **TADEPALLIGUDEM–534 101.**W.G.Dist**. (A.P)**

Department of Electrical & Electronics Engineering

Dt: 08.08.2022

The sixth meeting of Board of Studies in Department of Electrical and Electronics Engineering was held at 12.00 PM on 28-07-2022 though online mode using Zoom meetings (Meeting ID: 81475413157).

The following members are attended the meeting.

S.No.	Name	Designation	Role
1.	Dr. Sudha Rani Donepudi	Professor, Head, Dept. of EEE, SVEC, Pedatadepalli.	Chairperson
2.	Dr. R. SrinivasaRao	Professor, Dept. of EEE, UCEK, JNTUK, Kakinada	Subject Expert Nominated By V.C.
3.	Dr. Y.P. Obulesu	Professor, School of EE, VIT, Vellore	Subject Expert Nominated By A.C.
4.	Er. B.N.V.R.C. Suresh Kumar	Retired AGM, PGCI, Hyderabad	Industry Expert Nominated By A.C
5.	Er. Narayana Murthy Vella	Engineer, PGCI, Vijayawada	Alumni
6.	Dr. Ch. Rambabu	Professor	Member
7.	Mr. U. Chandra Rao	Sr. Asst. Professor	Member
8.	Mr. N. Sri Harish	Sr. Asst. Professor	Member
9.	Mr. Ch. V.S.R. Gopala Krishna	Sr. Asst. Professor	Member
10.	Mr. K. Ramesh Babu	Asst. Professor	Member
11.	Mr. M.T.V.L. Ravi Kumar	Asst. Professor	Member
12.	Mr. V. Rama Narayana	Asst. Professor	Member
13.	Mr. G. Chandra Babu	Asst. Professor	Member
14.	Mr. G. Madhu Sagar Babu	Asst. Professor	Member
15.	Mr. G. Govardhan	Asst. Professor	Member
16.	Mr. A. Uma Siva Naga Prasad	Asst. Professor	Member
17.	Mr. Ch. Srinivas	Asst. Professor	Member
18.	Mr. M. M. Swami Naidu	Asst. Professor	Member
19.	Dr. Anilkumar Chappa	Asst. Professor	Member
20.	Mr. Durga R Ch Nookesh	Asst. Professor	Member
21.	Mr. SK. Moulali	Asst. Professor	Member
22.	Dr. E. Naga Venkata Durga Vara Prasad	Asst. Professor	Member

The following are the minutes of the meeting

Item No. 1: Welcome note by the Chairperson BOS

The HOD extended a formal welcome and introduced the members.

Item No. 2: Approval of course structure for V to VIII semesters of B. Tech EEE under V20 Regulation.

Approved the course structure of V to VIII semesters of B. Tech Programme -EEE under V20 Regulation.

The details of the approved course structure for V to VIII semesters of UG (B. Tech) Programme (EEE) under V20 Regulation are given in Annexure-I.

Item No. 3: Approval of syllabi for the courses offered in V to VIII semesters B. Tech EEE under V20 Regulation.

Approved the syllabi for the courses offered in V to VIII semesters B. Tech EEE under V20 Regulation.

The approved syllabi for the courses offered in V to VIII semesters of B. Tech EEE of under V20 Regulation is attached in Annexure-II.

Item No. 4: Approval of list of courses offering for Open Elective- I to IV for all other branches under V20 Regulation and the approval of their detailed syllabi.

Approved the list of courses offering for Open Elective- I to IV for all other branches under V20 Regulation and their detailed syllabi.

The approved courses offering by EEE Department for Open Elective- I to IV under V20 Regulation and their syllabi is attached in Annexure-III.

Item No. 5: Approval for offering Honors in Electrical and Electronics Engineering under V20 Regulation.

Approved to offer Honors in Electrical and Electronics Engineering under V20 Regulation. The details are given in Annexure IV.

Item No. 6: Approval for offering minor degree in Electrical Engineering for all branches except Electrical and Electronics Engineering under V20 Regulation.

Approved to offer Minor Degree in Electrical Engineering for all other Engineering Department students with the rules and regulations which will be approved by Academic Council. The details are given in Annexure V.

Item No. 7: Approval for offering minor degree offered by all other Departments for B. Tech Electrical and Electronics Engineering students under V20 Regulation.

Approved to opt for minor degree by B. Tech Electrical and Electronics Engineering Students offered by all other departments under V20 regulation.

CHAIRPERSON OF BOS
DR. SUDHA RANI DONEPUDI

Annexure I

Approved Course Structure of V to VIII Semesters B. Tech EEE

Semester V

S. No	Code	Course Title	Hours			Credits
			L	T	P	
1	V20EET11	Control Systems	3	0	0	3
2	V20EET12	Switchgear & Protection	3	0	0	3
3	V20EET13	Power Electronics	3	0	0	3
4		Open Elective –I Job Oriented Elective	0	0	6	3
5	V20EET14 V20EET15 V20EET16 V20EET17	Professional Elective-I 1. Utilization of Electrical Energy 2. Renewable Energy Systems 3. Instrumentation 4. Energy Audit & Demand side management	3	0	0	3
6	V20EEL07	Electrical Machines-II Lab	0	0	3	1.5
7	V20EEL08	Control Systems Lab	0	0	3	1.5
8	V20ENT04	Professional Communication Skills– III	2	0	0	0
9		Soft Skills	1	0	2	2
Summer Internship 2 Months (Mandatory) after second year (to be evaluated during V Semester			0	0	0	1.5
Total Credits			**21.5**			
Honors/Minor Courses (The hours distribution can be 3-0-2 or 3-1-0 also)			**4**	**0**	**0**	**4**

Category	Credits
Professional Core Courses	12
Professional Elective Courses	3
Open Elective Course/Job Oriented Elective	3
Skill advanced Course/ Soft Skill Course*	2
Summer Internship	1.5
Total Credits	21.5

Semester VI

S. No	Code	Course Title	Hours			Credits
			L	T	P	
1	V20EET18	Power System Analysis	3	1	0	3
2	V20EET19	Electrical Drives	3	0	0	3
3	V20EET20	Microprocessors & Microcontrollers	3	0	0	3
4	V20EET21 V20EET22 V20EET23 V20EET24	Professional Elective-II 1. Smart Grid Technologies 2. Power Quality & Custom Power Devices 3. Modern Control Theory 4. IoT Applications In Electrical Engineering	3	0	0	3
5		Open Elective –II /Job Oriented Elective	3	0	0	3
6	V20EEL09	Power Systems Lab	0	0	3	1.5
7	V20EEL10	Power Electronics & Simulation Lab	0	0	3	1.5
8	V20EEL11	Microprocessors & Microcontrollers Lab	0	0	3	1.5
9	V20CEMC01	IPR & Patents	2	0	0	0
10	V20SOC04	Skill advanced Course	1	0	2	2
Total Credits			**21.5**			

Industrial/Research Internship (Mandatory) 2 Months during summer vacation	
Category	Credits
Professional Core Courses	13.5
Professional Elective Courses	3
Open Elective Course/Job Oriented Elective	3
Skill advanced Course/ Soft Skill Course*	2
Mandatory Course (AICTE)	0
Industrial/Research Internship (Mandatory) 2 Months	-
Total Credits	21.5

Semester VII

S. No	Code	Course Title	Hours			Credits
			L	T	P	
1	V20EET25 V20EET26 V20EET27 V20EET28	Professional Elective-III 1. Extra High Voltage AC Transmission 2. Power System Operation and Control 3. Digital Control Systems 4. Electrical Machine Modelling & Analysis	3	0	0	3
2	V20EET29 V20EET30 V20EET31 V20EET32	Professional Elective-IV 1. High Voltage Engineering 2. Electrical Distribution Systems 3. Power System Reforms 4. Advanced Power Electronics	3	0	0	3
3	V20EET33 V20EET34 V20EET35 V20EET36	Professional Elective-V 1. Special Electrical Machines 2. AI Techniques for Power Systems 3. Energy Storage and Battery Management 4. Hybrid Electric Vehicles	3	0	0	3
4		Open Elective – III	3	0	0	3
5	V20EEL12	Open Elective –IV/Job Oriented Elective (Advanced Electrical Simulation Lab)	0	0	6	3
6	V20MBT54	Universal Human Values	3	0	0	3
	V20SOC05	Skill advanced Course	1	0	2	2
Industrial/Research Internship 2 Months (Mandatory) after third year (to be evaluated during VII semester			0	0	0	3
Total Credits			**23**			

Category	Credits
Professional Elective Courses	9
Open Elective Course/Job Oriented Elective	6
Humanities and Social Science Elective	3
Skill advanced Course/ Soft Skill Course*	2
Industrial/Research Internship	3
Total Credits	23

Semester VIII

S. No	Category	Code	Course Title	Hours			Credits
				L	T	P	
1	Major Project	PROJ	Project Work, Seminar and Internship in Industry	0	0	0	12
Internship (6 Months)							
						Total Credits	**12**

Skill Advanced Courses

S. No.	Course Code	Course Title
1.	V20EES04/ V20EES05	Machine Learning
2.		Data Science
3.		Augmented Reality
4.		Robotics
5.		Clouds computing
6.		Industrial IoT (IIoT)
7.		Embedded Systems
8.		Integrated Systems
9.		Web Development
10.		Deep Learning
11.		Block Chain Technology
12.		Cyber Security
13.		MEAN Stack Technologies
14.		Big Data Analytics

Annexure II

Approved Syllabi for the courses offered in V to VIII semesters B. Tech EEE under V20 Regulation.

Semester	**V SEM**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	3	-	-	3	V20EET12
Name of the Course	**Switchgear & Protection**					
Branch	EEE					

Course Outcomes

After Successful completion of this course, students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Understand the arc interruption phenomenon in oil, air, vacuum, SF6 gas type circuit breakers.	(K2)
CO2	Extract the constructional features and working of different types of electromagnetic relays.	(K2)
CO3	Choose suitable relay for different type of protective schemes.	(K3)
CO4	Apply suitable protective scheme for generators and transformers against different faults.	(K3)
CO5	Choose suitable protective scheme for the protection of feeders & bus bars, digital relays and the concept of grounding.	(K3)

UNIT–I: CIRCUIT BREAKERS

Miniature Circuit Breaker(MCB)– Elementary principles of arc interruption– Restriking Voltage and Recovery voltages– Restriking phenomenon - RRRV– Average and Max. RRRV– Current chopping and Resistance switching– Introduction to oil circuit breakers– Description and operation of Air Blast– Vacuum and SF6 circuit breakers– CB ratings and specifications– Concept of Auto reclosing.

UNIT–II:

ELECTROMAGNETIC PROTECTION Relay connection – Balanced beam type attracted armature relay - induction disc and induction cup relays–Torque equation - Relays classification–Instantaneous– DMT and IDMT types.

UNIT-III: APPLICATIONS OF RELAYS

Over current and under voltage relays– Directional relays– Differential relays and percentage differential relays– Universal torque equation– Distance relays: Impedance–Reactance– Mho Characteristics of distance relays and comparison.

UNIT–IV:

GENERATOR PROTECTION

Protection of generators against stator faults – Rotor faults and abnormal conditions – Numerical examples.

TRANSFORMER PROTECTION

Percentage differential protection – Design of CT's ratio– Buchholz relay protection–Numerical examples.

UNIT–V: FEEDER AND BUS BAR PROTECTION

Protection of lines: Over current Protection schemes – PSM,TMS - Numerical examples - Carrier current and three zone distance relay using impedance relays–Protection of bus bars by using Differential protection.

DIGITAL RELAYS

Micro Processor based digital relays.

NEUTRAL GROUNDING

Effects of ungrounded neutral on system performance– Methods of neutral grounding: Solid–resistance–Reactance–Arcing grounds and grounding Practices.

TEXT BOOKS:

1. Power System Protection and Switchgear by Badri Ram and D. N Viswakarma, TMH Publications, 2007
2. Power System Protection and Switchgear by B. Ravindranath, M. Chander, New Age International, 1977

3. Power system protection- Static Relays with microprocessor applications by T. S. Madhava Rao, TMH, 2017

REFERENCE BOOKS:

1. Fundamentals of Power System Protection by Paithankar and S. R. Bhide., PHI, 2003.
2. Art & Science of Protective Relaying – by C R Mason, Wiley Eastern Ltd, 1956.
3. Protection and Switch Gear by Bhavesh Bhalja, R.P. Maheshwari, Nilesh G.Chothani, Oxford University Press, 2013
4. https://onlinecourses.nptel.ac.in/noc21_ee110/
5. https://nptel.ac.in/courses/108101039

Semester	**V SEM**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	3	-	-	3	V20EET13
Name of the Course	Power Electronics					
Branch	EEE					

Course Outcomes

After Successful completion of this course, students will be able to

CO No.	**Course Outcome**	**Knowledge Level**
CO1	Illustrate the characteristics of various power semiconductor devices and different firing circuits of SCR.	(K3)
CO2	Operate various 1- φ AC-DC Controlled rectifiers for R and RL Loads and compare their performance.	(K3)
CO3	Explain the operation of 3-φ full converter and dual converter.	(K2)
CO4	Explain the operation of AC voltage controller, 1- φ cyclo-converter and high frequency dc-dc converters.	(K2)
CO5	Apply PWM techniques for voltage control and harmonic mitigation.	(K3)

UNIT - I: Power Semi-Conductor Devices

Power transistors- Basic structure and working of power MOSFET and power IGBT. Characteristics of power MOSFET and power IGBT-Silicon controlled rectifiers (SCR's)- Basic theory of operation of SCR-Static & Dynamic characteristics of SCR- Turn on and turn off methods of SCR-Snubber circuit Design.

UNIT - II: **Single Phase - Phase Controlled Rectifiers and Harmonic Analysis**

Half wave converters with R, RL and RLE loads- Derivation of average output voltage and output current- Effect of freewheeling diode for RL load. Fully controlled converters with R, RL and RLE loads-Derivation of output voltage and current - Effect of source Inductance. Semi Converters (Half Controlled) operation with R, RL and RLE loads - Harmonic analysis for input/source current waveform in a system with a large load inductance -Calculation of input power factor.

UNIT-III: Three Phase - Phase Controlled Rectifiers

Three Phase Half wave and Full wave converters with R and RL loads-Semi converter (Half Controlled) with R and RL loads- Derivation of average and rms output voltages-Line commutated Inverter operation-Dual converters with non-circulating and circulating currents.

UNIT - IV: AC-AC and DC-DC Converters

Single phase AC voltage controller with R and RL load- Single phase Bridge type Cyclo converter with R and RL load (Principle of operation) -High frequency DC-DC converters: Buck Converter operation, Time ratio control and current limit control strategies-Voltage and current waveforms-Derivation of output voltage-Boost converter operation-Voltage and current waveforms-Derivation of output voltage - Buck-Boost converter operation - Voltage and current waveforms.

UNIT - V: DC-AC Inverters

Single phase half bridge and full bridge inverters - Three phase Inverters (1200 and 1800 modes of operation) - PWM techniques- Single Pulse, Multiple Pulse and Sinusoidal PWM, amplitude and frequency modulation Indices -Harmonic analysis.

TEXT BOOKS:

1. Power Electronics: Circuits, Devices and Applications – by M. H. Rashid, Prentice Hall of India, 2nd edition, 1998
2. Power Electronics – by P.S. Bhimbra, Khanna Publishers, 2014
3. Power Electronics: converters, applications & design -by Nedmohan, Tore M. Undeland, Robbins by Wiley India Pvt. Ltd., 2018
4. Power Electronics: Essentials & Applications by L. Umanand, Wiley, Pvt. Limited, India, 2009

REFERENCE BOOKS:

1. Elements of Power Electronics–Philip T. Krein, Oxford, 2015.
2. Power Electronics by M. D. Singh, Tata McGraw Hill India, 2006
3. Thyristorised Power Controllers – by G. K. Dubey, S. R. Doradla, A. Joshi and R. M. K.Sinha, New Age International (P) Limited Publishers, 1996.
4. Power Electronics handbook by Muhammad H.Rashid, Elsevier, 2018.
5. Power Converter Circuits -by William Shepherd, Li Zhang, CRC Taylor & Francis Group, 2017
6. https://nptel.ac.in/courses/108105066
7. https://nptel.ac.in/courses/108102145

Semester	V SEM	L	T	P	C	Course Code
Regulation	V20	3	-	-	3	V20EET14
Name of the Course	Utilization of Electrical Energy (Professional Elective –I)					
Branch	EEE					

Course Outcomes

After Successful completion of this course, students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Choose a suitable motor for electric drives and industrial applications	(K3)
CO2	Select appropriate heating and welding techniques for different applications	(K2)
CO3	Recognise lightning system for particular inputs and constraints.	(K2)
CO4	Illustrate the speed-time characteristics of traction motors.	(K3)
CO5	Estimate the energy consumption levels at various modes of operation.	(K2)

UNIT – I: SELECTION OF MOTORS

Choice of motor, type of electric drives, starting and running characteristics – Speed control – Temperature rise – Applications of electric drives – Types of industrial loads – Continuous, Intermittent and variable loads – Load equalization.

UNIT – II: ELECTRIC HEATING AND WELDING

Advantages and methods of electric heating and welding –Resistance heating, induction heating and dielectric heating. Classification - Resistance welding and types - Arc welding and types–Electric welding equipment–Comparison between AC and DC Welding

UNIT – III: ILLUMINATION

Basic terms used in illumination – Laws of illumination – MHCP and MSCP– Sources of light: Working of Filament lamps, Arc lamps and Discharge lamps.

Basic principles of light control – Types of lighting schemes – Street, Flood and LED lighting – Lumen or flux method of lighting calculation – Numerical Examples.

UNIT – IV: ELECTRIC TRACTION – I

Review of existing electric traction systems in India – System of electric traction and track electrification– Special features of traction motor – Mechanics of train movement – Speed-time curves for different services – Trapezoidal and quadrilateral speed time curves.

UNIT – V: ELECTRIC TRACTION – II

Calculations of tractive effort– power –Specific energy consumption for given run–Effect of varying acceleration and braking retardation–Adhesive weight and braking, retardation adhesive weight and coefficient of adhesion.

TEXT BOOKS:

1. Utilization of Electric Energy by E. Openshaw Taylor, SI Edition, Orient Longman, 1971.
2. Art and Science of Utilization of Electrical Energy by H. Partab, Dhanpat Rai & Sons, 2006.

REFERENCE BOOKS:

1. Utilization of Electrical Power including Electric drives and Electric traction – by N. V. Suryanarayana, New Age International (P) Limited, Publishers, 1996.
2. Generation, Distribution and Utilization of electrical Energy by C.L. Wadhwa, New Age International (P) Limited, Publishers, 1997.
3. https://www.governmentpolytechnicnayagarh.org/upload/ueet(Pm).pdf,
4. https://sites.google.com/site/eeenotes2u/courses/electrical-power-utilization-epu-notes

Semester	V SEM	L	T	P	C	Course Code
Regulation	V20	3	-	-	3	V20EET15
Name of the Course	Renewable Energy Systems (Professional Elective –I)					
Branch	EEE					

Course Outcomes

After Successful completion of this course, students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Understand the solar radiation and calculate geometric angle.	(K2)
CO2	Understand the working of solar thermal collectors.	(K2)
CO3	Understand the working of solar photo voltaic systems and develop the maximum power point techniques.	(K2)
CO4	Understand the wind energy conversion systems, Betz coefficient and tip speed ratio.	(K2)
CO5	Understand the basic principle and working of tidal, fuel cell and geothermal energy systems.	(K2)

UNIT–I: FUNDAMENTALS OF ENERGY SYSTEMS AND SOLAR ENERGY CONSERVATION PRINCIPLE

Energy scenario (world and India) – various forms of renewable energy - Solar radiation: Outside earth's atmosphere – Earth surface – Analysis of solar radiation data – Geometry – Radiation on tilted surfaces – Numerical problems.

UNIT–II: SOLAR THERMAL SYSTEMS

Liquid flat plate collectors: Performance analysis –Transmissivity– Absorptivity product collector efficiency factor – Numerical problems. Introduction to solar air heaters – Concentrating collectors, solar pond and solar still – solar thermal plants.

UNIT–III: SOLAR PHOTOVOLTAIC SYSTEMS

Solar photovoltaic cell, module, array – construction – Efficiency of solar cells – Developing technologies – Cell I-V characteristics – Equivalent circuit of solar cell – Series resistance – Shunt resistance – Applications and systems - System design: storage sizing –

PV system sizing – Maximum power point techniques: Perturb and observe (P&O) technique.

UNIT–IV: WIND ENERGY

Sources of wind energy - Wind patterns – Types of turbines –Horizontal axis and vertical axis machines - Kinetic energy of wind – Betz coefficient – Tip–speed ratio – Efficiency – Power output of wind turbine – Selection of generator (synchronous, induction) – Maximum power point tracking – wind farms.

UNIT–V: TIDAL, FUEL CELL AND GEOTHERMAL ENERGY SYSTEMS

Tidal power – Basics – Kinetic energy equation – Turbines for tidal power - Numerical problems – Wave power – Basics – Kinetic energy equation – Wave power devices. Fuel classification, Fuel cell: Classification of fuel for fuel cells – Fuel cell voltage– Efficiency – V-I characteristics. Geothermal: Classification – Dry rock and hot acquifer – Energy analysis – Geothermal based electric power generation.

TEXT BOOKS:

1. Solar Energy: Principles of Thermal Collection and Storage, S. P. Sukhatme and J. K. Nayak, TMH, New Delhi, 3rd Edition, 2013.
2. Renewable Energy Resources, John Twidell and Tony Weir, Taylor and Francis - second edition, 2013.

REFERENCE BOOKS:

1. Energy Science: Principles, Technologies and Impacts, John Andrews and Nick Jelly, Oxford University Press, 2nd edition, 2013.
2. Renewable Energy- Edited by Godfrey Boyle-oxford university.press,3rd edition, 2013.
3. Handbook of renewable technology Ahmed and Zobaa, Ramesh C Bansal, World scientific, Singapore, 2011.
4. Renewable Energy Technologies /Ramesh & Kumar /Narosa.
5. Renewable energy technologies – A practical guide for beginners – Chetong Singh Solanki, PHI, 2008.
6. Non conventional energy source –B.H.khan- TMH-2nd edition, 2017.
7. https://archive.nptel.ac.in/courses/115/105/115105127/
8. https://mrcet.com/downloads/digital_notes/ECE/III%20Year/INSTRUMENTATION%20ENGINEERING.pdf

Semester	V SEM	L	T	P	C	Course Code
Regulation	V20	3	-	-	3	V20EET16
Name of the Course	**INSTRUMENTATION** (Professional Elective –I)					
Branch	EEE					

Course Outcomes

After Successful completion of this course, students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Illustrate various types of signals and their characteristics.	(K3)
CO2	Explain different types of transducers with applications.	(K2)
CO3	Compute various parameters of non-electrical quantities.	(K3)
CO4	Understand the principles of digital voltmeters and CRO.	(K2)
CO5	Explain various types of signal analyzers.	(K2)

UNIT–I:

Signals and their representation

Measuring Systems, Performance Characteristics, – Static characteristics – Dynamic Characteristics – Errors in Measurement – Gross Errors – Systematic Errors – Statistical analysis of random errors – Signal and their representation – Standard test, periodic, aperiodic, modulated signal – Sampled data pulse modulation and pulse code modulation.

UNIT–II:

Transducers

Definition of transducers – Classification of transducers – Advantages of Electrical transducers – Characteristics and choice of transducers – Principle operation of resistor, inductor, LVDT and capacitor transducers – LVDT Applications – Strain gauge and its principle of operation – Guage factor – Thermistors – Thermocouples – Synchros – Piezoelectric transducers – Photo diodes.

UNIT–III:

Measurement of Non–Electrical Quantities

Measurement of strain – Gauge Sensitivity – Displacement – Velocity – Angular Velocity – Acceleration – Force – Torque – Measurement of Temperature, Pressure, Vacuum, Flow, Liquid level.

UNIT–IV:
Digital Voltmeters and Oscilloscopes
Digital voltmeters –dual–Slope integration continuous balance type – Microprocessor based ramp type, Cathode ray oscilloscope – Time base generator – Horizontal amplifier and vertical amplifier – Sampling oscilloscope – Analog and digital type data logger – Transient recorder.

UNIT–V:
Signal Analyzers
Wave Analyzers – Frequency selective analyzers – Heterodyne – Application of Wave analyzers – Harmonic Analyzers – Total Harmonic distortion – Spectrum analyzers – Basic spectrum analyzers – Spectral displays – Vector impedance meter – Q meter – Peak reading and RMS voltmeters.

Text Books:
1. Electronic Instrumentation–by H.S.Kalsi Tata MCGraw–Hill Edition, 1995.
2. A course in Electrical and Electronic Measurements and Instrumentation, A.K.Sawhney, Dhanpatrai&Co, 2015

Reference Books:
1. Measurement and Instrumentation theory and application, Alan S.Morris and RezaLangari, Elsevier, 2020
2. Measurements Systems, Applications and Design – by D O Doeblin, 1990.
3. Principles of Measurement and Instrumentation – by A.S Morris, Pearson/Prentice Hall ofIndia, 3rd edition 2012 Elsevier.
4. Modern Electronic Instrumentation and Measurement techniques – by A.DHelfrickandW.D.Cooper, Pearson/Prentice Hall of Indi, 2015
5. Transducers and Instrumentation by D.V.S Murthy, Prentice Hall of India, 2nd edition, October-2011.

Semester	**VI SEM**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	3	-	-	3	V20EET17
Name of the Course	Energy Audit & Demand Side Management (Professional Elective –I)					
Branch	EEE					

Course Outcomes

After Successful completion of this course, students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Describe the concepts and procedures for Energy Audit & Management.	(K2)
CO2	Understand the necessity of Energy efficient lighting systems.	(K2)
CO3	Understand the operation of Energy instruments and their use in energy audit.	(K2)
CO4	Explain Energy Conservation measures in HVAC system	(K2)
CO5	Apply various economic aspects of Energy systems and life cycle costing analysis for various system	(K3)

UNIT–I:

BASIC PRINCIPLES OF ENERGY AUDIT AND MANAGEMENT ENERGY AUDIT

Definitions – Concept – Types of audit – Energy index – Cost index – Pie charts –Sankey diagrams – Load profiles – Energy conservation schemes and energy saving potential – Numerical problems – Principles of energy management – Initiating, planning, controlling, promoting, monitoring, reporting – Energy manager – Qualities and functions – Language.

UNIT–II:

LIGHTING MODIFICATION OF EXISTING SYSTEMS – REPLACEMENT OF EXISTING SYSTEMS – PRIORITIES:

Definition of terms and units – Luminous efficiency – Polar curve – Calculation of illumination level – Illumination of inclined surface to beam – Luminance or brightness – Types of lamps – Electric lighting fittings (luminaries) –Flood lighting – White light LED – Energy conservation measures.

UNIT–III:

POWER FACTOR IMPROVEMENT AND ENERGY INSTRUMENTS

Power factor – Methods of improvement – Location of capacitors – Power factor with non linear loads – Effect of harmonics on Power factor – Numerical problems. Energy Instruments – Watt–hour meter – Data loggers – Thermocouples – Pyrometers – Lux meters – Tong testers – Power analyzer.

UNIT–IV:

SPACE HEATING AND VENTILATION

Ventilation – Air–Conditioning (HVAC) and Water Heating: Introduction – Heating of buildings – Transfer of Heat–Space heating methods – Ventilation and air–conditioning – Insulation–Electric water heating systems – Energy conservation methods.

UNIT–V:

FINANCIAL ANALYSIS AND COMPUTATION OF ECONOMIC ASPECTS

Economics Analysis – Depreciation Methods – Time value of money – Rate of return – Present worth method – Replacement analysis – Life cycle costing analysis – Energy efficient motors (basic concepts) – Economics of energy efficient motors and systems. Need of investment, appraisal and criteria - Calculation of simple payback period–Return on investment – Net present value -Numerical examples.

TEXT BOOKS:

1. Hand Book of Energy Audit by Sonal Desai- Tata McGraw hill, 2015.
2. Energy efficient electric motors by John .C. Andreas, Marcel Dekker Inc Ltd–2nd edition, 1995.

REFERENCE BOOKS:

1. Energy management by W.R. Murphy & G. Mckay Butter worth, Elsevier publications, 2012.
2. Electric Energy Utilization and Conservation by S C Tripathy, Tata McGraw hill publishing company Ltd. New Delhi, 1991.
3. Energy management by Paul o' Callaghan, Mc–Graw Hill Book company–1st edition, 1998.
4. Energy management hand book by W.C.Turner, John wiley and sons, 6th Edition, 2006.

5. Energy management and conservation –k v Sharma and pvenkataseshaiah-I K International Publishing House pvt.ltd,2011.
6. http://www.energymanagertraining.com/download/Gazette_of_IndiaPartIISecI-37_25-08-2010.pdf

Semester	V SEM	L	T	P	C	Course Code
Regulation	V20	-	-	3	1.5	V20EEL07
Name of the Course	Electrical Machines Lab - II					
Branch	EEE					

Course Outcomes

After Successful completion of this course, students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Pre-determine the performance parameters and sketch the performance characteristics of 3-phase induction motor by conducting different tests.	(K3)
CO2	Pre-determine the performance parameters of cylindrical pole synchronous machine by conducting OC and SC tests.	(K3)
CO3	Determine the direct and quadrature axis reactance by conducting slip test.	(K3)
CO4	Determine V and inverted V curves through synchronization of synchronous machine to mains.	(K3)
CO5	Calculate the equivalent circuit parameters of a 1-phase transformer by conducting OC and SC Tests.	(K3)

The following experiments are required to be conducted as compulsory experiments:

1. Brake test on three phase Induction Motor
2. No–load & Blocked rotor tests on three phase Squirrel Cage Induction motor
3. Load test on three phase slip ring induction motor
4. No–load & Blocked rotor tests on three phase Slip Ring Induction motor
5. Regulation of a three –phase alternator by synchronous impedance &m.m.f. Methods
6. Regulation of three–phase alternator by Potier triangle method
7. V and Inverted V curves of a three—phase synchronous motor.
8. Determination of X_d and X_q of a salient pole synchronous machine
9. Equivalent circuit of single phase induction motor
10. Speed control of induction motor by V/f method.
11. Determination of efficiency of three phase alternator by loading with three phase induction motor.
12. Power factor improvement of single phase induction motor by using capacitors and load test on single phase induction motor.
13. Heat run test on a bank of 3 Nos. of single phase Delta connected transformers.

Semester	**V SEM**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	-	-	3	1.5	V20EEL08
Name of the Course	Control Systems Lab					
Branch	EEE					

Course Outcomes

After Successful completion of this course, students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Find time response of given control system model.	(K3)
CO2	Analyze the performance and working of Magnetic amplifier, D.C. servo motors, A.C. Servo motors and synchronous motors.	(K4)
CO3	Analyze PID controllers for given control system model.	(K4)
CO4	Analyze lead, lag and lead-lag systems in control system	(K4)
CO5	Determine the transfer function of D.C. motor and D.C Generator.	(K4)

Any 10 of the following experiments are to be conducted:

1. Time response of Second order system
2. Characteristics of Synchros
3. Programmable logic controller – characteristics of stepper motor
4. Effect of feedback on DC servo motor
5. Effect of P, PD, PI, PID Controller on a second order systems
6. Lag and lead compensation – Magnitude and phase plot
7. DC position control system
8. Transfer function of DC motor
9. Temperature controller using PID
10. Characteristics of magnetic amplifiers
11. Characteristics of AC servo motor

12. Characteristics of DC servo motor

13. Potentiometer as an error detector

Semester	**VI SEM**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	3	1	-	3	V20EET18
Name of the Course	Power System Analysis					
Branch	EEE					

Course Outcomes

After Successful completion of this course, students will be able to

CO No.	**Course Outcome**	**Knowledge Level**
CO1	Compute Y_{BUS} matrix for a power system network.	(K3)
CO2	Find the load flow solution of a power system network using load flow methods.	(K3)
CO3	Develop the Z_{BUS} for a power system network and calculate the fault currents for symmetrical faults.	(K3)
CO4	Compute the sequence components of currents for unbalanced power system network.	(K3)
CO5	Understand the concepts of power system stability.	(K2)

UNIT –I: PER UNIT REPRESENTATION & TOPOLOGY

Per Unit Quantities–Single line diagram– Impedance diagram of a power system–Graph theory definition – Formation of element node incidence and bus incidence matrices – Primitive network representation – Formation of Y_{BUS} matrix by singular transformation and direct inspection methods.

UNIT –II: POWER FLOW STUDIES

Necessity of power flow studies – Derivation of static power flow equations – Power flow solution using Gauss-Seidel Method – Newton Raphson Method (Rectangular and polar coordinates form) –Decoupled and Fast Decoupled methods – Algorithmic approach – Problems on 3–bus system only.

UNIT –III: Z_{BUS} FORMULATION and SYMMETRICAL FAULT ANALYSIS

Z_{BUS} FORMULATION

Formation of Z_{BUS}: Partial network– Algorithm for the Modification of Z_{BUS} Matrix for addition element for the following cases: Addition of element from a new bus to reference– Addition of element from a new bus to an old bus– Addition of element between an old bus to reference and Addition of element between two old busses (Derivations and Numerical Problems).

SYMMETRICAL FAULT ANALYSIS

Transients on a Transmission line-Short circuit of synchronous machine (on no-load) - 3–Phase short circuit currents and reactance of synchronous machine–Short circuit MVA calculations -Series reactors – selection of reactors.

UNIT –IV: SYMMETRICAL COMPONENTS & FAULT ANALYSIS

Definition of symmetrical components - symmetrical components of unbalanced three phase systems – Power in symmetrical components – Sequence impedances – Synchronous generator – Transmission line and transformers – Sequence networks – Various types of faults LG– LL– LLG and LLL on unloaded alternator–unsymmetrical faults on power system.

UNIT – V: POWER SYSTEM STABILITY ANALYSIS

Elementary concepts of Steady state– Dynamic and Transient Stabilities– Description of Steady State Stability Power Limit–Transfer Reactance–Synchronizing Power Coefficient – Power Angle Curve and Determination of Steady State Stability –Derivation of Swing Equation–Determination of Transient Stability by Equal Area Criterion–Applications of Equal Area Criterion–Methods to improve steady state and transient stability.

TEXT BOOKS:

1. Power System Analysis by Grainger and Stevenson, Tata McGraw Hill, 1994.
2. Modern Power system Analysis – by I. J. Nagrath& D. P. Kothari: Tata McGraw–Hill Publishing Company, 2nd edition,2011.

REFERENCE BOOKS:

1. Power System Analysis – by A.R.Bergen, Prentice Hall, Inc, 1999.
2. Power System Analysis by HadiSaadat – TMH Edition, 2002.
3. Power System Analysis by B.R.Gupta, Wheeler Publications, 1998.
4. Power System Analysis and Design by J.Duncan Glover, M.S.Sarma, T.J.Overbye – Cengage Learning publications, 2017.

Semester	**VI SEM**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	3	-	-	3	V20EET19
Name of the Course	Electrical Drives					
Branch	EEE					

Course Outcomes

After Successful completion of this course, students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Understand the fundamentals concepts of an electric drive and different electric braking methods.	(K2)
CO2	Operate Chopper fed DC motor drives in various quadrants.	(K4)
CO3	Understand the closed loop operation of chopper fed dc motor drive.	(K2)
CO4	Compute the change in speed of 3-φ induction motor with variable voltage and v/f control	(K3)
CO5	Illustrate the speed control mechanism of synchronous motors	(K3)

UNIT - I: Fundamentals of Electric Drives

Electric drive – Fundamental torque equation – Load torque components – Nature and classification of load torques – Steady state stability – Load equalization– Four quadrant operation of drive (hoist control) – Braking methods: Dynamic – Plugging – Regenerative methods.

UNIT - II: Controlled Converter Fed DC Motor Drives

Single phase half and fully controlled converter fed separately and self-excited DC motor drive – three phase fully controlled converter fed separately excited DC motor drive- Output voltage and current waveforms – Speed-torque expressions – Speed-torque characteristics — Principle of operation of dual converters and dual converter fed DC motor drives -Numerical problems.

UNIT - III: DC–DC Converters Fed DC Motor Drives

Single quadrant – Two quadrant and four quadrant DC-DC converter fed separately excited and self-excited DC motors – Continuous current operation– Output voltage and current waveforms – Speed–torque expressions – Speed–torque characteristics –Four quadrant operation – Closed loop operation (qualitative treatment only).

UNIT - IV: Control of Induction Motor Drives

Stator side control: Stator voltage control using 3-phase AC voltage regulators – Waveforms –Speed torque characteristics– Variable Voltage Variable Frequency control of induction motor by PWM voltage source inverter – Closed loop v/f control of induction motor drives (qualitative treatment only).

Rotor side control: Static rotor resistance control – Slip power recovery schemes – Static Scherbius drive – Static Kramer drive – Performance and speed torque characteristics – Advantages –Applications.

UNIT - V: Control of Synchronous Motor Drives

Separate control & self-control of synchronous motors – Operation of self-controlled synchronous motors byVSI– Closed Loop control operation of synchronous motor drives (qualitative treatment only).–Variable frequency control–Pulse width modulation.

TEXT BOOKS

1. Power Semiconductor Controlled Drives by G. K. Dubey, Prentice Hall, 1989.
2. Electric Motor Drives: Modeling, Analysis and Control by R. Krishnan, Prentice Hall, 2001.
3. Fundamentals of Electrical Drives by G. K. Dubey, CRC Press, 2002.
4. Power Semiconductor Drives, by S.B. Dewan, G.R. Slemon, A. Straughen, Wiley-India Edition, 2009.

REFERENCE BOOKS

1. Control of Electric Drives by W. Leonhard, Springer Science & Business Media, 2001.
2. Electric Motors and Drives Fundamentals, Types and Applications, by Austin Hughes and Bill Drury, Newnes, 203
3. Thyristor Control of Electric drives – Vedam Subramanyam Tata McGraw Hill Publications, 1987
4. Power Electronic Circuits, Devices and applications by M.H. Rashid, PHI, 2013
5. Power Electronics handbook by Muhammad H. Rashid, Elsevier 2017
6. https://www.digimat.in/nptel/courses/video/108104140/L01.html
7. https://archive.nptel.ac.in/courses/108/104/108104140/,

Semester	**VI SEM**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	4	-	-	3	V20EET20
Name of the Course	Microprocessors and Microcontrollers					
Branch	EEE					

CO No.	**Course Outcome**	**Knowledge Level**
CO1	Understand the microprocessor capability in general.	(K2)
CO2	Explain the addressing modes of microprocessor.	(K2)
CO3	Understand the microcontroller capability.	(K2)
CO4	Develop microprocessor and microcontroller programmes.	(K3)
CO5	Connect microprocessor and microcontroller with other electronic devices.	(K4)

UNIT–I: Introduction to Microprocessor Architecture
Introduction and evolution of Microprocessors – Architecture of 8086–Register Organization of 8086–Memory organization of 8086–General bus operation of 8086–Introduction to80286–80386 and 80486 and Pentium.

UNIT–II: Minimum and Maximum Mode Operations
Instruction set, Addressing modes– Minimum and Maximum mode operations of 8086–8086Control signal interfacing–Read and write cycle timing diagrams.

UNIT–III:I/O Interface
8255 PPI– Architecture of 8255–Modes of operation– Interfacing I/O devices to 8086 using8255–Interfacing A to D converters– Interfacing D to A converters– Stepper motor interfacing– Static memory interfacing with 8086–DMA controller (8257)–Architecture–Interfacing 8257 DMA controller– Programmable Interrupt Controller (8259)–Command words and operating modes of 8259– Interfacing of 8259–Keyboard/display controller(8279)–Architecture–Modes of operation–Command words of 8279– Interfacing of 8279.

UNIT–IV: Introduction to 8051 Micro Controller
Overview of 8051 Micro Controller– Architecture– Register set–I/O ports and Memory Organization– Interrupts–Timers and Counters–Serial Communication.

UNIT– V: PIC Architecture
Block diagram of basic PIC 18 micro controller, registers I/O ports.

Text Books:

1. Kenneth J Ayala, "The 8051 Micro Controller Architecture, Programming and Applications", Thomson Publishers, 2nd Edition.
2. PIC Microcontroller and Embedded Systems using Assembly and C for PIC 18, -Muhammad Ali Mazidi, RolindD. Mckinay , Danny causey -Pearson Publisher 21stImpression.

Reference Books:

1. R.S. Kaler, " A Text book of Microprocessors and Micro Controllers", I.K.International Publishing House Pvt. Ltd., 2015
2. Ajay V. Deshmukh, "Microcontrollers – Theory and Applications", Tata McGraw–Hill Companies –2005.
3. Ajit Pal, "Microcontrollers – Principles and Applications", PHI Learning Pvt Ltd,2011.
4. Microprocessors and Interfacing, Douglas V Hall, Mc–Graw Hill, 2nd Edition, 2017
5. Ray and Burchandi, "Advanced Micro Processors and Interfacing", Tata McGraw–Hill, 2013
6. https://www.digimat.in/nptel/courses/video/108105102/L01.html,
7. https://www.youtube.com/watch?v=liRPtvj7bFU
8. ,https://nptel.ac.in/courses/108107029

Semester	V SEM	L	T	P	C	Course Code
Regulation	V20	3	-	-	3	V20EET21
Name of the Course	Smart Grid Technologies (Professional Elective –II)					
Branch	EEE					

Course Outcomes:
After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Understand concept of smart grid and its advantages over conventional grid.	K2
CO2	Explain the architecture of smart Grid.	K2
CO3	Illustrate the concept of Micro Grid and its integration.	K2
CO4	Understand the smart metering and measuring techniques.	K2
CO5	Illustrate different communication technologies and power quality problems associated with smart grid.	K2

UNIT –I: INTRODUCTION TO SMART GRID

Introduction to Smart Grid - Need of Smart Grid, Working definitions of Smart Grid and Associated Concepts – Smart Grid Functions – Traditional Power Grid and Smart Grid – New Technologies for Smart Grid – Advantages — Key Challenges for Smart Grid.

UNIT—II: SMART GRID ARCHITECTURE

Components and Architecture of Smart Grid Design – Review of the proposed architectures for Smart Grid-Geographic Information System(GIS)-The fundamental components of Smart Grid designs – Transmission Automation – Sub-Station Automation -Distribution Automation – Feeder Automation, Renewable Integration.

UNIT-III: DISTRIBUTION GENERATION

Introduction-necessity of DG– Concept of micro grid-Issues of interconnection-protection & control of micro grid – Storage Technologies – Smart Storages, Battery, SMES– Economic Issues.

UNIT-IV: SMART METERS

Introduction to smart Meters-Phasor Measurement Unit (PMU)-Wide Area Measurement Systems (WAMS). Intelligent Electronic Devices (IED) & their application for monitoring & protection.

UNIT-V: COMMUNICATION TECHNOLOGY AND POWER QUALITY MANAGEMENT IN SMART GRID

Advanced Metering infrastructure (AMI) drivers and benefits-AMI protocols-Standards and initiatives-AMI needs in the smart grid, Home Area Network (HAN), Wide Area Network (WAN). Introduction to Power Quality, Power Quality Issues of Grid Connected Renewable Energy Sources, Voltage Control in Micro Grid System – Reactive Power Control in Smart Grid- Web based Power Quality Monitoring-Power Quality Audit.

TEXT BOOKS:

1. James Momoh, “Smart Grid :Fundamentals of Design and Analysis”-Wiley, IEEE Press,2012
2. Ali Keyhani, Mohammad N. Marwali, Min Dai ―Integration of Green and Renewable Energy in Electric Power Systems, Wiley, 2019
3. JanakaEkanayake, KithsiriLiyanage, Jianzhong.Wu, AkihikoYokoyama, Nick Jenkins,“Smart Grid: Technology and Applications”- Wiley, 2012.
4. A.G. Phadke and J.S. Thorp, “Synchronized Phasor Measurements and their Applications”, Springer Edition, 2010

REFERENCE BOOKS:

1. Yang Xiao, “Communication and Networking in Smart Grids”, CRC Press, 202
2. Wiley Blackwell 3.Peter S. Fox Penner, “Smart Power: Climate Changes, the Smart Grid, and the Future of Electric Utilities”, Island Press; 1 edition 8 Jun 2010.
3. Stuart Borlase, “Smart Grids (Power Engineering)”, CRC Press
4. https://onlinecourses.nptel.ac.in/noc21_ee68/preview
5. https://archive.nptel.ac.in/courses/108/107/108107113/

Semester	**VI SEM**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	3	-	-	3	V20EET22
Name of the Course	**Power Quality & Custom Power Devices** (Professional Elective –II)					
Branch	EEE					

Course Outcomes:
After successful completion of this course, the students will be able to

CO No.	**Course Outcome**	**Knowledge Level**
CO1	Identify the issue related to power quality in power systems	K2
CO2	Describe the problems of transient voltage variations in power systems	K2
CO3	Analyze the effects of harmonics and understand different mitigation techniques	K4
CO4	Identify the importance of custom power devices and their applications	K2
CO5	Choose suitable custom power device to mitigate power quality problem	K2

Unit–I: INTRODUCTION TO POWER QUALITY
Overview of power quality, Concern about the power quality, General classes of power quality problems, Voltage unbalance, Waveform distortion, Voltage fluctuation, Power frequency variations, power quality terms, voltage sags, swells, flicker and Interruptions-sources of voltage and current interruptions, Nonlinear loads.

Unit–II: TRANSIENT VOLTAGE VARIATIONS
Sources of transient over voltages- principles of overvoltage protection, devices for over voltage protection, utility capacitor switching transients, utility lightning protection, load switching transient problems.

Unit– III: HARMONIC DISTORTION AND SOLUTIONS
Voltage distortion vs. Current distortion, Harmonics vs. Transients – power system quantities under non-sinusoidal conditions, Harmonic indices – Sources of harmonics, locating sources of harmonics, system response characteristics, Effect of harmonic distortion, inter harmonics, harmonic solutions.

Unit–IV: CUSTOM POWER DEVICES
Custom power and custom power devices, voltage source inverters, reactive power harmonic compensation devices, compensation of voltage interruptions and current interruptions, static series and shunt compensators, compensation in distribution systems, interaction with distribution equipment, installation considerations.

Unit–V: APPLICATION OF CUSTOM POWER DEVICES IN POWER SYSTEMS
Static and hybrid source transfer switches, solid state current limiter-solid state breaker. P-Q theory- control of P and Q, dynamic voltage restorer (DVR): operation and control-interline power flow controller (IPFC): operation and control of unified power quality conditioner (UPQC); generalized power quality conditioner.

TEXTBOOKS:

1. Electrical Power Systems Quality, Dugan R C, McGranaghan M F, Santoso S, and Beaty H W, Second Edition, McGraw-Hill, 2002.
2. Understanding Power Quality Problems: Voltage Sags and Interruptions, Bollen M H J, First Edition, IEEE Press; 2000.
3. Power Quality Enhancement Using Custom Power Devices – Power Electronics and Power Systems, Gerard Ledwich, ArindamGhosh, Kluwer Academic Publishers, 2002.
4. Custom Power Devices - An Introduction, Arindam Ghosh and Gerard Ledwich, Springer, 2002.

REFERENCE BOOKS:

1. Power Quality Primer, Kennedy B W, First Edition, McGraw-Hill, 2000.
2. Power System Harmonics, Arrillaga J and Watson N R, Second Edition, John Wiley & Sons, 2003.
3. Electric Power Quality control Techniques, W. E. Kazibwe and M. H. Sendaula, Van Nostrad Reinhold, New York.
4. Power Quality c.shankaran, CRC Press, 2001.
5. Harmonics and Power Systems –Franciso C.DE LA Rosa-CRC Press (Taylor & Francis).
6. Power Quality in Power systems and Electrical Machines-EwaldF.fuchs, Mohammad A.S. Masoum Elsevier.
7. Power Quality, C. Shankaran, CRC Press, 2001.
8. Instantaneous Power Theory and Application to Power Conditioning, H. Akagiet.al., IEEE Press, 2007.
9. A Review of Compensating Type Custom Power Devices for Power Quality Improvement, Yash Palet.al., Joint International Conference on Power System Technology and IEEE Power India Conference, POWERCON 2008.
10. Guidebook on Custom Power Devices, Technical Report, Published by EPRI, Nov 2000
11. https://onlinecourses.nptel.ac.in/noc21_ee103/preview

Semester	**VI SEM**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	3	-	-	3	V20EET23
Name of the Course	**Modern Control Theory** (Professional Elective –II)					
Branch	EEE					

CO No.	**Course Outcome**	**Knowledge Level**
CO1	Understand the concepts of State Space Analysis.	(K2)
CO2	Find the concepts of Controllability, Observability and development of pole placement techniques.	(K3)
CO3	Demonstrate the non-linear systems behaviour by describing function analysis.	(K3)
CO4	Demonstrate the non-linear systems behaviour by phase-plane.	(K3)
CO5	Compute the stability of linear and non-linear systems by Lypunov's Method.	(K3)

UNIT –I

State Variable Analysis: The concept of state – State Equations for Dynamic systems – State diagram--- - Linear Continuous time model for physical systems – Existence and Uniqueness of Solutions to Continuous – Time State Equations – Solutions – Linear Time Invariant Continuous – Time State Equations – State transition matrix and it's properties

UNIT – II

State Variable Techniques: General concept of Controllability – General concept of Observability Controllability tests for Continuous &Time Invariant systems - Observability tests for Continuous &Time Invariant systems - Controllability and Observability of state model in Jordan Canonical form - Controllability and Observability Canonical forms of State model – State feedback controller design through pole assignment.

UNIT – III

Non Linear Systems – I: Introduction – Non Linear Systems – Types of Non – Linarites – Saturation – Dead – Zone – Backlash – Jump Phenomenon etc. - Singular Points – Introduction to Linearization of nonlinear systems, properties of Non Linear Systems – Describing function – describing function analysis of nonlinear systems- Stability analysis of Non – Linear systems through describing functions.

UNIT – IV

Non Linear Systems – II: Introduction to phase – plane analysis, Method of Isoclines for Constructing Trajectories, singular points, phase – plane analysis of nonlinear control systems.

UNIT – V

Stability Analysis Stability in the sense of Lyapunov, Lyapunov's stability and Lyapunov's instability theorems – Stability Analysis of the Linear Continuous time invariant systems by Lyapunov second method – Generation of Lyapunov functions – Variable gradient method – Krasooviski's method.

Text Books

1. M. Gopal, "Modern Control System Theory", New Age International – 1984
2. Ogata. K, "Modern Control Engineering", Prentice Hall – 1997

Reference Books

1. Hassan K. Klalil, "Nonlinear systems", Prentice Hall, 1996
2. Richard C. Dorf and Robert H. Bishop, "Modern control systems", 11th Edition, Pearson Edu, India, 2009
3. https://www.smartzworld.com/notes/modern-control-theory-pdf-vtu/

Semester	**VI SEM**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	3	-	-	3	V20EET24
Name of the Course	**IoT Applications In Electrical Engineering** (Professional Elective –II)					
Branch	EEE					

Course Outcomes

After Successful completion of this course, students will be able to

CO No.	**Course Outcome**	**Knowledge Level**
CO1	Understand various fundamentals, architectures and technologies of Internet of Things.	(K2)
CO2	Discuss about various communication technologies used in the Internet of Things.	(K2)
CO3	Acquire knowledge on the various device connectivity methods using web and internet in the IoT environment.	(K2)
CO4	Explore various data acquisition methods, data handling using cloud for IoT applications.	(K3)
CO5	Apply IoT to design Smart Home, Smart cities, and agriculture practices.	(K3)

UNIT-I: The Internet of Things
An Overview of Internet of Things (IoT) – IoT framework –Architecture – Technology behind IoT – Sources of the IoT – M2M Communication – Examples of IoT.

UNIT-II: Design Principles for Connected Devices
Introduction –IoT/M2M systems, Layers and Designs Standardization – Communication Technologies – Data Enrichment, Consolidation and Device Management at Gateway – Ease of designing and affordability.

UNIT-III: Design Principles for the Web Connectivity
Introduction – Web Communication protocols for Connected Devices - Message Communication protocols for Connected Devices – Web Connectivity for connected devices network.
Introduction to Internet Connectivity Principles, Internet connectivity, Internet based communication – IPaddressing in the IoT – Application Layer Protocols: HTTP, HTTPS, FTP, Telnet, WAP (Wireless Application Protocol).

UNIT-IV:

Data Acquiring, Organizing, Processing and Analytics: Introduction – Data Acquiring and Storage –Organizing the Data – Analytics.

Data Collection, Storage and Computing Using a Cloud Platform: Introduction – Cloud computing paradigm for data collection, storage and computing – IoTas a service and Cloud Service Models – IoTcloudbased services using the Xively (Pachube/COSM), Nimbits and other platforms.

UNIT-V: Sensor Technology:

Actuator, Sensor data communication protocols, Radio Frequency Identification technology, Wireless Sensor Network Technology.

IoT application case studies: Smart Home, Smart Cities, Environment monitoring and Agriculture practices.

TEXT BOOKS:

1. Internet of Things: Architecture, Design Principles, Raj Kamal, McGraw Hill Education (India) Pvt. Limited, 2017.

REFERENCES BOOKS:

1. Designing the Internet of Things, Adrian McEwen and Hakim Cassimally, Wiley, First edition, 2013.
2. Getting Started with the Internet of Things, CunoPfister, O'reilly, 2011.
3. Internet of Things : A Hands-on Approach, Arshdeep Bahga, and Vijay Madisetti, 2014

Semester	VI SEM	L	T	P	C	COURSE CODE
Regulation	V20	-	-	3	1.5	V20EEL09
Name of the Course	Power Systems Lab					
Branch	EEE					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Calculate the sequence impedances of 3-φ Transformer.	K4
CO2	Determine the power Angle Characteristics of 3-φ Alternator with infinite bus bars.	K4
CO3	Calculate the dielectric strength of Transformer oil.	K4
CO4	Explain load flow studies using G-S & N-R method.	K5
CO5	Assess load frequency control with & without controller and Evaluate economic load dispatch with & without losses.	K5

Any 10 of the Following experiments are to be conducted:

1. Sequence impedances of 3 phase Transformer.
2. Sequence impedances of 3 phase Alternator by Fault Analysis.
3. Sequence impedances of 3 phase Alternator by Direct method.
4. ABCD parameters of Transmission line.
5. Power Angle Characteristics of 3phase Alternator with infinite bus bars.
6. Dielectric strength of Transformer oil.
7. Calibration of Tong Tester.
8. Load flow studies using Gauss-Seidel method
9. Load flow studies using N-R method
10. Transient Stability Analysis
11. Load frequency control without controller
12. Load frequency control with controller
13. Economic load dispatch without losses
14. Economic load dispatch with losses.

Semester	**VI SEM**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	-	-	3	1.5	V20EEL10
Name of the Course	**Power Electronics & Simulation Lab**					
Branch	EEE					

Course Outcomes

After Successful completion of this course, students will be able to

CO No.	**Course Outcome**	**Knowledge Level**
CO1	Sketch the characteristics of various power electronics devices and analyse the firing circuits.	(K4)
CO2	Analyze the performance of 1-φ and 3-phase full converter and 1-φ dual converter for resistive and inductive loads.	(K4)
CO3	Experiment the 1-φ AC voltage controller and cyclo-converter with resistive and inductive loads.	(K4)
CO4	Operate the DC-DC buck converter and boost converter.	(K3)
CO5	Analyze the performance of the 1-φ bridge and PWM inverter	(K4)

Any 10 of the Following Experiments are to be conducted

1. Study of Characteristics of Thyristor, MOSFET & IGBT.
2. Design and development of a firing circuit for Thyristor.
3. Single -Phase Half controlled converter with R and RL load
4. Single -Phase fully controlled bridge converter with R and RL loads
5. Single -Phase AC Voltage Regulator with R and RL Loads
6. Single -Phase square wave bridge inverter with R and RL Loads
7. Design and verification of voltages gain of Boost converter in Continuous Conduction Mode (CCM).
8. Simulation of transient response of RLC circuits a. Response to pulse input b. Response to step input C. Response to sinusoidal input.
9. Simulation of single-phase full converter using RLE loads, Experiment of single phase AC voltage controller using RL loads.
10. Simulation of Boost and Buck converters.
11. Integrator and Differentiator circuits using op-amp.

12. Simulation of single phase inverter with PWM control.
13. Simulation of three phase full converter using MOSEFET and IGBTs.

Reference Books:

1. Simulation of power electronic circuit by MB patil, V. ramanarayan, V.T. Ranganathan Narosha, 2009.
2. Pspice for circuits and electronics using PSPICE-by M.H. Rashid, M/s PHI Publications.
3. Pspice A/D user's manual-Microsim, USA.

Semester	VI SEM	L	T	P	C	Course Code
Regulation	V20	-	-	3	1.5	V20EEL11
Name of the Course	**Microprocessors and Microcontrollers Lab**					
Branch	EEE					

Course Outcomes:
After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Understand assembly language program using 8086 based on arithmetic, logical, and shift operations.	(K2)
CO2	Connect 8086 with I/O and other devices.	(K3)
CO3	Operate Stepper motor control using microcontroller.	(K3)
CO4	Understand the serial and parallel communication using 8051 microcontroller.	(K2)
CO5	Connect PIC18 with a DC motor.	(K3)

Any 10 of the following experiments are to be conducted:
Microprocessor 8086 & Microcontroller 8051
Introduction to MASM/TASM.

1. Arithmetic operation – Multi byte addition and subtraction, multiplication and division – Signed and unsigned arithmetic operation, ASCII – Arithmetic operation.
2. Logic operations – Shift and rotate – Converting packed BCD to unpacked BCD, BCD to ASCII conversion.
3. By using string operation and Instruction prefix: Move block, Reverse string Sorting,
4. Inserting, Deleting, Length of the string, String comparison.
5. Interfacing 8255–PPI
6. Interfacing 8259 – Interrupt Controller.
7. Interfacing 8279 – Keyboard Display.
8. Stepper motor control using 8253/8255.
9. Reading and Writing on a parallel port using 8051
10. Timer in different modes using 8051
11. Serial communication implementation using 8051
12. Understanding three memory areas of 00– FF Using 8051 external interrupts.
13. Interface PIC 18 with an opto-isolator
14. Interface PIC 18 with a DC motor

Semester	**VII SEM**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	3	-	-	3	V20EET25
Name of the Course	**Extra High Voltage AC Transmission** (Professional Elective –III)					
Branch	EEE					

Course Outcomes:
After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Calculate the parameters of EHV line modeling.	(K3)
CO2	Find electric field and interference characteristics of	(K3)
CO3	Understand the corona loss formulation and radio interference to 3-φ Induction machines.	(K2)
CO4	Understand the Lightning phenomenon and methods of Lightning Protection	(K2)
CO5	Understand the over-voltage phenomenon and methods to limit over-voltage EHVAC systems.	(K2)

UNIT-I: Introduction to EHV AC Transmission:
Calculations of line and ground parameters: Properties of bundled conductors, inductance and capacitance calculations line parameters for modes of propagation resistance and inductance of ground returns, equivalent circuit of line model.

UNIT-II: Voltage Gradients of Conductors:
Electrostatics, Field of Sphere, Field of Line Charges and their Charge-Potential Relations for Multi-Conductor, Surface Voltage Gradient on Conductors, Examples of Conductors and Maximum Gradients on Actual Lines, Gradient Factors and Their Use, Distribution of Voltage Gradient on Sub-conductors of Bundle.

UNIT-III: Corona and Radio interference:
Corona loss formula factors affecting corona. Audible noise, its characteristics, limits for audio noise, relation between 1-φ and 3-φ AN level, radio interference, limits for radio interference fields, CIGRE formula.

UNIT-IV: Lightning Protection
Lightning Strokes to Lines, Mechanism, General Principles of the Lightning Protection Problem, Tower Footing Resistance, Insulator Flashover and Withstand Voltages, Lightning Arresters, Insulation Coordination Based on Lightning

UNIT-V: Over Voltage in EHV Systems:
Switching surges, causes of switching surge over voltages, recovery voltage, restriking transients, over voltages caused by interruption of low inductance currents, line energization transients, Ferro-resonance over voltages, lightning over voltages, protection against switching surges, VFTO in GIS, insulation coordination, design example

TEXT BOOKS:
1. Rakesh Das Begamudre, "Extra High Voltage AC Transmission Engineering", Fourth Edition,New Age International publishers, 2014.
2. Allen J Wood & Bruce Wollenberg, "Power Generation Operation & Control, Third Edition,2016.

REFERENCEBOOKS:
1. Turan Gonen, "Electric Power Transmission System Engineering Analysis and Design", CRCPress, Third Edition, 2014
2. Md. Abdus Salam, Quazi M. Rahman "Power Systems Grounding" Springer publishers, 2016
3. A Chakraborti, D.P. Kothari and A.K. Mukhopadyay: Performance, Operation and Control ofEHV Power Transmission Systems, T.M.H. (Pub) 1992.

Semester	**VII SEM**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	3	-	-	3	V20EET26
Name of the Course	**Power System Operation and Control** (Professional Elective –III)					
Branch	EEE					

Course Outcomes:
After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Analyze the optimal scheduling of power generating thermal units.	K4
CO2	Compute optimal hydro and thermal scheduling and predict the optimal unit commitment problem.	K3
CO3	Calculate the transfer function of single area and two area load frequency control.	K4
CO4	Evaluate the steady state response of single area load control with PI controller.	K5
CO5	Assess the reactive power control and compensation of transmission lines.	K3

UNIT–I:
ECONOMIC OPERATION OF POWER SYSTEMS
Optimal operation of Generators in Thermal power stations, Heat rate curve, Cost Curve, Incremental fuel and Production costs, Input–output characteristics, Optimum generation allocation with line losses neglected, Optimum generation allocation including the effect of transmission line losses, Loss Coefficients, General transmission line loss formula.

UNIT–II:
HYDROTHERMAL SCHEDULING
Optimal scheduling of Hydrothermal System**:** Hydroelectric power plant models, Scheduling problems, Short term hydrothermal scheduling problem.
UNIT COMMITMENT
Optimal unit commitment problem, Need for unit commitment, Constraints in unit commitment, Cost function formulation, Solution methods, Priority ordering, Dynamic programming.

UNIT–III:
LOAD FREQUENCY CONTROL-I

Modeling of steam turbine, Generator, Mathematical modeling of speed governing system–Transfer function – Modeling of Hydro turbine –Necessity of keeping frequency constant–

Definitions of Control area – Single area control system – Block diagram representation of an isolated power system – Steady state analysis – Dynamic response – Uncontrolled case. Proportional plus Integral control of single area and its block diagram representation – Steady state response.

UNIT–IV:

LOAD FREQUENCY CONTROL-II

Block diagram development of Load Frequency Control of two area system uncontrolled case and controlled case. Tie-line bias control. Load Frequency Control and Economic dispatch control.

UNIT–V:

REACTIVE POWER CONTROL

Overview of Reactive Power control – Reactive Power compensation in transmission systems– Advantages and disadvantages of different types of compensating equipment for transmission systems – Load compensation – Specifications of load compensator – Uncompensated and compensated transmission lines**:** Shunt and series compensation – Need for FACTS controllers.

TEXT BOOKS:

1. Electric Energy systems Theory – by O.I.Elgerd, Tata McGraw–hill Publishing Company Ltd., Second edition, 2016
2. Power System stability & control, Prabha Kundur,TMH, 2011
3. Modern Power System Analysis – by I.J.Nagrath & D.P.Kothari Tata Mc Graw – Hill Publishing Company Ltd, 2nd editionEnergy management by Paul o' Callaghan, Mc–Graw Hill Bookcompany–1st edition, 1998.

REFERENCE BOOKS:

1. Power System Analysis and Design by J.Duncan Glover and M.S.Sarma, THOMPSON, 3rd Edition.
2. Power System Analysis by Grainger and Stevenson, Tata McGraw Hill 2003
3. Power System Analysis by Hadi Saadat – TMH Edition.

Semester	**VII SEM**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	3	-	-	3	V20EET27
Name of the Course	**Digital Control Systems** (Professional Elective –III)					
Branch	EEE					

Course Outcomes:
After successful completion of this course, the students will be able to

CO No.	**Course Outcome**	**Knowledge Level**
CO1	Solve difference equations and determine pulse transfer functions.	K3
CO2	Analyse a discrete time system using state space model.	K3
CO3	Determine the stability of a discrete time system.	K4
CO4	Design a controller for discrete time system using conventional methods.	K4
CO5	Design a controller for discrete time system using state feedback.	K4

UNIT– I: SIGNAL PROCESSING AND Z-TRANSFORMS
Introduction to analog and digital control systems – Advantages of digital systems – Typical examples – Signals and processing – Sample and hold devices – Sampling theorem and data reconstruction – Digital to Analog conversion and Analog to Digital conversion Frequency domain characteristics of zero order hold.
Z-Transform and theorems, finding inverse and method for solving difference equations; Pulse transforms function, block diagram analysis of sampled – data systems.

UNIT–II: STATE SPACE ANALYSIS
State Space Representation of discrete time systems, Pulse Transfer Function Matrix solving discrete time state space equations, State transition matrix and it's Properties, Methods for Computation of State Transition Matrix, Discretization of continuous time state – space equations- Concepts of controllability and observability-Tests (without-proof).

UNIT–III: STABILITY ANALYSIS
Mapping between the S-Plane and the Z-Plane – Primary strips and Complementary Strips – Constant frequency loci, Constant damping ratio loci, Stability Analysis of closed loop systems in the Z-Plane. Jury stability test – Stability Analysis by use of the Bilinear Transformation and Routh Stability criterion.

UNIT – IV: DESIGN OF DISCRETE TIME CONTROL SYSTEM BY CONVENTIONAL METHODS

Transient and steady – State response Analysis – Design based on the frequency response method –Bilinear Transformation and Design using frequency response in the w–plane for lag and led compensators and digital PID controllers.

UNIT–V: STATE FEEDBACK CONTROLLERS AND OBSERVERS

Design of state feedback controller through pole placement – Necessary and sufficient conditions, Ackerman'sformula.

TEXT BOOKS:

1. K. Ogata, "Discrete–Time Control systems", Pearson Education/PHI, 2nd Edition.
2. M.Gopal, "Digital Control and State Variable Methods", TMH, 4th Edition.

REFERENCE BOOKS:

1. Kuo, "Digital Control Systems", Oxford University Press, 2nd Edition, 2003.

Semester	**VII SEM**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	3	-	-	3	V20EET28
Name of the Course	**Electrical Machine Modeling & Analysis** (Professional Elective –III)					
Branch	**EEE**					

Course Outcomes:
After successful completion of this course, the students will be able to

CO No.	**Course Outcome**	**Knowledge Level**
CO1	Analyze Kron's primitive Machine.	(K4)
CO2	Develop modeling of dc machine.	(K3)
CO3	Explain Linear transformation and mathematical modeling concepts to 3-phase Induction machines.	(K5)
CO4	Develop control strategies based on dynamic modeling of 3-ph Induction machines and 3-phase synchronous	(K3)
CO5	Analyze BLDC Machine and switched reluctance machine based on mathematical modeling of BLDCM and SRM.	(K4)

UNIT – I:
BASIC CONCEPTS OF MODELING
Basic Two-pole Machine representation of Commutator machines, 3-phase synchronous machine with and without damper bars and 3-phase induction machine, Kron's primitive Machine-voltage, current and Torque equations.

UNIT – II:
DC MACHINE MODELING
Mathematical model of separately excited D.C motor – Steady State analysis-Transient State analysis-Sudden application of Inertia Load-Transfer function of Separately excited D.C Motor- Mathematical model of D.C Series motor, Shunt motor.

UNIT- III:
REFERENCE FRAME THEORY & MODELING OF THREE PHASE INDUCTION MACHINE
Linear transformation, Power equivalence, generalized model in arbitrary reference frame - Electromagnetic torque-Derivation of commonly used Induction machine models- Stator reference frame model-Rotor reference frame model-Synchronously rotating reference frame model-state space model with flux linkages as variables.

UNIT –IV:

MODELING OF SYNCHRONOUS MACHINE

Synchronous machine inductances–voltage equations in the rotor's dq0 reference frame electromagnetic torque-current in terms of flux linkages-three synchronous machine model.

UNIT –V:

MODELING OF SPECIAL MACHINES

Modeling of PM Synchronous motor, modeling of BLDC motor, modeling of Switched Reluctance motor.

TEXT BOOKS:

1. Generalized theory of Electrical Machinery–P.S. Bimbra-Khanna Publishers.
2. Electric Motor Drives-Modeling, Analysis &control-R. Krishnan-Pearson Publications-1st edition- 2002.

REFERENCEBOOKS:

1. Analysis of Electrical Machinery and Drive systems– P.C. Krause, Oleg Wasynczuk, Scott D. Sudh off – Second Edition-IEEE Press.
2. Dynamic simulation of Electric machinery using Matlab / Simulink–Chee Mun Ong -PHl.
3. Modern Power Electronics and AC Drives-B.K.Bose –PHI- 2005

Semester	**VII SEM**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	3	-	-	3	V20EET29
Name of the Course	**High Voltage Engineering** (Professional Elective –IV)					
Branch	EEE					

Course Outcomes:
After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Understand the performance of high voltages with regard to different configurations of electrode systems.	K2
CO2	Understand the theory of breakdown and withstand phenomena of all types of dielectric materials.	K2
CO3	Explain various methods available for generation and measurement of high DC, AC and Impulse voltages and currents.	K2
CO4	Choose suitable method for measuring the dielectric property of a material used for HV equipment.	K3
CO5	Illustrate the testing techniques for various equipments used in HV engineering.	K2

UNIT–I
INTRODUCTION TO HIGH VOLTAGE TECHNOLOGY
Electric Field Stresses – Uniform and non–uniform field configuration of electrodes – Estimation and control of electric Stress – Numerical methods for electric field computation.

UNIT–II
BREAK DOWN PHENOMENON IN GASEOUS, LIQUID AND SOLID INSULATION
Gases as insulating media – Collision process – Ionization process – Townsend's criteria of breakdown in gases – Paschen's law – Liquid as Insulator – Pure and commercial liquids – Breakdown in pure and commercial liquid – Intrinsic breakdown – Electromechanical breakdown – Thermal breakdown –Breakdown of solid dielectrics, composite dielectrics used in practice.

UNIT–III

GENERATION OF HIGH VOLTAGES AND HIGH CURRENTS

Generation of high DC voltages – Generation of high alternating voltages – Generation of impulse voltages and currents – Tripping and control of impulse generators.

MEASUREMENT OF HIGH VOLTAGES AND HIGH CURRENTS

Measurement of high AC, DC and Impulse voltages – Voltages and measurement of high currents – Direct, alternating and Impulse.

UNIT–IV

NON–DESTRUCTIVE TESTING OF MATERIAL AND ELECTRICAL APPARATUS

Measurement of DC resistivity – Measurement of dielectric constant and loss factor – Partial discharge measurements.

UNIT–V

HIGH VOLTAGE TESTING OF ELECTRICAL APPARATUS

Testing of insulators and bushings – Testing of isolators and circuit breakers – Testing of cables – Testing of transformers – Testing of surge arresters – Radio interference measurements.

Text Books:

1. High Voltage Engineering: Fundamentals by E.Kuffel, W.S.Zaengl, J.Kuffel by Elsevier, 2nd Edition, 2000
2. High Voltage Engineering and Technology by Ryan, IET Publishers, 2001.

Reference Books:

1. High Voltage Engineering by M.S.Naidu and V. Kamaraju – TMH Publications, 3rd Edition, 2013
2. High Voltage Engineering by C.L.Wadhwa, New Age Internationals (P) Limited, 1997.
3. High Voltage Insulation Engineering by RavindraArora, Wolfgang Mosch, New Age International (P)Limited,1995

Semester	**VII SEM**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	3	-	-	3	V20EET30
Name of the Course	**Electrical Distribution Systems** (Professional Elective – IV)					
Branch	EEE					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	**Course Outcome**	**Knowledge Level**
CO1	Understand various factors of distribution system	K2
CO2	Construct the distribution substation and feeders	K3
CO3	Calculate the voltage drop and power loss calculations on Distribution System	K3
CO4	Understand the distribution system protection and its coordination.	K2
CO5	Understand the effect of compensation for power factor improvement, voltage control on distribution system.	K2

UNIT I:
GENERAL CONCEPTS
Introduction to distribution systems, Load modeling and characteristics, Coincidence factor, Contribution factor loss factor, Relationship between the load factor and loss factor, Classification of loads (Residential, commercial, Agricultural and Industrial).

UNIT II:
SUBSTATIONS
Location of substations**:** Rating of distribution substation, Service area with ‘n’ primary feeders, Benefits and methods of optimal location of substations.
DISTRIBUTION FEEDERS
Design Considerations of distribution feeders**:** Radial and loop types of primary feeders, Voltage levels, Feeder loading, Basic design practice of the secondary distribution system.

UNIT III:
SYSTEM ANALYSIS
Voltage drops and power–loss calculations**:** Derivation for voltage drop and power loss in lines, uniformly distributed loads and non-uniformly distributed loads, Numerical problems, three phase balanced primary lines.

UNIT IV:
PROTECTION
Objectives of distribution system protection, Types of common faults and procedure for fault calculations for distribution system, Protective devices**:** Principle of operation of fuses, Circuit reclosures, Line sectionalizes and circuit breakers.

CO-ORDINATION
Co-ordination of protective devices**:** General coordination procedure, Various types of coordinated operation of protective devices, Residual Current Circuit Breaker.

UNIT V:
COMPENSATION FOR POWER FACTOR IMPROVEMENT
Capacitive compensation for power factor control, Different types of power capacitors, shunt and series capacitors, Effect of shunt capacitors (Fixed and switched), Power factor correction, Capacitor allocation, Economic justification, Procedure to determine the best capacitor location, Numerical problems.
VOLTAGE CONTROL
Equipment for voltage control, Effect of series capacitors, Effect of AVB/AVR, Line drop compensation

TEXT BOOK:
1. "Electric Power Distribution system, Engineering" – by Turan Gonen, McGraw–hill Book Company, 2007.

REFERENCE BOOKS:
1. Electrical Distribution Systems by Dale R.Patrick and Stephen W.Fardo, CRC press, 2021
2. Electric Power Distribution – by A.S. Pabla, Tata McGraw–hill Publishing company, 4th edition, 1997.
3. Electrical Power Distribution Systems by V.Kamaraju, Right Publishers, 2017

Semester	**VII SEM**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	3	-	-	3	V20EET31
Name of the Course	**Power System Reforms** (Professional Elective –IV)					
Branch	EEE					

Course Outcomes:
After successful completion of course the student will able to

CO No.	Course Outcome	Knowledge Level
CO1	Understand fundamentals of power system deregulation and restructuring.	K2
CO2	Compute Available Transfer Capability (ATC).	K3
CO3	Apply methods to reduce congestion.	K3
CO4	Compute electricity pricing in deregulated environment.	K3
CO5	Understand importance of ancillary services.	K2

UNIT-I: Basic Issues in Electric Utilities
Introduction – Restructuring models – Independent system operator (ISO) – Power Exchange – Market operations – Market Power – Stranded cost – Transmission Pricing – Congestion Pricing.

UNIT-II: Overview of OASIS
Structure of OASIS – Posting of Information – Transfer capability on OASIS – Definitions of Transfer capability – Transfer Capability Issues – ATC calculations – TTC calculations – TRM calculations – CBM calculations – Methods to calculate ATC.

UNIT-III: Congestion Management
Introduction to congestion management –Effects of congestion – Methods to relieve congestion – Non market methods –Market Based methods –Management of Inter zonal/Intra zonal Congestion

UNIT-IV: Pricing of Electricity
Introduction – Electricity price volatility – Factors effecting volatility – Measuring Volatility – electricity price indexes– Construction of forward price curves – Short–time price forecasting – Factors impacting electricity prices – Forecasting Methods – Analysing forecasting errors – Impact of data pre-processing – Impact of training vectors.

UNIT-V: Ancillary Services:
Introduction – Types of ancillary services – Reactive power as an ancillary service – Synchronous generators as ancillary service providers.

Text Books

1. Mohammad Shahidehpour, and Muwaffaqalomoush, – "Restructured electrical Power systems" Marcel Dekker, Inc. 2001
2. Kankar Bhattacharya, Math H.J. Boller, JaapE.Daalder, 'Operation of Restructured Power System' Kluver Academic Publisher – 2001

Reference Books

1. Loi Lei Lai; "Power system Restructuring and Deregulation", Jhon Wiley & Sons Ltd., England, 2001.
2. Electrical Power Distribution Case studies from Distribution reform, upgrades and Management (DRUM) Program, by USAID/India, TMH, 2012.

Semester	**VII SEM**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	3	-	-	3	V20EET32
Name of the Course	**Advanced Power Electronics** (Professional Elective –IV)					
Branch	EEE					

Course Outcomes

After Successful completion of this course, students will be able to

CO No.	**Course Outcome**	**Knowledge Level**
CO1	Analyze and design power converter configurations for specific applications	(K3)
CO2	Design power electronic converters to improve power quality	(K3)
CO3	Analyze and design resonant converters	(K3)
CO4	Develop power converter models under steady state and small signal conditions	(K3)
CO5	Understand the designing of magnetic components for power converters	(K2moder)

UNIT-I: DC-DC CONVERTERS

Non-isolated DC-DC converters: buck, boost, buck-boost, CUK converters under continuous and discontinuous conduction operation - Isolated DC-DC converters: forward, fly-back, push-pull, half-bridge and full-bridge converters - Relationship between I/P and O/P voltages – design of filter inductor and capacitors.

UNIT-II: FRONT-END (AC-DC) CONVERTERS

Conventional methods of power factor improvements: Semi converter, extinction angle control, symmetrical angle control – active front-end converters-Single phase: Boost, voltage doubler and PWM rectifiers –voltage and current controlled three-phase PWM rectifiers

UNIT-III: RESONANT CONVERTERS

Introduction, Basic resonant circuit concepts, Classification - Load resonant converters, resonant switch converters, Zero voltage switching clamped voltage converters, Resonant DC link inverters High frequency link integral half cycle converters, Phase modulated resonant converters, Dual active bridge converters, High gain converters.

UNIT-IV: MODELLING OF DC-DC CONVERTERS

Basic ac modeling approach, State space averaging, Circuit averaging and averaged switch modeling, Canonical circuit modeling, Converter transfer functions for buck, boost and buck-boost topologies.

UNIT-V: DESIGN OF POWER CONVERTERS COMPONENTS

Design of magnetic components - design of transformer, design of inductor and current transformer - Selection of filter capacitors, Selection of ratings for devices, input filter design, Thermal design.

TEXT BOOKS:

1. Power Electronics-Circuits, Devices & Applications by M.H. Rashid, Pearson, 4thedition, 2013.
2. Power Electronics: Converters, Applications & Design by N. Mohan, T.M. Undeland, W.P. Robbins, J.Wiley& Sons, 3rd Edition, 2003.
3. Power Electronics by Daniel W. Hart, McGraw-Hill, 2011.

REFERENCES BOOKS:

1. Switching Power Supply Design by Abraham I. Pressman, Keith Billings & Taylor Morey, McGraw Hill International, 3rd Edition, 2009.
2. Fundamentals of Power Electronics by R.W. Erickson and Dragan Maksimonic, Springer, 2nd Edition, 2001.
3. Power Electronics: Essentials and Applications by Umanand. L, John Wiley India, 1st Edition, 2009.

Semester	**VII SEM**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	3	-	-	3	V20EET33
Name of the Course	**Special Electrical Machines** (Professional Elective –V)					
Branch	EEE					

Course Outcomes:

After Successful completion of this course, students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Describe the operation and characteristics of permanent magnet dc motor	**(K2)**
CO2	Understand the operation and control of stepper motors	**(K2)**
CO3	Understand the operation and control of switched reluctance motor	**(K2)**
CO4	Describe the operation and characteristics of brush less dc Motor	**(K2)**
CO5	Understand the construction and operation of linear induction motors	**(K2)**

UNIT I: PERMANENT MAGNET MATERIALS AND PMDC MOTORS

Introduction-classification of permanent magnet materials used in electrical machines-minor hysteresis loop and recoil line-Stator frames of conventional dc machines-Development of electronically commutated dc motor from conventional dc motor-Permanent-magnet materials and characteristics-B-H loop and demagnetization characteristics-Temperature effects: reversible and irreversible losses-high temperature effects-reversible losses Irreversible losses recoverable by magnetization-Mechanical properties, handling and magnetization-Application of permanent magnets in motors-power density-operating temperature range-severity of operation duty.

UNIT II: STEPPER MOTORS

Classification of stepper motors – Hybrid and Variable Reluctance Motor (VRM) - Construction and principle of hybrid type synchronous stepper motor – Different configuration for switching the phase windings control circuits for stepper motors – Open loop and closed loop control of 2-phase hybrid stepping motor. Construction and principle of operation of Variable Reluctance Motor (VRM) – Single stack and multiple stack – Open loop control of 3- phase VR Stepper Motor- Applications.

UNIT III: SWITCHED RELUCTANCE MOTORS

Construction – Comparison of conventional and switched reluctance motors – Design of stator and rotor pole arcs – Torque producing principle and torque expression – Different converter configurations for SRM – Drive and power circuits for SRM – Position sensing of rotor – Applications of SRM.

UNIT IV: PERMANENT MAGNET BRUSHLESS DC MOTOR

Types of constructions – Surface mounted and interior type permanent magnet – Principle of operation of BLDC motor. Torque and EMF equations – Torque speed characteristics – Performance and efficiency- Phasor Diagram – Comparison between square wave and sine wave permanent magnet motors - Applications.

UNIT V: LINEAR INDUCTION MOTORS (LIM)

Construction– principle of operation–Double sided LIM from rotating type Induction Motor – Schematic of LIM drive for traction – Development of one sided LIM with back iron equivalent circuit of LIM.

TEXT BOOKS:

1. Brushless Permanent Magnet and Reluctance Motor Drives, T.J.E. Miller, 1989, Oxford University press.
2. Special Electrical Machines, K. Venkataratnam, University press, 2009, New Delhi.

Semester	**VII SEM**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	3	-	-	3	V20EET34
Name of the Course	**AI Techniques for Power Systems** (Professional Elective –V)					
Branch	EEE					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	**Course Outcome**	**Knowledge Level**
CO1	Understand fundamentals concepts of artificial neural networks.	K2
CO2	Understand concepts of different algorithms ANN paradigms.	K2
CO3	Understand fundamentals of fuzzy set properties and membership functions, concept of evolutionary techniques	K2
CO4	Understand fundamentals of optimization techniques.	K2
CO5	Apply optimization techniques to power system applications.	K4

UNIT-I: ARTIFICIAL INTELLIGENCE
Artificial Neural Networks (ANN) – definition and fundamental concepts – Biological neural networks – Artificial neuron – typical architectures – biases and thresholds – learning/training laws and algorithms.

UNIT-II: ANN PARADIGMS
ADALINE – feed forward networks – Back Propagation algorithm-Radial Basis Function (RBF) network- Hopfield Neural Network.

UNIT- III: CLASSICAL AND FUZZY SETS
Introduction to classical sets- properties, Operations and relations; Fuzzy sets, Membership, Operations, Properties, Fuzzy relations, Membership functions.

EVOLUTIONARY TECHNIQUES
Introduction-concepts of genetic algorithms: Initialization-Selection-Genetic operators, Mutation- Evolutionary programming-Evolutionary techniques.

UNIT- IV: FUNDMENTALS OF OPTIMIZATION
Classification of optimization problems-Unconstrained and Constrained optimization-Particle swarm optimization.

UNIT- V: APPLICATIONS OF AI
PSO based Economic load dispatch without losses, Load flow, and Load frequency control: Single area system using ANN.

TEXT BOOKS:

1. Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications by Rajasekharan and pai – PHI Publication, 2011.
2. Fuzzy logic with Fuzzy Applications – T.J Ross – Mc Graw Hill Inc, 1997.
3. NP Padhy, Artificial Intelligence and Intelligent Systems, Oxford University Press, 1st Edition, 2005.

REFERENCE BOOKS:

1. Goldberg D.E. “Genetic Algorithms in Search Optimization & Machine Learning”, 13th Edition Addition Wesley Co., New York 1996.
2. D.P.Kothari and J.S.Dhillon, “Power System Optimization”, 2ndEdition, PHI learning private limited, 2010
3. **https://nptel.ac.in/content/storage2/courses/109101003/downloads/Lecture-notes/Lecture-19-20-21.pdf**

Semester	**VII SEM**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	3	-	-	3	V20EET35
Name of the Course	**Energy Storage and Battery Management** (Professional Elective – V)					
Branch	EEE					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	**Course Outcome**	**Knowledge Level**
CO1	Use suitable energy storage system in real time applications.	K3
CO2	Understand the role of electrical energy storage technologies in various aspects.	K2
CO3	Interpret the role of battery management system.	K3
CO4	Illustrate the requirements of Battery Management System.	K3
CO5	Understand the concepts of battery state of charge and state of health estimations.	K2

UNIT-I: INTRODUCTION TO ENERGY STORAGE

Necessity of energy storage system; classification of electrical energy storage (EES) systems; **mechanical:** pumped hydro storage (PHS), compressed air energy storage (CAES), flywheel energy storage (FES); **chemical:** hydrogen (H_2), synthetic natural gas (SNG); **electrical:** capacitor, super capacitor; **electrochemical:** secondary batteries, flow batteries; **electromagnetic:** superconducting magnetic energy storage (SMES); **thermal:** sensible heat, latent heat, cryogenic liquid air energy storage system, Carnot battery.

UNIT-II: NEEDSFOR ELECTRICAL ENERGY STORAGE

Emerging needs for EES, More renewable energy, less fossil fuel, Smart Grid uses, the roles of electrical energy storage technologies, the roles from the viewpoint of a utility, the roles from the viewpoint of consumers, the roles from the viewpoint of generators of renewable energy.

UNIT- III: INTRODUCTION TO BATTERY MANAGEMENT SYSTEM

Introduction to Battery Management System, Cells & Batteries, Nominal voltage and capacity, C rate, Energy and power, Cells connected in series, Cells connected in parallel, Electrochemical and lithium-ion cells, Rechargeable cell, Charging and Discharging Process, Overcharge and Undercharge, Modes of Charging.

UNIT- IV: BATTERY MANAGEMENT SYSTEM REQUIREMENT

Introduction and BMS functionality, Battery pack topology, BMS Functionality, Voltage Sensing, Temperature Sensing, Current Sensing, BMS Functionality, High-voltage contactor control, Isolation sensing, Thermal control, Protection, Communication Interface, Range estimation, State-of charge estimation, Cell total energy and cell total power.

UNIT- V: BATTERY STATE OF CHARGE AND STATE OF HEALTH ESTIMATION, CELL BALANCING

Battery state of charge estimation (SOC), voltage-based methods to estimate SOC, Model-based state estimation, Battery Health Estimation, Lithium-ion aging: Negative electrode, Lithium ion aging: Positive electrode, Cell Balancing, Causes of imbalance, Circuits for balancing

TEXT BOOKS:

1. "James M. Eyer, Joseph J. Iannucci and Garth P. Corey ", "Energy Storage Benefits and Market Analysis", Sandia National Laboratories, 1st edition, 2004.
2. The Electrical Energy Storage by IEC Market Strategy Board.

REFERENCE BOOK:

1. "Jim Eyer, Garth Corey", Energy Storage for the Electricity Grid: Benefits and Market Potential Assessment Guide, Report, Sandia National Laboratories, Feb 2010.
2. Plett, Gregory L. Battery management systems, Volume I: Battery modeling. Artech House, 1st edition, 2015.
3. Plett, Gregory L. Battery management systems, Volume II: Equivalent-circuit methods. Artech House, 1st edition, 2015.
4. Bergveld, H.J., Kruijt, W.S., Notten, P.H.L "Battery Management Systems -Design by Modelling" Philips Research Book Series 2002.
5. https://nptel.ac.in/content/storage2/courses/108103009/download/M9.pdf.

Semester	**VII SEM**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	3	-	-	3	V20EET36
Name of the Course	**Hybrid Electric Vehicles** (Professional Elective – V)					
Branch	EEE					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Differentiate between Electric vehicles and Hybrid Electric Vehicles	K2
CO2	Discriminate between various Drive-Train Topologies	K2
CO3	Identify different motors used for hybrid electric vehicles.	K2
CO4	Explain the Sizing of Drive Train	K2
CO5	Illustrate different batteries and other energy storage systems.	K3

UNIT– I: Introduction

Fundamentals of vehicles, components of conventional vehicle and propulsion load; Drive cycles and drive terrain; Concept of electric vehicle and hybrid electric vehicle; History of hybrid vehicles, advantages and applications of Electric and Hybrid Electric Vehicles, principle of magnetic levitation, different Motors suitable for of Electric and Hybrid Electric Vehicles.

UNIT–II: Hybridization of Automobile

Architectures of HEVs, series and parallel HEVs, complex HEVs. Plug-in hybrid vehicle, constituents of PHEV, comparison of HEV and PHEV; Fuel Cell vehicles and its constituents.

UNIT–III: Plug-in Hybrid Electric Vehicle

PHEVs and EREVs blended PHEVs, PHEV Architectures, equivalent electric range of blended PHEVs; Fuel economy of PHEVs, power management of PHEVs, end-of-life battery for electric power grid support, vehicle to grid technology, PHEV battery charging.

UNIT–IV: Power Converters in HEVs

Rectifiers used in HEVs, voltage ripples; Buck converter used in HEVs, non-isolated bidirectional DC-DC converter, voltage source inverter, current source inverter, isolated bidirectional DC-DC converter, PWM rectifier in HEVs, EV and PHEV battery chargers.

UNIT– V: Battery and Storage Systems

Energy Storage Parameters; Lead–Acid Batteries; Lithium-ion batteries-Ultra capacitors; Flywheels - Superconducting Magnetic Storage System; Pumped Hydroelectric Energy Storage; Compressed Air Energy Storage - Storage Heat; Energy Storage as an Economic Resource.

TEXT BOOKS:

1. Ali Emadi, Advanced Electric Drive Vehicles, CRC Press, 1st edition, 2014.
2. Iqbal Hussein, Electric and Hybrid Vehicles: Design Fundamentals, CRC Press, 1st edition, 2003.

REFERENCE BOOKS:

1. Mehrdad Ehsani, Yimin Gao, Ali Emadi, "Modern Electric, Hybrid Electric, and Fuel Cell Vehicles: fundamentals, theory, and design, 2nd edition, 2009.
2. Sandeep Dhameja, "Electric Vehicle Battery Systems", Newnes, 1st edition, 2001.
3. http://nptel.ac.in/courses/108103009/

Semester	VII	L	T	P	C	Course Code
Regulation	V20	0	0	6	3	V20EEL12
Name of the Course	Advanced Electrical Simulation Lab					
Branch	EEE					

Course Outcomes:
After successful completion of the course, the student will be able to:

CO No.	Course Outcome	Knowledge Level
CO1	Construct the Electrical circuits using MultiSim & LT Spice.	K2
CO2	Analyze the LTI systems & State space model using MATLAB.	K4
CO3	Construct the Inverters, Series RLC circuits, Op-amp circuits using Or CAD.	K2
CO4	Design the power electronic converters using PLECS.	K4
CO5	Operate Electrical Drives using different controllers.	K3

Any 20 of the following experiments are to be conducted:
MultiSim & LT Spice:

1. Verification of KVL and KCL.
2. Verification of Thevenin‘s and Norton‘s Theorems.
3. Verification of Superposition and Reciprocity Theorem.
4. Verification of Compensation and Millmann‘s Theorems.
5. Verification of Maximum Power Transfer Theorem.

MATLAB:

6. Stability analysis (Bode) of Linear Time Invariant system.
7. Stability analysis (Root Locus) of Linear Time Invariant System.
8. Stability analysis (Nyquist) of Linear Time Invariant system.
9. State space model for classical transfer function.
10. Simulation of DC separately excited motor using transfer function.
11. Speed control of BLDC based electric drive using MATLAB/Simulink.

ORCAD:

12. Transient Analysis of Series RLC circuits.
13. Simulate an Op-amp based Integrator and Differentiator circuits.
14. Modelling of transformer and Lossy Transmission Line.

15. Analysis of Single Phase inverter with PWM control.
16. Analysis of Three Phase inverter with PWM control.

PLECS:

17. Analysis of RC circuits.
18. Design the small signal transfer functions for a buck converter.
19. Simulation of diode-clamped inverter.
20. Calculation of losses for a unipolar PWM inverter.
21. Design of PID controller for converter.

Hardware Implementation:

22. Operation of Buck converter using Aurdino.
23. Operation of Single-Phase H-Bridge Inverter using FPGA and Xilinx.

Annexure III

List courses offered under Open Elective -I to IV under V20 Regulation for all other branches:

Open Electives(Offered to the other Departments)						
S.No.	**Course Code**	**Name of the Course**	**L**	**T**	**P**	**Credits**
1.	V20EEOE01	Non-Conventional Energy Sources	3	-	-	3
2.	V20EEOE02	Basics of Control systems	3	-	-	3
3.	V20EEOE03	Principles of Electric Power Conversion	3	-	-	3
4.	V20EEOE04	Programmable Logic Controller and Applications	3	-	-	3
5.	V20EEOE05	Energy Storage Systems	3	-	-	3
6.	V20EEOE06	Soft Computing Techniques	3	-	-	3
7.	V20EEOE07	Electric Vehicles	3	-	-	3
8.	V20EEOE08	Indian Electricity Act, 2003.	3	-	-	3
9.	V20EEOE09	Power Systems for Data Centers	3	-	-	3
10.	V20EEOE10	Concepts of Power System Engineering	3	-	-	3
11.	V20EEOE11	Fundamentals of Smart Grid Technologies	3	-	-	3
12.	V20EEOE12	Distribution Automation	3	-	-	3

Semester	V to VII SEMESTERS	L	T	P	C	Course Code
Regulation	V20	3	-	-	3	V20EEOE01
Name of the Course	**Non-Conventional Energy Sources** (Open Elective)					
Branch	EXCEPT EEE					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Understand the concepts of solar radiation data, extraterrestrial radiation, and radiation on earth's surface.	**K2**
CO2	Understand the operation of various solar thermal Systems.	**K2**
CO3	Choose suitable maximum power point tracking technique in solar PV and wind applications.	**K3**
CO4	Explain basic principle and working of hydro and tidal power systems.	**K2**
CO5	Explain the basic principle of biomass, fuel cell and geothermal systems.	**K2**

UNIT–I:
Fundamentals of Energy Systems
Energy conservation principle, Energy scenario (world and India), Solar radiation**:** Outside earth's atmosphere, Earth surface – Analysis of solar radiation data – Geometry – Radiation on tilted surface, Numerical problems.
UNIT–II:
Solar Thermal Systems
Liquid flat plate collections**:** Performance analysis, Transmissivity, Absorptivity, Product collector efficiency factor, Collector heat removal factor, Numerical problems, Introduction to solar air heaters, Concentrating collectors and solar pond.
UNIT–III:
Solar Photovoltaic Systems
Balance of systems, I-V & P-V characteristics, System design**,** Storage sizing, PV system sizing, Maximum power point techniques**,** Perturb and observe (P&O) technique, Incremental Conductance (INC), Hill climbing technique.
Wind Energy
Wind patterns, Types of turbines, Kinetic energy of wind, Betz coefficient, Tip–speed ratio, efficiency, Power output of wind turbine, Selection of generator (synchronous, induction), Maximum power point tracking.

UNIT–IV:

Hydro and Tidal power systems

Basic working principle, Classification of hydro systems: large, small, micro, Measurement of head and flow, Energy equation, Types of turbines, Numerical problems.

Tidal power-Basics, Kinetic energy equation, Numerical problems, Wave power-basics, Kinetic energy equation.

UNIT–V:

Biomass, fuel cells and geothermal systems

Biomass Energy: Fuel classification – Pyrolysis – Direct combustion of heat– Different digesters and sizing, Fuel cell: classification – Efficiency – V-I characteristics–Geothermal: classification – Dry rock and acquifer –Energy analysis.

TEXT BOOKS:

1. Solar Energy: Principles of Thermal Collection and Storage, S. P. Sukhatme and J. K. Nayak, TMH, New Delhi, 3rd Edition, 2013.
2. Renewable Energy Resources, John Twidell and Tony Weir, Taylor and Francis - second edition, 2013.

REFERENCE BOOKS:

1. Energy Science: Principles, Technologies and Impacts, John Andrews and Nick Jelly, Oxford University Press, 2nd edition, 2013.
2. Renewable Energy- Edited by Godfrey Boyle-oxford university.press,3rd edition, 2013.
3. Handbook of renewable technology Ahmed and Zobaa, Ramesh C Bansal, World scientific, Singapore, 2011.
4. Renewable Energy Technologies /Ramesh & Kumar /Narosa.
5. Renewable energy technologies – A practical guide for beginners – Chetong Singh Solanki, PHI, 2008.
6. Non-conventional energy source –B.H.khan- TMH-2nd edition, 2017.

Semester	V TO VII SEMESTERS	L	T	P	C	Course Code
Regulation	V20	3	-	-	3	V20EEOE02
Name of the Course	**Basics of Control systems** (Open Elective)					
Branch	EXCEPT EEE					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Construct the transfer function of various mechanical and electrical systems using block diagram algebra and signal flow graphs.	**K2**
CO2	Find the time response specifications of second order systems and absolute, relative stability of LTI systems using routh's stability criterion and the root locus method.	**K3**
CO3	Assess the stability of LTI systems using frequency response methods.	**K3**
CO4	Construct the lag, lead, lag-lead compensators from bode diagrams to improve the system performance.	**K2**
CO5	Understand the concepts in state space representation of LTI systems, controllability and observability.	**K2**

UNIT – I: Mathematical modeling of control systems
Classification of control systems, open loop and closed loop control systems and their differences, Feedback characteristics, transfer function of linear system, differential equations of electrical networks, translational and rotational mechanical systems, transfer function of DC servo motor – AC servo motor – synchro, transmitter and receiver – block diagram algebra – representation by signal flow graph – reduction using Mason's gain formula.

UNIT-II: Time response analysis
Standard test signals – time response of first and second order systems – time domain specifications, steady state errors and error constants, effects of proportional (P), proportional-integral (PI),proportional-integral derivative(PID) systems.

Stability and root locus technique
The concept of stability – Routh's stability criterion – limitations of Routh's stability, root locus concept –construction of root loci (simple problems), Effect of addition of Poles and zeros to the transfer function.

UNIT–III: Frequency response analysis
Introduction to frequency domain specifications – Bode diagrams – transfer function from the Bode diagram –phase margin and gain margin – stability analysis from Bode plots, Polar plots, Nyquist stability criterion.
UNIT–IV: Classical control design techniques
Lag, lead, lag-lead compensators, design of compensators using Bode plots.
UNIT–V: State space analysis of LTI systems
Concepts of state, state variables and state model, state space representation of transfer function, diagonalization, solving the time invariant state equations, State Transition Matrix and it's Properties, concepts of controllability and observability.

Text Books:

1. Control Systems principles and design, M. Gopal, Tata McGraw Hill education Pvt Ltd., 4th Edition, 2014.
2. Automatic control systems, Benjamin C. Kuo, Prentice Hall of India,2ndEdition, 2014.

Reference Books:

1. Modern Control Engineering, Kotsuhiko Ogata, Prentice Hall of India, 2002.
2. Control Systems, ManikDhanesh N, Cengage Publications, 2012.
3. Control Systems Engineering, I.J.Nagarath and M.Gopal, Newage International Publications, 5th Edition, 2007.
4. Control Systems Engineering, S.Palani, Tata McGraw Hill Publications, 2009.
5. https://nptel.ac.in/courses/107/106/107106081/

Semester	V to VII SEMESTERS	L	T	P	C	Course Code
Regulation	V20	3	-	-	3	V20EEOE03
Name of the Course	**Principles of Electric Power Conversion** (Open Elective)					
Branch	EXCEPT EEE					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Understand the basic operation of various power electronic devices and converters.	K2
CO2	Apply the suitable power electronic converter for different electrical machines.	K3
CO3	Understand the operation of various renewable energy sources.	K2
CO4	Understand the operation of different energy storage systems and their applications.	K2
CO5	Choose the suitable heating and welding method for different domestic and industrial applications.	K3

UNIT-I: POWER ELECTRONIC DEVICES AND CONVERTERS
V-I Characteristics of SCR, MOSFET and IGBT. Phase controlled rectifiers, DC-DC converters and Inverters.

UNIT-II: APPLICATION OF CONVERTERS TO ELECTRICALMACHINES
Speed control of DC motor, Induction motors, PMSM and BLDC drives

UNIT-III: RENEWABLE ENERGY SOURCES AND THEIR INTEGRATION TO GRID
Introduction to solar cell, solar panels, MPPT, wind and other renewable energy sources, Integration of renewable energy sources to the grid.

UNIT-IV: ENERGY STORAGE SYSTEMS
Study of automotive batteries, SMF, pumped storage systems, super-capacitors; fly wheels – applications, Li-ion batteries and applications to electric vehicles.

UNIT-V: DOMESTIC AND INDUSTRIAL APPLICATIONS
Induction heating, welding, melting, hardening, lighting applications and their control, UPS, battery chargers.

Text Books:

1. M.H.Rashid: Power Electronics-circuits, Devices and applications, Prentice Hall India, NewDelhi,2009
2. P.S.Bhimbra: Power Electronics, Khanna publishers, New Delhi,2012
3. Ned Mohan, Undeland and Robbin: Power electronics converters, applications and design, JohnWilley & Sons, Inc. NewYork, 2006.
4. Utilization of Electrical Energy and Traction, J.B.Gupta, Rajeev Manglik, RohithManglik, KATSONBooks, 2012

Semester	V to VII SEMESTERS	L	T	P	C	Course Code
Regulation	V20	3	-	-	3	V20EEOE04
Name of the Course	**Programmable Logic Controller and Applications** (Open Elective)					
Branch	EXCEPT EEE					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Understand the basic concepts of PLCs and their I/O modules.	**K2**
CO2	Construct the control algorithms to PLC using ladder logic.	**K2**
CO3	Illustrate the PLC registers for effective utilization in different applications.	**K2**
CO4	Understand the function of various program control instructions.	**K2**
CO5	Apply the suitable controller in real time applications.	**K3**

Unit I: Introduction
PLC Basics: PLC system, I/O modules and interfacing, CPU processor, programming equipment, programming formats, construction of PLC ladder diagrams, devices connected to I/O modules.

Unit II: PLC Programming
PLC Programming: Input instructions, outputs, operational procedures, programming examples using contacts and coils. Digital logic gates, programming in the Boolean algebra system, conversion examples. Ladder diagrams and sequence listings, ladder diagram construction.

Unit III: Programmable Timers and Counters
Timer instructions – On delay time instruction – Off delay timer instruction – Retentive timer – Counter instructions – Up counter – Down counter – Cascading counters – Incremental encoder – Counter applications– Combining counter and timer functions.

Unit IV: Program Control Instructions

Master control reset instruction – Jump instructions and sub routines – Immediate input and output instructions.-Data manipulation – Data transfer operation – Data compare instruction – Data manipulation programs –

Numerical data I/O interfaces – Math instructions – Addition, subtraction, multiplication & division instruction– Sequential instructions – Sequence programs – Shift registers – Word shift registers.

Unit V: Applications

Control of water level indicator – Alarm monitor - Conveyor motor control – Parking garage – Ladder diagram for process control – PID controller.

Text Books:

1. Programmable logic controllers by Frank D. Petruzella- McGraw Hill – 3rd Edition.
2. Programmable Logic Controllers – Principle and Applications by John W. Webb and Ronald A. Reiss, Fifth Edition, PHI

Reference Books:

1. Programmable Logic Controllers – Programming Method and Applications by JR. Hackworth and F.D Hackworth Jr. – Pearson, 2004.
2. Introduction to Programmable Logic Controllers- Gary Dunning- Cengage Learning. Programmable Logic Controllers –W. Bolton-Elsevier publisher, 2005.

Semester	V to VII SEMESTERS	L	T	P	C	Course Code
Regulation	V20	3	-	-	3	V20EEOE05
Name of the Course	**Energy Storage Systems** (Open Elective)					
Branch	EXCEPT EEE					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Classify different energy storage systems.	**K2**
CO2	Understand the operation of different energy storage systems.	**K2**
CO3	Illustrate the role of electrical energy storage systems in various aspects.	**K2**
CO4	Understand the operation of different Electrical Energy Storage (EES) systems.	**K2**
CO5	Apply suitable EES system to various applications.	**K3**

UNIT - I: Introduction:
Necessity of energy storage, different types of energy storage, mechanical, chemical, electrical, electrochemical, biological, magnetic, electromagnetic, thermal, comparison of energy storage technologies

UNIT - II: Energy Storage Systems:
Thermal Energy storage-sensible and latent heat, phase change materials, Energy and exergy analysis of thermal energy storage, Electrical Energy storage-super-capacitors, Magnetic Energy storage-Superconducting systems, Mechanical-Pumped hydro, flywheels and pressurized air energy storage, Chemical-Hydrogen production and storage, Principle of direct energy conversion using fuel cells, thermodynamics of fuel cells, Types of fuel cells, Fuel cell performance, Electrochemical Energy Storage- Battery, primary, secondary and flow batteries.

UNIT - III Needs for Electrical Energy Storage:
Emerging needs for EES, More renewable energy-less fossil fuel, Smart Grid uses - the roles of electrical energy storage technologies-the roles from the viewpoint of a utility-the roles from the viewpoint of consumers-the roles from the viewpoint of generators of renewable energy.

UNIT - IV: Types of Electrical Energy Storage systems:
Electrical storage systems, Double-layer capacitors (DLC), Superconducting magnetic energy storage (SMES),super charging stations, Thermal storage systems, Standards for EES, Technical comparison of EES technologies.

UNIT - V: Applications of Electrical Energy Storage:
Renewable energy storage-Battery sizing and stand-alone applications, stationary (Power Grid application),Small scale application-Portable storage systems and medical devices, Mobile storage Applications- Electric vehicles (EVs), types of EVs, batteries and fuel cells, future technologies, hybrid systems for energy storage.

Text Books:

1. Energy Storage - Technologies and Applications by Ahmed Faheem Zobaa, InTech, 2013.
2. Fundamentals of Energy Storage by J. Jensen and B. Sorenson, Wiley-Interscience, New York, 984
3. Energy Storage: Fundamentals, Materials and Applications, by Huggins R. A., Springer, 2019.

Reference Books:

1. Thermal energy storage: Systems and Applications by Dincer I. and Rosen M. A., Wiley pub, 2011.
2. Electric & Hybrid Vehicles by G. Pistoia, Elsevier, 2010.
3. Fuel cell Fundamentals by R. O'Hayre, S. Cha, W. Colella and F. B. Prinz, Wiley Pub, 2016.

Semester	**V to VII SEMESTERS**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	3	-	-	3	V20EEOE06
Name of the Course	**Soft Computing Techniques** (Open Elective)					
Branch	EXCEPT EEE					

Course Outcomes:
After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Understand the basic concepts of different soft computing techniques like fuzzy, GA and neural network.	**K2**
CO2	Understand the fundamental concepts of artificial neural networks.	**K2**
CO3	Explain the basic concepts & convergence of GA.	**K2**
CO4	Explain the basic concepts of fuzzy systems and its applications.	**K2**
CO5	Apply different evolutionary algorithms to various applications.	**K3**

Unit I: Introduction to AI
Artificial Intelligence – a Brief Review – Pitfalls of Traditional AI – Need for Computational Intelligence –Importance of Tolerance of Imprecision and Uncertainty - Constituent Techniques – Overview of Artificial Neural Networks - Fuzzy Logic - Evolutionary Computation.

Unit II: Artificial Neural Networks
Supervised Learning: Introduction and how brain works, Neuron as a simple computing element, The perceptron, Back propagation networks: architecture, multilayer perceptron, back propagation learning-input layer, accelerated learning in multilayer perceptron, The Hopfield network, Bidirectional associative memories(BAM), RBF Neural Network.
Unsupervised Learning: Hebbian Learning, Generalized Hebbian learning algorithm, Competitive learning, Self- Organizing Computational Maps: Kohonen Network.

Unit III: Genetic algorithms
Genetic algorithms basic concepts, encoding, fitness function, reproduction-Roulette wheel, Boltzmann, tournament, rank, and steady state selections, Convergence of GA, Applications of GA-case studies.

Unit IV: Fuzzy Logic
Fuzzy Sets – Properties – Membership Functions - Fuzzy Operations. Fuzzy Logic and Fuzzy Inference System

Unit V: Evolutionary Computation
Evolutionary Computation - Overview of other Bio-inspired Algorithms - Swarm Intelligence Algorithms

Textbooks:

1. R. Rajasekaran and G. A and Vijayalakshmi Pai, Neural Networks, Fuzzy Logic, and Genetic, 2013.
2. Algorithms: Synthesis and Applications, Prentice Hall of India,2008
3. D. E. Goldberg, Genetic Algorithms in Search, Optimization, and Machine Learning, Addison-Wesley
4. T. Ross, Fuzzy Logic with Engineering Applications, Tata McGraw Hill, 2003

Reference books

1. L. Fausett, Fundamentals of Neural Networks, Prentice Hall, 2004

Semester	V to VII SEMESTERS	L	T	P	C	Course Code
Regulation	V20	3	-	-	3	V20EEOE07
Name of the Course	**Electric Vehicles** (Open Elective)					
Branch	EXCEPT EEE					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Understand the fundamentals of an electric vehicle.	**K2**
CO2	Explain the technical characteristics and properties of batteries.	**K2**
CO3	Estimate the ratings and requirements of electrical machines.	**K2**
CO4	Illustrate the regenerative braking system of an electric vehicle.	**K3**
CO5	Estimate the sizing of components of hybrid electric vehicles.	**K2**

UNIT I ELECTRIC VEHICLES
Introduction, Components, vehicle mechanics – Roadway fundamentals, vehicle kinetics, Dynamics of vehicle motion - Propulsion System Design.

UNIT II BATTERY
Basics – Types, Parameters – Capacity, Discharge rate, State of charge, state of Discharge, Depth of Discharge, Technical characteristics, Battery pack Design, Properties of Batteries.

UNIT III DC & AC ELECTRICAL MACHINES
Motor and Engine rating, Requirements, DC machines, Three phase A.C machines, Induction machines, permanent magnet machines, switched reluctance machines.

UNIT IV ELECTRIC VEHICLE DRIVE TRAIN
Transmission configuration, Components – gears, differential, clutch, brakes regenerative braking, motor sizing.

UNIT V HYBRID ELECTRIC VEHICLES
Types – series, parallel and series, parallel configuration – Design – Drive train, sizing of components.

Text book(s) and/or required materials

1. Iqbal Hussain, “Electric & Hybrid Vehicles – Design Fundamentals”, Second Edition, CRC Press,2011.
2. James Larminie, “Electric Vehicle Technology Explained”, John Wiley & Sons, 2003.

Reference Books:

1. MehrdadEhsani, YiminGao, Ali Emadi, “Modern Electric, Hybrid Electric, and Fuel Cell Vehicles:Fundamentals”, CRC Press, 2010.
2. SandeepDhameja, “Electric Vehicle Battery Systems”, Newnes, 2000
3. http://nptel.ac.in/courses/108103009/

Semester	V to VII SEMESTERS	L	T	P	C	Course Code
Regulation	V20	3	-	-	3	V20EEOE08
Name of the Course	**Indian Electricity Act, 2003**. (Open Elective)					
Branch	EXCEPT EEE					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Understand the national policy, plan and the joint responsibilities of state and central governments.	**K2**
CO2	Illustrate the process of licensing and the provisions related to transmission and distribution of electricity.	**K2**
CO3	Understand the regulatory commissions and Central Electricity Authority (CEA).	**K2**
CO4	Illustrate the Appellate Tribunal, Reorganization of boards, offences and penalty.	**K2**
CO5	Understand the constitution procedures of special courts and dispute resolution	**K2**

UNIT - I: National electricity policy and plan, generation of electricity
Electricity Act: commencement, definitions, comments; national policy on standalone systems, non-conventional energy systems, electrification and local distribution for rural areas; joint responsibilities of state and central governments in rural electrification, requirement for setting up of generating station, hydro-electric generation, captive generation; duties of generating companies.

UNIT - II: Licensing, transmission and distribution of electricity
Licensing: powers, procedures, conditions, amendments, revocation, provisions, directions, suspension and sale; inter-state and intra-state transmission; other provisions relating to transmission; provisions with respect to distribution licenses, electricity traders, supply -consumer protection: standard performance.

UNIT - III: Tariff, works, CEA and Regulatory commissions
Works of licenses, provisions relating to overhead lines; Constitution and functions of Central Electricity Authority (CEA), directions and certain powers; Constitution, powers and functions of state and central commissions, other provisions, proceedings and powers of appropriate commission, Grants, Fund, Accounts Audit and Report.

UNIT - IV: Appellate Tribunal, Reorganization of boards, offences and penalty
Appellate Tribunal for electricity; investigation and assessment; reorganization of boards; Offences and penalties.

UNIT - V: Special courts, Dispute resolution, other provisions and Miscellaneous
Constitution of special courts, procedures, powers, appeal, revision; arbitration; protective clauses; miscellaneous and enactments.

Text Books:

1. The Electricity Act, 2003 {Act 36 of 2003, dt.2-6-2003, w.e.f. 10-6-2003 vide S.O. No. 669(E), dt. 10-6-2003} published by Commercial Law Publishers (I) Pvt. Ltd

Semester	V to VII SEMESTERS	L	T	P	C	Course Code
Regulation	V20	3	-	-	3	V20EEOE09
Name of the Course	**Power Systems for Data Centers** (Open Elective)					
Branch	EXCEPT EEE					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Understand the basics of power in the data centre.	K2
CO2	Illustrate the uninterrupted power supply.	K2
CO3	Illustrate the operation of generators and various power devices.	K2
CO4	Estimate the power required in the data centre.	K2
CO5	Describe the different methods to improve data centre energy efficiency.	K2

UNIT -I: Fundamentals of Power
Power basics and key terms, Power calculations, Grounding Power problems, Power protection system equipment.

UNIT -II: Uninterruptible Power Supply (UPS)
UPS basics, UPS topologies, UPS redundancy and efficiency, Modular UPS, UPS batteries
Flywheel UPS.

UNIT –III: Generators and Other Power Devices
Generators, Automatic and static transfer switches, Power distribution units, Circuit Breakers, Circuit Breaker Coordination, Circuit Breaker Protection, Circuit Breaker Sizing.

UNIT –IV: Power Distribution in the Rack
Rack power redundancy, Server power calculations, Power cabling, calculating power requirements, Power consumption in the data centre, Reducing Wasted Power in the Data Centre: reducing server power

UNIT –V: Data Center Energy Efficiency and practices
Data centre power growth, Barriers to data centre energy efficiency, Power consumption in the data centre, Power Usage effectiveness (PUE), Measuring PUE, Other data centre efficiency metrics

Energy Efficiency Best Practices
Reducing the support infrastructure load, Systematic approach to improving energy efficiency.

Text Books:
1. Data Center Handbook, by Hwaiyu Geng, Publisher(s): Wiley ISBN: 9781118436639, 2014

Reference Books:
1. Designing Data Centers - Book 1: Power: Specifying the requirements, power generation, power distribution, power efficiency, and fault tolerance for data centers, by by B.A.Ayomaya, ISBN-13 : 979-8695727715
2. Guide to Data Centre Power Systems, Publication Year: 2021, Pages: 278 ISBN-13: 978-1-78561-828-4

Semester	**V to VII SEMESTERS**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	3	-	-	3	V20EEOE10
Name of the Course	**Concepts of Power System Engineering** (Open Elective)					
Branch	EXCEPT EEE					

Course Outcomes:
After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Understand the working of thermal and nuclear power generating stations.	**K2**
CO2	Estimate the R,L and C parameters of transmission lines (Nominal T and π models).	**K2**
CO3	Find the parameters of DC and AC distribution systems along with voltage drop.	**K3**
CO4	Understand the operation of fuses and circuit breakers.	**K2**
CO5	Illustrate the speed/time characteristics of different types of traction motors.	**K2**

UNIT – I: Introduction to the Sources of Energy

Thermal Power Stations Selection of site, general layout of a thermal power plant showing paths of coal, steam, water, air, ash and flue gasses, ash handling system & operation of thermal plant

Nuclear Power Stations: Location of nuclear power plant, Working principle, Nuclear fission, Nuclear fuels, Nuclear chain reaction, nuclear reactor Components: Moderators, Control rods, Reflectors and Coolants.

UNIT – II: Parameters of Transmission line

Types of conductors - calculation of resistance for solid conductors - Calculation of inductance for single phase and three phase, concept of GMR & GMD- Calculation of capacitance for 2 wire and 3 wire systems, effect of ground on capacitance. Classification of Transmission Lines and their model representations -Nominal-T, Nominal-π, Ferranti effect - Numerical Problems.

UNIT – III: Distribution Systems

Classification of distribution systems, design features of distribution systems, radial distribution, ring main distribution, voltage drop calculations: DC distributors for following cases - radial DC distributor fed at one end and at both ends (equal / unequal voltages), ring main distributor.

UNIT-IV: Protective devices

Principle of operation of HRC fuses – SF6, oil circuit breakers, circuit reclosures and Line sectionalizes.

UNIT–V: Electric Traction

System of electric traction and track electrification– Review of existing electric traction systems in India–Special features of traction motor–Mechanics of train movement–Speed–time curves for different services –Trapezoidal and quadrilateral speed time curves.

Text Books:

1. Generation, Distribution and Utilization of Electric Energy by C.L.Wadhawa New age International (P) Limited, Publishers, 2015.
2. A Text Book on Power System Engineering by M.L.Soni, P.V.Gupta, U.S.Bhatnagar and A.Chakrabarti, Dhanpat Rai & Co. Pvt. Ltd., 2008
3. Utilization of Electric Energy – by E. Openshaw Taylor, Orient Longman,1971.

Reference Books:

1. Electrical Power Systems by P.S.R. Murthy, B.S. Publications, 2017.
2. Art & Science of Utilization of electrical Energy – by Partab, DhanpatRai & Sons, 2017

Semester	**V to VII SEMESTERS**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	3	-	-	3	V20EEOE11
Name of the Course	**Fundamentals of Smart Grid Technologies** (Open Elective)					
Branch	EXCEPT EEE					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Understand the basic structure of an electricity marketing conditions.	**K2**
CO2	Illustrate the developing technologies in DC distribution and smart grid.	**K2**
CO3	Understand the concepts of dynamic energy systems.	**K2**
CO4	Illustrate the development of smart domestic system.	**K2**
CO5	Illustrate the development of intelligent domestic system.	**K2**

UNIT - I: Introduction to Smart Grid & evolving it to a Perfect Power System:
Introduction: Introduction to smart grid- Electricity network-Local energy networks- Electric transportation-Low carbon central generation-Attributes of the smart grid- Alternate views of a smart grid. Smart Grid to Evolve a Perfect Power System: Introduction- Overview of the perfect power system configurations- Device level power system- Building integrated power systems- Distributed power systems-Fully integrated power system-Nodes of innovation.

UNIT - II: DC Distribution and Smart Grid
AC vs DC sources-Benefits of DC power delivery systems-Powering equipment and appliances with DC-Data centers and information technology loads-Future neighborhood-Potential future work and research.
Intelligrid Architecture for the Smart grid: Introduction- Launching intelligrid-Intelligrid today- Smart grid vision based on the intelligrid architecture-Barriers and enabling technologies. SCADA, synchro phasors (WAMS)

UNIT – III: Dynamic Energy Systems Concept
Smart energy efficient end use devices-Smart distributed energy resources-Advanced whole building control systems- Integrated communications architecture-Energy Management-Role of technology in demand response-Current limitations to dynamic energy management-Distributed energy resources-Overview of a dynamic energy management-Key characteristics of smart devices- Key

characteristics of advanced whole building control systems-Key characteristics of dynamic energy management system.

UNIT - IV: Energy Port as a Part of the Smart Grid & Market Implementation
Energy Port as Part of The Smart Grid: Concept of energy -Port, generic features of the energy port. Policies and Programs to Encourage End – Use Energy Efficiency: Policies and programs in action -multinational -national-state-city and corporate levels.
Market Implementation: Framework-factors influencing customer acceptance and response- program planning-monitoring and evaluation.

UNIT - V: Efficient Electric End – Use Technology Alternatives
Existing technologies – lighting - Space conditioning - Indoor air quality - Domestic water heating – hyper efficient appliances - Ductless residential heat pumps and air conditioners - Variable refrigerant flow air conditioning-Heat pump water heating - Hyper efficient residential appliances - Data center energy efficiency-LED street and area lighting - Industrial motors and drives - Equipment retrofit and replacement – Process heating - Cogeneration, Thermal energy storage - Industrial energy management programs – Manufacturing process-Electro-technologies, Residential, Commercial and industrial sectors.

Text Books:

1. The Smart Grid, Enabling Energy Efficiency and Demand Side Response, Clark W Gellings,CRC Press, 2009.
2. Smart Grids, Jean Claude Sabonnadiere, Nouredine Hadjsaid, Wiley-ISTE, IEEE Press,May 2012.
3. SMART GRID Fundamentals of Design and Analysis, James Momoh, IEEE press, A John Wiley &Sons, Inc., Publication, 2012.

Reference Books:

1. Smart Grid: Technology and Applications, Janaka Ekanayake, Kithsiri Liyanage, Jianzhong.Wu, Akihiko Yokoyama, Nick Jenkins, Wiley, 2012.
2. Smart Grid: Fundamentals of Design and Analysis, James Momoh, Wiley, IEEEPress,2012

Semester	V to VII SEMESTERS	L	T	P	C	Course Code
Regulation	V20	3	-	-	3	V20EEOE12
Name of the Course	**Distribution Automation** (Open Elective)					
Branch	EXCEPT EEE					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Understand the basic principles of distribution and automation.	**K2**
CO2	Describe the working functions of distribution automation.	**K2**
CO3	Select appropriate Communication Technology for various parts of Distribution System for their automation.	**K2**
CO4	Illustrate the technical benefits of Distribution Automation (DA).	**K2**
CO5	Select an appropriate method for Economic Evaluation of DA plans.	**K2**

UNIT-I: DISTRIBUTION AUTOMATION AND THE UTILITY SYSTEM
Introduction to Distribution Automation (DA), Control System Interfaces, Control and Data Requirements, Centralized (Vs) Decentralized Control, DA System (DAS), DA Hardware, DAS Software.

UNIT-II: DISTRIBUTION AUTOMATION FUNCTIONS
DA Capabilities, Automation System Computer Facilities, Management Processes, Information Management, System Reliability Management, System Efficiency Management, Voltage Management, Load Management, Management Process (Function) Interaction, Operating and Objective Priorities.

UNIT-III: COMMUNICATION SYSTEMS FOR DA
DA Communication Requirements - Communication Reliability, Cost Effectiveness, Data Rate Requirements, Two Way Capability, Ability to communicate during outages and faults, Ease of Operation and Maintenance, Conforming to the Architecture of Data Flow. Communication Systems used in DA - Distribution Line Carrier (Power line carrier), Ripple Control, Zero Crossing Technique, Telephone, Cable TV, Radio, AM Broadcast, FM SCA, VHF Radio, UHF Radio, Microwave, Satellite, Fibre Optics, Hybrid Communication Systems, Communication Systems used in Field Tests.

UNIT-IV TECHNICAL BENEFITS
DA Benefit Categories, Capital Deferred Savings, Operation and Maintenance Savings, Interruption Related Savings, Customer-related Savings, Operational Savings, Improved Operation, Function Benefits, Potential Benefits for Functions, Function-shared Benefits, Guidelines for Formulation of Estimating Equations, Parameters Required, Economic Impact Areas, Resources for determining benefits, Integration of System Benefits into Economic Evaluation, Impact of DA on Distribution System.

UNIT-V: ECONOMIC EVALUATION METHODS
Development and Evaluation of Alternate Plans, Select Study Area, Select Study Period, Project Load Growth, Develop Alternatives, Calculate Operation and Maintenance Costs, Evaluate Alternatives. Economic Comparison of Alternate Plans: Classification of Expenses and Capital Expenditures, Comparison of Revenue Requirements of Alternative Plans, Book Life and Continuing Plant Analysis, Year-by- Year Revenue Requirement Analysis, Short Term Analysis, End of Study Adjustment, Break-Even Analysis, Sensitivity Analysis, Major Steps in Utility Economic Evaluation of DA (Flow-Chart) Computational Aids.

Text Books:
1. Dr.M.K. Khedkar and Dr.G.M.Dhole," A Textbook of Electric Power Distribution Automation",University Science Press (Laxmi Publications Pvt. Ltd.), 2011
2. D. Bassett, K. Clinard, J. Grainger, S. Purucker, and D. Ward, "Tutorial Course: DistributionAutomation", IEEE Tutorial Publication 88EH0280-8-PWR, 1988.

Reference Books:
1. James Northcote-Green, Robert Wilson "Control and Automation of Electrical Power DistributionSystems" CRC Press, Taylor and Francis Group, 2007.
2. James A. Momoh "Electric Power Distribution, Automation, Protection, and Control", CRC Press,Taylor and Francis Group, 2017.

Annexure IV

List of courses for B.Tech (Honors)

S.No.	Course name	Number of Weeks	Credits	
1.	Advance power electronics and Control(IITR)	8	2	Students have to acquire a minimum of 16 credits by completing MOOC/NPTEL course from the Pool
2.	Advanced IOT Applications (IISc)	8	2	
3.	Advances in UHV Transmission and Distribution (IISC)	8	2	
4.	Control and Tuning Methods in Switched Mode Power Converters (IITKGP)	12	3	
5.	Dc Microgrid and control systems(IITR)	8	2	
6.	Design of photovoltaic systems (IISc)	12	3	
7.	Design of Power Electronic Converters	8	2	
8.	Digital Control in Switched Mode Power Converters and FPGA-based Prototyping (IITKGP)	12	3	
9.	Digital Protection of Power System	8	2	
10.	Electric Vehicles - Part 1	4	1	
	or Electric vehicles and Renewable energy,(IITM)	12	3	
11.	Electrical Distribution System Analysis, (IITR)	8	2	
12.	Electricity & safety measures, (IGNOU)	12	3	
13.	High Power Multilevel Converters- Analysis, design and operational issues, (IITD)	12	3	
14.	Introduction to Smart Grid, (IITR)	8	2	
15.	Linear Systems Theory, (IITM)	12	3	
16.	Power Management Integrated Circuits, (IITM)	12	3	
17.	Power Quality Improvement Technique, (IITR)	8	2	
	or Power Quality,(IITD)	12	3	
18.	Power System Dynamics, Control and Monitoring, (IIT Kharagpur)	12	3	
19.	Real-Time Digital Signal Processing, (IISc)	12	3	
Project Work			4	4
Total				20 Credits

NOTE: However the list is not exhaustive. Before registering the course, take the approval from HOD.

Annexure V

List of Courses for Minors Degree in Electrical Engineering

S.No.	Course name	Number of Weeks	Credits	
1.	Basic Electric Circuits (IITK)	12	3	Students have to acquire a minimum of 16 credits by completing MOOC/NPTEL course from the Pool
	or Basic Electrical Circuits (IIT Hyderabad)	12	3	
	or Introduction to Electrical Engineering (IITD)	12	3	
	or Fundamentals Of Electrical Engineering (IITKGP)	12	3	
2.	Network Analysis (IITKGP)	12	3	
3.	Electrical Machines – I (IITKGP)	12	3	
4.	Electrical Machines - II (IIT KGP)	12	3	
5.	Control Engineering (IITM)	12	3	
6.	Electrical Measurement And Electronic Instruments (IITKGP)	12	3	
7.	Electricity & Safety Measures (IGNOU)	12	3	
8.	Electromagnetic Theory (IITK)	12	3	
9.	Digital Circuits (IITKGP)	12	3	
10.	Power System Engineering (IITKGP)	12	3	
11.	Fundamental of Power Electronics (IISc)	12	3	
12.	Fundamentals of Electric Drives (IITK)	8	2	
13.	Design of photovoltaic systems (IISc)	12	3	
14.	Power System Protection (IITKGP)	12	3	
15.	Power Quality Improvement Technique (IITR)	8	2	
16.	Introduction to Smart Grid (IITR)	8	2	
17.	Power System Dynamics, Control and Monitoring (IIT Kharagpur)	12	3	
18.	Power Management Integrated Circuits (IITM)	12	3	
19.	Electric Vehicles - Part 1	4	1	
	Electric vehicles and Renewable energy,(IITM)	12	3	
Project Work			4	4
Total				20 Credits

NOTE: However the list is not exhaustive. Before registering the course, take the approval from HOD.

Sri Vasavi Engineering College

(Autonomous)
(Sponsored by Sri Vasavi Educational Society)
(Approved by AICTE, New Delhi & Permanently affiliated to JNTUK, Kakinada)
(Accredited by NBA & NAAC with 'A' Grade, Recognized by UGC Under Section 2(f) & 12(B))
Pedatadepalli, Tadepalligudem, W.G.Dt, A.P-534101

Department of Mechanical Engineering

Agenda of the 6th BOS meeting of the department on 19-07-2022

Item No.1

Approval of course structure and syllabi for V, VI, VII & VIII semesters of B.Tech under V20 Regulations.

Item No.2

Approval of courses offered in Open Electives V, VI & VII Semester B.Tech., under V20 Regulations to the students of the other departments.

Item No.3

Approval of list of courses offering under Minors / honours of Engineering in B.Tech under V20 Regulations.

Sri Vasavi Engineering College (Autonomous)
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Pedatadepalli, Tadepalligudem, W.G.Dt, A.P-534101

Department of Mechanical Engineering

Date: 19-07-2022

Sixth meeting of BOS in Mechanical Engineering Department along with external members is held on 19/07/2022 at 02.00 PM in online mode through ZOOM meeting app.

The following members are present.

S. No	Name of the BOS Members
1.	Dr.N. Mohan Rao, Professor & Director (IIIPT & SDC),JNTUK.
2.	Dr. R.V. Chalam, Professor,NIT,Warangal
3.	Dr. A. Krishnaiah, Professor, Osmania University, Hyderabad
4.	Sri S.S. Subramanya Sastry, Head of Practice QMS Veave Technologies, Banglore, India.
5.	Sri A.Sai Krishna, Alumni, Renault Nissan Technology and business India Pvt. Ltd. Chennai.
6.	Dr. Ch.Rambabu, Professor & I/C Principal, SVEC
7.	Dr. M.V. Ramesh, Chairman & HOD, SVEC
8.	All the BOS internal members

Minutes of meeting

Chairman welcomed all the BOS members and introduced to all the BOS internal members.

Item No. 1: Approval of course structure and syllabi for V, VI, VII & VIII semesters of B.Tech under V20 Regulations.

- The approved course structure and syllabi for V, VI, VII & VIII semesters of B.Tech under V20 Regulations are attached in **Annexure-I.**

Item No. 2 : Approval of courses offered in Open Electives V, VI & VII Semester B.Tech., under V20 Regulations to the students of the other departments.

- The approved list of courses offered in Open Electives V, VI & VII Semester B.Tech., under V20 Regulations to the students of the other departments are attached in **Annexure-II.**

Item No. 3 : Approval of list of courses offering under Minors in Mechanical Engineering offering for other departments & honours of Mechanical Engineering in B.Tech under V20 Regulations.

- The approved list of courses offering under Minors in Mechanical Engineering offering for other departments & honours of Mechanical Engineering in B.Tech under V20 Regulations are attached in **Annexure-III.**

Chairman (Head –ME)

Head of the Department
Mechanical Engineering
Sri Vasavi Engineering College
TADEPALLIGUDEM-53410

Annexure - I

Course structure Approved in previous BOS under V20 Regulations

(For 2020 – 2021 Admitted Batch)

V SEMESTER							
S. No	**Category**	**Course Code**	**Course Title**	**Hours per week**			
				L	**T**	**P**	**C**
1	Professional Core course	V20MET11	Dynamics of machinery	3	0	0	3
2	Professional Core course	V20MET12	Metal Cutting & Machine Tools	3	0	0	3
3	Professional Core course	V20MET13	Design of Machine Members – I	3	0	0	3
4	Open Elective Course/Job oriented elective		Open Elective / Job Oriented Elective Course – I	3	0	0	3
5	Professional Elective courses		Professional Elective – I	3	0	0	3
6	Professional Core courses Lab	V20MEL08	Metal Cutting & Machine Tools Lab	0	0	3	1.5
7	Professional Core courses Lab	V20MEL09	Theory of machines lab	0	0	3	1.5
8	**Skill advanced course/ soft skill course***	V20SOC03	Soft Skills (Under BOS of English)	1	0	2	2
9	Mandatory course (AICTE suggested)	V20ENT04	Professional Communication Skills-III (Under BOS of English)	2	0	0	MNC
10	**Summer Internship (Mandatory) after second year (to be evaluated during V semester**			0	0	0	1.5
Total Credits				18	0	8	21.5

Total Contact Hours: 26 Total Credits: 21.5

VI SEMESTER							
S. No	**Category**	**Course Code**	**Course Title**	**Hours per week**			
				L	**T**	**P**	**C**
1	Professional Core course	V20MET14	Heat Transfer with Artificial Intelligence	3	0	0	3
2	Humanities and Social Sciences		Operations Research (under BOS of Maths)	3	0	0	3
3	Professional Core course	V20MET15	Design of Machine Members – II	3	0	0	3
4	Professional Elective courses		Professional Elective – II	3	0	0	3
5	Open Elective Course/Job oriented elective		Open Elective / Job Oriented Elective Course – II	3	0	0	3
6	Professional Core course Lab	V20MEL10	Heat Transfer Lab	0	0	3	1.5
7	Professional Core course Lab	V20MEL11	Simulation of mechanical systems lab	0	0	3	1.5
8	Professional Core course Lab	V20MEL12	Computer Numerical Control Programming Lab	0	0	3	1.5
9	**Skill advanced course/ soft skill course***	V20SOC03	Certificate course offered by industries/Professional bodies/APSSDC or any other accredited bodies.	**1**	**0**	**2**	**2**
10	Mandatory course (AICTE)	V20CEMC01	Intellectual Property Rights And Patents (under BOS of Civil Engg.)	2	0	0	MNC
Total Credits				18	0	11	21.5
Industrial/Research Internship (Mandatory) during summer vacation							

Total Contact Hours: 29 Total Credits: 21.5

VII SEMESTER							
S. No	**Category**	**Course Code**	**Course Title**	**Hours per week**			
				L	**T**	**P**	**C**
1	Professional Elective courses		Professional Elective III	3	0	0	3
2	Professional Elective courses		Professional Elective IV	3	0	0	3
3	Professional Elective courses		Professional Elective V	3	0	0	3
4	Open Elective Course/Job oriented elective		Open Elective / Job Oriented Elective Course – III	3	0	0	3
5	Open Elective Course/Job oriented elective		Open Elective / Job Oriented Elective Course – IV	3	0	0	3
6	***Humanities and Social Science Elective**	V20MBT54	Universal Human Values-II (under BOS of MBA)	3	0	0	3
	Skill advanced course/ soft skill course*	V20SOC04	Certificate course offered by industries/Professional bodies/APSSDC or any other accredited bodies.	1	0	2	2
	Industrial/Research Internship (Mandatory) after third year (to be evaluated during VII semester			0	0	0	3
Total Credits				19	0	2	23

Total Contact Hours: 21 Total Credits: 23

VIII SEMESTER							
S. No	**Category**	**Course Code**	**Course Title**	**Hours per week**			
				L	**T**	**P**	**C**
1	Major Project	V20MEP01	Project Project work, seminar and internship in industry	0	0	0	12
	INTERNSHIP (6 MONTHS)						
Total Credits				0	0	0	12

Professional Electives:	
Professional Elective – I V20MEPE1 – Internal Combustion Engines and Air Compressors V20MEPE2 – Nanotechnology V20MEPE3 – Composite Materials	**Professional Elective – II** V20MEPE4 – Tool and Die Design V20MEPE5 – Industrial Automation and Robotics V20MEPE6 – Product design and Development
Professional Elective – III V20MEPE7 – Finite Element Methods V20MEPE8 – Tribology V20MEPE9 – Micro Electro Mechanical Systems	**Professional Elective – IV** V20MEPE10 – Automobile Engineering V20MEPE11 – Cryogenics V20MEPE12 – Design for Manufacturing & Assembly
Professional Elective – V V20MEPE13 – Power plant Engineering V20MEPE14 – Non Destructive Testing & Evaluation V20MEPE15 – Gas dynamics & Jet Propulsion	

Job Oriented Courses:	**Open Electives:**
V20MEJO1 – CAD/CAM V20MEJO2 – Refrigeration and Air conditioning V20MEJO3 – Integration of AI & ML in Mechanical Engineering V20MEJO4 – Industrial Safety & Management V20MEJO5 – Industrial Hydraulics & Pneumatics V20MEJO6 – Automation in Manufacturing	V20MEOE1 – Basic Mechanical Engineering V20MEOE2 – Green Engineering Systems V20MEOE3 – Computational Fluid Dynamics V20MEOE4 – Rapid Prototyping V20MEOE5- Computer Aided Design V20MEOE6 - Mechatronics

Syllabi for the courses offered in V semester B. Tech under V20 Regulation for the Academic Year 2022-2023
V Semester

Semester	V	L	T	P	C	Course Code
Regulation	V20	3	0	0	3	V20MET11
Name of the Course	Dynamics of machinery					
Branch	Mechanical Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to:	Knowledge Level
CO1	Apply gyroscopic effect for stabilization of sea vehicles, aircrafts and automobile Vehicles etc.,	K3
CO2	Apply friction for torque transmission of mechanical systems	K3
CO3	Interpret dynamic force analysis of slider crank mechanism in design of flywheel and different types of Governors for stability	K3
CO4	Understand balancing of reciprocating and rotary masses.	K2
CO5	Understand how to determine the natural frequencies of continuous systems starting from the general equation of displacement.	K2

UNIT – I
PRECESSION: Gyroscopes, effect of precession motion on the stability of moving vehicles such as motor car, motor cycle, aero planes and ships.

UNIT – II
FRICTION: Inclined plane, friction of screw and nuts, pivot and collar, uniform pressure, uniform wear, friction circle and friction axis.
CLUTCHES: Friction clutches- single disc or plate clutch, multiple disc clutch, cone clutch, centrifugal clutch.
BRAKES AND DYNAMOMETERS: Simple block brakes, internal expanding brake, band brake of vehicle. General description and operation of dynamometers: Prony, Rope brake, Epicyclic, Bevis Gibson and belt transmission.

UNIT – III
TURNING MOMENT DIAGRAMS: Dynamic force analysis of slider crank mechanism, inertia torque, angular velocity and acceleration of connecting rod,

crank effort and turning moment diagrams, fluctuation of energy, fly wheels and their design.

GOVERNERS: Watt, porter, proell and Hartnell governors, sensitiveness, isochronisms and hunting.

UNIT – IV

BALANCING: Balancing of rotating masses single and multiple, single and different planes, use analytical and graphical methods. Primary and secondary balancing of reciprocating masses. analytical and graphical methods, unbalanced forces and couples, examination of "V" multi cylinder in line and radial engines for primary and secondary balancing, locomotive balancing, hammer blow, swaying couple, variation of tractive effort.

UNIT – V

VIBRATIONS: Free Vibration of spring mass system, oscillation of pendulums, centers of oscillation and suspension. Transverse loads, Natural frequency, types of damping, damped free vibration. vibrations of beams with concentrated and distributed loads. Dunkerly's methods, Raleigh's method, whirling of shafts, critical speeds, torsional vibrations, two and three rotor systems, Simple problems on forced damped vibration, vibration isolation and transmissibility.

TEXT BOOKS:

1. Theory of Machines / S.S Rattan/ Mc. Graw Hill Publ.
2. Mechanism and machine theory by Ashok G. Ambedkar, PHI Publications.

REFERENCE BOOKS:

1. Mechanism and Machine Theory / JS Rao and RV Dukkipati / New Age.
2. Theory of Machines / Shiegly / MGH
3. Theory of Machines / Thomas Bevan / CBS Publishers
4. Theory of machines / Khurmi / S.Chand.

Semester	V	L	T	P	C	Course Code
Regulation	V20	3	0	0	3	V20MET12
Name of the Course	Metal Cutting & Machine Tools					
Branch	Mechanical Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to:	Knowledge Level
CO1	Describe the mechanism of chip formation and forces involved while machining	K2
CO2	Describe various types of lathe, shaper, slotter, planar and drilling machines and their operations.	K2
CO3	Explain the construction and working of various milling and grinding machines.	K2
CO4	Discuss the basic principle and working of Ultrasonic machining, Abrasive jet machining and Electrochemical machining.	K2
CO5	Explain the basic principle and working of Electric discharge machining, electron beam machining, Laser beam machining.	K2

UNIT – I

FUNDAMENTALS OF MACHINING: Elementary treatment of metal cutting theory – element of cutting process –geometry of single point tool angles, chip formation and types of chips – built up edge and its effects chip breakers, mechanics of orthogonal cutting –Merchant's force diagram, cutting forces, cutting speeds, feed, depth of cut, tool life, coolants, tool materials.

UNIT – II

LATHE: Engine lathe, principle of working, specification of lathe, types of lathe, work holders tool holders, operations.

SHAPING, SLOTTING AND PLANNING MACHINES: Principles of working – principal parts – specifications, operations performed.

DRILLING: Principles of working, specifications, types, operations performed, tool, work holding devices

UNIT – III

MILLING MACHINES: Principles of working, specifications, classification of Milling Machines, Principle features of horizontal, vertical and universal Milling Machine, machining operations, types of cutters, methods of indexing.

FINISHING PROCESSES: Theory of grinding, classification of grinding machines, cylindrical and surface grinding machines, tool and cutter grinding machines, different types of abrasives, bonds, specification and selection of a grinding wheel.

UNIT – IV

Need for non-traditional machining -Ultrasonic machining (USM), Abrasive jet machining (AJM), Electro-chemical machining (ECM)-Basic principle, equipment, applications, advantages and limitations.

UNIT – V

Electric Discharge Machining (EDM), Electron Beam Machining (EBM), Laser Beam Machining (LBM)-Basic principle, equipment, applications, advantages and limitations.

TEXT BOOKS:

1. Production Technology by R.K. Jain and S.C. Gupta.
2. Workshop Technology – B.S. Raghuwanshi – Vol II/DhanpatRai& Co. (P) Ltd
4. Elements of Workshop Technology Vol 2- S K Hajrachoudhury/Asia Publishing House
3. Advanced machining processes/ VK Jain/ Allied publishers.

REFERENCE BOOKS:

1. Metal cutting Principles by M.C. Shaw
2. Metal cutting and machine tools by Boothroyd
3. Manufacturing technology II, P.N Rao
4. Production Technology by H.M.T. (Hindustan Machine Tools).

Semester	V	L	T	P	C	Course Code
Regulation	V20	3	0	0	3	V20MET13
Name of the Course	Design of Machine Members – I					
Branch	Mechanical Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to:	Knowledge Level
CO1	Understand the stresses on design of machine elements.	K2
CO2	Apply the varying loads on machine elements	K3
CO3	Solve problems in bolted, welded and riveted joints	K3
CO4	Illustrate various types of Keys and cotter joints	K3
CO5	Apply the different type of loads on shafts and couplings	K3

UNIT – I

Design Methods: The art and science of machine design, types of design methods, stages in machine design, selection of materials, types of loads, factor of safety, Design for strength and rigidity, preferred numbers.

Theories of Failure: Maximum Principal stress theory, Maximum shear stress theory, Maximum principal strain theory, Maximum strain energy theory, Maximum distortion energy theory, impact loads, problems.

UNIT – II

Strength of Machine Elements: Stress Concentration, theoretical stress concentration factor, fatigue stress concentration factor, notch sensitivity, design for fluctuating stresses, endurance limit, Estimation of endurance strength, S-N curves, Goodman's line, soderberg's line, modified Goodman's line, Gerber parabola, related problems.

UNIT – III

Bolted Joints: Advantages , types of Bolted joints, stresses in bolts, bolts of uniforms strength bolted joints under eccentric loading, , locking devices.

Riveted Joints: Types of riveted joints, modes of failure, strength and efficiency of riveted joints, pitch of the rivets, design stresses, boiler joints, diamond joints, and riveted joints under eccentric loading.

Welded Joints: Types of welded joints, strength of welds, Design of simple welded joints.

UNIT – IV
Keys, Cotters and Knuckle Joints: Types of Keys, stresses in Keys, design of rectangular, square and taper Keys, design of spigot and socket, sleeve and cotter, jib and cotter joints and knuckle joints.

UNIT – V
SHAFTS: Design of solid and hollow shafts for strength and rigidity – design of shafts for combined bending and axial loads – shaft sizes – BIS code.
SHAFT COUPLING: Rigid couplings – muff, split muff and flange couplings, flexible couplings – flange coupling (modified).

Note: Design data book is NOT Permitted for examination

TEXT BOOKS:
1. R.K. Jain ,Machine Design, Khanna Publishers, New Delhi.
2. V.B.Bhandari ,Design of Machine Elements , TMH Publishers, New Delhi.

REFERENCE BOOKS :
1. Schaum"sseries ,Machine Design, TMH Publishers, New Delhi.
2. Sadhu Singh, Machine Design, Khanna Publishers, New Delhi.
3. Joseph E. Shigely, Mechanical Engineering Design, TMH Publishers, New Delhi.
4. M.F. Spotts, Design of Machine Elements, PHI Publishers, New Delhi.
5. Pandya and Shah ,Machine Design, Charotar Publishers, Anand.

Data Hand Book :1. Mahadevan and Balaveera Reddy [1996], Machine Design Data Hand Book, CBS Publishers, New Delhi.

Semester	V	L	T	P	C	Course Code
Regulation	V20	0	0	3	1.5	V20MEL08
Name of the Course	Metal Cutting & Machine Tools Lab					
Branch	Mechanical Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to:	Knowledge Level
CO1	Understanding various mechanism used in different machine tools	K2
CO2	Apply desired work holders and tool holder for specific work	K3
CO3	Operate different machine tools	K3

DETAILED SYLLABUS:

1. Introduction of general purpose machines -lathe, drilling machine, milling machine, shaper, planing machine, slotting machine, cylindrical grinder, surface grinder and tool and cutter grinder.
2. Step turning and taper turning on lathe machine
3. Thread cutting and knurling on -lathe machine.
4. Drilling and tapping
5. Shaping and planning
6. Slotting
7. Milling
8. Cylindrical surface grinding
9. Grinding of tool angles.

TEXT BOOKS:

Lab Manual

Semester	**V**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	0	0	3	1.5	V20MEL09
Name of the Course	Theory of Machines Lab					
Branch	Mechanical Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to:	Knowledge Level
CO1	Understand the concepts on various machine elements such as governors, springs, flywheel and cam & follower	K2
CO2	Examine the motion of gyroscope and static & dynamic balancing of masses	K3
CO3	Understand the principles of various power transmission systems such as shafts, gears and belt & pulley	K2

LIST OF EXPERIMENTS:

1. To determine whirling speed of shaft theoretically and experimentally.
2. To determine the position of sleeve against controlling force and speed of a Hartnell governor and to plot the characteristic curve of radius of rotation.
3. To analyse the motion of a motorized gyroscope when the couple is applied along its spin axis.
4. To determine the frequency of undamped free vibration of an equivalent spring mass system.
5. To determine the frequency of damped force vibration of a spring mass system.
6. To study the static and dynamic balancing using rigid blocks.
7. To find the moment of inertia of a flywheel.
8. To plot follower displacement vs cam rotation for various Cam Follower systems.
9. To find coefficient of friction between belt and pulley.
10. To study simple and compound screw jack and determine the mechanical advantage , velocity ratio and efficiency.

11. To study various types of gears- Spur, Helical, Worm and Bevel Gears.

Semester	**V**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	3	0	0	3	V20MEPE1
Name of the Course	Internal Combustion Engines and Air Compressors **Professional Elective – I**					
Branch	Mechanical Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to:	Knowledge Level
CO1	Understand the affects of various losses that occur in the actual engine operation and the working principles of I.C. Engines.	K2
CO2	Illustrate the function of fuel supply, ignition, lubrication and cooling systems of I.C. Engines.	K2
CO3	Interpret the combustion phenomena in S.I. and C.I. Engines and effect of various engine operating parameters on it.	K3
CO4	Calculate the performance parameters of I.C. Engines.	K3
CO5	Understand the classification and basic principles of compressors.	K2

UNIT – I

Air standard and actual cycles: Comparison of cycles, Time Loss Factor, Heat Loss Factor, Exhaust Blow down, Loss due to gas exchange process, Loss due to Rubbing Friction.

Basics of IC Engines: Classification, working principles of two stroke and four stroke S.I. and C.I. Engines, Valve timing and port timing diagrams.

UNIT – II

Engine systems: Requirements of fuel supply system, components and working of simple carburettor, types of diesel injection system, requirements of ignition system, types of ignition systems, types of lubrication systems, types of cooling system.

UNIT – III

Combustion in S.I. Engines and C.I. Engines: Normal Combustion and abnormal combustion, Stages of combustion in S.I. Engine, Types of Abnormal combustion, Pre-ignition and knocking , Fuel requirements, fuel rating, Anti knock additives, Detonation and its Control.

Stages of combustion in C.I. Engines: Four stages of combustion, Delay period, Factors influencing delay period, Diesel knock, Control of diesel knock, types of combustion chamber, Fuel requirements and fuel rating.

UNIT – IV

Measurement, Testing and Performance of IC Engines: Engine performance Parameters, Measurement of engine power, determination of IP,BP, FP, IMEP, BMEP, various efficiencies, engine performance characteristics and affecting variables, preparation of the Heat balance sheet.

UNIT – V

Compressors:

Reciprocating Compressors : Principle of operation, work required, Isothermal efficiency, volumetric efficiency and effect of clearance, multi stage compression, saving of work, minimum work condition for two stage compression.

Rotary Compressors: Roots Blower, vane sealed compressor, Lysholm compressor – mechanical details and principle of working – efficiency considerations.

TEXT BOOKS:

1. Internal Combustion Engines, Ganesan.V, Tata McGraw Hill Publishing Company.
2. Thermal Engineering- Mahesh Rathore, Tata McGrawHill
3. I.C. Engines Fundamentals, Heywood J.McGraw Hill publications.

REFERENCE BOOKS:

1. Thermal Engineering, R.K.Rajput, Lakshmi Publications.
2. Heat engines, Vasandani, Kumar Publications.
3. Thermal Engineering, P.L.Ballany, Khanna Publications.

Semester	**V**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	3	0	0	3	V20MEPE2
Name of the Course	Nanotechnology **Professional Elective – I**					
Branch	Mechanical Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to:	Knowledge Level
CO1	Understand the essential concepts used in nanotechnology	K2
CO2	Identify the various nano materials properties	K2
CO3	Describe the syntheses and fabrication methods	K2
CO4	Explain the various characterization Techniques	K2
CO5	Use of the various applications of nanotechnology	K3

UNIT – I

INTRODUCTION: History of nano science, definition of nano meter, nano materials, nanotechnology. Classification of nano materials. Crystal symmetries, crystal directions, crystal planes. Band structure.

UNIT – II

PROPERTIES OF MATERIALS: Mechanical properties, electrical properties, dielectric properties, thermal properties, magnetic properties, opto electronic properties. Effect of size reduction on properties, electronic structure of nano materials.

UNIT – III

SYNTHESIS AND FABRICATION: Synthesis of bulk polycrystalline samples, growth of single crystals. Synthesis techniques for preparation of nano particle – Bottom Up Approach – sol gel synthesis, hydro thermal growth, thin film growth, PVD and CVD; Top Down Approach – Ball milling, micro fabrication, lithography. Requirements for realizing semiconductor nano structures, growth techniques for nano structures.

UNIT – IV

CHARECTERIZATION TECHNIQUES:X-Ray diffraction and Scherrer method, scanning electron microscopy, transmission electron microscopy, scanning probe microscopy, atomic force microscopy, piezoresponse microscopy, X-ray photoelectron spectroscopy, XANES and XAFS, angle resolved photoemission spectroscopy, diffuse reflectance spectra, photoluminescence spectra, Raman spectroscopy.

UNIT –V

APPLICATIONS OF NANO TECHNOLOGY: Applications in material science, biology and medicine, surface science, energy and environment. Applications of nano structured thin fins, applications of quantum dots.

TEXT BOOKS:

1. Nano science and nanotechnology by M.S Rama Chandra Rao, Shubra Singh, Wiley publishers.

REFERENCE BOOKS:

1. Introduction to Nano Technology by Charles P. Poole, Jr., Frank J.Owens, Wiley publishers.
2. Nanotechnology by Jermy J Ramsden, Elsevier publishers.
3. Nano Materials- A.K.Bandyopadhyay/ New Age Introdu.
4. Nano Essentials- T.Pradeep/TMH.
5. Nanotechnology the Science of Small by M.A Shah, K.A Shah, Wiley Publishers.

Semester	**V**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	3	0	0	3	V20MEPE3
Name of the Course	Composite Materials **Professional Elective – I**					
Branch	Mechanical Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to:	Knowledge Level
CO1	Classify the composites, explain the required properties, reinforcements and uses of composites.	K2
CO2	Explain how common fibers are produced and how the properties of the fibers are related to the internal structure and the interfaces obtained.	K2
CO3	Illustrate the processing techniques for polymer matrix, ceramic matrix and metal matrix composites and list out their properties and applications	K3
CO4	Construct different ceramic composite materials	K3
CO5	Examine the processing of ceramic matrix composites and Calculate mechanical properties of composite materials	K3

UNIT – I

Introduction, Classification of Composite materials based on structure and matrix and reinforcements, Advantages and applications of composites, Functional requirements of reinforcement and matrix materials. Difference between composites and metals &alloys, Properties of composites in comparison with standard materials

UNIT – II

Types of reinforcements and their properties: Glass, Carbon, Boron, Aramid, Al_2O_3 and SiC fibers. Nature and manufacture of glass, carbon and aramid fibers.
Role of interfaces: Wettability and Bonding, the interface in Composites, Interactions and Types of bonding at the Interface.

UNIT – III

Fabrication of Polymeric Matrix Composites, Structure and properties of Polymeric Matrix Composites, Interface in Polymeric Matrix Composites, Applications.
Fabrication of Metal Matrix Composites (MMC): Solid state fabrication, Liquid state fabrication and In-situ fabrication techniques. Interface in Metal Matrix Composites. Mechanical bonding, Chemical bonding and Interfaces in In-situ Composites. MMC: Properties and Applications.

UNIT – IV

Fabrication of Ceramic Matrix Composites (CMC): Processing of CMCs: Cold Pressing and Sintering, Hot Pressing, Reaction Bonding Processes, Infiltration, Sol–Gel process. Interface in CMCs. Properties of CMCs, Applications of CMCs.

UNIT – V

Mechanical Testing of Composites and Their Constituents: Measurement of Constituent Material Properties Fiber Tests, Neat Resin Matrix Tests, Constituent Volume Fraction Measurement. Measurement of Basic Composite Properties: Tensile Tests, Compressive Tests, Shear Tests, Flexure Tests, Fiber/Matrix Interface Tests.

TEXT BOOKS:

1. Composite Materials – Science & Engineering, K.K. Chawla, Springer-Verlag, New York,1987.
2. Principles of Composite Material Mechanics, Ronald F. Gibson
3. An Introduction to Composite Materials, Hull, Cambridge, 2nd Edt.1997.

REFERENCE BOOKS:

1. Composites, Engineered Materials Handbook, Vol.1, ASM International, Ohio, 1988.
2. Structure and Properties of Composites, Materials Science and Technology, Vol. 13, VCH, Weinheim, Germany, 1993
3. Composite Materials: Engineering and Science, F.L. Matthews and R.D. Rawlings, Chapman & Hall, London, 1994.

Syllabi for the courses offered in VI semester B. Tech under V20 Regulation for the Academic Year 2023-2024

VI Semester

Semester	**VI**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	3	0	0	3	V20MET14
Name of the Course	Heat Transfer with Artificial Intelligence					
Branch	Mechanical Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to:	Knowledge Level
CO1	Illustrate the basic modes of heat transfer, basic laws of heat transfer and to develop solution for one dimensional steady state heat conduction problems.	K3
CO2	Interpret the heat transfer through extended surfaces, to find solution for one dimensional extended surfaces and unsteady state heat conduction problems.	K3
CO3	Illustrate convective heat transfer and to apply Dimensional analysis concept to convective heat transfer and Apply empirical correlations for phase change process to calculate values for the convection heat transfer coefficient	K3
CO4	Illustrate Heat Exchangers and concepts of Artificial Intelligence.	K3
CO5	Employ the principles of radiation heat transfer, to find the shape factor and heat transfer rate through radiation.	K3

UNIT – I

Introduction: Different Modes of Heat Transfer, Governing Laws of Heat Transfer, Applications of Heat Transfer.

Conduction heat transfer: General Heat Conduction Equation: Derivation of the equation in (i) Cartesian, (ii) Polar and (iii) Spherical Co-ordinate Systems.

Steady-state one-dimensional heat conduction in Cartesian System: Steady-state one-dimensional heat conduction problems (i) without heat generation and (ii) without variable thermal conductivity, Thermal Resistances in Series and in Parallel and Numerical Problems.

Steady-state radial heat conduction in Polar and spherical Systems: Steady-state one-dimensional heat conduction problems (i) without heat generation and (ii)

without varying thermal conductivity, Thermal Resistances in Series and Numerical Problems.
Critical Thickness of Insulation: Concept, Derivation and Numerical Problems.

UNIT – II

Extended Surfaces (Fins): Classification, Applications, Straight Rectangular Fins - long fin, fin with insulated tip and short fin, Temperature Distribution and Heat Transfer Calculations, Fin Efficiency and Effectiveness and Numerical Problems.
One dimensional Transient (Unsteady-state) conduction heat transfer: Definition, Systems with negligible internal resistance, Numerical Problems, Heisler and Gober charts: Solutions to various one-dimensional problems using the charts, Numerical problems.

UNIT – III

Convective heat transfer: Classification of convective heat transfer, dimensional analysis – application of Buckingham Pi Theorem for forced and free convection, Significance of non-dimensional numbers, concepts of continuity, momentum and Energy Equations, boundary layer theory.

Heat transfer with phase change: Boiling: Definition, types, regimes of Pool boiling - Numerical Problems on nucleate boiling, critical heat flux and film boiling using empirical correlations.
Condensation: Definition, Film wise and drop wise condensation, Numerical Problems on film condensation over vertical and horizontal cylinders using empirical correlations.

UNIT –IV

Radiation heat transfer: Fundamental principles - Gray, White, Opaque, Transparent and Black bodies, Emissivity, Planck's distribution law, Wien's displacement law, Kirchoff's law, Lambert's cosine law and the Stefan-Boltzmann law, Irradiation, total and monochromatic quantities, concepts of shape factor, heat exchange between two black bodies, heat exchange between grey bodies, radiation shields, electrical analogy for radiation networks and Numerical problems.

UNIT – V

Heat Exchangers: Definition, Classification, LMTD method, Effectiveness - NTU method, overall heat transfer coefficient, fouling factor and Numerical Problems.
Chart Solution Procedures for solving Heat Exchanger problems: Correction Factor Charts and Effectiveness-NTU Charts and Numerical Problems.
Artificial Intelligence: Introduction, Biological and Artificial Neuron, Artificial Neural Network, Training of Artificial Neural Network, Perceptron learning rule, Convergence Theorem, Activation Functions, Delta Rule, Generalised Delta Rule, Back Propagation Algorithm, Genetic Algorithm – Terminology, Working.

TEXT BOOKS:

1. Heat Transfer, JP HOLMAN, Tata McGraw Hill Publications, Special Indian edition.
2. Heat Transfer, P.K.Nag, Tata McGraw Hill Publications.
3. Fundamentals of Engineering Heat and Mass Transfer, R.C.Sachdeva, New Age International Publications.
4. Artificial Intelligence, Saroj Kaushik, 1st Edition, Cengage Learning
5. Artificial Intelligence – A modern Approach, 3rd Edition, Stuart Russel, Peter Norvig, Pearson Education

REFERENCE BOOKS:

1. Heat and Mass Transfer, Cengel, McGraw Hill Publications.
2. Principles of Heat Transfer, Frank Kreith, R. M. Manglik& M. S. Bohn, Cengage learning publishers.
3.Heat and Mass Transfer /D.S.Kumar / S.K.Kataria& Sons
4. Heat and mass transfer, R.K. Rajput, S. Chand Publications, Revised edition
5.Artificial Intelligence, Elaine Rich, Kevin Knight, Shivashankar B Nair, 3rd Edition, Tata McGraw Hill
   Education Private Limited., 2009

Semester	**VI**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	3	0	0	3	V20MET15
Name of the Course	Design of Machine Elements – II					
Branch	Mechanical Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to:	Knowledge Level
CO1	Apply the concepts of different types of Bearings for design	K3
CO2	Illustrate the design concept of IC Engine Parts	K3
CO3	Employ the design concepts to curved beams	K3
CO4	Examine different Transmissions Systems and mechanical springs	K2
CO5	Analyze the design of Spur & Helical Gears	K4

UNIT – I

Design of Bearings: Applications and types of Journal bearings, Lubrication, Bearing Modulus, clearance ratio, bearing materials, journal bearing design, Ball and roller bearings, Static loading of ball & roller bearings, bearing life, Failure of bearings. Selection of Anti-friction bearings

UNIT – II

Design of Engine Parts: Design of piston, forces acting on piston. Design of Cylinder, Cylinder block.

Design of Connecting Rod, stress due to whipping action on connecting rod ends. Design of Cranks and Crank shafts-Centre and over hung cranks.

UNIT – III

Design of Curved Beams: Introduction, Stresses in curved beams, Expression for radius of neutral axis for rectangular, circular, trapezoidal and T-Section. Design of crane hooks, C –clamps, problems.

UNIT – IV

Power Transmissions Systems, Pulleys: Transmission of power by belt and rope drives, transmission efficiencies, belts – flat and V types, ropes, pulleys for belt and rope drives, materials, chain drives, problems. Selection of V-Belts.

Mechanical Springs: Stress and deflections of helical Springs, Compression springs, Springs for fatigue loading, Natural frequency of helical springs, Energy storage capacity. Shear stress multiplication Factor, Wahl correction factor and design of helical springs under static and dynamic loads. Design of leaf springs, co-axial springs, related problems.

UNIT – V

Spur & Helical Gear drives: Spur gears, Helical gears, Load concentration factor, Dynamic load factor, Surface compressive strength, Bending strength, Design analysis of spur and Helical gears, Estimation of centre distance, module and face width, Check for dynamic and wear considerations, problems.

Note: Design data book is permitted for examination

TEXT BOOKS:

1. Machine Design/V.Bandari/TMH Publishers
2. Machine Design/ NC Pandya & CS Shaw/ Charotar publishers
3. Design data book.

REFERENCE BOOKS:

1. Machine Design: An integrated Approach / R.L. Norton / Pearson Education
2. Mech. Engg. Design / JE Shigley/Tata McGraw Hill education
3. Design of machine elements- spots/Pearson Publications
4. Machine Design-Norton/Pearson Publications

Semester	**VI**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	0	0	3	1.5	V20MEL10
Name of the Course	Heat Transfer Lab					
Branch	Mechanical Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to:	Knowledge Level
CO1	Evaluate the amount of heat exchange in various modes of heat transfer for several geometries.	K4
CO2	Evaluate the amount of heat exchange in condensation & boiling processes and for heat exchangers.	K4

List of experiments:

1. Determination of overall heat transfer co-efficient of a composites lab.
2. Determination of efficiency of a pin-fin.
3. Determination of heat transfer rate through a lagged pipe.
4. Determination of thermal conductivity of a metal rod.
5. Determination of Thermal conductivity of liquid sand gases.
6. Determination of heat transfer rate through a concentric sphere.
7. Determination of heat transfer coefficient in natural and forced convection
8. Determination of emissivity of a given surface.
9. Determination of Stefan Boltzman constant.
10. Determination of effectiveness of parallel and counter flow heat exchangers.
11. Determination of heat transfer rate in drop and film wise condensation.
12. Determination of critical heat flux.

Add-on experiments: Heat transfer modeling of a simple component used in a heat exchanger using Ansysin the lab(Virtual lab)

Semester	VI	L	T	P	C	Course Code
Regulation	V20	0	0	3	1.5	V20MEL11
Name of the Course	Simulation of Mechanical Systems Lab					
Branch	Mechanical Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to:	Knowledge Level
CO1	Examine the stress analysis of trusses.	K3
CO2	Interpret the deflection analysis of different type of loads.	K3
CO3	Illustrate the stress analysis of different components.	K3
CO4	Develop the modal analysis of beams.	K3
CO5	Practice the basics of simulation using MATLAB	K3

Introduction to software

Introduction to SOLIDWORKS

List of Experiments:

SOLIDWORKS

1. Part design of different components using Solid works
2. Assembly of given parts using Solid works
3. Thermal analysis of a rectangular plate with circular hole (steady state)
4. Thermal analysis of a rectangular plate with circular hole (transient)
5. Stress analysis of the corner angle bracket
6. Stress analysis of an axis-symmetric component
7. Thermal stress analysis within the rectangular plate
8. Model analysis of cantilever beam without load
9. Model analysis of cantilever beam with load

FEMAP

1. Force and stress analysis using four link elements in trusses
2. Stress and deflection analysis in simply supported beam with point load
3. Stress and deflection analysis in simply supported beam with uniformly varying load
4. Stress and deflection analysis in simply supported beam with uniformly distributed load

Semester	VI	L	T	P	C	Course Code
Regulation	V20	0	0	3	1.5	V20MEL12
Name of the Course	Computer Numerical Control Programming Lab					
Branch	Mechanical Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to:	Knowledge Level
CO1	Describe the features of CNC Machine Tool.	K2
CO2	Examine the applications of various CNC machines like CNC lathe, CNC Vertical	K3
CO3	Interpret CNC Programmes for turning applications	K3
CO4	Prepare CNC programmes for milling applications	K3
CO5	Review modern control systems	K2

CNC LATHE OPERATIONS

1. FACING CYCLE
2. TURNING CYCLE
3. STEP TURNING
4. TAPER TURNING
5. TURNING - CIRCULAR INTERPOLATION
6. THREADING

CNC MILLING OPERATIONS

1. LINEAR AND CIRCULAR INTERPOLATION
2. ENGRAVING
3. MIRRORING
4. ROTATION
5. CIRCULAR POCKETING
6. RECTANGULAR POCKETING

Semester	**VI**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	3	0	0	3	V20MEPE4
Name of the Course	Tool and Die Design **Professional Elective – II**					
Branch	Mechanical Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to:	Knowledge Level
CO1	Describe various tool materials and their applications.	K2
CO2	Construct cutting die with required specifications	K3
CO3	Construct non-cutting die with required specifications	K3
CO4	Explain various types of jigs and fixtures with design data	K2
CO5	Discuss various components and types of die casting dies	K2

UNIT – I

Tool Materials properties and applications of Carbon steels – plain carbon steels, plain carbon spring steels, plain carbon free cutting steels.
Case hardening steels – Case hardening alloy steels, Nitriding steels.
Tool steels-Cold work water hardening steel, cold work oil/air hardening steel, hot work tool steel

UNIT – II

PRESS TOOLS (Cutting dies)

Introduction, components of simple die, press features, types of dies, clearance between die and punch, dowels and screws, punch holder and die holder, press work operations, cutting force, die block design, punch design, stripper plate, die springs, stock strip stops, strip payout, design procedure of cutting dies, design calculations.

UNIT – III

PRESS TOOLS (Non-Cutting dies)

Bending dies-Introduction, types of bending, bending force, bend allowance, spring back
Forming-Introduction, types of forming dies
Drawing-Introduction, drawing dies, factors effecting drawing, blank size calculation, clearance between punch and die, draw ratio, thickness ratio, drawing force, blank holder pressure, redrawing, ironing, calculation of number of draws, lubricants for drawing, design procedure for drawing die, design calculations for drawing die

UNIT – IV
JIGS AND FIXTURES
Introduction, advantages, design principles, design factors, design steps, location, rules for location, degrees of freedom, 3-2-1 principle of location, locating methods and devices, diamond pin locator, fool proofing, jig bushes, clamping devices, types of clamping devices, box jig, leaf jig, milling fixture, grinding fixture

UNIT – V
DIE CASTING DIE
Introduction, steps of die casting process, types of die casting processes, die casting alloys, advantages, limitations, applications of die casting, hot chamber and cold chamber machines.

TEXT BOOKS:
1. Industrial steel reference book by S N Bagchi, kuldipprakash by New age international Publishers.
2. Press Tools Design and Construction by Joshi P. H. by S Chand & Co Ltd
3. Jigs and fixtures Design manual by P H Joshi by McGraw-Hill companies

REFERENCE BOOKS:
1. Tool Engineering, jigs and fixtures by Albert A. Dowd and Frank W. Curtis by McGraw-Hill companies.
2. ASM Hand book Vol14 Forming and forging by ASM International

Semester	**VI**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	3	0	0	3	V20MEPE5
Name of the Course	Industrial Automation and Robotics **Professional Elective – II**					
Branch	Mechanical Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to:	Knowledge Level
CO1	Describe various robot configuration and components.	K2
CO2	Select appropriate actuator sand sensors for a robot based on specific application.	K3
CO3	Apply kinematic and dynamic analysis for simple serial kinematic chains.	K3
CO4	Explain trajectory planning for a manipulator	K2
CO5	Understand the Robot Actuators And Feed Back Components	K2

UNIT – I

INTRODUCTION TO INDUSTRIAL AUTOMATION: Importance of the automation of an industrial system. Basic concepts: plant, control, operator, sensors, drives, open loop control, closed loop control, continuous processes, discrete processes, mixed processes, batch processing. Functional and physical architecture of the control of a system. Automation pyramid. Function of each level. Technological elements of each level: sensor networks, field buses, controllers (PLCs), instrumentation, drives, robots, plant buses, RTUs, local area networks and control centers. OSI communications model. Control types: centralized, distributed. Real time control.

UNIT – II

INTRODUCTION TO ROBOTICS: Automation principle in Robotics, CAD/CAM and Robotics–An overview of Robotics–present and future applications, classification by coordinate system.

COMPONENTS OF THE INDUSTRIAL ROBOTICS: Function line diagram representation of simple Robot, Components. Degrees of freedom –Requirements and challenges of end effectors. Mechanical, Electrical and hydraulic grippers.

UNIT– III

MOTION ANALYSIS: Homogeneous transformations as applicable to rotation and translation – problems. MANIPULATOR KINEMATICS: Specifications of matrices, D-H notation joint coordinates and world coordinates Forward and inverse kinematics – problems. Differential transformation and manipulators, Jacobians– problems.

UNIT– IV

GENERAL CONSIDERATIONS IN PATH DESCRIPTION AND GENERATION : Trajectory planning and avoidance of obstacles, path planning, Skew motion, joint integrated motion –straight line motion – Robot programming, languages, and software packages-description of paths with a robot programming language.

ROBOT ACTUATORS AND FEED BACK COMPONENTS: Actuators: Pneumatic, Hydraulic actuators, electric & step per motors.

UNIT– V

FEEDBACK COMPONENTS: Position sensors –potentiometers, resolvers, encoders and Velocity, proximity sensors.

ROBOT APPLICATIONS IN MANUFACTURING: Material Transfer–Material handling, loading, and unloading – Processing– spot and continuous arc welding & spray painting –Assembly and Inspection.

TEXT BOOKS:

1. Industrial Robotics/ Groover MP/ Pearson Edu.
2. Robotics and Control/Mittal RK & Nagrath IJ /TMH.

REFERENCE BOOKS:

1. Robotics/ FuK S/McGraw Hill.
2. Robotic Engineering/ Richard D.Kl after, Prentice Hall
3. Robot Analysis and Intelligence/ Asada and Slow time/ Wiley Inter-Science.
4. Introduction to Robotics /John JCraig / Pearson Edu.

Semester	**VI**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	3	0	0	3	V20MEPE6
Name of the Course	Product Design and Development **Professional Elective – II**					
Branch	Mechanical Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to:	Knowledge Level
CO1	Discuss proto typing of a product that meets established requirements.	K2
CO2	Describe product development, manufacturing and management.	K2
CO3	Investigate risk and identify corrective action.	K4
CO4	Experiment different tests and assess data.	K3
CO5	Illustrate maintenance concepts and product standardization.	K3

UNIT – I

Product Design Process: Design Process Steps, Morphology of Design. Problem Solving and Decision Making: Problem-Solving Process, Creative Problem Solving, Invention, Brainstorming, Morphological Analysis, Behavioral Aspects of Decision Making, Decision Theory, Decision Matrix, Decision Trees.

Modeling and Simulation: Triz, Role of Models in Engineering Design, Mathematical Modeling, Similitude and Scale Models, Computer Simulation, Geometric Modeling on Computer, Finite- Element Analysis.

UNIT – II

Product management: The operation of product management: Customer focus of product management , product planning process, Levels of strategic planning, Wedge analysis, Opportunity search, Product life cycle Life cycle theory and practice.

Product development: Managing new products, Generating ideas, Sources of product innovation, Selecting the best ideas, The political dimension of product design, Managing the product launch and customer feedback.

Product managers and manufacturing: The need for effective relationships, The impact of manufacturing processes on product decisions, Prototype planning,, Productivity potentials, Management of product quality, Customer service levels.

UNIT – III

Risk and Reliability: Risk and Society, Hazard Analysis, Fault Tree Analysis. Failure Analysis and Quality: Causes of Failures, Failure Modes, Failure Mode and Effect Analysis, FMEA Procedure, Classification of Severity, Computation of Criticality Index, Determination of Corrective Action, Sources of Information, Copyright and Copying. Patent Literature.

UNIT – IV

Product Testing: thermal, vibration, electrical, and combined environments, temperature testing, vibration testing, test effectiveness. Accelerated testing and data analysis, accelerated factors. Weibull probability plotting, testing with censored data.

UNIT – V

Design For Maintainability: Maintenance Concepts and Procedures, Component Reliability, Maintainability and Availability, Fault Isolation in design and Self-Diagnostics. Product Design for Safety, Product Safety and User Safety Concepts, Examples of Safe Designs. Design Standardization and Cost Reduction: Standardization Methodology, Benefits of Product Standardization; International, National, Association and Company Level Standards; Parts Modularization

TEXT BOOKS:

1. Engineering Design , George E. Dieter, McGRAW-HILL
2. Product Integrity and Reliability in Design, John W. Evans and Jillian Y. Evans, Springer Verlag

REFERENCE BOOKS:

1. The Product Management Handbook, Richard S. Handscombe, McGRAW-HILL
2. New Product Design, Ulrich Eppinger,
3. Product Design, Kevin Otto.

Syllabi for the courses offered in VII semester B. Tech under V20 Regulation
for the Academic Year 2023-2024
VII Semester

Semester	**VII**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	3	0	0	3	V20MEPE7
Name of the Course	Finite Element Methods **Professional Elective – III**					
Branch	Mechanical Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to:	Knowledge Level
CO1	Use the concepts of variational methods and weighted residual methods in FEM.	K3
CO2	Use Finite Element Formulation for solving the problems.	K3
CO3	Solve the problems of Truss elements and Beam elements by FEM.	K3
CO4	Use FEM to solve 2D CST problems.	K3
CO5	Apply finite element method for problems involving dynamics and heat transfer.	K3

UNIT – I
INTRODUCTION TO FINITE ELEMENT METHOD: stress and equilibrium, strain – displacement relations, stress-strain relations, plane stress and plane strain conditions, variational and weighted residual methods, the concept of potential energy, one-dimensional problems.

UNIT – II
FINITE ELEMENT FORMULATION: Discretization of the domain, element shapes, discretization procedures, assembly of stiffness matrix, bandwidth, node numbering, mesh generation, interpolation functions, convergence requirements, Treatment of Boundary conditions, Derivation of element stiffness matrix for Bar elements and problems

UNIT – III
ANALYSIS OF TRUSSES: Finite element modelling, coordinates and shape functions, assembly of global stiffness matrix and load vector, finite element equations, treatment of boundary conditions, stress, strain and support reaction calculations.

ANALYSIS OF BEAMS: Derivation of Element stiffness matrix for beam element, derivation of load vector for concentrated and UDL, Problems on Cantilever, simply supported beams with point and uniformly distributed loads.

UNIT – IV

Finite element modelling of two-dimensional stress analysis with constant strain triangles and treatment of boundary conditions, formulation of axisymmetric problems,

HIGHER ORDER AND ISOPARAMETRIC ELEMENTS: One dimensional quadratic and cubic elements in natural coordinates, two dimensional four node disoparametric elements, numerical integration.

UNIT-V

STEADY STATE HEAT TRANSFER ANALYSIS: one dimensional analysis of a fin and two dimensional analysis of thin plate, analysis of a uniform shaft subjected to torsion.

DYNAMIC ANALYSIS: Formulation of finite element model, element consistent and lumped mass matrices, evaluation of eigen values and eigen vectors, free vibration analysis.

TEXT BOOKS:

1. The Finite Element Methods in Engineering / S. S Rao / Pergamon.

REFERENCE BOOKS:

1. Finite Element Method with applications in Engineering / YM Desai, Eldho& Shah /Pearson publishers
2. An introduction to Finite Element Method / JN Reddy / McGraw Hill
3. The Finite Element Method for Engineers – Kenneth H. Huebner, Donald L. Dewhirst, Douglas E. Smithand Ted G. Byrom / John Wiley &Sons (ASIA) Pte Ltd.
4. Finite Element Analysis/ P.Seshu
5. Finite Element Methods: Basic Concepts and Applications ByChennakesava R. Alavala
6. Finite Element Analysis: for students & Practicing Engineers / G.LakshmiNarasaiah / BSP Books Pvt. Ltd.

Semester	**VII**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	3	0	0	3	V20MEPE8
Name of the Course	Tribology **Professional Elective – III**					
Branch	Mechanical Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to:	Knowledge Level
CO1	Understand the fundamentals of tribology and associated parameters.	K2
CO2	Apply concepts of tribology for the performance analysis and design of components experiencing relative motion.	K3
CO3	Analyse the requirements and design hydrodynamic journal and plane slider bearings for a given application.	K4
CO4	Select proper bearing materials and lubricants for a given tribological application.	K3
CO5	Apply the principles of surface engineering for different applications of tribology.	K3

UNIT – I

Introduction to tribology: Friction, Wear and Lubrication, practical importance. Lubricants: Types and specific field of applications. Properties of lubricants, viscosity, its measurement, effect of temperature and pressure on viscosity, lubrication types, standard grades of lubricants, and selection of lubricants.

UNIT – II

Friction: Origin, friction theories, measurement methods, friction of metals and non-metals.

Wear: Classification and mechanisms of wear, delamination theory, debris analysis, testing methods and standards. Related case studies.

UNIT – III

Hydrodynamic journal bearings: Friction forces and power loss in a lightly loaded journal bearing, Petroff's equation, mechanism of pressure development in an oil film, and Reynold's equation in 2D.

Introduction to idealized journal bearing, load carrying capacity, condition for equilibrium, Sommerfeld's number and it's significance; partial bearings, end leakages in journal bearing, numerical examples on full journal bearings only.

UNIT – IV

Plane slider bearings with fixed/pivoted shoe: Pressure distribution, Load carrying capacity, coefficient of friction, frictional resistance in a fixed/pivoted shoe bearing, center of pressure, numerical examples.
Hydrostatic Lubrication: Introduction to hydrostatic lubrication, hydrostatic step bearings, load carrying capacity and oil flow through the hydrostatic step bearing, numerical examples.

UNIT – V
Bearing Materials: Commonly used bearings materials, and properties of typical bearing materials. Advantages and disadvantages of bearing materials.
Introduction to Surface engineering: Concept and scope of surface engineering. Surface modification – transformation hardening, surface melting, thermo chemical processes. Surface Coating – plating, fusion processes, vapor phase processes. Selection of coating for wear and corrosion resistance.

TEXT BOOKS:
1.”Introduction to Tribology”, B. Bhushan, John Wiley & Sons, Inc., New York, 2002
2. “Engineering Tribology”, Prasanta Sahoo, PHI Learning Private Ltd, New Delhi, 2011.
3.“Engineering Tribology”, J. A. Williams, Oxford Univ. Press, 2005.

REFERENCE BOOKS:
1. “Introduction to Tribology in bearings”, B. C. Majumdar, Wheeler Publishing.
2. “Tribology, Friction and Wear of Engineering Material”, I. M.Hutchings, Edward Arnold, London,1992.
3. “Engineering Tribology”, G. W. Stachowiak and A. W. Batchelor, Butterworth-Heinemann,1992.
4. “Friction and Wear of Materials”, Ernest Rabinowicz, John Wiley & sons,1995.
5. “Basic Lubrication Theory”, A. Cameron, Ellis Hardwoods Ltd., UK.
6. “Handbook of tribology: materials, coatings and surface treatments”, B.Bhushan, B.K. Gupta, McGraw-Hill,1997.

Semester	VII	L	T	P	C	Course Code
Regulation	V20	3	0	0	3	V20MEPE9
Name of the Course	Micro Electro Mechanical Systems (MEMS) **Professional Elective – III**					
Branch	Mechanical Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to:	Knowledge Level
CO1	Understand about the basics of MEMS, Methods of Micro machining.	K2
CO2	Interpret various Mechanical and Thermal sensors & Actuators	K3
CO3	Differentiate between different types of MOEMS devices	K2
CO4	Illustrate and explain various Magnetic sensors and Actuators & its applications	K3
CO5	Illustrate and explain various micro-fluidic devices & its applications	K3

UNIT – I

INTRODUCTION: Definition of MEMS, MEMS history and development, micro machining, lithography principles & methods, structural and sacrificial materials, thin film deposition, surface micro machining, Bulk micro machining , wafer bonding, LIGA.

UNIT – II

MECHANICAL SENSORS AND ACTUATORS: Principles of sensing and actuation: beam and cantilever, capacitive, piezo electric, pressure, shear mode piezo actuator, gripping piezo actuator, Inchworm technology.

THERMAL SENSORS AND ACTUATORS Thermal energy basics and heat transfer processes, thermo couple, micro hot plate gas sensors, pyro electricity, shape memory alloys (SMA).

UNIT – III

MICRO-OPTO-ELECTRO MECHANICAL SYSTEMS: Principle of MOEMS technology, properties of light, light modulators, beam splitter, micro lens, micro mirrors, digital micro mirror device (DMD), light detectors, grating light valve (GLV), optical switch.

UNIT – IV

MAGNETIC SENSORS AND ACTUATORS: Magnetic materials for MEMS and properties, magnetic sensing and detection, magneto resistive sensor, more on hall effect, magneto diodes, magneto transistor, MEMS magnetic sensor.

UNIT – V

MICRO FLUIDIC SYSTEMS: Applications, considerations on micro scale fluid, fluid actuation methods, dielectro phoresis (DEP), electro wetting, electro thermal flow, thermo capillary effect, electro osmosis flow, opto electro wetting (OEW), micro fluid dispenser, micro needle, micro pumps.

TEXT BOOKS:

1.MEMS, Nitaigour Premchand Mahalik, TMH Publishing co.

REFERENCE BOOKS:

1. Foundation of MEMS, Chang Liu, Prentice Hall Ltd.
2. MEMS and NEMS, Sergey Edwrd Lyshevski, CRC Press, Indian Edition.
3. MEMS and Micro Systems: Design and Manufacture, Tai-Ran Hsu, TMH Publishers.
4. Introductory MEMS, Thomas M Adams, Richard A Layton, Springer International Publishers.

Semester	VII	L	T	P	C	Course Code
Regulation	V20	3	0	0	3	V20MEPE10
Name of the Course	Automobile Engineering **Professional Elective – IV**					
Branch	Mechanical Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to:	Knowledge Level
CO1	Understand various components in four wheel automobile.	K2
CO2	Differentiate between different types of transmission systems used in automobile.	K4
CO3	Examine steering geometry and steering systems used in automobile and Interpret suspension systems in automobile	K3
CO4	Interpret breaking and electrical systems in automobile.	K3
CO5	Use various safety systems used in automobile and Practice engine service for different components in automobile.	K3

UNIT – I

INTRODUCTION: Components of four wheeler automobile – chassis and body – power unit – power transmission – rear wheel drive, front wheel drive, 4 wheel drive – types of automobile engines, engine construction, no. of cylinders and arrangement, turbo charging and super charging – engine lubrication, splash and pressure lubrication systems, oil filters, oil pumps – crank case ventilation – engine service, reboring, decarbonisation, Nitriding of crankshaft.

UNIT – II

TRANSMISSION SYSTEM: Clutches, principle, types, cone clutch, single plate clutch, multi plate clutch, magnetic and centrifugal clutches, fluid fly wheel – gear boxes, types, sliding mesh, construct mesh, synchro mesh gear boxes, epicyclic gear box, over drive torque converter. propeller shaft– Hotch – Kiss drive, Torque tube drive, universal joint, differential rear axles–types–wheels and tyres.

UNIT – III

STEERING SYSTEM: Steering geometry – camber, castor, king pin rake, combined angle toe in, center point steering. Types of steering mechanism – Ackerman steering mechanism, Davis steering mechanism, steering gears– types, steering linkages.

SUSPENSION SYSTEM: Objects of suspension systems – rigid axle suspension system, torsion bar, shock absorber, Independent suspension system.

UNIT –IV

BRAKING SYSTEM: Mechanical brake system, hydraulic brake system, master cylinder, wheel cylinder tandem master cylinder requirement of brake fluid, pneumatic and vacuum brakes.
ELECTRICAL SYSTEM: Charging circuit, generator, current – voltage regulator – starting system, bendix drive mechanism solenoid switch, lighting systems, horn, wiper, fuel gauge – oil pressure gauge, engine temperature indicator etc.
UNIT – V
SAFETYSYSTEMS: Introduction, safety systems - seatbelt, airbags, bumper, antilock brake system (ABS), wind shield, suspension sensors, traction control, mirrors, central locking and electric windows, speed control.
ENGINE SERVICE: Introduction, service details of engine cylinder head, valves and valve mechanism, piston connecting rod assembly, cylinder block, cranks haft and main bearings, engineer assembly-precautions.

TEXT BOOKS:
1. Automotive Mechanics –Vol.1&Vol.2/Kirpal Singh/standard publishers
2. Automobile Engineering/William Crouse/TMHD istributors
3. Automobile Engineering/P.SGill/S.K.Kataria & Sons/ New Delhi.

REFERENCE BOOKS:
1. Automotive Engines Theory and Servicing/James D. Halderman and Chase D. Mitchell Jr.,/ Pearson educationinc.
2. Automotive Engineering/K Newton,W.Steeds & TKGarrett/SAE
3. AutomotiveMechanics:PrinciplesandPractices/JosephHeitner/VanNostrandReinhold
4. Automobile Engineering/CSrinivasan/ McGrawHill

Semester	**VII**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	3	1	0	4	V20MEPE11
Name of the Course	Cryogenics **Professional Elective – IV**					
Branch	Mechanical Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to:	Knowledge Level
CO1	Illustrate the basics for evolution of low temperature science, Understand properties of materials at cryogenic temperatures.	K3
CO2	Illustrate various liquefaction systems.	K3
CO3	Illustrate gas liquefaction systems.	K3
CO4	Illustrate Cryogenic Refrigeration systems.	K3
CO5	Illustrate Cryogenic fluid storage and transfer system.	K3

UNIT – I

Introduction to Cryogenic Systems, Historical development, Low Temperature properties of Engineering Materials, Mechanical properties- Thermal properties- Electric and magnetic properties – Cryogenic fluids and their properties.

Applications of Cryogenics: Applications in space, Food Processing, super conductivity, Electrical Power, Biology, Medicine, Electronics and Cutting Tool Industry. Low temperature properties of engineering materials.

UNIT – II

Liquefaction systems ideal system, Joule Thoms on expansion, Adiabatic expansion, Linde Hampson Cycle, Claude & Cascaded System, Magnetic Cooling, Stirling Cycle Cryo Coolers.

UNIT – III

Gas liquefaction systems: Introduction - Production of low temperatures - General Liquefaction systems - Liquefaction systems for Neon. Hydrogen and Helium – Critical components of Liquefaction systems.

UNIT –IV

Cryogenic Refrigeration systems: Ideal Refrigeration systems - Refrigeration using liquids and gases as refrigerant- Refrigerators using solids as working media.

UNIT – V

Cryogenic fluid storage and transfer systems: Cryogenic Storage vessels and Transportation, Thermal insulation and their performance at cryogenic temperatures, Super Insulations, Vacuum insulation, Powder insulation, Cryogenic fluid transfer systems.

TEXT BOOKS:

1.R.B.Scott,CryogenicEngineering,VanNostrandCo., 1959
2.RandalF.Barron,Cryogenicsystems,McGraw Hill,1986

REFERENCE BOOKS:

1. Klaus D.Timmerhaus and Thomas M.Flynn, Cryogenic Process Engineering, Plenum Press, New York, 1989.

Semester	**VII**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	3	0	0	3	V20MEPE12
Name of the Course	Design for Manufacturing and Assembly **Professional Elective – IV**					
Branch	Mechanical Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to:	Knowledge Level
CO1	Explain how a design can be made suitable for various manufacturing and assembly processes.	K2
CO2	Express various factors influencing the manufacturability of components.	K2
CO3	Illustrate various metal casting, extrusion and sheet metal work.	K2
CO4	Apply different factors to joining processes.	K3
CO5	Explain various assembly systems and assembly lines.	K2

UNIT – I

Introduction to DFM, DFMA: How Does DFMA Work? Reasons for Not Implementing DFMA, What Are the Advantages of Applying DFMA During Product Design?, Typical DFMA Case Studies, Overall Impact of DFMA on Industry.

Design for Manual Assembly: General Design Guidelines for Manual Assembly, Development of the Systematic DFA Methodology, Assembly Efficiency, Effect of Part Symmetry, Thickness, Weight on Handling Time, Effects of Combinations of Factors, Application of the DFA Methodology.

UNIT – II

Machining processes: Overview of various machining processes-general design rules for machining-dimensional tolerance and surface roughness-Design for machining – ease – redesigning of components for machining ease with suitable examples. General design recommendations for machined parts.

UNIT – III

Metal casting: Appraisal of various casting processes, selection of casting process,-general design considerations for casting-casting tolerance-use of solidification, simulation in casting design-product design rules for sand casting.

Extrusion & Sheet metal work: Design guide lines extruded sections-design principles for punching, blanking, bending, deep drawing-Keeler Goodman forging line diagram – component design for blanking.

UNIT – IV

Metal joining: Appraisal of various welding processes, factors in design of weldments – general design guidelines-pre and post treatment of welds-effects of thermal stresses in weld joints-design of brazed joints. Forging: Design factors for forging – closed die forging design – parting lines of dies – drop forging die design – general design recommendations.

UNIT – V

Design for Assembly Automation: Fundamentals of automated assembly systems, System configurations, parts delivery system at workstations, various escapement and placement devices used in automated assembly systems, Quantitative analysis of Assembly systems, Multi station assembly systems, single station assembly lines.

TEXTBOOKS:

1. Design for manufacture, John cobert,AdissonWesley.1995
2. Design for Manufacture and assembly by Boothroyd,3rd edition CRC press
3. Design for manufacture, James Bralla, 2nd edition Mc Graw Hill

REFERENCES BOOK:

1. ASM Hand book Vol.20, Taylor & Francis 1997

Semester	VII	L	T	P	C	Course Code
Regulation	V20	3	0	0	3	V20MEPE13
Name of the Course	Power Plant Engineering **Professional Elective – V**					
Branch	Mechanical Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to:	Knowledge Level
CO1	Explain the working and layout of steam power plant and the different systems comprising the plant.	K2
CO2	Describe the basic components and working principle of hydroelectric power plant.	K2
CO3	Explain the working principles, layouts of diesel power plant and gas turbine power plants.	K2
CO4	Describe the basic components and working principle of different reactors of nuclear power plant.	K2
CO5	Compute the power plant economics.	K3

UNIT – I

Introduction to the Sources of Energy.

Steam Power Plant: Plant layout, working of different circuits, coal handling equipment, ash handling systems, overfeed and underfeed fuel beds, types of stokers, dust collectors, cooling towers and feed water treatment.

UNIT – II

Hydro Electric Power Plant: Water power, hydrological cycle, hydrographs, classification of dams and spill ways.

Hydro Projects and Plant: Classification – typical layouts – plant auxiliaries – plant operation pumped storage plants.

UNIT – III

Diesel power Plant: IC Engines, types, Plant layout with auxiliaries – fuel supply system, air starting equipment, lubrication and cooling system, super charging.

Gas Turbine Plant: Introduction, classification, construction, Layout with auxiliaries, Principles of working of closed and open cycle gas turbines, combined cycle power plants and comparison.

UNIT – IV

Nuclear Power Station: Nuclear fuel – breeding and fertile materials, nuclear reactor – reactor operation. Types of reactors and their operation - Pressurized water reactor, boiling water reactor, sodium-graphite reactor, fast breeder reactor. Radiation hazards and shielding, radioactive waste disposal.

UNIT – V

Power Plant Economics: Capital cost, investment of fixed charges, operating costs, general arrangement of power distribution, load curves, load duration curve, definitions of connected load, maximum demand, demand factor, average load, load factor, diversity factor – related exercises.

TEXT BOOKS:

1. A course in Power Plant Engineering /Arora and Domkundwar/Dhanpatrai& Co.
2. Power Plant Engineering /P.C.Sharma / S.K.Kataria Pub

REFERENCE BOOKS:

1. Power Plant Engineering: P.K.Nag/ TMH.
2. Power station Engineering – M.M.Ei-Wakil / McGraw Hill.

Semester	**VII**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	3	0	0	3	V20MEPE14
Name of the Course	Non Destructive Testing and Evaluation **Professional Elective – V**					
Branch	Mechanical Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to:	Knowledge Level
CO1	Identify the flaws in manufacturing process through radiographic inspection	K2
CO2	Explain the theory of wave propagation and inspect the components using ultrasonic test	K2
CO3	Identify various surface, subsurface flaws with LPT and ECT	K2
CO4	Explain the principle of magnetic particle test system, flaw detection and evolution	K2
CO5	Explain the industrial applications in railways, nuclear, aerospace	K2

UNIT – I
Introduction to non-destructive testing, Radiographic test, Sources of X and Gamma Rays and their interaction with Matter, Radiographic equipment, Radiographic Techniques, Safety Aspects of Industrial Radiography.

UNIT – II
Ultrasonic test: Principle of Wave Propagation, Reflection, Refraction, Diffraction, Mode Conversion and Attenuation, Sound Field, Piezo-electric Effect, Ultrasonic Transducers and their Characteristics, Ultrasonic Equipment and Variables Affecting Ultrasonic Test, Ultrasonic Testing, Interpretations and Guidelines for Acceptance, Rejection, Effectiveness and Limitations of Ultrasonic Testing.

UNIT – III
Liquid Penetrant Test: Liquid Penetrant Test, Basic Concepts, Liquid Penetrant System, Test Procedure, Effectiveness and Limitations of Liquid Penetrant Testing.
Eddy Current Test: Principle of Eddy Current, Eddy Current Test System, Applications of Eddy Current Testing Effectiveness of Eddy Current Testing.

UNIT – IV
Magnetic Particle Test: Magnetic Materials, Magnetization of Materials, Demagnetization of Materials, Principle of Magnetic Particle Test, Magnetic

Particle Test Equipment, Magnetic Particle Test Procedure, Standardization and Calibration, Interpretation and Evaluation, Effective Applications and Limitations of the Magnetic Particle Test.

UNIT – V

Industrial Applications of NDE: Span of NDE Activities Railways, Nuclear, Non-nuclear and Chemical Industries, Aircraft and Aerospace Industries, Automotive Industries, Offshore Gas and Petroleum Projects, Coal Mining Industry, NDE of pressure vessels, castings, welded constructions.

TEXT BOOKS:

1. Non destructive test and evaluation of Materials/J Prasad, GCK Nair/TMH Publishers
2. Ultrasonic testing of materials/ H Krautkramer/Springer
3. Non destructive testing/Warren, J Mc Gonnagle / Godan and Breach Science publishers
4. Non destructive evaluation of materials by infrared thermography / X. P. V. Maldague, Springer-Verlag,
   1st edition, (1993)

REFERENCE BOOKS:
1. Ultrasonic inspection training for NDT/ E. A. Gingel/Prometheus Press,
2. ASTM Standards, Vol 3.01, Metals and alloys
3. Non-destructive, Hand Book – R. Hamchand

Semester	VII	L	T	P	C	Course Code
Regulation	V20	3	0	0	3	V20MEPE15
Name of the Course	Gas Dynamics and Jet Propulsion **Professional Elective – V**					
Branch	Mechanical Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to:	Knowledge Level
CO1	Understand the basic principles of Gas Dynamics.	K2
CO2	Apply governing equations of Isentropic Flow.	K3
CO3	Illustrate governing equations of Fanno Flow, Rayleigh Flow.	K3
CO4	Develop governing equations of Normal Shock.	K3
CO5	Examine jet engines, rocket engines and associated parameters.	K3

UNIT – I

Introduction to gas dynamics: control volume and system approaches acoustic waves and sonic velocity, mach number, classification of fluid flow based on mach number, mach cone, compressibility factor, general features of one dimensional flow of a compressible fluid, continuity and momentum equations for a control volume.

UNIT – II

Isentropic flow of an ideal gas: basic equation, stag nation enthalpy, temperature, pressure and density, acoustic speed, critical speed of sound, maximum fluid velocity, mach number M*, area ratio as function of mach number, dimensionless velocity, governing equations for isentropic flow of a perfect gas, critical flow area, stream thrust an dimpulse function.

Steady one dimensional is entropic flow with area change, effect of area change on flow parameters, chocking, convergent nozzle, performance of a nozzle under decreasing backpressure, De lavelnozzle, optimum area ratioeffect of back pressure, nozzle discharge coefficients, nozzle efficiencies.

UNIT – III

Simple frictional flow: adiabatic flow with friction in a constant area duct, governing equations, fanno line limiting conditions, effect of wall friction on flow properties in an Isothermal flow with friction in a constant are a duct, governing equations, limiting conditions.

Steady one dimensional flow with heat transfer in constant area duct, governing equations, Rayleigh line entropy change caused by heat transfer, conditions of maximum enthalpy and entropy.

UNIT – IV

Effect of heat transfer on flow parameters: Intersection of Fanno and Rayleigh lines, Shock waves in perfect gas, properties of flow across a normal shock, governing equations, Rankine Hugoniat equations, Prandtl's velocity relationship, converging diverging nozzle flow with shock thickness, shock strength.

UNIT – V

Propulsion: Air craft propulsion: types of jet engines, energy flow through jet engines, thrust, thrust power and propulsive efficiency, turbojet components - diffuser, compressor, combustion chamber, turbines, exhaust systems.
Performance of turbo propeller engines, ramjet and pulse jet, scram jet engines.
Rocket propulsion-rocket engines, Basic theory of equations - thrust equation, effective jet velocity, specific impulse, rocket engine performance, solid and liquid propellant rockets, comparison of various propulsion systems.

TEXT BOOKS:

1. Compressible fluid flow/A.H.Shapiro/Ronald Press Co.,1953
2. Fundamentals of compressible flow with air craft and rocket propulsion / S.M.Yahya / New Age international Publishers
3. Fundamental of Gasdynamics-2nd edition/MJZucker/Wiley publishers

REFERENCE BOOKS:

1. Elements of gas dynamics/HW Liepman & ARoshko /Wiley
2. Air craft & Missile propulsion/MJ Zucrow/Wiley
3. Gas dynamics/M.J.Zucrow & Joe D.Holfman / Krieger Publishers

		L	T	P	C	Course Code
Regulation	V20	3	0	0	3	V20MEJO1
Name of the Course	CAD / CAM **Job Oriented Course**					
Branch	Mechanical Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to:	Knowledge Level
CO1	Understand the basics of CAD/CAM and different representations of curves	K2
CO2	Identify the basic components to solve different surface models	K2
CO3	Interpret the functionality of numerical control systems to write the programming	K3
CO4	Illustrate part families and group technology models	K3
CO5	Apply appropriate process strategy to achieve FMS	K3

UNIT – I

Fundamentals of CAD/ CAM, Application of computers for Design and Manufacturing, Benefits of CAD/ CAM - Computer peripherals for CAD/ CAM, Design workstation, Graphic terminal, CAD/ CAM software- definition of system software and application software, CAD/ CAM database and structure.

Geometric Modeling: Wire frame modeling, wire frame entities, Interpolation and approximation of curves, Concept of parametric and non-parametric representation of curves, Curve fitting techniques, definitions of cubic spline, Bezier, and B-spline.

UNIT – II

Surface Modeling: Algebraic and geometric form, Parametric space of surface, Blending functions, parameterization of surface patch, Subdividing, Cylindrical surface, Ruled surface, Surface of revolution Spherical surface, Composite surface, Bezier surface. B-spline surface, Regenerative surface and pathological conditions.

Solid Modeling: Definition of cell composition and spatial occupancy enumeration, Sweep representation, Constructive solid geometry, Boundary representations.

UNIT – III

NC Control Production Systems: Numerical control, Elements of NC system, NC part programming: Methods of NC part programming, manual part programming, Computer assisted part programming, Post Processor, Computerized part program, SPPL (A Simple Programming Language). CNC, DNC and Adaptive Control Systems.

UNIT – IV

Group Technology: Part families, Parts classification and coding. Production flow analysis, Machine cell design. Computer aided process planning: Difficulties in traditional process planning, Computer aided process planning: retrieval type and generative type, Machinability data systems.

Computer Aided Manufacturing Resource Planning: Material resource planning, inputs to MRP, MRP output records, Benefits of MRP, Enterprise resource planning, Capacity requirements planning

UNIT – V

Flexible Manufacturing System: F.M.S equipment, FMS layouts, Analysis methods for FMS benefits of FMS.

Computer Aided Quality Control: Automated inspection- Off-line, On-line, contact, Non-contact; Coordinate measuring machines, Machine vision.

Computer Integrated Manufacturing: CIM system, Benefits of CIM

TEXT BOOKS:

1. CAD/CAM Concepts and Applications/ Alavala / PHI
2. CAD/CAM Principles and Applications/P.N. Rao/Mc Graw Hill
3. CAD/CAM/ GrooverM.P/ Pearson
4. CAD/CAM/CIM/Radha Krishnan and Subramanian/New Age

		L	T	P	C	Course Code
Regulation	V20	3	0	0	3	V20MEJO2
Name of the Course	Refrigeration and Air conditioning **Job Oriented Course**					
Branch	Mechanical Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to:	Knowledge Level
CO1	Apply the concept of refrigeration to various systems.	K3
CO2	Employ the methods to improve performance of vapor compression systems.	K3
CO3	Identify eco-friendly refrigerants and understanding various VCR System Components.	K2
CO4	Analyze cooling and heating loads in an air conditioning system.	K4
CO5	Explain various air conditioning systems.	K2

UNIT – I

INTRODUCTION TO REFRIGERATION: Necessity and applications – Unit of refrigeration and C.O.P. –Mechanical refrigeration – Types of ideal cycles of refrigeration.

Air refrigeration: Bell Coleman cycle - Open and Dense air systems – Refrigeration needs of Air crafts-Refrigeration systems used in air crafts and Problems.

UNIT – II

VAPOUR COMPRESSION REFRIGERATION: Working principle and essential components of the plant –simple vapour compression refrigeration cycle – COP – Representation of cycle on T-S and p-h charts – Effect of sub cooling and super heating – Cycle analysis – Actual cycle influence of various parameters on system performance – Use of p-h charts – Problems.

UNIT – III

Refrigerants – Classification – Desirable properties of an ideal refrigerant – Common refrigerants used – Nomenclature of refrigerants .

VCR System Components: Compressors – General classification – comparison – Advantages and Disadvantages. Condensers – Classification – Working Principles. Evaporators – Classification – Working Principles. Expansion devices – Types – Working Principles.

UNIT – IV
VAPOR ABSORPTION SYSTEM: Calculation of maximum COP – description and working of Water-Ammonia Systems, Water-Lithium Bromide System. Principle of operation three fluid absorption system, salient features.
INTRODUCTION TO AIR CONDITIONING: Psychometric properties & Processes – Characterization of sensible and latent heat loads — Need for ventilation, Consideration of infiltration – Load concepts of RSHF, GSHF- Problems, concept of ESHF and ADP temperature.

UNIT – V
AIR CONDITIONING SYSTEMS: Classification of equipment, Components related to Air- Conditioning Systems- filters, grills and registers, fans and blowers.

TEXT BOOKS:

1. A Course in Refrigeration and Air conditioning , SC Arora & Domkundwar, Dhanpatrai
2. Refrigeration and Air Conditioning , CP Arora, TMH.
3. Refrigeration and Air Conditioning / Manohar Prasad / New Age

REFERENCE BOOKS:
1. Principles of Refrigeration /Dossat / Pearson Education.
2. Basic Refrigeration and Air-Conditioning / Ananthanarayanan / TMH
3. Stoecker, W. F., and Jones, J. W., Refrigeration and Air-Conditioning, McGraw - Hill, New Delhi.
4. Data Book: Refrigerant and Psychrometric Properties - Tables and Charts [SI Units], MathurM. L.,and Mehta F. S., Jain Brothers.

		L	T	P	C	Course Code
Regulation	V20	3	0	0	3	V20MEJO3
Name of the Course	Integration of AI & ML in Mechanical Engineering **Job Oriented Course**					
Branch	Mechanical Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to:	Knowledge Level
CO1	Apply ML models in design of mechanical materials	K3
CO2	Apply AI technologies for development of Robotics	K3
CO3	Apply AI to represent manufacturing problems	K3
CO4	Apply ML for engineering design	K3
CO5	Apply AI for thermal comfort systems	K3

UNIT – I

AI and ML in design of mechanical materials: Introduction – summary of ML models – data collection, generation and pre-processing – Applications – perspectives.

UNIT – II

Robotics and AI: Introduction – History – current state of the art – the seasons of AI and robotics – technologies and disciplines – limitations – weak and strong AI and robotics – the impact of government – major technological firms – programming languages – risks and fears

UNIT – III

Artificial intelligence in advanced manufacturing: Introduction to Artificial intelligence in advanced manufacturing – Evolution – Opportunities – Hierarchical approach to manufacturing systems – Manufacturing system optimization – AI for manufacturing applications of human robot collaboration – AI for condition based maintenance – AI for process monitoring, diagnostics and prognostics – AI for manufacturing process control – challenges and opportunities

UNIT – IV

Machine learning approach for engineering design: Introduction – model formation and use – Adaptive and interactive Modelling systems(AIMS) – Apply AIMS to engine design: engine design simulator, simulation and example generation – AIMS as support tool.

UNIT – V

AI for efficient thermal comfort systems: Introduction – thermal comfort: Air conditioning and personal thermal comfort system – AI for thermal comfort requirements – current applications and requirements of AI for thermal comfort in buildings – future directions for enabling autonomous personalized thermal comfort systems

TEXT BOOKS:

1. Artificial Intelligence: A Modern Approach, 4th US ed. by Stuart Russell and Peter Norvig
2. Artificial Intelligence Saroj Kaushik. February 19, 2018

REFERENCE JOURNAL PUBLICATIONS:

1. Kai Guo, Zhenze Yang, Chi-Hua Yu and Markus J. Buehler, "Artificial intelligence and
machine learning in design of mechanical materials", *Mater. Horiz.*, 2021, 8, 1153–1172 |
1153–1172.
2. Estifanos Tilahun Mihret, "Robotics and Artificial Intelligence", International Journal of
Artificial Intelligence and Machine Learning Volume 10 • Issue 2 • July-December 2020,
pp. 57-78.
3. Jorge F. Arinez, Qing Chang, Robert X. Gao, Chengying Xu and Jianjing Zhang, "Artificial Intelligence in Advanced Manufacturing: Current Status and Future Outlook", Journal of Manufacturing Science and Engineering · NOVEMBER 2020, Vol. 142 / 111003-1 to 16.
4. Sudhakar Yerramareddy, David K. Tcheng, Stephen C-Y. Lu, and Dennis N. Assanis,
"Cmatjng and Using Models for Engineering Design", Article in IEEE Expert · June 1992,
pp. 52-59.
5. Ali Ghahramani, Parson Galicia, David Lehrer, Zubin Varghese, Zhe Wang and Yogesh Pandit,
"Artificial Intelligence for Efficient Thermal Comfort Systems: Requirements, Current
Applications and Future Directions", Front. Built Environ. 6:49. Volume 6, Article 49,
April 2020, pp. 1-16.

		L	T	P	C	Course Code
Regulation	V20	3	0	0	3	V20MEJO4
Name of the Course	Industrial Safety and Management **Job Oriented Course**					
Branch	Mechanical Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to:	Knowledge Level
CO1	Understand the basic principles of Industrial Safety	K2
CO2	Discuss the principles of Directing for Safety	K2
CO3	Explain the principles of Safety Management	K2
CO4	Describe the role of Safety Committee	K2
CO5	Apply the knowledge for Accident Prevention	K3

UNIT – I

Henrichs Axioms Of Industrial Safety, Concepts Of Safety, Organization For Safety, Organization, Definition, Need & Principles Organizing For Health, and, Environmental, Activities, Organization Structure, Function & Responsibilities.

UNIT-II

Directing For Safety, Direction, Definition, Process, Principles and Techniques Leadership, Role, Function and, Attributes of a Leader.

UNIT-III

Safety Management System, Objectives of Health, Safety and Environment Policy, Responsibility for Implementation of HSE Policy.

UNIT-IV

Role of Occupier and Factory Manager, Factory Safety Committee, Structure and Functions and Working Tenure details etc.

UNIT-V

ACCIDENT PREVENTION :Definition : Incident, Accident, Injury , Dangerous occurrence ,Unsafe Act, Unsafe, Conditions, Hazards, Error, Oversight, Mistake ,Near Miss ,Electricity & Hazards ,Of Electricity, Explosives and Transportation Safety.

TEXT BOOKS:

1. Fundamentals of Industrial safety & health by K.U. Mistry.
2. Factories Act 1948.

		L	T	P	C	Course Code
Regulation	V20	3	0	0	3	V20MEJO5
Name of the Course	Industrial Hydraulics and Pneumatics **Job Oriented Course**					
Branch	Mechanical Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to:	Knowledge Level
CO1	Identify the fundamentals of Fluid Power Systems found in industry today.	K2
CO2	Discuss various types of Fluid Power Actuators	K2
CO3	Illustrate various Hydraulic elements in the design of circuits	K3
CO4	Describe the operations of Accumulators & intensifiers typically used in industry.	K2
CO5	Illustrate various Pneumatic systems and their operations	K3

UNIT – I

Fundamentals of Fluid Power Systems – Introduction-types advantages, disadvantages & applications-fluid characteristics-terminologies used in fluid power-hydraulic symbols-hydraulic systems and components-sources pumping theory-gear, vane & piston pumps.

UNIT – II

Fluid Power Actuators: Introduction-hydraulic actuators-hydraulic cylinders types, construction, specifications and special types. Hydraulic motors working principle-selection criteria for various types-hydraulic motors in circuits

UNIT – III

Hydraulic elements in the design of circuits – Introduction-control elements direction control valve-check valve-pressure control valve-relief valve throttle valve-temperature & pressure compensation-locations of flow control valve.

UNIT – IV

Accumulators & intensifiers-types, size & function of accumulators application & circuits of accumulators – intensifiers – circuit & applications. Design & drawing of hydraulic circuits-Introduction-case study & specifications-method of drawing a hydraulic circuit-hydraulic cylinder – quick return of a hydraulic cylinder.

UNIT –V

Pneumatic systems-Introduction-symbols used-concepts & components comparison- types & specifications of compressors-arrangement of a complete pneumatic system-compressed air behaviour- understanding pneumatic circuits-direction control valves. Electro pneumatics- Introduction-Pilot operated solenoid valve-electrical connections to solenoids-electro pneumatic circuit switches-relays-solenoids- P.E converter-concept of latching.

TEXT BOOKS:
1.Introduction to Hydraulics and Pneumatics by S. Ilango and V. Soundararajan, PHI , New Delhi.
2.Applied hydraulics and pneumatics-T. Sunder Selwyn & R. Jayendiran, Anuradha Publications.

REFERENCE BOOKS:
1.Oil Hydraulic Systems, S.R .Majumdar, McGrawHill Companies.
2.Pneumatic Systems : Principles and Maintenance, Majumdar, Mc Graw Hill.

Semester	**VI**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	3	0	0	3	V20MEJO6
Name of the Course	Automation in Manufacturing **Job Oriented Course**					
Branch	Mechanical Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to:	Knowledge Level
CO1	Explain Automation and types of Automations in the industries.	K2
CO2	Examine different Automated flow lines in the Industries.	K3
CO3	Asses and perform one or more processing and/or assembly operations on a starting raw material, part, or set of parts.	K3
CO4	Produce a sequence of automated or mechanized assembly operations Flexible manufacturing system (FMS)—a highly automated machine cell that produces part.	K3
CO5	Interpret logic controls, sensor, actuators and software configuration	K2

UNIT – I
Introduction: Types and strategies of automation, pneumatic and hydraulic components circuits, Automation in machine tools, Mechanical Feeding and to changing and machine tool control transfer the automation

UNIT – II
Automated flow lines: Methods or work part transport transfer Mechanical buffer storage control function, design and fabrication consideration. Analysis of Automated flow lines: General terminology and analysis of transfer lines without and with buffer storage, partial automation, implementation of automated flow lines .

UNIT – III
Assembly system and line balancing: Assembly process and systems assembly line, line balancing methods, ways of improving line balance, flexible assembly lines.

UNIT – IV
Automated material handling: Types of equipment, functions, analysis and design of material handling systems conveyor systems, automated guided vehicle systems. Automated storage systems: Automated storage and retrieval systems; work in process storage, interfacing handling and storage with manufacturing.

UNIT – V

Fundamentals of Industrial controls: Review of control theory, logic controls, sensors and actuators, Data communication and LAN in manufacturing. Business process Re-engineering: Introduction to BPE logistics, ERP, Software configuration of BPE.

TEXT BOOKS:

1. Automation, production systems and computer integrated manufacturing/ Mikell. P Groover
2. CAD/CAM/CIM/ P. Radha Krishnan & S. Subrahamanyarn and Raju/New Age International Publishers
3. System Approach to Computer Integrated Design and Manufacturing/ Singh/John Wiley

REFERENCE BOOKS:

1. Computer Aided Manufacturing/Tien-Chien Chang, Richard A. Wysk and Hsu-Pin Wang/ Pearson
2. Manufacturing and Automation Technology / R Thomas Wright and Michael Berkeihiser / Good Heart/Willcox Publishers

Annexure - II

Courses offered in OPEN ELECTIVES V, VI & VII Semester B.Tech., under V20 Regulations to the students of the other departments

Semester	**V /VI/VII**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	3	0	0	3	V20MEOE1
Name of the Course	Basic Mechanical Engineering **Open Elective**					
Branch	Mechanical Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to:	Knowledge Level
CO1	Discuss different types of materials, their properties and testing with applications.	K2
CO2	Interpret concepts of thermodynamics, Refrigeration, air conditioning and working of IC engines and air conditioners.	K2
CO3	Illustrate different manufacturing, joining, machining processes and machines with applications.	K2
CO4	Explain concepts of force, power transmission and power plants.	K2
CO5	Discuss the classification and working of pumps, turbines and gas turbines.	K2

UNIT – I
ENGINEERING MATERIALS AND PROCESSES:
ENGINEERING MATERIALS: Ferrous metals (Mild steel, Cast iron and its types, Stainless steel, High carbon steel), Non ferrous metals and alloys (Copper, Zinc, Aluminium, Tin, Nickel and their alloys).
Properties- Strength, Hardness, Toughness, Brittleness, Creep, Fatigue, Stiffness, Ductility, Malleability, Elasticity, Plasticity, Specific gravity, Viscosity, Thermal conductivity, Specific heat, Corrosion resistance.

UNIT – II
THERMAL SCIENCE:
THERMODYNAMICS: System, Surroundings, Thermodynamic equilibrium, Property, State, Path, Process, Cyclic process, Work, Heat, Energy, Enthalpy, Entropy, Internal energy, Laws of thermodynamics (Description only), Scales of temperature.

IC ENGINES: Classification, Carnot, Otto, Diesel Cycles with P-V and T-S diagrams, 2 and 4 stroke C.I and S.I engines, working, Hybrid engines, Indicated power, Brake power, efficiencies.
REFRIGERATION AND AIRCONDITIONING: Refrigerant and its types with applications, Unit of refrigeration, COP, working of vapour compression refrigeration.

UNIT – III
MANUFACTURING SCIENCE: Basic description of manufacturing processes-Casting, Forging, Rolling, Extrusion, Hot and cold working processes with applications.
METAL JOINING PROCESSES: Basic description with sketches-Rivetting, Arc welding, Gas welding, Soldering and Brazing with applications.

UNIT – IV

FORCE AND POWER TRANSMISSION:

FORCE SYSTEM AND ANALYSIS: Concepts of- Laws of motion, Free body diagrams, Resultant force, Equilibrium, Friction, laws of friction, Stress, types of stress, Strain, Poisson's ratio, Elastic constants, Moment, Moment of inertia, centroid, Torque.
POWER TRANSMISSION: Description of working with sketches-Belt, Chain drives, Gear trains with applications, Single plate clutches. Basic concepts of hydraulic and pneumatic power transmission.

UNIT – V
PUMPS AND PRIME MOVERS:
PUMPS: Classification of pumps, Description and working of- Reciprocating and centrifugal pumps with applications, priming, Multistage pumps., Discharge and coefficient of discharge.
PRIME MOVERS: Classification of hydraulic turbines, steam turbines, description and working of Pelton wheel and governing. Types of gas turbines and working of gas turbines with applications.

TEXT BOOKS:
1. Thermal Engineering –Rajput RK, Laxmi publications.
2. Elements of Mechanical Engineering-Sadhu singh, S.chand publications.
3. Basic Mechanical Engineering –Pravin kumar, Pearson publications.
4. Elements of Mechanical Engineering-N.M. Bhatt and J.R.Mehta, Mahajan publishing house.

REFERENCE BOOKS:
1. Production Technology-P.C.Sharma
2. Thermal Engineering-PL Ballaney
3. Power Plant Engineering-Nagpal
4. Workshop Technology-Hajra choudhury

Semester	V/VI/VII	L	T	P	C	Course Code
Regulation	V20	3	0	0	3	V20MEOE2
Name of the Course	Green Engineering Systems **Open Elective**					
Branch	Mechanical Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to:	Knowledge Level
CO1	Illustrate the concept of Solar Radiation, Collection, Storage and Applications	K2
CO2	Discuss the construction and working of wind energy and bio-energy conversion systems.	K2
CO3	Describe the construction and working of Geothermal and Ocean Energy conversion systems.	K2
CO4	Illustrate the principles of environmental impact of current manufacturing practices.	K2
CO5	Discuss the features and benefits of green building materials and its applications.	K2

UNIT – I

INTRODUCTION: SOLAR RADIATION: Role and potential of new and renewable sources, the solar energy option, Environmental impact of solar power, structure of the sun, the solar constant, sun-earth relationships, instruments for measuring solar radiation and sun shine, Flat plate and concentrating collectors.
SOLAR ENERGY STORAGE AND APPLICATIONS: Different Storage methods, solar ponds, solar applications- solar heating/cooling technique, solar distillation and drying, solar cookers, central power tower concept and solar chimney.

UNIT – II

WIND ENERGY: Sources and potentials, horizontal and vertical axis windmills, performance characteristics, types of winds.
BIO-MASS: Principles of bio-conversion, anaerobic/aerobic digestion, types of bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, bio fuels, I.C. engine operation.

UNIT – III

GEOTHERMAL ENERGY: Resources, types of wells, methods of harnessing the energy, potential in India.
OCEAN ENERGY: OTEC, Principles of utilization, setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Potential and conversion techniques, mini-hydel power plants, and their economics.

UNIT – IV

ENERGY EFFICIENT PROCESSES: Environmental impact of the current manufacturing practices and systems, benefits of green manufacturing systems, selection of recyclable and environment friendly materials in manufacturing, design and implementation of efficient and sustainable green production systems with examples like environmental friendly machining, vegetable based cutting fluids, zero waste manufacturing.

UNIT – V

GREEN BUILDINGS: Definition, features and benefits. Sustainable site selection and planning of buildings for maximum comfort. Environmental friendly building materials like bamboo, timber, rammed earth, hollow blocks, lime & lime pozzolana cement, agro materials and industrial waste, Ferro cement and Ferro-concrete, alternate roofing systems, paints to reduce heat gain of the buildings.

TEXT BOOKS:

1. Sukhatme S.P. and J.K.Nayak, Solar Energy – Principles of Thermal Collection and Storage,TMH.
2. Khan B.H., Non-Conventional Energy Resources, Tata McGraw Hill, New Delhi, 2006.
3. Green Manufacturing Processes and Systems, Edited by J. Paulo Davim, Springer 2013.

REFERENCE BOOKS

1. Alternative Building Materials and Technologies / K.S Jagadeesh, B.V Venkata Rama Reddy and K.S Nanjunda Ra.
2. Principles of Solar Energy / Frank Krieth & John F Kreider.
3. Non-Conventional Energy / Ashok V Desai /Wiley Eastern.
4. Renewable Energy Technologies /Ramesh & Kumar /Narosa
5. Renewable Energy Technologies/ G.D Roy

Semester	V/VI/VII	L	T	P	C	Course Code
Regulation	V20	3	0	0	3	V20MEOE3
Name of the Course	Computational Fluid Dynamics **Open Elective**					
Branch	Mechanical Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to:	Knowledge Level
CO1	Apply techniques in the numerical solution of fluid equations	K3
CO2	Apply numerical modeling and its role in the field of heat transfer and fluid flow.	K3
CO3	Develop methodologies used in CFD	K3
CO4	Compare various discretization methods and solving methodologies.	K4
CO5	Apply skills in the actual implementation of CFD methods (e.g. boundary conditions, different numerical schemes etc., Finite element methods in the application of CFD analysis to real life engineering designs.	K3

UNIT – I

ELEMENTARY DETAILS IN NUMERICAL TECHNIQUES: Number system and errors, representation of integers, fractions, floating point arithmetic, loss of significance and error propagation, condition and instability, computational methods for error estimation, convergence of sequences.

UNIT – II

APPLIED NUMERICAL METHODS: Solution of a system of simultaneous linear algebraic equations, iterative schemes of matrix inversion, direct methods for matrix inversion, direct methods for banded matrices.

EQUATIONS GOVERNING FLUID FLOW AND HEAT TRANSFER: Introduction, conservation of mass, Newton's second law of motion, expanded forms of Navier-stokes equations, conservation of energy principle, special forms of the Navier – stokes equations.

UNIT– III

Steady flow, dimensionless form of momentum and energy equations, stokes equation, conservative body force fields, stream function - vorticity formulation. Finite difference applications in heat conduction and convention – heat conduction, steady heat conduction in a rectangular geometry, transient eat conduction, finite difference application in convective heat transfer, closure.

UNIT – IV

Finite differences, discretization, consistency, stability, and fundamentals of fluid flow modelling: introduction, elementary finite difference quotients, implementation aspects of finite-difference equations, consistency, explicit and implicit methods.

UNIT – V

Introduction to first order wave equation, stability of hyperbolic and elliptic equations, fundamentals of fluid flow modelling, conservative property, the up wind scheme.

FINITEVOLUMEMETHOD: Approximation of surface integrals, volume integrals, interpolation and differentiation practices, upwind interpolation, linear interpolation and quadratic interpolation.

TEXTBOOKS:

1. Numerical heat transfer and fluid flow/Suhas V.Patankar- Butter –worth Publishers.
2.Computational fluid dynamics – Basics with applications -John. D.Anderson /McGraw Hill.

REFERENCEBOOKS:

1. Computational Fluid Flow and Heat Transfer/Niyogi, Pearson Publications.
2. Fundamentals of Computational Fluid Dynamics–Tapan K.Sengupta / Universities Press.
3. Computational fluid dynamics, 3rd edition/Wendt/Springer publishers

Semester	V/VI/VII	L	T	P	C	Course Code
Regulation	V20	3	0	0	3	V20MEOE4
Name of the Course	Rapid Prototyping **Open Elective**					
Branch	Mechanical Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to:	Knowledge Level
CO1	Understand virtual prototyping and testing of technology	K2
CO2	Construct CAD modelling for rapid prototyping	K3
CO3	Examine different types of process in rapid prototyping	K3
CO4	Explain Rapid Manufacturing errors	K2
CO5	Express the applications of rapid prototyping	K2

UNIT – I

Introduction: Introduction to Prototyping, Traditional Prototyping Vs. Rapid Prototyping (RP), Classification of Rapid Manufacturing Processes: Additive, Subtractive, Formative, Generic RP process.

UNIT – II

CAD Modelling and Data Processing for RP: CAD model preparation, Data interfacing: formats (STL, SLC, CLI, RPI, LEAF, IGES, HP/GL, CT, STEP), conversation, validity checks, repair procedures; Part orientation and support generation, Support structure design, Model Slicing algorithms and contour data organization, direct and adaptive slicing, Tool path generation.

UNIT – III

RP Processes: Process Physics, Tooling, Process Analysis, Material and technological aspects, Applications, limitations and comparison of various rapid manufacturing processes. Photo polymerization (Stereo lithography (SL), Micro stereo lithography), Powder Bed Fusion (Selective laser Sintering (SLS), Electron Beam melting (EBM)), Extrusion-Based RP Systems (Fused Deposition Modelling (FDM)), 3D Printing, Sheet Lamination (Laminated Object Manufacturing (LOM), Ultrasonic Consolidation (UC)), Beam Deposition (Laser Engineered Net Shaping (LENS), Direct Metal Deposition (DMD)).

UNIT – IV

Errors in RP Processes: Pre-processing, processing, post-processing errors, Part building errors in SLA, SLS.

UNIT – V

Application of Rapid Prototyping and Technology: Functional models, pattern for investment and Vacuum casting, medical models, Art models, Engineering analysis models.

REFERENCE BOOKS:

1. Rapid Prototyping: Principles and Applications in Manufacturing. Chua C.K., Leong K.F., Chu S. L., World Scientific.
2. Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing. Gibson, Ian, Rosen, David, Stucker, Brent, Pearson
3. Rapid Prototyping: Principles and Applications in Manufacturing. Noorani R, John Wiley & Sons.
4. Rapid Prototyping and Engineering applications: A tool box for prototype development. Liou W.L., Liou F. W., CRC Press
5. Rapid Prototyping: Theory and practice. Kamrani A. K., Nasr E. A., Springer

SEMESTER	**V/VI/VII**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	3	0	0	3	V20MEOE5
Name of the Course	Computer Aided Design **Open Elective**					
Branch	Mechanical Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to:	Knowledge Level
CO1	Explain the basic fundamentals of CAD tools	K2
CO2	Find the characteristics of curves, Representation and continuity requirements	K3
CO3	Illustrate the Geometric Transformations and demonstrate various types of surfaces and Representation.	K3
CO4	Differentiate between the methods of representing Solid Modelling**.**	K4
CO5	Apply the local and global properties for product development	K3

UNIT – I
CAD Introduction: Need of machine design, use of computer, computer fundamentals, computer aided design process, CAD configuration, and CAD tools, positive and negative points of CAD, CAD and CAM integration.
UNIT – II
DESIGN OF CURVES: Fundamental of Curve Design, Parametric Space of a Curve, Representation, Parametric cubic curve, Blending functions, Truncation, extension, and subdivision, composite curve: continuity requirements .
UNIT – III
GEOMETRIC TRANSFORMATIONS: Translation, Rotation, Scaling Symmetry and Reflection, Homogeneous Transformations. Orthographic Projections, Axonometric Projections, Oblique Projections, Perspective Transformation.
DESIGN OF SURFACES: Fundamental of Surface Design, Parametric Space of a Surface, Representation of a Surface patch, sixteen point form, Four Curve Form, Plane.
UNIT – IV
SOLID MODELLING: Solid Modelling fundamentals, topology and geometry. Geometric Modelling Method, Constructive Solid Geometry (CSG), Boundary Representation (Brep), Introduction to Wireframe, surface and solid modelling techniques. Introduction CAD data exchange format IGES, STEP

UNIT – V

GEOMETRIC PROPERTIES: Local and global properties of a curve, Local and global properties of a surface, Global properties of complex solids, Relational properties, intersections. Applications in Product Development and other areas.

REFERENCE BOOKS:

1. Geometric Modeling: Michael E. Mortenson, Third Edition, Industrial Press Inc.2006.
2. Mathematical Elements of Computer Graphics, Rogers and Adams, McGraw Hill. 1994
3. CAD CAM Theory and Prectice: I. Zeid, Tata-McGraw Hill, 2006
4. Computer-Aided Engineering Design, B Sahay and ASaxena, Springer, 2005.
5. Differential Geometry of Curves and Surfaces, Thomas F. Banchoff and Stephen T. Lovett, Thomas Banchoff-Stephen Lovett, 2010.
6. Computational Geometry for Design and Manufacture, I.D. Faux and M.J. Pratt, John Wiley, 1980.
7. Lectures on Classical Differential Geometry, Dirk J. Struick, Addison Wesley, 1980.

SEMESTER	V/VI/VII	L	T	P	C	Course Code
Regulation	V20	3	0	0	3	V20MEOE6
Name of the Course	Mechatronics **Open Elective**					
Branch	Mechanical Engineering					

Course Outcomes:

	After successful completion of the course, the student will be able to:	Knowledge Level
CO1	Understand the elements of Mechatronics & levels and explain various types of sensors , transducers and Mechatronics design process	K2
CO2	Sketch and explain various types of solid state devices like Diode, BJT, MOSFET, etc.,	K3
CO3	Illustrate and explain basic principles of Hydraulic, pneumatic, electro hydraulic, electro hydraulic servo actuating systems.	K3
CO4	Illustrate and explain microprocessors, microcontrollers and PLC	K3
CO5	Sketch and explain System interfacing and data acquisition systems.	K3

UNIT – I

MECHATRONICS SYSTEMS – elements & levels of mechatronics system, Mechatronics design process, system, measurement systems, control systems, advantages and disadvantages of mechatronics systems. Sensors and transducers, types, displacement,velocity, force, acceleration, liquid flow, liquid level, temperature and light sensors.

UNIT– II

SOLID STATE ELECTRONIC DEVICES - PN junction diode, BJT, FET, Analog signal conditioning, operational amplifiers, filters.

UNIT– III

HYDRAULIC AND PNEUMATIC ACTUATING SYSTEMS - Fluid systems, Hydraulic systems, and pneumatic systems, components, control valves, electro-pneumatic, hydro-pneumatic, electro-hydraulic servo systems.

UNIT– IV

DIGITAL ELECTRONICS AND SYSTEMS - Digital logic control, micro processors and micro controllers, programming, programmable logic controllers, PLCs versus computers, application of PLCs for control.

UNIT– V

SYSTEM AND INTERFACING AND DATA ACQUISITION – Data Acquisition Systems, Analog to Digital and Digital to Analog conversions; Digital Signal Processing.

TEXT BOOKS:

1. MECHATRONICS Integrated Mechanical Electronics Systems/KP Ramachandran, GK Vijaya Raghavan & MS Balasundaram/WILEY India Edition

REFERENCE BOOKS:

1. Mechatronics /Smaili A, Mrad F/ Oxford Higher Education, Oxford University Press
2. Mechatronics Source Book / Newton C Braga/Thomson Publications, Chennai.
3. Mechatronics – N. Shanmugam / Anuradha Agencies Publishers.
4. Mechatronics System Design / Devdas shetty/Richard/Thomson.
5. Mechatronics/M.D.Singh/J.G.Joshi/PHI.
6. Mechatronics – Electronic Control Systems in Mechanical and Electrical Engg. 4th Edition / W. Bolton / Pearson, 2012
7. Mechatronics – Principles and Application / Godfrey C. Onwubolu/Elsevier, Indian print

ANNEXURE- III

Sri Vasavi Engineering College (Autonomous)
(Sponsored by Sri Vasavi Educational Society)
(Approved by AICTE, New Delhi & Permanently affiliated to JNTUK, Kakinada)
(Accredited by NBA & NAAC with 'A' Grade, Recognized by UGC Under Section 2(f) & 12(B))
Pedatadepalli, Tadepalligudem, W.G.Dt, A.P-534101

Department of Mechanical Engineering

List of courses for B.Tech., - Honours Degree

S.No	Name of the course	No. of weeks	Credits	
1.	Advanced Machining processes	8	3	Students have to acquire a minimum of 14 credits by completing MOOCS/NPTEL courses from this pool
2.	Advanced materials and processes	12	4	
3.	Advanced thermodynamics and combustion	12	4	
4.	Advanced Engineering Thermodynamics	12	4	
5.	Advances in welding and joining technologies	8	3	
6.	Computational Fluid Dynamics and Heat transfer	12	4	
7.	Automation in production systems and management	12	4	
8.	Aluminium based alloys and metal matrix composites	12	4	
9.	Advanced fluid mechanics	12	4	
10.	BioMEMS and Microfluidics	8	3	
11.	Engineering Fracture Mechanics	12	4	
12.	Dynamics and Control of Mechanical Systems	12	4	
13.	Mechanism And Robot Kinematics	8	3	
14.	Welding Application Technology	8	3	
	Project work		**6**	
	Total Credits	**20**		

Sri Vasavi Engineering College (Autonomous)
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Pedatadepalli, Tadepalligudem, W.G.Dt, A.P-534101

Department of Mechanical Engineering
Minor degree in Mechanical Engineering

List of courses for B.Tech., (Minors) - 3D printing

S.No	Name of the course	No. opf weeks	Credits	
1.	Laser Based Manufacturing	8	3	Students have to acquire a minimum of 14 credits by completing MOOCS/NPTEL courses from this pool
2.	Fundamentals of additive manufacturing Technologies	12	4	
3.	Metal Additive Manufacturing	12	4	
4.	Rapid Manufacturing	12	4	
5.	The Future of Manufacturing Business: Role of Digital Technologies	8	3	
6.	Design for additive manufacturing	12	4	
7.	Additive Manufacturing Architecture	12	4	
8.	3D Printing	8	3	
9.	Additive Manufacturing for innovative design and production	12	4	
10.	Additive manufacturing- process and applications	12	4	
	Project work		**6**	
	Total Credits	**20**		

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SRI VASAVI ENGINEERING COLLEGE

(AUTONOMOUS)

(Sponsored by Sri Vasavi Educational Society)

(Approved by **AICTE**, New Delhi & Recognized by **UGC** under section **2(f) & 12(B)**)

(Permanently affiliated to JNTUK, Kakinada, Accredited by **NBA** and **NAAC** with '**A**' Grade)

Pedatadepalli, **TADEPALLIGUDEM – 534 101.**W.G.Dist**.** **(A.P)**

Department of Electronics and Communication Engineering

Date: 27.07.2022

Minutes of the 6th meeting of BOS
(Held on 25.07.2022)

The ECE Department 6th meeting of Board of Studies (BOS) was conducted through online mode on 25.7.2022 at 02.00 P.M using ZOOM Application with following given link address.
https://us02web.zoom.us/j/89973827779

Following external members have attended the meeting along with internal faculty members. The ECE HOD, Dr E. Kusuma Kumari, BOS Chairperson headed the meeting.

S.No.	Name of the BOS Member	Position	Address
1.	Dr.E. KusumaKumari	Chair person	Professor & Head, ECE, SVEC
2.	Prof. B.T. Krishna	University Nominee	Prof.& HoD in ECE Dept., University College of Engg., JNTUK, Kakinada
3.	Prof. NVSN. Sarma	Subject Expert	Director, IIIT Trichy Tiruchirapalli, Tamilnadu.
4.	Prof. M. VenugopalaRao	Subject Expert	Prof., ECE Dept., K.L.University, Vijayawada.
5.	Sri.Sunkavalli Siva Kumar	Alumni Nominee	Sr.Engineer,Qualcomm, Bangalore.
6.	All Faculty Members in Dept.	Members	ECE Dept., SVEC

The following are the key points discussed in the meeting.

- **Item No.1: Chairperson, BOS has welcomed all the members and given the Opening Remarks.**
- **Item No.2: Approval of Proposed course structure and Syllabi for V, VI, VII & VIII semesters of B. Tech ECE & ECT under V20 Regulations.**

BOS members Reviewed the Course Structure and given Following Suggestions

Prof. NVSN. Sarma (Academic Expert)		
Regulation	**Suggestions Given**	**Remarks**
B. Tech V20-Regulation	Microwave and Optical Communication Course should be separated	This course is separated as Microwave Engg and Optical Communication Networks
	Revise the Antenna and Wave Propagation Course syllabus	Sky wave Propagation concepts were removed. Space wave Propagation was included.
	Include the PIN Diode and Schotky Diode concepts in Microwave Engg course.	Mentioned Topics were included
	Embedded Systems & IOT Lab : Change the Lab name to IOT lab only	Lab name was changed.
	Include courses like wireless Sensor Networks, computer Networks, Optical Networks, Industrial IOT.	Suggested Courses were added in the Syllabus.

Dr. B. T. Krishna (University Nominee)		
Regulation	**Suggestions Given**	**Remarks**
B. Tech V20-Regulation	Reference books in VLSI Design course (V20ECT10) to be added	Reference books were Added
	Analog Circuits (V20ECT12) Syllabus is to be Revised	Syllabus was revised
	For Every Course no. of. Text Books and no. of Reference books are to be same.	No. of Books kept same.
	Text book Titles should be in same format	Kept in Same format.
	Radar Engg (V20ECT24) Text book and Reference book is to be interchanged	Books Interchanged

Prof. M. Venu Gopala Rao, (Academic Expert)		
Regulation	**Suggestions Given**	**Remarks**
B. Tech V20-Regulation	Ensure the Courses CO levels and Blooms Taxonomy Levels are to be properly defined	Made the necessary Changes and COs & BTL Levels are Properly Defined.
	Make the Analog Circuits (V20ECT12) course as compulsory course	Analog Circuits course was made as Compulsory course and AWP course was kept in Professional Elective course.
	Reduce the Digital signal Processing Course (V20ECT15) Syllabus.	DSP Processors topics are removed.
	DSP Lab (V20ECL08)Part-B , DIP experiments are included, which the students are not studied DIP	While doing the DIP experiments, a complete DEMO will be given to students though DIP Course was in VII Sem. DIP Experiments are essential while students are doing their Final Yr Projects.
	Reduce the Digital Image Processing (V20ECT20) Course Syllabus	Syllabus was reduced.
	In the course of VLSI Design, Design concepts should be include with revised Knowledge levels	Design concepts included with revised Knowledge levels

BOS members Approved course structure and Syllabi for V, VI, VII & VIII semesters of B. Tech ECE & ECT under V20 Regulations was given in **Annexure-1**

- **Item No.3: Approval of list of courses and Syllabi offered under Job Oriented courses for B. Tech ECE & ECT under V20 Regulation.**
  BOS Members reviewed the list of courses and syllabi and suggested to include CSE relevant courses in the pool of Job Oriented Elective Courses. Hence, we included the courses Deep Learning & Machine Learning in Job Oriented Elective Courses.
  Approved list of course and syllabi given in **Annexure-2**

- **Item No.4: Approval of Course structure & List of Courses for Honors Degree in B. Tech ECE in two streams ie., Communication & Signal Processing, VLSI & Embedded Systems & Minors Degree in ECE (VLSI & ES).**

BOS Members reviewed the list of courses and syllabi and suggested that At least minimum three course should be taught in conventional mode for Honors/Minors Degree and approved the same.
Details given in **Annexure-3**

Item No.5: Approval of list of courses and Syllabi offered under Open Elective courses for B. Tech under V20 Regulation for all other branches.

BOS Members reviewed the list of courses and syllabi and approved list of Open Elective Courses are given in **Annexure-4**

Finally, the chairperson thanked all the BOS members and faculty. The meeting was ended at 3.00 P.M

Dr. E. Kusuma Kumari,
Chairperson, BOS

Annexure-01

Approved Course Structure & Syllabus

for

(V, VI, VII, VIII Semesters)

(V20 Regulation)

V- Semester

S. No	Course Code	Course Name	L	T	P	Course-Category	Credits
1	V20ECT10	VLSI Design	3	0	0	Professional Core	3
2	V20ECT11	Microprocessors & Microcontrollers	3	0	0	Professional Core	3
3	V20ECT12	Analog Circuits	3	0	0	Professional Core	3
4	V20ECT13 V20ECT14	**Professional Elective-I** Antenna &Wave Propagation Information Theory & Coding	3	0	0	Professional Elective	3
5		**Open Elective-I / Job Oriented Elective**	3	0	0	Open Elective	3
6	V20ECL06	VLSI Design Lab	0	0	3	Professional Core Lab	1.5
7	V20ECL07	Microprocessor & Microcontrollers Lab	0	0	3	Professional Core Lab	1.5
8	V20ECSOC 03	Skill Oriented Course	1	0	2	Skill Oriented Course	2
9	V20ENT04	Professional Comm. skills(Eng+ aptitude) –III (BOS of English)	2	0	0	Mandatory & Non Credit	0
10		Summer Internship- Mandatory after Second Year to be Evaluated during V Semester	0	0	0	Mandatory	1.5
		TOTAL	**18**	**0**	**08**		**21.5**

VI- Semester

S. No	Course Code	Course Name	L	T	P	Course-Category	Credits
1	V20ECT15	Digital Signal Processing	3	1	0	Professional Core	3
2	V20ECT16	Microwave Engineering	3	0	0	Professional Core	3
3	V20ECT17	Internet of Things: Use Cases	3	0	0	Professional Core	3
4	V20ECT18 V20ECT19	**Professional Elective-II** Embedded Systems System Design Through Verilog	3	0	0	Professional Elective	3
5	V20MBT52	Management Science	3	0	0	Humanities & Social Science Elective	3
6	V20ECL08	Digital Signal Processing Lab	0	0	3	Professional Core Lab	1.5
7	V20ECL09	IoT Lab	0	0	3	Professional Core Lab	1.5
8	V20ECL10	Microwave Engineering Lab	0	0	3	Professional Core Lab	1.5
	V20CEMC02	Professional Ethics and Human Values	2	0	0	MNC	0
9	V20ECSOC04	Skill Advanced Course / Soft Skill Course	1	0	2	Skill Advanced Course / Soft Skill Course	2
		TOTAL	**16**	**1**	**11**		**21.5**

VII Semester

Sl. No.	Course Code	Course Title	Hours per week			Category	Credits
			L	T	P		C
1	V20ECT20 V20ECT21	**Prof. Elective III:** • Digital Image Processing • Computer Networks	3	0	0	Prof. Elective Course	3
2	V20ECT22 V20ECT23	**Prof. Elective IV:** • Cellular Mobile Communication • Low Power VLSI Design	3	0	0	Prof. Elective Course	3
3	V20ECT24 V20ECT25	**Prof. Elective V:** • Radar Engineering • CMOS Digital IC Design	3	0	0	Prof. Elective Course	3
4		**Open Elective-II/ Job Oriented Elective**	2	0	2	Open Elective Course	3
5		**Open Elective-III / Job Oriented Elective**	2	0	2	Open Elective Course	3
6		**Open Elective-IV / Job Oriented Elective**	2	0	2	Open Elective	3
7	V20ECSOC05	Skill Advanced Course	1	0	2	Skill Advanced Course	2
8		Industrial Internship-Mandatory after Third Year to be Evaluated during VII Semester	0	0	0	Mandatory	3
		Total	**16**	**0**	**8**		**23**

VIII Semester

Sl. No.	Course Code	Course Title	Hours per week			Category	Credits
			L	T	P		C
1	V20ECP01	Project Work, Seminar and Internship in Industry	0	0	0	Major Project	12
		Total	**0**	**0**	**0**		**12**

V-Semester

Syllabus

(V20 Regulation)

Semester	V SEM	L	T	P	C	Course Code
Regulation	V20	3	0	0	3	V20ECT10
Name of the Course	VLSI Design					
Branch	ECE					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO-1: Understand different IC technologies. **(K2)**
CO-2: Explain basic electrical properties of MOS, CMOS and Bi-CMOS Circuits. **(K2)**
CO-3: Develop layouts for MOS & Bi-CMOS circuits using design rules. **(K3)**
CO-4: Compute the parameters of MOS circuits and assess the effects of scaling **(K3)**
CO-5: Design Combinational circuits and Subsystems. **(K4)**

UNIT-I:
Review of Microelectronics and An Introduction to MOS technology: Introduction to IC technology, Basic MOS transistors, Enhancement mode MOS transistor Action, Depletion mode MOS transistor Action, NMOS, PMOS fabrication, CMOS fabrication and Bi-CMOS technology, Comparison between CMOS and Bi-CMOS technology.

UNIT-II:
Basic Electrical Properties of MOS and BICMOS Circuits: Ids versus Vds relationships, Aspects of MOS transistor threshold voltage Vt, Trans conductance gm, Output conductance gds and Figure of merit, NMOS inverter, Pull-up to pulldown ratio for NMOS inverter driven by another NMOS inverter and through one or more pass transistors, Alternative forms of pull-up, CMOS inverter, BICMOS inverters, Latch-up in CMOS circuits.

UNIT-III:
MOS and Bi-CMOS Circuit Design Processes: MOS Layers, Stick Diagrams, Design Rules and Layout, General observations on the Design rules, 2μm Double Metal, Double Poly, CMOS/Bi-CMOS rules, 1.2μm Double Metal, Double Poly CMOS rules, Layout Diagrams of NAND and NOR gates and CMOS inverter, Symbolic Diagrams-Translation to Mask Form.

UNIT-IV:

Basic Circuit Concepts: Sheet Resistance, Sheet Resistance concept applied to MOS transistors and Inverters, Area Capacitance of Layers, Standard unit of capacitance, some area Capacitance Calculations, The Delay Unit, Inverter Delays, driving large capacitive loads, Propagation Delays, Wiring Capacitances, Choice of layers. Scaling of MOS Circuits: Scaling models and scaling factors, Scaling factors for device parameters, Limitations of scaling.

UNIT-V:

Subsystem Design and Layout: Architectural issues, Switch logic, Gate Logic Examples of Structured Design (Combinational Logic): A Parity Generator, Bus Arbitration Logic for n-line-Bus an Illustration of Design Process: Multiplier, Design of an ALU Subsystem, Ripple Carry Adder, and Carry look ahead adder.

Text Books:

1. Essentials of VLSI Circuits and Systems by Kamran Eshraghian, Douglas and A. Pucknell and Sholeh Eshraghian, Prentice-Hall of India Private Limited, 2005Edition.

References:

1. "CMOS Digital Integrated Circuits, Analysis And Design", Sung – Mo (Steve) Kang, Yusuf Leblebici, Tata McGraw Hill, 3rd Edition, 2003.
2. "VLSI Technology", S.M. Sze, 2nd edition, Tata McGraw Hill, 2003.

Semester	V SEM	L	T	P	C	Course Code
Regulation	V20	3	0	0	3	V20ECT11
Name of the Course	Microprocessors & Microcontrollers					
Branch	ECE					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO-1: Describe the basic architecture and Modes of 8086 microprocessor (**K2)**
CO-2: Construct assembly language programs for arithmetic and Logical Operations (**K3).**
CO-3: Describe the basic peripherals inter facing and its programming techniques

(K2)

CO-4: Illustrate the Architecture and features of Intel 8051 Microcontroller **(K3)**

CO-5: Explain the Architecture and features of PIC microcontroller **(K2)**

UNIT-1: **Introduction to Microprocessors**: Evolution of Microprocessors, features, Intel Microprocessor families, Architecture of 8086 microprocessor, pin/signal description, Physical address formation, Description of Minimum and maximum mode pins, Timing diagrams.
Interrupts, Available interrupts, Interrupt Cycle, ISR (Interrupt service Routine).

UNIT-II: **Programming with 8086 Microprocessor**: Various addressing modes of 8086, Instruction set and Classification, Assembler Directives of 8086, writing Assembly language programs using various types of instructions.

UNIT – III: **Interfacing with Basic Peripherals**: Semiconductor memories interfacing (RAM, ROM), Interfacing Microprocessor to keyboards, interfacing to ADC/DAC, Interfacing, 8255(PPI-Parallel I/O port), 8259(Programmable interrupt controller), 8251(serial communication UART), Stepper motor interfacing and programming.

UNIT – IV: **8051 Microcontroller**: Intel 8051 Microcontroller, Microprocessor vs. Microcontroller, 8051 Microcontroller Architecture, Microcontroller 8051 pin diagram, Internal and External Memory, Counters and Timers, Serial Communication in 8051, interrupts in 8051, Addressing Modes, Instruction set, simple programs using microcontroller 8051.

UNIT – V: PIC Microcontroller: Introduction, characteristics of PIC microcontroller, memory organization, parallel and serial input and output, timers, Interrupts, PIC 16F877 architecture, instruction set of the PIC 16F877.

TEXT BOOKS:

1. Advanced microprocessor and Peripherals by A.K.Ray and K.M.Bhurchandi, TMH, 2000.
2. Microprocessors and Interfacing by Programming and Hardware by Douglas V Hall, SSSP Rao, Tata McGrawHill Education Private Limited, 3rd Edition.

REFERENCE BOOKS:

1. The Intel Microprocessors-Architecture, Programming, and Interfacing by Barry B.Brey,Pearson, Eighth Edition-2012.

Semester	V SEM	L	T	P	C	Course Code
Regulation	V20	3	0	0	3	V20ECT12
Name of the Course	Analog Circuits					
Branch	ECE					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO-1: Demonstrate Linear wave shaping circuits for various applications. **(K2)**
CO-2: Explain Non-Linear wave shaping circuits for various applications. **(K2)**
CO-3: Explain the operation of non sinusoidal oscillators & Illustrate Op-Amp Characteristics **(K2)**
CO-4: Demonstrate circuits for different applications using ICs. **(K2)**
CO-5: Discuss the operation of Active filters and Data Converters. **(K2)**

Unit I
Linear Wave shaping circuits: Response of high pass and low pass RC circuits to step, pulse inputs. High pass RC circuit as differentiator, low pass RC circuit as integrator.

Unit II
Non Linear Wave Shaping Circuits: Introduction to Clippers, Series and Shunt Clippers, Clippers with reference voltages, Clipping at two independent levels, Series and Shunt Noise Clippers, Positive and Negative Clampers, Clamping Circuits, Clamping Circuit Theorem.

Unit III
Non-sinusoidal oscillators & Introduction to Op-amp: Bistable, Monostable and Astable Multivibrators using BJT . Op-amp Block Diagram, Ideal Op-amp, Equivalent Circuit, Op Amp Characteristics.

Unit IV
Integrated Circuits and applications: open loop op-amp configurations. Inverting and non-inverting amplifier, OP Amp Applicationsr, 555 IC functional block diagram, 555 IC as Astable and Monostable multivibrators.

Unit V
Active filters and Data Converters: First order Low pass, high pass, band pass and band stop filters, All pass filter design guidelines. Weighted resistor DAC, R-2R ladder DAC. Dual slope ADC, Successive approximation ADC, flash ADC.

Text Books:
1. Integrated Electronics- J. Millman and C.C. Halkias, TMH

2. Electronic Devices and Circuits- Salivahanan, N.Suresh Kumar, A. Vallavaraj, TMH

2. Pulse, Digital and Switching Waveforms - J. Millman and H. Taub, TMH

References :

1. Pulse and Digital Circuits – A. Anand Kumar, PHI

2. Linear Integrated Circuits – D. Roy Choudhury, 4th edition, New Age International (p) Ltd.

3. Op-Amps & Linear Integrated Circuits - Ramakanth A. Gayakwad,3rd edition, PHI.

Semester	**V SEM**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	3	0	0	3	V20ECT13
Name of the Course	Antenna & Wave Propagation (Professional Elective -I)					
Branch	ECE					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO-1: Understand the radiation mechanism and fundamental parameters of antenna **(K2)**
CO-2: Solve the field components of dipole (or quarter monopole), loop antenna and their characteristics. **(K3)**
CO-3: Solve array factor for N element linear array and directivity & Design the Microwave antennas. **(K3)**
CO-4: Demonstrate the measurement procedure for antenna parameters, develop the rectangular Microstrip antenna and understand the concepts of modern antennas. **(K3)**
CO-5: Explain the concept of propagation methods and fading in wave propagation. **(K2)**

UNIT I
ANTENNA FUNDAMENTALS: Introduction, Radiation Mechanism – single wire, two wires, Dipoles, Current Distribution on a thin wire antenna. Antenna Parameters – Near and far field regions, Radiation Patterns, Patterns in Principal Planes, Main Lobe and Side Lobes, Beam width, Polarization, Beam Area, Radiation Intensity, Beam Efficiency, Directivity, Gain and Resolution, Antenna Apertures, Aperture Efficiency, Effective Height, Reciprocity Theorem applicable to antennas, Simple Problems.

UNIT II
WIRE ANTENNAS: Retarded Potentials, Radiation from Small Electric Dipole, Quarter wave Monopole and Half wave Dipole – Current Distributions, Evaluation of Electric and magnetic Field Components, Radiation Resistance, Beam-width, Directivity.
Loop Antennas: Small Loops - Concept of short magnetic dipole - Field Components, Comparison of far fields of small loop and short dipole, Helical Antennas – Significance, Geometry, basic properties.

UNIT III

ANTENNA ARRAYS: Two element arrays, N element Uniform Linear Arrays – Broadside Array, End-fire Array, Array factor, Derivation of their characteristics and comparison, Principle of Pattern Multiplication, Non Uniform arrays- Binomial arrays, Phased Arrays concept - Beam scanning, Applications.

MICROWAVE ANTENNAS: Parabolic Reflectors – Geometry, characteristics, types of feeds, F/D Ratio, Spill Over, Back Lobes, Aperture Blocking, Off-set Feeds & Cassegrain Feeds. Horn Antennas – Types, design Characteristics of Pyramidal Horns.

UNIT IV

ANTENNA MEASUREMENTS – Block diagram of radiation pattern measurement setup and measurement procedure, Distance Criterion, Indoor and outdoor measurement- Far field measurement, Advantages. Gain Measurements and measurement procedure (Comparison of Absolute and 3-Antenna Methods).

MODERN ANTENNAS: Microstrip Antennas - Geometry, Features, Advantages and Limitations, Rectangular MSA Design, Radiation mechanism, Simple design problems. Smart antennas - Block diagram, concept, switched beam and adaptive array concept & MIMO antennas.

UNIT V

WAVE PROPAGATION AND TRENDS IN WIRELESS COMMUNICATION: Concepts of Propagation - frequency ranges and types of propagations. Ground Wave-Propagation characteristics, Fundamental Equation for Free - Space Propagation, Basic Transmission Loss Calculations, Space Wave Propagation - Mechanism, LOS and Radio Horizon, Tropospheric Wave Propagation – Radius of Curvature of path, Effective Earth's Radius, Effect of Earth's Curvature, Field Strength Calculations. Fading - Types of fading, Multipath propagation.

TEXT BOOKS

1. Antennas for All Applications by John D. Kraus and Ronald J. Marhefka, 3rd Edition, TMH, 2003.
2. Electromagnetic Waves and Radiating Systems by E.C. Jordan and K.G. Balmain, PHI, 2nd Edition, 2000.
3. Broadband Microstrip Antenna by Girish Kumar, Artech house Publishers

REFERENCES

1. Antenna Theory by C.A. Balanis, John Wiley and Sons, 2nd Edition, 2001.
2. Antennas and Wave Propagation by K.D. Prasad, Satya Prakashan, Tech India Publications, New Delhi, 2001.
3. Antennas and Wave Propagation by Sisir K Das and Annapurna Das – Tata McGraw Hill.

Semester	**V SEM**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	3	0	0	3	V20ECT14
Name of the Course	Information Theory & Coding (Professional Elective -I)					
Branch	ECE					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1. Analyze the properties of Information theory **[K4]**
CO2. Evaluate Source coding efficiencies for different discrete sources **[K4]**
CO3. Apply various source coding techniques for data compression **[K3]**
CO4. Analyze linear block code encoding and decoding techniques **[K4]**
CO5. Analyze cyclic and convolutional code encoding and decoding techniques **[K4]**

UNIT I

INFORMATION THEORY : Introduction, Types of Information sources, Discrete messages, Concept of amount of information and its properties, Average information, Entropy and its properties, Information rate, Mutual information and its properties, Classification of Channels-Binary symmetric Channel, Binary Erasure Channel, Channel Matrices for different Channels.

UNIT II

CHANNEL CAPACITY & SOURCE CODING : Shannon-Hartley Theorem, Channel capacity of analog and discrete Channels, Capacity of a Gaussian channels, bandwidth –S/N trade off, Introduction to source coding, Shannon's source coding theorem, Prefix, Variable, & Fixed-Length Codes, Shanon-Fano coding, Huffman coding, Non-binary Huffman coding, Coding efficiency calculations.

UNIT III

DATA COMPRESSION : Basic Concepts of data compression, Run Length Coding, Block Sorting Compression, Dictionary Coding- Lempel Ziv algorithm, Statistical Compression, Prediction by Partial Matching, Arithmetic Coding, Adaptive Huffman Coding, Comparison of Huffman coding and Adaptive Huffman Coding.

UNIT IV

LINEAR BLOCK CODES : Introduction to channel coding, Classification of channel coding techniques-Error detection and correction codes, Systematic and Nonsystematic codes, Matrix description of Linear Block codes, Encoding using Generator Matrix, Syndrome Calculation, Decoding of linear block codes, Error detection and error correction capabilities of linear block codes.

UNIT V

BINARY CYCLIC CODES: Introduction, Polynomial Representation of Code words, Generator Polynomial, Systematic cyclic codes, Encoder design, Syndrome Calculation, Error Detection, Decoder design, and Limitations of Cyclic Codes.

CONVOLUTIONAL CODES: Introduction, Encoder Design, Encoding-Time Domain, Graphical approach: state, tree and trellis diagram, Decoding of Convolutional Codes-Viterbi algorithm, Sequential Decoding, Advantages and Limitations of Convolutional codes.

TEXT BOOKS:

T1. John G Proakis, “Digital Communications”, Mc Graw-Hill, 4th ed, 2000.

T2. Carlson A. Bruce, “Communication Systems”, 4th Edition, Mc. Graw Hill Publishers, 2002.

REFERENCES:

R1. Roberto Togneri, Christopher J.S. Desilva, “Fundamentals of Information Theory and Coding Design”, CRC Press, Taylor & Francis, 2006.

R2. Taub &Schilling, “Principles of Communication Systems”, 2nd Edition, McGrawHill Publishing Company.

Semester	V SEM	L	T	P	C	Course Code
Regulation	V20	0	0	3	1.5	V20ECL06
Name of the Course	VLSI Design Lab					
Branch	ECE					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO-1: Explain the VLSI Design Methodologies using Mentor Graphics Tools **(K2)**
CO-2: Demonstrate significance of various CMOS Analog and Digital circuits in Full-custom IC Design flow **(K2)**
CO-3: Explain the Physical Verification in Layout Design **(K2)**
CO-4: Design and analyse of Analog and mixed signal simulation **(K3)**
CO-5: Analyse the Significance of Pre-Layout Simulation and Post-Layout Simulation. **(K4)**

PART-A List of Experiments: Design the following experiments using 250nm CMOS technology and extract parasitic.

1. CMOS Inverter
2. Universal Logic gates
3. Full Adder
4. RS-Latch & D- latch
5. JK-Flip Flop
6. Ripple Carry Adder
7. Asynchronous Counter
8. Ring Oscillator
9. R-2R Ladder Type DAC
10. Differential Amplifier
11. 2–3-week Mini Project. Lab Requirements: Software: Mentor Graphics – Pyxis Schematic, IC Station, Calibre, ELDO Simulator

Semester	**V SEM**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	0	0	3	1.5	V20ECL07
Name of the Course	Microprocessors & Microcontrollers Lab					
Branch	ECE					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO-1: Develop algorithm and logic for different operations using 8086 Instructions. **(K3)**
CO-2: Construct simple programs for 8086 using Assembler directives (MASM)/Machine control Instructions. **(K3)**
CO-3: Develop ALP to perform arithmetic and logical operations using various instructions. **(K3)**
CO-4: Develop ALP to perform conversions, finding squares of a numbers by using Loop, Jump instructions. **(K3)**
CO-5: Develop Assembly language programs for 8051 Micro controller. **(K3)**

LIST OF EXPERIMENTS

PART- A:
8086 Assembly Language Programming using Assembler Directives
Introduction to MASM/TASM

1. Basic Arithmetical operations – Unsigned Addition, Subtraction, Multiplication and Division.
2. Multi byte addition/subtraction
3. Sorting of given array of elements (Ascending order /descending order)
4. Sum of squares/cubes of a given n-numbers
5. Shift and rotate operations for given number.

PART- B: 8051 Assembly Language Programming

6. Assembly Language program to find average of n numbers by 8051 Micro controllers.
7. Assembly Language program to find the no of 1’s and 0’s in a given number by 8051 Microcontroller.

8. Assembly language program in 8051 micro controllers for Counter 0 in Mode 2 to count the number of pulses and display the count value on port P2 and external memory location 0FFC1H.

9. Assembly language program for serial transmission and serial reception with a baud rate of 9600bps.

10. Assembly Language program to interface stepper motor to 8051 microcontroller (Both directions)

VI-Semester

Syllabus

(V20 Regulation)

Semester	**VI SEM**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	3	1	0	3	V20ECT15
Name of the Course	Digital Signal Processing					
Branch	ECE					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO-1: Classify Discrete Time Signals & systems, Compute DFT for discrete Time signals. **(K3)**
CO-2: Compute DFT for discrete Time signals using FFT Algorithm **(K3)**
CO-3: Describe the various implementations of digital filter structures **(K2)**
CO-4: Analyze and design a Digital filter (FIR&IIR) from the given specifications **(K4)**
CO-5: Use the Multi-rate Processing concepts in various applications **(K3)**

UNIT I INTRODUCTION & DISCRETE FOURIER TRANSFORMS: Classification of Discrete time signals & Systems, stability of LTI systems. Introduction to DTFT**,** Discrete Fourier transforms, Properties of DFT.

UNIT II INTRODUCTION & FAST FOURIER TRANSFORMS Fast Fourier transforms (FFT) - Radix-2 decimation in time and decimation in frequency FFT Algorithms, Inverse FFT.

UNIT III REALIZATION OF DIGITAL FILTER: Review of Z-transform, digital filters, Block diagram representation of linear constant coefficient difference equations, Basic structures of IIR systems, Transposed forms. Basic structures of FIR systems.

UNIT IV DESIGN OF IIR and FIR DIGITAL FILTERS: Analog filter approximations – Butterworth and Chebyshev, Design of IIR Digital filters from Analog filters, Characteristics of FIR Digital Filters, frequency response. Design of FIR Digital Filters using Window Techniques and Frequency Sampling technique, Comparison of IIR & FIR filters.

UNIT V MULTIRATE DIGITAL SIGNAL PROCESSING: Introduction, Decimation, Interpolation Sampling rate conversion, Implementation of sampling rate converters, Applications – Sub-band Coding of Speech Signals, Introduction to architecture of TMS320C5X DSP processors.

TEXT BOOKS:

1. Digital Signal Processing, Principles, Algorithms, and Applications by John G. Proakis, Dimitris G.Manolakis, Pearson Education / PHI, 2007.
2. Discrete Time Signal Processing by A.V.Oppenheim and R.W. Schaffer, PHI
3. Digital Signal Processing by Ramesh babu, Sci Tech publications

Reference Books:

1. Digital Signal Processing by MH Hayes, Schaum's Outlines, TATA Mc-Graw Hill, 2007.
2. Digital Signal Processing by Alan V. Oppenheim, Ronald W. Schafer, PHI Ed., 2006
3. Digital Signal Processing by A.Nagoor Kani, RBA Publications.

Semester	VI SEM	L	T	P	C	Course Code
Regulation	V20	3	0	0	3	V20ECT16
Name of the Course	Microwave Engineering					
Branch	ECE					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Solve the TE/TM modes and characteristics of Rectangular waveguide **(K2)**
CO2: Illustrate the construction, operation, Power output and efficiency of two cavity Klystron Amplifier and Reflex klystron Oscillator **(K3)**
CO3: Examine the construction, operational details of travelling wave tube Amplifier & cylindrical cavity Magnetron Oscillator **(K4)**
CO4: Construct the various passive waveguide components based on the Scattering matrix **(K3)**
CO5: Explain the operation of Microwave Solid State Devices & the procedure for measuring various microwave parameters using a Microwave test bench **(K2)**

UNIT I
MICROWAVE TRANSMISSION LINES: Introduction, Microwave Spectrum and Bands, Applications of Microwaves. Rectangular Waveguides (RWG) – Solution of TE and TM wave equation in RWG - Characteristic Equation and Cut-off Frequencies, Filter Characteristics, Dominant and Degenerate Modes, Mode Characteristics – Phase and Group Velocities, Wavelengths and Impedance Relations & Characteristics, Cavity resonators – Rectangular cavity resonator – Dominant mode – Resonant frequency – related problems.

UNIT II
MICROWAVE TUBES (O type): Limitations and Losses of conventional tubes at microwave frequencies. Re-entrant cavities, Microwave tubes – O type and M type classifications. O-type tubes: 2 Cavity Klystrons – Structure, Velocity Modulation Process and Applegate Diagram, Bunching Process and Small Signal Theory – Expressions for o/p Power and Efficiency, Applications, Reflex Klystrons – Structure, Applegate Diagram and Principle of working, Bunching Process, Power Output, Efficiency, Applications, Related Problems.

UNIT III

HELIX TWTS: Significance, Types and Characteristics of Slow Wave Structures; Structure of TWT and Suppression of Oscillations, Nature of the four Propagation Constants.

M-type Tubes Introduction, Cross-field effects, Magnetrons – Different Types, 8-Cavity Cylindrical Travelling Wave Magnetron – operation, Modes of Resonance and PI-Mode Operation, Separation of PI-Mode, o/p characteristics.

UNIT IV MICROWAVE PASSIVE COMPONENTS: Waveguide Attenuators-Waveguide phase shifters. Scattering Matrix – Significance - Formulation and Properties. E plane Tee - H plane Tee – Magic Tee - Directional coupler operation and Scattering Matrix Calculation. Ferrite Components- Faraday rotation - Isolator and Circulator.

UNIT V

MICROWAVE SOLID STATE DEVICES: TEDs – Introduction, Gunn Diode – Principle - RWH Theory – Characteristics - Basic Modes of Operation - Oscillation Modes. Avalanche Transit Time Devices – IMPATT Diode – Principle of Operation and characteristics. Detector Diode, PIN Diode characteristics and applications.

MICROWAVE MEASUREMENTS: Description of Microwave Bench – Different Blocks and their Features, Precautions. Microwave Power Measurement using Bolometer Method. Measurement of Attenuation, VSWR and Impedance.

TEXT BOOKS:

1. Microwave Devices and Circuits by Samuel Y. Liao, PHI, 3rd Edition, 1994.
2. Foundations for Microwave Engineering by R.E. Collin, IEEE Press, John Wiley, 2nd Edition, 2002.
3. “Microwave Engineering” by David M.Pozar, Fourth Edition, Wiley, India 2012.

REFERENCES:

1. Microwave and Radar Engineering by M.Kulkarni, Umesh Publications, 3rd Edition.
2. Microwave Engineering by G S N Raju, I K International
3. Microwave and Radar Engineering by G Sasibhushan Rao Pearson

Semester	**VI SEM**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	3	0	0	3	V20ECT17
Name of the Course	Internet of Things: Use Cases					
Branch	ECE					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe M2M and IOT Technologies. **[K2]**
CO2: Explain the layers and protocols in IOT. **[K2]**
CO3: Describe various communication technologies used in IOT. **[K2]**
CO4: Illustrate various hardware components required for IOT applications. **[K2]**
CO5: Discuss the cloud technologies and their services and explain the IoT Applications. **[K2]**

UNIT I – INTRODUCTION [1]
Introduction from M2M to IoT - An Architectural Overview, building architecture, Main design principles and needed capabilities, An IoT architecture outline, M2M and IoT Technology Fundamentals - Devices and gateways.

UNIT II – IOT PROTOCOLS [2]
Functionality of Layers in IoT –Study of protocols - Wireless HART, Z-Wave, 6LoWPAN, RPL, CoAP, MQTT.

UNIT III - COMMUNICATION TECHNOLOGIES IN IOT [2, 4]
IoT Connectivity – IEEE 802.15.4, Zigbee, LPWAN, Wi-Fi, Bluetooth, 5G Era.

UNIT IV - SYSTEM HARDWARE [3, 4]
Sensors, Actuators, Radio Frequency Identification, Introduction to Embedded Devices for IoT - RASPBERRY PI, Beaglebone black.

UNIT V – Cloud Computing [3, 4]
Data Collection, Storage and Computing Using a Cloud Platform for IoT Applications/ Services. Use Cases - Smart and Connected Cities, Agriculture, and Healthcare.

TEXTBOOKS:

1. “From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence”, Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, 1st Edition, Academic Press, 2014.
2. IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things, David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry, Cisco Press 800 East 96th Street Indianapolis, Indiana 46240 USA.
3. “Internet of Things (A Hands-on- Approach)”, Vijay Madisetti and ArshdeepBahga, 1st Edition, VPT, 2014.

Internet of Things - By Raj Kamal, McGraw-Hill Education. Copyright.

REFERENCE BOOKS:

1. From Internet of Things to Smart Cities: Enabling Technologies - edited by Hongjian Sun, Chao Wang, Bashar I. Ahmad, CRC Press -2018.
2. Bernd Scholz-Reiter, Florian Michahelles, “Architecting the Internet of Things”, ISBN 978-3-642-19156-5 e-ISBN 978-3-642-19157-2, Springer.
3. IOT (Internet of Things) Programming: A Simple and Fast Way of Learning IOT, David Etter.

Semester	**VI SEM**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	3	0	0	3	V20ECT18
Name of the Course	Embedded Systems (Professional Elective -II)					
Branch	ECE					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe the Basic Concepts of Embedded Systems- **(K2).**
CO2: Describe the characteristics of Application & Domain-Specific Embedded Systems – **(K2)**
CO3: Discuss various hardware design approaches in embedded environment- **(K2)**
CO4: Describe various Embedded firmware design approaches on Embedded environment. **(K2)**
CO5: Illustrate the development, implementation & testing of Embedded System. **(K3)**

UNIT-I:
INTRODUCTION: Embedded System -Definition, history of embedded systems, classification of embedded systems, major application areas of embedded systems, purpose of embedded systems, the typical embedded system-core of the embedded system, Memory, Sensors and Actuators, List of Communication Interface.

UNIT-II:
Characteristics of an embedded system: Quality attributes of embedded systems, Application-specific and Domain-Specific examples of an embedded system.

UNIT-III:
EMBEDDED HARDWARE DESIGN: Analog and digital electronic components, I/O types and examples, Serial communication devices, Parallel device ports, Wireless devices, Timer and counting devices, Watchdog timer, Real time clock.

UNIT-IV:
EMBEDDED FIRMWARE DESIGN: Embedded Firmware design approaches, Embedded Firmware development languages, ISR concept, Interrupt sources, Interrupt servicing mechanism, Multiple interrupts, DMA, Device driver programming, Concepts of C versus Embedded C and Compiler versus Cross-compiler.

UNIT-V:

EMBEDDED SYSTEM DEVELOPMENT, IMPLEMENTATION AND TESTING: The integrated development environment, Types of files generated on cross-compilation, Deassembler/De-compiler, Simulators, Emulators and Debugging, Target hardware debugging, Embedded Software development process and tools, Interpreters, Compilers and Linkers, debugging tools, Quality assurance and testing of the design, Testing on host machine, Simulators, Laboratory Tools.

Text Books:

1.Embedded Systems Architecture- By Tammy Noergaard, Elsevier Publications, 2013.
2.Embedded Systems-By Shibu. K.V-Tata McGraw Hill Education Private Limited, 2013.

References:

1.Embedded System Design, Frank Vahid, Tony Givargis, John Wiley Publications, 2013.
2.Embedded Systems-Lyla B.Das-Pearson Publications,2013.

Semester	VI SEM	L	T	P	C	Course Code
Regulation	V20	3	0	0	3	V20ECT19
Name of the Course	SYSTEM DESIGN THROUGH VERILOG (Professional Elective -II)					
Branch	ECE					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Outline basic concepts, constructs and conventions of VERILOG. **(K2)**
CO2: Develop Verilog codes for combinational and sequential logic circuits at gate and data flow level. **(K3)**
CO3: Develop Verilog codes for combinational and sequential logic circuits at behavioral level. **(K3)**
CO4: Develop Verilog codes for CMOS circuits at switch level and outline the concepts of task, function and complier directives. **(K3)**
CO5: Explain Synthesize of Combinational and Sequential Circuits. **(K2)**

UNIT-I
INTRODUCTION TO VERILOG:
Verilog as HDL, Levels of design description, concurrency, module, simulation and synthesis, test bench, functional verification, programming language interface (PLI), simulation and synthesis tools.
LANGUAGE CONSTRUCTS AND CONVENTIONS:
Introduction, keywords, identifiers, whitespace characters, comments, numbers, strings, logic values, data types, scalars and vectors, parameters, memory, operators.

UNIT-II
GATE LEVEL MODELLING:
Introduction, AND gate primitive, module structure, other gate primitives, illustrative examples, tristate gates, array of instances of primitives, design of Flip flops with gate primitives, delays, strengths and contention resolution, net types, design of basic circuits.
DATA FLOW LEVEL MODELLING
Introduction, continuous assignment structures, delays and continuous assignments, assignment to vectors, design of basic circuits.

UNIT-III
BEHAVIORAL MODELLING:

Introduction, operations and assignments, initial construct, always construct, examples, assignments with delays, wait construct, multiple always blocks, blocking and non-blocking assignments, the case statement, if and if else constructs, assign-De assign construct, repeat construct, FOR loop, the disable construct, While loop, Forever loop, parallel blocks, force-release construct, event.

UNIT-IV
SWITCH LEVEL MODELLING
Basic transistor switches, CMOS switch, Bidirectional gates and time delays with switch primitives, instantiations with strengths and delays, strength contention with trireg nets, switch level modeling for NAND, NOR and XOR.

SYSTEM TASKS, FUNCTIONS, AND COMPILER DIRECTIVES:
Introduction, System Tasks and Functions, File based Tasks and Functions, Compiler Directives, Hierarchical Directives, User-defined Primitives (UDP).

UNIT-V
SYNTHESIS OF COMBINATIONAL AND SEQUENTIAL LOGIC USING VERILOG:
Synthesis of combinational logic: Net list of structured primitives, a set of continuous assignment statements and level sensitive cyclic behavior with examples, Synthesis of priority structures, Exploiting logic don’t care conditions. Synthesis of sequential logic with latches: Accidental synthesis of latches and Intentional synthesis of latches, Synthesis of sequential logic with flip-flops, Synthesis of explicit state machines.

TEXT BOOKS:
1. Design through Verilog HDL — T.R. Padmanabhan and B. Bala Tripura Sundari, WSE, IEEE Press, 2004.
2. Advanced Digital Design with Verilog HDL — Michael D. Ciletti, PHI, 2005.

REFERENCES:
1. Fundamentals of Logic Design with Verilog — Stephen. Brown and Zvonko Vranesic, TMH, 2005.
2. A Verilog Primier — J. Bhasker, BSP, 2003.

Semester	VI SEM	L	T	P	C	Course Code
Regulation	V20	0	0	3	1.5	V20ECL08
Name of the Course	Digital Signal Processing Lab					
Branch	ECE					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO-1: Describe the generation and convolution of discrete time signals **(K2)**
CO-2: Compute the DFT using FFT **(K3)**
CO-3: Design Digital IIR and FIR filter **(K4)**
CO-4: Develop Interpolator and Decimator **(K3)**
CO-5: Apply DSP algorithms for audio and Image processing applications **(K3)**
CO-6: Develop DSP algorithms on TMS320C6713 DSP processor Kit **(K3)**

List of Experiments (Any 6 Experiment from PART-A and PART-B):

PART – A

1. Generate the varies discrete time signals.
2. Perform linear & circular convolution of given sequences
3. Obtain a 4-point and 8-point DFT of a givensequence.
4. Determine the 4-point and 8-point DFT using FFT.
5. Design and Simulate Infinite Impulse Response (IIR) filters using butter worth and Chebyshev filters.
6. Design and simulate Finite Impulse Response (FIR) filters using windowing techniques.
7. Compute Interpolation and Decimation of given signal and find their spectrum.

PART – B (DSP Applications)

1. Read a .wav file and plot time domain waveform of a speech signal
2. Compute the histogram of the given image.
3. Compute the edge of an image using spatial filters.
4. Compute the two-level Decomposition of Discrete Wavelet transforms and Reconstruct image using inverse Discrete Wavelet transform
5. Obtain linear & circular convolution of two signals using TMS320C6713 DSP processor.
6. Obtain Power Spectral Density of a periodic signal using TMS320C6713 DSP processor.

7. Design and simulate Finite Impulse Response (FIR) and Infinite Impulse Response
(IIR) filters using TMS320C6713 DSP processor.

Semester	**VI SEM**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	0	0	3	1.5	V20ECL09
Name of the Course	IoT lab					
Branch	ECE					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:
CO1: Develop Embedded C Program to interface sensors & actuators. **(K3)**
CO2: Develop Embedded C Program to send the sensor data to cloud. **(K3)**
CO3: Develop Wireless Module Interface with Embedded device. **(K3)**
CO4: Develop street light control system, security system, home automation system. **(K4)**
CO5: Develop mobile application to interface with Embedded device. **(K3)**

List of Experiments (any 10 Experiments)

1. Write an Embedded C Program to interface the following with Arduino Uno with IR Sensor, Temperature Sensor, Ultrasonic Sensor
2. Write an Embedded C Program to Interface DC Motor, Servo/stepper Motor with Arduino Uno.
3. Write an Embedded C Program to Interface LCD with Arduino Uno.
4. Develop an Application to Interface GPS with Arduino and Identify Latitude and Longitude
5. Wireless Module Interface – Bluetooth with Arduino Uno.
6. Wireless Module Interface – Zigbee with Arduino Uno as transceiver.
7. Write an Embedded C Program to monitor temperature and humidity and store in cloud using Wi-Fi Module.
8. Read data from sensor and send it to a requesting client using socket communication. Note: The client and server should be connected to same local area network.
9. Home security System using Raspberry-pi and PIR Sensor.
10. LED Control and LDR interfacing with Raspberry-pi.
11. Uploading sensor Data to cloud With MQTT protocol.
12. Interfacing Raspberry-pi with the smart phone for enabling home automation.

REFERENCE BOOKS:

1. From Internet of Things to Smart Cities: Enabling Technologies - edited by Hongjian Sun, Chao Wang, Bashar I. Ahmad, CRC Press -2018.
2. Bernd Scholz-Reiter, Florian Michahelles, “Architecting the Internet of Things”, ISBN 978-3-642-19156-5 e-ISBN 978-3-642-19157-2, Springer.

3. IOT (Internet of Things) Programming: A Simple and Fast Way of Learning IOT, David Etter.
4. “Internet of Things (A Hands-on- Approach)”, Vijay Madisetti and ArshdeepBahga, 1st Edition, VPT, 2014.

Semester	**VI SEM**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	0	0	3	1.5	V20ECL10
Name of the Course	Microwave Engineering Lab					
Branch	ECE					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Sketch the characteristics of various Microwave & Optical sources **(K3)**

CO2: Compute the various Parameters of Microwave & Optical Components **(K3)**

CO3: Measure the radiation pattern of Horn antenna and reflector antenna. **(K5)**

CO4: Analyze a rectangular micro strip patch antenna using HFSS software **(K4)**

Minimum Twelve Experiments to be conducted:

Part – A (Any 7 Experiments):

1. Reflex Klystron Characteristics.
2. Gunn-Diode Characteristics.
3. Attenuation Measurement.
4. Directional Coupler Characteristics.
5. Frequency and Waveguide Parameters Measurement.
6. Impedance and Measurement.
7. Scattering parameters of Magic Tee.
8. Scattering parameters of Circulator.
9. Radiation Pattern of Horn and Parabolic Antennas.
10. Synthesis of Microstrip antennas (Rectangular Structure) Using HFSS.

Part – B (Any 5 Experiments):

11. Characterization of LED.
12. Characterization of Laser Diode.
13. Intensity modulation of Laser output through an optical fiber.
14. Measurement of Data rate for Digital Optical link.
15. Measurement of NA.

16. Measurement of losses for Analog Optical link.

VII-Semester

Syllabus

(V20 Regulation)

Semester	**VII SEM**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	3	0	0	3	V20ECT20
Name of the Course	Digital Image Processing (Professional Elective -III)					
Branch	ECE					

Syllabus Details

Course Outcomes: After Successful completion of this course, the students will be able to:

CO1. Explain image fundaments and the different image Transforms Techniques **(K2)**
CO2. Describe Spatial and frequency domain filtering like smoothing and sharpening operations on Images **(K2)**
CO3. Describe Restoration operations/techniques on Images **(K3)**
CO4. Describe the Image compression Techniques and Image segmentation **(K3)**
CO5. Explain the different color models and color image processing techniques **(K2)**

UNIT-I
Introduction: Introduction to Image Processing, Fundamental steps in digital image processing, components of an image processing system, some basic relationships between pixels, an introduction to the mathematical tools used in digital image processing.
Image Transforms: Need for image transforms, Discrete Fourier transform (DFT) of two variables, Walsh Transform. Hadamard transform, Haar Transform, Slant transform, Discrete Cosine transform.

UNIT-II
Intensity Transformations and Spatial Filtering: Some basic intensity transformation functions, histogram processing, fundamentals of spatial filtering, smoothing spatial filters, and sharpening spatial filters.
Filtering in the Frequency Domain:, image smoothing using frequency domain filters, Image Sharpening using frequency domain filters and Selective filtering.

UNIT-III
Image Restoration and Reconstruction: A model of the image degradation / Restoration process, Noise models, restoration in the presence of noise only-Spatial Filtering, Periodic Noise Reduction by frequency domain filtering, Estimating the image degradation function, Inverse filtering, Minimum mean square error (Wiener) filtering, geometric mean filter.

UNIT-IV

Image compression : Fundamentals, Basic compression methods: Huffman coding, Arithmetic coding, LZW coding, Run-Length coding, Symbol-Based coding, Bit-Plane coding, Block Transform coding,Image pyramids and subband coding.

Image segmentation: Fundamentals, point, line, edge detection, thresholding, region based segmentation and .simple morphological operations Erosion and dilation,opening and closing.

UNIT-V

Color image processing: color fundamentals, color models, pseudo color image processing, basics of full color image processing, color transformations, smoothing and sharpening. Image segmentation based on color.

Text Books

1. R. C. Gonzalez and R. E. Woods, Digital Image Processing, 3rd edition, Prentice Hall, 2008.
2. Jayaraman, S. Esakkirajan, and T. Veerakumar," Digital Image Processing", Tata McGraw-Hill Education, 2011.

Reference Books

1. Anil K.Jain, "Fundamentals of Digital Image Processing", Prentice Hall of India, 9th Edition, Indian Reprint, 2002.
2. B.Chanda, D.Dutta Majumder, "Digital Image Processing and Analysis", PHI, 2009.

Semester	**VII SEM**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	3	0	0	3	V20ECT21
Name of the Course	Computer networks (Professional Elective -III)					
Branch	ECE					

Syllabus Details

Course Outcomes: After Successful completion of this course, the students will be able to:

CO1: Discuss fundamentals of network concepts, Reference Models and physical layer. **(K2)**
CO2: Demonstrate Error control and protocols. **(K3)**
CO3: Apply Routing algorithms and congestion control algorithms. **(K3)**
CO4: Discuss Transport layer services and protocols. **(K2)**
CO5: Describe Application layer protocols. **(K2)**

UNIT-I:

Introduction: Reference models: The OSI Reference Model- the TCP/IP Reference Model, Examples of Networks: Novell Networks, Arpanet, Internet, Network Topologies WAN, LAN, MAN.

Physical Layer: Transmission Media, Multiplexing: FDM, WDM and TDM- LAN Technologies, introduction to switching: Circuit Switched Networks, Datagram Networks, and Virtual Circuit Networks.

UNIT–II:

Data link layer: Design issues, Framing, Flow control, error control, error detection and correction, CRC, Checksum: idea, one's complement internet checksum, MAC: ALOHA, CSMA. Elementary Data Link Layer protocols: simplex protocol, Simplex stop and wait, Simplex protocol for Noisy Channel. Sliding window protocol: One bit, go back N, Selective repeat-Stop and wait protocol, HDLC, point to point protocol (PPP).Piggybacking.

UNIT-III:

Network Layer : Network layer design issues- Algorithm shortest path routing, Flooding, Hierarchical routing, Broad cast, Multi cast Routing algorithms Congestion control and algorithms, Internet Protocol (IP) Addresses, Subnet masking

UNIT–IV:

Transport Layer: Services, Primitives and sockets, Elements of transport protocols, Internet Transport protocols(TCP,UDP,RPC,RTTP/RTP,RTCP) Segment headers, Primitives, Control, Congestion control, Quality of Service, QoS improving techniques: Leaky Bucket and Token Bucket algorithm.

UNIT–V:

Application Layer: DNS, SMTP, POP, & FTP HTTP Presentation formatting. Network security: Introduction to Cryptography, Authentication, Basics of Public key and private key cryptography, digital signatures and certificates firewalls and wireless security.

TEXT BOOKS:

1. Computer Networks by Andrew S Tanenbaum, 4th Edition. Pearson Education/PHI
2. Data Communications and Networks by Behrouz A. Forouzan.Third Edition TMH

REFERENCES:

1. An Engineering Approach to Computer Networks by S.Keshav, 2nd Edition, Pearson Education
2. Understanding Communications and Networks, 3rd Edition by W.A. Shay, Thomson

Semester	VII SEM	L	T	P	C	Course Code
Regulation	V20	3	0	0	3	V20ECT22
Name of the Course	Cellular Mobile Communication (Professional Elective -IV)					
Branch	ECE					

Syllabus Details

Course Outcomes: After Successful completion of this course, the students will be able to:

CO1: Demonstrate the limitations of conventional mobile telephone systems; Understand the concepts of cellular systems. **[K2]**
CO2: Illustrate the concept of frequency Reuse channels, deduce Co- channel Interference reduction factor **[K2]**
CO3: Understand the frequency management, channel assignment strategies and Antennas in cellular systems.**[K2]**
CO4: Discuss the concepts of Handoff, dropped calls and cell splitting, Intersystem Handoff. **[K2]**
CO5: Explain the knowledge about different multiple acess schemes, GSM architecture and higher generation cellular standards,.**[K2]**

UNIT-I
CELLULAR MOBILE RADIO SYSTEMS: Introduction to Cellular Mobile System, uniqueness of mobile radio environment, operation of cellular systems, consideration of the components of Cellular system, Hexagonal shaped cells, Analog and Digital Cellular systems.
CELLULAR CONCEPTS: Evolution of Cellular systems, Concept of frequency reuse, frequency reuse ratio, Number of channels in a cellular system, Cellular traffic: trunking and blocking, Grade of Service; Cellular structures: macro, micro, pico and femto cells; Cell splitting, Cell sectoring.

UNIT-II
INTERFERENCE: Types of interferences, Introduction to Co-Channel Interference, real time Co-Channel interference, Co-Channel measurement, Co-channel Interference Reduction Factor, desired C/I from a normal case in a Omni directional Antenna system, design of Antenna system, antenna parameters and their effects, diversity receiver, non-cochannel interference-different types.

UNIT-III
FREQUENCY MANAGEMENT AND CHANNEL ASSIGNMENT: Numbering and grouping, setup access and paging channels, channel assignments to cell sites and mobile units: fixed channel and non-fixed channel assignment, channel sharing and borrowing, overlaid cells. CELL COVERAGE FOR SIGNAL AND TRAFFIC: Signal reflections in flat and hilly terrain, effect of human made structures, phase difference between direct and reflected paths, straight line path loss slope, and

general formula for mobile propagation over water and flat open area, near and long distance propagation, antenna height gain, form of a point to point model.

UNIT-IV

HANDOFF STRATEGIES Concept of Handoff, types of handoff, handoff initiation, delaying handoff, forced handoff, mobile assigned handoff, intersystem handoff, vehicle locating methods, dropped call rates and their evaluation.

UNIT-V

DIGITAL CELLULAR NETWORKS: GSM architecture, GSM channels, multiple access schemes; FDMA, TDMA, CDMA, OFDMA;
HIGHER GENERATION CELLULAR STANDARDS: 3G System architecture (UMTS) enhancements in 4G standard, Architecture and representative protocols, introduction to 5G.

TEXTBOOKS:

1. Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2rd Edn,2006.
2. Principles of Mobile Communications – Gordon L. Stuber, Springer International 2nd Edition, 2007.

REFERENCES:

1. Wireless Communications – Theodore. S. Rapport, Pearson education, 2nd Edn, 2002.
2. Wireless and Mobile Communications – Lee McGraw Hills, 3rd Edition, 2006. 3. Mobile Cellular Communication – G Sasibhushana Rao Pearson
3. Wireless Communication and Networking – Jon W. Mark and WeihuaZhqung, PHI, 2005.

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Semester	VII SEM	L	T	P	C	Course Code
Regulation	V20	3	0	0	3	V20ECT23
Name of the Course	Low Power VLSI Design (Professional Elective -IV)					
Branch	ECE					

Syllabus Details

Course Outcomes: After Successful completion of this course, the students will be able to:

CO1: Illustrate the importance of low power design, sources of power dissipation and the factors affecting them. **[K3]**
CO2: Describe various power reduction techniques possible for Low-Power Design at different levels. **[K2]**
CO3: Analyze various adder structures for low power applications. **[K4]**
CO4: Analyze various multipliers and multiplication algorithms for low voltage and low power environment. **[K4]**
CO5: Discuss the techniques for attaining the low power consumption in memories. **[K2]**

UNIT-I:
Fundamentals of Low Power VLSI Design: Need for Low Power Circuit Design, Sources of Power Dissipation – Switching Power Dissipation, Short Circuit Power Dissipation, Leakage Power Dissipation, Glitching Power Dissipation, Short Channel Effects –Drain Induced Barrier Lowering and Punch Through, Surface Scattering, Velocity Saturation, Impact Ionization, Hot Electron Effect.

UNIT-II:
Low-Power Design Approaches:
Low-Power Design through Voltage Scaling: VTCMOS circuits, MTCMOS circuits, Architectural Level Approach –Pipelining and Parallel Processing Approaches.
Switched Capacitance Minimization Approaches: System Level Measures, Circuit Level Measures, Mask level Measures.

UNIT-III:
Low-Voltage Low-Power Adders: Introduction, Standard Adder Cells, CMOS Adder's Architectures – Ripple Carry Adders, Carry Look-Ahead Adders, Carry Select Adders, Carry Save Adders, Low-Voltage Low-Power Design Techniques –Trends of Technology and Power Supply Voltage, Low-Voltage Low-Power Logic Styles.

UNIT-IV:
Low-Voltage Low-Power Multipliers Introduction, Overview of Multiplication, Types of Multiplier Architectures, Braun Multiplier, Baugh-Wooley Multiplier, Booth Multiplier, Introduction to Wallace Tree Multiplier.
UNIT-V:

Low-Voltage Low-Power Memories: Basics of ROM, Low-Power ROM Technology, Future Trend and Development of ROMs, Basics of SRAM, Memory Cell, Precharge and Equalization Circuit, Low-Power SRAM Technologies, Basics of DRAM, Self-Refresh Circuit, Future Trend and Development of DRAM.

Text Books:
1. Low-Voltage, Low-Power VLSI Subsystems – Kiat-Seng Yeo, Kaushik Roy, TMH Professional Engineering.

Reference Books:
1. Low Power CMOS VLSI Circuit Design – Kaushik Roy, Sharat C. Prasad, John Wiley & Sons, 2000.
2. CMOS Digital Integrated Circuits – Analysis and Design – Sung-Mo Kang, Yusuf Leblebici, TMH, 2011.

Semester	**VII SEM**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	3	0	0	3	V20ECT24
Name of the Course	Radar Engineering (Professional Elective -V)					
Branch	ECE					

Syllabus Details

Course Outcomes: After Successful completion of this course, the students will be able to:

CO1: Demonstrate the factors which affecting the radar performance using Radar Equation. **[K2]**

CO2: Describe the operation of CW and FMCW Radar systems. **[K2]**

CO3: Illustrate the principle of each and every block of MTI Radar **[K2]**

CO4: Distinguish the different methods used for tracking targets. **[K2]**

CO5: Illustrate the basic principle and the importance of Matched Filter Receivers in Radars **[K2]**

UNIT–I:

Basics of Radar: Introduction, Maximum Unambiguous Range, simple Radar range Equation, Radar Block Diagram and Operation, Radar Frequencies and Applications.

Radar Equation : Prediction of Range Performance, Minimum Detectable Signal, Receiver Noise, Modified Radar Range Equation, SNR, Probability of Detection, Probability of False Alarm, Integration of Radar Pulses, Radar Cross Section of Targets, Transmitter Power, PRF and Range Ambiguities, System Losses.

UNIT–II:

CW and Frequency Modulated Radar: Doppler Effect, CW Radar – Block Diagram, Isolation between Transmitter and Receiver, Non-zero IF Receiver, Receiver Bandwidth Requirements, Applications of CW radar.

FM-CW Radar: Range and Doppler Measurement, Block Diagram and Characteristics, FMCW altimeter, Multiple Frequency CW Radar.

UNIT-III:

MTI Radar: Introduction, Principle, MTI Radar with - Power Amplifier Transmitter and Power Oscillator Transmitter, Delay Line Cancellers – Filter Characteristics, Blind Speeds, Double Cancellation and Staggered PRFs. Range Gated Doppler Filters. MTI Radar Parameters, Limitations to MTI Performance.

UNIT –IV:

Tracking Radar: Tracking with Radar, Sequential Lobing, Conical Scan, Mono pulse Tracking Radar – Amplitude Comparison Mono pulse (one- and two- coordinates), Phase Comparison Mono pulse, Tracking in Range, Acquisition and Scanning Patterns.

UNIT –V:

Detection of Radar Signals in Noise: Introduction, Matched Filter Receiver – Response Characteristics and Derivation, Correlation Detection and Cross-correlation Receiver, Matched Filter with Non-white Noise, Noise Figure and Noise Temperature.

Radar Receivers: Displays – types. Duplexers – Branch type and Balanced type, Circulators as Duplexers.

TEXT BOOKS:

1. Introduction to Radar Systems – Merrill I. Skolnik, TMH Special Indian Edition, 2ndEdition,2007.
2. Radar Principles – Peebles, Jr., P.Z., Wiley, New York, 1998.
3. Radar Engineering – GSN Raju, IK International.

REFERENCE BOOKS:

1. Introduction to Radar Systems, 3rd edition – M.I. Skolnik, TMH Ed., 2005.
2. Microwave & Radar Engineering – M. Kulkarni, Umesh Publications, 3rd edition
3. Microwave & Radar Engineering – G. SasibhushanaRao, Pearson Publications

Semester	VII SEM	L	T	P	C	Course Code
Regulation	V20	3	0	0	3	V20ECT25
Name of the Course	CMOS DIGITAL IC DESIGN (Professional Elective -V)					
Branch	ECE					

Syllabus Details

Course Outcomes: After Successful completion of this course, the students will be able to:

CO1: Analyze the concepts of MOS Design. **[K2]**
CO2: Design and analysis of Combinational MOS Circuits. **[K2]**
CO3: Design and analysis of Sequential MOS Circuits. **[K2]**
CO4: Construct Dynamic Logic Circuits Using Various Logic Styles. **[K2]**
CO5: Describe the Concepts of Semiconductor Memories, Flash Memory, RAM array organization **[K2]**

UNIT-I
MOS Design:
Pseudo NMOS Logic – Inverter, Inverter threshold voltage, Output high voltage, Output Low voltage, Gain at gate threshold voltage, Transient response, Rise time, Fall time, Pseudo NMOS logic gates, Transistor equivalency, CMOS Inverter logic.

UNIT-II
Combinational MOS Logic Circuits:
MOS logic circuits with NMOS loads, Primitive CMOS logic gates NOR & NAND gate, Complex Logic circuits design – Realizing Boolean expressions using NMOS gates and CMOS gates , AOI and OIA gates, CMOS full adder, CMOS transmission gates, Designing with Transmission gates.

UNIT-III
Sequential MOS Logic Circuits:
Behaviour of bistable elements, SR Latch, Clocked latch and flip flop circuits, CMOS D latch and edge triggered flip-flop.

UNIT-IV
Dynamic Logic Circuits:

Basic principle, Voltage Bootstrapping, Synchronous dynamic pass transistor circuits, Dynamic CMOS transmission gate logic, High performance Dynamic CMOS circuits.

UNIT-V

Semiconductor Memories:

Types, RAM array organization, DRAM – Types, Operation, Leakage currents in DRAM cell and refresh operation, SRAM operation Leakage currents in SRAM cells, Flash Memory, NOR flash and NAND flash.

TEXT BOOKS:

1. Digital Integrated Circuit Design – Ken Martin, Oxford University Press, 2011.
2. CMOS Digital Integrated Circuits Analysis and Design – Sung-Mo Kang, Yusuf Leblebici, TMH, 3rd Ed., 2011.

REFERENCE BOOKS:

1. Introduction to VLSI Systems: A Logic, Circuit and System Perspective – Ming-Bo Lin, CRC Press, 2011
2. Digital Integrated Circuits – A Design Perspective, Jan M. Rabaey, Anantha Chandrakasan, Borivoje Nikolic, 2nd Ed., PHI.

Annexure-II

Job Oriented
Elective Courses
(V20 Regulation)

List of Advanced/ Job Oriented Elective Courses for ECE Students

S. No	Course Code	Name of the Course	Department Offered
1	V20ECTJO01	FPGA Architecture	Electronics & Communication Engineering
2	V20ECTJO02	Optical Communications & Networks	
3	V20ECTJO03	Industrial IOT	
4	V20ECTJO04	Modern Satellite Communication	
5	V20ECTJO05	Wireless Sensor & Networks	
6	V20ECTJO06	Digital Signal Processors and Applications	
7	V20ECTJO07	Modern Wireless Communication Systems	
8	V20ECTJO08	CMOS Analog IC Design	
9	V20ECTJO09	Bio Medical Instrumentation	
10	V20ECTJO10	Speech Signal Processing	
11	V20ECTJO11	Electronic Instrumentation	
12	V20ECTJO12	Sensors & Applications	
13	V20ECTJO13	Deep Learning	
14	V20ECTJO14	Machine learning	

Semester	V/VI/VII	L	T	P	C	Course Code
Regulation	V20	2	0	2	3	V20ECTJO01
Name of the Course	FPGA Architecture (Job Oriented Elective)					
Branch	ECE					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO-1 Describe Low end programmable devices and FPGA basics. **[K2]**
CO-2 Describe Spartan 6 basics. **[K2]**
CO-3 Use Virtex 5 clock sources and FIFO. Comprehend various I/O standards. **[K3]**
CO-4 Use Memory, DSP blocks in complex designs. Comprehend SerDes. **[K3]**
CO-5 Distinguish RISC based Soft processors from Xilinx, Aletra. **[K3]**

UNIT-I
DESIGNING WITH PROGRAMMABLE LOGIC DEVICES:
Read only Memories, Programmable logic Arrays (PLA), Programmable Array logic (PAL), Programmable logic Devices (PLD). Skew, setup, hold time.
DESIGNING WITH FPGA:
Logic implementation options, Technology trends, Simple SRAM programmable FPGA architecture, Xilinx 3000 series FPGAs, Programmable interconnects, Xilinx 4000 series FPGAs, Programming the FPGA.

UNIT-II
SPARTAN 6 ARCHITECUTUTE:
Spartan 6 Device features- 6 input LUT, Slice, Single Port RAM, Dual Port RAM, ROM, Distributed RAM, 32 x 6, 64 x 1, 128 x 1, Distributed RAM timings, Shift Registers, Multiplexers, Interconnect, PLL, DCM, DSP Slice.

UNIT-III
VIRTEX 5 ARCHITECTURE:
Clock resources-Global clocks, regional clocks, Clock buffer, Clock Gating. Clock Tree, Clock De-skew, True Dual port RAM. Write modes, FIFO architecture, empty

flags, almost empty flags, almost fill flags, full flag, cascading FIFOS, connecting FIFOs in parallel, designing Large multiplexer 4xl, 8xl, 16xl. Control impedance, I/O primitives. I/O supported standards, LVDS.

UNIT-IV

STARATIX V ARCHITECTURE:

ALM Block diagram, ALM operating modes, ALM in Arithmetic mode, Types of embedded memory, Control clocking, Memory features, Memory modes, DSP block features, operational modes, DSP block architecture in 27 X 27 mode, independent complex multiplier mode, I/O features mixing voltage referenced and non-voltage referenced standard I/O features standards. Dynamic OCT.LVDS Serdes block diagram and features, Differential Receiver Block diagram and features.

UNIT-V

SOFT PROCESSORS:

JTAG, programming through JTAG, IEEE 1149.1 Boundary scan testing, programmable power technology, Features of Soft processors, Nios-II, Microblaze.

TEXT BOOKS:

1. Charles H Roth Jr“ Digital System Design using VHDL”, second edition, 2008.
2. Spartan 6 family overview.
3. Virtex 5- User Guide.

REFERENCES:

1. J. Old Field,R.Dorf, “Field Programmable Gate Arrays”, John Wiley & Sons, New York, 1995.
2. S. Trimberger, Edr.“Field Programmable Gate Arrays Technology”, Kluwer Academic Publications, 1994.
3. Bob Zeidman, “ Designing with FPGAs & CPLDs”, CMP Books, 2002.

Semester	V/VI/VII	L	T	P	C	Course Code
Regulation	V20	2	0	2	3	V20ECTJO02
Name of the Course	Optical Communication & Networks (Job Oriented Elective)					
Branch	ECE					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:
CO1. Describe the overview of optical fiber communication, ray theory transmission and concepts of modes. **[K2]**
CO2. Explain the Transmission characteristics of fiber and optical fiber Connectors. **[K2]**
CO3. Describe the operation of optical sources, photo detectors and optical Receiver. **[K2]**
CO4. Explain WDM Concepts and Components. **[K2]**
CO5. Explain the Optical switching networks. **[K2]**

UNIT I
Optical fiber Communications: Historical development, The general system, Advantages of optical fiber communication, Optical fiber wave guides: Ray theory transmission, Modes in planar guide, Phase and group velocity, Cylindrical fiber: Modes, Step index fibers, Graded index fibers, Single mode fibers, Cut-off wavelength, Mode field diameter, effective refractive index. Fiber Materials, Photonic crystal fibers.**(Text 2)**

UNIT II
Transmission characteristics of optical fiber: Attenuation, Material absorption losses, Linear scattering losses, Nonlinear scattering losses, Fiber bend loss, Dispersion, Chromatic dispersion, Intermodal dispersion: Multimode step index fiber.
Optical Fiber Connectors: Fiber alignment and joint loss, Fiber splices: Fusion Splices, Mechanical splices, Fiber connectors: Cylindrical ferrule connectors, Duplex and Multiple fiber connectors, Fiber couplers: three and four port couplers, star couplers, Optical Isolators and Circulators**.(Text 2)**

UNIT III
Optical sources: Light emitting diodes: LED Structures, Light Source Materials, Quantum Efficiency and LED Power, Modulation. Laser Diodes: Modes and Threshold conditions, Rate equation, External Quantum Efficiency, Resonant Frequencies.
Photodetectors: Physical principles of Photodiodes, Photo detector noise, Detector responsetime.

Optical Receiver: Optical Receiver Operation: Error sources, Front End Amplifiers,Receiver sensitivity, Quantum Limit.**(Text1)**

UNIT IV
WDM Concepts and Components: Overview of WDM: Operational Principles of WDM, WDM standards, Mach-Zehnder Interferometer, Multiplexers, Isolators and Circulators, Fiber grating filters, Dielectric Thin-Film Filters, Diffraction Gratings. Introduction to Optical amplifiers: Basic application and Types. **(Text 1)**

UNIT V
Optical Networks: Optical network evolution and concepts: Optical networking terminology, Optical network node and switching elements, Wavelength division multiplexed networks, Optical network transmission modes, layers and protocols: Synchronous networks, Asynchronous transfer mode, OSI reference model, Optical transport network, Internet protocol, Wavelength routing networks: Routing and wavelength assignment

Optical switching networks: Optical circuit switched networks, packet switched networks,Multiprotocol Label Switching, Optical burst switching networks.**(Text 2)**

TEXT BOOKS:
1. Optical Fiber Communications – Gerd Keiser, McGraw-Hill International edition, 5th Edition, 2015.
2. Optical Fiber Communications – John M. Senior, PHI, 3rd Edition, 2010.

RERFERENCES :
1. Fiber Optic Communication Systems – Govind P. Agarwal , John Wiley, 3rd Ediition, 2004.
2. Fiber Optic Communications – Joseph C. Palais, 4th Edition, Pearson Education, 2004.

Semester	**V/VI/VII**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	2	0	2	3	V20ECTJO03
Name of the Course	Industrial IoT (Job Oriented Elective)					
Branch	ECE					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe the key techniques and theory behind Industrial Internet of Things **[K2]**
CO2: Explain the key techniques and theory behind Industrial Internet of Things **[K2]**
CO3: Explain the integration of Cloud and IoT, Edge and Fog Computing **[K2]**
CO4: Apply effectively the various enabling technologies (both hardware and software) for IIoT **[K3]**
CO5: Illustrate and build IIoT system for different Use cases **[K3]**

Unit – 1 – Introduction to IoT

Overview of Internet of Things, Introduction, IoT Architecture, Application-based IoT Protocols - Infrastructure-based protocols, Data protocols, Transport protocols; Cloud Computing - Types of cloud, Business aspects of cloud, Virtualization: Key aspect of cloud computing, Mobile cloud computing; Fog Computing - Applications of Fog computing; Sensor Cloud - Applications of Sensor Cloud; Big Data.

Unit -2 - Introduction to IIoT

Industry 4.0, Introduction IIoT, Design requirement of Industry 4.0, Drivers of Industry 4.0, Sustainability Assessment of Industry, Smart Business perspective, Cybersecurity, Impacts of Industry 4.0, Industrial Internet Systems, Industrial Sensing, Industrial Process.

Unit – 3- IIoT Technologies

Business Model of IIoT, Reference Architecture of IIoT, Off-site Technologies – cloud computing & Fog Computing, On-site Technologies –Augmented Reality, Virtual Reality, Big Data & Advance Analytics, Smart factories.

Unit -4 Sensors, Actuators & Data Transmission

Sensors – Thermal, Mechanical, Electrical, optical; Actuators – Thermal, Hydraulic, Electromechanical; Industrial Data Transmission – Profibus, Modbus, CAN, NB-IoT, IEEE 802.11AH.

Unit – 5 Case Studies

Introduction, Manufacturing Industry; Automotive Industry; Mining Industry.

Textbooks:

1. SudipMisra, Chandana Roy, Anandarup Mukherjee, "Introduction to Industrial Internet of Things and Industry 4.0".
2. Alasdair Gilchrist, "Industry 4.0: The Industrial Internet of Things".

References:

1. Antonio Capasso, GiacomoVeneri, "Hands-On Industrial Internet of Things", Packt Publishing.
2.Chen, Fulong, Luo, Yonglong, "Industrial IoT Technologies and Applications", LNICST Series.

Semester	**V/VI/VII**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	3	0	0	3	V20ECTJO04
Name of the Course	Modern Satellite Communication (Job Oriented Elective)					
Branch	ECE					

Syllabus Details

Course Outcomes: After Successful completion of this course, the students will be able to:

CO1: Describe the basic concepts and orbit mechanics of satellite communication. **[K2]**

CO2: Discuss the major subsystems of a satellite and satellite link design. **[K2]**

CO3: Describe the various sub-systems used in Earth stations and the different orbits. **[K2]**

CO4: Illustrate the various multiple access techniques. **[K2]**

CO5: Explain the Special purpose communication satellites and Global Positioning System. **[K2]**

UNIT I

INTRODUCTION: Origin of Satellite Communications, Basic Concepts of Satellite Communications, Frequency allocations for Satellite Services, Applications, Future Trends of Satellite Communications.

ORBITAL MECHANICS: Orbital Mechanics, Look Angle determination, Orbital perturbations, Orbital effects in communication systems performance. Advanced payload systems and launch vehicles.

UNIT II

SATELLITE SUB SYSTEMS: Attitude and orbit control system, telemetry, tracking, Command and monitoring, power systems, communication subsystems, Satellite antenna.

SATELLITE LINK DESIGN: General Link equation, system noise temperature and G/T ratio, Design of down links, up link design.

UNIT III

EARTH STATION TECHNOLOGY: Introduction, Transmitters, Receivers, Antennas, Tracking systems, Advanced ground sub systems.

LOW EARTH ORBIT AND GEO-STATIONARY SATELLITE SYSTEMS: Orbit consideration, coverage and frequency considerations, Delay & Throughput considerations, System considerations. Very high throughput satellites, Operational NGSO constellation Designs.

UNIT IV

Frequency division multiple access (FDMA), Intermodulation, Calculation of C/N. Time division Multiple Access (TDMA) Frame structure. Satellite Switched TDMA Onboard processing, Code Division Multiple access (CDMA), Spread spectrum transmission and reception.

UNIT V

Special Purpose Satellites: Earth observation satellite, Satellite Television, Direct Broadcast Satellite-TV receiver, Very Small Aperture Terminal(VSAT),Mobile Communication Satellite system(MSAT), Search and Rescue satellites(SARSAT),GPS Systems, Satellite signal acquisition, GPS Navigation Message, GPS signal levels, GPS receiver operation, Differential GPS. Satellite Internet of Things.

TEXT BOOKS:

1. Satellite Communications – Timothy Pratt, Charles Bostian and Jeremy Allnutt, WSE, Wiley Publications, 2ndEdition, 2003.

2. Satellite Communications Engineering – Wilbur L. Pritchard, Robert A Nelson and Henri G. Suyderhoud, 2ndEdition, Pearson Publications, 2003.

REFERENCES:

1. Satellite Communication - D.C Agarwal, Khanna Publications, 5th Ed.

2. Fundamentals of Satellite Communications – K.N. Raja Rao, PHI, 2004

Semester	**V/VI/VII**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	2	0	2	3	V20ECTJO05
Name of the Course	Wireless Sensors & Networks (Job Oriented Elective)					
Branch	ECE					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Explain the concepts of Wireless Sensor Networks, it's Architecture. **[K2]**
CO2: Describe the Networking Technologies. **[K2]**
CO3: Explain the MAC Protocols. **[K2]**
CO4: Illustrate the Routing and Transport Layer Protocols. **[K2]**
CO5: Explain the Security Layer Protocols and Applications of WSN. **[K2]**

UNIT I - Overview of Wireless Sensor Networks:

Key definitions of sensor networks, Advantages of sensor Networks, Unique constraints and challenges, Driving Applications, Enabling Technologies for Wireless Sensor Networks.Single-Node Architecture - Hardware Components, Energy Consumption of Sensor Nodes, OperatingSystems and Execution Environments, Network Architecture -Sensor Network Scenarios, Gateway Concepts.

UNIT II - Networking Technologies:

Physical Layer and Transceiver Design Considerations, Personal area networks (PANs), hiddennode and exposed node problem, Topologies of PANs, MANETs, WANETs.

UNIT-III - MAC Protocols for Wireless Sensor Networks:

Issues in Designing a MAC protocol for Ad Hoc Wireless Networks, Design goals of a MAC Protocol for Ad Hoc Wireless Networks, Classifications of MAC Protocols - Contention - Based Protocols, with reservation Mechanisms, and with Scheduling Mechanisms.

UNIT-IV–Routing and Transport Layer Protocols:

Routing Protocols:, Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks,Classification of Routing Protocols, Table–Driven Routing Protocols, On – Demand Routing Protocols.

Transport Layer Protocols: Issues in Designing a Transport Layer Protocol for Ad Hoc Wireless Networks, Classification of Transport Layer Solutions, TCP Over Ad Hoc Wireless Networks.

UNIT- V - Security, Platforms & Applications:

Security in Ad Hoc Wireless Networks, Network Security Requirements, Issues and Challenges in Security Provisioning; Sensor Node Hardware – Berkeley Motes, Programming Challenges; Applications - Home Automation, Smart Metering.

TEXT BOOKS:

1. Ad Hoc Wireless Networks: Architectures and Protocols, C. Siva Ram Murthy and B.S.Manoj, 2004, PHI.
2. Wireless Adhoc and Sensor Networks: Protocols, Performance and Control, JagannathanSarangapani, CRC Press.
3. Holger Karl & Andreas Willig, “Protocols and Architectures for Wireless Sensor Networks", John Wiley, 2005.

REFERENCES:

1. Wireless Sensor Networks- Technology, Protocols, and Applications, KazemSohraby, Daniel Minoli, &TaiebZnati, John Wiley, 2007.
2. Wireless Sensor Networks- An Information Processing Approach,Feng Zhao & Leonidas J. Guibas, Elsevier, 2007.
3. Adhoc Mobile Wireless Networks: Protocols & Systems, C.K. Toh,1st Ed., PearsonEducation.
4. Wireless Sensor Networks - C. S. Raghavendra, Krishna M. Sivalingam, 2004, Springer.
5. Wireless Sensor Networks – S Anandamurugan, Lakshmi Publications.

Semester	**V/VI/VII**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	2	0	2	3	V20ECTJO06
Name of the Course	Digital Signal Processors and Applications (Job Oriented Elective)					
Branch	ECE					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO-1: Describe the concepts of digital signal processing. **(K2)**
CO-2: Explain architectures used in programmable DSP's.**(K2)**
CO-3: Illustrate addressing modes and memory organization of TMS32OC54xx processor**. (K3)**
CO-4: Describe the Instruction set, peripheral devices and programming techniques**. (K2)**
CO-5: Illustrate the applications of DSP processor (**K3)**

UNIT I
INTRODUCTION TO DIGITAL SIGNAL PROCESSING:
A Digital Signal Processing System, The Sampling Process, Discrete Time Sequences, Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT), Linear Time-Invariant Systems, Digital Filters, Decimation and Interpolation, Number Formats for Signals and coefficients in DSP Systems.

UNIT II
ARCHITECTURES FOR PROGRAMMABLE DIGITAL SIGNAL-PROCESSORS:
Basic Architectural Features, DSP Computational Building Blocks, Bus Architecture and Memory, Data Addressing Capabilities, Address Generation Unit, Programmability and Program Execution, Features for External Interfacing.

UNIT III
PROGRAMMABLE DIGITAL SIGNAL PROCESSORS:
Commercial digital Signal-processing Devices, Data Addressing Modes of TMS32OC54xx, Memory Space of TMS32OC54xx Processors, Program Control.

UNIT IV
INSTRUCTION SET AND PROGRAMMING: TMS320C54X & 54xx Instructions and Programming, On-Chip peripherals, Interrupts, Pipeline Operation of TMS32OC54xx Processor.
UNIT V

INTERFACING AND APPLICATIONS OF DSP PROCESSOR:
Synchronous Serial Interface, A CODEC Interface Circuit, DSP Based Bio-telemetry Receiver, A Speech Processing System, An Image Processing System.

TEXT BOOKS:
1. Digital Signal Processing, Avatar Singh and S. Srinivasan, Thomson Learning, 2004.
2. Digital Signal Processing, Principles, Algorithms, and Applications by John G. Proakis,
Dimitris G. Manolakis, Pearson Education / PHI, 2007.
3. Discrete Time Signal Processing by A.V.Oppenheim and R.W. Schaffer, PHI
Reference Books:
1. Digital Signal Processing by Andreas Antoniou, TATA McGraw Hill , 2006
2. Digital Signal Processing by MH Hayes, Schaum's Outlines, TATA Mc-Graw Hill, 2007.

Semester	**V/VI/VII**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	2	0	2	3	V20ECTJO07
Name of the Course	Modern Wireless Communication Systems (Job Oriented Elective)					
Branch	ECE					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe how to measure the performance of wireless system, in multipath Environment **[K2]**

CO2: Summarize about Wireless Channel. **[K2]**

CO3: Explain Principle and properties of CDMA. **[K2]**

CO4: Discuss the working and advantages of MIMO wireless communication systems **[K2]**

CO5: Explain the principle and advantages of OFDM system and various modern wireless communication technologies **[K2]**

Unit I:

Introduction to Wireless Systems: Evolution of Wireless Communication Technologies, Modeling Wireless Channel, Wireless Fading Channel Model, Fading Channel Distribution , Rayleigh Fading Channel, Bit Error Rate (BER) Performance, Bit Error Rate (BER) of AWGN Channels.

Unit II:

Performance in Fading wireless channels: Bit Error Rate of Rayleigh Fading Wireless Channel, Exact BER Expression for Rayleigh Fading Wireless Channel, Deep Fade Analysis of Wireless Communication, Principle of Diversity, Multiple Antenna Diversity, BER of Multiple Antenna Wireless Systems.

Wireless Channel Characterization : Delay Spread and Doppler,RMS Delay Spread, Delay Spread and Inter Symbol Interference, Coherence Bandwidth of Wireless Channel,Impact of Doppler Effect on Wireless Channel

Unit III:

Principles of CDMA Wireless Communication: Introduction to Code Division Multiple Access (CDMA),Chip Time and Bandwidth Expansion in CDMA, Code Generation for CDMA,CDMA Codes: Properties of PN Sequences, BER of CDMA Systems

Unit IV:

Principles of CDMA and MIMO Wireless Communication: Analysis of Multi-user CDMA, Multipath Diversity in CDMA Systems, Near-Far Problem in CDMA, Multiple Input Multiple Output (MIMO) Systems, Examples of MIMO Systems, MIMO Receivers, BER Performance of ZF Receiver, Alamouti Code and Space-Time Block Codes, BER of Alamouti Coded System, Singular Value Decomposition (SVD), SVD in MIMO

Unit V: Principles of OFDM Wireless Communication: Capacity of MIMO Wireless Systems, SVD based MIMO Transmission, Orthogonal Frequency Division Multiplexing (OFDM), Transmission in Multicarrier Systems, FFT/IFFT Processing in OFDM, Cyclic Prefix in OFDM Systems, Schematic Representation of OFDM Transmitter and Receiver, BER Performance of OFDM Systems.

Text Books:

1. Aditya K. Jagannatham, ―Principle of Modern Wireless Communication Systems: Theory and practice‖ 1st Edition, McGrawHill Publication
2. Theodore S. Rappaport, ―Wireless Communications: Principles and Practice‖ Second Edition, Pearson Education

Reference Books:

1. Simon Haykin, MichaleMoher, ―Modern Wireless Communications‖, Pearson.

2. Xiaodong Wang, H. Vincent Poor, ―Wireless Communication Systems: Advanced Techniques for Signal Reception.

Semester	V/VI/VII	L	T	P	C	Course Code
Regulation	V20	2	0	2	3	V20ECTJO08
Name of the Course	CMOS Analog IC Design (Job Oriented Elective)					
Branch	ECE					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO-1: Describe the concept of MOS device and modeling of MOS drain current for large and small signal analysis **(K2)**
CO-2: Design and analyze Analog CMOS Sub-Circuits **(K4)**
CO-3: Describe the large signal and small signal analysis of Inverters & differential amplifier **(K2)**
CO-4: Describe the large signal and small signal analysis of cascade amplifier & Current Amplifiers **(K2)**
CO-5: Illustrate the CMOS output Amplifiers **(K3)**

UNIT -I: MOS Devices and Modeling: The MOS Transistor, Passive Components-Capacitor & Resistor, Integrated circuit Layout, CMOS Device Modeling - Simple MOS Large-Signal Model, Other Model Parameters, Small Signal Model for the MOS Transistor, Computer Simulation Models, Sub-threshold MOS Model.

UNIT -II: Analog CMOS Sub-Circuits: MOS Switch, MOS Diode, MOS Active Resistor, Current Sinks and Sources, Current Mirrors Cascade current Mirror and Wilson Current Mirror, Current and Voltage References, Band gap Reference.

UNIT -III: CMOS Amplifiers-I: Inverters- Active load inverter, current source inverter, push-pull inverter, Differential Amplifiers- large signal analysis, small signal analysis, design of differential amplifier,

UNIT -IV: CMOS Amplifiers-II: Cascode Amplifiers- Large signal analysis, small signal analysis and frequency response, design of cascade amplifier, Current Amplifiers- single ended input current amplifier, differential input current amplifier,

UNIT-V: Output Amplifiers: class-a amplifier, source follower, push pull CS amplifier, High Gain Amplifiers Architectures.

TEXT BOOKS:

1. CMOS Analog Circuit Design - Philip E. Allen and Douglas R. Holberg, Oxford University Press, International Second Edition/Indian Edition, 2010.
2. Design of Analog CMOS Integrated Circuits- Behzad Razavi, TMH Edition.

REFERENCE BOOKS:

1. Analog Integrated Circuit Design- David A.Johns, Ken Martin, Wiley Student Edn, 2016.
2. Analysis and Design of Analog Integrated Circuits- Paul R. Gray, Paul J. Hurst, S. Lewisand R. G. Meyer, Wiley India, Fifth Edition, 2010.
3. CMOS: Circuit Design, Layout and Simulation- Baker, Li and Boyce, PHI

Semester	**V/VI/VII**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	2	0	2	3	V20ECTJO09
Name of the Course	Bio Medical Instrumentation (Job Oriented Elective)					
Branch	ECE					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Explain the basics concepts of Bio-Medical Instrumentation **(K2)**
CO2: Explain the concepts of electrode theory, classification of Electrodes and Transducers used in Bio-Medical Applications **(K2)**
CO3: Explain the Anatomy and Physiology of Cardiovascular system and Illustrate the application of Bio-Medical Instruments to measure the Physiological parameters of Cardiovascular System **(K2)**
CO4: Discuss the processing methods in elements used for Patient's Health care & monitoring.
CO5: Classify different types of monitors, discuss the principals of recorders and Illustrate the methods of accident preventions i.e. Shock Hazards from different Electrical Equipment. **(K2)**

UNIT-I:

INTRODUCTION TO BIOMEDICAL INSTRUMENTATION: Age of Biomedical Engineering, Development of Biomedical Instrumentation, Man Instrumentation System, Components of the Man-Instrument System, Physiological System of the Body, Problems Encountered in Measuring a Living System, Sources of Bioelectric Potentials, Muscle, Bioelectric Potentials, Sources of Bioelectric Potentials, Resting and ActionPotentials,BioelectricPotentials-ECG,EEGandEMG,EnvokedResponses.

UNIT-II:

ELECTRODES AND TRANSDUCERS: Introduction, Electrode Theory, Bio potential Electrodes, Examples of Electrodes, Basic Transducer Principles ,The Transducer and Transduction Principles, Active Transducers, Passive Transducers, Transducers for Biomedical Applications, Pulse Sensors, Respiration Sensor, Transducers with Digital Output.

UNIT-III:

CARDIOVASCULAR SYSTEM AND MEASUREMENTS: The Heart and Cardiovascular System, Electro Cardiography, Blood Pressure Measurement,

Measurement of Blood Flow and Cardiac Output, Measurement of Heart Sounds, Plethysmography.

MEASUREMENTS IN THE RESPIRATORYSYSTEM: The Physiology of The Respiratory System, Tests and Instrumentation for the Mechanics of Breathing, Respiratory Therapy Equipment.

UNIT-IV:

PATIENT CARE AND MONITORING: Elements of Intensive-Care Monitoring, Patient Monitoring Displays, Diagnosis, Calibration and Repair ability of Patient-Monitoring Equipment, Other Instrumentation for Monitoring Patients, Organization of the Hospital for Patient-Care Monitoring, Pacemakers, Defibrillators.

UNIT-V:

MONITORS, RECORDERS AND SHOCK HAZARDS: Bio potential Amplifiers, Monitors, Recorders, Shock Hazards and Prevention, Physiological Effects and Electrical Current, Shock Hazards from Electrical Equipment, Methods of Accident Prevention, Isolated Power Distribution System.

Text Books:

1.“Bio-Medical Electronics and Instrumentation”, Onkar N. Pandey, Rakesh Kumar, Katson Books.
2.“Bio-Medical Instrumentation”, Cromewell, Wiebell, Pfeiffer

References:

1. “Hand Book of Bio-Medical Instrumentation”, Khandapur. McGrawHill
2. “Introduction to Bio-Medical Equipment Technology”, 4thEdition, Joseph J.Carr, John M.Brown, Pearson Publications.

Semester	V/VI/VII	L	T	P	C	Course Code
Regulation	V20	3	0	0	3	V20ECTJO10
Name of the Course	SPEECH SIGNAL PROCESSING (Job Oriented Elective)					
Branch	ECE					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO 1 Outline the basic characteristics of speech signal in relation to speech production **and** model the speech production system.**(K2)**
CO 2 List different speech parameters. **(K2)**
CO 3 Apply various algorithms for speech enhancement and speech coding. **(K3)**
CO 4 Design a simple system for speech recognition. **(K3)**
CO 5 Make use of different Speaker Recognition Techniques. **(K3)**

UNIT I Speech Production: Speech signal; Speech Production process: Lungs, Larynx and Vocal folds, Vocal tract; Acoustic Phonetics: Vowels, Diphthongs, Semi vowels, Nasals, Unvoiced fricatives, Voiced fricatives, Voiced and unvoiced stops; Acoustic theory of speech production; Digital models for speech signals.

UNIT II Speech Analysis: Time-Dependent processing of speech; Short-Time energy and average magnitude; Speech vs. Silence discrimination using energy and zero crossings; Short-Time autocorrelation; Short-Time average magnitude difference function; Pitch period estimation using autocorrelation function; Linear Predictive Coding (LPC) Analysis; Cepstral Analysis.

UNIT III Speech Enhancement: Nature of Interfering Sounds; Speech Enhancement (SE) Techniques: Basic principles of Spectral Subtraction; Wiener Filtering; Wiener filtering for noise reduction; Statistical-Model-based method: Maximum-likelihood estimator for speech enhancement; Applications of speech enhancement.

UNIT IV Speech Coding: Quantization; Speech redundancies; Time-Domain waveform coding: Basic Time-Adaptive Waveform Coding, Exploiting Properties of the Spectral Envelope; Linear predictive coding (LPC)-based coders: Adaptive delta modulation, Adaptive differential pulse code modulation, Code-excited linear prediction;

UNIT V Automatic Speech and Speaker Recognition: Introduction: ASR Search, Variability in Speech Signals, Speech recognition approaches - using HMMs and

Deep Neural Networks, Speaker recognition using GMMs, I-Vector and Deep Learning

Text books:

1. Douglas O Shaughnessy, "Speech Communications Human and Machine" 2 nd Edition, IEEE Press, 2000.
2. Dr Shaila D Apte, " Speech and Audio Processing , Wiley India, 1ST Edition 2012

Reference Books:

1. Philipos C. Loizou, "Speech Enhancement" 2 ndEdition, CRC Press, Taylor & Francis Group, 2013
2. Thomas F. Quatieri, "Discrete -Time Speech Signal Processing: Principles and Practice", Pearson Education, 2002

Semester	V/VI/VII	L	T	P	C	Course Code
Regulation	V20	3	0	0	3	V20ECTJO11
Name of the Course	Electronic Instrumentation (Job Oriented Elective)					
Branch	ECE					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1. Select the instrument to be used based on the requirements. **[K2]**
CO2. Understand the design of oscilloscopes for different applications. **[K2]**
CO3. Explain different signal generators and analyzers. **[K2]**
CO4. Understand the design of different types of Bridge circuits for different Applications. **[K2]**
CO5. Explain and Design different types of transducers for different Applications and for measurement of Physical Parameters. **[K2]**

UNIT-I

Performance characteristics of instruments, Static characteristics, Accuracy, Resolution, Precision, Expected value, Error, Sensitivity. Errors in Measurement, Dynamic Characteristics-speed of response, Fidelity, Lag and Dynamic error. DC Voltmeters-Multi-range, Range extension/Solid state and differential voltmeters, AC voltmeters-multi range, range extension, shunt. Thermocouple type RF ammeter, Ohmmeters series type, and shunt type, Multi-meter for Voltage, Current and resistance measurements.

UNIT-II

Oscilloscopes CRT features, vertical amplifiers, horizontal deflection system, sweep, trigger pulse, delay line, sync selector circuits, simple CRO, triggered sweep CRO, Dual beam CRO, Dual trace oscilloscope, sampling oscilloscope, storage oscilloscope, digital readout oscilloscope, digital storage oscilloscope, Lissajous method of frequency measurement.

UNIT-III

Signal Generator- fixed and variable, AF oscillators, Standard and AF sine and square wave signal generators, Function Generators, Square pulse, Random noise, sweep, Arbitrary waveform. Wave Analyzers, Harmonic Distortion Analyzers, Spectrum Analyzers, Digital Fourier Analyzers.

UNIT-IV

DC Bridges: Measurement of Resistance-Wheatstone's Bridge, Kelvin's Bridge. AC Bridges: Measurement of inductance- Maxwell's bridge, Hay's bridge, Anderson Bridge. Measurement of capacitance-Schering's Bridge. Measurement of Frequency-Wien Bridge, Errors and precautions in using bridges.

UNIT-V

Transducers- active & passive transducers : Resistance, Capacitance, inductance; Strain gauges, LVDT, Piezo Electric transducers, Resistance Thermometers, Thermocouples, Thermistors, Sensistors.

Measurement of physical parameters- Force, Pressure, Velocity, Humidity, Moisture. Data acquisition systems.

TEXTBOOKS:

1. Electronic Instrumentation, second edition -. S. Kalsi, Tata Mc Graw Hill, 2004.
2. Modern Electronic Instrumentation and Measurement Techniques – A.D. Helfrickand W.D.Cooper, PHI, 5th Edition,2002.

REFERENCES:

1. Electronic Instrumentation & Measurements- David A. Bell, PHI, 2nd Edition, 2003.
2. Electronic Test Instruments, Analog and Digital Measurements- Robert A. Witte, Pearson Education, 2ndEdition, 2004.
3. Electronic Measurements & Instrumentations by K. Lal Kishore, Pearson Education-2005.
4. Electronic Measurements & Instrumentation by Uday A.Bakshi & Ajay V. Bakshi Technical Publications.

Semester	**V/VI/VII**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	3	0	0	3	V20ECTJO12
Name of the Course	Sensors & Applications (Job Oriented Elective)					
Branch	ECE					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe the sensors and theory behind **[K2]**
CO2: Explain the Sensors used in mechanical systems. **[K2]**
CO3: Explain the Thermal and electrical Sensors **[K2]**
CO4: Explain the Magnetic, Acoustic and High frequency sensors **[K2]**
CO5: Illustrate and build IoT or IIoT systems for different Use cases **[K3]**

UNIT – I
Introduction: transducer, Electrical sensor – need for sensors in the modern world. Different fields of sensors based on the stimuli - various schematics for active and passive sensors.General characteristics and specifications of sensors - Implications of specifications uses of sensors - measurement of stimuli - block diagram of sensor system. Brief description of each block.

UNIT– II
Sensors for mechanical systems or mechanical sensors - Displacement - acceleration and force - flow of fluids - level indicators - pressure in fluids - stress in solids. Typical sensors - wire and film strain gauges, anemometers, piezo electric, accelerometers, potentiometric sensors, LVDT.

UNIT– III
Thermal sensors – temperature – temperature difference – heat quantity. Thermometers for different situation – thermocouples thermistors – colorpyrometry.Optical sensors: light intensity – wavelength and color – light dependent resistors, photodiode, photo transistor, CCD, CMOS sensors.
Electrical sensors: conventional volt and ammeters, high current sensors, (current transformers), high voltage sensors, High power sensors.

UNIT – IV
Magnetic sensors: magnetic field, magnetic flux density – magneto resistors, Hall sensors, super conduction squids.

Acoustic or sonic sensors: Intensity of sound, frequency of sound in various media, various forms of microphones, piezo electric sensors.
High frequency sensors like microwave frequency sensors, wavelength measuring sensors. MEMs and MEM based sensors.

UNIT – V
Applications in IoT: Smart Cities and AgricultureApplications in IIoT: Manufacturing and Automotive Industries.

Textbooks:
1. Henry Bolte, “Sensors – A Comprehensive Sensors”, John Wiley
2. Doebelin, “Measurement Systems: Application and Design”, McGraw Hill.

References:
1. Julian W. Gardner, Vijay K. Varadan, Osama O. Awadelkarim “Microsensors, MEMS and Smart Devices”, New York: Wiley
2. KouroshKalantar – Zadeh, Benjamin Fry, “Nanotechnology- Enabled Sensors”, Springer
3. Ramon Pallas-Areny, John G. Webster, “Sensors and signal conditioning” John Wiley & Sons.

Semester	V/VI/VII	L	T	P	C	Course Code
Regulation	V20	3	0	0	3	V20ECTJO13
Name of the Course	Deep Learning (Job Oriented Elective)					
Branch	ECE					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe the basics of learning algorithms. **(K2)**
CO2: Explain neural network and various parameters while training neural network. **(K2)**
CO3: Describe convolution neural network and its training. **(K2)**
CO4: Discuss various advanced neural network architectures. **(K2)**
CO5: Discuss various Deep Learning applications. **(K2)**

Unit-I
Introduction:
Introduction to Deep Learning, Bayesian Learning, Optimization Techniques, Gradient Descent, Batch Optimization. Bias and Variance, Maximum Likelihood Estimation,Supervised Learning Algorithms, Unsupervised Learning Algorithms.

Unit-II
Neural Networks
The Basic Architecture of Neural Networks**-** Single Computational Layer: The Perceptron, Multilayer Neural Networks; Training a Neural Network with Backpropagation, Practical Issues in Neural Network Training-The Problem of Overfitting, The Vanishing and Exploding Gradient Problems, Unsupervised Learning with Deep Network, Autoencoders.

Unit-III
Convolution neural network and training
Introduction, The Basic Structure of a Convolutional Network- Padding, Strides, Typical Settings, The ReLU Layer, Pooling, Fully Connected Layers, The Interleaving Between Layers, **,** Transfer Learning
Gradient Descent, Momentum Optimizer, RMSProp, Adam , Transfer Learning ,Effective training in Deep Net- early stopping, Dropout, Batch Normalization, Instance Normalization, Group Normalization

Unit-IV

Advanced Deep Learning Architectures Recent Trends in Deep Learning Architectures, Residual Network, Skip Connection Network, Fully Connected CNN, LSTM Networks, Generative Modeling with DL, Variational Autoencoder, Generative Adversarial Network.

Unit-V
Deep Learning applications
Applications of Convolutional Networks: Content-Based Image Retrieval, Object Localization, Object Detection, Natural Language and Sequence Learning; Application of Recurrent Neural Networks: Application to Automatic Image Captioning, Time-Series Forecasting and Prediction, End-to-End Speech Recognition, Handwriting Recognition.

Text Books
1. “Deep Learning”, Ian Goodfellow, Yoshua Bengio, Aaron Courville, The MIT Press, 2016.
2. ”Neural Networks and Deep Learning”,Charu C. AggarwalSpringer.

Reference Books
1. Raúl Rojas ” Neural Networks: A Systematic Introduction,,Springer.
2.Pattern Classification- Richard O. Duda, Peter E. Hart, David G. Stork, John Wiley & Sons Inc.

Semester	**V/VI/VII**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	3	0	0	3	V20ECTJO14
Name of the Course	Machine Learning (Job Oriented Elective)					
Branch	ECE					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Explain the principles and concepts of machine learning **(K2)**
CO2: Describe the different machine learning approaches and techniques **(K2)**
CO3: Explain the clustering techniques used in Data representation**. (K2)**
CO4: Explain the neural network concepts **(K2)**
CO5: Describe the regression and reinforcement learning and solve ML problems using Machine
learning tools **(K2)**

UNIT I
Introduction: Machine learning: What and why? , Types of Machine Learning Supervised Learning ,Unsupervised Learning , The Curse of dimensionality, Over and under fitting , Model selection , Error analysis and validation , Parametric vs. non,parametric models.

UNIT II
Machine learning Types of Machine Learning , Supervised Learning, Classification models , Naïve Bayes Classifier , Decision trees , Support Vector Machines , KNN model , Dimensionality reduction , PCA.

UNIT III

Clustering Clustering approaches , Mean Shift clustering , Clustering data points and features , Bi-clustering , Multi,view clustering , K-Means clustering , K-medians clustering , Expectation Maximization (EM).

UNIT IV
Neural Networks Neural networks , Biological motivation for Neural Network, Neural network Representation , Perceptron , Feed forward networks , Multilayer Networks and Back Propagation Algorithms , Hidden layer representation , Application of neural network.

UNIT V

Applications and Tools Linear models for regression , Reinforcement Learning , Machine Learning Tools , Engineering applications.

Text Books:

1. Kevin P. Murphy, "Machine Learning: A Probabilistic Perspective", MIT Press, 2012.

2. Ethem Alpaydin, "Introduction to Machine Learning", Second Edition, Prentice Hall of India, 2010.

Reference Books:

1. Laurene Fausett, "Fundamentals of Neural Networks, Architectures, Algorithms and Applications", Pearson Education, 2008.
2. Tom Mitchell, "Machine Learning", McGraw,Hill, 1997.

Annexure-III

Honors (For ECE) Students:

Track-I : Communication & Signal Processing

1. Modern Digital Communication Techniques
2. Communication for 5G and Beyond
3. Modern CDMA/ MIMO/ OFDM Wireless Communications
4. Signal Processing Techniques And Its Applications
5. Broadband Networks: Concepts And Technology
6. Bio medical Image Processing
7. Cognitive Radio

Track-II : VLSI & Embedded Systems

1. Analog & Mixed Signal ICs
2. ASIC Design
3. C- Based VLSI Design
4. Fabrication Techniques for MEMS Based Sensors
5. Embedded System Design with ARM
6. MEMS & Micro Systems
7. EMC in Design

NOTE : List of Courses will be updated in every semester as per the courses offered by NPTEL.

Course Structure for Minors in ECE (VLSI & ES) Degree for all other Branch Students

S. No	Name of the Course	Mode of Learning	No. of Weeks	Credits
1	Introduction to Semi Conductor Devices	NPTEL	12 weeks	3
2	Semiconductor Devices and Circuits	NPTEL	12 weeks	3
3	Digital Circuits	NPTEL	12 weeks	3
4	Digital IC Design	Conventional Teaching	8 weeks	2
5	Basics of VLSI Design	Conventional Teaching	12 weeks	3
6	System design through Verilog	NPTEL	8 weeks	2
7	CMOS Analog VLSI Design	Conventional Teaching	12 weeks	3
8	Introduction to Internet of Things	NPTEL	12 weeks	3
9	Microprocessors & Micro Controllers	NPTEL	8 weeks	2
10	Concepts of Embedded Systems	Conventional Teaching	8 weeks	2
11	Embedded system Design with ARM	NPTEL	8 weeks	2
12	Project work		16 weeks	4

Note: While registering for the course, the student have to take the approval from the department. Above list of courses is tentative.

Total Credits : 20

(16 Credits from the above list of courses + 4 Credits from Project work)

Annexure-04

Open Elective Courses
(V20 Regulation)

List of Open Elective Courses

Courses offfered to Other Branch Students

S. No	Course Code	Name of the Course	Department Offered
1	V20ECTOE1	Internet of Things	Electronics & Communication Engineering
2	V20ECTOE2	Communication Systems	
3	V20ECTOE3	Principles of Image Processing	
4	V20ECTOE4	Medical Electronics	
5	V20ECTOE5	Principles of Wireless Comm.	
6	V20ECTOE6	Basics of VLSI Design	
7	V20ECTOE7	Concepts of Embedded Systems	

Semester	**V/VI/VII**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	2	0	2	3	V20ECTOE1
Name of the Course	Internet of Things (Open Elective)					
Branch	Except ECE					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO-1: Describe M2M and IOT Technologies. **(K2)**

CO-2: Identify the layers and protocols in IOT. **(K2)**

CO-3: Describe various communication technologies used in IOT**. (K2)**

CO-4: Demonstrate various hardware components required for IOT applications. **(K2)**

CO-5: Identify the cloud technologies & explain the applications of IoT**. (K2**)

UNIT I – INTRODUCTION
Introduction from M2M to IoT - An Architectural Overview, building architecture, Main design principles and needed capabilities, An IoT architecture outline, M2M and IoT Technology Fundamentals - Devices and gateways

UNIT II – IOT PROTOCOLS
Functionality of Layers in IoT –Study of protocols - Wireless HART, Z-Wave, 6LoWPAN, RPL, CoAP, MQTT.

UNIT III - COMMUNICATION TECHNOLOGIES IN IOT
IoT Connectivity – IEEE 802.15.4, Wi-Fi, Bluetooth, Zigbee, LPWAN, 5G Era.

UNIT IV - SYSTEM HARDWARE
Sensors, Actuators, Radio Frequency Identification, Introduction to Embedded Devices for IoT - RASPBERRY PI.

UNIT V – Cloud Computing & Case Studies
Data Collection, Storage and Computing Using a Cloud Platform for IoT Applications/Services. Real-time applications of IoT - Smart and Connected Cities, Agriculture.

TEXTBOOKS:

1. "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence" Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle , 1st Edition, Academic Press, 2014.
2. IOT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things, David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry, Cisco Press 800 East 96th Street Indianapolis, USA.
3. "Internet of Things (A Hands-on- Approach)", Vijay Madisetti and ArshdeepBahga, 1st Edition, VPT, 2014.

REFERENCE BOOKS:

1. From Internet of Things to Smart Cities: Enabling Technologies - edited by Hongjian Sun, Chao Wang, Bashar I. Ahmad, CRC Press -2018.
2. "Architecting the Internet of Things", Bernd Scholz-Reiter, Florian Michahelles, ISBN 978-3-642-19156-5 e-ISBN 978-3-642-19157-2, Springer.
3. IOT (Internet of Things) Programming: A Simple and Fast Way of Learning IOT, David Etter.

Semester	V/VI/VII	L	T	P	C	Course Code
Regulation	V20	2	0	2	3	V20ECTOE2
Name of the Course	Communication Systems (Open Elective)					
Branch	Except ECE					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO-1: Demonstrate the fundamentals of communication systems **(K2)**
CO-2: Compare the various analog modulation and demodulation schemes **(K2)**
CO-3: Compare the various digital modulation and demodulation schemes **(K2)**
CO-4: Explain the wireless communication system concepts **(K2)**
CO-5: Outline the satellite & Optical communication system principles **(K2)**

Unit-I
Fundamentals of Communication systems: Block diagram of communication system; types of communications-analog and digital; Noise–types of noise, sources of noise, and noise figure.

Unit-II
Fundamentals of Analog Communication: Need for modulation; Types of analog modulation techniques (AM, FM & PM). Sampling theorem, Nyquist criteria, introduction to PAM, PWM and PPM.

Unit-III
Fundamentals of Digital Communication: Advantages; Working principle of PCM; introduction to digital modulation techniques-ASK, FSK, &PSK.

UNIT-IV:
Fundamentals of Wireless Communication: Evolution of mobile communications, Mobile Radio System around the world, Comparison of Common wireless system, Concepts of 1G, 2G, 3G, 4G. , Introduction to 5G.

Unit-V
Fundamentals of Satellite & Optical communication: Brief history of Satellite systems; Principles, architecture. Fundamentals of Optical Communication: Evolution of fiber optic system, Elements of an Optical Fiber Transmission link and Reception link.

Textbooks:

1. Principles of Communications by H. Taub and D. Schilling, TMH, 2003.
2. Wireless Networks: Applications and Protocols by T. S. Rappaport, Pearson Education
3. Satellite Communications by Timothy Pratt, Charles Bostian and Jeremy Allnutt, WSE, Wiley Publications, 2nd Edition, 2003.
4. Optical Fiber Communication by Gerd Kaiser (TMH)

References:

1. Electronic Communication Systems by Kennedy and Davis, TMH, 4th edition, 2004.
2. Wireless Communication and Networks: 3G and Beyond by I. SahaMisra, TMH Education.
3. Satellite Communications: Design Principles by M. Richharia, B S publications, 2nd Edition, 2003.

Semester	V/VI/VII	L	T	P	C	Course Code
Regulation	V20	2	0	2	3	V20ECTOE3
Name of the Course	Principles of Image Processing (Open Elective)					
Branch	Except ECE					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1. Understand the different Transforms Techniques & their use in Image Processing Applications. **(K2)**
CO2. Describe Spatial and frequency domain filtering like smoothing and sharpening operations on Images. **(K2)**
CO3. Describe Restoration operations/techniques on Images. **(K2)**
CO4. Describe the Image compression Techniques and Image segmentation. **(K2)**
CO5. Explain the different color Image Processing Techniques. **(K2)**

UNIT-1 Introduction
Introduction: Introduction to Image Processing, Fundamental steps in digital image processing, components of an image processing system, some basic relationships between pixels, an introduction to the mathematical tools used in digital image processing.
Image Transforms: Discrete Fourier transform (DFT) and Discrete Cosine transform.

UNIT-2 Image Enhancement Techniques
Intensity Transformations and Spatial Filtering: Some basic intensity transformation functions, histogram processing, fundamentals of spatial filtering, smoothing spatial filters and sharpening spatial filters.
Filtering in the Frequency Domain: image smoothing using frequency domain filters, Image Sharpening using frequency domain filters.

UNIT-3 Image Restoration
Image Restoration : A model of the image degradation / Restoration process, Noise models, restoration in the presence of noise only-Spatial Filtering. Estimating the image degradation function, Inverse filtering, Minimum mean square error (Wiener) filtering.

UNIT-4 Image compression and Segmentation

Image compression: Fundamentals, Basic compression methods: Huffman coding, Arithmetic coding, LZW coding and subband coding.

Image segmentation: Fundamentals, point, line, edge detection, thresholding, based segmentation and simple morphological operations :Erosion and dilation, opening and closing.

UNIT-5 Color image processing

Color image processing: color fundamentals, color models, pseudo color image processing, basics of full color image processing, color transformations, smoothing and sharpening.

Text Books

1. R. C. Gonzalez and R. E. Woods, Digital Image Processing, 3rd edition, Prentice Hall, 2008.
2. Jayaraman, S. Esakkirajan, and T. Veerakumar," Digital Image Processing", Tata McGraw Hill Education, 2011.

Reference Books

3. Anil K.Jain, "Fundamentals of Digital Image Processing", Prentice Hall of India, 9th Edition, Indian Reprint, 2002.
4. B.Chanda, D.Dutta Majumder, "Digital Image Processing and Analysis", PHI, 2009.

Semester	**V/VI/VII**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	2	0	2	3	V20ECTOE4
Name of the Course	Medical Electronics (Open Elective)					
Branch	Except ECE					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Explain the basics concepts of Bio-Medical Instrumentation. **(K2)**
CO2: Explain the concepts of electrode theory, classification of Electrodes and Transducers used in Bio-Medical Applications. **(K2)**
CO3: Explain the Anatomy and Physiology of Cardiovascular system and Illustrate the application of Bio-Medical Instruments to measure the Physiological parameters of Cardiovascular System **(K2)**
CO4: Discuss the elements used for Patient's Health care &monitoring. **(K2)**
CO5: Classify different types of monitors, discuss the principals of recorders and Illustrate the methods of accident preventions **(K2)**

UNIT-I:

INTRODUCTIONTOBIOMEDICALINSTRUMENTATION: AgeofBiomedicalEngineering,Development of Biomedical Instrumentation, Man Instrumentation System, Components of the Man-Instrument System, Physiological System of the Body, Problems Encountered in Measuring a Living System, Sources of Bioelectric Potentials, Muscle, Bioelectric Potentials, Sources of Bioelectric Potentials, Resting and Action Potentials, Bioelectric Potentials-ECG, EEG and EMG,

UNIT-II:

ELECTRODES AND TRANSDUCERS: Introduction, Electrode Theory, Bio potential Electrodes, Examples of Electrodes, Basic Transducer Principles, Active Transducers, Passive Transducers, Transducers for Biomedical Applications, Pulse Sensors, Respiration Sensor, Transducers with Digital Output.

UNIT-III:

CARDIOVASCULAR SYSTEM AND MEASUREMENTS: The Heart and Cardiovascular System, Electrocardiography, Blood Pressure Measurement, Measurement of Blood Flow and Cardiac Output, Measurement of Heart Sounds, Plethysmography.

UNIT-IV:

PATIENTCAREANDMONITORING: ElementsofIntensive-CareMonitoring,PatientMonitoringDisplays, Diagnosis, Calibration and Repair ability of Patient-Monitoring Equipment, Other Instrumentation for Monitoring Patients, Organization of the Hospital for Patient-Care Monitoring, Pacemakers, Defibrillators.

UNIT-V:

DIAGNOSTIC TECHNIQUES AND BIO-TELEMETRY: Principles of Ultrasonic Measurement, Ultrasonic Imaging, Ultrasonic Applications of Therapeutic Uses, Ultrasonic Diagnosis, X-Rayand Radio-Isotope Instrumentations, CAT Scan, Emission Computerized Tomography, MRI, Introduction to Biotelemetry, Physiological Parameters Adaptable to Biotelemetry, The Components of Biotelemetry System, Implantable Units, Telemetry for ECG Measurements during Exercise, Telemetry for Emergency Patient Monitoring

Text Books:

1. Bio-Medical Electronics and Instrumentation, OnkarN.Pandey, RakeshKumar, KatsonBooks.
2. Bio-Medical Instrumentation, Cromewell, Wiebell, Pfeiffer

References:

1. “Hand Book of Bio-Medical Instrumentation”, Khandapur. McGrawHill
2. “Introduction to Bio- Medical Equipment Technology”, 4thEdition, Joseph J.Carr, John M.Brown, Pearson Publications.

Semester	**V/VI/VII**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	2	0	2	3	V20ECTOE5
Name of the Course	Principles of Wireless Communication (Open Elective)					
Branch	ECE					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Discuss the cellular system evolution of mobile radio systems **[K2]**
CO2: Illustrate the basic cellular concepts. **[K2]**
CO3: Explain the Various Propagation models. **[K2]**
CO4: Discuss the need of modulation, diversity and equalization in cellular & Mobile Communication. **[K2]**
CO5: Demonstrate the knowledge about GSM architecture, &upcoming technologies like 3G, 4G etc. **[K2]**

UNIT-I: Introduction of Wireless Communication History and evolution of mobile radio systems: Types of mobile wireless services/systems, WLL, Paging, Satellite systems.

UNIT-II: Cellular Concepts and System Design Fundamentals: Cellular concept and frequency reuse, channel assignment, handoff strategies, cell splitting,cell sectoring.

UNIT-III: Mobile radio Propagation Models: Radio wave propagation issues in personal wireless systems, Propagation models, Multipath fading.

UNIT-IV: Overview analog and digital modulation techniques Need For Modulation.

UNIT-V: Digital cellular networks: GSM architecture, GSM Services, multiple access schemes; FDMA, TDMA, CDMA, OFDMA;

Higher Generation Cellular Standards: 3G System architecture (UMTS), 4G System Architecture, Introduction to 5G.

Text Books

1. Theodore S. Rappaport, ―wireless communications Principles and Practices‖, PHI, 2005

2. Jochen Schiller, ―Mobile Communications‖, Pearson Education, second edition, 2009.

Reference Book

1. Lee W.C.Y, ―Mobile communication Engineering
2. Theory and Applications‖, 2/e McGraw-Hill,New York, 2003
3. Andreas F. Molisch, ―Wideband Wireless Digital Communication‖, Pearson Education 2001.

Semester	**V/VI/VII**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	2	0	2	3	V20ECTOE6
Name of the Course	Basic of VLSI Design (Open Elective)					
Branch	ECE					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1. Identify the CMOS layout levels, and the design layers used in the process sequence. **(K2)**
CO2. Describe the general steps required for processing of CMOS integrated circuits. **(K2)**
CO3. Outline static CMOS combinational and sequential logic at the transistor level. **(K1)**
CO4. Demonstrate different logic styles such as complementary CMOS logic, pass-Transistor Logic, dynamic logic, etc. **(K3)**
CO5. Interpret the need for testability and testing methods in VLSI. **(K3)**

UNIT-I:

Moore's law, speed power performance, n-MOS fabrication, CMOS fabrication: n-well, well processes, Bi-CMOS, Comparison of bipolar and CMOS. Basic Electrical Properties of MOS And Bi-CMOS Circuits: Drain to source current versus voltage characteristics, threshold voltage, trans conductance.

UNIT-II:

Basic Electrical Properties of MOS And Bi-CMOS Circuits: n-MOS inverter, Determination of pull up to pull down ratio: n-MOS inverter driven through one or more pass transistors, alternative forms of pull up, CMOS inverter, Bi-CMOS inverters, latch up.
Basic Circuit Concepts: Sheet resistance, area capacitance calculation, Delay unit, inverter delay, estimation of CMOS inverter delay, super buffers, Bi-CMOS drivers.

UNIT-III:

MOS and Bi-CMOS Circuit Design Processes: MOS layers, stick diagrams, n-MOS design style, CMOS design style Design rules and layout & Scaling of MOS Circuits: λ - based design rules, scaling factors for device parameters

UNIT-IV:

Subsystem Design and Layout-1: Switch logic pass transistor, Gate logic inverter, NAND gates, NOR gates, pseudo n-MOS, Dynamic CMOS Examples of structured design: Parity generator, Bus arbitration, multiplexers, logic function block, code converter.

UNIT-V:

Subsystem Design and Layout-2: Clocked sequential circuits, dynamic shift registers, bus lines, General considerations, 4-bit arithmetic processes, 4-bit shifter, Regularity- Definition & Computation Practical aspects and testability: Some thoughts of performance, optimization and CAD tools for design and simulation.

Text Books:

1. "Basic VLSI Design", Douglas A Pucknell, Kamran Eshraghian, 3rd Edition, Prentice Hall of India publication, 2005.

References:

1. "CMOS Digital Integrated Circuits, Analysis And Design", Sung – Mo (Steve) Kang,Yusuf Leblebici, Tata McGraw Hill, 3rd Edition, 2003.
2. "VLSI Technology", S.M. Sze, 2nd edition, Tata McGraw Hill, 2003.

Semester	**V/VI/VII**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	2	0	2	3	V20ECTOE7
Name of the Course	Concepts of Embedded Systems (Open Elective)					
Branch	ECE					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO-1: Describe the Basic Concepts of embedded systems- **(K2).**
CO-2: Describe the characteristics of Application & Domain-Specific Embedded Systems - **(K2)**
CO-3: Explain the various elements of embedded hardware and their design principles- **(K2)**
CO-4: Explain various software design approaches in embedded environment- **(K2)**
CO-5: Discuss various tools used for Embedded system implementation and testing - **(K2)**

UNIT I - INTRODUCTION TO EMBEDDED SYSTEMS:

Introduction to Embedded Systems, Classification of Embedded systems, Major application areas of embedded systems, Purpose of embedded Systems, The Typical embedded system - core of the embedded system, Difference between RISC and CISC, Types of Memories.

UNIT II - CHARACTERISTICS OF EMBEDDED SYSTEM:

Characteristics of an embedded system, Quality attributes of embedded systems, Application-specific and Domain-Specific examples of an embedded system.

UNIT III - EMBEDDED HARDWARE DESIGN:

Analog Electronic Components, Digital electronic components, I/O types and examples, Serial communication devices (I2C, SPI, USB), GPRS, Watchdog timer, Real time Clock, Sensors and Actuators.

UNIT IV - EMBEDDED FIRMWARE DESIGN:

Embedded Firmware design approaches, Embedded Firmware development languages: Assembly level and High-level Programming Language, Advantages and Drawbacks of development languages, Concepts of C versus Embedded C and Compiler versusCross-compiler.

UNIT V - EMBEDDED SYSTEM IMPLEMENTATION AND TESTING:
The main software utility tools - IDE and CAD, Translation tools - Pre-processors, Interpreters, Compilers and Linkers, Debugging tools, Quality assurance and testing of the design, Testing on host machine.

Text Books:

1. Embedded Systems Architecture- By Tammy Noergaard, ElsevierPublications,2013
2. Embedded Systems-By Shibu.K.V-Tata McGraw Hill Education Private Limited,2013.

References:

1. Embedded Systems: Architecture, Programming and Design by Raj Kamal, Tata McGraw-Hill Education, 2011.
2. Embedded System Design, Frank Vahid, Tony Givargis, John Wiley Publications,2013.
3. Embedded/Real Time Systems by KVKK Prasad by Dreamtech Publication

Sri Vasavi Engineering College

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(Sponsored by Sri Vasavi Educational Society)

(Approved by AICTE, New Delhi & Permanently affiliated to JNTUK, Kakinada)

(Accredited by NBA & NAAC with 'A' Grade, Recognized by UGC Under Section 2(f) & 12(B))

Pedatadepalli, Tadepalligudem, W.G.Dt, A.P-534101

Department of Compter Science Engineering & Compter Science Technology

6th Meeting of Board of Studies

Agenda:

1. **Welcome note by the Chairperson BOS**
2. **Progress Report of the Department**
3. **Review and Approval of Course Structure for I to VIII Semesters of B.Tech(CSE) and B.Tech(CST) Programme under V20 Regulation**. The details are given in Annexure-I.
4. **Approval of Syllabi for the Proposed Courses offered in V to VIII Semesters of B.Tech(CSE) and B.Tech(CST) Programme under V20 Regulation.** The details are given in Annexure-II.
5. **Approval of list of Courses offering under Job Oriented Elective-I to Job Oriented Elective-IV in V to VII Semesters of B.Tech(CSE) and B.Tech(CST) Programme respectively under V20 Regulation and the approval of their Syllabi.** The details are given in Annexure-III.
6. **Approval of list of Courses offering under Open Elective-I to Open Elective-IV in V and VII Semesters respectively under V20 Regulation for all other branches and the approval of their Syllabi.** The details are given in Annexure-IV.
7. **Approval of B.Tech(Hons) & B.Tech(Minors) offered by CSE in line with the guidelines prescribed by APSCHE.** The details are given in Annexure-V.
8. **Any other item with the permission of chair.**

Dr.D Jaya Kumari
Chairperson of BOS

Annexure-I

SEMESTER – I (First Year)

S.No.	Code	Name of the Course		L	T	P	C
1	V20MAT01	Linear Algebra and Differential	BSC	3	0	0	3
2	V20CHT01	Engineering Chemistry	BSC	3	0	0	3
3	V20ENT01	English for Professional	HSS	3	0	0	3
4	V20MEL02	Engineering Workshop	ESC	1	0	4	3
5	V20CST01	Programming in 'C' for problem	ESC	3	0	0	3
6	V20ENL01	Hone Your Communication Skills Lab –I	HSS	0	0	3	1.5
7	V20CHL01	Engineering Chemistry Lab	BSC	0	0	3	1.5
8	V20CSL01	Programming Lab in 'C' for problem Solving	ESC	0	0	3	1.5
Total:				**13**	**0**	**13**	**19.5**

Total Contact Hours: 26 **Total Credits: 19.5**

SEMESTER – II (First Year)

S.No.	Code	Name of the Course		L	T	P	C
1	V20MAT02	Numerical Methods and Vector Calculus	BSC	3	0	0	3
2	V20PHT01	Engineering Physics	BSC	3	0	0	3
3	V20ECT01	Switching Theory and Logic Design	ESC	3	0	0	3
4	V20CST02	Python Programming	ESC	3	0	0	3
5	V20MEL01	Engineering Graphics	ESC	1	0	4	3
6	V20PHL01	Engineering Physics Lab	BSC	0	0	3	1.5
7	V20CSL02	Python Programming Lab	ESC	0	0	3	1.5
8	V20ENL02	Hone Your Communication Skills Lab –II	HSS	0	0	3	1.5
9	V20CHT02	Environmental Science	MNC	0	0	0	0
			Total:	**13**	**0**	**13**	**19.5**

Total Contact Hours: 26 **Total Credits: 19.5**

SEMESTER-III (SECOND YEAR)

S.No.	Code	Name of the Course		L	T	P	C
1	V20MBT51	Managerial Economics and Financial Analysis	HSS	3	0	0	3
2	V20MAT07	Mathematical Foundation Of Computer Science	ESC	3	0	0	3
3	V20CST03	OOPs Through C++	PCC	3	0	0	3
4	V20CST04	Data Structures	PCC	3	0	0	3
5	V20CST05	Computer Organization and Architecture	ESC	3	0	0	3
6	V20CSL03	OOPs Through C++ Lab	PCC	0	0	3	1.5
7	V20CSL04	Data Structures Lab	PCC	0	0	3	1.5
8	V20CSL05	Linux Shell Scripting Lab	PCC	0	0	3	1.5
9	V20SOC01	**Skill Oriented Course-I**	**SOC**	**1**	**0**	**2**	**2**
10	V20ENT02	Professional Communication Skills –I	MNC	2	0	0	0
			Total:	**18**	**0**	**11**	**21.5**

Total Contact Hours: 29 **Total Credits: 21.5**

SEMESTER - IV (SECOND YEAR)

S.No.	Code	Name of the Course		L	T	P	C
1	V20CST06	Design and Analysis of Algorithms	PCC	3	0	0	3
2	V20CST07	Software Engineering	PCC	3	0	0	3
3	V20CST08	Database Management Systems	PCC	3	0	0	3
4	V20CST09	Java Programming	PCC	3	0	0	3
5	V20MAT04	Probability and Statistics	BSC	**3**	0	0	**3**
6	V20CSL06	Statistical Visualization using R Lab	BSC	0	0	3	1.5
7	V20CSL07	Database Management Systems Lab	PCC	0	0	3	1.5
8	V20CSL08	Java Programming Lab	PCC	0	0	3	1.5
9	V20SOC02	Skill Oriented Course-II	SOC	1	0	2	2
10	V20ENT03	Professional Communication Skills –II	**MNC**	**2**	0	0	**0**
			Total:	**18**	**0**	**11**	**21.5**

Total Contact Hours: 29 **Total Credits: 21.5**

V SEMESTER (THIRD YEAR)

S.No.	Code	Name of the Course		L	T	P	C
1	V20CST10	Operating Systems	PCC	3	0	0	3
2	V20CST11	Data Mining	PCC	3	0	0	3
3	V20CST12	Web Technologies	PCC	3	0	0	3
4		**Open Elective -I / Job Oriented Elective-I**	OEC	3	0	0	3
			JOE	0	0	6	3
5	**Professional Elective-I**		PEC	3	0	0	3
	V20CSTPE01	Software Testing Methodologies					
	V20CSTPE02	Principles of Programming Languages					
	V20CSTPE03	Artificial Intelligence					
	V20CSTPE04	Computer Graphics					
6	V20CSL09	Data Mining Lab	PCC	0	0	3	1.5
7	V20CSL10	Web Technologies Lab	PCC	0	0	3	1.5
8	V20SOC03	Skill Oriented Course-III (Soft Skills)	SO/SS	1	0	2	2
9	V20CSP01	Mini Project / Internship	Internship	0	0	3	1.5
10	V20ENT04	Professional Communication Skills –III	**MNC**	**2**	0	0	**0**
			Total:	**15/18**	**0**	**11 / 17**	**21.5**

Total Contact Hours: 27 **Total Credits: 21.5**

VI SEMESTER (THIRD YEAR)

S.No.	Code	Name of the Course		L	T	P	C
1	V20CST13	Computer Networks	PCC	3	0	0	3
2	V20CST14	Machine Learning	PCC	3	0	0	3
3	V20CST15	Automata and Compiler Design	PCC	3	0	0	3
4		**Open Elective -II /**	OEC	3	0	0	3
		Job Oriented Elective-II	JOE	0	0	6	
5	**Professional Elective-II**		PEC	3	0	0	3
	V20CSTPE05	Object Oriented Software Engineering					
	V20CSTPE06	Advanced Data Structures					
	V20CSTPE07	Data Science					
	V20CSTPE08	Cryptography &Network Security					
6	V20CSL11	Computer Networks Lab	PCC	0	0	3	1.5
7	V20CSL12	Machine Learning Lab using Python	PCC	0	0	3	1.5
8	V20CSL13	Unified Modeling Language Lab	PCC	0	0	3	1.5
9	V20SOC04	Skill Oriented Course-IV	SO	**1**	**0**	**2**	**2**
10	V20CEMC02	Professional Ethics & Human Values	MNC	**2**	0	0	**0**
			Total:	**15/18**	**0**	**11/17**	**21.5**

Total Contact Hours: 32 **Total Credits: 21.5**

VII SEMESTER(FOURTH YEAR)

S.No.	Code	Name of the Course		L	T	P	C
1	**Professional Elective-III**		PEC	3	0	0	3
	V20CSTPE09	Advanced Computer Architecture					
	V20CSTPE10	BigData Analytics					
	V20CSTPE11	Deep Learning					
	V20CSTPE12	Human Computer Interaction					
2	**Professional Elective-IV**		PEC	3	0	0	3
	V20CSTPE13	Design Patterns					
	V20CSTPE14	NoSQL Databases					
	V20CSTPE15	Reinforcement Learning					
	V20CSTPE16	Cloud Computing					
3	**Professional Elective-V**		PEC	3	0	0	3
	V20CSTPE17	Software Project Management					
	V20CSTPE18	Scripting Languages					
	V20CSTPE19	Natural Language Processing					
	V20CSTPE20	Social Networks and Semantic Web					
4		**Open Elective -III /**	OEC	3	0	0	3
		Job Oriented Elective -III	JOE	0	0	6	
5		**Open Elective -IV /**	OEC	3	0	0	3
		Job Oriented Elective - IV	JOE	3	0	0	
6	V20MBT52	Management Science	HSS	3	0	0	3
7	V20SOC05	Skill Oriented Course-V	SO	1	0	2	2
8	V20CSP02	Mini Project /Internship	Internship	0	0	6	3
			Total:	**16/22**	0	**8/14**	**23**

Total Contact Hours: 30 **Total**
Credits: 23

VIII SEMESTER (FOURTH YEAR)

S.No.	Code	Name of the Course		L	T	P	C
1	V20CSP03	Internship/ Industrial Training /Practical training	PRO	0	0	4	2
2	V20CSP04	Major Project (6 Months)	PRO	0	0	20	10
			Total:	0	0	**24**	**12**

Total Contact Hours: 24 **Total Credits: 12**

SKILL ORIENTED COURSES

With reference to the Lr No: SVEC/Admn/Circular/2021-22/61 dated: 05/11/2021, regarding the V20 regulations in B.Tech III & IV Semesters about the offering of Skill Oriented Course in all branches, the course codes are as follows.

In III Semester: V20SOC01
In IV Semester: V20SOC02

If any proposed courses and course codes offered under Skill Oriented Course will be considered as Skill Oriented Course **(V20SOC01 or V20SOC02**) only.

S.No.	Name of the Course
1.	Mobile Application Development
2.	MEAN Stack Technologies
3.	Secure DevOps
4.	AWS Cloud Computing
5.	SDG -Web Development
6.	Web Development using Django
7.	Game Development using Buildbox
8.	Game Programming
9.	.NET Framework
10.	CCNA IT Essentials
11.	Augmented Reality and Virtual Reality
12.	Go Programming
13.	Applications of Python using NumPy & Pandas
14.	Ethical Hacking
Any advanced courses offered by industries / Professional bodies / APSSDC can be appended in future	

Annexure-II

Semester	**V**	**L**	**T**	**P**	**C**	**Course Code**
Regulation	V20	3	0	0	3	V20CST10
Name of the Course	Operating System					
Branch	ECE					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe Operating System Services and System Calls. **(K2)**

CO2: Illustrate Process Management Concepts and CPU Scheduling Algorithms. **(K3)**

CO3: Demonstrate Process Synchronization primitives and Process Deadlocks. **(K3)**

CO4: Illustrate Memory Management Techniques and Page Replacement Algorithms. **(K3)**

CO5: Describe File System Concepts and Mass Storage Structures. **(K2)**

UNIT-I: Introduction: Operating-System Structure, Operating-System Services, User and Operating System Interface, System Calls, Types of System Calls.

UNIT-II: Process Management: Process Concept, Process Scheduling, Operations on Processes, Inter process Communication. **Threads:** Overview, Multithreading Models

CPU Scheduling: Basic Concepts**,** Scheduling Criteria**,** Scheduling Algorithms.

UNIT-III: Process Synchronization: The Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Mutex Locks, Semaphores, Classic Problems of Synchronization, Monitors. **Deadlocks:** System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.

UNIT-IV: Memory Management: Main Memory: Swapping, Contiguous Memory Allocation, Segmentation, Paging, Structure of the Page Table.

Virtual Memory: Introduction, Demand Paging, Page Replacement Algorithms, Allocation of Frames, Thrashing.

UNIT-V: Storage Management: Overview of Mass-Storage Structure, Disk Scheduling, File Concept, Access Methods, Directory and Disk Structure, File-System Mounting, File Allocation Methods.

Text Book:

1. Operating System Concepts**,** Abraham Silberschatz, ,Peter Baer Galvin,Greg Gagne, 9th Edition, John Wiley and Sons Inc., 2012.

Reference Books:

1. Operating Systems – Internals and Design Principles, William Stallings, 7th Edition,
   Prentice Hall, 2012 .
2. Modern Operating Systems, Andrew S. Tanenbaum, Third Edition, Addison Wesley,
   2007.

Semester	V	L	T	P	C	COURSE CODE
Regulation	V20	3	0	0	3	V20CST11
Name of the Course	Data Mining					
Branch	Common to CSE and CST					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Explain the concept of Data Mining and its functionalities. **(K2)**

CO2: Discuss various Data Preprocessing Techniques. **(K3)**

CO3: Demonstrate Association Analysis Techniques. **(K3)**

CO4: Illustrate various Classification Techniques. **(K3)**

CO5: Use different Clustering techniques to cluster data. **(K3)**

UNIT-I: Introduction: Need for Data Mining, Knowledge Discovery from Data, Kinds of Data mined, Kinds of Patterns mined, Technologies used, Kinds of Applications targeted, Major Issues in Data Mining, Data Objects and Attribute Types, Basic Statistical Descriptions of Data, Measuring Data Similarity and Dissimilarity.

UNIT-II: Data Preprocessing: Overview of Data Preprocessing, Data Cleaning, Data Integration, Data Reduction, Data Transformation and Data Discretization.

UNIT-III: Mining Frequent Patterns, Associations, and Correlations: Basic Concepts, Frequent Itemset Mining Methods- Apriori Algorithm: Finding Frequent Itemsets by Confined Candidate Generation, Generating Association Rules from Frequent Itemsets, Improving the Efficiency of Apriori, Pattern-Growth Approach for Mining Frequent Itemsets.

UNIT-IV: Classification: Basic Concepts, Decision Tree Induction, Attribute Selection Measures, Tree Pruning.
Bayes Classification Methods: Bayes' Theorem, Naive Bayesian Classification.
Bayesian Belief Networks: Concepts and Mechanisms.

UNIT-V: Cluster Analysis: Basic Concepts and Methods, Partitioning Methods, Hierarchical Methods, Density Based Method-DBSCAN.

Text Books:

1. Data Mining Concepts and Techniques, Jiawei Han, Micheline Kamber, Jian Pei,3rd Edition, Morgan Kaufmann Publishers.

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Reference Books:

1. Introduction to Data Mining, Pang-Ning Tan, Michael Steinbach, Vipin Kumar, 1st Edition, Pearson Education Inc.
2. Data Mining and Analysis,Mohammed J Zaki, Wagner Meira JR, 1st Edition ,Cambridge University Press.

Semester	V	L	T	P	C	COURSE CODE
Regulation	V20	3	0	0	3	V20CST12
Name of the Course	Web Technologies					
Branch	Common to CSE and CST					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Illustrate the basic concepts of HTML and CSS . **(K2)**

CO2: Illustrate Extensible markup language and XML parsers**.** **(K3)**

CO3: Develop web applications using JDBC. **(K3)**

CO4: Build database driven web applications using JSP. **(K3)**

CO5: Illustrate the basic concepts of Angular and NODE JS. **(K2)**

UNIT-I: HTML :Basic Syntax, Standard HTML Document Structure, Basic Text Markup, Images, Hypertext Links, Lists, Tables, Frames Forms.
CSS: Cascading style sheets, Levels of Style Sheets, Style Specification Formats, Selector Forms, Property value forms, Font Properties, List Properties, color, Alignment of Text

UNIT-II: Working with XML: Introduction, The syntax of XML, XML Document Structure, Document type Definition (DTD), Namespaces, XML schemas, XSLT, **XML Parsers** - DOM and SAX

UNIT-III: WORKING WITH DATABASE: Getting started with JDBC , Defining ODBC, Introduction to JDBC, Components of JDBC, JDBC Architecture, Types of Drivers, Working with JDBC APIs, Creating a Simple Application, Working with Prepared Statement.

UNIT IV: Introduction to Servlets & JSP: Introduction to servlets, Life cycle of Servlet, Limitations of servlets, Java Server Pages: JSP Overview, Components of a JSP Page: Directives, comments, Expressions, Scriptlets , Declarations, implicit objects, Database Access, session tracking.

UNIT V: Fundamentals of NODE JS and Angular : Understanding Node.js, Installing Node.js, Working with Node Packages, Creating a Node.js Application, Understanding Angular, Modules, Directives, Data Binding, Dependency Injection, Services, Creating a Basic Angular Application.

Text Books:

1. Programming the World Wide Web, 7th Edition, Robet W Sebesta, Pearson, 2013.
2. Node.js, MongoDB and Angular Web Development, 2nd Edition,Brad Dayley Brendan Dayley Caleb Dayley,Pearson Education,2018
3. JSP:The Complete reference,Phil Hanna,The McGraw-Hill Copanies,2001.
4. JDBC, Servlets, and JSP, New Edition, Santhosh Kumar K, Kogent Learning Solutions Inc Dreamtech Press, 2018.

Reference Books:

1. Web Technologies: HTML, JavaScript, PHP, Java, JSP, XML and AJAX, Black book, Dream Tech.
2. An Introduction to Web Design, Programming, Paul S Wang, Sanda S Katila, Cengage Learning
3. Web Technologies, 1st Edition 7th impression, Uttam K Roy, Oxford, 2012.

Semester	V	L	T	P	C	COURSE CODE
Regulation	V20	3	0	0	3	V20CSTPE01
Name of the Course	Software Testing Methodologies (Professional Elective-I)					
Branch	Common to CSE and CST					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe Software testing objectives and methodology **(K2)**

CO2: Apply various Software testing techniques. **(K3)**

CO3: Discuss Static testing techniques for software testing. **(K2)**

CO4: Distinguish Software testing and debugging process. **(K2)**

CO5: Explain modern Software testing tools to support software testing. **(K2)**

UNIT-I: Introduction to Software Testing: Evolution of software Testing, Myths and Facts, Goals of software Testing, Definitions of Testing, Model for Software Testing, Software Testing Terminology, Software Testing Life Cycle.

UNIT-II: Verification and Validation: Verification & Validation Activities, Verification, Verification of Requirements, Verification of High level and low level designs, How to verify code, Validation. **Dynamic Testing I:** Black Box testing techniques: Boundary Value Analysis, Equivalence Class Testing, Decision Table based Testing,

UNIT-III: Dynamic Testing II: White-Box Testing: Need of White-Box Testing, Logic coverage criteria, Basis path testing, Loop testing.
Static Testing: Inspections, Structured Walkthroughs, Technical reviews.

UNIT-VI: Regression Testing: Progressive Vs Regressive Testing, Regression testability, Objectives of regression testing, When is Regression Testing done? Regression Testing Types, Regression testing techniques.

Debugging: Debugging process, Techniques, correcting bugs.

UNIT-V: Software Quality Management: Software quality concept, Quality control and Quality Assurance, Software Quality metrics.
Automation and Testing Tools: Need for automation, categorization of Testing tools, selection of testing tools, Overview of some commercial testing tools.

Text Books:

1. Software Testing, Principles and Practices, Naresh Chauhan, 9th Edition, Oxford Publisher.

Reference Books:

1. Software testing techniques - Boris Beizer, 2nd Edition, Dreamtech publisher.
2. Foundations of Software testing, Aditya P Mathur, 2nd ed, Pearson.
3. Software Testing- Yogesh Singh, CAMBRIDGE.

Semester	V	L	T	P	C	COURSE CODE
Regulation	V20	3	0	0	3	V20CSTPE02
Name of the Course	Principles of Programming Languages (Professional Elective-I)					
Branch	Common to CSE and CST					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe syntax and semantics of programming languages. **(K2)**

CO2: Explain data types and basic statements of programming languages **(K2)**

CO3: Design and implement subprogram constructs **(K3)**

CO4: Discuss concurrency process using OOP. **(K2)**

CO5: Develop programs in Scheme, ML, and Prolog. **(K3)**

UNIT-I: Syntax and semantics: Evolution of programming languages, describing syntax, context, free grammars, attribute grammars, describing semantics, lexical analysis, parsing, recursive – decentbottom - up parsing

UNIT-II: Data, Data types, and basic statements: Names, variables, binding, type checking, scope, scope rules, lifetime and garbage collection, primitive data types, strings, array types, associative arrays, pointers and references, Arithmetic expressions, overloaded operators, type conversions, relational and boolean expressions , assignment statements , mixed mode assignments, control structures – selection, iterations, branching, guarded Statements

UNIT-III: Subprograms and implementations: Subprograms, design issues, local referencing, parameter passing, overloaded methods, generic methods, design issues for functions, semantics of call and return, implementing simple subprograms, stack and dynamic local variables, nested subprograms, blocks, dynamic scoping.

UNIT- IV: Object- orientation, concurrency, and event handling: Object – orientation, design issues for OOP languages, implementation of object, oriented constructs, concurrency, semaphores, Monitors, message passing, threads, statement level concurrency, exception handling.

UNIT- V: Functional programming languages: Introduction to lambda calculus, fundamentals of functional programming languages, Programming with Scheme, Programming with ML, Logic programming languages: Introduction to logic and logic programming, Programming with Prolog, multi - paradigm languages

Text Books:

1. Robert W. Sebesta, “Concepts of Programming Languages”, Tenth Edition, Addison Wesley, 2012.
2. Programming Languages, Principles & Paradigms, 2ed, Allen B Tucker, Robert E Noonan, TMH

Reference Books:

1. R. Kent Dybvig, “The Scheme programming language”, Fourth Edition, MIT Press, 2009.
2. Jeffrey D. Ullman, “Elements of ML programming”, Second Edition, Prentice Hall, 1998.
3. Richard A. O'Keefe, “The craft of Prolog”, MIT Press, 2009.
4. W. F. Clocksin and C. S. Mellish, “Programming in Prolog: Using the ISO Standard”,5th Edition, Springer, 2003

Semester	V	L	T	P	C	COURSE CODE
Regulation	V20	3	0	0	3	V20CSTPE03
Name of the Course	Artificial Intelligence (Professional Elective-I)					
Branch	Common to CSE & CST					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Discuss the foundations of AI. **(K2)**

CO2: Identify Search Strategies for Problem Solving. **(K2)**

CO3: Illustrate Adversarial Search for Game Playing. **(K2)**

CO4: Discuss Reasoning approaches. **(K2)**

CO5: Illustrate Knowledge Representation approaches. **(K2)**

UNIT-I: Introduction: What is AI? The Foundations of Artificial Intelligence, History of Artificial Intelligence, The State of the Art Applications.
Intelligent Agents: Agents and Environments, Good Behaviour: The Concept of Rationality, The Nature of Environments, The Structure of Agents.

UNIT-II: Solving Problems by Searching: Problem-Solving Agents, Example Problems, Searching for Solutions, Uninformed Search Strategies, Informed (Heuristic) Search Strategies, Heuristic Functions, Local Search Algorithms and Optimization Problems.

UNIT-III: Adversarial Search : Games, Optimal Decisions in Games, Alpha–Beta Pruning, Imperfect Real-Time Decisions, Stochastic Games, Partially Observable Games, State-of-the-Art Game Programs, Alternative Approaches.

UNIT-IV: Knowledge and Reasoning: Propositional Logic, Propositional Theorem Proving, Syntax and Semantics of First-Order Logic, Using First-Order Logic, Forward Chaining, Backward Chaining, Resolution.

UNIT-V: Knowledge Representation: Representations and Mappings, Approaches to Knowledge Representation-Simple Relational Knowledge, Inheritable Knowledge, Inferential Knowledge, Procedural Knowledge, Issues in Knowledge Representation, The Frame Problem.

Text Books:

1. Artificial Intelligence : A Modern Approach, Stuart J. Russell and Peter Norvig, 3rd Edition, Prentice Hall.
2. Artificial Intelligence, Elaine Rich,Kevin Knight, Shivashankar B Nair, 3rd Edition,Tata McGraw-Hill.

Reference Books:

1. Artificial Intelligence, George F Luger, Pearson Education Publications.
2. Artificial Intelligence, Saroj Kaushik, 1st Edition, Cengage Learning.

Semester	**V**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	3	0	0	3	V20CSTPE04
Name of the Course	**Computer Graphics (Professional Elective-I)**					
Branch	Common to CSE and CST					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Discuss the applications of computer graphics and learn basic algorithms. **(K2)**
CO2: Discuss the concepts of 2D graphics along with transformation techniques. **(K2)**
CO3: Demonstrate3D graphics and 3D object representation. **(K3)**
CO4: Discuss different visible surface detection methods and color models. **(K2)**
CO5: Illustrate different animation sequences . **(K2)**

UNIT-I: Introduction: Application of Computer Graphics, raster scan systems, random scan systems, raster scan display processors. Output Primitives : Points and lines, line drawing algorithms(Bresenham's and DDA Line derivations and algorithms), mid-point circle algorithms.
Filled area primitives: Boundary-fill and flood-fill algorithms.

UNIT-II: 2-D geometrical transforms: Translation, scaling, rotation, reflection and shear transformations, and homogeneous coordinates, composite transforms.
2-D viewing: The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Cohen-Sutherland line clipping, Sutherland–Hodgeman polygon clipping algorithm.

UNIT-III: 3-D Geometric transformations: Translation, rotation, scaling, reflection and shear transformations, composite transformations.
3-D object representation: Polygon surfaces, quadric surfaces, spline representation, Bezier curve and B-Spline curves.

UNIT-IV: Visible surface detection methods: Classification, back-face detection, depth-buffer, scan-line, BSP tree methods, area sub-division.
Color Models – RGB, YIQ, CMY, HSV.

UNIT-V: Computer Animation: Design of animation sequence, general computer animation functions, raster animation, computer animation languages, key frame systems**,** motion specifications.

Text Books:

1. Computer Graphics C version, Donald Hearn, M.Pauline Baker,Pearson
2. Computer Graphics, Schaum's outlines", Zhigandxiang,RoyPlastock, 2nd Edition,TataMc-Graw HillEdition.

Reference Books:

1. Computer Graphics Principles & practice, 2/e, Foley, VanDam, Feiner, Hughes,Pearson
2. Computer Graphics, Peter, Shirley, CENGAGE
3. Principles of Interactive Computer Graphics, Neuman ,Sproul,TMH.

Semester	V	L	T	P	C	COURSE CODE
Regulation	V20	0	0	3	1.5	V20CSL09
Name of the Course	Data Mining Lab					
Branch	Common to CSE and CST					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Demonstrate Data Preprocessing techniques. **(K3)**

CO2: Demonstrate Association Rule Mining techniques. **(K3)**

CO3: Demonstrate Classification techniques. **(K3)**

CO4: Demonstrate the Clustering techniques. **(K3)**

List of Experiments (Weka Tool)

1. Demonstrate Data Preprocessing on predefined Weka dataset labor.arff
2. Create a student.arff dataset and Demonstrate Data Preprocessing on it
3. Demonstrate Association rule process on predefined Weka dataset contactlenses.arff using apriori algorithm.
4. Create an employee.arff dataset and demonstrate Association rule process on it using apriori algorithm
5. Demonstrate Classification process on student.arff dataset using j48 algorithm
6. Create a customer.arff dataset and demonstrate Classification process on it using j48 algorithm
7. Demonstrate Classification process on employee.arff dataset using id3 algorithm
8. Demonstrate Classification process on employee.arff dataset using Naïve Bayes algorithm
9. Demonstrate Clustering process on predefined Weka dataset iris.arff using simple k-means algorithm.
10. Demonstrate Clustering process on dataset student.arff using simple k-means algorithm.

Reference Books:

1. Data Mining: Practical Machine Learning Tools and Techniques, Ian H. Witten, Eibe Frank, Mark A. Hall, 3rd Edition, Morgan Kaufmann Publishers.
2. Data Mining Concepts and Techniques, Jiawei Han, Micheline Kamber, Jian Pei, 3rd Edition, Morgan Kaufmann Publishers.
3. Introduction to Data Mining, Pang-Ning Tan, Michael Steinbach, Vipin Kumar, 1st Edition, Pearson Education Inc.

Semester	**V**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	0	0	3	1.5	V20CSL10
Name of the Course	**Web Technologies Lab**					
Branch	Common to CSE and CST					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Illustrate the basic concepts of HTML and CSS. **(K2)**

CO2: Illustrate Extensible markup language and XML parsers . **(K3)**

CO3: Develop web applications using JDBC . **(K3)**

CO4: Build database driven web applications using JSP. **(K3)**

CO5: Illustrate the basic concepts of Angular and NODE JS. **(K2)**

List of Experiments

Exercise 1: Design HTML fundamental constructs.
(i) Headings (ii) Links (iii) Paragraph (iv) Images (v) Tables

Exercise 2: Design HTML fundamental constructs.
(i) Frames (ii) Forms and HTML controls

Exercise 3: Design Cascading style sheets
(i) Internal (ii) External (iii) Inline

Exercise 5: Write an XML file which will display the Book information which includes the following:
(i) Title of the book (ii) Author Name (iii) ISBN number (iv) Publisher name (v) Edition (vi) Price
(a) Write a Document Type Definition (DTD) to validate the above XML file.
(b) Write a XML Schema Definition (XSD)

Exercise 6: Create a simple JSP to print the current Date and Time.

Exercise 7: Develop JSP program calculates factorial values for an integer number, while the input is taken from an HTML form.

Exercise 8: Develop JSP program shows a Sample Order Form.

A Sample Order Form

Item	Price	Quantity	Total Price
DVD	19.99	2	39.98
CD	12.99	9	116.91
Diskette	1.99	24	47.76

Exercise 9: Create JSP to insert, delete, and update the details of student into the database using JDBC connectivity.
Exercise 10: Design a simple Angular JS form
Exercise 11: Design a simple Node JS application
Reference Books:

1. Web Technologies: HTML, JavaScript, PHP, Java, JSP, XML and AJAX, Black book, Dream Tech.
2. An Introduction to Web Design, Programming, Paul S Wang, Sanda S Katila, Cengage Learning
3. Web Technologies, 1st Edition 7th impression, Uttam K Roy, Oxford, 2012.

Semester	**VI**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	3	0	0	3	V20CST13
Name of the Course	**Computer Networks**					
Branch	Common to CSE and CST					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Discuss fundamentals of network concepts and Reference Models. **(K2)**

CO2: Discuss Communication media and switching techniques. **(K2)**

CO3: Demonstrate Error control and Data link layer protocols. **(K3)**

CO4: Apply Routing algorithms and congestion control algorithms. **(K3)**

CO5: Discuss Transport layer protocols and Application layer protocols. **(K2)**

UNIT-I: Introduction: Reference models: The OSI Reference Model- the TCP/IP Reference Model, Examples of Networks: Novell Networks, Arpanet, Internet, Network Topologies WAN, LAN, MAN.

UNIT-II: Physical Layer: Transmission Media, Multiplexing: FDM, WDM and TDM- LAN Technologies, introduction to switching: Circuit Switched Networks, Datagram Networks, and Virtual Circuit Networks.

UNIT–III: Data link layer: Design issues, Framing, Flow control, error control, error detection - Parity bit, CRC, Checksum, error correction- Hamming code. MAC: ALOHA, CSMA. Elementary Data Link Layer protocols: simplex protocol, Simplex stop and wait, Simplex protocol for Noisy Channel. Sliding window protocol: One bit, Go back N, Selective repeat-Stop and wait protocol, HDLC, point to point protocol (PPP).Piggybacking.

UNIT-IV: Network Layer : Network layer design issues- Algorithm shortest path routing, Flooding, Distance Vector Routing, Link State Routing, Hierarchical routing, Broad cast, Multi cast Routing algorithms-Congestion control and algorithms, Internet Protocol (IP) Addresses, Subnet masking. Quality of Service, QoS improving techniques: Leaky Bucket and Token Bucket algorithm.

UNIT–V:
Transport Layer: Services, Primitives and sockets, Elements of transport protocols, Internet Transport protocols(TCP,UDP,RPC,RTTP/RTP,RTCP) Segment headers, Primitives, Control, Congestion control.

Application layer: DNS, SMTP, POP,FTP HTTP Presentation formatting. Network security: Cryptography, DES Public key and RSA private key cryptography Algorithms.

Text Books:

1. Computer Networks — Andrew S Tanenbaum, 4th Edition. Pearson Education/PHI
2. Data Communications and Networks – Behrouz A. Forouzan.Third Edition TMH

Reference Books:

1. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition, Pearson Education
2. Understanding communications and Networks, 3rd Edition, W.A. Shay, Thomson

Semester	VI	L	T	P	C	COURSE CODE
Regulation	V20	3	0	0	3	V20CST14
Name of the Course	Machine Learning					
Branch	Common to CSE and CST					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Explain the Basics of Machine Learning **(K2)**

CO2: Demonstrate Classification and Clustering Techniques. **(K3)**

CO3: Construct Decision Trees and Random Forest. **(K3)**

CO4: Illustrate the Working of Neuron and Perceptron Algorithm. **(K2)**

CO5: Demonstrate the working of Multi-Layer Perceptron algorithm. **(K3)**

UNIT-I: Introduction: Learning**:** Machine Learning, Types of Machine Learning, Supervised Learning: Classification & Regression, The Machine Learning Process, Weight Space, The Curse of Dimensionality, Overfitting, Training, Testing, Validation Sets, The Confusion Matrix, Accuracy, ROC Curve, Unbalanced Datasets, Measurement Precision, Thae Bias-Variance Tradeoff.

UNIT-II: Classification: The General Problem, Probabilistic Classifiers: The Bayes Classifier, Logistic Regression, Non-Probabilistic Classifiers: K-Nearest Neighbors, Support Vector Machines, Assessing Classification Performance: Accuracy-0/1 Loss, Sensitivity, Specificity. **Clustering**: The General Problem, K-Means Clustering.

UNIT-III: Learning With Trees: Using Decision Trees, Constructing Decision Trees: Entropy in Information Theory, ID3 Algorithm, CART-Gini Impurity. **Ensemble Learning:** Boosting: Adaboost, Stumping; Bagging, Random Forests.

UNIT-IV: Neuron & Neural Network: The Brain And The Neuron: Hebb's Rule, McCulloch and Pitts Neuron and Its Limitations, Neural Networks, The Perceptron: The Learning Rate, Bias Input, The Perceptron Learning Algorithm, Linear Separability, Linear Regression.

UNIT-V: Multi-Layer Perceptron: Going Forward: Biases, Back-Propagation and Error, The Multi-Layer Perceptron Algorithm, Initializing the Weights, Activation Functions, Sequential and Batch Training, Local Minima, Picking up momentum, Minibatches and Stochastic Gradient Descent, The Multi-Layer Perceptron In Practice: Amount of Training Data, Number of Hidden Layers, When to Stop Learning.

Text Books:

1. Machine Learning: An Algorithmic Perspective, Stephen Marsland, 2ndEdition, CRC Press.
2. A First Course in Machine Learning, Simon Rogers & Mark Girolami, 2nd Edition, CRC Press.

Reference Books:

1. Machine Learning, Tom Mirchel,Mcgraw Hill.
2. Machine Learning: The Art and Science of Algorithms that Make Sense of Data, Peter Flash, Cambridge University Press.

Semester	**VI**	**L**	**T**	**P**	**C**	**COURSE CODE**

Regulation	V20	3	0	0	3	V20CST15
Name of the Course	**Automata and Compiler Design**					
Branch	Common to CSE and CST					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Construct Finite Automata and Regular Expressions. **(K3)**

CO2: Describe the Compilation Process and Lexical Analysis. **(K2)**

CO3: Construct Topdown and Bottom up Parsing Techniques. **(K3)**

CO4: Produce Intermediate Code Generation and Runtime Environments**.** **(K3)**

CO5: Explain Code Optimization and Code Generation. **(K2)**

UNIT I: Formal Language and Regular Expressions: Alphabet, Strings, Language, Finite Automaton- Design of DFA, Design of NFA, Equivalence between NFA and DFA, Finite Automata with ϵ-Transition, Equivalence between NFA and ϵ-NFA. **Regular Expression**: Regular expressions Equivalence between Regular Expressions and Finite Automata ,Chomsky Hierarchy.

UNIT II: Compiler: Definition, Structure of a compiler. **Lexical Analysis**: The Role of the Lexical Analyzer, Specification of Tokens, Recognition of Tokens and the Lexical-Analyzer Generator-Lex. **Context Free grammars**: Context free grammars, derivation, parse trees, Ambiguous Grammar, Writing a Grammar-Elimination of Left Recursion, Left Factoring.

UNIT III: Top Down Parsing: First and Follow, LL(1) Grammars, **Bottom-Up Parsing**: Bottom Up Parser Classification, Reductions, Handle Pruning, Shift-Reducing, Constructing SLR Parsing Tables, construction of CLR (1), LALR Parsing tables, Comparison of all Bottom Up approaches.

UNIT IV: Semantic Analysis: Syntax Directed Definitions, Evaluation Orders for SDD‘s

Intermediate Code Generation: Variants of Syntax Trees, Three-Address Code, Basic blocks and Flow graphs, Control Flow. **Run-Time Environments:** Storage Organization, Stack Allocation of Space, Heap Management

UNIT V: Code optimization: Machine Independent Optimization. The principle sources of Optimization, optimization of Basic blocks, peep hole Optimization, Introduction to Date flow Analysis.

Code generation: Issues in design of code generation, The target Language, Address in the target code, A Simple Code generation.

Text Books:

1) Introduction to AutomataTheory, Languages and Computation, J.E.Hopcroft, R.MotwaniandJ.D.Ullman, 3rdEdition, Pearson, 2008.

2) Compilers Principles, Techniques and Tools Aho, Ullman, Ravisethi, Pearson Education.

Reference Books:

1) Louden: "Compiler Construction, Principles & Practice", 1st Edition, Thomson Press, 2006.

2) Tremblay J P, Sorenson G P: "The Theory & Practice of Compiler writing", 1st Edition, BSP Publication, 2010.

3) Theory of Computation, V. Kulkarni, Oxford University Press, 2013.

Semester	**VI**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	3	0	0	3	V20CSTPE05
Name of the Course	**Object Oriented Software Engineering (Professional Elective-II)**					
Branch	Common to CSE and CST					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe Software process and different life cycle models. **(K2)**

CO2: Discuss Project Planning, and organization. **(K2)**

CO3: Apply OO concepts along with their applicability contexts. **(K3)**

CO4: Demonstrate object oriented analysis and design. **(K3)**

CO5: Describe Implementation, Integration and Maintenance phases. **(K2)**

UNIT I: Introduction to Classical software Engineering: Introduction to OO Paradigm.Different phases in structured paradigm and OO Paradigm. Software Process and different life cycle models and corresponding strengths and weaknesses.

UNIT II: Planning and Estimation: Estimation of Duration and Cost, COCOMO components of software. Project Management plan. Planning Object-Oriented Projects.Project Organization & communication concepts and their activities.

UNIT III: Modules to objects: Cohesion and Coupling, Data Encapsulation and Information hiding aspects of Objects. Inheritance, Polymorphism and Dynamic Binding aspects.Cohesion and coupling of objects. Reusability, Portability and Interoperability aspects.

Introduction to testing, with focus on Utility, Reliability, Robustness, Performance, Correctness.

UNIT IV: Requirement phase: Rapid Prototyping method, Specification phase, Specification Document, Formal methods of developing specification document, Examples of other semi - formal methods of using Finite-State- Machines, Petri nets and E- Language.

Analysis phase: Use case Modeling, Class Modeling, Dynamic Modeling, Testing during OO Analysis.

UNIT V: Design phase: Data oriented design, Object Oriented design, and Formal techniques for detailed design. Challenges in design phase.**IIM Phases:** Implementation, Integration and maintenance phases, OOSE aspects in these phases.

Text Books:
1. Object oriented and Classical Software Engineering, **7/e**, Stephen R. Schach, TMH
2. Object oriented and classical software Engineering, Timothy Lethbridge, Robert Laganiere, TMH, **Second Edition**.

Reference Books:
1. Component-based software engineering: 7th international symposium, **CBSE 2004**, IvicaCrnkovic, Springer.

Semester	VI	L	T	P	C	COURSE CODE
Regulation	V20	3	0	0	3	V20CSTPE06
Name of the Course	Advanced Data Structures (Professional Elective-II)					
Branch	Common to CSE and CST					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Explain external sorting method. **(K2)**

CO2: Discuss pattern matching Algorithms. **(K2)**

CO3: Illustrate various hash functions with appropriate examples. **(K3)**

CO4: Illustrate various priority queues with appropriate examples. **(K3)**

CO5: Construct self-balanced tree with appropriate examples. **(K3)**

UNIT-I: Sorting: Introduction - External Sorting- K-way Merging - Buffer Handling for parallel Operation Run Generation- Optimal Merging of Runs.

UNIT-II: String Matching Algorithms: The Navi String matching algorithms – The Robin-Krap algorithm – String Matching algorithm using finite automata – The Knuth Morris Pratt algorithm.

UNIT-III: Hashing: Dictionaries –-Hash Table Representation: Ideal hashing – Hash functions and tables -Linear probing- Hashing with Chains
Priority Queues (HEAPS): Definition and Applications – ADT – Linear lists – Heaps : Definition – Max heap and Min heap operations, Applications – Heap Sort – Huffman Codes.

UNIT-IV: Efficient Binary Search Trees :ADT-Introduction to AVL Trees- Red-Black Trees- Definition Representation of a Red- Black Tree- Searching a Red-Black Tree- Inserting into a Red Black Tree- Deletion from a Red-Black Tree-Joining Red-Black Trees, Splitting a Red-Black tree – Splay Trees – Introduction – operation – Amortized complexity.

UNIT-V: Multiway Search Trees : ISAM - M-Way Search Trees, Definition and Properties Searching an M-Way Search Tree, B-Trees, Definition and Properties-search Elements in a B-tree-Insertion into B-Tree- Deletion from a B-Tree- Node Structure.

Text Books:

1. Data Structures, Algorithms and Applications in C++; SartajSahni; UniverstiyPress ; 2 nd Edition.
2. Introduction to Algorithms By Thomas H Cormen, Charless E leiserson, Ronald L Rivest and Cliford Stein PHI publication Third Edition (UNIT – II)

References:

1. Data Structures, a Pseudocode Approach, Richard F Gilberg, BehrouzAForouzan, Cengage.
2. An Introduction to Data Structures with applications By Jean Paul Trembly and Paul G Sorenson Tata McGraw Hill Second Edition
3. Fundamentals of Data Structures and algorithms by C V Sastry, RakeshNayak, Ch. Raja Ramesh, IK Publications, new Delhi.

Semester	**VI**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	3	0	0	3	V20CSTPE07
Name of the Course	**Data Science (Professional Elective-II)**					
Branch	Common to CSE and CST					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Discuss the fundamental concepts of Data Science. **(K2)**

CO2: Illustrate Exploratory Data Analysis. **(K2)**

CO3: Explain the Concepts of Recommendation Engines. **(K2)**

CO4: Explain various Anomaly Detection Techniques. **(K2)**

CO5: Discuss Feature Selection techniques. **(K2)**

UNIT-I: Introduction: AI, Machine Learning and Data Science, What is Data Science? Case for Data Science, Data Science Classification, Data Science Algorithms.
Data Science Process: Prior Knowledge, Data Preparation, Modeling-Training and Testing Datasets, Learning Algorithms, Evaluation of the Model, Ensemble Modeling, Application, Knowledge.

UNIT-II: Data Exploration: Objectives of Data Exploration, Datasets- Types of Data, Descriptive Statistics-Univariate Exploration, Multivariate Exploration, Data Visualization, Roadmap for Data Exploration.

UNIT-III: Recommendation Engines: Need, Applications, Concepts, Types, Collaborative Filtering-Neighborhood-Based Methods, Matrix Factorization; Content-Based Filtering- Building an Item Profile, User Profile Computation, Implementation Steps,Hybrid Recommenders.

UNIT-IV: Anomaly Detection: Concepts - Causes of Outliers, Anomaly Detection Techniques; Distance-Based Outlier Detection- Working, Implementation Steps; Density-Based Outlier Detection- Working, Implementation Steps; Local Outlier Factor- Working, Implementation Steps.

UNIT-V: Feature Selection: Classifying Feature Selection Methods, Principal Component Analysis, Information Theory-Based Filtering, Chi-Square-Based Filtering, Wrapper-Type Feature Selection- Backward Elimination.

Textbook:

1. Data Science Concepts and Practice, Vijay Kotu, BalaDeshpande, 2nd Edition, Morgan Kaufmann Publishers.

Reference Books:

1. An Introduction to Data Science, Jeffrey S. Saltz,Jeffrey M. Stanton, Sage Publications.
2. The Art of Data Science, Roger D Peng, Elizabeth Matsui, Lean Publishing.
3. Data Science for Business, Foster Provost, Tom Fawcett,O'Reilly Media.

Semester	**VI**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	3	0	0	3	V20CSTPE08
Name of the Course	**Cryptography and Network Security (Professional Elective-II)**					
Branch	Common to CSE and CST					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Discuss fundamentals and mathematical support of Cryptography and Network Security. **(K2)**

CO2: Discuss symmetric and asymmetric cryptosystems. **(K2)**

CO3: Discuss about HASH functions & Digital Signatures to provide authentication and integrity. **(K2)**

CO4: Demonstrate various methods of Mutual trust and mail security. **(K3)**

CO5: Review the Network& Internet Security Scenarios. **(K2)**

UNIT-I: Overview: Security attacks, Services, Mechanisms, A model for network security, Symmetric cipher model.
Classical encryption techniques: Substitution Techniques, Transposition Techniques.
Number Theory: Prime numbers, Fermat's theorem, Euler's Theorem, the Chinese Remainder Theorem.

UNIT-II: Block Cipher: Principles, DES, Strength of DES, AES, Block cipher Modes of Operations.
Public Key Cryptography: Principles, Public Key Crypto system, RSA Algorithm, Diffie Hellman Key Exchange.

UNIT-III: Cryptographic Hash Functions: Application of Cryptographic Hash Functions, Requirements & Security, SHA-512, Message Authentication Functions, Requirements, HMAC.
Digital Signatures: Properties, Attacks and Forgeries, Requirements, Digital Signature Standards, NIST Digital Signature Algorithm.

UNIT-IV: Key Management and Distribution: Symmetric Key Distribution Using Symmetric Encryption, Asymmetric Key Distribution Using Symmetric Encryption, Distribution of Public Keys, X.509 Certificates.

User Authentication: Remote User Authentication Principles, Kerberos. **Electronic Mail Security:** Pretty Good Privacy (PGP) And S/MIME.

UNIT-V:

IP Security: Two modes, two security protocols Authentication Header, Encapsulating Security Payload.

Transport Level Security: Secure Socket Layer (SSL) and Transport Layer Security (TLS).

HTTPS: Connection Initiation Connection Closure.

Text Books:

1. William Stallings, "Cryptography and Network Security, Principles and Practices", Pearson Education, Sixth Edition.
2. Cryptography and Network Security, Behrouz A Forouzan, Debdeep Mukhopadhyay, (3e) Mc Graw Hill.

Reference Books:

1. Charlie Kaufman, Radia Perlman and Mike Speciner, "Network Security – Private Communication in a Public World" Pearson/PHI.

Semester	**VI**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	0	0	3	1.5	V20CSL11
Name of the Course	**Computer Networks Lab**					
Branch	Common to CSE and CST					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Implement Error detection technique and Sliding window protocol. (**K3**)

CO2: Implement Routing and congestion control Algorithms. (**K3**)

CO3: Implement socket programming. (**K3**)

List of Experiments
(Implement using C/C++/Java/Python)

1. Study of basic network commands and Network configuration commands.
   a) Ping
   b) Tracert / Traceroute
   c) Ipconfig / ifconfig
   d) Hostname
   e) Nslookup
   f) Netstat
2. Construct Detecting error using CRC-CCITT.
3. Implementation of Bit Stuffing
4. Implementation of Character Stuffing
5. Implementation of stop and wait protocol.
6. Implementation of Dijkstra's algorithm
7. Implementation Distance vector algorithm
8. Implementation of Congestion control using leaky bucket algorithms
9. Implementation using Socket TCP both client and server programs.
10. Implementation using Socket UDP both client and server programs

Text Books:

1. Computer Networks — Andrew S Tanenbaum, 4th Edition. Pearson Education/PHI.
2. Data Communications and Networks – Behrouz A. Forouzan.Third Edition TMH.

Reference Books:

1. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition, Pearson Education.
2. Understanding communications and Networks, 3rd Edition, W.A. Shay, Thomson.

Semester	**VI**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	0	0	3	1.5	V20CSL12
Name of the Course	**Machine Learning Lab using Python**					
Branch	Common to CSE and CST					

Syllabus Details

Course Outcomes: After successful completion of the course, the student will be able to:

CO1: Identify various Python libraries used in Machine Learning. **(K2)**
CO2: Implement probabilistic classifiers using Python Programming. **(K3)**
CO3: Construct non-probabilistic classifiers using Python Programming. **(K3)**
CO4: Demonstrate the process of clustering using the K-Means algorithm. **(K3)**
CO5: Illustrate the working of a Multi-layer perceptron network. **(K3)**

List of Experiments

1. Introduction to required python libraries such as Numpy, Pandas, Scipy, Matplotliband Scikit-learn.
2. Import, preprocess, and split the datasets using scikit-learn.
3. Construct a classification model using the Bayes classifier using Python Programming.
4. Implement a Logistic Regression algorithm for binary classification using Python Programming.
5. Implement the KNN algorithm for classification and demonstrate the process of finding out optimal "K" value using Python Programming.
6. Construct an SVM classifier using python programming.
7. Demonstrate the process of the Decision Tree construction for classification problems using python programming.
8. Implement an Ensemble Learner using Random Forest Algorithm using python programming.
9. Implement an Ensemble Learner using Adaboost Algorithm using Python programming.
10. Demonstrate the working of Multi-layer perceptron with MLPClassifier() using Python programming.
11. Demonstrate the K-Means algorithm for the given data set using Python programming.

Text Books:

1. Introduction to Machine Learning with Python, Andreas C. Muller and Sarah Guido, First Edition, O'Reilly.

Reference Books:

1. Practical Machine Learning with Python, Dipanjan Sarkar, Raghav Bali and Tushar Sharma, First Edition, A Press.

Semester	VI	L	T	P	C	COURSE CODE
Regulation	V20	0	0	3	1.5	V20CSL13
Name of the Course	**Unified Modeling Language Lab**					
Branch	Common to CSE and CST					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Develop Class diagrams. **(K3)**
CO2: Develop Use case diagrams. **(K3)**
CO3: Construct Interaction diagrams. **(K3)**
CO4: Develop State chart, Activity diagrams. **(K3)**
CO5: Develop Component and Deployment diagrams. **(K3)**

List of Experiments

1. Draw basic class diagrams to identify and describe key concepts like classes, and their relationships.
2. Draw Use Case diagrams for capturing and representing requirements of the system.
3. Draw sequence diagrams OR communication diagrams with advanced notation for system to show objects and their message exchanges.
4. Draw activity diagrams to display either business flows or like flow charts.
5. Develop State chart diagrams.
6. Draw component diagrams assuming that build the system reusing existing components along with a few new ones.
7. Draw deployment diagrams to model the runtime architecture of system.
8. Design Case study on Library Management System.
9. Design Case Study on Hospital Management System.
10. Design Case study-Railway Reservation System.

Text Books:

1. The Unified Modeling Language User Guide, Grady Booch, James Rumbaugh, Ivar Jacobson, Pearson Education.

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Reference Books:

1. UML 2 Toolkit, Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado, WILEY-Dreamtech India Pvt. Ltd.
2. Fundamentals of Object Oriented Design in UML, Meilir Page-Jones, Pearson Education.
3. Modeling Software Systems Using UML2, Pascal Roques, WILEY- Dreamtech India Pvt. Ltd.

Semester	**VII**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	3	0	0	3	V20CSTPE09
Name of the Course	**Advanced Computer Architecture (Professional Elective-III)**					
Branch	Common to CSE and CST					

<u>Syllabus Details</u>

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Explain the different types of parallel computer models. **(K2)**
CO2: Describe various Processor and Memory organizations. **(K2)**
CO3: Illustrate Pipelining, Multiprocessors and Multicomputers concepts. **(K2)**
CO4: Explain Multivector, SIMD Computers and Multithreaded, Dataflow Architectures. **(K2)**
CO5: Illustrate the Parallel Programming models and instruction level parallelism. **(K2)**

UNIT-I: Parallel computer models: The state of computing, Multiprocessors and Multicomputers, Multivector and SIMD computers. **Program and network properties:** Conditions of parallelism, Program flow mechanisms.

UNIT-II: Processors: Advanced Processor Technology, Superscalar and Vector Processors, **Memory Hierarchy, Cache and Shared Memory:** Hierarchical Memory Technology, Virtual Memory Technology, Cache Memory Organizations, Shared-Memory Organizations.

UNIT-III: Pipelining: Linear Pipeline Processors, Nonlinear Pipeline Processors, Instruction Pipeline Design, Arithmetic Pipeline Design.
Multiprocessors and Multicomputers: Multiprocessor System Interconnects, Cache Coherence and Synchronization Mechanisms, Message Passing Mechanisms.

UNIT-IV: Multivector and SIMD Computers: Vector Processing Principles, Compound Vector Processing. **Scalable, Multithreaded, Dataflow Architectures:** Latency-Hiding Techniques, Principles of Multithreading.

UNIT-V: Parallel Models, Languages: Parallel Programming Models, Parallel Languages and Compilers.

Instruction Level Parallelism: Problem Definition, Model of a Typical Processor, Compiler- detected Instruction Level Parallelism, Operand Forwarding, Reorder Buffer, Register Renaming, Tomasulo's Algorithm, Branch Prediction.

Text Book:

1. Advanced Computer Architecture: Parallelism, Scalability, Programmability, Kai Hwang, Naresh Jotwani, 2nd Edition, Tata McGraw Hill Education

Reference Books:

1. Computer Organization and Design, David A. Patterson and John. L. Hennessy, 5th Edition, Morgan Kaufmann Series.
2. Computer Architecture and Organization, John P. Hayes, 3rd Edition, McGraw Hill Education.
3. Computer Architecture and Organization: Design Principles and Applications, B. Govindarajulu, 2nd Edition, McGraw Hill Education.

Semester	**VII**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	3	0	0	3	V20CSTPE10
Name of the Course	**BigData Analytics (Professional Elective-III)**					
Branch	Common to CSE and CST					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Discuss the challenges of Big Data using Hadoop. **(K2)**
CO2: Apply data modelling techniques to large data sets using map reduce programs. **(K3)**
CO3: Describe the Hadoop I/O classes. **(K2)**
CO4: Examine the use of Pig Framework to work with Big Data. **(K3)**
CO5: Develop a data analytical system using HIVE. **(K3)**

UNIT-I: Introduction to Big Data & Hadoop: What is Big Data, Why Big Data is Important, Data Storage and Analysis, Comparison with other systems. A brief history of Hadoop, Meet Hadoop Data, Apache Hadoop and the Hadoop Ecosystem.
Working with Big Data & HDFS: Google File System, Hadoop Distributed File System (HDFS) –Building blocks of Hadoop (Namenode, Datanode, Secondary Namenode, JobTracker, TaskTracker).

UNIT-II: Introducing and Configuring Hadoop cluster: Local distributed mode, Pseudo-distributed mode, Fully Distributed mode, Configuring XML files.
Writing Map Reduce Programs: Analyzing the Data with Hadoop-Map Reduce, Basic programs of Hadoop Map Reduce, Driver code, Mapper code, Reducer code, Record Reader, Combiner functions. Map Reduce Types, Input Format class Hierarchy.

UNIT-III: Hadoop I/O: The Writable Interface, Writable Comparable and Comparators.
Writable Classes: Writable wrappers for Java primitives, Text & Bytes Writable, Null Writable, Object Writable and Generic Writable, Writable collections.
Implementing a Custom Writable: Implementing a Raw Comparator for speed, Custom comparators

UNIT-IV: Pig - Hadoop Programming Made Easier: Admiring the Pig Architecture, Going with the Pig Latin Application Flow, Working through the ABCs of Pig Latin, Evaluating Local and Distributed Modes of Running Pig Scripts, Checking out the Pig Script Interfaces, Scripting with Pig Latin.

UNIT-V: Applying Structure to Hadoop Data with Hive: Saying Hello to Hive, Seeing How the Hive is Put Together, Getting Started with Apache Hive, Examining the Hive Clients, Working with Hive Data Types, Creating and Managing Databases and Tables, Seeing How the Hive Data Manipulation Language Works, Querying and Analyzing Data.

Text Books:

1. Hadoop: The Definitive Guide, Tom White, O'Reilly, 3rd Edition, 2012.
2. Hadoop in Action, Chuck Lam, MANNING Publ., 2016.
3. Hadoop for Dummies, Dirk deRoos, Paul C.Zikopoulos, Roman B.Melnyk, Bruce Brown, Rafael Coss, 2014.

Reference Books:

1. Hadoop in Practice, Alex Holmes, MANNING Publ., 2014.
2. Hadoop Map Reduce Cookbook, Srinath Perera, Thilina Gunarathne, PACKT, 2013.

Semester	**VII**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	3	0	0	3	V20CSTPE11
Name of the Course	**Deep Learning (Professional Elective-III)**					
Branch	Common to CSE and CST					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe the fundamentals of deep learning. **(K2)**
CO2: Illustrate the working of deep feed forward neural networks. **(K2)**
CO3: Discuss regularization and optimization techniques used in deep neural networks. **(K2)**
CO4: Illustrate the working of convolution neural networks. **(K2)**
CO5: Explain about recurrent and recursive neural networks. **(K2)**

UNIT-I: Introduction: Historical Trends in Deep Learning**,** The Many Names and Changing Fortunes of Neural Networks, Increasing Dataset Sizes, Increasing Model Sizes, Increasing Accuracy, Complexity and Real-World Impact.

UNIT-II: Deep Feed forward Networks: Learning XOR, Gradient-Based Learning, Hidden Units, Architecture Design, Back Propagation and Other Differentiation Algorithms.

UNIT-III: Regularization for Deep Learning: Parameter Norm Penalties, Early Stopping, Dropout; **Optimization for Training Deep Models:** How Learning Differs from Pure Optimization, Challenges, Basic Algorithms, Parameter Initialization Strategies, Algorithms with Adaptive Learning Rates, Optimization Strategies and Meta-Algorithms.

UNIT-VI: Convolution Networks: The Convolution Operation, Motivation, Pooling, Convolution and Pooling as an Infinitely StrongPrior, Variants of Basic Convolution Functions, Structured Outputs, Data Types, Efficient Convolution Algorithms, Random or Unsupervised Features, The Neuroscientific Basis for Convolutional Networks, Convolutional Networks and the History of Deep Learning.

UNIT-V: Sequence Modeling- Recurrent and Recursive Nets: Unfolding Computational Graphs, Recurrent Neural Networks, Bidirectional RNNs, Encoder-Decoder Sequence-to-Sequence Architectures, Deep Recurrent Networks, Recursive Neural Networks, The Challenge of Long-Term Dependencies, Echo State Networks, Leaky Units and Other Strategies for Multiple Time Scales, LSTM and Other Gated RNNs, Explicit Memory.

Textbooks:

1. Deep Learning, Ian Goodfellow, YoshuaBengio, and Aaron Courville, MIT Press.

Reference Books:

1. Neural Networks and Deep Learning, Charu C. Aggarwal, Springer.
2. Fundamentals of Deep Learning, Nikhil Buduma, 1st Edition, O'Reilly

Semester	**VII**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	3	0	0	3	V20CSTPE12
Name of the Course	Human Computer Interaction **(Professional Elective-III)**					
Branch	Common to CSE and CST					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe the principles and characteristics of GUI. **(K2)**
CO2: Describe how a computer system may be modified to include human diversity. **(K2)**
CO3: Select an effective style and screen design for a specific business application. **(K2)**
CO4: Discuss System Menus & Navigation Schemes**.** **(K2)**
CO5: Select Device and Screen based controls. **(K2)**

UNIT I:The User Interface: Introduction, Importance of the User Interface, Importance and benefits of Good Design, Characteristics of Graphical and Web User Interface Graphical User Interface, popularity of graphics, concepts of Direct Manipulation, Graphical System advantage and disadvantage, Characteristics of GUI, Characteristics of Web Interface, Principles of User Interface Design.

UNITII:TheUserInterfaceDesignProcess:ObstaclesandPitfallinthedevelopmentProcess,Usability, The Design Team, Human Interaction with Computers, Important Human Characteristics in Design, Human Consideration in Design, Human Interaction Speeds, Performance versus Preference, Methods for Gaining and Understanding of Users.

UNIT III: Understanding Business Functions: Business Definitions& Requirement analysis, Determining Business Functions. **Principles of Good Screen Design:** Human considerations in screen Design, interface design goals, screen meaning and purpose, Technological considerations in Interface Design.

UNIT IV:
System Menus and Navigation Schemes: Structure, Functions, Context, Formatting, Phrasing and Selecting, Navigating of Menus, Kinds of Graphical Menus Windows Interface: Windows characteristic, Components of Window,

Windows Presentation Styles, Types of Windows, Window Management,

UNIT V: Device and Screen-Based Control: Device based controls, Operable Controls, Textentry/read-Only Controls, Section Controls, Combining Entry/Selection Controls Presentation Controls, Selecting proper controls.

Text Books:

1. "The Essential Guide to User Interface Design", Wilbert O. Galitz, 2nd edition,2002,Wiley India Edition.
2. Prece, Rogers, "Sharps Interaction Design", Wiley India.
3. "Designing the user interfaces". Ben Shneidermann 3rd Edition, Pearson Education Asia.

Reference Books:

1. "User Interface Design" , SorenLauesen, Pearson Education
2. "Essentials of Interaction Design", Alan Cooper, Robert Riemann, David Cronin, Wiley
3. "HumanComputer Interaction", Alan Dix, Janet Fincay, GreGoryd, Abowd, Russell, Bealg, Pearson Education.

Semester	**VII**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	3	0	0	3	V20CSTPE13
Name of the Course	**Design Patterns (Professional Elective-IV)**					
Branch	Common to CSE and CST					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe the design patterns view and its applications. **(K2)**
CO2: Demonstrate Creational Patterns. **(K3)**
CO3: Construct Structural Patterns for a given Scenario. **(K3)**
CO4: Construct Behavioural Patterns for a given Scenario. **(K3)**
CO5: Examine various Case Studies in utilizing Software Architectures **(K3)**

UNIT I: Introduction: What Is a Design Pattern?, Design Patterns in Smalltalk MVC, Describing Design Patterns, The Catalog of Design Patterns, Organizing the Catalog, How Design Patterns Solve Design Problems, How to Select a Design Pattern, How to Use a Design Pattern

UNIT II: Creational Patterns: Abstract factory, Builder, Factory method, Prototype, Singleton.

UNIT III: Structural Patterns: Adapter, Bridge, Composite, Decorator, Façade, Flyweight, and PROXY.

UNIT VI: Behavioural Patterns: Chain of responsibility, command, Interpreter, iterator, mediator, memento, observer, state, strategy, template method, visitor.

UNIT V: Case Studies A-7E – A case study in utilizing architectural structures, The World Wide Web - a case study in Interoperability, Air Traffic Control – a case study in designing for high availability, Celsius Tech – a case study in product line development.

Text Books:

1. Software Architecture in Practice, second edition, Len Bass, Paul Clements & Rick Kazman, Pearson Education, 2003.
2. Design Patterns, Erich Gamma, Pearson Education, 1995.

Reference Books:

1. Beyond Software architecture, Luke Hohmann, Addison wesley, 2003.
2. Software architecture, David M. Dikel, David Kane and James R. Wilson, Prentice Hall PTR, 2001
3. Software Design, David Budgen, second edition, Pearson education, 2003
4. Head First Design patterns, Eric Freeman & Elisabeth Freeman, O'REILLY, 2007.
5. Design Patterns in Java, Steven John Metsker & William C. Wake, Pearson education, 2006.

Semester	**VII**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	3	0	0	3	V20CSTPE14
Name of the Course	**NOSQL Database (Professional Elective-IV)**					
Branch	Common to CSE and CST					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Discuss four types of NoSQL Databases (Document-oriented, KeyValue Pairs, Column oriented and Graph). **(K2)**

CO2: Illustrate Replication and sharding. **(K2)**

CO3: Explain NoSQL Key/Value databases using MongoDB. **(K2)**

CO4: Demonstrate Column- oriented NoSQL databases using Apache HBASE. **(K3)**

CO5: Explain Graph NoSQL databases using Neo4. **(K3)**

UNIT I: Introduction: Overview and History of NoSQL Databases Definition of the Four Types of NoSQL Database, The Value of Relational Databases, Getting at Persistent Data, Concurrency, Integration, Impedance Mismatch, Application and Integration Databases, Attack of the Clusters, The Emergence of NoSQL, Key Points, Comparison of relational databases to new NoSQL stores, MongoDB, Cassandra, HBASE, Neo4j use and deployment, Application, RDBMS approach, Challenges NoSQL approach, Key-Value and Document Data Models, Column-Family Stores, Aggregate-Oriented Databases.

UNIT II: Replication and sharding, MapReduce on databases. Distribution Models, Single Server, Sharding, Master-Slave Replication, Peer-to-Peer Replication, Combining Sharding and Replication.

UNIT III: NoSQL Key/Value databases using MongoDB, Document Databases, What Is a Document Database? Features, Consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases, Event Logging, Content Management Systems, Blogging Platforms, Web Analytics or Real-Time Analytics, E-Commerce Applications, When Not to Use, Complex Transactions Spanning Different Operations, Queries against Varying Aggregate Structure.

UNIT IV: Column- oriented NoSQL databases using Apache HBASE, Column-oriented NoSQL databases using Apache Cassandra, Architecture of HBASE, What Is a Column-Family Data Store? Features, Consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases, Event Logging, Content Management Systems, Blogging Platforms, Counters, Expiring Usage, When Not to Use

UNIT V: Graph NoSQL databases using Neo4,NoSQL database development tools and programming languages, Graph Databases, What Is a Graph Database? Features, Consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases, Connected Data, Routing, Dispatch, and Location-Based Services, Recommendation Engines, When Not to Use

Textbooks:

1. NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence , **1st Edition, 2012.** Authors: Sadalage, P. & Fowler, Publication: Pearson Education.
2. The Definitive Guide to MongoDB: A complete guide to dealing with Big Data using MongoDB, **3rd Edition, December, 2015**. Authors: Eelco Plegge, David Hows, Peter Membrey, Tim Hawkins, Apress Publishers

Reference Books:

1. Redmond, E. ,Wilson, Perkins: Seven Databases in Seven Weeks: A Guide to Modern Databases and the NoSQL Movement Edition**: 2nd Edition,2018**, O'Reilly Publishers.

Semester	**VII**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	3	0	0	3	V20CSTPE15
Name of the Course	**Reinforcement Learning (Professional Elective-IV)**					
Branch	Common to CSE and CST					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Discuss Elements of Reinforcement Learning and Multi-armed Bandits. **(K2)**

CO2: Illustrate Finite Markov Decision Process and Dynamic Programming. **(K2)**

CO3: Explain Monte Carlo Methods and *n*-step Bootstrapping. **(K2)**

CO4: Explain Off-policy Methods with Approximation. **(K2)**

CO5: Discuss Policy Gradient Methods. **(K2)**

UNIT I: Introduction: Reinforcement Learning, Examples, Elements of Reinforcement Learning, Limitations and Scope. **Multi-armed Bandits:** A k-armed Bandit Problem, Action-value methods, The 10-armed Testbed, Incremental Implementation, Tracking a Non stationary Problem, Optimistic Initial Values, Upper –Confidence-Bound Action Selection, Gradient Bandit Algorithm.

UNIT II: Finite Markov Decision Process: The Agent-Environment Interface, Goals and Rewards, Returns and Episodes, Unified Notataion for Episodic and Continuing Tasks, Policies and Value Functions. **Dynamic Programming:** Policy Evaluation, Policy Improvement, Policy Iteration, Value Iteration, Asynchronous Dynamic Programming, Generalized Policy Iteration, Efficiency of Dynamic Programming.

UNIT III: Monte Carlo Methods: Monte Carlo Prediction, Monte Carlo Estimation of Action Values, Monte Carlo Control, Monte Carlo Control without Exploring Starts, Off-policy Prediction via Importance Sampling, Incremental Implementation, Discontinuing-aware Importance Sampling, Per-decision Importance Sampling. ***n*-step Bootstrapping:** *n*-step TD Prediction, *n*-step Sarsa, *n*-step Off-policy Learning, Per-decision methods with Control Variables, A Unifying Algorithm: *n*-step Q(σ).

UNIT IV:Off-policy Methods with Approximation:
Semi-gradient Methods, Examples of Off-policy Divergence, The Deadly Triad, Linear Value-function Geometry, Gradient Descent in the Bellman Error, The Bellman Error is not Learnable, Gradient-TD methods, Emphatic-TD methods, Reducing Variance.

Eligibility Traces: The λ-return, TD(λ), *n*-step Truncated λ-return methods, Online λ –return Algorithm, True Online TD(λ), Dutch Traces in Monte Carlo Learning, Sarsa(λ), Variable λ and γ, Off-policy Traces with Control Variables, Watkins's Q(λ) to Tree-Backup(λ).

UNIT V:
Policy Gradient Methods: Policy Approximation and its Advantages, The Policy Gradient Theorem, REINFOECE: Monte Carlo Policy Gradient, REINFORCE with Baseline, Actor-Critic Methods, Policy Gradient for Continuing Problems, Policy Parameterization fr Continuous Actions.

Text Books:

1. R. S. Sutton and A. G. Bart,. "Reinforcement Learning - An Introduction," MIT Press, 2018.

Reference Books:

1. Szepesvári, Csaba, "Algorithms for Reinforcement Learning," United States: Morgan & Claypool, 2010.
2. Puterman, Martin L., "Markov Decision Processes: Discrete Stochastic Dynamic Programming," Germany: Wiley, 2014.

Semester	**VI**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	3	0	0	3	V20CSTPE16
Name of the Course	**Cloud Computing (Professional Elective-IV)**					
Branch	Common to CSE and CST					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Explain the basic concepts of cloud computing. **(K2)**
CO2: Describe the Virtualization and Migration concepts of Cloud. **(K2)**
CO3: Explain the Cloud Application Design methodologies. **(K2)**
CO4: Illustrate the Security aspects of Cloud. **(K2)**
CO5: Illustrate the SLA Management aspects of Cloud. **(K2)**

UNIT-I: Introduction to Cloud Computing: Definition of Cloud Computing, Layers and Types Of Clouds, Desired Features of a Cloud, Infrastructure as a Service Providers, Platform as a Service Providers, Challenges and Risks.

UNIT-II: Cloud Concepts & Technologies: Virtualization, Load Balancing, Replication, Software Defined Networking, Network Function Virtualization (NFV).
Migrating into a Cloud: The Seven-Step Model of Migration into a Cloud, Migration Risks and Mitigation

UNIT-III: Cloud Application Design: Design Considerations for Cloud Applications, Reference Architectures for Cloud Applications, Cloud Application Design Methodologies: SOA, Cloud Component Model, MVC, Data Storage Approaches.

UNIT-IV: Cloud Security: Cloud Security Architecture (CSA), Authentication, Authorization, Identity, Access Management, Data Security, Key Management.

UNIT-V: SLA Management in Cloud Computing: Service Level Agreements (SLA), Traditional Approaches to SLO Management, Types of SLA, Life Cycle of SLA, SLA Management in Cloud.

Text Books:

1. Cloud Computing: Principles and Paradigms,RajkumarBuyya, James Broberg, Andrzej Goscinski, Wiley Publication.
2. Cloud Computing: A Hands-on Approach, ArshdeepBahga , Vijay Madisetti , Universities Press.

Reference Books:

1. Cloud Computing – Web-Based Applications That Change the way you Work and Collaborate Online, Michael Miller, PearsonEducation.
2. Cloud Computing: A Practical Approach , Anthony T. Velte, Toby J. Velte, Robert Elsenpeter, McGraw-Hill,(2010).

Semester	**VII**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	3	0	0	3	V20CSTPE17
Name of the Course	**Software Project Management (Professional Elective-V)**					
Branch	Common to CSE and CST					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe Software Project Management Terminology. **(K2)**
CO2: Explain various Software development process Models and software Life cycle phases. (**K2)**
CO3: Illustrate various Effort Estimation Techniques and activity network models for Software Project Planning. **(K3)**
CO4: Demonstrate Risk Management Concepts and resource allocation. **(K3)**
CO5: Explain the importance of Project monitoring and control for accomplishing project goals and software Quality. **(K2)**

UNIT-I: Introduction to Software Project Management: Software Project versus other types of projects, Activities covered by Software Project Management, Categorizing projects ,Stakeholders, Objectives& goals, what is management. **Project Planning:** Step-wise planning, Identify Project Scope and objectives, Infrastructure, Project Products &deliverables, Project activities, Effort estimation.

UNIT-II: Project Approach: Build or buy, process models: waterfall model, Prototyping, Incremental delivery model.
Agile methods: Extreme Programming, Atern method, selecting an appropriate process model.
Lifecycle phases: Engineering and Production stages, Inception, Elaboration, Construction, Transition phases.

UNIT-III: Software effort estimation and Activity planning: Overview of Effort Estimation techniques, Function Point analysis, COCOMO.
Activity planning: Objectives, Network planning models, forward pass and backward pass, Identify Critical path and activities.

UNIT-IV: Risk Management and Resource Allocation: Introduction, Risk and its categories, Identification, Assessment, Risk Planning and management, applying PERT technique.

Resource Allocation: Types of Resources, Identifying resource requirements, Resource scheduling.

UNIT-V: Project Monitoring and Control: Creating framework for monitoring& control, Collecting Data, Visualizing Progress, Cost monitoring, Earned value Analysis.

Software Quality: Defining Quality, Importance of quality, ISO 9126, Product Quality Vs Process Quality management.

Process Capability Models: Capability Maturity Model, Enhancing software Quality.

Text Books:

1. Software Project Management, Bob Hughes & Mike Cotterell, 6 th edition, TATA Mcgraw-Hill 2. Software Project Management, WalkerRoyce 2nd edition, Pearson Education.

Reference Books:

1. Software Project Management in practice, PankajJalote, 9th edition, Pearson Education.
2. Software Project Management, Joel Henry, 3rd edition, Pearson Education.

Semester	**VII**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	3	0	0	3	V20CSTPE18
Name of the Course	**Scripting Languages (Professional Elective-V)**					
Branch	Common to CSE and CST					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Develop dynamic webpages and validate with java Script. **(K3)**
CO2: Discuss fundamentals of PHP. **(K2)**
CO3: Develop web applications using PHP. **(K3)**
CO4: Demonstrate Perl Programming concepts. **(K3)**
CO5: Illustrate AngularJS frame work. **(K2)**

UNIT–I: JavaScript: Overview of JavaScript, General Syntactic Characteristics, Primitives Operations and Expressions, Screen output and Keyboard Input, Control Statements, Object creation and Modification, Arrays, Functions, Constructors, Pattern Matching using Regular Expressions, Events and Event Handling.

DHTML: Positioning Moving and Changing Elements.

UNIT – II: PHP Basics- Features, Embedding PHP Code in your Web pages, Outputting the data to the browser, Data types, Variables, Constants, expressions, string interpolation, control structures, Function, Creating a Function, Function Libraries, Arrays, strings and Regular Expressions.

UNIT - III: Advanced PHP Programming: PHP and Web Forms, Files, PHP Authentication and Methodologies - Database Based, Login Administration, Uploading Files with PHP, Sending Email using PHP.

UNIT – IV: Introduction to PERL and Scripting: Scripts and Programs, Origin of Scripting , Scripting Today, Characteristics of Scripting Languages, Uses for Scripting Languages, Web Scripting, and the universe of Scripting Languages. PERL- Names and Values, Variables, Scalar Expressions, Control Structures, arrays, list, hashes, strings, pattern and regular expressions, subroutines.

UNIT- V: AngularJS - Overview, environment Setup, MVC Architecture, Creating AngularJS Application, Directives, Expressions, Controllers, Filters, Tables, HTML DOM, Modules, Forms.

Text Books:
1. The World of Scripting Languages, David Barron, Wiley Publications.
2. A Journey to Angular Development, by Sukesh Marla, bpb publisher

Reference Books:
1. Open Source Web Development with LAMP using Linux, Apache, MySQL, Perl and PHP, J.Lee and B.Ware (Addison Wesley) Pearson Education.
2. Perl by Example, E.Quigley, Pearson Education.
3. Programming Perl, Larry Wall T.Christiansen and J.Orwant, O'Reilly, SPD.
4. Tcl and the Tk Toolkit, Ousterhout, Pearson Education.
5. Pearl Power, J.P. Flynt, Cengage Learning.
6. Learn Angular in 24 Hours A Step-by-Step Approach, Lakshmi Kamala Thota.

Semester	VII	L	T	P	C	COURSE CODE
Regulation	V20	3	0	0	3	V20CSTPE19
Name of the Course	Natural Language Processing (Professional Elective-V)					
Branch	Common to CSE and CST					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Illustrate Natural Language Processing tasks in syntax, semantics, and pragmatics. **(K2)**
CO2: Classify Morphology and Finite State Transducers, Markov Models and Entropy Models. **(K2)**
CO3: Explain about Statistical parsing and probabilistic CFGs. **(K2)**
CO4: Demonstrate semantic analysis. **(K2)**
CO5: Explain Discourse Analysis and Lexical Resources. **(K2)**

UNIT-I : Introduction: Natural Language Processing tasks in syntax, semantics, and pragmatics–Issues–Applications- The role of machine learning - Probability Basics–Information theory–Collocations-N-gram Language Models - Estimating parameters and smoothing – Evaluating language models.

UNIT-II : Morphology And Part Of Speech Tagging: Linguistic essentials - Lexical syntax- Morphology and Finite State Transducers - Part of speech Tagging - Rule-Based Part of Speech Tagging - Markov Models - Hidden Markov Models – Transformation based Models - Maximum Entropy Models. Conditional Random Fields.

UNIT-III : Syntax Parsing: Syntax Parsing - Grammar formalisms and treebanks - Parsing with Context Free Grammars ,Features and Unification-Statistical parsing and probabilistic CFGs(PCFGs)-Lexicalized PCFGs.

UNIT-IV : Semantic Analysis: Representing Meaning – Semantic Analysis - Lexical semantics –Word-sense disambiguation- Supervised – Dictionary based and Unsupervised Approaches - Compositional semantics- Semantic Role Labeling and Semantic Parsing – Discourse Analysis.

UNIT-V : Discourse Analysis and Lexical Resources: Discourse segmentation, Coherence – Reference Phenomena, Anaphora Resolution using Hobbs and Centering Algorithm – Coreference Resolution – Resources: Porter Stemmer, Lemmatizer, Penn Treebank, Brills Tagger, WordNet, PropBank, FrameNet, Brown Corpus, British National Corpus (BNC). NLP Applications**:** Named entity recognition and relation extraction- IE using sequence labeling-Machine Translation (MT) .

Text Books:

1. Daniel Jurafsky and James H. Martin Speech and Language Processing (2nd Edition), Prentice Hall; 2 edition,2008
2. FoundationsofStatisticalNaturalLanguageProcessingbyChristopherD. Manningand Hinrich Schuetze, MIT Press,1999
3. Steven Bird, Ewan Klein and Edward Loper Natural Language Processing with Python, O'Reilly Media; 1 edition,2009 Roland R. Hausser, Foundations of Computational Linguistics: Human-Computer Communication in Natural Language, Paperback, MIT Press,2011

Reference Books:

1. Pierre M. Nugues, An Introduction to Language Processing with Perl and Prolog: An Outline of Theories, Implementation, and Application with Special Consideration of English, French, and German (Cognitive Technologies) Softcover reprint,2010
2. James Allen, Natural Language Understanding, Addison Wesley; 2 edition 1994
   NLTK – Natural Language Tool Kit -http://www.nltk.org/

Semester	**VII**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	3	0	0	3	V20CSTPE20
Name of the Course	**Social Networks and Semantic Web (Professional Elective-V)**					
Branch	Common to CSE and CST					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Demonstrate knowledge by explaining the three different "named" generations of the web. **(K3)**
CO2: Construct a social network. **(K3)**
CO3: Relate knowledge representation methods for semantic web. **(K3)**
CO4: Describe web services and its Applications. **(K2)**
CO5: Develop "Linked Data" Applications using Semantic Web Technologies. **(K3)**

UNIT-I: The Semantic web: Limitations of the current Web, The semantic solution, Development of the Semantic Web, The emergence of the social web.

UNIT-II: Social Network Analysis: What is network analysis? Development of Social Network Analysis, Key concepts and measures in network analysis. Electronic sources for network analysis: Electronic discussion networks, Blogs and online communities, Web-based networks.

UNIT-III: Knowledge Representation on the Semantic Web: Ontologies and their role in the Semantic Web, Ontology languages for the semantic Web.

Modeling and Aggregating Social Network Data: State of the art in network data representation, Ontological representation of Social individuals, Ontological representation of social relationships, Aggregating and reasoning with social network data.

UNIT-IV: Developing social semantic applications: Building Semantic Web applications with social network features, Flink- the social networks of the Semantic Web community, Open academia: distributed, semantic-based publication management.

UNIT-V: Evaluation of Web-Based Social Network Extraction: Differences between survey methods and electronic data extraction, context of the empirical study, Data collection, Preparing the data, optimizing goodness of fit, Comparison across methods and networks, Predicting the goodness of fit, Evaluation through analysis.

Text Books:

1. Social Networks and the Semantic Web, PeterMika, Springer,2007.
2. Semantic Web Technologies, Trends and Research in Ontology basedsystems, J.Davies,RudiStuder,PaulWarren,JohnWiley&Sons.

Reference Books:

1. Semantic Web and Semantic Web Services –Liyang Lu Chapman and Hall/CRC Publishers, (Taylor & Francis Group).
2. Information Sharing on the semantic Web – Heiner Stuckenschmidt; Frank Van Harmelen, Springer Publications.

Annexure-III

List of Job Oriented Elective Courses

S.No.	Course Code	Name of the Course
1.	V20CSTJE01	Master Coding and Competitive Programming - Part-1
2.	V20CSTJE02	Master Coding and Competitive Programming - Part-2
3.	V20CSTJE03	Full Stack Technologies
4.	V20CSTJE04	DevOps
5.	V20CSTJE05	Blockchain Technologies

NOTE: All the Job oriented can be theory / Lab Course

Semester	V	L	T	P	C	COURSE CODE
Regulation	V20	0	0	6	3	V20CSTJE01
Name of the Course	**Master Coding and Competitive Programming - Part-1 (Job Oriented Elective-I)**					
Branch	Common to CSE and CST					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Apply Mathematical reasoning and number theory to solve real world problems in linear time. **(K3)**
CO2: Use of modular arithmetic, to solve complex problems in linear time , logarithmic. **(K3)**
CO3: Use of Prime Factorization and complex solve problems. **(K3)**
CO4: Analyse different techniques including sieve to find prime numbers and evaluate efficiency of these methods. **(K4)**
CO5: Experiment with Hashing and searching techniques to solve problems on Arrays in Linear time. **(K3)**

List of Experiments

1. Develop Programs to solve problems based on Mathematical logic, Reasoning and number theory
2. Develop programs using different techniques to find prime number
3. Develop programs using Sieve method and optimize Complexity of finding prime number
4. Develop Programs based on series, patterns
5. Develop programs on concept of Fibonacci series
6. Develop programs on strings including palindrome and anagram concepts
7. Develop programs to search pattern in a string
8. Develop programs for String Processing.

Text Books:

1. Java The Complete Reference - Eleventh Edition, Herbert Schildt, Oracle
2. Guide to Competitive Programming by Antti Laaksonen
3. Programming challenges by Steven S Skiena

Tools:

1. practice.geeksfoegeeks.com
2. leetcode.com
3. codingninjas.com
4. Hackerrank.com
5. Interviewbit.com

Semester	VI	L	T	P	C	COURSE CODE
Regulation	V20	0	0	6	3	V20CSTJE02
Name of the Course	**Master Coding and Competitive Programming - Part-2 (Job Oriented Elective-II)**					
Branch	Common to CSE and CST					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Apply Divide and Conquer algorithm technique to solve complex in logarithmic time. **(K3)**

CO2: Apply Greedy method to solve Optimization and decision making problems. **(K3)**

CO3: Apply Backtracking Algorithm technique to find combinatorial problems. **(K4)**

CO4: Experiment with Dynamic Programming Algorithm technique to solve Problems that uses Optimal substructures. **(K3)**

CO5: Develop programs using LinkedList Graphs, DFS and BFS techniques. **(K3)**

List of Experiments

1. Develop Programs to solve problems based on Divide and Conquer Algorithm Technique.
2. Develop programs using two pointer and sliding window algorithms.
3. Problem Solving using Greedy Algorithm technique.
4. Problem Solving using Backtracking.
5. Develop programs using Dynamic Programming and Kadane Algorithm.
6. Develop programs using Linked List and its applications.
7. Develop programs using Graphs and Graph Searching Techniques.

Text Books:

1. Introduction to Algorithms, Second Edition, Thomas H. Cormen Charles E. Leiserson.

2. Data Structures and Algorithms Made Easy: Narasimha Karumanchi .

3. The Algorithm Design Manual, Springer series, Steven Skiena.

Tools:

1. practice.geeksfoegeeks.com
2. leetcode.com
3. codingninjas.com
4. Hackerrank.com
5. Interviewbit.com

Semester	**VII**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	0	0	6	3	V20CSTJE03
Name of the Course	**Full Stack Technologies**					
Branch	Common to CSE and CST					

Syllabus Details

After Successful completion of the Course, the students will be able to:

CO1: Demonstrate IDE tolls Installation. **(K3)**
CO2: Develop programs using servlets. **(K3)**
CO3: Illustrate MVC architecture. **(K3)**
CO4: Demonstrate applications of Hibernate. **(K3)**
CO5: Illustrate Spring MVC Framework. **(K3)**

Exercise 1: Basic Installation of IDEs and Development Tools (use any one of the following IDEs).

The Student should know about installing IDEs (Integrated Development Environment) in the system such as IntelliJ, Eclipse, NetBeans, Macromedia Dream Viewer and Databases such as My-SQL, Oracle, SQL Server etc.

Additional Tasks:

- How we can import project files into IDEs.
- How we can import eclipse (Java IDE) projects.
- How to Create new project in IDEs.
- How to Save the Project using packages.
- How to Compile the Project or Program in IDE.
- How to Build the Project or Program in IDE.
- How to Debug the Errors in IDE.

Exercise 2: Understanding about Servlets: Create Example programs Using the below concepts

- Introduction to Servlets.
- Write Servlet application to print current date & time.
- Write Servlet program to link Html & Servlet Communication.
- Write Servlet program to Auto refresh a page.
- Demonstrate session tracking using small program.
- Write Servlet program to insert/delete/update the record into database.
- Write Servlet program to add cookie to selected value.

Exercise 3: Understanding about Model View Controller : Create Example programs Using the below concepts

- Introduction to MVC in java.
- Create sample program on Model Layer in MVC Using Java.
- Create sample program on View Layer in MVC Using Java

- Create sample program on Controller Layer in MVC Using Java
- Demonstrate MVC Deployment in java.
- Rules for MVC Mapping in Server Side.
- How to use Web Server for MVC Deployment.

Exercise 4: Understanding about Hibernate : Create Example programs Using the below concepts

- Introduction to Hibernate.
- What is ORM
- Demonstrate the components of Hibernate
- How to persist objects using Hibernate
- How to use map using XML and Annotations
- How to implement Inheritance in Hibernate
- Working with relationship between entities - association
- Transactions in Hibernate
- Querying with HQL (Hibernate Query Language)
- Various other forms of querying - Criteria, QBE etc.

Exercise 5: Understanding about Spring MVC Framework: Create Example programs Using the
Below concepts

- Introduction to Spring MVC.
- Demonstrate the usage of **Dispatcher Servlet** in Spring MVC.
- Load the spring jar files or add dependencies in the case of Maven
- Create the controller class.
- Provide the entry of controller in the web.xml file.
- Define the bean in the separate XML file.
- Display the message in the JSP page.
- Start the server and deploy the project.
- Execute the application on webserver using Spring MVC.

Exercise 6: Understanding Some Debugging Tools in Java : The Student should know about how to
debug the java codes using some debugging tools such as:

- NetBeans.
- Eclipse.
- IntelliJ IDEA.
- Visual Studio Code.

Reference Books:

1. Jeffrey C. Jackson, "Web Technologies--A Computer Science Perspective", Pearson Education, 2006.

2. Murach's Java Servlets and JSP, 3rd Edition by (Murach: Training & Reference) 3rd Edition.

3. Spring and Hibernate Paperback – 1 July 2017 by K. Santosh Kumar.

4. Full Stack Java Development with Spring MVC, Hibernate, jQuery, and Bootstrap by Mayur Ramgir,Wiley.

Semester	**VII**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	3	0	0	3	V20CSTJE04
Name of the Course	**DEVOPS (Job Oriented Elective)**					
Branch	Common to CSE and CST					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Discuss the traditional software development. **(K2)**
CO2: Discuss the concepts of rise of agile methodologies. **(K2)**
CO3: Discuss the concept of DevOps and Agile. **(K2**)
CO4: Demonstrate the purpose of DevOps. **(K3)**
CO5: Illustrate the Operations of CAMS. **(K2)**

UNIT-I: Traditional Software Development: The Advent of Software Engineering - Waterfall method - Developers vs IT Operations conflict.

UNIT-II: Rise of Agile Methodologies: Agile movement in 2000 - Agile Vs Waterfall Method - Iterative Agile SoftwareDevelopment - Individual and team interactions over processes and tools – Workingsoftware over -comprehensive documentation - Customer collaboration over contract negotiation - Responding to change over following a plan.

UNIT-III: Definition of DevOps: Introduction to DevOps - DevOps and Agile.

UNIT-IV: Purpose of DevOps: Minimum Viable Product - Application Deployment - Continuous Integration -Continuous Delivery.

UNIT-V: **CAMS (Culture, Automation, Measurement And Sharing)**: CAMS – Culture - CAMS – Automation - CAMS – Measurement - CAMS – Sharing - Test-Driven Development - Configuration Management - Infrastructure Automation - Root Cause Analysis – Blamelessness - Organizational Learning.

Text Books:

1. The DevOps Handbook - Book by Gene Kim, Jez Humble, Patrick Debois, and Willis Willis.

Reference Books:

1. What is DevOps? - by Mike Loukides.

Semester	**VII**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	3	0	0	3	V20CSTJE05
Name of the Course	**Blockchain Technologies** (Job Oriented Elective)					
Branch	Common to CSE and CST					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Discuss the Cryptographic primitives used in Blockchain. **(K2)**

CO2: Discuss about various technologies borrowed in Blockchain. **(K2)**

CO3: Illustrate various models for Blockchain. **(K2)**

CO4: Discuss about Ethereum. **(K2)**

CO5: Discuss about Hyperledger Fabric. **(K2)**

UNIT-I: Introduction: History of Bitcoin and origins of Blockchain, Fundamentals of Blockchain and key components, Permission and Permission-less platforms, Cryptography, SHA256 and ECDSA, Hashing and Encryption, Symmetric/ Asymmetric keys, Private and Public Keys.

UNIT-II: Technologies Borrowed in Blockchain: Technologies Borrowed in Blockchain–hash pointers--Digital cashetc.-Bitcoin Blockchain-Wallet–Blocks Merkley Tree - hardness of mining - Transaction verifiability - Anonymity -forks - Double spending - Mathematical analysis of properties of Bitcoin -Bitcoin-the challenges and solutions.

UNIT-III: Consensus Mechanisms: Consensus Algorithms: Proof of Work(PoW) as random oracle-Formal treatment of consistency-Liveness and Fairness-Proof of Stake(PoS)based Chains -Hybrid models (PoW + PoS), Byzantine Models of fault tolerance.

UNIT-IV: Ethereum: Ethereum- Ethereum Virtual Machine(EVM)-Wallets for Ethereum-Solidity-Smart Contracts-The Turing Completeness of Smart Contract Languages and verification challenges- Using smart contracts to enforce legal contracts-Comparing Bitcoin scripting vs. Ethereum Smart Contracts-Some attacks onsmart contracts.

UNIT-V: Hyperledger Fabric: Hyperledger fabric- the plug and play platform and mechanisms inpermissioned block chain - Beyond

Cryptocurrency – applications of blockchain in cyber security- integrity of information-E-Governance and other contract enforcement mechanisms-Limitations of blockchain as a technology and myths vs reality of Blockchain technology.

Textbooks:

1. S.Shukla,M.Dhawan,S.Sharma,S.Venkatesan“BlockchainTechnology:CryptocurrencyandApplications”,OxfordUniversityPress2019.
2. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller andStevenGoldfeder,”Bitcoinandcryptocurrencytechnologies:acomprehensiveintroduction”,PrincetonUniversityPress,2016.

Reference Books:

1. Joseph Bonneau et al, SoK: “Research perspectives and challenges forBitcoinandcryptocurrency”,IEEESymposiumonsecurityandPrivacy,2015
2. J.A.Garayetal,“Thebitcoinbackboneprotocolanalysisandapplications”,EUROCRYPT2015,Volume2.
3. R.Passetal,“AnalysisofBlockchainprotocolinAsynchronousnetworks”,EUROCRYPT2017.
4. Passetal,”Fruitchain-afairblockchain”,PODC2017.

Honors Degree

List of Courses for B.Tech(Hons) in Computer Science

S.No.	Course Name	Number of Weeks	Credits	
1.	Data Science for Engineers	8	2	Students have to acquire a minimum of 16 credits by completing MOOC/NPTEL Courses from this Pool
2.	Big Data Computing	8	2	
3.	Introduction to Haskell Programming	8	2	
4.	Distributed Systems	8	2	
5.	Computer Graphics	8	2	
6.	Data Analytics With Python	12	3	
7.	Learning Analytics Tools	12	3	
8.	Introduction to Artificial Intelligence	12	3	
9.	Deep Learning	12	3	
10.	Natural Language Processing	12	3	
11.	Reinforcement Learning	12	3	
12.	Computer Vision	12	3	
13.	Deep Learning for Computer Vision	12	3	
14.	Cloud Computing	12	3	
15.	Advanced Distributed systems	12	3	
16.	Software Testing Methodologies	12	3	
17.	Privacy and Security in Online Social Media	12	3	
18.	Blockchain Architecture Design And Use Cases	12	3	
19.	Introduction To Internet Of Things	12	3	
20.	Introduction to Biomedical Imaging Systems	12	3	
21.	Digital Forensics	12	4	
22.	Web based Technologies and Multimedia Applications	12	4	
23.	Introduction to Information Technology	12	4	
Project Work			4	4
Total				**20 Credits**

NOTE: However the list is not exhaustive. Before registering the Course take the approval from HOD.

Minor Degree in Computer Science and Engineering

List of Courses for B.Tech(Minors) - Artificial Intelligence

S.No.	Course Name	Number of Weeks	Credits	
1	Data Science for Engineers	8	2	**Students have to acquire a minimum of 16 credits by completing MOOC/NPTEL Courses from this Pool**
2*	Introduction to Machine Learning (IITKGP)	8	2	
	Introduction to Machine Learning (IITM)	12	3	
3	Machine Learning for Earth System Sciences	8	2	
4	Scalable Data Science	8	2	
5*	Business Analytics and Text Mining Modeling using Python	8	2	
	Data Analytics With Python	12	3	
6	Introduction to Artificial Intelligence	12	3	
7	Essential Mathematics for Machine Learning	12	3	
8	Deep Learning	12	3	
9	Computer Vision	12	3	
10	Deep Learning for Computer Vision	12	3	
11	Natural Language Processing	12	3	
Project Work			4	4
Total				**20 Credits**

***Students can opt only one course from this set.**

NOTE: However the list is not exhaustive. Before registering the Course take the approval from HOD.

List of Courses for B.Tech(Minors) - Networks and Cyber Security

S.No.	Course Name	Number of Weeks	Credits	
1	Computer Networks and Internet Protocol	12	3	**Students have to acquire a minimum of 16 credits by completing MOOC/NPTEL Courses from this Pool**
2*	Cyber Security **(NPTEL)**	12	3	
	Cyber Security **(CEC)**	15	4	
	Cyber Security Tools, Techniques and Counter measures **(IGNOU)**	12	4	
3	Cryptography and Network Security	12	3	
4	Information Security and Cyber Forensics (CEC)	12	4	
5	Blockchain and its Applications	12	3	
6	Cloud Computing	12	3	
7	Introduction to Internet of Things	12	3	
8	Hardware Security	12	3	
9*	Digital Forensics **(IGNOU)**	12	4	
	Digital Forensics **(CEC)**	16	4	
Project Work			4	4
Total				**20 Credits**

***Students can opt only one course from this set.**

NOTE: However the list is not exhaustive. Before registering the Course take the approval from HOD.

Sri Vasavi Engineering College (Autonomous)

(Sponsored by Sri Vasavi Educational Society)
(Approved by AICTE, New Delhi & Permanently affiliated to JNTUK, Kakinada)
(Accreted by NBA & NAAC with 'A' Grade)
Pedatadepalli, Tadepalligudem, W.G.Dt, A.P-534101

Department of Compter Science Engineering (AI & ML)

Date: 26.07.2022

Minutes of the Second Board of Studies

The Second Meeting of BOS, B.Tech in CSE(AI) and B.Tech in AI&ML is held at 10:00AM through online mode on 25.07.2022(Monday) using the following link:
https://us02web.zoom.us/j/83338219367

The following members attended the meeting:

S.No.	Name of the Member	Designation	Role
1.	Dr. D Jaya Kumari	Professor, HoD-CSE, SVEC	Chairperson
2.	Dr.Dasari Haritha	Professor &HOD, UCEK, Kakinada	University Nominee
3.	Dr Nagesh Bhattu Sristy	Asst.Professor, Department of CSE, NIT- AP	Academic Expert
4.	Dr. K. Venkata Rao	Professor, Dept of CS&SE, Andhra University.	Academic Expert
5.	Sri. Seshagiri Telkapalli	Enterprise Architect, TCS Hyderabad.	Industry Expert
6.	Sri. M Jnana Surya Prakasha Rao	Pragmasys consulting LLP, Gurgaon	Alumni
7.	Sri Ch. Apparao	Technical Director	Invited Member
8.	Dr. V. Venkateswara Rao	Professor	Member
9.	Dr. G Loshma	Professor	Member
10.	Dr. V S Naresh	Professor	Member
11.	Dr. Ch. Raja Ramesh	Associate Professor	Member
12.	A. Leelavathi	Sr. Assistant Professor	Member
13.	R. LeelaPhani Kumar	Assistant Professor	Member
14.	D Sasi Rekha	Assistant Professor	Member
15.	B.SriRamya	Assistant Professor	Member
16.	G.Sriram Ganesh	Assistant Professor	Member
17.	N.V.Murali Krishna Raja	Assistant Professor	Member
18.	K Lakshmi Narayana	Assistant Professor	Member
19.	D.S L Manikanteswari	Assistant Professor	Member
20.	M Babu Rao	Assistant Professor	Member
21.	P Rajesh	Assistant Professor	Member
22.	M Sree Radha	Assistant Professor	Member

	Mangamani		
23.	Ch Hemanandh	Assistant Professor	Member
24.	M Chilaka Rao	Assistant Professor	Member
25.	A Nageswara Rao	Assistant Professor	Member
26.	A NagaJyothi	Assistant Professor	Member
27.	G Prashanthi	Assistant Professor	Member
28.	M Yesu Shekharam	Assistant Professor	Member
29.	G Jaya Raju	Assistant Professor	Member
30.	K Lakshmaji	Assistant Professor	Member

Members Absent:

S.No.	Name of the Member	Designation	Role
1.	Sri. Vinay Kumar	Director,XpertBridge, Hyderabad.	Industry Expert

Item No. 1: Welcome note by the Chairman BOS.
The HOD extended a formal welcome and introduced the members.

Item No. 2: Progress Report of the Department

Item No. 3: Review of Course Structure for I to II Semesters of B.Tech CSE(Artificial Intelligence) and Artificial Intelligence & Machine Learning Programmes under V20 Regulation.

The details are given in Annexure-I.

Item No. 4: Approval of Proposed Course Structure and Syllabus for III and IV Semesters of B.Tech CSE(Artificial Intelligence) and Artificial Intelligence & Machine Learning Programmes under V20 Regulation.

Approved the Course Structure and Syllabus for III and IV Semesters of B.Tech in CSE(AI) and B.Tech in AI&ML Programmes under V20 Regulation and suggested the following changes:

SEM	**Course Code**	**Course Name**	**Suggestions**	**Inclusions / Modifications**
III	V20AIT02	Advanced Python Programming	In Advanced Python Programming course it was suggested that include Database Connectivity	Included Database connectivity in Advanced Python Programming course.
III	V20AIL03	Advanced Python Programming Lab	In Advanced Python Programming Lab course it was suggested that include Database Connectivity Programs and also move pandas library programs to Pandas session.	Included Database Connectivity Programs in Advanced Python Programming Lab course and also moved the related programs to pandas.
III	V20AIL05	Database Management Systems Lab	In Database Management Systems Lab Course it was suggested that exclude Part-B (MongoDb)	Excluded Part-B (MongoDb).
IV	V20AIT06	Java Programming	In Java Programming Course it was suggested that replace Collections instead of swings	Included Collections
IV	V20AIL06	Java Programming Lab	In Java Programming Lab Course it was suggested that replace Collections Programs instead of swings	Included Collections Programs

IV	V20CST11 & V20CSL09	Data Mining & Data Mining Lab	It was suggested that replace Data Mining (T+L) course with Operating Systems (T+L)	**Added:** • V20AIT07: Operating Systems • V20AIL07: Operating Systems Lab

The Approved and Modified Course Structure and Syllabus is given in **Annexure-II**.

Chairperson of BOS
(Dr.D Jaya Kumari)

Head of the Department
Dept. of Computer Science & Engineering
Sri Vasavi Engineering College
TADEPALLIGUDEM-534 101

SRI VASAVI ENGINEERING COLLEGE (Autonomous)
(Permanent Affiliation to JNTUK, Kakinada), PEDATADEPALLI, TADEPALLIGUDEM-534 101

Department of Computer Science and Engineering

B.Tech CSE(Artificial Intelligence)&
B.Tech (Artificial Intelligence& Machine Learning)

Annexure-I

SEMESTER – I (FIRST YEAR)

S.No.	Course Code	Name of the Course	L	T	P	C
1	V20MAT01	Linear Algebra and Differential Equations	3	-	-	3
2	V20MAT09	Descriptive Statistics	3	-	-	3
3	V20ENT01	English for Professional Enhancement	3	-	-	3
4	V20AIL01	Computer Engineering Workshop	**1**	-	4	**3**
5	V20CST01	Programming in „C" for problem Solving	3	-	-	3
6	V20ENL01	Hone Your Communication Skills Lab -I	-	-	3	1.5
7	V20AIL02	Statistical Visualization using R Lab	-	-	3	1.5
8	V20CSL01	Programming Lab in „C" for problem Solving	-	-	3	1.5
		Total:	**13**	**-**	**13**	**19.5**

Total Contact Hours: 26 **Total Credits:** 19.5

SEMESTER – II (FIRST YEAR)

S.No.	Course Code	Name of the Course	L	T	P	C
1	V20MAT10	Integral Transformations and Vector Calculus	3	-	-	3
2	V20CST02	Python Programming	3	-	-	3
3	V20ECT01	Switching Theory and Logic Design	3	-	-	3
4	V20CST04	Data Structures	3	-	-	3
5	V20AIT01	Introduction to Artificial Intelligence	3	-	-	3
6	V20CSL02	Python Programming Lab	-	-	3	1.5
7	V20CSL04	Data Structures Lab	-	-	3	1.5
8	V20ENL02	Hone Your Communication Skills Lab -II	-	-	3	1.5
9	V20CHT02	Environmental Science	2	-	-	0
		Total:	**17**		**09**	**19.5**

Total Contact Hours: 26 **Total Credits:** 19.5

Annexure-II

SEMESTER-III (SECOND YEAR)

S.No.	Code	Name of the Course		L	T	P	C
1	V20MBT51	Managerial Economics and Financial Analysis	HSS	3	0	0	3
2	V20MAT11	Probability Theory	BSC	3	0	0	3
3	V20MAT07	Mathematical Foundation of Computer Science	BSC	3	0	0	3
4	V20AIT02	Advanced Python Programming	PCC	3	0	0	3
5	V20AIT03	Database Management Systems	PCC	3	0	0	3
6	V20AIL03	Advanced Python Programming Lab	PCC	0	0	3	1.5
7	V20AIL04	Linux Shell Scripting Lab	PCC	0	0	3	1.5
8	V20AIL05	Database Management Systems Lab.	PCC	0	0	3	1.5
9	V20SOC01	Skill Oriented Course-I	**SO**	**1**	**0**	**2**	**2**
10	V20ENT02	Professional Communication Skills -I	MNC	2	0	0	0
			Total:	**18**	**0**	**11**	**21.5**

Total Contact Hours: 29 **Total Credits:** 21.5

SEMESTER - IV (SECOND YEAR)

S.No.	Code	Name of the Course		L	T	P	C
1	V20AIT04	Computer Organization and Architecture	PCC	3	0	0	3
2	V20AIT05	Design and Analysis of Algorithms	PCC	3	0	0	3
3	V20AIT06	Java Programming	PCC	3	0	0	3
4	V20AIT07	Operating Systems	PCC	3	0	0	3
5	V20AIT08	Artificial Intelligence and its Applications	PCC	3	0	0	3
6	V20AIL06	Java Programming Lab	PCC	0	0	3	1.5
7	V20AIL07	Operating Systems Lab	PCC	0	0	3	1.5
8	V20AIL08	Artificial Intelligence Lab	PCC	0	0	3	1.5
9	V20SOC02	Skill Oriented Course-II	SO	1	0	0	2
10	V20ENT03	Professional Communication Skills -II	**MNC**	**2**	0	0	**0**
			Total:	**18**	**0**	**11**	**21.5**

Total Contact Hours: 29 **Total Credits:** 21.5

Semester	**III Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	3	0	0	3	V20MBT51
Name of the Course	**Managerial Economics and Financial Analysis**					
Branches	Common to All Branches					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Understand the basic concepts of managerial economics, demand, elasticity of demand and methods of demand forecasting. **(K2)**

CO2: Interpret production concept, least cost combinations and various costs concepts in decision making. **(K3)**

CO3: Differentiate various Markets and Pricing methods along with Business Cycles. **(K2)**

CO4: Prepare financial statements and its analysis. **(K3)**

CO5: Assess various investment project proposals with the help of Capital Budgeting techniques for decision making. **(K3)**

UNIT-I: Introduction to Managerial Economics and demand Analysis: Definition of Managerial Economics and Scope-Managerial Economics and its relation with other subjects-Concept of Demand-Types-Determinants-Law of Demand its Exceptions-Elasticity of Demand-Types and Measurement- Demand forecasting and its Measuring Methods.

UNIT-II: Production and Cost Analysis: Production function-Iso-quants and Iso-cost-Law of Variable proportions- Cobb-Douglas Production function-Economies of Scale-Cost Concepts- Opportunity Cost-Fixed vs Variable Costs-Explicit Costs vs Implicit Costs- Cost Volume Profit analysis- Determination of Break-Even Point-BEP Chart (Simple Problems).

UNIT-III: Introduction To Markets, Pricing Policies & forms of Organizations and Business Cycles: Market Structures: Perfect Competition, Monopoly, Monopolistic and Oligopoly – Features – Price,Out-put Determination – Methods of Pricing: Evolution of Business Forms - Features of Sole Trader – Partnership – Joint Stock Company – State/Public Enterprises. Business Cycles – Meaning and Features – Phases of Business Cycle.

UNIT-IV: Introduction to Accounting & Financing Analysis: Introduction to Double Entry System – Preparation of Financial Statements- Trading Account, Profit & Loss Account and Balance Sheet - Ratio Analysis – (Simple Problems).

UNIT-V: Capital and Capital Budgeting: Capital Budgeting: Meaning of Capital-Capitalization-Meaning of Capital Budgeting-Need for Capital Budgeting-Techniques of Capital Budgeting-Traditional and Modern Methods.

Text Books

1. Dr. N. AppaRao, Dr. P. Vijay Kumar: 'Managerial Economics and Financial Analysis',Cengage Publications, New Delhi – 2011
2. Dr. A. R. Aryasri – Managerial Economics and Financial Analysis, TMH 2011
3. Prof. J.V.Prabhakararao, Prof. P. Venkatarao. 'Managerial Economics and Financial Analysis', Ravindra Publication.

References:

1. Dr. B. Kuberudu and Dr. T. V. Ramana: Managerial Economics &Financial Analysis,Himalaya Publishing House, 2014.
2. V. Maheswari: Managerial Economics, Sultan Chand.2014
3. Suma Damodaran: Managerial Economics, Oxford 2011.
4. VanithaAgarwal: Managerial Economics, Pearson Publications 2011.
5. Sanjay Dhameja: Financial Accounting for Managers, Pearson
6. Maheswari: Financial Accounting, Vikas Publications.
7. S. A. Siddiqui& A. S. Siddiqui: Managerial Economics and Financial Analysis, New Age International Publishers, 2012
8. Ramesh Singh, Indian Economy, 7th Edn., TMH2015
9. PankajTandonA Text Book of Microeconomic Theory, Sage Publishers, 2015
10. ShailajaGajjala and UshaMunipalle, Univerties press, 2012.

Semester	III Sem	L	T	P	C	COURSE CODE
Regulation	V20	3	0	0	3	V20MAT11
Name of the Course	Probability Theory					
Branches	Common to CSE((AI) & AIML)					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Find the statistical parameters of given function. **(K3)**
CO2: Apply probability distribution to real time problems. **(K3)**
CO3: Create good estimators to various parameters **(K3)**
CO4: Apply the principles of Statistical Inference to practical problems on large samples. **(K3)**
CO5: Apply the principles of Statistical Inference to practical problems on small samples. **(K3)**

UNIT-I: Random Variables and expectation: Random Variables: Discrete and continuous - Probability function – density and distribution function, Expectation of a Random Variable, Moments, Chebychev's Inequality (Without proof).

UNIT -II: Probability Distributions: Probability distributions: Binomial, Poisson and Normal - Evaluation of statistical parameters: Mean, Variance and their properties, Introduction to Exponential, Gamma and Weibull distributions.

UNIT -III: Sampling Distribution and Estimation: Introduction **–**Sampling distribution of means with known and unknown standard deviation.
Estimation: Criteria of a good estimator, point and interval estimators for means and proportions.

UNIT -IV: Tests of Hypothesis: Introduction-Type-I, Type-II Errors, Maximum Error, one–tail, two-tail tests, **Test of significance:** Large sample test for single proportion, difference of proportions, single mean, difference of means.

UNIT -V: Tests of significance: Test of significance: Small sample test for single mean, difference of means and test of ratio of variances (F-Test) - Chi-square test for goodness of fit and independence of attributes.

Text Books:

1. **B. V. Ramana**, A text Book of Engineering Mathematics, Tata McGraw Hill.
2. **Miller & Freund's**, Probability & Statistics for Engineers – Eighth Edition, Richard. A.Johnson

References Books:

1. **S. Ross,** "A First Course in Probability", Pearson Education India, 2002.

2. **Dr.T.S.R.Murthy**, Probability and Statistics for Engineers, BS Publications.
3. **T. Veerarajan**, "Engineering Mathematics", Tata McGraw-Hill, New Delhi, 2010.

Semester	**III Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	3	0	0	3	V20MAT07
Name of the Course	**Mathematical Foundation of Computer Science**					
Branches	Common to CSE((AI) & AIML)					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Demonstrate the concepts associated with propositions and mathematical logic. **(K3)**
CO2: Demonstrate the basic concepts associated with relations, functions and their applications. **(K3)**
CO3: Solve recurrence relations using various methods. **(K3)**
CO4: Apply techniques of graphs for real-time problems. **(K3)**
CO5: Construct minimal spanning tree by using different algorithms. **(K3)**

UNIT-I : Mathematical Logic: Statements and Notation , Connectives, Well Formed Formulas ,Truth tables, Tautologies, Equivalence of formulas, Tautological Implications, Normal forms, Theory of inference for Statement Calculus, Indirect Method of Proof. Predicate calculus-Predicates, quantifiers, universe of discourse.

UNIT-II: Set Theory and Relations: Operations on Sets, Principle of Inclusion and Exclusion, Relations, Properties of Binary Relations in a set, Transitive Closure, Relation Matrix and Digraph, Equivalence, Partial Ordering Relations, Hasse Diagrams, Lattice and its Properties, Functions, Bijective Functions, Composition of Functions.

UNIT-III: Recurrence relations: Generating Function of Sequences, Calculating Coefficient of generating functions, Recurrence relations, solving recurrence relation by substitution and Generating functions, the method of Characteristic roots, Solution of Inhomogeneous Recurrence Relation.

UNIT-IV: Graph Theory: Basic Concepts of graph, Representing graphs, Sub graphs, Isomorphic graphs, Paths and Circuits, Eulerian and Hamiltonian Graphs, Planar graphs, Graph Coloring, Chromatic Number. (Theorems without proofs).

UNIT-V: Trees: Spanning Trees, minimal Spanning Trees, BFS, DFS, Kruskal's Algorithm, Prim's Algorithm, Binary trees, Planar Graphs.

Text Books:

1. Discrete Mathematical Structures with Applications to Computer Science, J. P. Tremblay and P. Manohar, 1st Edition, Tata McGraw Hill.
2. Discrete Mathematics and its Applications with Combinatorics and Graph Theory, K. H.Rosen, 7thEdition, Tata McGraw Hill.
3. Discrete Mathematics for Computer Scientists and Mathematicians, J. L.

Mott, A. Kandel, T.P. Baker, 2nd Edition, Prentice Hall of India.

Reference Books:

1. Elements of Discrete Mathematics -A Computer Oriented Approach, C. L. Liu and D. P.Mohapatra, 3rd Edition, Tata McGraw Hill.
2. Discrete Mathematics with Combinatorics and Graph Theory , Santha , 1st Edition Cengage Learning.

Semester	**III**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	3	0	0	3	V20AIT02
Name of the Course	**Advanced Python Programming**					
Branches	Common to CSE((AI) & AIML)					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Demonstrate Regular Expressions and Database Connectivity. **(K2)**
CO2: Develop GUI interfaces using widgets. **(K3)**
CO3: Demostrate statistical analysis using Numpy. **(K3)**
CO4: Demonstrate data analysis using pandas. **(K3)**
CO5: Develop different types of charts using matplotlib. **(K3)**

UNIT-I: Regular Expressions: Sequence Characters, Quantifiers, Special Characters.
Database Connectivity: Advantages of a DBMS over files, Installation of MYSQL DB Software, using MYSQL from Python, retrieve, insert, delete, update operations on tables.

UNIT-II: Graphical User Interface: GUI in python, The root window, fonts and colors, working with containers, canvas, frame, widgets, Button widgets, Arranging widgets in the frame, Label widget, message widget, Text widget, scrollbar Widget, Check button Widget, Radio button widget, entry widget, listbox widget.

UNIT-III: Working with Arrays using Numpy : Introduction to Numpy, Functions for generating sequences , Aggregate functions , Generating Random Numbers using Numpy , Zeros, ones, eyes and Full , Indexing , Slicing , Scalar with an Array operations , Array with an Array Operations. Joining Arrays , Splitting arrays , Variance , covariance , correlation.

UNIT-IV: Data Analysis using Pandas: Introduction , Creating Pandas series , Indexing, iloc, slicing and Boolean index , sorting , statistical Analysis , and string functions , creating data frames , dealing with rows , iterating a pandas data frame- data frame methods (Head, tail and describe), Boolean index , sorting , statistical Analysis , and string functions , Reading of formatted files, Handling Missing values.

UNIT-V: Data visualization: Introduction , plot function , plotting lines and curves, Additional Arguments, The bar Chart ,box plot , frequency plots and Histogram , the pie chart.

Text Books:

1. Core Python Programming Dr.R Nageswara Rao Dreamtech publications.

2. Problem solving and python programming fundametals and application: Numpy, Pandas and Matplotlib. HarshaBhasin.

Semester	III Sem	L	T	P	C	COURSE CODE
Regulation	V20	3	0	0	3	V20AIT03
Name of the Course	**Database Management Systems**					
Branches	Common to CSE((AI) & AIML)					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1 : Describe Database systems, various Data models and Database architecture. **(K2)**

CO2 : Develop various real time applications using Relational algebra and Relational calculus. **(K3)**

CO3 : Apply various Normalization techniques to refine schema. **(K3)**

CO4 : Explain Transaction management and Concurrency control. **(K2)**

CO5 : Illustrate various Database indexing techniques. **(K2)**

UNIT-I:An Overview of Database Systems: Managing data, File systems verses DBMS, Advantages of DBMS, Data models, Levels of abstraction in a DBMS, Data independence, Structure of a DBMS, Client/Server Architecture, E.F.Codd Rules.

Database Design: Database design and ER Diagrams, Entities, Attributes, Entity sets, Relationships and Relationship sets, Conceptual design with ER Models.

UNIT-II: Relational Model: Integrity constraints over relations, Key constraints, Foreign key constraints, General constraints, Enforcing integrity constraints, Querying relational data

Relational Algebra: Selection and Projection, set operation, renaming, Joins, Division, Introduction to Views, destroying/altering Tables and Views.

Relational Calculus: Tuple Relational Calculus, Domain Relational Calculus.

UNIT-III: SQL Queries, Constraints and Triggers: The Form of Basic SQL Query, Union, Intersect, Except, Nested Queries, Aggregate Operators, Null Values, Complex Integrity Constraints in SQL, Triggers and active data bases. **Schema Refinement (Normalization):** Problems caused by redundancy, Decompositions, purpose of Normalizion, Schema refinement, Concept of functional dependency, Normal forms based on functional dependency (1NF, 2NF and 3NF), Concept of Surrogate key, Boyce-Codd Normal Form (BCNF), Lossless Join and Dependency preserving decomposition, Fourth Normal Form(4NF).

UNIT-IV: Transaction Management: Transaction, Properties of Transactions, Transaction Log, and Transaction management with SQL commit, rollback and save point.

Concurrency Control: ConcurrencyControl for Lost updates, Uncommitted data, Inconsistent retrievals and the Scheduler.

Concurrency Control with Locking Methods : Lock granularity, Lock types, Two phase locking for ensuring serializability, Deadlocks, Concurrency control with Time stamp ordering, Transaction recovery.

UNIT-V: Storage and Indexing: Overview of Storages and Indexing, Data on external storage, File organization and indexing, Clustered indexing, Primary and secondary indexes, Index data structures, Hash based indexing, Tree based indexing, Comparison of file organization

Text Books:

1. Database Management Systems, Raghu Ramakrishnan, Johannes Gehrke, 3rd Edition TATA McGraw Hill.
2. An Introduction to Database Systems, C.J Date , A.Kannan , S.J Swamynathan 8th Edition, Pearson Education

Reference Books:

1. Database Systems-Design, Implementation and Management, Peter Rob &Carlos Coronel 7th Edition, Course Technology Inc.
2. Fundamentals of Database Systems, RamezElmasri,Shamkant B. Navathe ,7th Edition, Pearson Education.
3. Database Systems - The Complete Book, Hector Garcia- Molina, Jeffry D Ullman, Jennifer Widom, 2nd Edition, Pearson.

Semester	**III SEM**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	0	0	3	1.5	**V20AIL03**
Name of the Course	**Advanced Python Programming Lab**					
Branches	Common to CAI & AIM					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Develop Python Programs using regular expressions and Database. (**K3**)
CO2: Develop programs using GUI. (**K3**)
CO3: Construct programs using Numpy Arrays. (**K3**)
CO4: Develop python programs using pandas. (**K3**)
CO5: Develop charts using matplotlib. (**K3**)

LIST OF EXPERIMENTS

1. Regular expressions & Database:

a) Develop a python program to create regular expression to replace a string with a new string.
b) Develop a python program to create regular expression to retrieve all the words starting with 'a' in a given string and other create other regular expression to retrieve all the words with size 5.
c) Develop a Python Program to create a regular expression to search for string using search() , findall() , match().
d) Create a python program to connect MYSQL database and perform operations viz. retrieve, insert, delete and update.

2. GUI:

a) Develop a Python Program to draw different shapes on canvas.
b) Develop a Python Program to create a push button and bind it with an event handler function using command option.
c) Develop a Python Program to design a simple calculator.
d) Develop a Python Program to create check boxes and display the content of selected boxes.
e) Develop a Python Program using GUI to retrieve a row from a MYSQL database table.

3. Numpy

a. Develop a Python Program to split arrays using numpy module.
b. Develop a Python Program to test all aggregate functions in numpy module
c. Develop a Python Program to generate a matrix of random numbers within range and print its Transpose.
d. Develop a Python Program that calculates variance, co variance, correlation by taking a sample statistical data.
e. Develop a python program to find rank, determinant, and trace of an array.

f. Develop a python program to find eigenvalues of matrices.
g. Develop a python program to find matrix and vector products (dot, inner, outer, product), matrix exponentiation.
h. Develop a python program to solve a linear matrix equation, or system of linear scalar equations.

4. Pandas

a. Develop a python program to implement Pandas Series with labels, dictionary and Numpy.
b. Develop a program to creating a Pandas DataFrame using dictionary and two dimensional array.
c. Develop a program which make use of following Pandas methods
   i) describe()   ii) head()   iii) tail()
d. Develop a python program to perform insert, delete row operations on data frame.
e. Develop a python program of groupby() method.
f. Demonstrate pandas Merging, Joining and Concatenating.
g. Creating data frames from csv and excel files.

5. Pandas Library: Visualization

a. Develop a program which use pandas inbuilt visualization to plot following graphs:
   i. Bar plots
   ii. Histograms
   iii. Line plots
   iv. Scatter plots

Text Books:

1. Core Python Programming Dr. R Nageswara Rao Dreamtech publications.
2. Problem solving and python programming fundametals and application : Numpy,PandasandMatplotlib,HarshaBhasin.

Semester	**III SEM**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	0	0	0	1.5	**V20AIL04**
Name of the Course	**Linux Shell Scripting Lab**					
Branches	Common to CAI & AIM					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Demonstrate the basic knowledge of Linux commands and utilities by using Linux shell environment. **(K3)**

CO2: Experiment with the Concept of shell Programming on Files and Directories. **(K3)**

CO3: Experiment with the Concept of shell Programming on File Permissions. **(K3)**

CO4: Experiment with the Concept of shell Programming on Conditional Statements. **(K3)**

CO5: Experiment with the Concept of shell Programming on Looping Statements. **(K3)**

LIST OF EXPERIMENTS

1. Experiment the following Unix Commands:
   a) **General Purpose Utilities:** cal, date,man,who.
   b) **Directory Handling Commands:** pwd,cd,mkdir,rmdir.
   c) **File Handling Utilities:** cat,cp,ls,rm,nl,wc
   d) **Displaying Commands:** head, tail
   e) **Filters:** cmp,comm.,diff,sort,uniq
   f) **Disk Utilities:** du,df
2. Develop a Shell Program to Display all the words which are entered as command line arguments.
3. Develop a shell script that Changes Permissions of files in PWD as rwx for users.
4. Develop a shell script to print the list of all sub directories in the current directory.
5. Develop a Shell Program which receives any year from the keyboard and determine whether the year is leap year or not. If no argument is supplied the current year should be assumed.
6. Develop a shell script which takes two file names as arguments-If their contents are same then delete the second file.
7. Develop a shell script to print the given number in the reversed order.
8. Develop a shell script to print first 25 Fibbonacci numbers.
9. Develop a shell script to print the Prime numbers between the specified range.
10. Develop a shell script to delete all lines containing the word ‘unix’ in the files supplied as arguments.
11. Develop a shell script Menu driven program which has the following

options.

i) contents of /etc/passwd ii) list of users who have currently logged in.

iii) present working directory. iv) exit.

Text Books:

1. UNIX and Shell Programming: A Textbook, Behrouz A. Forouzan | Richard F. Gilberg, Cengage Learning.
2. UNIX: Concepts and Applications, Sumithaba Das, 4th Edition, Tata McGrawHill.
3. Unix & Shell Programming, M.G.Venkatesh Murthy, Pearson Education.
4. UNIX shells by example, 4th Edition Ellie Quigley, Pearson Education.

Semester	**III Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	0	0	3	1.5	**V20AIL05**
Name of the Course	**Data Base Management System Lab**					
Branches	Common to CSE((AI) & AIML)					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Construct SQL queries to perform different database operations. (K3)
CO2: Experiment with various constraints and Database Indexing Techniques. (K3)
CO3: Construct PL/SQL Cursors and Exceptions (K3)
CO4: Develop PL/SQL Functions, Procedures and Packages (K3)
CO5: Apply basic operations on collections of Mongo DB database (K3)

LIST OF EXPERIMENTS

SQL:

1. Construct SQL queries to facilitate acquaintance of Built-In Functions, String Functions, Numeric Functions, Date Functions and Conversion Functions.
2. Construct SQL queries using Operators.
3. Construct SQL queries to Retrieve and Change Data: Select, Insert, Delete and Update
4. Construct SQL queries using Group By, Order By, and Having Clauses.
5. Construct SQL queries on Controlling data: commit, rollback and savepoint
6. Construct report using SQL*PLUS
7. Construct SQL queries for Creating, Dropping and Altering Tables, Views and Constraints
8. Construct SQL queries on Joins and Correlated Subqueries
9. Demonstrate Index, Sequence and Synonym.
10. Demonstrate Controlling access, locking rows for update and security features.

PL/SQL

11. Demonstrate Basic Variables , Anchored Declarations, and Usage of Assignment Operation Using PL SQL block
12. Demonstrate Bind and Substitution Variables using PL SQL block
13. Demonstrate Control Structures in PL SQL
14. Demonstrate Cursors, Exception and Composite Data Types in PL SQL.
15. Demonstrate Procedures, Functions, and Packages in PLSQL.

Textbooks:

1. OracleDatabase11gTheCompleteReferencebyOraclePress,Kevin Loney
2. DatabaseSystemsUsingOracle,NileshShah,2ndEdition, PHI.
3. IntroductiontoSQL,RickFVanderLans, 4thEdition, Pearson Education.

Reference Books:

1. OraclePL/SQLInteractiveWorkbook,B.RosenzweigandE.Silve strova,2ndEdition,Pearsoneducation.
2. SQL&PL/SQLforOracle10 g,BlackBook, Dr.P.S.Deshpande, DreamTech.

Semester	**IV Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	3	0	0	3	**V20AIT04**
Name of the Course	**Computer Organization and Architecture**					
Branches	Common to CSE((AI) & AIML)					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Illustrate Basic structure of Computers, Instruction types and their addressing modes. **(K2)**
CO2: Describe the different modes of Input / Output transfer. **(K2)**
CO3: Illustrate different types of Memory. **(K2)**
CO4: Describe the different types of Control Unit techniques. **(K2)**
CO5: Explain the Concepts of Pipelining and Parallel Processing **(K2)**

UNIT-I: Introduction: Functional Units, Basic Operational Concepts, Bus Structures.
Instruction Sequencing and Addressing Modes: Instructions and Instruction Sequencing, Addressing modes, Basic Input/output Operations.

UNIT-II: Input/output Organization: Accessing Input/output devices, Interrupts- Interrupt Hardware, Enabling and Disabling Interrupts, Handling Multiple Devices, Direct Memory Access, Buses- Synchronous and Asynchronous.

UNIT-III: Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory, Associative memory, Cache Memory. (Morris Mano)

UNIT-IV: Processing Unit: Fundamental Concepts, Execution of a Complete Instruction, Multiple-Bus Organization, Hardwired Control, Microprogrammed Control-Microinstructions, Microprogram Sequencing.

UNIT-V: Pipelining: Basic Concepts, Data Hazards, Instruction Hazards.
Parallelism: Parallel processing challenges – Flynn's classification – SISD, MIMD, SIMD, SPMD, and Vector Architectures - Hardware multithreading – Multi-core processors and other Shared Memory Multiprocessors - Introduction to Graphics Processing Units, Clusters, Warehouse Scale Computers and other Message-Passing Multiprocessors.

Text Books:

1. Computer Organization, Carl Hamacher, ZvonkoVranesic, SafwatZaky, 5th Edition, McGraw Hill Education. Computer System Architecture, M. Morris Mano, 3rd Edition, Pearson Education.
2. David A. Patterson and John L. Hennessy, Computer Organization and Design: The Hardware/Software Interface, Fifth Edition, Morgan Kaufmann / Elsevier, 2014.

Reference Books:
1.Computer Organization and Architecture, William Stallings, 10th Edition, Pearson Education.
2.Computer Architecture and Organization,John P. Hayes,3rd Edition , McGraw Hill Education.

Semester	**IV Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	3	0	0	3	**V20AIT05**
Name of the Course	**Design and Analysis of Algorithms**					
Branches	Common to CSE((AI) & AIML)					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Demonstrate asymptotic notation and divide and conquer technique. **(K3)**
CO2: Use greedy technique to solve various problems. **(K3)**
CO3: Demonstrate dynamic programming technique to various problems. **(K3)**
CO4: Develop algorithms using backtracking technique. **(K3)**
CO5: Demonstrate branch and bound technique to various problems. **(K3)**

UNIT-I: Introduction: What is an Algorithm, Algorithm Specification-Pseudo code Conventions Recursive Algorithms, Performance Analysis-Space Complexity, Time Complexity, Asymptotic Notation, Practical Complexities, Performance Measurement.
Divide and Conquer: General Method, Binary Search, Finding the Maximum and Minimum, Merge Sort, Quick Sort-Performance Measurement.

UNIT-II: The Greedy Method: The General Method, Knapsack Problem, Job Sequencing with Deadlines, Minimum-cost Spanning Trees-Prim's Algorithm, Kruskal's Algorithms, Optimal Merge Patterns, Single Source Shortest Paths.

UNIT-III: Dynamic Programming: All Pairs Shortest Paths, Single Source Shortest paths General Weights, Explain Optimal Binary Search Trees, String Edition, 0/1 Knapsack, Reliability Design.

UNIT-IV: Backtracking: The General Method, 8-Queens Problem, Sum of Subsets, Graph Coloring, and Hamiltonian Cycles.

UNIT-V: Branch and Bound: The Method-Least cost (LC) Search, The 15-Puzzle: an Example, Control Abstraction for LC-Search, Bounding, FIFO Branch-and-Bound, LC Branch and Bound, 0/1 Knapsack Problem-LC Branch-and Bound Solution, FIFO Branch-and-Bound Solution, Traveling Salesperson. Basic Concepts of NP-hard and NP-complete problems.

Text Books:

1. Fundamentals of computer algorithms E. Horowitz S. Sahni, University Press.

Reference Books:

1. Introduction to Algorithms Thomas H. Cormen, PHI Learning.

2. The Design and Analysis of Computer Algorithms, Alfred V. Aho, John E. Hopcroft, Jeffrey D.Ullman.
3.Fundamentals of Data Structures and algorithms by C V Sastry, Rakesh Nayak, Ch. Raja Ramesh, Distributed by WILEY publications, New Delhi.
4. Algorithm Design, Jon Kleinberg, Pearson.

Semester	**IV Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	3	0	0	3	**V20AIT06**
Name of the Course	**Java Programming**					
Branches	Common to CSE((AI) & AIML)					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe Java Virtual Machine and Type casting. **(K2)**
CO2: Demonstrate Concepts like Constructors, Arrays, Nested Classes and Command Line Arguments. **(K3)**
CO3: Implement Concepts of Inheritance and Exception Handling. **(K3)**
CO4: Develop programs on Multi-Threading and Files. **(K3)**
CO5: Demonstrate java Collection Classes. **(K3)**

UNIT-I: Introduction to Java: Introduction to Object Oriented Paradigm, Concepts of OOP, Applications of OOP, History of Java, Java Features, JVM, Program Structure. Variables, Primitive Data Types, Constants, String class, Primitive type conversion and Casting, Control Structures.

UNIT-II: Classes and Objects: Classes and objects, Class declaration, Creating objects, Methods, Constructors and Constructor Overloading, Importance of Static Keyword and Examples, this Keyword, Arrays, Command Line Arguments, Nested Classes, Garbage Collector.

UNIT-III: Inheritance and Exception Handling: Inheritance, super Keyword, final Keyword, Method Overriding and Abstract Class. Interfaces, Creating Packages, Using Packages, Importance of Class path. Exception Handling, Importance of try, catch, throw, throws and finally Block.

UNIT-IV: Multithreading and Files: Introduction, Thread Lifecycle, Creation of Threads, Thread Priorities, Thread Synchronization, Communication between Threads. Reading Data from Files and Writing Data to Files, Random Access Files.

UNIT-V: Java Collections Framework: collections overview, collection classes: ArrayList, LinkedList, HashSet, LinkedHashSet, TreeSet,HashMap. Accessing a Collection: Iterator and for-each.

Text Books:

1. Java Programming, E. Balagurusamy, 4thEdition, TMH.
2. The complete Reference Java, 8thEdition, Herbert Schildt,TMH.
3. Introduction to java programming, Y Daniel Liang, 7 Edition,Pearson.

Reference books:

1. Core Java: An Integrated Approach , R Nageswara Rao, 7thEdition, Dream Tech.

2. Head First Java , Kathy Sierra and Bert Bates, 2nd Edition O'reilly.

Semester	**IV**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	3	0	0	3	**V20AIT07**
Name of the Course	**Operating Systems**					
Branches	Common to CSE((AI) & AIML)					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe Operating System Services and System Calls. **(K2)**
CO2: Illustrate Process Management Concepts and CPU Scheduling Algorithms. **(K3)**
CO3: Demonstrate Process Synchronization primitives and Process Deadlocks. **(K3)**
CO4: Illustrate Memory Management Techniques and Page Replacement Algorithms. **(K3)**
CO5: Describe File System Concepts and Mass Storage Structures. **(K2)**

UNIT-I: Introduction: Operating-System Structure, Operating-System Services, User and Operating System Interface, System Calls, Types of System Calls.

UNIT-II: Process Management: Process Concept, Process Scheduling, Operations on Processes, Inter process Communication. **Threads:** Overview, Multithreading Models
CPU Scheduling: Basic Concepts**,** Scheduling Criteria**,** Scheduling Algorithms.

UNIT-III: Process Synchronization: The Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Mutex Locks, Semaphores, Classic Problems of Synchronization, Monitors. **Deadlocks:** System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.
UNIT-IV: Memory Management: Main Memory: Swapping, Contiguous Memory Allocation, Segmentation, Paging, Structure of the Page Table.
Virtual Memory: Introduction, Demand Paging, Page Replacement Algorithms, Allocation of Frames, Thrashing.

UNIT-V: Storage Management: Overview of Mass-Storage Structure, Disk Scheduling, File Concept, Access Methods, Directory and Disk Structure, File-System Mounting, File Allocation Methods.

Text Book:

1. Operating System Concepts**,** Abraham Silberschatz, ,Peter Baer Galvin,Greg Gagne, 9th Edition, John Wiley and Sons Inc., 2012.

Reference Books:

1. Operating Systems – Internals and Design Principles, William Stallings, 7th Edition,
   Prentice Hall, 2012 .

2. Modern Operating Systems, Andrew S. Tanenbaum, Third Edition, Addison Wesley,
 2007.

Semester	**IV**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	3	0	0	3	**V20AIT08**
Name of the Course	**Artificial Intelligence & its applications**					
Branches	Common to CSE((AI) & AIML)					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Discuss Problem Solving Agents and Environment. **(K2)**
CO2: Identify Search Strategies for Non Deterministic and Unknown Environments. **(K2)**
CO3: Illustrate Adversarial Search for Game Playing. **(K2)**
CO4: Discuss Reasoning approaches. **(K2)**
CO5: Illustrate Knowledge Representation approaches. **(K2)**

UNIT I: Intelligent Agents: Agents and Environments, Good Behavior: The Concept of Rationality, The Nature of Environments, The Structure of Agents
Solving Problems by Searching: Problem-Solving Agents, Example Problems, Searching for Solutions, Uninformed Search Strategies, Informed (Heuristic) Search Strategies, Heuristic Functions

UNIT II: Beyond Classical Search: Local Search Algorithms and Optimization Problems, Local Search in Continuous Spaces, Search with Non Deterministic Actions, Searching with Partial Observations, Online Search Agents and Unknown Environments

UNIT III: Adversarial Search : Games, Optimal Decisions in Games, Alpha–Beta Pruning, Imperfect Real-Time Decisions, Stochastic Games, Partially Observable Games, State-of-the-Art Game Programs, Alternative Approaches

UNIT IV: Reasoning and Inference: Propositional Logic, Propositional Theorem Proving, Syntax and Semantics of First-Order Logic, Using First-Order Logic, Forward Chaining, Backward Chaining, Resolution

UNIT V: Knowledge Representation: Representations and Mappings, Approaches to Knowledge Representation-Simple Relational Knowledge, Inheritable Knowledge, Inferential Knowledge, Procedural Knowledge, Issues in Knowledge Representation, The Frame Problem

Text Books:

1. Artificial Intelligence : A Modern Approach, Stuart J. Russell and Peter Norvig, 3rdEdition, Prentice Hall

2. Artificial Intelligence, Elaine Rich,Kevin Knight, Shivashankar B Nair, 3rdEdition,Tata McGraw-Hill

Reference Books:

1. Artificial Intelligence, George F Luger, Pearson Education Publications
2. Artificial Intelligence, SarojKaushik, 1stEdition, Cengage Learning.

Semester	**IV Sem**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	0	0	3	1.5	**V20AIL06**
Name of the Course	**Java Programming Lab**					
Branches	Common to CSE((AI) & AIML)					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Demonstrate Programs on Classes, Objects, Constructors and Arrays. **(K3)**
CO2: Demonstrate Inheritance and Exception Handling **(K3)**
CO3: Implement programs on Multi-Threading and File Handling. **(K3)**
CO4: Implement programs using java collections. **(K3)**

LIST OF EXPERIMENTS

1. Develop programs on Control Structures and Type Conversions in java.
2. Develop programs using various String handling functions
3. Construct programs using the following concepts:
   (a) Classes & Objects b) Usage of static c)Constructors
4. Construct programs using the following concepts.
   (a) Arrays b)Nested Classes c) Command Line Arguments
5. Construct programs using the following concepts.
   (a)Inheritance b) Usage of super c)Method Overriding
6. Construct programs using the following concepts.
   (a)Usage of final b) Abstract class c)Interfaces
7. Implement the programs using the concepts
   (a)Packages b) Exception Handling.
8. Implement the programs on Multi-Threading.
   (a)Multiple Threads on Single Object b) Thread Deadlock
9. Construct a program that shows Inter-thread Communication
10. Construct programs to perform read and write operations on files.
    (a)Sequential Files b) Random Access files
11. Construct program using Array List and perform following operations
    a)Insert b) update c) search d) display
12. Construct program using Linked List and perform following operations
    a)Insert b) update c) search d) display
13. Construct a java program to iterate elements of HashSet using iterator and for Each.

Text Books:

1. The complete Reference Java, 8th Edition, Herbert Schildt, TMH.
2. Introduction to java programming, Y Daniel Liang, 7 Edition, Pearson.

Semester	**IV**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	0	0	3	1.5	**V20AIL07**
Name of the Course	**Operating Systems Lab**					
Branches	Common to CSE((AI) & AIML)					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Illustrate CPU scheduling algorithms **(K3)**

CO2: Apply Bankers Algorithm for Deadlock Avoidance and Deadlock Prevention. **(K3)**

CO3: Use Page replacement algorithms for memory management **(K3)**

LIST OF EXPERIMENTS

1. Demonstrate the following CPU scheduling algorithms:
   a) FCFS
   b) SJF
   c) Round Robin
   d) Priority
2. Illustrate : fork (), wait (), exec() and exit () system calls.
3. Demonstrate Producer and Consumer problem using Semaphores.
4. Demonstrate Bankers Algorithm for Deadlock Avoidance.
5. Demonstrate Bankers Algorithm for Deadlock Detection.
6. Demonstrate the following page replacement algorithms:
   a) FIFO b) LRU c) LFU
7. Demonstrate the following File allocation strategies:
   a) Sequenced b) Indexed c) Linked

Reference Books:

1. Operating System Concepts, Abraham Silberschatz, ,Peter Baer Galvin, Greg Gagne, 9th Edition, John Wiley and Sons Inc., 2012
2. Operating Systems – Internals and Design Principles, William Stallings, 7th Edition, Prentice Hall, 2012
3. Modern Operating Systems, Andrew S. Tanenbaum, Third Edition, Addison Wesley,2007

Semester	**IV**	**L**	**T**	**P**	**C**	**COURSE CODE**
Regulation	V20	0	0	3	1.5	V20AIL08
Name of the Course	**Artificial Intelligence Lab**					
Branches	Common to CSE((AI) & AIML)					

Syllabus Details

Course Outcomes: After successful completion of the Course, the student will be able to:

CO1: Demonstrate uninformed search techniques. **(K3)**
CO2: Demonstrate heuristic search techniques. **(K3)**
CO3: Solve real world problems by searching. **(K3)**
CO4: Develop AI agent for Gaming and AI-powered chatbot. **(K3)**

List of Experiments (Using Python Programming)

1. Solve Water Jug problem using BFS algorithm.
2. Solve Water Jug problem using DFS algorithm.
3. Demonstrate Hill Climbing Algorithm.
4. Demonstrate A* Algorithm.
5. Solve the n-queens problem using backtracking.
6. Solve Travelling Salesman Problem using backtracking
7. Develop Tic-Tac-Toe game
8. Solve8-Puzzle problem
9. Develop a Simple Chatbot.

Reference Books:

1. Artificial Intelligence : A Modern Approach, Stuart J. Russell and Peter Norvig, 3rdEdition, Prentice Hall
2. Artificial Intelligence, Elaine Rich,Kevin Knight, Shivashankar B Nair, 3rdEdition,Tata McGraw-Hill
3. Artificial Intelligence with Python, Alberto Artasanchez, Prateek Joshi,2nd Edition, Packt Publishing

SRI VASAVI ENGINEERING COLLEGE (Autonomous)

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Pedatadepalli, TADEPALLIGUDEM – 534 101, W.G. Dist, (A.P.)

Department of Management Studies (MBA)

Minutes of the 5th Board of Studies meeting of Management Studies held on 29-07-2022

The following are the members who attended for the meeting.

S. No	Name of the member	Designation	Role
1	Dr.G.V.Subba Raju	Professor Sri Vasavi Engg.College	Chairman BOS
2	Prof. B. Amarnath	Former Professor, Department of Management Studies Sri Venkateswara University. Tirupathi.	Council Nominee
3	Prof.D.Suryachandra Rao	Professor, Department of Management Studies, Krishna University, Machilipatnam	University Nominee
4	Sri. P.S.Varma	Former D G M, Coromandel International Limited, Kakinada	Industry expert
5	Sri Satyanarayana Ruttala	Senior Manager, Ericsson India Global Services Pvt., Ltd., Bangalore	Alumni
Department of Management Studies, Sri Vasavi Engineering College members			
6	D. Naveen Kumar	Asst. Professor & HOD	Member
7	Dr. S. Krishna Murthy Naidu	Associate Professor	Member
8	D.Satyanarayana	Sr. Asst.Professor	Member
9	Dr.K.Rambabu	Asst. Professor	Member
10	K.Vinay Kumar	Asst. Professor	Member
11	T.Dileep	Asst. Professor	Member

12	K.Pavan Kumar	Asst. Professor	Member
13	K.Suji	Asst. Professor	Member
14	B Aruna	Asst. Professor	Member
15	P.Bharath Kumar	Asst. Professor	Member
16	K.Murali Krishna	Asst. Professor	Member
17	P.Devi	Asst. Professor	Member
18	Dr.K.Pulla Rao	Asst. Professor	Member
19	K.Lalitha Bhavani	Asst. Professor	Member

The Chairman of the BOS Extended a formal welcome to the members and handed over the proceedings to the Head of the Department.

Minutes of the 5th BOS Meeting

Item No.1:

- **Reviewed and approved the syllabi for the Courses offered in 3rd & 4th Semesters under V21 Regulations.**

  The Chairman of BOS proposed the New Syllabi under V21 Regulations for the Academic year 2022-23. After considering the suggestions made by all BOS members the Syllabi was modified accordingly and was approved by BOS. The approved Syllabi was enclosed under Annexure-1

Item No.2:

- **To design and approve the Syllabus for Management Science & Universal Human Values under V20 Regulations for Engineering Branches.**

  The Syllabi of Management Science & Universal Human Values under V20 Regulations has been approved by BOS. The approved Syllabi was enclosed under Annexure-2

MBA: III Semester
V21MBT14: BUSINESS POLICY AND CORPORATE STRATEGY

L	T	P	C
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COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO1: Understand the concept of business policy and strategic management in detail. (K2) **CO2:** Examine various models for appraising an organization's external environment. (K3) **CO3:** Analyze various strategies formulated at corporate, business and functional levels. (K4) **CO4:** Understand strategy implementation procedure in detail. (K2)

CO5: Analyze the performance of strategies designed and applied at various levels of business. (K4)

UNIT 1

Introduction: The concept and evolution of Business Policy- Vision, Misssion and Objectives-Difference between business policy and strategic management. Corporate governance- concept, issues, models, evolution and significance. Introduction to Strategic Management-Concept importance of strategic Management, Strategy & Competitive Advantage, Strategy Planning & Decisions, strategic Management Process.

UNIT 2

Environmental Scanning and leadership: External Environment Appraisal using PESTEL, Competitor Analysis using Porter's 5-Forces model, Environmental Threat and Opportunity Profile (ETOP), Porter Value chain Analysis, Scanning Functional Resources and Capabilities for building Organization Capability Profile (OCP), SWOT Analysis. Key strategic leadership actions.

UNIT 3

Strategy Formulation: Strategic alternatives at corporate level: concept of grand strategies, Strategic choice models - Strickland's Grand Strategy Selection Matrix, Model of Grand Strategy Clusters, BCG, GE Nine Cell Matrix Strategic alternatives at business level: Michael Porter's Generic competitive strategies, Formulation of strategy at corporate, business and functional levels. Red Ocean and Blue Ocean Strategies

UNIT 4

Strategy Implementation: Developing short-term objectives and policies, functional tactics, and rewards, Structural Implementation: an overview of Structural Considerations Behavioral Implementation: an overview of: Leadership and Corporate Culture Mc Kinsey 7-S Framework.

UNIT 5

Strategy Evaluation and control – Establishing strategic controls - Measuring performance –appropriate measures- Role of the strategist – using qualitative and quantitative benchmarking to evaluate performance - strategic information systems – problems in measuring performance
– Strategic surveillance -strategic audit

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References

1. Vijaya Kumar P,.Hitt A: **Strategic Management**, Cengage learning, NewDelhi,2010
2. John A PearceII, AmitaMital: "**Strategic Management**", TMH, New Delhi,2012.Mohapatra: "**Cases Studies in Strategic Management**", Pearson, NewDelhi,2012
3. Adrian Haberberg&Alison: **Strategic Management**, Oxford University Press, NewDelhi, 2010
4. P.SubbaRao: "**Business Policy and Strategic Management**" Text and Cases,Himalaya Publishing House, New Delhi,2011
5. AppaRao, ParvatheshwarRao, Shiva Rama Krishna: "**Strategic Management and Business Policy"**, Excel Books, New Delhi,2012

MBA: III Semester

V21MBT15: CONSUMER BEHAVIOR

L	T	P	C
4	**0**	**0**	**4**

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

1. Understand the concept of Consumer Behavior and various models of buyer behavior. (K2)
2. Identify various behavioral aspects based on psychological foundations of CB. (K2)
3. Understand the factors influencing consumer behavior. (K2)
4. Understand the importance of communication on consumer behavior. (K2)
5. Identify the roots of consumerism. (K2)

UNIT-1

Introduction to Consumer Behavior:
Understanding consumers and market segments. Evolution of concept of consumer behavior, consumer analysis and business strategy. Models of Buyer Behavior, Howard Model, Howard- Sheth Model, EKB Model, Webster and Wind Model and Sheth Industrial Buyer Behavior Model

UNIT-2

Psychological Foundations of Consumer Behavior:
Consumer Motivation, Perception, Personality and Behavior, Learning and Behavior Modification, Information Processing, Memory Organization and Function, Attitude Formation and Attitude Change.

UNIT-3

Consumer Behavioral **Influences:**
Social and Cultural Environment Economic, Demographic, Cross Cultural and Socio–Cultural Influences, Social Stratification, Reference Groups and Family, Personal influence

UNIT-4

Communication and Consumer Behavior:
Components of communications process, designing persuasive communication and Diffusion of Innovations. Consumer Decision Processes High and Low Involvement, Pre-purchase Processes,

Post Purchase processes, Consumption and evaluation, Brand Loyalty and Repeat Purchase Behavior

UNIT-5

Consumerism:
The roots of consumerism, consumer safety, consumer information, Environmental concerns, consumer privacy, legislative responses to consumerism and marketer responses to consumer issues.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References

1. Ramneek Kapoor, Nnamdi O Madichie: "Consumer Behavior" Text and Cases", TMH, NewDelhi, 2012.
2. Ramanuj Majumdar: "Consumer Behavior insight from Indian Market", PHI Learning, New Delhi, 2011
3. M.S.Raju: "Consumer Behavior Concepts, applications and Cases", Vikas Publishing House, New Delhi, 2013.
4. David L Loudon and Albert J Della Bitta, "Consumer Behavior" 4/e, TMH, New Delhi, 2002.
5. Schiffman, L.G and Kanuk L.L "Consumer Behavior", 8/e, Pearson Education, New Delhi, 2003.

MBA: III Semester
V21MBT16: RETAIL MANAGEMENT

L	T	P	C
4	0	0	4

COURSE OUTCOMES:
After successful completion of the course, the student will be able to:

1: Understand the basic structure of Retail business in India. (K2)

2: Understand various retail strategies in practice. (K2)

3: Interpret the importance of location in making a retail business successful. (K2) 4: Apply basic operations in retail business in real life environment. (K3)

5: Examine the technical and financial aspects of retail business besides report preparation. (K3)

UNIT 1

Basics of Retailing: Retail and Retailing, Functions of Retailers, Types of Retailers, Benefits of a self service store, Evolution of Modern Retail, Understanding Barcoding, Multi-channel Retailing.

UNIT 2

Retail Strategies : Building sustainable competitive advantage, Strategic Retail planning process, Merchandising principles, Smart Pricing, Purchasing staples and branded FMCG items, Manpower planning and scheduling, Retail life Cycle

UNIT 3

Retail Location: Types, Location advantages, Finding the right place, core catchment area, Getting the right layout, Strategic profit model.

UNIT 4

Store operations : Inventory Management, Plan-O-Gram, Store manager routine and checklist, The cashier process, Cash management at Till, Billing process, Managing pilferage, Customer relationship management, periodic stock taking, Day-to-day security and loss prevention.

UNIT 5

Retail Monetary actions: Costs of running a supermarket, Key performance Indicators, Retail automation, MIS and business reports, Licenses and permissions required, Models of retail franchising.

Relevant cases have to be discussed in each unit and in examination case is compulsory fromany unit.

References:

1. A.J.Lamba (2011): "The Art of Retailing", Tata McGraw Hill Education Pvt Ltd, NewDelhi

2. Sivakumar A (2007): "Retail Marketing", Excel Books, New Delhi.

3. Sheikh and Kaneez Fatima (2012): "Retail Management" Himalaya publishing house,Mumbai.

SwapnaPradhan (2012): "Retail Management", Tata McGraw Hill, New Delhi

MBA: III Semester

V21MBT17: DIGITAL & SOCIAL MEDIA MARKETING

L	T	P	C
4	0	0	4

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO1: Understand the basic fundamentals of evolution of Digital Marketing. (K2)

CO2: Apply SEM tools in managing promotional activities. (K3)

CO3: Employ SEO techniques to optimize the Website. (K3)

CO4: Assess the importance of SMM & Affiliate Marketing tools. (K3)

CO5: Construct and examine the reports generated under Analytics. (K4)

UNIT 1

Overview of Digital Marketing: Concept of Digital Marketing – Evolution of digital communication through ages & Evolution of Digital Marketing. Concepts of Web 1.0, Web 2.0, Web 3.0 or Semantic Web, Web 4.0 or Symbiotic Web. Key drivers for Digital Marketing in India
– Digital Marketspace. Digital Marketing Funnel, various tools available in Digital Marketing landscape.

UNIT 2

Search Engine Marketing/Google Ads: Understanding Ad words, Ad words Account structure, Ad Network & Ad types, Keyword Match types, Ad rank, Quality score calculation, Difference between Max CPC & Actual CPC, Keyword planning and control, Bidding Strategies, Creating Ad campaigns (Search and Display only)

UNIT 3

Search Engine Optimization (SEO) & E Mail Marketing: Anatomy of a Website; Paid, Owned and Earned Media; Search Engine working methodology, Keyword Research Techniques, On-Page Optimization elements like Website Architecture. Off-Page Optimization Techniques. E-Mail Marketing-Basics, 4 Stage E Mail Marketing process: Data, Design, Delivery & Discovery.

UNIT 4

Social Media & Affiliate Marketing: Importance of social media, social media-Disruption of Traditional Media, Benefits of Social Media Marketing, Essentials of a successful Social Media Marketing Strategy, Engagement Metrics, Reach Metrics & Conversion Metrics; Affiliate Marketing – Parties in Affiliate Marketing. Difference between Affiliate & Influencer Marketing, Process of being an Affiliate Marketer, Briefing on Amazon Associates Affiliate Program.

UNIT 5

Google Analytics: Concept of Google Analytics, Analytics Account Structure: Hierarchy of Accounts, Users, Properties & Views. Website data collection, Anatomy of a 'HIT' and most common types of HIT's. Categorizing date into users and sessions. Types of Reports, Metrics under Audience Overview Report, Overview of Acquisition reports and Behavioral reports, Exit Rate Vs. Bounce Rate.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. Ian Dodson (2017). 'The Art of Digital Marketing'. - WILEY

2. Puneet Singh Bhatia (2017). 'Fundamentals of Digital Marketing'. Pearson Education.

3. Swaminathan (2019). 'Digital Marketing-Fundamentals to Future'. CENGAGE.

4. Seema Gupta (2017). 'Digital Marketing.' Tata McGraw Hill.

5. Philip Kotler (2017). 'Marketing 4.0: Moving from Traditional to Digital'.

6. Vandana Ahuja (2015). 'Digital Marketing'. Oxford University Press.

MBA: III semester
V21MBT18: SECURITY ANALYSIS & PORTFOLIO MANAGEMENT

L	T	P	C
4	0	0	4

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

1. Understand the environment of share markets and trading system in stock exchanges.(K2)
2. Find the relationship between risk and return and value the equities and bonds. (K1)
3. Understand the fundamental, technical and efficient market approaches. (K2)
4. Identify portfolio selection through different portfolio theories. (K2)
5. Apply various tools to analyze the performance of mutual funds. (K3)

Unit-I:

Concept of Investment Education: Investment Vs Speculation, Investment alternatives - Investment Process – Trading System in Stock Exchanges –Market Indices. Calculation of SENSEX and NIFTY - Return and Risk – Meaning and Measurement of Security Returns. Meaning and Types of Security Risks: Systematic Vs Non-systematic Risk - Measurement of Risk. (Problems)

Unit-II:

Equity and Bond Valuation Models: – Equity Shares valuation-Cash flow valuation-Asset Valuation-Dividend-discount model; concept of Bond. Zero coupon bond, YTM, YTC. Bond valuation (Simple Problems)

Unit-III:

Investment Analysis: Fundamental Analysis – Economy, Industry and Company Analysis, Technical Analysis – Dow Theory – Elliot Wave Theory – Trends and Trend Reversals - Efficient Market Theory –Hypothesis- Forms of Market Efficiency.

Unit-IV:

Portfolio Analysis and Selection: Elements of Portfolio Management, Portfolio Models – Markowitz Model, Efficient Frontier and Selection of Optimal Portfolio. Sharpe Single Index Model (SIM) and Capital Asset Pricing Model (CAPM).

Unit-V:

Portfolio Evaluation of Mutual funds: Concept and Objectives, Functions and Classification of Mutual Funds- SEBI- Guidelines for Mutual Funds, Performance Evaluation of Portfolios; Sharpe-Jenson – Fama Models for Evaluation of Mutual funds (Problems).

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References

1. S.Kevin: “Security Analysis and Portfolio Management”, PHI Learning, New Delhi, 2009
2. Punithavathy Pandian: “Security Analysis and Portfolio Management”, Vikas Publishing House, N
3. Sudhendra Bhat: “Security Analysis and Portfolio Management”, Excel Books, New Delhi, 2009.
4. Shashi K Gupta: “Security Analysis and Portfolio Management”, Kalyani Publishers, New Delhi,2010
5. Prasanna Chandra, “Investment Analysis and Portfolio Management”, 3/e Tata McGrawHill Publishing Co. Ltd. New Delhi, 2003.
6. Ranganatham : “Investment Analysis and Portfolio Management” Pearson Education. New Delhi, 2009.

MBA: III semester
V21MBT19: BANKING AND INSURANCE MANAGEMENT

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

1. Interpret the basic institutional and practical knowledge of Banking and Insurance. (K2)
2. Apply the practical knowledge of bank credit system and non-performing assets in real scenario. (K3)
3. Recognize the new innovations and regulations in the banking sector. (K2)
4. Interpret the types of insurance and their importance. (K2)
5. Understand the concept of general insurance and its practical applicability. (K2)
6. Identify and understand the practical issues in banking and insurance sectors. (K2)

UNIT 1

Introduction to Banking: Meaning of a Bank and Customer- Bank and customer Relationship –Evolution of Banking in India – origin, nationalization, reforms and Financial Inclusion in India - Classification of Banks - Role of commercial banks in Economic Development

UNIT 2

Sources and Uses of Bank Funds: Sources of Bank funds – Uses of bank funds - different types of loans - management of credit process – tools to assess credit worthiness of a prospective borrower. Non Performing Assets: gross and net concept of NPAs, causes, implications & recovery of NPAs.

UNIT 3

Regulation and Innovations in Banking System: Financial statement analysis of banks: CAMEL Approach, Key Performance indicators. Regulation of Bank Capital: The need to regulate Bank Capital - Concept of Regulatory Capital, Basel Accords I,II and III.

Banking Innovations - Core Banking Solution - Retail Banking: Products & Services - Plastic Money – types of electronic fund transfers - Mobile Phone

Banking - Net Banking- Banc- assurance.

UNIT 4

Introduction to Insurance: Evolution of insurance business in India- Insurance as a Risk Management Tool- Principles of Insurance - Characteristics of Insurance contract - Functions ofInsurers – Insurance Marketing channels - responsibilities of insurance agents - an overview of IRDAI.

UNIT 5

Life Insurance and General Insurance: The concept of Life Insurance - types of Life Insurancecontracts - Provisions of Life Insurance contracts - Life Insurance Products- Tax treatment of Life Insurance - The Actuarial Science- - Special Life Insurance forms.

General Insurance: Health Insurance, Travel Insurance, Personal accident insurance, Motor Insurance – Marine Insurance – Fire accident insurance. Micro Insurance in India.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References

1. Peter.S.Rose& Sylvia. C. Hudgins: “**Bank Management & Financial Services**”,Tata McGraw Hill New Delhi,2010,
2. James S. Trieschmann, Robert E. Hoyt & David. W. Sommer B:“**RiskManagement & Insurance**”, Cengage Learning, NewDelhi
3. Reddy K S and Rao R N: “**Banking & Insurance**”, Paramount Publishing House2013.
4. Vasant Desai: “**Banks & Institutional Management**”, Himalaya PublishingHouse 2010.
5. Harold. D. Skipper & W. Jean Kwon: “Risk **Management & Insurance,Perspectives in a Global Economy**”, Blackwell Publishing NewDelhi.
6. NIA: “**Life Insurance Principles and Practices**”, Cengage Learning, NewDelhi,2013.
7. Neelam C.Gulati: **“Banking and Insurance: Principles and Practice”**, ExcelBooks, New Delhi2011.

MBA: III semester
V21MBT20: BUSINESS TAXATION & PLANNING

L	T	P	C
4	0	0	4

COURSE OUTCOMES:
After successful completion of the course, the student will be able to:

1) Understand the basic concept of Taxation and Tax planning. (K2)
2) Calculate individual's tax liability and filing the returns. (K4)
3) Understand the tax planning for a business firm. (K2)
4) Differentiate among different Indirect taxes. (K2)
5) Understand tax audit and reporting. (K2)
6) Apply tax planning concepts in business decision making. (K3)

UNIT 1

Introduction: Meaning, Nature, objectives, principles and basic concepts of taxation - Indian taxation system **–** Classification of Taxes - Income Tax Act 1961 – Concept of Tax Avoidance,Tax Evasion and Tax Planning - Measures to plug tax loopholes in India.

UNIT 2

Tax Planning for Individuals: Computation of Gross and Net income of an individual under various 'Heads of Income' – Tax deductions, rebates, reliefs – Calculation of Tax Liability – Filing of IT Returns – IT Forms, due dates and penalties.

UNIT 3

Tax Planning for Business Forms – Direct tax: Corporate Taxation – Tax deductions, exemptions, reliefs, rebates and Incentives available to business firms – Carry forward and set
–off of losses – Tax considerations in management decisions

UNIT 4

Tax Planning for Business Forms – Indirect tax: Concept of Excise Duty, Customs Duty, VAT and GST. Evolution of GST in India – Key concepts, components, slabs rates of GST. Benefits and Challenges of GST in India.

UNIT 5

Tax Audit: Tax Audit – Qualities and Qualifications required to a tax auditor – Tax reportingand disclosure in financial statements.

Relevant cases have to be discussed in each unit and in examination case iscompulsory from any unit.

References:

1. Vinod K. Singhania and Mounica singhnia, Corporate Tax Planning and businessManagement, Taxmann Publications, New Delhi.
2. Vinod K. Singhania and Kapil Singhania, Direct Taxes – Law and Practice, TaxmannPublications, New Delhi
3. R.N.Lakhotia, Corporate Tax Planning, vision publications.
4. Arun kumar "Ground Scorching Tax" Penguin Portfolio
5. Bhagavati Prasad, Direct Taxes Law and Practice, Wishwa Prakashan, New Delhi.

MBA: III semester
V21MBT21: LABOUR WELFARE & LEGISLATION

L	T	P	C
4	0	0	4

COURSE OUTCOMES:
After successful completion of the course, the student will be able to:

CO1: Understand the principles of labor welfare. (K2) CO2: Understand various labor welfare programs. (K2)

CO3: Recall the provisions of various acts related to labor welfare. (K1)

CO4: Recall the provisions of various acts related to payment of bonus and wages. (K1) CO5: Explain the functioning of trade unions in India. (K2)

UNIT 1

Labour Welfare: Concept, scope and philosophy, principles of labour welfare, Indian constitution on labour, Agencies of labour welfare and their role. Impact of ILO on labour welfare in India-Labour problems – Indebtedness, Absenteeism, Alcoholism, Personal and Family Counselling.

UNIT 2

Labour welfare programmes: Statutory and non-statutory, extra mural and intra mural, Central Board of Workers' Education; Workers' Cooperatives; Welfare Centers, Welfare Officers' Role, Status and Functions. Role of social work in industry, Labour welfare fund.

UNIT 3

Welfare Legislation: Factories Act 1948, Mines Act 1952, Plantation Labour Act 1951, Contract Labour (Regulation and Abolition) Act 1970 and A.P. Shops and Establishments Act.

UNIT 4

Wage and Social Security Legislation: Payment of wages Act 1936 - Minimum wages Act 1948 - Payment of Bonus Act 1966 -. Payment of Gratuity Act 1972 - Workmen's Compensation Act 1923 - Employees State Insurance Act 1948 - Maternity Benefit Act 1961 and Employees Provident Fund and Miscellaneous Provisions Act 1952.

UNIT 5

Industrial Relations Legislation: Industrial Disputes Act 1947 Concept & objectives,Types of Strikes and Lock-outs, Wages for Strike and Lock-out Period– IndustrialEmployment (standing orders) Act 1946 and Trade Unions Act 1926- Types of Trade Unions - Reasons for Joining Trade Unions.

Relevant cases have to be discussed in each unit and in examination case iscompulsory from any unit.

References:

1. Govt. of India (Ministry of Labour, 1969). Report of the Commission on LabourWelfare, New Delhi: Author.
2. Govt. of India (Ministry of Labour, 1983). Report on Royal Commission on Labour inIndia, New Delhi: Author.
3. Malik, P.L: "Industrial Law", Eastern Book Company. Laknow,1977
5. Moorthy, M.V: "Principles of Labour Welfare", Oxford University Press, New Delhi.
6. Pant, S.C: "Indian Labour Problems", Chaitanya Pub. House. Allahabad.

MBA: III semester
V21MBT22: PERFORMANCE EVALUATION & COMPENSATION MANAGEMENT

L	T	P	C
4	0	0	4

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO1: Understand the concept of Performance and linkage with other HR processes. (K2)

CO2: Interpret Performance Management Planning Process. (K2)

CO3: Understand the methods of Performance Management System. (K2)

CO4: Understand the objectives and dimensions of compensation system. (K2)

CO5: Design the pay structure and frame different types of pay structures. (K4)

UNIT-1

Introduction: Definition–concerns-scope-Historical developments in performance management- Over view of performance management-Process for managing performance- Importance –Linkage of PM to other HR processes-Performance Audit

UNIT 2

Performance Management Planning: Introduction-Need-Importance-Approaches-The Planning Process—Planning Individual Performance- Strategic Planning –Linkages to strategic planning Barriers to performance planning-Competency Mapping-steps-Methods.

UNIT-3

Management System: objectives – Functions- Phases of Performance Management System- Competency and Reward based Performance Management Systems- HR Challenges- Appraisal for recognition and reward-Methods of Appraising- Appraisal system design-Implementing the Appraisal System

UNIT 4

Compensation: concept and definition – objectives and dimensions of compensation program – factors influencing compensation –Role of compensation and Reward in Modern organizations Compensation as a Retention strategy- aligning compensation strategy with business strategy - Managing Compensation: Designing a compensation system – internal and external equity– pay

determinants - frame work of compensation policy - influence of pay on employee attitude and behaviour - the new trends in compensation management at national and international level.

UNIT 5

Pay Structure and Tax Planning: Designing pay structures-comparison in evaluation of different types of pay structures-Significance of factors affecting Tax Planning –Concept of Tax planning- Role of tax plans in compensation benefits- Tax efficient compensation package-Fixation of tax liability salary restructuring.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References

1. PremChadha: "Performance Management", Macmillan India, New Delhi, 2008.

2. Michael Armstrong & Angela Baron, "Performance Management": The New Realities, Jaico Publishing House, New Delhi, 2010.

3. T.V.Rao, "Appraising and Developing Managerial Performance", Excel Books, 2003.

4. Dr. Kanchan Bhatia "Compensation Management", Himalaya Publishing House, New Delhi 2012.

5. A.M.Sarma, N.SambasivaRao: "Compensation and Performance management", Himalaya Publishing House, Mumbai

6. Dewakar Goel:"Performance Appraisal and Compensation Management", PHI Learning, New Delhi, 2012

7. ER Soni Shyan Singh 'Compensation Management' – Excel Books, New Delhi – 2008.

MBA: III Semester

V21MBT23: STRATEGIC HUMAN RESOURCE MANAGEMENT

L	T	P	C
4	0	0	4

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO1: Understand the theoretical perspectives and various approaches to Strategic HRM. (K2)

CO2: Describe various strategic HR Planning processes. (K2)

CO3: Explain strategic HR implementation process. (K2)

CO4: Explain strategic HR Development. (K2)

CO5: Analyze various HR Evaluation strategies. (K3)

UNIT-1

Human Resource Strategy: Introduction to Strategic Human Resource Management - Evaluation objectives and Importance of Human Resources Strategy- Strategic fit – A conceptual framework -Human Resources contribution to strategy - Theoretical Perspectives on SHRM approaches - Linking business strategies to HR strategies.

UNIT-2

Strategic Human Resource Planning: Objectives, benefits and levels of strategic planning, Components of the strategic plan, Basic overview of various strategic planning models, Strategic HR Plan-Activities related to strategic HR Planning, Models of Strategic HR Planning

UNIT-3

Strategy Implementation: Strategy implementation as a social issue-The role of Human Resource-Work force utilization and employment practices-Resourcing and Retention strategies- Reward and Performance management strategies.

UNIT-4

Strategic Human Resource Development: Concept of Strategic Planning for HRD- Levels in Strategic HRD planning-Training and Development Strategies-HRD effectiveness- employee engagement- Green HRM

UNIT-5

Human Resource Evaluation: Approaches to evaluation, Evaluation Strategic contributions of Traditional Areas - Evaluating Strategic Contribution of Emerging Areas-HR as a Profit centre and HR outsourcing strategy.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. Charles R. Greer: "Strategic Human Resource Management" - A General Manager Approach -Pearson Education, Asia

2. Fombrum Charles &Tichy: "Strategic Human Resource Management" - John Wiley Sons, 1984

3. Dr. Anjali Ghanekar "Strategic Human Resource Management" Everest Publishing House, Pune 2009

4. TanujaAgarwala "Strategic Human Resource Management" Oxford University Press, New Delhi 2014

5.Srinivas R Kandula "Strategic Human Resource Development" PHI Learning PVT Limited, New Delhi 2009

6.Dreher, Dougherty "Human Resource Strategy" Tata McGraw Hill Publishing Company Limited, New Delhi 2008

MBA: IV semester
V21MBT24: LOGISTICS & SUPPLY CHAIN MANAGEMENT

L	T	P	C
4	0	0	4

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO1: Understand the concept of Logistics and Supply chain management. (K2)

CO2: Generalize various costs incurred to measure the logistics performance. (K2)

CO3: Understand the strategy of benchmarking in Logistics and supply chain. (K2)

CO4: Assess the need for various third-party aggregator services. (K3)

CO5: Understand the logistics management at global level. (K2)

UNIT 1

Logistics and Competitive strategy: Competitive advantage – Gaining Competitive advantage through logistics-Integrated supply chains– Competitive performance - Models in Logistics Management - Logistics to Supply Chain Management – Focus areas in Supply Chain Management.- Customer service and retention- Basic service capability Value added services

UNIT 2

Measuring logistics costs and performance: The concept of Total Cost analysis – Principles of logistics costing – Logistics and the bottom-line – Impact of Logistics on shareholder value - customer profitability analysis –direct product profitability – cost drivers and activity-based costing.

UNIT 3

Logistics and Supply chain relationships: Benchmarking the logistics process and SCM operations –Mapping the supply chain processes – Supplier and distributor benchmarking – setting benchmarking priorities –identifying logistics performance indicators –Channel structure
– Economics of distribution –channel relationships –logistics service alliances.

UNIT 4

Sourcing, Transporting and Pricing Products: sourcing decisions and transportation in supply chain – infrastructure suppliers of transport services – transportation economics and pricing – documentation - pricing and revenue management Lack of coordination and Bullwhip Effect - Impact of lack of coordination. - CRM –Internal supply chain management - .

UNIT 5

Managing global Logistic: Logistics in a global economy – views of global logistics- global operating levels – interlinked global economy – Global strategy – Global purchasing – Global logistics – Channels in Global logistics –Global alliances.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References

1. Donald J.Bowersox and David J.Closs: "Logistical Management" The Integrated Supply Chain Process, TMH, 2011.
2. Edward J Bradi, John J Coyle: " A Logistics Approch to Supply Chain Management, Cengage Learning, New Delhi, 2012.
3. D.K.Agrawal: "Distribution and Logistics Management", MacMillan Publishers, 2011
4. Sunil Chopra and Peter Meindl: "Supply chain Management: Strategy, Planning and Operation", Pearson Education, New Delhi 2013
5. Rahul V Altekar: Supply Chain Management, PHI Learning Ltd, New Delhi, 2009

MBA: IV semester
V21MBT25: SALES AND DISTRIBUTION MANAGEMENT

L	T	P	C
4	0	0	4

COURSE OUTCOMES:
After successful completion of the course, the student will be able to:

1. Understand the basic concept of Sales and distribution management. (K2)
2. Apply personal selling techniques to promote a product. (K3)
3. Apply various concepts of sales force management. (K3)
4. Understand various issues related to distribution channels. (K2)
5. Understand the functionality of logistics and supply chain concepts. (K2)

UNIT 1:

Definition of Sales Management-nature and scope of sales Management –Modern trends in Sales Management -Role and responsibilities of Sales Managers - Organization of Sales Department- Different types of Sales Organizations

UNIT 2:

Personal Selling –Objectives – Approaches to Personal Selling –Process of Personal Selling-Organization Design and Staffing, Sales Planning, Time and Territory Management

UNIT 3:

Managing sales Force - Recruitment –Selection and Training of salesmen-Salesmen's Compensation Plans - Evaluation of Salesmen's performance –Sales Control Research

UNIT4:

Marketing Channels- Structure and Functions-Channel Design –Selecting Channel Members – Motivating Channel Members – Selection and Recruitment of

Channel Partners - Channel Conflicts
– Reasons –Managing Channel Conflicts

UNIT5:

Distribution Management -–Retailing –Wholesaling - Supply Chain Management-Managing Logistics-Physical Distribution Management –Transportation and Traffic Management – Warehousing and Storage

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. Sales Management: Decisions, Strategies & Cases, Richard R. Still, Edward W. Cundiff, Norman A.P. Govoni, Pearson Education, Latest Edition
2. Sales Management: Concepts Practice, and Cases, Johnson F.M., Kurtz D.L., Scheuing E.E., Tata McGraw- Hill, Latest Edition
3. Selling & Sales Management, David Jobber, Geoffrey Lancaster, Pearson Education, Latest Edition
4. Sales Management, Tanner, Honeycutt, Erffmeyer, Pearson Education, Latest Edition
5. Sales Force Management, Mark W. Johnston, Greg W. Marshall, Tata McGraw-Hill, Latest Edition
6. Sales Management, William L. Cron, Thomas E. DeCarlo, Wiley, Latest Edition
7. Sales & Distribution Management, Dr. S. L. Gupta, Excel, Latest Edition

MBA: IV semester
V21MBT26: SERVICES MARKETING

L	T	P	C
4	0	0	4

COURSE OUTCOMES:
After successful completion of the course, the student will be able to:

1. Understand the nature and importance of services in an economy. (K2)
2. Understand the need for CRM in services. (K2)
3. Examine various elements related to service product management. (K3)
4. Understand distribution mechanism for services. (K2)
5. Analyze the importance of service quality. (K3)

UNIT I:

Importance of services marketing; Service characteristics and Marketing challenges; Reasons for growth of services sector; Services sector in the Indian economy.

UNIT II:

Customer Relationship Marketing: Relationship Marketing, the nature of services consumption, understanding customer needs and expectations, strategic response to the intangibility of service performance.

UNIT III:

Services product management: Basic service package, CVH, service flower, new service development, service life cycle; Services branding and positioning; physical evidence; Pricing of services.

UNIT IV:

Service Distribution strategies; internal marketing; External marketing; Interactive marketing, Service encounter, Management of moments of truth, Interaction process design and efficiency.

UNIT V:

Service quality management: Gap model, SERVQUAL; Total quality services marketing; Services failures and recovery strategies (Case Studies are Compulsory)

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. K.Rama Mohana Rao: Services Marketing, Pearson, 2 Ed. New Delhi.

2. Valeri Zeithmal, Mary Jo Binter,Dwayne D Gremler and Ajay Pandit: Services Marketing, Tata McGraw Hill, New Delhi.

3. Christopher Lovelock, Jochen Wirtz and Jayanta Chatterjee: Services Marketing: People, Technology, Strategy, Pearson, New Delhi.

4. Christian Gronroos: Services Management and Marketing, Maxwell Macmillan.

5. Harsh V. Verma, Services Marketing, Pearson, New Delhi.

MBA: IV semester

V21MBT27: ADVERTISING & BRAND MANAGEMENT

	L	T	P	C
COURSE OUTCOMES: After successful completion of the course, the student will be able to:	4	0	0	4

CO1: Describe the importance of Advertising. (K2)

CO2: Explain the Advertising campaign development from organizational context. (K2)

CO3: Examine the Advertising effectiveness. (K3)

CO4: Identify the foundations of Branding (K1)

CO5: Illustrate the Brand Building Practices. (K2)

Unit – I

Advertising: Its importance and nature; Communication model; Persuasion Process –perception, learning and attitude change; Major advertising decisions and influencing factors;

Unit – II

Developing Advertising Campaign: Determining advertising Objectives and budget Determining advertising message and copy - Headline, body copy, logo, illustration and layout; Creative styles and advertising appeals; Media planning – media selection and scheduling Advertising through Internet.

Unit – III

Organisation and Evaluation of Advertising Efforts: In-house arrangements; Using advertising agencies – selection, compensation and appraisal of advertising agency; Evaluating Advertising

Effectiveness.

Unit – IV

Importance of branding; Basic Branding concepts –Brand personality, brand image, brand identify, brand equity and brand loyalty; Identifying and selecting brand name, Brand positioning and re-launch; Brand extension; Adjustments to Brand portfolio.

Unit – V

Brand Building in Different Sectors – Corporate Branding, Service branding challenges, B2B Branding. Leadership Capabilities for B2B Global Brand Leadership. Global Branding – Adaption and Brand Culture perspective

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

Suggested Readings:

1. S.H.H Kazmi and SatishK.Batra : Advertising and sales promotion,Excel books Cowley. D: Understanding Brands, ,Kogan Page Ltd
2. George E.Belch& Michael A. Balch : Advertising and Promotion, TMH
3. Aaker, Myers &Batra : Advertising Management , Prentice Hall.
4. Wells,Moriarity&Burnett : Advertising Principles & practices , Prentice Hall.

MBA: IV semester

V21MBT28: FINANCIAL DERIVATIVES

L	T	P	C
4	0	0	4

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

1. Understand the nature of derivatives and derivative markets. (K2)
2. Operate the trading of futures in BSE &NSE. (K3)
3. Develop fundamental knowledge of options market. (K3)
4. Apply pricing mechanism on various derivative options. (K4)
5. Understand swaps and economic functions of swap transactions. (K2)

UNIT– I:

Introduction to Financial Derivatives – Meaning and Need – Growth of Financial Derivatives in India – Derivative Markets – Participants – Functions – Types of Derivatives – Forwards – Futures – Options – Swaps – The Regulatory Framework of Derivatives Trading in India.

UNIT – II:

Features of Futures – Differences Between Forwards and Futures – Financial Futures – Trading –Currency Future – Interest Rate Futures – Pricing of Future Contracts – Value At Risk (VAR) – Hedging Strategies – Hedging with Stock Index Futures –Futures Trading on BSE & NSE.

UNIT – III:

Options Market – Meaning & Need – Options Vs futures – Types of Options Contracts – Call Options – Put Options – Trading Strategies Involving Options – Basic Option Positions – Margins – Options on stock Indices – Option Markets in India on NSE and BSE.

UNIT – IV:

Option Pricing – Intrinsic Value and Time Value - Pricing at Expiration – Factors Affecting Options pricing – Put-Call Parity Pricing Relationship – Pricing Models – Introduction to Binominal Option Pricing Model.

UNIT – V:

Swaps – Meaning – Overview – The Structure of Swaps – Interest Rate Swaps – Currency Swaps
– Commodity Swaps – Swap Variant – Swap Dealer Role – Equity Swaps – Economic Functions of Swap Transactions – FRAs and Swaps.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. Rene M Stulz, Risk Management and Derivatives, Cengage, New Delhi

2. David Thomas. W &Dubofsky Miller. Jr., Derivatives Valuation and Risk Management, Oxford University, Indian Edition.

3. N.D.Vohra&B.R.Baghi, Futures and Options, Tata McGraw-Hill Publishing Company Ltd.

4. Red Head: Financial Derivatives: An Introduction to Futures, Forward, Options" Prentice Hall of India.

5. David A. Dubofsky, Thomas W.Miller, Jr.: Derivatives: Valuation and Risk Management, Oxford University Press.

6. Sunil K.Parameswaran, "Futures Markets: Theory and Practice" Tata-McGraw-Hill Publishing Company Ltd.

7. D.C.Parwari, Financial Futures and Options, Jaico Publishing House

8. T.V.Somanathan, Derivatives, Tata McGraw-Hill Publishing Company Ltd.

9. NSE manual of Indian Futures & Options &www.Sebi.com

MBA: IV semester

V21MBT29: FINANCIAL MARKETS & SERVICES

L	T	P	C
4	0	0	4

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

- Understand the structure of Indian financial system. (K2)
- Generalize the financial services and functions of merchant banker. (K2)
- Understand the function of venture capital business and lease financing. (K2)
- Describe the functions of various NBFCs. (K2)
- Understand the functions of security deposits and stock broking houses. (K2)

Unit I:

Indian Financial System , Financial Markets: Structure of Financial System – role of Financial System in Economic Development – Financial Markets :Capital Markets – Money Markets – Primary Market and Secondary Market – Role of SEBI – Secondary Market Operations – Regulation – Functions of Stock Exchanges – Listing – Formalities – Financial Services Sector- Problems and Reforms.

Unit –II:

Financial Services: Concept , Scope of Financial Services – Regulatory Frame Work of Financial Services – Growth of Financial Services in India – Merchant Banking – Meaning-Types – Responsibilities of Merchant Bankers – Role of Merchant Bankers in Issue Management – Regulation of Merchant Banking in India.

Unit III:

Venture Capital and Leasing: – Growth of Venture Capital in India – Financing Pattern under Venture Capital – Legal Aspects and Guidelines for Venture Capital, Leasing – types of Leases –Evaluation of Leasing Option Vs. Borrowing.

Unit IV:

NBFCs: Credit Rating – Meaning, Functions –Credit Rating Agencies in India, Factoring, Forfeiting and Bill Discounting – Types of Factoring Arrangements – Factoring in the Indian Context;

Unit V:

Stock Broking and Security Depository: Concept of Stock Broking, Evolution of stock brokingbusiness, functions of stock broking firm-Regulatory guidelines of SEBI on stock broking business- Debt Securitization – Concept and Application – De-mat Services-need and Operations-role of NSDL and CDSL.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References

1. Bhole&Mahakud, Financial Institutions and Market, TMH, New Delhi
2. V.A.Avadhani, Marketing of Financial Services, Himalayas Publishers, Mumbai
3. DK Murthy, and Venugopal, Indian Financial System, IK Int Pub House
4. Anthony Saunders and MM Cornett, Fin Markets &Institutions,TMH, ND
5. Edminister R.D., Financial Institution, Markets and Management:
6. Punithavathy Pandian, Financial Markets and Services, Vikas, New Delhi
7. Vasanth Desai, Financial Markets & Financial Services, Himalaya, Mumbai
8. Meir Khan – Financial Institutions and Markets, Oxford Press.
9. Madura, Financial Markets & Institutions, Cengage, ND

MBA: IV semester

V21MBT30: ADVANCED MANAGEMENT ACCOUNTING

L	T	P	C
4	0	0	4

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

1. Understand the nature, objectives and importance of advanced management accounting.(K2)
2. Experiment on optimum pricing, and various elements of marginal costing. (K3)
3. Assess the importance of standard costing and variance analysis. (K3)
4. Prepare different types of budgets. (K3)
5. Understand contemporary practices in the area of advanced management accounting. (K2)

Unit – 1: Introduction: Scope, objectives, importance and limitations of Employment of Management Accounting — Role, duties and responsibilities of Management Accountant. Essentials of reporting of management accounting.

Unit - 2: Marginal Costing: Significance of marginal costing. Cost volume profit-BEP analysis – Decision Situations-Sales Volume Decisions – Pricing and Special Order Pricing –Make / Buy Decisions – Product Mix Decisions-– Plant Shutdown Decision Profit Planning –planning of level of activity – Key factor – Foreign market offers.

Unit - 3: Standard Costing: Standard Costing and Absorption costing – Establishment of cost standards. Variance analysis: Material Variances – Labour Variances – Overhead Variances - Sales Variances

Unit- 4: Budgetary Control: – Objectives and advantages of Budgetary control. Types of various budgets. Preparation of Budgets – Purchase, Production, Sales and Cash Budget- Flexible Budget – Master Budget – Zero Based Budgeting.

Unit – 5: Contemporary issues in Management Accounting: Value analysis-Activity based costing-Social cost benefit analysis-Kaizen costing-Throughput costing-Target costing- Learning curve.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. Charles T. Horn Gaxy L. Sundem.: "Introduction to Management Accounting" Konrk Publishers PVT Ltd, New Delhi.

2. S.P. Gupta: "Management Accounting" Sahitya Bhawan Publications, Agra 2002.

3. Manmohan and Goyal: "Management Accounting" Pearson Education.

4. V. Krishna Kumar: "Management Accounting" Mittal Publications, New Delhi.

5. Dr. Kulsreshtha and Gupta: "Practical Problem in Management Accounting" Tata Mc Graw Hill, New Delhi.

6. S.P. Jain and K.L. Narang: "Advanced Cost and Management Accounting" Kalyani Publishers, New Delhi.

MBA: IV semester
V21MBT31: HUMAN RESOURCE METRICS & ANALYTICS

L	T	P	C
4	0	0	4

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

1. Understand various approaches in designing HR Metrics. (K2)
2. Compute Metrics for different HR operations. (K3)
3. Understand the concept of HR Analytics using dashboards. (K2)
4. Assess diversity in various HR functions. (K3)
5. Evaluate the best practices in HR Analytics. (K5)

Unit 1

HR Metrics Overview--Concepts, Objectives-- Historical evolution of HR metrics. —Importance of HR Metrics. --Approaches for designing HR metrics--The Inside-Out Approach--The Outside-In Approach-- Align HR metrics with business strategy,goals and objectives.

Unit II

Creating levels of metrics measures—HR Efficiency measures—HR Effectiveness measures-- HR value / impact measures. Building HR functions metrics-- WorkforcePlanning Metrics-- Recruitment Metrics --Training & Development Metrics-- Compensation & Benefits Metrics -- Employee relations & Retention Metrics

Unit III

HR Analytics Overview -- What HR Analytics. -- Importance of HR Analytics. -- Translating HR metrics results into actionable business decisions for upper management (Using Excel Application exercises, HR dashboards)-- HR information systems and data sources-- HR Metrics and HR Analytics-- Intuition versus analytical thinking-- HRMS/HRIS and data sources-- Analytics frameworks like LAMP-- HCM:21(r)Model.

Unit IV

Diversity Analysis-- Equality, diversity and inclusion, measuring diversity and inclusion, Testing the impact of diversity, Workforce segmentation and search for

critical job roles.. Recruitment and Selection Analytics--Evaluating Reliability and validity of selection models, Finding out selection bias.Predicting the performance and turnover. Performance Analysis-- Predicting employee performance, Training requirements, evaluating training anddevelopment.

UNIT V:

Optimizing selection and promotion decisions. Monitoring impact of Interventions-- Tracking impact interventions-- Evaluating stress levels and value-change-- Formulating evidence based practices and responsible investment-- Evaluation mediation process, moderation and interaction analysis.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References

1. Edwards Martin R, Edwards Kirsten (2016),-Predictive HR Analytics:Masteringthe HR Metric‖,Kogan Page Publishers,ISBN-0749473924
2. Fitz-enzJac (2010), -Thenew HR analytics:predictingtheeconomicvalu eofyour company‘shumancapitalinvestments‖,AMACOM,ISBN -13:978-0-8144-1643-3
3. Fitz-enzJac, MattoxIIJohn (2014), -Predictive AnalyticsforHuman Resources‖, Wiley, ISBN-1118940709
4. Bernard Marr(2018), Data Driven HR:How to use Analytics and metrics to data driven performance,Kindle Edition.
5. John Sullivan(2003)HR Metrics The World Class Way, Kennedy Information ISBN 978- 1932079012

MBA: IV semester
V21MBT32: MANAGEMENT OF INDUSTRIAL RELATIONS

L	T	P	C
4	0	0	4

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO1: Explain the factors influencing IR. (K2)

CO2: Describe the growth and functioning of trade unions. (K2)

CO3: Describe nature, importance and various forms of Workers' Participation in management. (K2)

CO4: Recall the Salient features of Workmen Compensation Act. (K1)

CO5: Analyze the Causes of Grievances and Design redressal mechanism. (K4)

UNIT 1

Industrial Relations Management: Concept- meaning- evaluation – Background of industrial Relations in India- Influencing factors of IR in enterprise and the consequences. Economic, Social and Political environments-Employment Structure –Social Partnership- Wider approaches to industrial relations- Labour Market.

UNIT 2

Trade Unions: Introduction-Definition and objectives-growth of Trade Unions in India- trade Unions Act , 1926, recent amendments. Legal framework-Union recognition-Union Problems-Employees Association-introduction ,Objective Membership, Financial Status.

UNIT 3

Workers' Participation in Management: Workers' Participation in Management - Worker's Participation in India, shop floor, Plant Level, Board Level- Workers' Welfare in Indian scenario- Collective bargaining concepts & Characteristics – Promoting peace.

UNIT 4

Social Security: Introduction and types –Social Security in India, Health and Occupational safety programs- Salient features of Workmen Compensation Act and Employees' State Insurance Act relating to social security – Workers' education objectives-Rewarding.

UNIT 5
Employee Grievances: Causes of Grievances –Conciliation, Arbitration and Adjudication procedural aspects for Settlement of Grievances –Standing Orders-Code Discipline. Industrial Disputes: Meaning, nature and scope of industrial disputes - Cases and Consequences of Industrial Disputes –Prevention and Settlement of industrial disputes in India.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References

1. C.S Venkataratnam: "**Industrial Relations**", Oxford University Press, New Delhi, 2011
2. Sinha: "**Industrial Relations, Trade Unions and Labour Legislation**", Pearson Education, New Delhi, 2013
3. Mamoria: "**Dynamics of Industrial Relations**", Himalaya Publishing House, New Delhi, 2010
4. B.D.Singh: "**Industrial Relations**" Excel Books, New Delhi, 2010
5. Arun Monappa: "**Industrial Relations**", TMH, New Delhi. 2012
6. Prof. N.Sambasiva Rao and Dr. Nirmal Kumar: "**Human Resource Management and Industrial Relations**", Himalaya Publishing House, Mumbai
7. Ratna Sen: "**Industrial Relations**", MacMillon Publishers, New Delhi, 2011

MBA: IV semester
V21MBT33: INTERNATIONAL HUMAN RESOURCE MANAGEMENT

L	T	P	C
4	0	0	4

COURSE OUTCOMES:
After successful completion of the course, the student will be able to:

CO1: Describe HR applications in global perspective. (K2)

CO2: Explain problems involved in international assignments. (K2)

CO3: Describe the relevance of Cross Culture Communication in global context. (K2) CO4: Analyze the worth of a overseas assignment. (K3)

CO5: Analyze Global Strategic Advantages through HRD. (K3)

UNIT 1
Introduction: A Global HR Perspective in New Economy-Challenges of Globalization - Implications of Managing People and Leveraging Human Resource- - Conflicts - Strategic Role of International HRM – Global HR Planning – Staffing policy – Training and development – performance appraisal – International Labour relations – Industrial democracy.

UNIT 2
Managing International Assignments: Significance – Selection methods - Positioning Expatriate – Repatriate – factors of consideration - Strategies - International assignments for Women – gender issues.

UNIT 3
Cross Culture Management: Importance – Concepts and issues – theories-considerations - Problems – Skill building methods – Cross Culture Communication and Negotiation – Cross Culture Teams.

UNIT 4
Compensation Management: Importance – Concepts- Trends - Issues – Methods – Factors of Consideration – Models – incentive methods – global compensation implications on Indian systems - Performance Management.

UNIT 5

Global Strategic Advantages through HRD: Measures for creating global HRD Climate – Strategic Frame Work of HRD and Challenges - Globalization and Quality of Working Life and Productivity – Challenges in Creation of New Jobs through Globalization- New Corporate Culture

Relevant cases have to be discussed in each unit and in examination case iscompulsory from any unit.

References:

1. Subba Rao P: "International Human Resource Management", Himalaya PublishingHouse, Hyderabad, 2011

2. NilanjanSen Gupta: "International Human Resource Management Text and cases"Excel Books, New Delhi.

3. Tony Edwards :"International Human Resource Management", Pearson Education,New Delhi, 2012

4. Aswathappa K, Sadhana Dash: "International Human Resource Management, TMH,New Delhi,

5. Monir H Tayeb: "International Human Resource Management", Oxford Universities Press, Hyderabad, 2012.

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Dt: 10/03/2022

Minutes of the Meeting of the Result Committee

The Sri Vasavi Engineering College (Autonomous) result committee meeting was held on 05-03-2022 at 5:00 PM through online mode using Zoom application.

Link: https://us02web.zoom.us/j/8238252041

The following members were present in the meeting.

S.No	Name	Designation	Member Role
1.	Dr.Guduru VNSR Ratnakara Rao	Principal	Chairman
2.	Dr. P Vinay Kumar	Addl.Controller of Examinations-JNTU Kakinada	University Nominee
3.	Dr.M.Thamarai	Prof./ECE- SVEC(A8)	Member
4.	Mr V.S.R.Gopala Krishna Ch	CoE; SVEC(A8)	Member
5.	Mr G V Subrahmanyam	Dy. CoE; SVEC(A8)	Member

The following are the minutes of the results committee meeting.

Item#1: B.Tech VII Semester (V18) regular results February 2022 for the ac. year 2021-22.

The summary of the results

a. Branch Wise Performance Analysis

S.No	Branch	Registered	Passed	Fail	Pass
1	CE	60	51	09	85.00
2	EEE	118	106	12	89.83
3	ME	121	97	24	80.17
4	ECE	191	154	37	80.63
5	CSE	251	220	31	87.65
Overall		**741**	**628**	**113**	**84.75**

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Appeared	Pass	Fail	Pass %
1.	V18EET27	AI TECHNIQUES FOR POWER SYSTEMS	118	118	0	100
2.	V18ECP01	PROJECT WORK PART-A	191	191	0	100
3.	V18CEP01	PROJECT WORK PART-A	60	60	0	100
4.	V18CSP01	PROJECT WORK PART-A	251	251	0	100
5.	V18EEP01	PROJECT WORK PART-A	118	118	0	100
6.	V18MEL12	SIMULATION LAB	121	121	0	100
7.	V18MEP01	PROJECT WORK PART-A	121	121	0	100
8.	V18MEL13	PRODUCTION DRAWING LAB	121	121	0	100
9.	V18CSL10	ADVANCED JAVA AND WEB TECHNOLOGIES LAB	251	250	1	99.6
10.	V18ECL11	MICROWAVE & OPTICAL COMMUNICATION LAB	191	190	1	99.48
11.	V18EEL10	POWER SYSTEMS LABORATORY	118	117	1	99.15
12.	V18CET34	CONSTRUCTION PROJECT PLANNING & SYSTEMS	60	59	1	98.33
13.	V18MET24	REFRIGERATION & AIR CONDITIONING	121	118	3	97.52
14.	V18MBT52	MANAGEMENT SCIENCE	251	243	8	96.81
15.	V18CET25	ESTIMATION, SPECIFICATION AND CONTRACTS	60	58	2	96.67
16.	V18EET34	ELECTRICAL MACHINE MODELLING ANALYSIS	118	114	4	96.61
17.	V18EET29	HIGH VOLTAGE ENGINEERING	118	114	4	96.61
18.	V18CETOE3	ENVIRONMENTAL POLLUTION AND CONTROL	369	356	13	96.48
19.	V18CSTOE4	OPERATING SYSTEMS	251	242	9	96.41
20.	V18ECT20	RADAR ENGINEERING	191	183	8	95.81
21.	V18CST31	HUMAN COMPUTER INTERACTION	251	240	11	95.62
22.	V18MET27	MICRO ELECTRO MECHANICAL SYSTEMS	121	115	6	95.04
23.	V18CET29	IRRIGATION ENGINEERING	60	57	3	95
24.	V18ECT24	IOT: USE CASES	191	181	10	94.76
25.	V18MET20	AUTOMATION IN MANUFACTURING	121	114	7	94.21
26.	V18EET26	POWER SYSTEM OPERATION AND CONTROL	118	111	7	94.07
27.	V18CST27	ADVANCED JAVA AND WEB TECHNOLOGIES	251	235	16	93.63
28.	V18ECT29	SYSTEM DESIGN THROUGH VERILOG	191	176	15	92.15
29.	V18CSTOE5	ARTIFICIAL INTELLIGENCE	121	111	10	91.74

S. No	Course Code	Course Name	Appeared	Pass	Fail	Pass %
30.	V18CST32	DISTRIBUTED SYSTEMS	251	230	21	91.63
31.	V18ECT21	OPTICAL COMMUNICATION	191	175	16	91.62
32.	V18MET21	OPERATION RESEARCH	121	108	13	89.26
33.	V18CET26	ENVIRONMENTAL ENGINEERING-II	60	53	7	88.33
34.	V18ECT22	DIGITAL IMAGE PROCESSING	191	164	27	85.86

Details enclosed in annexure-I

Item#2: B Tech VI Semester (V18) supplementary results February 2022 for the ac. year 2021-22.

The summary of the results

a. Program Wise Performance Analysis

S. No	Branch	No of Students Registered	No. of Courses			Course Wise Pass %
			Registered	Passed	Fail	
1	CE	20	32	11	21	34.38
2	EEE	18	32	22	10	68.75
3	ME	24	36	23	13	63.89
4	ECE	37	70	21	49	30
5	CSE	37	111	62	49	55.86
Overall		**136**	**281**	**139**	**142**	**49.47**

b. Course Wise Performance Analysis

S. No	Branch	Course Code	Course Name	Appeared	Passed	Fail	Pass %
1.	CE	V18CEL10	CAD & GIS LAB	1	1	0	100
2.	CE	V18CET20	STRUCTURAL ANALYSIS–II	10	7	3	70
3.	CE	V18CET21	GEOTECHNICAL ENGINEERING–II	1	0	1	0
4.	CE	V18CET22	DESIGN OF STEEL STRUCTURES	7	0	7	0
5.	CE	V18CET23	TRANSPORTATION ENGINEERING-II	1	0	1	0
6.	CE	V18CET24	ENVIRONMENTAL ENGINEERING-I	1	0	1	0
7.	CE	V18CSTOE3	PYTHON PROGRAMMING	11	3	8	27.27
8.	EEE	V18CSTOE1	DATA BASE MANAGEMENT SYSTEMS	12	11	1	91.67
9.	EEE	V18ECL10	MICROPROCESSORS & MICROCONTROLLERS LABORATORY	1	1	0	100
10.	EEE	V18ECT23	MICROPROCESSORS & MICROCONTROLLERS	7	4	3	57.14
11.	EEE	V18EET17	ELECTRICAL DRIVES	1	1	0	100
12.	EEE	V18EET18	UTILIZATION OF ELECTRICAL ENERGY	6	1	5	16.67

S. No	Branch	Course Code	Course Name	Appeared	Passed	Fail	Pass %
13.	EEE	V18EET24	ELECTRICAL ENERGY CONSERVATION, MANAGEMENT & AUDITING	3	3	0	100
14.	EEE	V18ENT06	PROFESSIONAL COMMUNICATION SKILLS-IV	2	1	1	50
15.	ME	V18ECTOE1	INTERNET OF THINGS	6	3	3	50
16.	ME	V18ENT06	PROFESSIONAL COMMUNICATION SKILLS-IV	3	3	0	100
17.	ME	V18MBT51	MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS	4	2	2	50
18.	ME	V18MEL08	THEORY OF MACHINES LAB	1	1	0	100
19.	ME	V18MEL09	HEAT TRANSFER LAB	1	1	0	100
20.	ME	V18MET10	METROLOGY	3	0	3	0
21.	ME	V18MET18	DESIGN OF MACHINE ELEMENTS–II	9	6	3	66.67
22.	ME	V18MET19	ROBOTICS	9	7	2	77.78
23.	ECE	V18CST11	COMPUTER NETWORKS	5	1	4	20
24.	ECE	V18CSTOE3	PYTHON PROGRAMMING	12	7	5	58.33
25.	ECE	V18ECT16	DIGITAL SIGNAL PROCESSING	21	5	16	23.81
26.	ECE	V18ECT17	MICROWAVE ENGINEERING	23	4	19	17.39
27.	ECE	V18ECT18	EMBEDDED SYSTEMS-I	4	3	1	75
28.	ECE	V18ECT19	CMOS DIGITAL IC DESIGN	2	0	2	0
29.	ECE	V18ENT06	PROFESSIONAL COMMUNICATION SKILLS-IV	1	0	1	0
30.	ECE	V18MBT52	MANAGEMENT SCIENCE	2	1	1	50
31.	CSE	V18CSL08	OBJECT ORIENTED ANALYSIS AND DESIGN THROUGH UML LAB	3	3	0	100
32.	CSE	V18CSL09	DATA MINING LAB	2	2	0	100
33.	CSE	V18CSMPS	MINI PROJECT WITH SEMINAR	2	2	0	100
34.	CSE	V18CST19	COMPILER DESIGN	19	13	6	68.42
35.	CSE	V18CST20	DATA MINING	21	8	13	38.1
36.	CSE	V18CST21	OBJECT ORIENTED ANALYSIS AND DESIGN THROUGH UML	14	8	6	57.14
37.	CSE	V18CST22	CRYPTOGRAPHY & NETWORK SECURITY	14	7	7	50
38.	CSE	V18CST25	MACHINE LEARNING	21	7	14	33.33
39.	CSE	V18CST63	TECHNICAL SKILLS-IV	1	1	0	100
40.	CSE	V18ECTOE1	INTERNET OF THINGS	8	5	3	62.5
41.	CSE	V18ENT06	PROFESSIONAL COMMUNICATION SKILLS-IV	6	6	0	100

Details enclosed in annexure-II

Item#3: Revaluation results of M Tech I Semester (V18) supplementary examinations November 2021 for the ac. year 2020-21.

The summary of the results

a. Specialization Wise Performance Analysis

S. No.	Branch	Revaluation(No of Courses)			
		Applied	Change	No Change	Pass %
1.	STE	2	0	2	---

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Applied	Change	No change
1.	V18SET03	STRUCTURAL DYNAMICS	1	0	1
2.	V18SET05	SUB –STRUCTURE DESIGN	1	0	1

Details enclosed in annexure-III

Item#4: Revaluation results of B Tech I Semester (V20) Supplementary examinations – November-2021 for the ac. year 2020-21.

The summary of the results

a. Branch Wise Performance Analysis

S. No.	Branch	Revaluation(No of Courses)			
		Applied	Change	No Change	Pass %
1.	ECE	1	0	1	---
2.	CSE	1	0	1	---
3.	ECT	2	0	2	---

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Applied	Change	No change
1.	V20CHT01	ENGINEERING CHEMISTRY	1	0	1
2.	V20CHT02	ENVIRONMENTAL STUDIES	1	0	1
3.	V20MAT01	LINEAR ALGEBRA AND DIFFERENITAL EQUATIONS	1	0	1
4.	V20EET01	BASIC ELECTRICAL ENGINEERING	1	0	1

Details enclosed in annexure-IV

- The committee has approved the results and accorded the permission for publication of the same.

S.No	Name	Designation	Member Role	Signature
1.	Dr.Guduru VNSR Ratnakara Rao	Principal, SVEC(A8)	Chairman	
2.	Dr. P Vinay Kumar	Addl.Controller of Examinations-JNTU Kakinada	University Nominee	
3.	Dr.M.Thamarai	Professor/ECE, SVEC(A8)	Member	
4.	Mr.V.S.R.Gopala Krishna Ch	CoE, SVEC(A8)	Member	
5.	Mr G V Subrahmanyam	Dy.CoE , SVEC(A8)	Member	

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Approved by AICTE, New Delhi and Permanently Affiliated to JNTUK, Kakinada
Pedatadepalli, TADEPALLIGUDEM – 534 101, W.G. Dist, (A.P.)

Dt: 05/04/2022

Minutes of the Meeting of the Result Committee

The Sri Vasavi Engineering College (Autonomous) result committee meeting was held on 03-04-2022 at 10:30 AM through online mode using Zoom application.

Link: https://us02web.zoom.us/j/89332865527

The following members were present in the meeting.

S.No	Name	Designation	Member Role
6.	Dr.Guduru VNSR Ratnakara Rao	Principal	Chairman
7.	Dr. P Vinay Kumar	Addl.Controller of Examinations-JNTU Kakinada	University Nominee
8.	Dr.M.Thamarai	Prof./ECE- SVEC(A8)	Member
9.	Mr V.S.R.Gopala Krishna Ch	CoE; SVEC(A8)	Member

The following are the minutes of the results committee meeting.

Item#1: B.Tech V Semester (V18) regular results February 2022 for the ac. year 2021-22.

The summary of the results

a. Branch Wise Performance Analysis

S.No	Branch	Registered	Passed	Fail	Pass
1	CE	63	50	13	79.37
2	ECT	57	41	16	71.93
3	EEE	107	90	17	84.11
4	ME	115	82	33	71.30
5	ECE	204	162	42	79.41
6	CSE	273	215	58	78.75
7	CST	60	32	28	53.33
Overall		**879**	**672**	**207**	**76.45**

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Appeared	Pass	Fail	Pass %
1.	V18ECMOOCS	MOOCS COURSE	261	261	0	100
2.	V18CEL08	GEOTECHNICAL ENGINEERING LAB	63	63	0	100
3.	V18CET33	RS&GIS	64	64	0	100
4.	V18CSL05	PYTHON PROGRAMMING LAB	115	115	0	100
5.	V18CSL07	OPERATING SYSTEM AND UNIX LAB	333	333	0	100
6.	V18CSL34	DATA STRUCTURES & ALGORITHMS LAB	261	261	0	100
7.	V18CST16	ADVANCED DATA STRUCTURES	47	47	0	100
8.	V18CEL07	TRANSPORTATION ENGINEERING LAB	63	63	0	100
9.	V18EEL06	ELECTRICAL MACHINES LABORATORY-II	107	107	0	100
10.	V18EEL07	CONTROL SYSTEMS LABORATORY	108	108	0	100
11.	V18CSL06	DATABASE MANAGEMENT SYSTEMS LAB	333	332	1	99.7
12.	V18CST62	TECHNICAL SKILLS-III	333	332	1	99.7
13.	V18MEL16	METAL CUTTING & MACHINE TOOLS LAB	115	114	1	99.13
14.	V18ECL08	VLSI DESIGN LAB	261	258	3	98.85
15.	V18ENT05	PROFESSIONAL COMMUNICATION SKILLS-III	886	875	11	98.76
16.	V18ECL07	MICROPROCESSOR & MICRO CONTROLLERS LAB	204	201	3	98.53
17.	V18CET19	TRANSPORTATION ENGINEERING-I	67	66	1	98.51
18.	V18MET46	INTELLECTUAL PROPERTY RIGHTS AND PATENTS	119	117	2	98.32
19.	V18MEL10	THERMAL ENGINEERING LAB	115	113	2	98.26
20.	V18ECL07	MICROPROCESSOR & MICROCONTROLLERS LAB	57	56	1	98.25
21.	V18ECT15	ENGINEER & SOCIETY	263	257	6	97.72
22.	V18MBT51	MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS	108	105	3	97.22
23.	V18EET13	POWER ELECTRONICS	107	104	3	97.2
24.	V18CET17	HYDROLOGY & WATER RESOURCES ENGINEERING	69	67	2	97.1
25.	V18EET12	SWITCHGEAR & PROTECTION	110	105	5	95.45
26.	V18CST81	DATA STRUCTURES & ALGORITHMS	262	250	12	95.42
27.	V18CST11	COMPUTER NETWORKS	340	320	20	94.12
28.	V18ECT11	VLSI DESIGN	267	251	16	94.01
29.	V18MBT53	ORGANIZATIONAL BEHAVIOR	345	324	21	93.91
30.	V18CET15	STRUCTURAL ANALYSIS-I	66	61	5	92.42
31.	V18MET37	INTERNAL COMBUSTION ENGINES	128	118	10	92.19

32.	V18EET14	POWER SYSTEM ANALYSIS	115	106	9	92.17
33.	V18CST12	OPERATING SYSTEMS	347	318	29	91.64
34.	V18CST14	UNIX PROGRAMMING	343	313	30	91.25
35.	V18CST10	DATABASE MANAGEMENT SYSTEMS	350	318	32	90.86
36.	V18MET17	METAL CUTTING & MACHINE TOOLS	120	109	11	90.83
37.	V18EET15	CONTROL SYSTEMS	393	350	43	89.06
38.	V18CET18	DESIGN OF REINFORCED CONCRETE STRUCTURES	69	61	8	88.41
39.	V18ECT13	ANTENNA & WAVE PROPAGATION	275	243	32	88.36
40.	V18ECT12	MICROPROCESSORS & MICROCONTROLLERS	272	238	34	87.5
41.	V18MET15	THEORY OF MACHINES-II	138	119	19	86.23
42.	V18EET16	SIGNALS & SYSTEMS	114	98	16	85.96
43.	V18ENT11	CONSTITUTION OF INDIA	69	58	11	84.06
44.	V18CST13	DESIGN AND ANALYSIS OF ALGORITHMS	350	292	58	83.43
45.	V18CET16	GEOTECHNICAL ENGINEERING-I	72	58	14	80.56
46.	V18MET16	DESIGN OF MACHINE ELEMENTS-I	131	101	30	77.1
47.	V18MET13	HEAT TRANSFER	136	100	36	73.53
48.	V18CST17	ARTIFICIAL INTELLIGENCE	297	213	84	71.72

Details enclosed in annexure-I

Item#2: B Tech IV Semester (V18) supplementary results February 2022 for the ac. year 2021-22.

The summary of the results

a. Program Wise Performance Analysis

S. No	Branch	No of Students Registered	No. of Courses			Course Wise Pass %
			Registered	Passed	Fail	
1.	CE	17	19	11	8	57.89
2.	EEE	37	61	24	37	39.34
3.	ME	68	179	62	117	34.64
4.	ECE	81	174	27	147	15.52
5.	CSE	97	257	66	191	25.68
6.	CST	29	84	21	63	25.00
7.	ECT	11	20	4	16	20.00
Overall		**340**	**794**	**215**	**579**	**27.08%**

b. Course Wise Performance Analysis

S. No	Branch	Course Code	Course Name	Appeared	Passed	Fail	Pass %
1.	CE	V18CET09	CONCRETE TECHNOLOGY	1	0	1	0
2.	CE	V18CET11	SURVEYING AND GEOMATICS	1	1	0	100
3.	CE	V18CET13	STRENGTH OF MATERIALS-II	14	7	7	50
4.	CE	V18CET14	HYDRAULIC ENGINEERING	1	1	0	100
5.	CE	V18MBT51	MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS	2	2	0	100
6.	EEE	V18EET07	ELECTRICAL CIRCUIT ANALYSIS-II	5	3	2	60
7.	EEE	V18EET08	DIGITAL ELECTRONICS	28	10	18	35.71
8.	EEE	V18EET09	ELECTRICAL MACHINES-II	11	4	7	36.36
9.	EEE	V18EET10	ELECTRICAL POWER GENERATION AND TRANSMISSION	12	2	10	16.67
10.	EEE	V18EET11	ELECTRICAL SAFETY & IE RULES	1	1	0	100
11.	EEE	V18ENT04	PROFESSIONAL COMMUNICATION SKILLS-II	2	2	0	100
12.	EEE	V18MAT04	PROBABILITY & STATISTICS	2	2	0	100
13.	ME	V18ENT04	PROFESSIONAL COMMUNICATION SKILLS-II	6	4	2	66.67
14.	ME	V18ENT11	CONSTITUTION OF INDIA	33	1	32	3.03
15.	ME	V18MEL05	MECHANICS OF SOLIDS & MATERIALS ENGINEERING LAB	1	1	0	100
16.	ME	V18MET06	THEORY OF MACHINES-I	32	9	23	28.12
17.	ME	V18MET07	APPLIED THERMODYNAMICS	49	28	21	57.14
18.	ME	V18MET08	MECHANICS OF SOLIDS	31	6	25	19.35
19.	ME	V18MET11	INSTRUMENTATION & CONTROL SYSTEMS	21	11	10	52.38
20.	ME	V18MET14	MANUFACTURING PROCESSES	6	2	4	33.33
21.	ECE	V18CSL32	OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB	2	2	0	100
22.	ECE	V18ECT07	ANALOG & DIGITAL COMMUNICATIONS	39	5	34	12.82
23.	ECE	V18ECT08	ANALOG CIRCUITS	36	3	33	8.33
24.	ECE	V18ECT09	PROBABILITY THEORY & STOCHASTIC PROCESS	47	2	45	4.26
25.	ECE	V18ECT10	ELECTROMAGNETIC WAVES & TRANSMISSION LINES	30	6	24	20
26.	ECE	V18ENT04	PROFESSIONAL COMMUNICATION SKILLS-II	5	4	1	80
27.	ECE	V18MAT03	MATHEMATICS-III	15	5	10	33.33
28.	CSE	V18CSL04	JAVA PROGRAMMING LAB	1	1	0	100
29.	CSE	V18CSL05	PYTHON PROGRAMMING LAB	1	0	1	0
30.	CSE	V18CST05	COMPUTER ORGANIZATION	46	19	27	41.3
31.	CSE	V18CST06	SOFTWARE ENGINEERING	23	6	17	26.09
32.	CSE	V18CST07	FORMAL LANGUAGES AND AUTOMATA THEORY	34	8	26	23.53
33.	CSE	V18CST08	JAVA PROGRAMMING	26	4	22	15.38

34.	CSE	V18CST09	PYTHON PROGRAMMING	73	10	63	13.7
35.	CSE	V18ENT04	PROFESSIONAL COMMUNICATION SKILLS-II	7	5	2	71.43
36.	CSE	V18ENT11	CONSTITUTION OF INDIA	32	2	30	6.25
37.	CSE	V18MBT51	MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS	14	11	3	78.57
38.	CST	V18CSL05	PYTHON PROGRAMMING LAB	1	1	0	100
39.	CST	V18CST05	COMPUTER ORGANIZATION	15	5	10	33.33
40.	CST	V18CST06	SOFTWARE ENGINEERING	13	4	9	30.77
41.	CST	V18CST07	FORMAL LANGUAGES AND AUTOMATA THEORY	6	2	4	33.33
42.	CST	V18CST08	JAVA PROGRAMMING	9	2	7	22.22
43.	CST	V18CST09	PYTHON PROGRAMMING	24	3	21	12.5
44.	CST	V18ENT04	PROFESSIONAL COMMUNICATION SKILLS–II	1	0	1	0
45.	CST	V18ENT11	CONSTITUTION OF INDIA	8	1	7	12.5
46.	CST	V18MBT51	MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS	7	3	4	42.86
47	ECT	V18CSL32	OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB	1	1	0	100
48	ECT	V18ECT07	ANALOG & DIGITAL COMMUNICATIONS	7	0	7	0
49	ECT	V18ECT08	ANALOG CIRCUITS	6	1	5	16.67
50	ECT	V18ECT10	ELECTROMAGNETIC WAVES & TRANSMISSION LINES	5	1	4	20
51	ECT	V18ENT04	PROFESSIONAL COMMUNICATION SKILLS-II	1	1	0	100

Details enclosed in annexure-II

Item#3: Revaluation results of B Tech VIII Semester (V18) regular examinations February 2022 for the ac. year 2021-22.

The summary of the results

b. Branch Wise Performance Analysis

S. No.	Branch	Revaluation(No of Courses)			
		Applied	Change	No Change	Pass %
1.	ME	8	3	5	37.5
2.	ECE	13	1	12	7.69
3.	CSE	5	4	1	80

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Appeared	Passed	Fail
1.	V18CST27	ADVANCED JAVA AND WEB TECHNOLOGIES	1	1	0
2.	V18CST32	DISTRIBUTED SYSTEMS	4	3	1
3.	V18CSTOE4	OPERATING SYSTEMS	1	0	1
4.	V18CSTOE5	ARTIFICAL INTELLIGENCE	4	1	3
5.	V18ECT22	DIGITAL IMAGE PROCESSING	10	0	10
6.	V18ECT24	IOT:USE CASES	1	0	1
7.	V18ECT29	SYSTEM DESIGN THROUGH VERILOG	1	1	0
8.	V18MET21	OPERATION RESEARCH	3	2	1
9.	V18MET24	REFRIGERATION &AIR CONDITIONING	1	0	1

Details enclosed in annexure-III

Item#4: Revaluation results of B Tech VI Semester (V18) Supplementary examinations – February-2022 for the ac. year 2021-22.

The summary of the results

b. Branch Wise Performance Analysis

S. No.	Branch	Revaluation(No of Courses)			
		Applied	Change	No Change	Pass %
1.	CE	10	0	10	---
2.	EEE	1	0	1	---
3.	ECE	6	1	5	16.66

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Applied	Change	No change
1.	V18CET20	STRUCTURAL ANALYSIS	1	0	1
2.	V18CET22	DESIGN OF STEEL STRUCTURES	6	0	6
3.	V18CSTOE3	PYTHON PROGRAMMING	3	0	3
4.	V18ECT16	DIGITAL SIGNAL PROCESSING	3	1	2

5.	V18ECT17	MICROWAVE ENGINEERING	3	0	3
6.	V18ECT23	MICROPROCEESORS & MICROCONTROLLERS	1	0	1

Details enclosed in annexure-IV

- The committee has approved the results and accorded the permission for publication of the same.

S.No	Name	Designation	Member Role	Signature
6.	Dr.Guduru VNSR Ratnakara Rao	Principal, SVEC(A8)	Chairman	
7.	Dr. P Vinay Kumar	Addl.Controller of Examinations-JNTU Kakinada	University Nominee	
8.	Dr.M.Thamarai	Professor/ECE, SVEC(A8)	Member	
9.	Mr.V.S.R.Gopala Krishna Ch	CoE, SVEC(A8)	Member	

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Dt: 25/04/2022

Minutes of the Meeting of the Result Committee

The Sri Vasavi Engineering College (Autonomous) result committee meeting was held on 23-04-2022 at 04:00 PM through online mode using Zoom application.

Link: https://us02web.zoom.us/j/89332865527

The following members were present in the meeting.

S.No	Name	Designation	Member Role
10.	Dr.Guduru VNSR Ratnakara Rao	Principal	Chairman
11.	Dr. P Vinay Kumar	Addl.Controller of Examinations-JNTU Kakinada	University Nominee
12.	Dr.M.Thamarai	Prof./ECE- SVEC(A8)	Member
13.	Mr V.S.R.Gopala Krishna Ch	CoE; SVEC(A8)	Member

Members Absent

S.No	Name	Designation	Member Role
1.	Mr G V Subrahmanyam	Dy. CoE; SVEC(A8)	Member

The following are the minutes of the results committee meeting.

Item#1: B.Tech III Semester (V20) regular results march 2022 for the ac. year 2021-22.

The summary of the results

a. Branch Wise Performance Analysis

S.No	Branch	Registered	Passed	Fail	Pass
1	CE	67	37	30	55.22
2	ECT	69	35	34	50.72
3	EEE	135	75	60	55.56
4	ME	136	85	51	62.50
5	ECE	209	136	73	65.07
6	CSE	280	229	51	81.79
7	CST	70	59	11	84.29
Overall		**966**	**656**	**310**	**67.91**

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Appeared	Pass	Fail	Pass %
1.	V20CSL05	LINUX SHELL SCRIPTING LAB	350	350	0	100
2.	V20ECL03	ANALOG ELECTRONICS LABORATORY	135	135	0	100
3.	V20CSL31	DATA STRUCTURES LAB	278	277	1	99.64
4.	V20ECL01	ELECTRONIC DEVICES, CIRCUITS & ANALYSIS LAB	278	277	1	99.64
5.	V20SOC01	SKILL ORIENTED COURSE-I	966	962	4	99.59
6.	V20ENT02	PROFESSIONAL COMMUNICATION SKILLS-I	966	962	4	99.59
7.	V20CSL03	OOPS THROUGH C++ LAB	350	348	2	99.43
8.	V20CSL04	DATA STRUCTURES LAB	350	346	4	98.86
9.	V20MEL04	MACHINE DRAWING	136	134	2	98.53
10.	V20MEL03	MECHANICS OF SOLIDS & MATERIALS ENGINEERING LAB	136	134	2	98.53
11.	V20MEL02	FLUID MECHANICS & HYDRAULIC MACHINES LAB	136	134	2	98.53
12.	V20CEL02	SURVEYING LAB	67	66	1	98.51
13.	V20CEL03	CONCRETE TECHNOLOGY LAB	67	66	1	98.51
14.	V20ECL02	SIGNALS & SYSTEMS LAB	278	268	10	96.4
15.	V20MAT07	MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE	350	336	14	96
16.	V20CEL01	STRENGTH OF MATERIALS LAB	67	64	3	95.52
17.	V20CSL31	DATA STRUCTURES & ALGORITHMS LAB	135	128	7	94.81
18.	V20MBT51	MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS	486	459	27	94.44
19.	V20CET04	BUILDING MATERIALS & CONCRETE TECHNOLOGY	67	63	4	94.03
20.	V20EEL04	ELECTRICAL CIRCUITS LAB	135	126	9	93.33
21.	V20CST04	DATA STRUCTURES	350	325	25	92.86
22.	V20MAT04	PROBABILITY & STATISTICS	67	62	5	92.54
23.	V20MET04	MECHANICS OF SOLIDS	136	125	11	91.91
24.	V20CST05	COMPUTER ORGANIZATION AND ARCHITECTURE	350	319	31	91.14
25.	V20ECT06	ANALOG ELECTRONICS	135	122	13	90.37
26.	V20EET06	ELECTRICAL MACHINES-I	135	122	13	90.37
27.	V20ECT04	NETWORK THEORY	278	251	27	90.29
28.	V20CST03	OOPS THROUGH C++	350	314	36	89.71
29.	V20MET06	THERMODYNAMICS	136	116	20	85.29
30.	V20ECT02	ELECTRONIC DEVICES, CIRCUITS & ANALYSIS	278	237	41	85.25
31.	V20MAT03	COMPLEX ANALYSIS	278	235	43	84.53

32.	V20EET05	ELECTRO MAGNETIC FIELDS	135	113	22	83.7
33.	V20MET03	METALLURGY AND MATERIAL SCIENCE	136	111	25	81.62
34.	V20MAT05	TRANSFORM CALCULUS	135	108	27	80
35.	V20MAT06	PROBABILITY THEORY STOCHASTIC PROCESS	278	221	57	79.5
36.	V20CET03	SURVEYING AND GEOMATICS	67	53	14	79.1
37.	V20ECT05	SIGNALS & SYSTEMS	278	198	80	71.22
38.	V20MET05	FLUID MECHANICS WITH MACHINE LEARNING	136	95	41	69.85
39.	V20CET01	STRENGTH OF MATERIALS	67	46	21	68.66
40.	V20EET04	ELECTRICAL CIRCUIT ANALYSIS-II	135	91	44	67.41
41.	V20CET02	FLUID MECHANICS & HYDRAULICS	67	43	24	64.18

Details enclosed in annexure-I

Item#2: B Tech III Semester (V18) supplementary results march 2022 for the ac. year 2021-22.

The summary of the results

a. Program Wise Performance Analysis

S. No	Branch	No of Students Registered	No. of Courses			Course Wise Pass %
			Registered	Passed	Fail	
1.	CE	27	50	10	40	20
2.	EEE	26	54	15	39	27.78
3.	ME	36	68	17	51	25
4.	ECE	55	170	33	137	19.41
5.	CSE	45	81	16	65	19.75
6.	CST	15	36	6	30	16.67
7.	ECT	9	16	3	13	18.75
Overall		**213**	**475**	**100**	**375**	**21.05 %**

b. Course Wise Performance Analysis

S. No	Branch	Course Code	Course Name	Appeared	Passed	Fail	Pass %
1.	CE	V18CEL02	MATERIAL TESTING LAB	1	1	0	100
2.	CE	V18CET04	STRENGTH OF MATERIALS-I	24	6	18	25
3.	CE	V18CET10	INTRODUCTION TO FLUID MECHANICS	4	1	3	25
4.	CE	V18CET35	PRINCIPLES OF ENVIRONMENTAL SCIENCE & ENGINEERING	2	0	2	0
5.	CE	V18CET36	BUILDING MATERIALS PLANNING & CONSTRUCTION	3	1	2	33.33
6.	CE	V18EEL01	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB	2	1	1	50
7.	CE	V18EET01	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	12	0	12	0
8.	CE	V18MAT04	PROBABILITY AND STATISTICS	2	0	2	0
9.	EEE	V18ECT05	ANALOG ELECTRONICS	20	1	19	5
10.	EEE	V18EET03	ELECTRICAL CIRCUIT ANALYSIS-1	2	1	1	50
11.	EEE	V18EET04	ELECTRICAL MACHINES-1	10	6	4	60
12.	EEE	V18EET05	ELECTRO MAGNETIC FIELDS	12	7	5	58.33
13.	EEE	V18EET06	ELECTRICAL AND ELECTRONIC MEASUREMENTS	10	0	10	0
14.	ME	V18ENT03	PROFESSIONAL COMMUNICATION SKILLS-1	1	0	1	0
15.	ME	V18MAT04	PROBABILITY & STATISTICS	2	1	1	50
16.	ME	V18MEL03	FLUID MECHANICS & FLUID MACHINES LAB	1	0	1	0
17.	ME	V18MET03	ENGINEERING MECHANICS	9	2	7	22.22
18.	ME	V18MET04	THERMODYNAMICS	21	12	9	57.14
19.	ME	V18MET05	FLUID MECHANICS & FLUID MACHINES	15	0	15	0
20.	ME	V18MET09	MATERIALS ENGINEERING	19	2	17	10.53
21.	ECE	V18ECL01	ELECTRONICS DEVICES & CIRCUITS LAB	2	2	0	100
22.	ECE	V18ECL02	DIGITAL SYSTEM DESIGN LAB	1	1	0	100
23.	ECE	V18ECT01	ELECTRONICS DEVICES & CIRCUITS	31	7	24	22.58
24.	ECE	V18ECT02	DIGITAL SYSTEM DESIGN	19	1	18	5.26
25.	ECE	V18ECT03	SIGNALS & SYSTEMS	44	9	35	20.45
26.	ECE	V18ECT04	NETWORK THEORY	39	3	36	7.69
27.	ECE	V18ENT03	PROFESSIONAL COMMUNICATION SKILL-1	1	0	1	0
28.	ECE	V18ENT11	CONSTITUTION OF INDIA	20	0	20	0
29.	ECE	V18MBT51	MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS	13	10	3	76.92
30.	CSE	V18CST02	DATA STRUCTURES AND ALGORITHMS	12	4	8	33.33
31.	CSE	V18CST03	DISCRETE MATHEMATICS	15	2	13	13.33
32.	CSE	V18CST04	OBJECT ORIENTED PROGRAMMING FOR	17	1	16	5.88

			PROBLEM SOLVING				
33.	CSE	V18ECT06	DIGITAL ELECTRONICS	30	7	23	23.33
34.	CSE	V18MAT04	PROBABILITY & STATISTICS	7	2	5	28.57
35.	CST	V18CST02	DATA STRUCTURES AND ALGORITHMS	6	1	5	16.67
36.	CST	V18CST03	DISCRETE MATHEMATICS	5	1	4	20
37.	CST	V18CST04	OBJECT ORIENTED PROGRAMMING FOR PROBLEM SOLVING	11	2	9	18.18
38.	CST	V18ECT06	DIGITAL ELECTRONICS	11	1	10	9.09
39.	CST	V18ENT03	PROFESSIONAL COMMUNICATION SKILLS – I	1	1	0	100
40.	CST	V18MAT04	PROBABILITY & STATISTICS	2	0	2	0
41.	ECT	V18ECT01	ELECTRONIC DEVICES & CIRCUITS	4	0	4	0
42.	ECT	V18ECT02	DIGITAL SYSTEM DESIGN	2	0	2	0
43.	ECT	V18ECT03	SIGNALS & SYSTEMS	5	3	2	60
44.	ECT	V18ECT04	NETWORK THEORY	2	0	2	0
45.	ECT	V18ENT11	CONSTITUTION OF INDIA	3	0	3	0

Details enclosed in annexure-II

Item#3: B Tech II Semester (V18 & V20) supplementary examinations march 2022 for the ac. year 2021-22.

The summary of the results

c. Branch Wise Performance Analysis

S. No	Branch	No of Students Registered	No. of Courses			Course Wise Pass %
			Registered	Passed	Fail	
1.	CE	29	48	16	32	33.33
2.	EEE	55	123	50	73	40.65
3.	ME	78	161	28	133	17.39
4.	ECE	56	116	31	85	26.72
5.	CSE	80	144	27	117	18.75
6.	CST	21	30	9	21	30
7.	ECT	18	27	12	15	44.44
Overall		**337**	**649**	**173**	**476**	**26.66%**

b. Course Wise Performance Analysis

S. No	Regl n.	Branch	Course Code	Course Name	Appeared	Passed	Fail	Pass %
1.	V18	CE	V18MAT02	ENGINEERING MATHEMATICS–II	1	0	1	0
2.	V18	CE	V18MET03	ENGINEERING MECHANICS	4	2	2	50
3.	V18	CE	V18PHT01	OPTICS AND WAVES	3	0	3	0
4.	V20	CE	V20CHT01	ENGINEERING CHEMISTRY	6	1	5	16.67
5.	V20	CE	V20EEL02	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB	3	3	0	100
6.	V20	CE	V20EET02	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	12	2	10	16.67
7.	V20	CE	V20ENL02	HONE YOUR COMMUNICATION SKILLS LAB-II	1	1	0	100
8.	V20	CE	V20MAT02	NUMERICAL METHODS AND VECTOR CALCULUS	10	5	5	50
9.	V20	CE	V20MEL01	ENGINEERING WORKSHOP	1	1	0	100
10.	V20	CE	V20MET02	ENGINEERING MECHANICS	7	1	6	14.29
11.	V18	EEE	V18MAT02	ENGINEERING MATHEMATICS-II	1	0	1	0
12.	V18	EEE	V18MET02	INTRODUCTION TO ENGINEERING MECHANICS	6	2	4	33.33
13.	V20	EEE	V20CHT02	ENVIRONMENTAL STUDIES	6	0	6	0
14.	V20	EEE	V20ECT01	SWITCHING THEORY AND LOGIC DESIGN	27	8	19	29.63
15.	V20	EEE	V20EEL03	ELECTRICAL ENGINEERING WORKSHOP	3	3	0	100
16.	V20	EEE	V20EET03	ELECTRICAL CIRCUIT ANALYSIS-I	39	22	17	56.41
17.	V20	EEE	V20ENL02	HONE YOUR COMMUNICATION SKILLS LAB-II	1	0	1	0
18.	V20	EEE	V20MAT02	NUMERICAL METHODS AND VECTOR CALCULUS	20	9	11	45
19.	V20	EEE	V20MET01	ENGINEERING GRAPHICS	13	2	11	15.38
20.	V20	EEE	V20PHL01	ENGINEERING PHYSICS LAB	4	4	0	100
21.	V20	EEE	V20PHT01	ENGINEERING PHYSICS	3	0	3	0
22.	V18	ME	V18CHT01	ENGINEERING CHEMISTRY	16	1	15	6.25
23.	V18	ME	V18CST01	PROGRAMMING IN C FOR PROBLEM SOLVING	22	1	21	4.55
24.	V18	ME	V18ENT02	ENGLISH-II	1	0	1	0
25.	V18	ME	V18MAT02	ENGINEERING MATHEMATICS-II	3	1	2	33.33
26.	V18	ME	V18MET01	ENGINEERING GRAPHICS	3	1	2	33.33
27.	V20	ME	V20CHT01	ENGINEERING CHEMISTRY	14	1	13	7.14
28.	V20	ME	V20EEL02	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB	5	3	2	60
29.	V20	ME	V20EET02	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	21	2	19	9.52
30.	V20	ME	V20MAT02	NUMERICAL METHODS AND VECTOR CALCULUS	41	15	26	36.59

31.	V20	ME	V20MET02	ENGINEERING MECHANICS	35	3	32	8.57
32.	V18	ECE	V18CHT02	ENVIRONMENTAL STUDIES	1	0	1	0
33.	V18	ECE	V18EET02	BASIC ELECTRICAL ENGINEERING	9	0	9	0
34.	V18	ECE	V18MAT02	ENGINEERING MATHEMATICS-II	2	0	2	0
35.	V18	ECE	V18PHT02	OPTO ELECTRONICS AND SEMI CONDUCTORS	5	1	4	20
36.	V20	ECE	V20CHL01	ENGINEERING CHEMISTRY LAB	3	3	0	100
37.	V20	ECE	V20CHT01	ENGINEERING CHEMISTRY	15	3	12	20
38.	V20	ECE	V20CSL01	PROGRAMMING LAB IN C FOR PROBLEM SOLVING	4	3	1	75
39.	V20	ECE	V20CST01	PROGRAMMING IN C FOR PROBLEM SOLVING	19	0	19	0
40.	V20	ECE	V20ECT01	SWITCHING THEORY AND LOGIC DESIGN	30	3	27	10

Details enclosed in annexure-III

Item#4: Revaluation results of B Tech IV Semester (V18) Supplementary examinations – February-2022 for the ac. year 2021-22.

The summary of the results

c. Branch Wise Performance Analysis

S. No.	Branch	Revaluation(No of Courses)			
		Applied	Change	No Change	Pass %
1.	CE	3	0	3	---
2.	EEE	1	0	1	---
3.	ME	11	1	10	9.09
4.	ECE	6	0	6	--
5.	CSE	15	3	12	20.00
6.	CST	8	5	3	62.5
7	ECT	1	0	1	-

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Applied	Change	No change
7.	V18CET13	Strength Of Materials-II	3	0	3
8.	V18CST05	Computer Organization	5	1	4
9.	V18CST06	Software Engineering	1	1	0
10	V18CST07	Formal Languages and Automata Theory	4	0	4

11	V18CST08	Java Programming	4	1	3
12	V18CST09	Python Programming	15	7	8
13	V18ECT07	Analog & Digital Communications	2	0	2
14	V18ECT08	Analog Circuits	2	0	2
15	V18ECT09	Probability Theory &stochastic Process	3	0	3
16	V18ECT10	Electromagnetic Waves and Transmission Lines	2	0	2
17	V18EET08	Digital Electronics	1	0	1
18	V18ENT11	Constitution of India	9	1	8
19	V18MET8	Mechanics of Solids	7	0	7

Details enclosed in annexure-IV

Item#5: MBA II Semester (V18) Supplementary examinations – March-2022 for the ac. year 2021-22.

The summary of the results

d. Program Wise Performance Analysis

S. No	Program	No of Students Registered	No. of Courses			Course Wise Pass %
			Registered	Passed	Fail	
1.	MBA	4	5	4	1	80.00

e. Course Wise Performance Analysis

S. No	Regl n.	Course Code	Course Name	Appe ar ed	Passe d	Fai l	Pass %
1.	V18	V18ENT14	EMPLOYABILITY SKILLS-II (SOFTSKILLS)	4	3	1	75
2.	V18	V18MBT10	PRODUCTION AND OPERATIONS MANAGEMENT	1	1	0	100

Details enclosed in annexure-V

Item#6: M.Tech II Semester (V18) Supplementary examinations – March-2022 for the ac. year 2021-22.

The summary of the results

a. Speclazation Wise Performance Analysis

S. No	Speclz	No of Students Registered	No. of Courses			Course Wise Pass %
			Registered	Passed	Fail	
1.	MD	1	2	2	0	100
2.	STE	3	7	4	3	57.1

b. Course Wise Performance Analysis

S. No	Regl n.	Course Code	Course Name	Appeared	Passed	Fail	Pass %
1.	V18	V18MDT13	THEORY OF PLASTICITY	1	1	0	100
2.	V18	V18MDT14	FINITE ELEMENT METHOD	1	1	0	100
3.	V18	V18SET12	STABILITY OF STRUCTURES	2	1	1	50
4	V18	V18SET19	EARTH RETAINING STRUCTURES	2	0	2	0
5.	V18	V18SET16	ADVANCED CONCRETE TECHNOLOGY	1	1	0	100
6.	V18	V18SEL02	CAD LABORATORY	2	2	0	100

Details enclosed in annexure-VI

- The committee has approved the results and accorded the permission for publication of the same.

S.No	Name	Designation	Member Role	Signature
10.	Dr.Guduru VNSR Ratnakara Rao	Principal, SVEC(A8)	Chairman	
11.	Dr. P Vinay Kumar	Addl.Controller of Examinations-JNTU Kakinada	University Nominee	
12.	Dr.M.Thamarai	Professor/ECE, SVEC(A8)	Member	
13.	Mr.V.S.R.Gopala Krishna Ch	CoE, SVEC(A8)	Member	

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Approved by AICTE, New Delhi and Permanently Affiliated to JNTUK, Kakinada
Pedatadepalli, TADEPALLIGUDEM – 534 101, W.G. Dist, (A.P.)

Dt: 25/05/2022

Minutes of the Meeting of the Result Committee

The Sri Vasavi Engineering College (Autonomous) result committee meeting was held on 18-05-2022 at 04:00 PM through online mode using Zoom application.
Link: https://us02web.zoom.us/j/86529517980

The following members were present in the meeting.

S.No	Name	Designation	Member Role
14.	Dr.Guduru VNSR Ratnakara Rao	Principal	Chairman
15.	Dr. P Vinay Kumar	Addl.Controller of Examinations-JNTU Kakinada	University Nominee
16.	Dr.M.Thamarai	Prof./ECE- SVEC(A8)	Member
17.	Mr V.S.R.Gopala Krishna Ch	CoE; SVEC(A8)	Member
18.	Mr G V Subrahmanyam	Dy. CoE; SVEC(A8)	Member

The following are the minutes of the results committee meeting.

Item#1: B.Tech I Semester (V20) regular results April- 2022 for the ac. year 2021-22.

The summary of the results

a. Branch Wise Performance Analysis

S.No	Branch	Registered	Passed	Fail	Pass
1	CE	49	28	21	57.14
2	EEE	104	89	15	85.58
3	ME	80	53	27	66.25
4	ECE	198	174	24	87.88
5	CSE	264	253	11	95.83
6	CST	65	54	11	83.08
7	ECT	66	55	11	83.33
8	CSE-AI	66	62	4	93.94
9	AI & ML	66	62	4	93.94
Overall		**958**	**830**	**128**	**86.64**

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Appeared	Pass	Fail	Pass %
1.	V20CHL01	ENGINEERING CHEMISTRY LAB	433	432	1	99.77
2.	V20EEL01	BASIC ELECTRICAL ENGINEERING LAB	264	263	1	99.62
3.	V20ENL01	HONE YOUR COMMUNICATION SKILLS LAB-1	958	954	4	99.58
4.	V20MEL01	ENGINEERING WORKSHOP	433	430	3	99.31
5.	V20ENT01	ENGLISH FOR PROFESSIONAL ENHANCEMENT	959	947	12	98.75
6.	V20PHL01	ENGINEERING PHYSICS LAB	394	389	5	98.73
7.	V20MAT09	DESCRIPTIVE STATISTICS	132	130	2	98.48
8.	V20AIL02	STATISTICAL VISUALIZATION USING R LAB	132	130	2	98.48
9.	V20AIL01	COMPUTER ENGINEERING WORKSHOP	132	129	3	97.73
10.	V20CSL01	PROGRAMMING LAB IN C FOR PROBLEM SOLVING	695	674	21	96.98
11.	V20MAT01	LINEAR ALGEBRA AND DIFFERENTIAL EQUATIONS	972	922	50	94.86
12.	V20CHT01	ENGINEERING CHEMISTRY	452	423	29	93.58
13.	V20MET01	ENGINEERING GRAPHICS	415	388	27	93.49
14.	V20PHT01	ENGINEERING PHYSICS	403	369	34	91.56
15.	V20CST01	PROGRAMMING IN C FOR PROBLEM SOLVING	706	643	63	91.08
16.	V20EET01	BASIC ELECTRICAL ENGINEERING	272	247	25	90.81
17.	V20CHT02	ENVIRONMENTAL STUDIES	405	367	38	90.62

Details enclosed in annexure-I

Item#2: B Tech I Semester (V18) supplementary results April 2022 for the ac. year 2021-22.

The summary of the results

a. Program Wise Performance Analysis

S. No	Branch	No of Students Registered	No. of Courses			Course Wise Pass %
			Registered	Passed	Fail	
1.	CE	9	11	6	5	54.5
2.	EEE	14	16	6	10	37.5
3.	ME	9	15	2	13	13.3
4.	ECE	26	53	21	32	39.6
5.	CSE	19	29	1	28	3.4
6.	CST	1	2	1	1	50
7.	ECT	3	3	3	0	100
Overall		**81**	**129**	**40**	**89**	**37.98**

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Appeared	Pass	Fail	Pass %
1.	V18MAT01	ENGINEERING MATHEMATICS-I	1	1	0	100
2.	V18EEL01	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB	1	1	0	100
3.	V18CHL01	ENGINEERING CHEMISTRY LAB	2	2	0	100
4.	V18CSL01	PROGRAMMING LAB IN C FOR PROBLEM SOLVING	3	2	1	66.67
5.	V18CST01	PROGRAMMING IN C FOR PROBLEM SOLVING	33	21	12	63.64
6.	V18CHT01	ENGINEERING CHEMISTRY	27	9	18	33.33
7.	V18MET01	ENGINEERING GRAPHICS	14	2	12	14.29
8.	V18CHT02	ENVIRONMENTAL STUDIES	7	1	6	14.29
9.	V18EET01	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	22	1	21	4.55

Details enclosed in annexure-II

Item#3: B Tech VII Semester (V18) supplementary examinations April 2022 for the ac. year 2021-22.

The summary of the results

d. Branch Wise Performance Analysis

S. No	Branch	No of Students Registered	No. of Courses			Course Wise Pass %
			Registered	Passed	Fail	
1.	CE	9	15	7	8	46.67
2.	EEE	12	16	12	4	75.00
3.	ME	19	29	22	7	75.86
4.	ECE	34	69	32	37	46.38
5.	CSE	21	42	20	22	47.62
Overall		95	171	93	78	**54.39 %**

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Appeared	Passed	Fail	Pass %
1.	V18CET25	ESTIMATION, SPECIFICATION AND CONTRACTS	2	1	1	50.0
2.	V18CET26	ENVIRONMENTAL ENGINEERING-II	7	3	4	42.9
3.	V18CET29	IRRIGATION ENGINEERING	3	1	2	33.3
4.	V18CET34	CONSTRUCTION PROJECT PLANNING & SYSTEMS	1	1	0	100.0
5.	V18CETOE3	ENVIRONMENTAL POLLUTION AND CONTROL	8	4	4	50.0
6.	V18CST27	ADVANCED JAVA AND WEB TECHNOLOGIES	11	2	9	18.2
7.	V18CST31	HUMAN COMPUTER INTERACTION	6	2	4	33.3
8.	V18CST32	DISTRIBUTED SYSTEMS	13	10	3	76.9
9.	V18CSTOE4	OPERATING SYSTEMS	6	2	4	33.3
10.	V18CSTOE5	ARTIFICIAL INTELLIGENCE	7	7	0	100.0
11.	V18ECT20	RADAR ENGINEERING	6	4	2	66.7
12.	V18ECT21	OPTICAL COMMUNICATION	14	7	7	50.0
13.	V18ECT22	DIGITAL IMAGE PROCESSING	24	11	13	45.8
14.	V18ECT24	IOT: USE CASES	8	4	4	50.0

15.	V18ECT29	SYSTEM DESIGN THROUGH VERILOG	12	5	7	41.7
16.	V18EEL10	POWER SYSTEMS LABORATORY	1	1	0	100.0
17.	V18EET26	POWER SYSTEM OPERATION AND CONTROL	7	5	2	71.4
18.	V18EET29	HIGH VOLTAGE ENGINEERING	4	3	1	75.0
19.	V18EET34	ELECTRICAL MACHINE MODELLING ANALYSIS	4	3	1	75.0
20.	V18MBT52	MANAGEMENT SCIENCE	4	2	2	50.0
21.	V18MET20	AUTOMATION IN MANUFACTURING	6	4	2	66.7
22.	V18MET21	OPERATION RESEARCH	9	6	3	66.7
23.	V18MET24	REFRIGERATION & AIR CONDITIONING	2	1	1	50.0
24.	V18MET27	MICRO ELECTRO MECHANICAL SYSTEMS	5	4	1	80.0

Details enclosed in annexure-III

Item#4: Revaluation results of B Tech V Semester (V18) Regular and Supplementary examinations – February-2022 for the ac. year 2021-22.

The summary of the results

f. Branch Wise Performance Analysis

S. No.	Branch	Revaluation(No of Courses)			
		Applied	Change	No Change	Pass %
1.	CE	11	2	9	18.2
2.	EEE	9	0	9	---
3.	ME	10	5	5	50.0
4.	ECE	19	5	14	26.3
5.	CSE	21	10	11	47.6
6.	CST	9	3	6	33.3
7	ECT	4	0	4	---

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Applied	Change	No change
20	V18CET15	STRUCTURAL ANALYSIS-I	4	0	4
21	V18CET16	GEOTECHNICAL ENGINEERING-I	4	0	4
22	V18CET17	HYDROLOGY & WATER RESOURCES ENGINEERING	1	1	0
23	V18CET18	DESIGN OF REINFORCED CONCRETE STRUCTURES	2	1	1
24	V18CST10	DATABASE MANAGEMENT SYSTEMS	4	0	4
25	V18CST12	OPERATING SYSTEMS	1	0	1
26	V18CST13	DESIGN AND ANALYSIS OF ALGORITHMS	2	0	2
27	V18CST14	UNIX PROGRAMMING	3	2	1
28	V18CST17	ARTIFICIAL INTELLIGENCE	19	10	9
29	V18CST81	DATA STRUCTURES & ALGORITHMS	4	1	3
30	V18ECT11	VLSI DESIGN	2	1	1
31	V18ECT12	MICROPROCESSORS & MICROCONTROLLERS	9	1	8
32	V18ECT13	ANTENNA & WAVE PROPAGATION	7	1	6
33	V18ECT15	ENGINEER & SOCIETY	1	0	1
34	V18EET12	SWITCHGEAR & PROTECTION	2	0	2
35	V18EET13	POWER ELECTRONICS	1	0	1
36	V18EET14	POWER SYSTEM ANALYSIS	1	0	1
37	V18EET15	CONTROL SYSTEMS	2	1	1
38	V18EET16	SIGNALS & SYSTEMS	4	0	4
39	V18MBT51	MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS	1	0	1

40	V18MBT53	ORGANIZATIONAL BEHAVIOR	1	1	0
41	V18MET13	HEAT TRANSFER	2	2	0
42	V18MET15	THEORY OF MACHINES-II	1	0	1
43	V18MET16	DESIGN OF MACHINE ELEMENTS-I	6	2	4
44	V18MET46	INTELLECTUAL PROPERTY RIGHTS AND PATENTS	1	1	0

Details enclosed in annexure-IV

- The committee has approved the results and accorded the permission for publication of the same.

S.No	Name	Designation	Member Role	Signature
14.	Dr.Guduru VNSR Ratnakara Rao	Principal, SVEC(A8)	Chairman	
15.	Dr. P Vinay Kumar	Addl.Controller of Examinations-JNTU Kakinada	University Nominee	
16.	Dr.M.Thamarai	Professor/ECE, SVEC(A8)	Member	
17.	Mr.V.S.R.Gopala Krishna Ch	CoE, SVEC(A8)	Member	
18.	Mr G V Subrahmanyam	Dy. CoE; SVEC(A8)	Member	

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Approved by AICTE, New Delhi and Permanently Affiliated to JNTUK, Kakinada
Pedatadepalli, TADEPALLIGUDEM – 534 101, W.G. Dist, (A.P.)

Dt: 30/06/2022

Minutes of the Meeting of the Result Committee

The Sri Vasavi Engineering College (Autonomous) result committee meeting was held on 30-06-2022 at 10:00 AM through online mode using Zoom application.

Link: https://us02web.zoom.us/j/89207815112

The following members were present in the meeting.

S.No	Name	Designation	Member Role
19.	Dr.Guduru VNSR Ratnakara Rao	Principal	Chairman
20.	Dr. P Vinay Kumar	Addl.Controller of Examinations-JNTU Kakinada	University Nominee
21.	Dr.M.Thamarai	Prof./ECE- SVEC(A8)	Member
22.	Mr V.S.R.Gopala Krishna Ch	CoE; SVEC(A8)	Member
23.	Mr G V Subrahmanyam	Dy. CoE; SVEC(A8)	Member

The following are the minutes of the results committee meeting.

Item#1: MBA III Semester (V18) regular and Supplementary results March- 2022 for the ac. year 2021-22.

The summary of the results

a. Program Wise Performance Analysis

S.No	Program	Registered	Passed	Fail	Pass
1	MBA	91	78	13	**85.71**

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Appeared	Pass	Fail	Pass %
1.	V18MBT14	BUSINESS POLICY & CORPORATE STRATEGY	91	91	0	100
2.	V18MBT15	ENTREPRENEURSHIP DEVELOPMENT	91	91	0	100

3.	V18MBT16	E-BUSINESS	91	91	0	100
4.	V18MBT17	CONSUMER BEHAVIOR	18	18	0	100
5.	V18MBT18	RETAIL MANAGEMENT	18	17	1	94.44
6.	V18MBT19	INTEGRATED MARKETING COMMUNICATION	18	18	0	100
7.	V18MBT20	PRODUCT & BRAND MANAGEMENT	18	18	0	100
8.	V18MBT21	SECURITY ANALYSIS & PORTFOLIO MANAGEMENT	39	39	0	100
9.	V18MBT22	ADVANCE MANAGEMENT ACCOUNTING	39	39	0	100
10.	V18MBT23	FINANCIAL MARKETS & SERVICES	39	39	0	100
11.	V18MBT24	BANKING & INSURANCE MANAGEMENT	39	39	0	100
12.	V18MBT25	HUMAN RESOURCE PLANNING & DEVELOPMENT	34	34	0	100
13.	V18MBT26	COMPENSATION AND REWARD MANAGEMENT	34	34	0	100
14.	V18MBT27	PERFORMANCE MANAGEMENT	34	33	1	97.05
15.	V18MBT28	STRATEGIC HUMAN RESOURCE MANAGEMENT	34	34	0	100
16.	V18MAT07	EMPLOYABILITY SKILLS III (APTITUDE-I)	91	78	13	85.71
17.	V18MBP01	MINI PROJECT	48	48	0	100
18.	V18MBM01	MOOCS	43	43	0	100

Details enclosed in annexure-I

Item#2: M Tech III Semester (V18) Regular and supplementary results March 2022 for the ac. year 2021-22.

The summary of the results

a. Specialization Wise Performance Analysis

S.No	Speclz	Registered	Passed	Fail	Pass
1	MD	5	3	2	**60.00**
2	PSC & AE	5	4	1	**80.00**
3	STE	4	1	3	**25.00**
4	VLSI & ES	14	14	0	**100.00**
5	CSE	8	8	0	**100**
Over All		36	30	6	**83.33**

b. Course Wise Performance Analysis

S. No	Specl	Course Code	Course Name	Appeared	Pass	Fail	Pass %
1.	MD	V18MDT43	MOOCS	5	3	2	60.00
2.	MD	V18MDT44	COMPREHENSIVE VIVA-VOCE	5	5	0	100
3.	PSCA &E	V18PST43	MOOCS	5	5	0	100
4.	PSCA &E	V18PST44	COMPREHENSIVE VIVA-VOCE	5	4	1	80.00
5.	STE	V18SET43	MOOCS	4	1	3	25.00
6.	STE	V18SET44	COMPREHENSIVE VIVA-VOCE	4	4	0	100
7.	VLSI& ES	V18VLT43	MOOCS	14	14	0	100
8.	VLSI& ES	V18VLT44	COMPREHENSIVE VIVA-VOCE	14	14	0	100
9.	CSE	V18CTT43	MOOCS	8	8	0	100
10.	CSE	V18CTT44	COMPREHENSIVE VIVA-VOCE	8	8	0	100

Details enclosed in annexure-II

Item#3: Revaluation results B Tech I Semester (V20 & V18) Regular and supplementary examinations April 2022 for the ac. year 2021-22.

The summary of the results

e. Branch Wise Performance Analysis

S. No.	Branch	Revaluation(No of Courses)			
		Applied	Change	No Change	Pass %
1.	CE	6	1	5	16.66
2.	EEE	3	1	2	33.33
3.	ME	6	4	2	66.66
4.	ECE	3	1	2	33.33
5.	CSE	14	4	10	28.57
6.	CST	1	0	1	---
7	ECT	1	0	1	---
8	CSE(AI)	4	3	1	75.00

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Applied	Change	No change
1.	V18CHT02	ENVIRONMENTAL STUDIES	1	0	1
2.	V18CST01	PROGRAMMING IN C FOR PROBLEM SOLVING	1	0	1
3.	V18MET01	ENGINEERING GRAPHICS	1	0	1
4.	V18PHT02	OPTO ELECTRONICS AND SEMI CONDUCTORS	1	0	1
5.	V20CHT01	ENGINEERING CHEMISTRY	9	2	7
6.	V20CHT02	ENVIRONMENTAL STUDIES	1	0	1
7.	V20CST01	PROGRAMMING IN C FOR PROBLEM SOLVING	12	5	7
8.	V20EET01	BASIC ELECTRICAL ENGINEERING	1	0	1

9.	V20ENT01	ENGLISH FOR PROFESSIONAL ENHANCEMENT	1	0	1
10.	V20MAT09	DESCRIPTIVE STATISTICS	1	1	0
11.	V20MET01	ENGINEERING GRAPHICS	2	1	1
12.	V20PHT01	ENGINEERING PHYSICS	6	3	3

Details enclosed in annexure-III

Item#4: Revaluation results of B Tech II Semester (V20 & V18) Supplementary examinations – March-2022 for the ac. year 2021-22.

The summary of the results

g. Branch Wise Performance Analysis

S. No.	Branch	Revaluation(No of Courses)			
		Applied	Change	No Change	Pass %
1.	CE	3	2	1	66.66
2.	EEE	2	1	1	50.00
3.	ME	3	1	2	33.33
4.	ECE	4	0	4	----
5.	CSE	6	0	6	----
6.	CST	4	1	3	33.3
7	ECT	6	0	6	---

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Applied	Chage	No change
45.	V18MET03	ENGINEERING MECHANICS	1	1	0
46.	V20CHT01	ENGINEERING CHEMISTRY	5	0	5
47.	V20CHT02	ENVIRONMENTAL STUDIES	2	1	1
48.	V20CST01	PROGRAMMING IN C FOR PROBLEM SOLVING	1	0	1
49.	V20CST02	PYTHON PROGRAMMING	4	0	4

50.	V20ECT01	SWITCHING THEORY AND LOGIC DESIGN	9	0	9
51.	V20MAT02	NUMERICAL METHODS AND VECTOR CALCULUS	3	1	2
52.	V20MET02	ENGINEERING MECHANICS	3	2	1

Details enclosed in annexure-IV

Item#5: Revaluation results of B Tech III Semester (V20 & V18) Regular and Supplementary examinations – March-2022 for the ac. year 2021-22.

The summary of the results

h. Branch Wise Performance Analysis

S. No.	Branch	Revaluation(No of Courses)			
		Applied	Change	No Change	Pass %
1.	CE	12	4	8	33.33
2.	EEE	8	2	6	25.00
3.	ME	18	7	11	38.88
4.	ECE	60	25	35	41.66
5.	CSE	36	16	20	44.44
6.	CST	6	2	4	33.33
7	ECT	16	5	11	45.45

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Applied	Change	No change
1.	V18CET04	STRENGTH OF MATERIALS-I	2	1	1
2.	V18CST04	OBJECT ORIENTED PROGRAMMING FOR PROBLEM	1	0	1
3.	V18ECT03	SIGNALS & SYSTEMS	3	0	3
4.	V18ECT04	NETWORK THEORY	5	1	4
5.	V18ECT05	ANALOG ELECTRONICS	1	1	0
6.	V18EET01	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	5	1	4

7.	V18EET06	ELECTRICAL AND ELECTRONIC MEASUREMENTS	1	1	0
8.	V18MET09	MATERIALS ENGINEERING	1	1	0
9.	V20CET02	FLUID MECHANICS & HYDRAULICS	5	2	3
10.	V20CST03	OOPS THROUGH C++	16	6	10
11.	V20CST04	DATA STRUCTURES	14	10	4
12.	V20CST05	COMPUTER ORGANIZATION AND ARCHITECTURE	3	1	2
13.	V20ECT02	ELECTRONIC DEVICES, CIRCUITS & ANALYSIS	9	6	3
14.	V20ECT04	NETWORK THEORY	5	3	2
15.	V20ECT05	SIGNALS & SYSTEMS	21	9	12
16.	V20EET04	ELECTRICAL CIRCUIT ANALYSIS-II	3	0	3
17.	V20EET05	ELECTRO MAGNETIC FIELDS	1	0	1
18.	V20MAT03	COMPLEX ANALYSIS	15	4	11
19.	V20MAT05	TRANSFORM CALCULUS	2	0	2
20.	V20MAT06	PROBABILITY THEORY STOCHASTIC PROCESS	18	7	11
21.	V20MAT07	MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE	5	0	5
22.	V20MBT51	MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS	6	2	4
23.	V20MET03	METALLURGY AND MATERIAL SCIENCE	4	2	2
24.	V20MET04	MECHANICS OF SOLIDS	1	0	1
25.	V20MET05	FLUID MECHANICS WITH MACHINE LEARNING	8	3	5
26.	V20MET06	THERMODYNAMICS	1	0	1

Details enclosed in annexure-V

Item#6: Revaluation results of B Tech VII Semester (V18) Supplementary examinations – April-2022 for the ac. year 2021-22.

The summary of the results

i. Branch Wise Performance Analysis

S. No.	Branch	Revaluation(No of Courses)			
		Applied	Change	No Change	Pass %
1.	ECE	3	3	0	100
2.	CSE	2	2	0	100

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Applied	Change	No change
1.	V18CSTOE4	4OPERATING SYSTEMS	1	1	0
2.	V18ECT22	DIGITAL IMAGE PROCESSING	2	2	0
3.	V18CETOE3	ENVIRONMENTAL POLLUTION AND CONTROL	2	2	0

Details enclosed in annexure-VI

Item#7: Revaluation results of M Tech II Semester (V18) Supplementary examinations – April-2022 for the ac. year 2021-22.

The summary of the results

j. Specialization Wise Performance Analysis

S. No.	Speclz	Revaluation(No of Courses)			
		Applied	Change	No Change	Pass %
1.	STE	2	0	2	---

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Applied	Change	No change
1.	V18SET12	STABILITY OF STRUCTURES	1	0	1
2.	V18SET19	EARTH RETAINING STRUCTURES	1	0	1

Details enclosed in annexure-VII

- The committee has approved the results and accorded the permission for publication of the same.

S.No	Name	Designation	Member Role	Signature
19.	Dr.Guduru VNSR Ratnakara Rao	Principal, SVEC(A8)	Chairman	
20.	Dr. P Vinay Kumar	Addl.Controller of Examinations-JNTU Kakinada	University Nominee	
21.	Dr.M.Thamarai	Professor/ECE, SVEC(A8)	Member	
22.	Mr.V.S.R.Gopala Krishna Ch	CoE, SVEC(A8)	Member	
23.	Mr G V Subrahmanyam	Dy. CoE; SVEC(A8)	Member	

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Dt: 07/07/2022

Minutes of the Meeting of the Result Committee

The Sri Vasavi Engineering College (Autonomous) result committee meeting was held on 05-07-2022 at 04:30 PM through online mode using Zoom application.
Link: https://us02web.zoom.us/j/82768898652

The following members were present in the meeting.

S.No	Name	Designation	Member Role
24.	Dr.Guduru VNSR Ratnakara Rao	Principal	Chairman
25.	Dr. P Vinay Kumar	Addl.Controller of Examinations-JNTU Kakinada	University Nominee
26.	Dr.M.Thamarai	Prof./ECE- SVEC(A8)	Member
27.	Mr V.S.R.Gopala Krishna Ch	CoE; SVEC(A8)	Member
28.	Mr G V Subrahmanyam	Dy. CoE; SVEC(A8)	Member

The following are the minutes of the results committee meeting.

Item#1: B Tech VIII Semester (V18) Regular results June- 2022 for the ac. year 2021-22.

The summary of the results

a. Branch Wise Performance Analysis

S.No	Branch	Registered	Passed	Fail	Pass
1	CE	60	40	20	**66.67**
2	EEE	118	118	0	**100**
3	ME	121	104	17	**85.95**
4	ECE	190	171	19	**90.00**
5	CSE	251	242	9	**96.41**
Overall		**740**	**675**	**65**	**91.22**

b. Course Wise Performance Analysis

S No	Branch	Course Code	Course Name	Appeared	Pass	Fail	Pass %
1.	CE	V18CET43	PRE-STRESSED CONCRETE	60	45	15	75.00
2.	CE	V18CET49	GROUND IMPROVEMENT TECHNIQUES	60	48	12	80.00
3.	CE	V18CSTOE7	SOFTWARE TESTING METHODOLOGIES	60	58	02	96.67
4.	CE	V18CEP02	PROJECT WORK PART-B	60	60	0	100
5.	EEE	V18EET36	ELECTRICAL DISTRIBUTION SYSTEMS	118	118	0	100
6.	EEE	V18EET41	ENERGY STORAGE AND MANAGEMENT	118	118	0	100
7.	EEE	V18CSTOE9	COMPUTER GRAPHICS	118	118	0	100
8.	EEE	V18EEP02	PROJECT WORK PART-B	118	118	0	100
9.	ME	V18MET28	AUTOMOBILE ENGINEERING	121	116	5	95.86
10.	ME	V18MET32	NON-DESTRUCTIVE EVALUATION	121	114	7	94.21
11.	ME	V18MET35	PRODUCTION PLANNING AND CONTROL	121	113	8	93.38
12.	ME	V18CETOE6	WATER QUALITY AND CONSERVATION	121	121	0	100
13.	ME	V18MEP02	PROJECT WORK PART-B	121	115	6	95.04
14.	ECE	V18ECT30	CELLULAR MOBILE COMMUNICATION	190	182	8	95.78
15.	ECE	V18ECT31	ELECTRONICS MEASUREMENTS & INSTRUMENTATION	190	174	16	91.57
16.	ECE	V18ECT34	SATELLITE COMMUNICATION	190	181	9	95.26
17.	ECE	V18EETOE8	BASICS OF ELECTRICAL POWER GENERATION	190	187	3	98.42
18.	ECE	V18ECP02	PROJECT WORK PART-B	190	189	1	99.47
19.	CSE	V18CST36	SOFTWARE PROJECT MANAGEMENT	251	246	5	98.00
20.	CSE	V18CST43	CYBER SECURITY	251	244	7	97.21
21.	CSE	V18EETOE8	BASICS OF ELECTRICAL POWER GENERATION	251	245	6	97.60
22.	CSE	V18CSP02	PROJECT WORK PART-B	251	251	0	100

Details enclosed in annexure-I

- The committee has approved the results and accorded the permission for publication of the same.

S.No	Name	Designation	Member Role	Signature
24.	Dr.Guduru VNSR Ratnakara Rao	Principal, SVEC(A8)	Chairman	
25.	Dr. P Vinay Kumar	Addl.Controller of Examinations-JNTU Kakinada	University Nominee	
26.	Dr.M.Thamarai	Professor/ECE, SVEC(A8)	Member	
27.	Mr.V.S.R.Gopala Krishna Ch	CoE, SVEC(A8)	Member	
28.	Mr G V Subrahmanyam	Dy. CoE; SVEC(A8)	Member	

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Dt: 20/07/2022

Minutes of the Meeting of the Result Committee

The Sri Vasavi Engineering College (Autonomous) result committee meeting was held on 19-07-2022 at 04:30 PM through online mode using Zoom application.

Link: https://us02web.zoom.us/j/83390942928

The following members were present in the meeting.

S.No	Name	Designation	Member Role
29.	Dr.Guduru VNSR Ratnakara Rao	Principal	Chairman
30.	Dr. P Vinay Kumar	Addl.Controller of Examinations-JNTU Kakinada	University Nominee
31.	Dr.M.Thamarai	Prof./ECE- SVEC(A8)	Member
32.	Mr V.S.R.Gopala Krishna Ch	CoE; SVEC(A8)	Member
33.	Mr G V Subrahmanyam	Dy. CoE; SVEC(A8)	Member

The following are the minutes of the results committee meeting.

Item#1: MBA I Semester (V21) Regular results May- 2022 for the ac. year 2021-22.

The summary of the results

a. Program Wise Performance Analysis

S.No	Program	Registered	Passed	Fail	Pass
1	MBA	127	108	19	**66.67**

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Appeared	Pass	Fail	Pass %
1.	V21MBT01	MANAGEMENT THEORY & ORGANIZATIONAL BEHAVIOUR	127	117	10	92.13
2.	V21MBT02	MANAGERIAL ECONOMICS	127	122	5	96.06
3.	V21MBT03	ACCOUNTING FOR MANAGERS	127	114	13	89.76
4.	V21MBT04	LEGAL & BUSINESS ENVIRONMENT	127	122	5	96.06

5.	V21MBT05	BUSINESS COMMUNICATION	127	127	0	100
6.	V21MBT06	QUANTITATIVE ANALYSIS FOR BUSINESS DECISIONS	127	126	1	99.21
7.	V21MBL01	BUSINESS COMMUNICATION & SOFT SKILLS LAB	127	127	0	100

Details enclosed in annexure-I

Item#2: M Tech I Semester (V21) Regular results June- 2022 for the ac. year 2021-22.

The summary of the results

a. Specialization Wise Performance Analysis

S.No	Specz.	Registered	Passed	Fail	Pass
1	CS	5	3	2	**60.00**
2	ES & VLSI	1	0	1	**---**
3	PE & PS	3	1	2	**33.33**
4	TE	1	0	1	**---**
Overall		10	4	6	**40.00**

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Appeared	Pass	Fail	Pass %
1.	V21CTL01	ADVANCED DATA STRUCTURES LAB	5	5	0	100
2.	V21CTL02	ADVANCED COMPUTING LAB-1	5	5	0	100
3.	V21CTT01	MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE	5	3	2	60
4.	V21CTT02	ADVANCED DATA STRUCTURES	5	5	0	100
5.	V21CTT03	ADVANCED OPERATING SYSTEMS	5	5	0	100
6.	V21CTT08	OBJECT ORIENTED SOFTWARE ENGINEERING	5	5	0	100
7.	V21ESVL01	SYSTEM DESIGN THROUGH VERILOG LAB	1	1	0	100
8.	V21ESVL02	EMBEDDED SYSTEMS DESIGN LAB	1	1	0	100
9.	V21ESVT01	SYSTEM DESIGN THROUGH VERILOG	1	0	1	0
10.	V21ESVT02	EMBEDDED SYSTEMS DESIGN	1	0	1	0
11.	V21ESVT05	SYSTEM ON CHIP & APPLICATIONS	1	0	1	0
12.	V21ESVT07	CPLD & FPGA ARCHITECTURES AND APPLICATIONS	1	1	0	100
13.	V21MBT55	RESEARCH METHODOLOGY AND IPR	10	7	3	70
14.	V21PEL01	POWER ELECTRONICS SIMULATION LAB	3	3	0	100
15.	V21PEL02	POWER SYSTEMS LAB	3	3	0	100

16.	V21PET01	ANALYSIS OF POWER ELECTRONIC CONVERTERS	3	2	1	66.67
17.	V21PET02	POWER SYSTEM OPERATION & CONTROL	3	3	0	100
18.	V21PET05	POWER QUALITY	3	3	0	100
19.	V21PET06	ELECTRICAL DISTRIBUTION AUTOMATION	3	3	0	100
20.	V21PGENT54	ENGLISH FOR RESEARCH PAPER WRITING	10	10	0	100
21.	V21TEE04	ADVANCED THERMODYNAMICS	1	0	1	0
22.	V21TEE06	ALTERNATIVE FUEL TECHNOLOGIES	1	1	0	100
23.	V21TEL01	COMPUTATIONAL FLUID DYNAMICS LAB –I	1	1	0	100
24.	V21TEL02	THERMAL ENGINEERING LAB-I	1	1	0	100
25.	V21TET01	ADVANCED FLUID MECHANICS	1	0	1	0
26.	V21TET02	COMPUTATIONAL FLUID DYNAMICS	1	0	1	0

Details enclosed in annexure-II

Item#3: Revaluation results B Tech VIII Semester (V18) Regular examinations April 2022 for the ac. year 2021-22.

The summary of the results

f. Branch Wise Performance Analysis

S. No.	Branch	Revaluation(No of Courses)			
		Applied	**Change**	**No Change**	**Pass %**
1.	CE	18	7	11	38.88
2.	ME	14	5	9	35.71
3.	ECE	9	6	3	66.66
4.	CSE	4	1	3	25.00
Overall		**45**	**19**	**26**	**42.22**

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Applied	Change	No change
1.	V18CET43	PRE-STRESSED CONCRETE	10	2	8
2.	V18CET49	GROUND IMPROVEMENT TECHNIQUES	8	5	3
3.	V18CETOE6	WATER QUALITY AND CONSERVATION	3	0	3
4.	V18CST36	SOFTWARE PROJECT MANAGEMENT	1	0	1

5.	V18CST43	CYBER SECURITY	2	1	1
6.	V18ECT30	CELLULAR MOBILE COMMUNICATION	3	1	2
7.	V18ECT31	ELECTRONICS MEASUREMENTS & INSTRUMENTATION	5	4	1
8.	V18EETOE8	BASICS OF ELECTRICAL POWER GENERATION	2	1	1
9.	V18MET28	AUTOMOBILE ENGINEERING	5	3	2
10.	V18MET32	NON-DESTRUCTIVE EVALUATION	5	1	4
11.	V18MET35	PRODUCTION PLANNING AND CONTROL	1	1	0

Details enclosed in annexure-III

Item#4: Revaluation results MBA III Semester (V18) Regular and Supplementary examinations March 2022 for the ac. year 2021-22.

a. Program Wise Performance Analysis

S. No.	Program	Revaluation(No of Courses)			
		Applied	Change	No Change	Pass %
1.	MBA	3	2	1	66.66

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Applied	Change	No change
1.	V18MBT15	ENTREPRENEURSHIP DEVELOPMENT	1	1	0
2.	V18MBT16	E-BUSINESS	1	1	0
3.	V18MBT23	FINANCIAL MARKETS & SERVICES	1	0	1

- The committee has approved the results and accorded the permission for publication of the same.

S.No	Name	Designation	Member Role	Signature
29.	Dr.Guduru VNSR Ratnakara Rao	Principal, SVEC(A8)	Chairman	
30.	Dr. P Vinay Kumar	Addl.Controller of Examinations-JNTU Kakinada	University Nominee	
31.	Dr.M.Thamarai	Professor/ECE, SVEC(A8)	Member	
32.	Mr.V.S.R.Gopala Krishna Ch	CoE, SVEC(A8)	Member	
33.	Mr G V Subrahmanyam	Dy. CoE; SVEC(A8)	Member	

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SRI VASAVI ENGINEERING COLLEGE (Autonomous)

(Sponsored by Sri Vasavi Educational Society; Regd.No:898/2000)

|Accredited by NAAC with 'A' Grade |&| Accredited by NBA |

Approved by AICTE, New Delhi and Permanently Affiliated to JNTUK, Kakinada

Pedatadepalli, TADEPALLIGUDEM – 534 101, W.G. Dist, (A.P.)

Dt: 05/04/2022

Minutes of the Meeting of the Result Committee

The Sri Vasavi Engineering College (Autonomous) result committee meeting was held on 03-04-2022 at 10:30 AM through online mode using Zoom application. Link: https://us02web.zoom.us/j/89332865527

The following members were present in the meeting.

S.No	Name	Designation	Member Role
1.	Dr.Guduru VNSR Ratnakara Rao	Principal	Chairman
2.	Dr. P Vinay Kumar	Addl.Controller of Examinations-JNTU Kakinada	University Nominee
3.	Dr.M.Thamarai	Prof./ECE- SVEC(A8)	Member
4.	Mr V.S.R.Gopala Krishna Ch	CoE; SVEC(A8)	Member

The following are the minutes of the results committee meeting.

Item#1: B.Tech V Semester (V18) regular results February 2022 for the ac. year 2021-22.

The summary of the results

a. Branch Wise Performance Analysis

S.No	Branch	Registered	Passed	Fail	Pass
1	CE	63	50	13	79.37
2	ECT	57	41	16	71.93
3	EEE	107	90	17	84.11
4	ME	115	82	33	71.30
5	ECE	204	162	42	79.41
6	CSE	273	215	58	78.75
7	CST	60	32	28	53.33
Overall		**879**	**672**	**207**	**76.45**

b. Course Wise Performance Analysis

S.	Course	Course	Appear	Pas	Fai	Pass

No	Code	Name	ed	s	l	%
1.	V18ECMOOCS	MOOCS COURSE	261	261	0	100
2.	V18CEL08	GEOTECHNICAL ENGINEERING LAB	63	63	0	100
3.	V18CET33	RS&GIS	64	64	0	100
4.	V18CSL05	PYTHON PROGRAMMING LAB	115	115	0	100
5.	V18CSL07	OPERATING SYSTEM AND UNIX LAB	333	333	0	100
6.	V18CSL34	DATA STRUCTURES & ALGORITHMS LAB	261	261	0	100
7.	V18CST16	ADVANCED DATA STRUCTURES	47	47	0	100
8.	V18CEL07	TRANSPORTATION ENGINEERING LAB	63	63	0	100
9.	V18EEL06	ELECTRICAL MACHINES LABORATORY-II	107	107	0	100
10.	V18EEL07	CONTROL SYSTEMS LABORATORY	108	108	0	100
11.	V18CSL06	DATABASE MANAGEMENT SYSTEMS LAB	333	332	1	99.7
12.	V18CST62	TECHNICAL SKILLS-III	333	332	1	99.7
13.	V18MEL16	METAL CUTTING & MACHINE TOOLS LAB	115	114	1	99.13
14.	V18ECL08	VLSI DESIGN LAB	261	258	3	98.85
15.	V18ENT05	PROFESSIONAL COMMUNICATION SKILLS-III	886	875	11	98.76
16.	V18ECL07	MICROPROCESSOR & MICRO CONTROLLERS LAB	204	201	3	98.53
17.	V18CET19	TRANSPORTATION ENGINEERING-I	67	66	1	98.51
18.	V18MET46	INTELLECTUAL PROPERTY RIGHTS AND PATENTS	119	117	2	98.32
19.	V18MEL10	THERMAL ENGINEERING LAB	115	113	2	98.26
20.	V18ECL07	MICROPROCESSOR & MICROCONTROLLERS LAB	57	56	1	98.25
21.	V18ECT15	ENGINEER & SOCIETY	263	257	6	97.72
22.	V18MBT51	MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS	108	105	3	97.22
23.	V18EET13	POWER ELECTRONICS	107	104	3	97.2
24.	V18CET17	HYDROLOGY & WATER RESOURCES ENGINEERING	69	67	2	97.1
25.	V18EET12	SWITCHGEAR & PROTECTION	110	105	5	95.45
26.	V18CST81	DATA STRUCTURES & ALGORITHMS	262	250	12	95.42
27.	V18CST11	COMPUTER NETWORKS	340	320	20	94.12
28.	V18ECT11	VLSI DESIGN	267	251	16	94.01
29.	V18MBT53	ORGANIZATIONAL BEHAVIOR	345	324	21	93.91
30.	V18CET15	STRUCTURAL ANALYSIS-I	66	61	5	92.42
31.	V18MET37	INTERNAL COMBUSTION ENGINES	128	118	10	92.19
32.	V18EET14	POWER SYSTEM ANALYSIS	115	106	9	92.17
33.	V18CST12	OPERATING SYSTEMS	347	318	29	91.64

34.	V18CST14	UNIX PROGRAMMING	343	313	30	91.25
35.	V18CST10	DATABASE MANAGEMENT SYSTEMS	350	318	32	90.86
36.	V18MET17	METAL CUTTING & MACHINE TOOLS	120	109	11	90.83
37.	V18EET15	CONTROL SYSTEMS	393	350	43	89.06
38.	V18CET18	DESIGN OF REINFORCED CONCRETE STRUCTURES	69	61	8	88.41
39.	V18ECT13	ANTENNA & WAVE PROPAGATION	275	243	32	88.36
40.	V18ECT12	MICROPROCESSORS & MICROCONTROLLERS	272	238	34	87.5
41.	V18MET15	THEORY OF MACHINES-II	138	119	19	86.23
42.	V18EET16	SIGNALS & SYSTEMS	114	98	16	85.96
43.	V18ENT11	CONSTITUTION OF INDIA	69	58	11	84.06
44.	V18CST13	DESIGN AND ANALYSIS OF ALGORITHMS	350	292	58	83.43
45.	V18CET16	GEOTECHNICAL ENGINEERING-I	72	58	14	80.56
46.	V18MET16	DESIGN OF MACHINE ELEMENTS-I	131	101	30	77.1
47.	V18MET13	HEAT TRANSFER	136	100	36	73.53
48.	V18CST17	ARTIFICIAL INTELLIGENCE	297	213	84	71.72

Details enclosed in annexure-I

Item#2: B Tech IV Semester (V18) supplementary results February 2022 for the ac. year 2021-22.

The summary of the results

a. Program Wise Performance Analysis

S. No	Branch	No of Students Registered	No. of Courses			Course Wise Pass %
			Registered	Passed	Fail	
1.	CE	17	19	11	8	57.89
2.	EEE	37	61	24	37	39.34
3.	ME	68	179	62	117	34.64
4.	ECE	81	174	27	147	15.52
5.	CSE	97	257	66	191	25.68
6.	CST	29	84	21	63	25.00
7.	ECT	11	20	4	16	20.00
Overall		**340**	**794**	**215**	**579**	**27.08%**

b. Course Wise Performance Analysis

S. No	Branch	Course Code	Course Name	Appeared	Passed	Fail	Pass %
1.	CE	V18CET09	CONCRETE TECHNOLOGY	1	0	1	0
2.	CE	V18CET11	SURVEYING AND GEOMATICS	1	1	0	100
3.	CE	V18CET13	STRENGTH OF MATERIALS-II	14	7	7	50
4.	CE	V18CET14	HYDRAULIC ENGINEERING	1	1	0	100
5.	CE	V18MBT51	MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS	2	2	0	100
6.	EEE	V18EET07	ELECTRICAL CIRCUIT ANALYSIS-II	5	3	2	60
7.	EEE	V18EET08	DIGITAL ELECTRONICS	28	10	18	35.71
8.	EEE	V18EET09	ELECTRICAL MACHINES-II	11	4	7	36.36
9.	EEE	V18EET10	ELECTRICAL POWER GENERATION AND TRANSMISSION	12	2	10	16.67
10.	EEE	V18EET11	ELECTRICAL SAFETY & IE RULES	1	1	0	100
11.	EEE	V18ENT04	PROFESSIONAL COMMUNICATION SKILLS-II	2	2	0	100
12.	EEE	V18MAT04	PROBABILITY & STATISTICS	2	2	0	100
13.	ME	V18ENT04	PROFESSIONAL COMMUNICATION SKILLS-II	6	4	2	66.67
14.	ME	V18ENT11	CONSTITUTION OF INDIA	33	1	32	3.03
15.	ME	V18MEL05	MECHANICS OF SOLIDS & MATERIALS ENGINEERING LAB	1	1	0	100
16.	ME	V18MET06	THEORY OF MACHINES-I	32	9	23	28.12
17.	ME	V18MET07	APPLIED THERMODYNAMICS	49	28	21	57.14
18.	ME	V18MET08	MECHANICS OF SOLIDS	31	6	25	19.35
19.	ME	V18MET11	INSTRUMENTATION & CONTROL SYSTEMS	21	11	10	52.38
20.	ME	V18MET14	MANUFACTURING PROCESSES	6	2	4	33.33
21.	ECE	V18CSL32	OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB	2	2	0	100
22.	ECE	V18ECT07	ANALOG & DIGITAL COMMUNICATIONS	39	5	34	12.82
23.	ECE	V18ECT08	ANALOG CIRCUITS	36	3	33	8.33
24.	ECE	V18ECT09	PROBABILITY THEORY & STOCHASTIC PROCESS	47	2	45	4.26
25.	ECE	V18ECT10	ELECTROMAGNETIC WAVES & TRANSMISSION LINES	30	6	24	20
26.	ECE	V18ENT04	PROFESSIONAL COMMUNICATION SKILLS-II	5	4	1	80
27.	ECE	V18MAT03	MATHEMATICS-III	15	5	10	33.33
28.	CSE	V18CSL04	JAVA PROGRAMMING LAB	1	1	0	100

29.	CSE	V18CSL05	PYTHON PROGRAMMING LAB	1	0	1	0
30.	CSE	V18CST05	COMPUTER ORGANIZATION	46	19	27	41.3
31.	CSE	V18CST06	SOFTWARE ENGINEERING	23	6	17	26.09
32.	CSE	V18CST07	FORMAL LANGUAGES AND AUTOMATA THEORY	34	8	26	23.53
33.	CSE	V18CST08	JAVA PROGRAMMING	26	4	22	15.38
34.	CSE	V18CST09	PYTHON PROGRAMMING	73	10	63	13.7
35.	CSE	V18ENT04	PROFESSIONAL COMMUNICATION SKILLS-II	7	5	2	71.43
36.	CSE	V18ENT11	CONSTITUTION OF INDIA	32	2	30	6.25
37.	CSE	V18MBT51	MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS	14	11	3	78.57
38.	CST	V18CSL05	PYTHON PROGRAMMING LAB	1	1	0	100
39.	CST	V18CST05	COMPUTER ORGANIZATION	15	5	10	33.33
40.	CST	V18CST06	SOFTWARE ENGINEERING	13	4	9	30.77
41.	CST	V18CST07	FORMAL LANGUAGES AND AUTOMATA THEORY	6	2	4	33.33
42.	CST	V18CST08	JAVA PROGRAMMING	9	2	7	22.22
43.	CST	V18CST09	PYTHON PROGRAMMING	24	3	21	12.5
44.	CST	V18ENT04	PROFESSIONAL COMMUNICATION SKILLS–II	1	0	1	0
45.	CST	V18ENT11	CONSTITUTION OF INDIA	8	1	7	12.5
46.	CST	V18MBT51	MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS	7	3	4	42.86
47	ECT	V18CSL32	OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB	1	1	0	100
48	ECT	V18ECT07	ANALOG & DIGITAL COMMUNICATIONS	7	0	7	0
49	ECT	V18ECT08	ANALOG CIRCUITS	6	1	5	16.67
50	ECT	V18ECT10	ELECTROMAGNETIC WAVES & TRANSMISSION LINES	5	1	4	20
51	ECT	V18ENT04	PROFESSIONAL COMMUNICATION SKILLS-II	1	1	0	100

Details enclosed in annexure-II

Item#3: Revaluation results of B Tech VIII Semester (V18) regular examinations February 2022 for the ac. year 2021-22.

The summary of the results

a. Branch Wise Performance Analysis

S. No.	Branch	Revaluation(No of Courses)			
		Applied	Change	No Change	Pass %
1.	ME	8	3	5	37.5
2.	ECE	13	1	12	7.69
3.	CSE	5	4	1	80

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Appeared	Passed	Fail
1.	V18CST27	ADVANCED JAVA AND WEB TECHNOLOGIES	1	1	0
2.	V18CST32	DISTRIBUTED SYSTEMS	4	3	1
3.	V18CSTOE4	OPERATING SYSTEMS	1	0	1
4.	V18CSTOE5	ARTIFICAL INTELLIGENCE	4	1	3
5.	V18ECT22	DIGITAL IMAGE PROCESSING	10	0	10
6.	V18ECT24	IOT:USE CASES	1	0	1
7.	V18ECT29	SYSTEM DESIGN THROUGH VERILOG	1	1	0
8.	V18MET21	OPERATION RESEARCH	3	2	1
9.	V18MET24	REFRIGERATION &AIR CONDITIONING	1	0	1

Details enclosed in annexure-III

Item#4: Revaluation results of B Tech VI Semester (V18) Supplementary examinations – February-2022 for the ac. year 2021-22.

The summary of the results

a. Branch Wise Performance Analysis

S. No.	Branch	Revaluation(No of Courses)			
		Applied	Change	No Change	Pass %
1.	CE	10	0	10	---
2.	EEE	1	0	1	---
3.	ECE	6	1	5	16.66

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Applied	Change	No change
1.	V18CET20	STRUCTURAL ANALYSIS	1	0	1
2.	V18CET22	DESIGN OF STEEL STRUCTURES	6	0	6
3.	V18CSTOE3	PYTHON PROGRAMMING	3	0	3
4.	V18ECT16	DIGITAL SIGNAL PROCESSING	3	1	2
5.	V18ECT17	MICROWAVE ENGINEERING	3	0	3
6.	V18ECT23	MICROPROCEESORS & MICROCONTROLLERS	1	0	1

Details enclosed in annexure-IV

- The committee has approved the results and accorded the permission for publication of the same.

S.No	Name	Designation	Member Role	Signature
1.	Dr.Guduru VNSR Ratnakara Rao	Principal, SVEC(A8)	Chairman	
2.	Dr. P Vinay Kumar	Addl.Controller of Examinations-JNTU Kakinada	University Nominee	
3.	Dr.M.Thamarai	Professor/ECE, SVEC(A8)	Member	
4.	Mr.V.S.R.Gopala Krishna Ch	CoE, SVEC(A8)	Member	

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Pedatadepalli, TADEPALLIGUDEM – 534 101, W.G. Dist, (A.P.)

Dt: 25/04/2022

Minutes of the Meeting of the Result Committee

The Sri Vasavi Engineering College (Autonomous) result committee meeting was held on 23-04-2022 at 04:00 PM through online mode using Zoom application.

Link: https://us02web.zoom.us/j/89332865527

The following members were present in the meeting.

S.No	Name	Designation	Member Role
1.	Dr.Guduru VNSR Ratnakara Rao	Principal	Chairman
2.	Dr. P Vinay Kumar	Addl.Controller of Examinations-JNTU Kakinada	University Nominee
3.	Dr.M.Thamarai	Prof./ECE- SVEC(A8)	Member
4.	Mr V.S.R.Gopala Krishna Ch	CoE; SVEC(A8)	Member

Members Absent

S.No	Name	Designation	Member Role
1.	Mr G V Subrahmanyam	Dy. CoE; SVEC(A8)	Member

The following are the minutes of the results committee meeting.

Item#1: B.Tech III Semester (V20) regular results march 2022 for the ac. year 2021-22.

The summary of the results

a. Branch Wise Performance Analysis

S.No	Branch	Registered	Passed	Fail	Pass
1	CE	67	37	30	55.22
2	ECT	69	35	34	50.72
3	EEE	135	75	60	55.56
4	ME	136	85	51	62.50
5	ECE	209	136	73	65.07
6	CSE	280	229	51	81.79
7	CST	70	59	11	84.29
Overall		**966**	**656**	**310**	**67.91**

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Appeared	Pass	Fail	Pass %
1.	V20CSL05	LINUX SHELL SCRIPTING LAB	350	350	0	100
2.	V20ECL03	ANALOG ELECTRONICS LABORATORY	135	135	0	100
3.	V20CSL31	DATA STRUCTURES LAB	278	277	1	99.64
4.	V20ECL01	ELECTRONIC DEVICES, CIRCUITS & ANALYSIS LAB	278	277	1	99.64
5.	V20SOC01	SKILL ORIENTED COURSE-I	966	962	4	99.59
6.	V20ENT02	PROFESSIONAL COMMUNICATION SKILLS-I	966	962	4	99.59
7.	V20CSL03	OOPS THROUGH C++ LAB	350	348	2	99.43
8.	V20CSL04	DATA STRUCTURES LAB	350	346	4	98.86
9.	V20MEL04	MACHINE DRAWING	136	134	2	98.53
10.	V20MEL03	MECHANICS OF SOLIDS & MATERIALS ENGINEERING LAB	136	134	2	98.53
11.	V20MEL02	FLUID MECHANICS & HYDRAULIC MACHINES LAB	136	134	2	98.53
12.	V20CEL02	SURVEYING LAB	67	66	1	98.51
13.	V20CEL03	CONCRETE TECHNOLOGY LAB	67	66	1	98.51
14.	V20ECL02	SIGNALS & SYSTEMS LAB	278	268	10	96.4
15.	V20MAT07	MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE	350	336	14	96
16.	V20CEL01	STRENGTH OF MATERIALS LAB	67	64	3	95.52
17.	V20CSL31	DATA STRUCTURES & ALGORITHMS LAB	135	128	7	94.81
18.	V20MBT51	MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS	486	459	27	94.44
19.	V20CET04	BUILDING MATERIALS & CONCRETE TECHNOLOGY	67	63	4	94.03
20.	V20EEL04	ELECTRICAL CIRCUITS LAB	135	126	9	93.33
21.	V20CST04	DATA STRUCTURES	350	325	25	92.86
22.	V20MAT04	PROBABILITY & STATISTICS	67	62	5	92.54
23.	V20MET04	MECHANICS OF SOLIDS	136	125	11	91.91
24.	V20CST05	COMPUTER ORGANIZATION AND ARCHITECTURE	350	319	31	91.14
25.	V20ECT06	ANALOG ELECTRONICS	135	122	13	90.37
26.	V20EET06	ELECTRICAL MACHINES-I	135	122	13	90.37
27.	V20ECT04	NETWORK THEORY	278	251	27	90.29
28.	V20CST03	OOPS THROUGH C++	350	314	36	89.71
29.	V20MET06	THERMODYNAMICS	136	116	20	85.29
30.	V20ECT02	ELECTRONIC DEVICES, CIRCUITS & ANALYSIS	278	237	41	85.25
31.	V20MAT03	COMPLEX ANALYSIS	278	235	43	84.53
32.	V20EET05	ELECTRO MAGNETIC FIELDS	135	113	22	83.7

33.	V20MET03	METALLURGY AND MATERIAL SCIENCE	136	111	25	81.62
34.	V20MAT05	TRANSFORM CALCULUS	135	108	27	80
35.	V20MAT06	PROBABILITY THEORY STOCHASTIC PROCESS	278	221	57	79.5
36.	V20CET03	SURVEYING AND GEOMATICS	67	53	14	79.1
37.	V20ECT05	SIGNALS & SYSTEMS	278	198	80	71.22
38.	V20MET05	FLUID MECHANICS WITH MACHINE LEARNING	136	95	41	69.85
39.	V20CET01	STRENGTH OF MATERIALS	67	46	21	68.66
40.	V20EET04	ELECTRICAL CIRCUIT ANALYSIS-II	135	91	44	67.41
41.	V20CET02	FLUID MECHANICS & HYDRAULICS	67	43	24	64.18

Details enclosed in annexure-I

Item#2: B Tech III Semester (V18) supplementary results march 2022 for the ac. year 2021-22.

The summary of the results

a. Program Wise Performance Analysis

S. No	Branch	No of Students Registered	No. of Courses			Course Wise Pass %
			Registered	Passed	Fail	
1.	CE	27	50	10	40	20
2.	EEE	26	54	15	39	27.78
3.	ME	36	68	17	51	25
4.	ECE	55	170	33	137	19.41
5.	CSE	45	81	16	65	19.75
6.	CST	15	36	6	30	16.67
7.	ECT	9	16	3	13	18.75
Overall		**213**	**475**	**100**	**375**	**21.05 %**

b. Course Wise Performance Analysis

S. No	Branch	Course Code	Course Name	Appeared	Passed	Fail	Pass %
1.	CE	V18CEL02	MATERIAL TESTING LAB	1	1	0	100
2.	CE	V18CET04	STRENGTH OF MATERIALS-I	24	6	18	25
3.	CE	V18CET10	INTRODUCTION TO FLUID MECHANICS	4	1	3	25
4.	CE	V18CET35	PRINCIPLES OF ENVIRONMENTAL SCIENCE & ENGINEERING	2	0	2	0
5.	CE	V18CET36	BUILDING MATERIALS PLANNING & CONSTRUCTION	3	1	2	33.33
6.	CE	V18EEL01	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB	2	1	1	50
7.	CE	V18EET01	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	12	0	12	0
8.	CE	V18MAT04	PROBABILITY AND STATISTICS	2	0	2	0
9.	EEE	V18ECT05	ANALOG ELECTRONICS	20	1	19	5
10.	EEE	V18EET03	ELECTRICAL CIRCUIT ANALYSIS-1	2	1	1	50
11.	EEE	V18EET04	ELECTRICAL MACHINES-1	10	6	4	60
12.	EEE	V18EET05	ELECTRO MAGNETIC FIELDS	12	7	5	58.33
13.	EEE	V18EET06	ELECTRICAL AND ELECTRONIC MEASUREMENTS	10	0	10	0
14.	ME	V18ENT03	PROFESSIONAL COMMUNICATION SKILLS-1	1	0	1	0
15.	ME	V18MAT04	PROBABILITY & STATISTICS	2	1	1	50
16.	ME	V18MEL03	FLUID MECHANICS & FLUID MACHINES LAB	1	0	1	0
17.	ME	V18MET03	ENGINEERING MECHANICS	9	2	7	22.22
18.	ME	V18MET04	THERMODYNAMICS	21	12	9	57.14
19.	ME	V18MET05	FLUID MECHANICS & FLUID MACHINES	15	0	15	0
20.	ME	V18MET09	MATERIALS ENGINEERING	19	2	17	10.53
21.	ECE	V18ECL01	ELECTRONICS DEVICES & CIRCUITS LAB	2	2	0	100
22.	ECE	V18ECL02	DIGITAL SYSTEM DESIGN LAB	1	1	0	100
23.	ECE	V18ECT01	ELECTRONICS DEVICES & CIRCUITS	31	7	24	22.58
24.	ECE	V18ECT02	DIGITAL SYSTEM DESIGN	19	1	18	5.26
25.	ECE	V18ECT03	SIGNALS & SYSTEMS	44	9	35	20.45
26.	ECE	V18ECT04	NETWORK THEORY	39	3	36	7.69
27.	ECE	V18ENT03	PROFESSIONAL COMMUNICATION SKILL-1	1	0	1	0
28.	ECE	V18ENT11	CONSTITUTION OF INDIA	20	0	20	0
29.	ECE	V18MBT51	MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS	13	10	3	76.92
30.	CSE	V18CST02	DATA STRUCTURES AND ALGORITHMS	12	4	8	33.33
31.	CSE	V18CST03	DISCRETE MATHEMATICS	15	2	13	13.33
32.	CSE	V18CST04	OBJECT ORIENTED PROGRAMMING FOR	17	1	16	5.88

			PROBLEM SOLVING				
33.	CSE	V18ECT06	DIGITAL ELECTRONICS	30	7	23	23.33
34.	CSE	V18MAT04	PROBABILITY & STATISTICS	7	2	5	28.57
35.	CST	V18CST02	DATA STRUCTURES AND ALGORITHMS	6	1	5	16.67
36.	CST	V18CST03	DISCRETE MATHEMATICS	5	1	4	20
37.	CST	V18CST04	OBJECT ORIENTED PROGRAMMING FOR PROBLEM SOLVING	11	2	9	18.18
38.	CST	V18ECT06	DIGITAL ELECTRONICS	11	1	10	9.09
39.	CST	V18ENT03	PROFESSIONAL COMMUNICATION SKILLS – I	1	1	0	100
40.	CST	V18MAT04	PROBABILITY & STATISTICS	2	0	2	0
41.	ECT	V18ECT01	ELECTRONIC DEVICES & CIRCUITS	4	0	4	0
42.	ECT	V18ECT02	DIGITAL SYSTEM DESIGN	2	0	2	0
43.	ECT	V18ECT03	SIGNALS & SYSTEMS	5	3	2	60
44.	ECT	V18ECT04	NETWORK THEORY	2	0	2	0
45.	ECT	V18ENT11	CONSTITUTION OF INDIA	3	0	3	0

Details enclosed in annexure-II

Item#3: B Tech II Semester (V18 & V20) supplementary examinations march 2022 for the ac. year 2021-22.

The summary of the results

a. Branch Wise Performance Analysis

S. No	Branch	No of Students Registered	No. of Courses			Course Wise Pass %
			Registered	Passed	Fail	
1.	CE	29	48	16	32	33.33
2.	EEE	55	123	50	73	40.65
3.	ME	78	161	28	133	17.39
4.	ECE	56	116	31	85	26.72
5.	CSE	80	144	27	117	18.75
6.	CST	21	30	9	21	30
7.	ECT	18	27	12	15	44.44
Overall		**337**	**649**	**173**	**476**	**26.66%**

b. Course Wise Performance Analysis

S.No	Regln.	Branch	Course Code	Course Name	Appeared	Passed	Fail	Pass %
1.	V18	CE	V18MAT02	ENGINEERING MATHEMATICS–II	1	0	1	0
2.	V18	CE	V18MET03	ENGINEERING MECHANICS	4	2	2	50
3.	V18	CE	V18PHT01	OPTICS AND WAVES	3	0	3	0
4.	V20	CE	V20CHT01	ENGINEERING CHEMISTRY	6	1	5	16.67
5.	V20	CE	V20EEL02	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB	3	3	0	100
6.	V20	CE	V20EET02	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	12	2	10	16.67
7.	V20	CE	V20ENL02	HONE YOUR COMMUNICATION SKILLS LAB-II	1	1	0	100
8.	V20	CE	V20MAT02	NUMERICAL METHODS AND VECTOR CALCULUS	10	5	5	50
9.	V20	CE	V20MEL01	ENGINEERING WORKSHOP	1	1	0	100
10.	V20	CE	V20MET02	ENGINEERING MECHANICS	7	1	6	14.29
11.	V18	EEE	V18MAT02	ENGINEERING MATHEMATICS-II	1	0	1	0
12.	V18	EEE	V18MET02	INTRODUCTION TO ENGINEERING MECHANICS	6	2	4	33.33
13.	V20	EEE	V20CHT02	ENVIRONMENTAL STUDIES	6	0	6	0
14.	V20	EEE	V20ECT01	SWITCHING THEORY AND LOGIC DESIGN	27	8	19	29.63
15.	V20	EEE	V20EEL03	ELECTRICAL ENGINEERING WORKSHOP	3	3	0	100
16.	V20	EEE	V20EET03	ELECTRICAL CIRCUIT ANALYSIS-I	39	22	17	56.41
17.	V20	EEE	V20ENL02	HONE YOUR COMMUNICATION SKILLS LAB-II	1	0	1	0
18.	V20	EEE	V20MAT02	NUMERICAL METHODS AND VECTOR CALCULUS	20	9	11	45
19.	V20	EEE	V20MET01	ENGINEERING GRAPHICS	13	2	11	15.38
20.	V20	EEE	V20PHL01	ENGINEERING PHYSICS LAB	4	4	0	100
21.	V20	EEE	V20PHT01	ENGINEERING PHYSICS	3	0	3	0
22.	V18	ME	V18CHT01	ENGINEERING CHEMISTRY	16	1	15	6.25
23.	V18	ME	V18CST01	PROGRAMMING IN C FOR PROBLEM SOLVING	22	1	21	4.55
24.	V18	ME	V18ENT02	ENGLISH-II	1	0	1	0
25.	V18	ME	V18MAT02	ENGINEERING MATHEMATICS-II	3	1	2	33.33
26.	V18	ME	V18MET01	ENGINEERING GRAPHICS	3	1	2	33.33
27.	V20	ME	V20CHT01	ENGINEERING CHEMISTRY	14	1	13	7.14
28.	V20	ME	V20EEL02	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB	5	3	2	60
29.	V20	ME	V20EET02	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	21	2	19	9.52
30.	V20	ME	V20MAT02	NUMERICAL METHODS AND VECTOR CALCULUS	41	15	26	36.59
31.	V20	ME	V20MET02	ENGINEERING MECHANICS	35	3	32	8.57

32.	V18	ECE	V18CHT02	ENVIRONMENTAL STUDIES	1	0	1	0
33.	V18	ECE	V18EET02	BASIC ELECTRICAL ENGINEERING	9	0	9	0
34.	V18	ECE	V18MAT02	ENGINEERING MATHEMATICS-II	2	0	2	0
35.	V18	ECE	V18PHT02	OPTO ELECTRONICS AND SEMI CONDUCTORS	5	1	4	20
36.	V20	ECE	V20CHL01	ENGINEERING CHEMISTRY LAB	3	3	0	100
37.	V20	ECE	V20CHT01	ENGINEERING CHEMISTRY	15	3	12	20
38.	V20	ECE	V20CSL01	PROGRAMMING LAB IN C FOR PROBLEM SOLVING	4	3	1	75
39.	V20	ECE	V20CST01	PROGRAMMING IN C FOR PROBLEM SOLVING	19	0	19	0
40.	V20	ECE	V20ECT01	SWITCHING THEORY AND LOGIC DESIGN	30	3	27	10

Details enclosed in annexure-III

Item#4: Revaluation results of B Tech IV Semester (V18) Supplementary examinations – February-2022 for the ac. year 2021-22.

The summary of the results

a. Branch Wise Performance Analysis

S. No.	Branch	Revaluation(No of Courses)			
		Applied	Change	No Change	Pass %
1.	CE	3	0	3	---
2.	EEE	1	0	1	---
3.	ME	11	1	10	9.09
4.	ECE	6	0	6	--
5.	CSE	15	3	12	20.00
6.	CST	8	5	3	62.5
7	ECT	1	0	1	-

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Applied	Change	No change
1.	V18CET13	Strength Of Materials-II	3	0	3
2.	V18CST05	Computer Organization	5	1	4
3.	V18CST06	Software Engineering	1	1	0
4.	V18CST07	Formal Languages and Automata Theory	4	0	4
5.	V18CST08	Java Programming	4	1	3

6.	V18CST09	Python Programming	15	7	8
7.	V18ECT07	Analog & Digital Communications	2	0	2
8.	V18ECT08	Analog Circuits	2	0	2
9.	V18ECT09	Probability Theory &stochastic Process	3	0	3
10	V18ECT10	Electromagnetic Waves and Transmission Lines	2	0	2
11	V18EET08	Digital Electronics	1	0	1
12	V18ENT11	Constitution of India	9	1	8
13	V18MET8	Mechanics of Solids	7	0	7

Details enclosed in annexure-IV

Item#5: MBA II Semester (V18) Supplementary examinations – March-2022 for the ac. year 2021-22.

The summary of the results

b. Program Wise Performance Analysis

S. No	Program	No of Students Registered	No. of Courses			Course Wise Pass %
			Registered	Passed	Fail	
1.	MBA	4	5	4	1	80.00

c. Course Wise Performance Analysis

S. No	Regln.	Course Code	Course Name	Appeared	Passed	Fail	Pass %
1.	V18	V18ENT14	EMPLOYABILITY SKILLS-II (SOFTSKILLS)	4	3	1	75
2.	V18	V18MBT10	PRODUCTION AND OPERATIONS MANAGEMENT	1	1	0	100

Details enclosed in annexure-V

Item#6: M.Tech II Semester (V18) Supplementary examinations – March-2022 for the ac. year 2021-22.

The summary of the results

a. Speclazation Wise Performance Analysis

S. No	Speclz	No of Students Registered	No. of Courses			Course Wise Pass %
			Registered	Passed	Fail	
1.	MD	1	2	2	0	100
2.	STE	3	7	4	3	57.1

b. Course Wise Performance Analysis

S. No	Regln.	Course Code	Course Name	Appeared	Passed	Fail	Pass %
1.	V18	V18MDT13	THEORY OF PLASTICITY	1	1	0	100
2.	V18	V18MDT14	FINITE ELEMENT METHOD	1	1	0	100
3.	V18	V18SET12	STABILITY OF STRUCTURES	2	1	1	50
4	V18	V18SET19	EARTH RETAINING STRUCTURES	2	0	2	0
5.	V18	V18SET16	ADVANCED CONCRETE TECHNOLOGY	1	1	0	100
6.	V18	V18SEL02	CAD LABORATORY	2	2	0	100

Details enclosed in annexure-VI

- The committee has approved the results and accorded the permission for publication of the same.

S.No	Name	Designation	Member Role	Signature
1.	Dr.Guduru VNSR Ratnakara Rao	Principal, SVEC(A8)	Chairman	
2.	Dr. P Vinay Kumar	Addl.Controller of Examinations-JNTU Kakinada	University Nominee	
3.	Dr.M.Thamarai	Professor/ECE, SVEC(A8)	Member	
4.	Mr.V.S.R.Gopala Krishna Ch	CoE, SVEC(A8)	Member	

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Approved by AICTE, New Delhi and Permanently Affiliated to JNTUK, Kakinada
Pedatadepalli, TADEPALLIGUDEM – 534 101, W.G. Dist, (A.P.)

Dt: 25/05/2022

Minutes of the Meeting of the Result Committee

The Sri Vasavi Engineering College (Autonomous) result committee meeting was held on 18-05-2022 at 04:00 PM through online mode using Zoom application.

Link: https://us02web.zoom.us/j/86529517980

The following members were present in the meeting.

S.No	Name	Designation	Member Role
1.	Dr.Guduru VNSR Ratnakara Rao	Principal	Chairman
2.	Dr. P Vinay Kumar	Addl.Controller of Examinations-JNTU Kakinada	University Nominee
3.	Dr.M.Thamarai	Prof./ECE- SVEC(A8)	Member
4.	Mr V.S.R.Gopala Krishna Ch	CoE; SVEC(A8)	Member
5.	Mr G V Subrahmanyam	Dy. CoE; SVEC(A8)	Member

The following are the minutes of the results committee meeting.

Item#1: B.Tech I Semester (V20) regular results April- 2022 for the ac. year 2021-22.

The summary of the results

a. Branch Wise Performance Analysis

S.No	Branch	Registered	Passed	Fail	Pass
1	CE	49	28	21	57.14
2	EEE	104	89	15	85.58
3	ME	80	53	27	66.25
4	ECE	198	174	24	87.88
5	CSE	264	253	11	95.83
6	CST	65	54	11	83.08
7	ECT	66	55	11	83.33
8	CSE-AI	66	62	4	93.94
9	AI & ML	66	62	4	93.94
Overall		**958**	**830**	**128**	**86.64**

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Appeared	Pass	Fail	Pass %
1.	V20CHL01	ENGINEERING CHEMISTRY LAB	433	432	1	99.77
2.	V20EEL01	BASIC ELECTRICAL ENGINEERING LAB	264	263	1	99.62
3.	V20ENL01	HONE YOUR COMMUNICATION SKILLS LAB-1	958	954	4	99.58
4.	V20MEL01	ENGINEERING WORKSHOP	433	430	3	99.31
5.	V20ENT01	ENGLISH FOR PROFESSIONAL ENHANCEMENT	959	947	12	98.75
6.	V20PHL01	ENGINEERING PHYSICS LAB	394	389	5	98.73
7.	V20MAT09	DESCRIPTIVE STATISTICS	132	130	2	98.48
8.	V20AIL02	STATISTICAL VISUALIZATION USING R LAB	132	130	2	98.48
9.	V20AIL01	COMPUTER ENGINEERING WORKSHOP	132	129	3	97.73
10.	V20CSL01	PROGRAMMING LAB IN C FOR PROBLEM SOLVING	695	674	21	96.98
11.	V20MAT01	LINEAR ALGEBRA AND DIFFERENTIAL EQUATIONS	972	922	50	94.86
12.	V20CHT01	ENGINEERING CHEMISTRY	452	423	29	93.58
13.	V20MET01	ENGINEERING GRAPHICS	415	388	27	93.49
14.	V20PHT01	ENGINEERING PHYSICS	403	369	34	91.56
15.	V20CST01	PROGRAMMING IN C FOR PROBLEM SOLVING	706	643	63	91.08
16.	V20EET01	BASIC ELECTRICAL ENGINEERING	272	247	25	90.81
17.	V20CHT02	ENVIRONMENTAL STUDIES	405	367	38	90.62

Details enclosed in annexure-I

Item#2: B Tech I Semester (V18) supplementary results April 2022 for the ac. year 2021-22.

The summary of the results

a. Program Wise Performance Analysis

S. No	Branch	No of Students Registered	No. of Courses			Course Wise Pass %
			Registered	Passed	Fail	
1.	CE	9	11	6	5	54.5
2.	EEE	14	16	6	10	37.5
3.	ME	9	15	2	13	13.3
4.	ECE	26	53	21	32	39.6
5.	CSE	19	29	1	28	3.4
6.	CST	1	2	1	1	50
7.	ECT	3	3	3	0	100
Overall		**81**	**129**	**40**	**89**	**37.98**

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Appeared	Pass	Fail	Pass %
1.	V18MAT01	ENGINEERING MATHEMATICS-I	1	1	0	100
2.	V18EEL01	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB	1	1	0	100
3.	V18CHL01	ENGINEERING CHEMISTRY LAB	2	2	0	100
4.	V18CSL01	PROGRAMMING LAB IN C FOR PROBLEM SOLVING	3	2	1	66.67
5.	V18CST01	PROGRAMMING IN C FOR PROBLEM SOLVING	33	21	12	63.64
6.	V18CHT01	ENGINEERING CHEMISTRY	27	9	18	33.33
7.	V18MET01	ENGINEERING GRAPHICS	14	2	12	14.29
8.	V18CHT02	ENVIRONMENTAL STUDIES	7	1	6	14.29
9.	V18EET01	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	22	1	21	4.55

Details enclosed in annexure-II

Item#3: B Tech VII Semester (V18) supplementary examinations April 2022 for the ac. year 2021-22.

The summary of the results

a. Branch Wise Performance Analysis

S. No	Branch	No of Students Registered	No. of Courses			Course Wise Pass %
			Registered	Passed	Fail	
1.	CE	9	15	7	8	46.67
2.	EEE	12	16	12	4	75.00
3.	ME	19	29	22	7	75.86
4.	ECE	34	69	32	37	46.38
5.	CSE	21	42	20	22	47.62
Overall		95	171	93	78	**54.39 %**

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Appeared	Passed	Fail	Pass %
1.	V18CET25	ESTIMATION, SPECIFICATION AND CONTRACTS	2	1	1	50.0
2.	V18CET26	ENVIRONMENTAL ENGINEERING-II	7	3	4	42.9
3.	V18CET29	IRRIGATION ENGINEERING	3	1	2	33.3
4.	V18CET34	CONSTRUCTION PROJECT PLANNING & SYSTEMS	1	1	0	100.0
5.	V18CETOE3	ENVIRONMENTAL POLLUTION AND CONTROL	8	4	4	50.0
6.	V18CST27	ADVANCED JAVA AND WEB TECHNOLOGIES	11	2	9	18.2
7.	V18CST31	HUMAN COMPUTER INTERACTION	6	2	4	33.3
8.	V18CST32	DISTRIBUTED SYSTEMS	13	10	3	76.9
9.	V18CSTOE4	OPERATING SYSTEMS	6	2	4	33.3
10.	V18CSTOE5	ARTIFICIAL INTELLIGENCE	7	7	0	100.0

11.	V18ECT20	RADAR ENGINEERING	6	4	2	66.7
12.	V18ECT21	OPTICAL COMMUNICATION	14	7	7	50.0
13.	V18ECT22	DIGITAL IMAGE PROCESSING	24	11	13	45.8
14.	V18ECT24	IOT: USE CASES	8	4	4	50.0
15.	V18ECT29	SYSTEM DESIGN THROUGH VERILOG	12	5	7	41.7
16.	V18EEL10	POWER SYSTEMS LABORATORY	1	1	0	100.0
17.	V18EET26	POWER SYSTEM OPERATION AND CONTROL	7	5	2	71.4
18.	V18EET29	HIGH VOLTAGE ENGINEERING	4	3	1	75.0
19.	V18EET34	ELECTRICAL MACHINE MODELLING ANALYSIS	4	3	1	75.0
20.	V18MBT52	MANAGEMENT SCIENCE	4	2	2	50.0
21.	V18MET20	AUTOMATION IN MANUFACTURING	6	4	2	66.7
22.	V18MET21	OPERATION RESEARCH	9	6	3	66.7
23.	V18MET24	REFRIGERATION & AIR CONDITIONING	2	1	1	50.0
24.	V18MET27	MICRO ELECTRO MECHANICAL SYSTEMS	5	4	1	80.0

Details enclosed in annexure-III

Item#4: Revaluation results of B Tech V Semester (V18) Regular and Supplementary examinations – February-2022 for the ac. year 2021-22.

The summary of the results

a. Branch Wise Performance Analysis

S. No.	Branch	Revaluation(No of Courses)			
		Applied	Change	No Change	Pass %
1.	CE	11	2	9	18.2
2.	EEE	9	0	9	---
3.	ME	10	5	5	50.0
4.	ECE	19	5	14	26.3
5.	CSE	21	10	11	47.6
6.	CST	9	3	6	33.3
7	ECT	4	0	4	---

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Applied	Change	No change
1.	V18CET15	STRUCTURAL ANALYSIS-I	4	0	4
2.	V18CET16	GEOTECHNICAL ENGINEERING-I	4	0	4
3.	V18CET17	HYDROLOGY & WATER RESOURCES ENGINEERING	1	1	0
4.	V18CET18	DESIGN OF REINFORCED CONCRETE STRUCTURES	2	1	1
5.	V18CST10	DATABASE MANAGEMENT SYSTEMS	4	0	4
6.	V18CST12	OPERATING SYSTEMS	1	0	1
7.	V18CST13	DESIGN AND ANALYSIS OF ALGORITHMS	2	0	2
8.	V18CST14	UNIX PROGRAMMING	3	2	1
9.	V18CST17	ARTIFICIAL INTELLIGENCE	19	10	9

10	V18CST81	DATA STRUCTURES & ALGORITHMS	4	1	3
11	V18ECT11	VLSI DESIGN	2	1	1
12	V18ECT12	MICROPROCESSORS & MICROCONTROLLERS	9	1	8
13	V18ECT13	ANTENNA & WAVE PROPAGATION	7	1	6
14	V18ECT15	ENGINEER & SOCIETY	1	0	1
15	V18EET12	SWITCHGEAR & PROTECTION	2	0	2
16	V18EET13	POWER ELECTRONICS	1	0	1
17	V18EET14	POWER SYSTEM ANALYSIS	1	0	1
18	V18EET15	CONTROL SYSTEMS	2	1	1
19	V18EET16	SIGNALS & SYSTEMS	4	0	4
20	V18MBT51	MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS	1	0	1
21	V18MBT53	ORGANIZATIONAL BEHAVIOR	1	1	0
22	V18MET13	HEAT TRANSFER	2	2	0
23	V18MET15	THEORY OF MACHINES-II	1	0	1
24	V18MET16	DESIGN OF MACHINE ELEMENTS-I	6	2	4
25	V18MET46	INTELLECTUAL PROPERTY RIGHTS AND PATENTS	1	1	0

Details enclosed in annexure-IV

- The committee has approved the results and accorded the permission for publication of the same.

S.No	Name	Designation	Member Role	Signature
1.	Dr.Guduru VNSR Ratnakara Rao	Principal, SVEC(A8)	Chairman	
2.	Dr. P Vinay Kumar	Addl.Controller of Examinations-JNTU Kakinada	University Nominee	
3.	Dr.M.Thamarai	Professor/ECE, SVEC(A8)	Member	
4.	Mr.V.S.R.Gopala Krishna Ch	CoE, SVEC(A8)	Member	
5.	Mr G V Subrahmanyam	Dy. CoE; SVEC(A8)	Member	

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Dt: 30/06/2022

Minutes of the Meeting of the Result Committee

The Sri Vasavi Engineering College (Autonomous) result committee meeting was held on 30-06-2022 at 10:00 AM through online mode using Zoom application.
Link: https://us02web.zoom.us/j/89207815112

The following members were present in the meeting.

S.No	Name	Designation	Member Role
1.	Dr.Guduru VNSR Ratnakara Rao	Principal	Chairman
2.	Dr. P Vinay Kumar	Addl.Controller of Examinations-JNTU Kakinada	University Nominee
3.	Dr.M.Thamarai	Prof./ECE- SVEC(A8)	Member
4.	Mr V.S.R.Gopala Krishna Ch	CoE; SVEC(A8)	Member
5.	Mr G V Subrahmanyam	Dy. CoE; SVEC(A8)	Member

The following are the minutes of the results committee meeting.

Item#1: MBA III Semester (V18) regular and Supplementary results March- 2022 for the ac. year 2021-22.

The summary of the results

a. Program Wise Performance Analysis

S.No	Program	Registered	Passed	Fail	Pass
1	MBA	91	78	13	**85.71**

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Appeared	Pass	Fail	Pass %
1.	V18MBT14	BUSINESS POLICY & CORPORATE STRATEGY	91	91	0	100
2.	V18MBT15	ENTREPRENEURSHIP DEVELOPMENT	91	91	0	100

3.	V18MBT16	E-BUSINESS	91	91	0	100
4.	V18MBT17	CONSUMER BEHAVIOR	18	18	0	100
5.	V18MBT18	RETAIL MANAGEMENT	18	17	1	94.44
6.	V18MBT19	INTEGRATED MARKETING COMMUNICATION	18	18	0	100
7.	V18MBT20	PRODUCT & BRAND MANAGEMENT	18	18	0	100
8.	V18MBT21	SECURITY ANALYSIS & PORTFOLIO MANAGEMENT	39	39	0	100
9.	V18MBT22	ADVANCE MANAGEMENT ACCOUNTING	39	39	0	100
10.	V18MBT23	FINANCIAL MARKETS & SERVICES	39	39	0	100
11.	V18MBT24	BANKING & INSURANCE MANAGEMENT	39	39	0	100
12.	V18MBT25	HUMAN RESOURCE PLANNING & DEVELOPMENT	34	34	0	100
13.	V18MBT26	COMPENSATION AND REWARD MANAGEMENT	34	34	0	100
14.	V18MBT27	PERFORMANCE MANAGEMENT	34	33	1	97.05
15.	V18MBT28	STRATEGIC HUMAN RESOURCE MANAGEMENT	34	34	0	100
16.	V18MAT07	EMPLOYABILITY SKILLS III (APTITUDE-I)	91	78	13	85.71
17.	V18MBP01	MINI PROJECT	48	48	0	100
18.	V18MBM01	MOOCS	43	43	0	100

Details enclosed in annexure-I

Item#2: M Tech III Semester (V18) Regular and supplementary results March 2022 for the ac. year 2021-22.

The summary of the results

a. Specialization Wise Performance Analysis

S.No	Speclz	Registered	Passed	Fail	Pass
1	MD	5	3	2	**60.00**
2	PSC & AE	5	4	1	**80.00**
3	STE	4	1	3	**25.00**
4	VLSI & ES	14	14	0	**100.00**
5	CSE	8	8	0	**100**
Over All		36	30	6	**83.33**

b. Course Wise Performance Analysis

S. No	Specl	Course Code	Course Name	Appeared	Pass	Fail	Pass %
1.	MD	V18MDT43	MOOCS	5	3	2	60.00
2.	MD	V18MDT44	COMPREHENSIVE VIVA-VOCE	5	5	0	100
3.	PSCA &E	V18PST43	MOOCS	5	5	0	100
4.	PSCA &E	V18PST44	COMPREHENSIVE VIVA-VOCE	5	4	1	80.00
5.	STE	V18SET43	MOOCS	4	1	3	25.00
6.	STE	V18SET44	COMPREHENSIVE VIVA-VOCE	4	4	0	100
7.	VLSI& ES	V18VLT43	MOOCS	14	14	0	100
8.	VLSI& ES	V18VLT44	COMPREHENSIVE VIVA-VOCE	14	14	0	100
9.	CSE	V18CTT43	MOOCS	8	8	0	100
10.	CSE	V18CTT44	COMPREHENSIVE VIVA-VOCE	8	8	0	100

Details enclosed in annexure-II

Item#3: Revaluation results B Tech I Semester (V20 & V18) Regular and supplementary examinations April 2022 for the ac. year 2021-22.

The summary of the results

a. Branch Wise Performance Analysis

S. No.	Branch	Revaluation(No of Courses)			
		Applied	Change	No Change	Pass %
1.	CE	6	1	5	16.66
2.	EEE	3	1	2	33.33
3.	ME	6	4	2	66.66
4.	ECE	3	1	2	33.33
5.	CSE	14	4	10	28.57
6.	CST	1	0	1	---
7	ECT	1	0	1	---
8	CSE(AI)	4	3	1	75.00

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Applied	Change	No change
1.	V18CHT02	ENVIRONMENTAL STUDIES	1	0	1
2.	V18CST01	PROGRAMMING IN C FOR PROBLEM SOLVING	1	0	1
3.	V18MET01	ENGINEERING GRAPHICS	1	0	1
4.	V18PHT02	OPTO ELECTRONICS AND SEMI CONDUCTORS	1	0	1
5.	V20CHT01	ENGINEERING CHEMISTRY	9	2	7
6.	V20CHT02	ENVIRONMENTAL STUDIES	1	0	1
7.	V20CST01	PROGRAMMING IN C FOR PROBLEM SOLVING	12	5	7
8.	V20EET01	BASIC ELECTRICAL ENGINEERING	1	0	1

9.	V20ENT01	ENGLISH FOR PROFESSIONAL ENHANCEMENT	1	0	1
10.	V20MAT09	DESCRIPTIVE STATISTICS	1	1	0
11.	V20MET01	ENGINEERING GRAPHICS	2	1	1
12.	V20PHT01	ENGINEERING PHYSICS	6	3	3

Details enclosed in annexure-III

Item#4: Revaluation results of B Tech II Semester (V20 & V18) Supplementary examinations – March-2022 for the ac. year 2021-22.

The summary of the results

a. Branch Wise Performance Analysis

S. No.	Branch	Revaluation(No of Courses)			
		Applied	Change	No Change	Pass %
1.	CE	3	2	1	66.66
2.	EEE	2	1	1	50.00
3.	ME	3	1	2	33.33
4.	ECE	4	0	4	----
5.	CSE	6	0	6	----
6.	CST	4	1	3	33.3
7	ECT	6	0	6	---

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Applied	Chage	No change
1.	V18MET03	ENGINEERING MECHANICS	1	1	0
2.	V20CHT01	ENGINEERING CHEMISTRY	5	0	5
3.	V20CHT02	ENVIRONMENTAL STUDIES	2	1	1
4.	V20CST01	PROGRAMMING IN C FOR PROBLEM SOLVING	1	0	1

5.	V20CST02	PYTHON PROGRAMMING	4	0	4
6.	V20ECT01	SWITCHING THEORY AND LOGIC DESIGN	9	0	9
7.	V20MAT02	NUMERICAL METHODS AND VECTOR CALCULUS	3	1	2
8.	V20MET02	ENGINEERING MECHANICS	3	2	1

Details enclosed in annexure-IV

Item#5: Revaluation results of B Tech III Semester (V20 & V18) Regular and Supplementary examinations – March-2022 for the ac. year 2021-22.

The summary of the results

b. Branch Wise Performance Analysis

S. No.	Branch	Revaluation(No of Courses)			
		Applied	Change	No Change	Pass %
1.	CE	12	4	8	33.33
2.	EEE	8	2	6	25.00
3.	ME	18	7	11	38.88
4.	ECE	60	25	35	41.66
5.	CSE	36	16	20	44.44
6.	CST	6	2	4	33.33
7	ECT	16	5	11	45.45

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Applied	Change	No change
1.	V18CET04	STRENGTH OF MATERIALS-I	2	1	1
2.	V18CST04	OBJECT ORIENTED PROGRAMMING FOR PROBLEM	1	0	1
3.	V18ECT03	SIGNALS & SYSTEMS	3	0	3
4.	V18ECT04	NETWORK THEORY	5	1	4
5.	V18ECT05	ANALOG ELECTRONICS	1	1	0

6.	V18EET01	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	5	1	4
7.	V18EET06	ELECTRICAL AND ELECTRONIC MEASUREMENTS	1	1	0
8.	V18MET09	MATERIALS ENGINEERING	1	1	0
9.	V20CET02	FLUID MECHANICS & HYDRAULICS	5	2	3
10.	V20CST03	OOPS THROUGH C++	16	6	10
11.	V20CST04	DATA STRUCTURES	14	10	4
12.	V20CST05	COMPUTER ORGANIZATION AND ARCHITECTURE	3	1	2
13.	V20ECT02	ELECTRONIC DEVICES, CIRCUITS & ANALYSIS	9	6	3
14.	V20ECT04	NETWORK THEORY	5	3	2
15.	V20ECT05	SIGNALS & SYSTEMS	21	9	12
16.	V20EET04	ELECTRICAL CIRCUIT ANALYSIS-II	3	0	3
17.	V20EET05	ELECTRO MAGNETIC FIELDS	1	0	1
18.	V20MAT03	COMPLEX ANALYSIS	15	4	11
19.	V20MAT05	TRANSFORM CALCULUS	2	0	2
20.	V20MAT06	PROBABILITY THEORY STOCHASTIC PROCESS	18	7	11
21.	V20MAT07	MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE	5	0	5
22.	V20MBT51	MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS	6	2	4
23.	V20MET03	METALLURGY AND MATERIAL SCIENCE	4	2	2
24.	V20MET04	MECHANICS OF SOLIDS	1	0	1
25.	V20MET05	FLUID MECHANICS WITH MACHINE LEARNING	8	3	5

26.	V20MET06	THERMODYNAMICS	1	0	1

Details enclosed in annexure-V

Item#6: Revaluation results of B Tech VII Semester (V18) Supplementary examinations – April-2022 for the ac. year 2021-22.

The summary of the results

c. Branch Wise Performance Analysis

S. No.	Branch	Revaluation(No of Courses)			
		Applied	Change	No Change	Pass %
1.	ECE	3	3	0	100
2.	CSE	2	2	0	100

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Applied	Change	No change
1.	V18CSTOE4	4OPERATING SYSTEMS	1	1	0
2.	V18ECT22	DIGITAL IMAGE PROCESSING	2	2	0
3.	V18CETOE3	ENVIRONMENTAL POLLUTION AND CONTROL	2	2	0

Details enclosed in annexure-VI

Item#7: Revaluation results of M Tech II Semester (V18) Supplementary examinations – April-2022 for the ac. year 2021-22.

The summary of the results

d. Specialization Wise Performance Analysis

S. No.	Speclz	Revaluation(No of Courses)			
		Applied	Change	No Change	Pass %
1.	STE	2	0	2	---

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Applied	Change	No change
1.	V18SET12	STABILITY OF STRUCTURES	1	0	1

2.	V18SET19	EARTH RETAINING STRUCTURES	1	0	1

Details enclosed in annexure-VII

- The committee has approved the results and accorded the permission for publication of the same.

S.No	Name	Designation	Member Role	Signature
1.	Dr.Guduru VNSR Ratnakara Rao	Principal, SVEC(A8)	Chairman	
2.	Dr. P Vinay Kumar	Addl.Controller of Examinations-JNTU Kakinada	University Nominee	
3.	Dr.M.Thamarai	Professor/ECE, SVEC(A8)	Member	
4.	Mr.V.S.R.Gopala Krishna Ch	CoE, SVEC(A8)	Member	
5.	Mr G V Subrahmanyam	Dy. CoE; SVEC(A8)	Member	

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Approved by AICTE, New Delhi and Permanently Affiliated to JNTUK, Kakinada

Pedatadepalli, TADEPALLIGUDEM – 534 101, W.G. Dist, (A.P.)

Dt: 07/07/2022

Minutes of the Meeting of the Result Committee

The Sri Vasavi Engineering College (Autonomous) result committee meeting was held on 05-07-2022 at 04:30 PM through online mode using Zoom application.

Link: https://us02web.zoom.us/j/82768898652

The following members were present in the meeting.

S.No	Name	Designation	Member Role
1.	Dr.Guduru VNSR Ratnakara Rao	Principal	Chairman
2.	Dr. P Vinay Kumar	Addl.Controller of Examinations-JNTU Kakinada	University Nominee
3.	Dr.M.Thamarai	Prof./ECE- SVEC(A8)	Member
4.	Mr V.S.R.Gopala Krishna Ch	CoE; SVEC(A8)	Member
5.	Mr G V Subrahmanyam	Dy. CoE; SVEC(A8)	Member

The following are the minutes of the results committee meeting.

Item#1: B Tech VIII Semester (V18) Regular results June- 2022 for the ac. year 2021-22.

The summary of the results

a. Branch Wise Performance Analysis

S.No	Branch	Registered	Passed	Fail	Pass
1	CE	60	40	20	**66.67**
2	EEE	118	118	0	**100**
3	ME	121	104	17	**85.95**
4	ECE	190	171	19	**90.00**
5	CSE	251	242	9	**96.41**
Overall		**740**	**675**	**65**	**91.22**

b. Course Wise Performance Analysis

S No	Branch	Course Code	Course Name	Appeared	Pass	Fail	Pass %
1.	CE	V18CET43	PRE-STRESSED CONCRETE	60	45	15	75.00
2.	CE	V18CET49	GROUND IMPROVEMENT TECHNIQUES	60	48	12	80.00
3.	CE	V18CSTOE7	SOFTWARE TESTING METHODOLOGIES	60	58	02	96.67
4.	CE	V18CEP02	PROJECT WORK PART-B	60	60	0	100
5.	EEE	V18EET36	ELECTRICAL DISTRIBUTION SYSTEMS	118	118	0	100
6.	EEE	V18EET41	ENERGY STORAGE AND MANAGEMENT	118	118	0	100
7.	EEE	V18CSTOE9	COMPUTER GRAPHICS	118	118	0	100
8.	EEE	V18EEP02	PROJECT WORK PART-B	118	118	0	100
9.	ME	V18MET28	AUTOMOBILE ENGINEERING	121	116	5	95.86
10.	ME	V18MET32	NON-DESTRUCTIVE EVALUATION	121	114	7	94.21
11.	ME	V18MET35	PRODUCTION PLANNING AND CONTROL	121	113	8	93.38
12.	ME	V18CETOE6	WATER QUALITY AND CONSERVATION	121	121	0	100
13.	ME	V18MEP02	PROJECT WORK PART-B	121	115	6	95.04
14.	ECE	V18ECT30	CELLULAR MOBILE COMMUNICATION	190	182	8	95.78
15.	ECE	V18ECT31	ELECTRONICS MEASUREMENTS & INSTRUMENTATION	190	174	16	91.57
16.	ECE	V18ECT34	SATELLITE COMMUNICATION	190	181	9	95.26
17.	ECE	V18EETOE8	BASICS OF ELECTRICAL POWER GENERATION	190	187	3	98.42
18.	ECE	V18ECP02	PROJECT WORK PART-B	190	189	1	99.47
19.	CSE	V18CST36	SOFTWARE PROJECT MANAGEMENT	251	246	5	98.00
20.	CSE	V18CST43	CYBER SECURITY	251	244	7	97.21
21.	CSE	V18EETOE8	BASICS OF ELECTRICAL POWER GENERATION	251	245	6	97.60
22.	CSE	V18CSP02	PROJECT WORK PART-B	251	251	0	100

Details enclosed in annexure-I

- The committee has approved the results and accorded the permission for publication of the same.

S.No	Name	Designation	Member Role	Signature
1.	Dr.Guduru VNSR Ratnakara Rao	Principal, SVEC(A8)	Chairman	
2.	Dr. P Vinay Kumar	Addl.Controller of Examinations-JNTU Kakinada	University Nominee	
3.	Dr.M.Thamarai	Professor/ECE, SVEC(A8)	Member	
4.	Mr.V.S.R.Gopala Krishna Ch	CoE, SVEC(A8)	Member	
5.	Mr G V Subrahmanyam	Dy. CoE; SVEC(A8)	Member	

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Dt: 20/07/2022

Minutes of the Meeting of the Result Committee

The Sri Vasavi Engineering College (Autonomous) result committee meeting was held on 19-07-2022 at 04:30 PM through online mode using Zoom application.

Link: https://us02web.zoom.us/j/83390942928

The following members were present in the meeting.

S.No	Name	Designation	Member Role
1.	Dr.Guduru VNSR Ratnakara Rao	Principal	Chairman
2.	Dr. P Vinay Kumar	Addl.Controller of Examinations-JNTU Kakinada	University Nominee
3.	Dr.M.Thamarai	Prof./ECE- SVEC(A8)	Member
4.	Mr V.S.R.Gopala Krishna Ch	CoE; SVEC(A8)	Member
5.	Mr G V Subrahmanyam	Dy. CoE; SVEC(A8)	Member

The following are the minutes of the results committee meeting.

Item#1: MBA I Semester (V21) Regular results May- 2022 for the ac. year 2021-22.

The summary of the results

a. Program Wise Performance Analysis

S.No	Program	Registered	Passed	Fail	Pass
1	MBA	127	108	19	**66.67**

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Appeared	Pass	Fail	Pass %
1.	V21MBT01	MANAGEMENT THEORY & ORGANIZATIONAL BEHAVIOUR	127	117	10	92.13
2.	V21MBT02	MANAGERIAL ECONOMICS	127	122	5	96.06
3.	V21MBT03	ACCOUNTING FOR MANAGERS	127	114	13	89.76
4.	V21MBT04	LEGAL & BUSINESS ENVIRONMENT	127	122	5	96.06
5.	V21MBT05	BUSINESS COMMUNICATION	127	127	0	100
6.	V21MBT06	QUANTITATIVE ANALYSIS FOR BUSINESS DECISIONS	127	126	1	99.21
7.	V21MBL01	BUSINESS COMMUNICATION & SOFT SKILLS LAB	127	127	0	100

Details enclosed in annexure-I

Item#2: M Tech I Semester (V21) Regular results June- 2022 for the ac. year 2021-22.

The summary of the results

a. Specialization Wise Performance Analysis

S.No	Specz.	Registered	Passed	Fail	Pass
1	CS	5	3	2	**60.00**
2	ES & VLSI	1	0	1	---
3	PE & PS	3	1	2	**33.33**
4	TE	1	0	1	---
Overall		10	4	6	**40.00**

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Appeared	Pass	Fail	Pass %
1.	V21CTL01	ADVANCED DATA STRUCTURES LAB	5	5	0	100
2.	V21CTL02	ADVANCED COMPUTING LAB-1	5	5	0	100
3.	V21CTT01	MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE	5	3	2	60
4.	V21CTT02	ADVANCED DATA STRUCTURES	5	5	0	100
5.	V21CTT03	ADVANCED OPERATING SYSTEMS	5	5	0	100
6.	V21CTT08	OBJECT ORIENTED SOFTWARE ENGINEERING	5	5	0	100
7.	V21ESVL01	SYSTEM DESIGN THROUGH VERILOG LAB	1	1	0	100
8.	V21ESVL02	EMBEDDED SYSTEMS DESIGN LAB	1	1	0	100
9.	V21ESVT01	SYSTEM DESIGN THROUGH VERILOG	1	0	1	0
10.	V21ESVT02	EMBEDDED SYSTEMS DESIGN	1	0	1	0
11.	V21ESVT05	SYSTEM ON CHIP & APPLICATIONS	1	0	1	0
12.	V21ESVT07	CPLD & FPGA ARCHITECTURES AND APPLICATIONS	1	1	0	100
13.	V21MBT55	RESEARCH METHODOLOGY AND IPR	10	7	3	70
14.	V21PEL01	POWER ELECTRONICS SIMULATION LAB	3	3	0	100
15.	V21PEL02	POWER SYSTEMS LAB	3	3	0	100
16.	V21PET01	ANALYSIS OF POWER ELECTRONIC CONVERTERS	3	2	1	66.67
17.	V21PET02	POWER SYSTEM OPERATION & CONTROL	3	3	0	100
18.	V21PET05	POWER QUALITY	3	3	0	100
19.	V21PET06	ELECTRICAL DISTRIBUTION AUTOMATION	3	3	0	100
20.	V21PGENT54	ENGLISH FOR RESEARCH PAPER WRITING	10	10	0	100
21.	V21TEE04	ADVANCED THERMODYNAMICS	1	0	1	0
22.	V21TEE06	ALTERNATIVE FUEL TECHNOLOGIES	1	1	0	100
23.	V21TEL01	COMPUTATIONAL FLUID DYNAMICS LAB –I	1	1	0	100
24.	V21TEL02	THERMAL ENGINEERING LAB-I	1	1	0	100
25.	V21TET01	ADVANCED FLUID MECHANICS	1	0	1	0
26.	V21TET02	COMPUTATIONAL FLUID DYNAMICS	1	0	1	0

Details enclosed in annexure-II

Item#3: Revaluation results B Tech VIII Semester (V18) Regular examinations April 2022 for the ac. year 2021-22.

The summary of the results

a. Branch Wise Performance Analysis

S. No.	Branch	Revaluation(No of Courses)			
		Applied	Change	No Change	Pass %
1.	CE	18	7	11	38.88
2.	ME	14	5	9	35.71
3.	ECE	9	6	3	66.66
4.	CSE	4	1	3	25.00
Overall		**45**	**19**	**26**	**42.22**

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Applied	Change	No change
1.	V18CET43	PRE-STRESSED CONCRETE	10	2	8
2.	V18CET49	GROUND IMPROVEMENT TECHNIQUES	8	5	3
3.	V18CETOE6	WATER QUALITY AND CONSERVATION	3	0	3
4.	V18CST36	SOFTWARE PROJECT MANAGEMENT	1	0	1
5.	V18CST43	CYBER SECURITY	2	1	1
6.	V18ECT30	CELLULAR MOBILE COMMUNICATION	3	1	2
7.	V18ECT31	ELECTRONICS MEASUREMENTS & INSTRUMENTATION	5	4	1
8.	V18EETOE8	BASICS OF ELECTRICAL POWER GENERATION	2	1	1
9.	V18MET28	AUTOMOBILE ENGINEERING	5	3	2
10.	V18MET32	NON-DESTRUCTIVE EVALUATION	5	1	4
11.	V18MET35	PRODUCTION PLANNING AND CONTROL	1	1	0

Details enclosed in annexure-III

Item#4: Revaluation results MBA III Semester (V18) Regular and Supplementary examinations March 2022 for the ac. year 2021-22.

a. Program Wise Performance Analysis

S. No.	Program	Revaluation(No of Courses)			
		Applied	Change	No Change	Pass %
1.	MBA	3	2	1	66.66

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Applied	Change	No change
1.	V18MBT15	ENTREPRENEURSHIP DEVELOPMENT	1	1	0
2.	V18MBT16	E-BUSINESS	1	1	0
3.	V18MBT23	FINANCIAL MARKETS & SERVICES	1	0	1

- The committee has approved the results and accorded the permission for publication of the same.

S.No	Name	Designation	Member Role	Signature
1.	Dr.Guduru VNSR Ratnakara Rao	Principal, SVEC(A8)	Chairman	
2.	Dr. P Vinay Kumar	Addl.Controller of Examinations-JNTU Kakinada	University Nominee	
3.	Dr.M.Thamarai	Professor/ECE, SVEC(A8)	Member	
4.	Mr.V.S.R.Gopala Krishna Ch	CoE, SVEC(A8)	Member	
5.	Mr G V Subrahmanyam	Dy. CoE; SVEC(A8)	Member	

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Dt: 14/09/2022

Minutes of the Meeting of the Result Committee

The Sri Vasavi Engineering College (Autonomous) result committee meeting was held on 13-09-2022 at 04:30 PM through online mode using Zoom application.

Link: https://us02web.zoom.us/j/85282185614

The following members were present in the meeting.

S.No	Name	Designation	Member Role
1.	Dr.Guduru VNSR Ratnakara Rao	Principal	Chairman
2.	Dr. P Vinay Kumar	Addl.Controller of Examinations-JNTU Kakinada	University Nominee
3.	Dr.M.Thamarai	Prof./ECE- SVEC(A8)	Member
4.	Mr V.S.R.Gopala Krishna Ch	CoE; SVEC(A8)	Member
5.	Mr G V Subrahmanyam	Dy. CoE; SVEC(A8)	Member

The following are the minutes of the results committee meeting.

Item#1: B Tech VI Semester (V18) Regular and Supplementary results July- 2022 for the ac. year 2021-22.
The summary of the results

a. Branch Wise Performance Analysis

S.No	Branch	Registered	Passed	Fail	Pass
1	CE	63	55	8	**87.30**
2	EEE	107	85	22	**79.44**
3	ME	115	93	22	**80.87**
4	ECE	202	172	30	**85.15**
5	CSE	271	234	37	**86.35**
6	CST	58	46	12	**79.31**
7	ECT	57	48	9	**84.21**
Overall		**873**	**733**	**140**	**83.96**

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Appeared	Pass	Fail	Pass %
1.	V18EET24	ELECTRICAL ENERGY CONSERVATION, MANAGEMENT & AUDITING	107	107	0	100
2.	V18CEL10	CAD & GIS LAB	63	63	0	100
3.	V18CSL35	COMPUTER NETWORKS LAB	259	259	0	100

4.	V18CEL09	ENVIRONMENTAL ENGINEERING LAB	63	63	0	100
5.	V18ECL09	DIGITAL SIGNAL PROCESSING LAB	259	259	0	100
6.	V18ENT06	PROFESSIONAL COMMUNICATION SKILLS –IV	63	63	0	100
7.	V18CSMPS	MINI PROJECT WITH SEMINAR	329	328	1	99.7
8.	V18CST63	TECHNICAL SKILLS-IV	329	326	3	99.09
9.	V18CSL09	DATA MINING LAB	329	326	3	99.09
10.	V18CSL08	OBJECT ORIENTED ANALYSIS AND DESIGN THROUGH UML LAB	329	326	3	99.09
11.	V18EET20	RENEWABLE ENERGY SYSTEMS	107	106	1	99.07
12.	V18MBT52	MANAGEMENT SCIENCE	260	256	4	98.46
13.	V18CET23	TRANSPORTATION ENGINEERING-II	64	63	1	98.44
14.	V18CET21	GEOTECHNICAL ENGINEERING–II	64	63	1	98.44
15.	V18MEL06	METROLOGY AND INSTRUMENTATION & CONTROL SYSTEMS LAB	115	113	2	98.26
16.	V18MEL09	HEAT TRANSFER LAB	115	113	2	98.26
17.	V18EET17	ELECTRICAL DRIVES	107	105	2	98.13
18.	V18EEL08	POWER ELECTRONICS LABORATORY	107	105	2	98.13
19.	V18ENT06	PROFESSIONAL COMMUNICATION SKILLS-IV	754	739	15	98.01
20.	V18CST11	COMPUTER NETWORKS	262	255	7	97.33
21.	V18ECT23	MICROPROCESSORS & MICROCONTROLLERS	110	107	3	97.27
22.	V18CST21	OBJECT ORIENTED ANALYSIS AND DESIGN THROUGH UML	337	327	10	97.03
23.	V18MEL08	THEORY OF MACHINES LAB	115	111	4	96.52
24.	V18ECL10	MICROPROCESSORS & MICROCONTROLLERS LABORATORY	107	103	4	96.26
25.	V18MBT51	MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS	117	112	5	95.73
26.	V18CET20	STRUCTURAL ANALYSIS–II	67	64	3	95.52
27.	V18ECTOE1	INTERNET OF THINGS	506	480	26	94.86
28.	V18ECT18	EMBEDDED SYSTEMS-I	259	245	14	94.59
29.	V18CST23	SOFTWARE TESTING METHODOLOGIES	283	267	16	94.35
30.	V18CET24	ENVIRONMENTAL ENGINEERING-I	65	61	4	93.85
31.	V18ECT17	MICROWAVE ENGINEERING	278	260	18	93.53
32.	V18ENT06	PROFESSIONAL COMMUNICATION SKILLS -IV	58	54	4	93.1
33.	V18ECT16	DIGITAL SIGNAL PROCESSING	273	252	21	92.31
34.	V18CST20	DATA MINING	345	318	27	92.17
35.	V18CST22	CRYPTOGRAPHY & NETWORK SECURITY	337	310	27	91.99
36.	V18CST19	COMPILER DESIGN	338	310	28	91.72
37.	V18MET18	DESIGN OF MACHINE ELEMENTS–II	118	108	10	91.53
38.	V18CET22	DESIGN OF STEEL STRUCTURES	70	64	6	91.43
39.	V18EEL09	ELECTRICAL SIMULATION LABORATORY	107	96	11	89.72
40.	V18MET19	ROBOTICS	118	104	14	88.14
41.	V18CSTOE3	PYTHON PROGRAMMING	336	296	40	88.1
42.	V18MET10	METROLOGY	118	103	15	87.29
43.	V18EET18	UTILIZATION OF ELECTRICAL ENERGY	6	5	1	83.33
44.	V18CST25	MACHINE LEARNING	63	50	13	79.37
45.	V18CSTOE1	DATA BASE MANAGEMENT SYSTEMS	53	39	14	73.58

46.	V18ECT19	CMOS DIGITAL IC DESIGN	3	1	2	33.33

Details enclosed in annexure-I

Item#2 B Tech IV Semester (V20) Regular results August- 2022 for the ac. year 2021-22.

The summary of the results

a.Branch Wise Performance Analysis

S.No	Branch	Registered	Passed	Fail	Pass
1	CE	63	42	21	**66.67**
2	EEE	134	83	51	**61.94**
3	ME	131	76	55	**58.02**
4	ECE	207	142	65	**68.60**
5	CSE	279	224	55	**80.29**
6	CST	70	55	15	**78.57**
7	ECT	69	40	29	**57.97**
Overall		**953**	**662**	**291**	**69.46**

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Appeared	Pass	Fail	Pass %
1.	V20CSL32	PYTHON PROGRAMMING LAB	134	134	0	100
2.	V20SOC02	SKILL ORIENTED COURSE-II	952	950	2	99.79
3.	V20CSL08	JAVA PROGRAMMING LAB	349	348	1	99.71
4.	V20CSL33	PYTHON PROGRAMMING LAB	275	274	1	99.64
5.	V20ECL04	ANALOG & DIGITAL COMMUNICATION LAB	275	274	1	99.64
6.	V20CSL06	STATISTICAL VISUALIZATION USING R LAB	349	347	2	99.43
7.	V20EEL06	ELECTRICAL MEASUREMENTS LAB	134	133	1	99.25
8.	V20CSL07	DATABASE MANAGEMENT SYSTEMS LAB	349	345	4	98.85
9.	V20CEL05	FM & HYDRAULIC MACHINERY LAB	63	62	1	98.41
10.	V20CEL04	ENGINEERING GEOLOGY LAB	63	62	1	98.41
11.	V20CEL06	TRANSPORTATION ENGINEERING LAB	63	62	1	98.41
12.	V20EEL05	ELECTRICAL MACHINES-I LAB	134	131	3	97.76
13.	V20ECL05	DIGITAL IC APPLICATIONS LAB	275	268	7	97.45
14.	V20CST06	DESIGN AND ANALYSIS OF ALGORITHMS	349	339	10	97.13
15.	V20CET05	ENGINEERING GEOLOGY	63	61	2	96.83
16.	V20MEL05	MECHANICAL MEASUREMENTS AND METROLOGY LAB	131	126	5	96.18
17.	V20MEL06	MANUFACTURING PROCESS LAB	131	125	6	95.42
18.	V20MEL07	THERMAL ENGINEERING LAB	131	125	6	95.42
19.	V20CST07	SOFTWARE ENGINEERING	349	332	17	95.13
20.	V20MET08	MANUFACTURING SCIENCE WITH ARTIFICIAL INTELLIGENCE	131	124	7	94.66
21.	V20ENT03	PROFESSIONAL COMMUNICATION SKILLS-II	952	894	58	93.91
22.	V20ECT09	ELECTRO MAGNETIC WAVES & TRANSMISSION LINES	275	255	20	92.73
23.	V20CST08	DATABASE MANAGEMENT SYSTEMS	349	323	26	92.55
24.	V20CET07	WATER RESOURCES ENGINEERING	63	58	5	92.06
25.	V20MBT51	MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS	275	253	22	92
26.	V20MET09	MECHANICAL MEASUREMENTS AND METROLOGY	131	119	12	90.84
27.	V20CST09	JAVA PROGRAMMING	349	315	34	90.26

28.	V20EET11	CONTROL SYSTEMS	275	247	28	89.82
29.	V20EET09	ELECTRICAL AND ELECTRONIC MEASUREMENTS	134	120	14	89.55
30.	V20EET08	ELECTRICAL MACHINES-II	134	119	15	88.81
31.	V20MAT04	PROBABILITY AND STATISTICS	480	421	59	87.71
32.	V20ECT08	DIGITAL IC APPLICATIONS	275	236	39	85.82
33.	V20EET07	SIGNALS AND SYSTEMS	134	115	19	85.82
34.	V20CET08	TRANSPORTATION ENGINEERING	63	54	9	85.71
35.	V20MBT51	MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS	134	111	23	82.84
36.	V20MBT51	MANAGERIAL ECONOMICS FINANCIAL ANALYSIS	63	52	11	82.54
37.	V20CET06	STRUCTURAL ANALYSIS-I	63	52	11	82.54
38.	V20MET10	APPLIED THERMODYNAMICS	131	108	23	82.44
39.	V20MET07	KINEMATICS OF MACHINERY	131	106	25	80.92
40.	V20EET10	ELECTRICAL POWER GENERATION AND TRANSMISSION	134	106	28	79.1
41.	V20ECT07	ANALOG & DIGITAL COMMUNICATION	275	203	72	73.82
42.	V18CSL32	OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB	1	1	0	100
43.	V18CET08	ENGINEERING GEOLOGY	2	2	0	100
44.	V18ENT04	PROFESSIONAL COMMUNICATION SKILLS–II	1	1	0	100
45.	V18CET14	HYDRAULIC ENGINEERING	1	1	0	100
46.	V18CET11	SURVEYING AND GEOMATICS	1	1	0	100
47.	V18CET09	CONCRETE TECHNOLOGY	1	1	0	100
48.	V18MBT51	MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS	5	4	1	80
49.	V18EET09	ELECTRICAL MACHINES-II	6	4	2	66.67
50.	V18ECT08	ANALOG CIRCUITS	32	19	13	59.38
51.	V18CST09	PYTHON PROGRAMMING	74	42	32	56.76
52.	V18MET06	THEORY OF MACHINES-I	20	10	10	50
53.	V18MET07	APPLIED THERMODYNAMICS	18	9	9	50
54.	V18EET10	ELECTRICAL POWER GENERATION AND TRANSMISSION	10	5	5	50
55.	V18ENT04	PROFESSIONAL COMMUNICATION SKILLS-II	8	4	4	50
56.	V18CST06	SOFTWARE ENGINEERING	23	9	14	39.13
57.	V18MET11	INSTRUMENTATION & CONTROL SYSTEMS	8	3	5	37.5
58.	V18ECT09	PROBABILITY THEORY & STOCHASTIC PROCESS	40	14	26	35
59.	V18MBT51	MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS	3	1	2	33.33
60.	V18CET13	STRENGTH OF MATERIALS-II	10	3	7	30
61.	V18ENT11	CONSTITUTION OF INDIA	67	18	49	26.87
62.	V18MET08	MECHANICS OF SOLIDS	24	6	18	25
63.	V18CST08	JAVA PROGRAMMING	26	6	20	23.08
64.	V18ECT10	ELECTROMAGNETIC WAVES & TRANSMISSION LINES	25	5	20	20
65.	V18MAT03	MATHEMATICS-III	10	2	8	20
66.	V18CST07	FORMAL LANGUAGES AND AUTOMATA THEORY	34	5	29	14.71
67.	V18CST05	COMPUTER ORGANIZATION	37	3	34	8.11

Details enclosed in annexure-II

Item#3: B Tech VIII Semester (V18) Advanced Supplementary examinations August 2022 for the ac. year 2021-22.

The summary of the results

a. Branch Wise Performance Analysis

S. No	Branch	No of Students Registered	No. of Courses			Course Wise Pass %
			Registered	Passed	Fail	
1.	CE	13	17	11	6	64.71
2.	ME	14	19	10	9	52.63
3.	ECE	13	23	10	13	43.48
4.	CSE	7	13	7	6	53.85
Overall		**47**	**72**	**38**	**34**	**52.78**

b. Course Wise Performance Analysis

S. No	Branch	Course Code	Course Name	Appeared	Passed	Fail	Pass %
1.	CE	V18CET43	PRE-STRESSED CONCRETE	11	5	6	45.45
2.	CE	V18CET49	GROUND IMPROVEMENT TECHNIQUES	4	4	0	100
3.	CE	V18CSTOE7	SOFTWARE TESTING METHODOLOGIES	2	2	0	100
4.	ME	V18MEP02	PROJECT WORK PART-B	6	3	3	50
5.	ME	V18MET28	AUTOMOBILE ENGINEERING	3	1	2	33.33
6.	ME	V18MET32	NON-DESTRUCTIVE EVALUATION	4	4	0	100
7.	ME	V18MET35	PRODUCTION PLANNING AND CONTROL	6	2	4	33.33
8.	ECE	V18ECT30	CELLULAR MOBILE COMMUNICATION	5	5	0	100
9.	ECE	V18ECT31	ELECTRONICS MEASUREMENTS & INSTRUMENTATION	10	3	7	30
10.	ECE	V18ECT34	SATELLITE COMMUNICATION	7	1	6	14.29
11.	ECE	V18EETOE8	BASICS OF ELECTRICAL POWER GENERATION	1	1	0	100
12.	CSE	V18CST36	SOFTWARE PROJECT MANAGEMENT	4	2	2	50
13.	CSE	V18CST43	CYBER SECURITY	4	2	2	50
14.	CSE	V18EETOE8	BASICS OF ELECTRICAL POWER GENERATION	5	3	2	60

Details enclosed in annexure-III

Item#4: MBA III Semester (V18) Supplementary examinations August 2022 for the ac. year 2021-22.

a. Program Wise Performance Analysis

S. No	Branch	No of Students Registered	No. of Courses			Course Wise Pass %
			Registered	Passed	Fail	
1.	MBA	13	15	8	7	53.33
Overall		**13**	**15**	**8**	**7**	**53.33**

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Appeared	Passed	Fail	Pass %
1.	V18MAT07	Employability Skills-II(Aptitude-I)	13	6	7	46.15
2.	V18MBT18	Retail Management	1	1	0	100
3.	V18MBT27	Performance Management	1	1	0	100

Details enclosed in annexure-IV

Item#5: M.Tech IV Semester (V18) Regular and Supplementary examinations July 2022 for the ac. year 2021-22.

The summary of the results

a.Speclization Wise Performance Analysis

S.No	Branch	Registered	Passed	Fail	Pass
1	MD	4	4	0	**100**
2	STE	1	1	0	**100**
3	VLSI & ES	13	13	0	**100**
4	CSE	6	6	0	**100**
Overall		**24**	**24**	**0**	**100**

Details enclosed in annexure-V

Item#6: Revaluation results of MBA I Semester (V21 & V18) Regular and Supplementary examinations May 2022 for the ac. year 2021-22.

a. Branch Wise Performance Analysis

S. No.	Program	Revaluation(No of Courses)			
		Applied	Change	No Change	Pass %
1.	MBA	25	10	15	**40.00**

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Applied	Change	No change
1.	V18ENT13	EMPLOYABILITY SKILLS-I (ENGLISH COMMUNICATION SKILLS)	1	1	0
2.	V18MBT02	MANAGERIAL ECONOMICS	1	0	1
3.	V21MBT01	MANAGEMENT THEORY & ORGANIZATIONAL BEHAVIOUR	6	3	3
4.	V21MBT02	MANAGERIAL ECONOMICS	4	0	4
5.	V21MBT03	ACCOUNTING FOR MANAGERS	9	5	4
6.	V21MBT04	LEGAL & BUSINESS ENVIRONMENT	3	0	3
7.	V21MBT06	QUANTITATIVE ANALYSIS FOR BUSINESS DECISIONS	1	1	0

Details enclosed in annexure-VI

Item#7: Revaluation results of M.Tech I Semester (V21 & V18) Regular and Supplementary examinations June 2022 for the ac. year 2021-22.

a. Speclz Wise Performance Analysis

S. No.	Spcelz	Revaluation(No of Courses)			
		Applied	Change	No Change	Pass %
1.	CS	1	0	1	----
2.	TE	2	0	2	----
3.	PE & PS	1	1	0	**100**

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Applied	Change	No change
1.	V21CTT01	MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE	1	0	1
2.	V21TET01	ADVANCED FLUID MECHANICS	1	0	1
3.	V21MBT55	RESEARCH METHODOLOGY AND IPR	2	1	1

Details enclosed in annexure-VII

- The committee has approved the results and accorded the permission for publication of the same.

S.No	Name	Designation	Member Role	Signature
1.	Dr.Guduru VNSR Ratnakara Rao	Principal, SVEC(A8)	Chairman	
2.	Dr. P Vinay Kumar	Addl.Controller of Examinations-JNTU Kakinada	University Nominee	
3.	Dr.M.Thamarai	Professor/ECE, SVEC(A8)	Member	
4.	Mr.V.S.R.Gopala Krishna Ch	CoE, SVEC(A8)	Member	
5.	Mr G V Subrahmanyam	Dy. CoE; SVEC(A8)	Member	

Dt: 10/10/2022

Minutes of the Meeting of the Result Committee

The Sri Vasavi Engineering College (Autonomous) result committee meeting was held on 01-10-2022 at 11:30 AM through online mode using Zoom application.

Link: https://us02web.zoom.us/j/89357514943

The following members were present in the meeting.

S.No	Name	Designation	Member Role
1.	Dr.Guduru VNSR Ratnakara Rao	Principal	Chairman
2.	Dr. P Vinay Kumar	Addl.Controller of Examinations-JNTU Kakinada	University Nominee
3.	Dr.M.Thamarai	Prof./ECE- SVEC(A8)	Member
4.	Mr V.S.R.Gopala Krishna Ch	CoE; SVEC(A8)	Member
5.	Mr G V Subrahmanyam	Dy. CoE; SVEC(A8)	Member

The following are the minutes of the results committee meeting.

Item#1: B Tech III Semester (V18 & V20) Supplementary results August- 2022 for the ac. year 2021-22. The summary of the results

a. Branch Wise Performance Analysis

S. No	Branch	No of Students Registered	No. of Courses			Course Wise Pass %
			Registered	Passed	Fail	
1.	CE	45	89	29	60	32.58
2.	EEE	75	154	77	77	50.00
3.	ME	69	131	31	100	23.66
4.	ECE	115	294	92	202	31.29
5.	CSE	83	165	56	109	33.94
6.	CST	22	54	24	30	44.44
7.	ECT	37	76	31	45	40.79
Overall		446	963	340	623	**35.31%**

b. Course Wise Performance Analysis

S. No	Regln.	Branch	Course Code	Course Name	Appeared	Passed	Fail	Pass %
1.	V18	CE	V18CET04	STRENGTH OF MATERIALS-I	16	3	13	18.75
2.	V18	CE	V18CET10	INTRODUCTION TO FLUID MECHANICS	3	1	2	33.33
3.	V18	CE	V18CET35	PRINCIPLES OF ENVIRONMENTAL SCIENCE & ENGINEERING	2	0	2	0
4.	V18	CE	V18CET36	BUILDING MATERIALS PLANNING & CONSTRUCTION	2	0	2	0
5.	V18	CE	V18EEL01	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB	1	0	1	0
6.	V18	CE	V18EET01	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	10	2	8	20
7.	V18	CE	V18MAT04	PROBABILITY AND STATISTICS	2	0	2	0
8.	V20	CE	V20CEL01	STRENGTH OF MATERIALS LAB	1	1	0	100
9.	V20	CE	V20CET01	STRENGTH OF MATERIALS	17	2	15	11.76
10.	V20	CE	V20CET02	FLUID MECHANICS & HYDRAULICS	19	11	8	57.89
11.	V20	CE	V20CET03	SURVEYING AND GEOMATICS	11	7	4	63.64
12.	V20	CE	V20CET04	BUILDING MATERIALS & CONCRETE TECHNOLOGY	1	0	1	0
13.	V20	CE	V20MAT04	PROBABILITY & STATISTICS	3	1	2	33.33
14.	V20	CE	V20SOC01	SKILL ORIENTED COURSE-I	1	1	0	100
15.	V18	EEE	V18ECT05	ANALOG ELECTRONICS	14	2	12	14.29
16.	V18	EEE	V18EET04	ELECTRICAL MACHINES-1	3	0	3	0
17.	V18	EEE	V18EET05	ELECTRO MAGNETIC FIELDS	5	0	5	0
18.	V18	EEE	V18EET06	ELECTRICAL AND ELECTRONIC MEASUREMENTS	7	4	3	57.14
19.	V20	EEE	V20CSL31	DATA STRUCTURES & ALGORITHMS LAB	6	6	0	100
20.	V20	EEE	V20ECT06	ANALOG ELECTRONICS	12	5	7	41.67
21.	V20	EEE	V20EEL04	ELECTRICAL CIRCUITS LAB	8	6	2	75
22.	V20	EEE	V20EET04	ELECTRICAL CIRCUIT ANALYSIS-II	42	27	15	64.29
23.	V20	EEE	V20EET05	ELECTRO MAGNETIC FIELDS	20	7	13	35
24.	V20	EEE	V20EET06	ELECTRICAL MACHINES-I	12	1	11	8.33
25.	V20	EEE	V20MAT05	TRANSFORM CALCULUS	25	19	6	76
26.	V18	ME	V18MET03	ENGINEERING MECHANICS	7	4	3	57.14
27.	V18	ME	V18MET04	THERMODYNAMICS	10	5	5	50
28.	V18	ME	V18MET05	FLUID MECHANICS & FLUID MACHINES	14	0	14	0
29.	V18	ME	V18MET09	MATERIALS ENGINEERING	17	8	9	47.06
30.	V20	ME	V20MBT51	MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS	9	4	5	44.44
31.	V20	ME	V20MET03	METALLURGY AND MATERIAL SCIENCE	19	6	13	31.58
32.	V20	ME	V20MET04	MECHANICS OF SOLIDS	7	0	7	0
33.	V20	ME	V20MET05	FLUID MECHANICS WITH MACHINE LEARNING	32	2	30	6.25
34.	V20	ME	V20MET06	THERMODYNAMICS	16	2	14	12.5
35.	V18	ECE	V18ECT01	ELECTRONICS DEVICES & CIRCUITS	21	8	13	38.1
36.	V18	ECE	V18ECT02	DIGITAL SYSTEM DESIGN	13	4	9	30.77
37.	V18	ECE	V18ECT03	SIGNALS & SYSTEMS	32	5	27	15.62
38.	V18	ECE	V18ECT04	NETWORK THEORY	31	7	24	22.58
39.	V18	ECE	V18ENT03	PROFESSIONAL COMMUNICATION SKILL-1	1	1	0	100
40.	V18	ECE	V18ENT11	CONSTITUTION OF INDIA	15	4	11	26.67
41.	V18	ECE	V18MBT51	MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS	1	1	0	100
42.	V20	ECE	V20CSL31	DATA STRUCTURES LAB	1	1	0	100
43.	V20	ECE	V20ECL01	ELECTRONIC DEVICES, CIRCUITS & ANALYSIS LAB	1	1	0	100
44.	V20	ECE	V20ECL02	SIGNALS & SYSTEMS LAB	10	7	3	70

45.	V20	ECE	V20ECT02	ELECTRONIC DEVICES, CIRCUITS & ANALYSIS	32	3	29	9.38
46.	V20	ECE	V20ECT04	NETWORK THEORY	18	1	17	5.56
47.	V20	ECE	V20ECT05	SIGNALS & SYSTEMS	52	25	27	48.08
48.	V20	ECE	V20MAT03	COMPLEX ANALYSIS	29	16	13	55.17
49.	V20	ECE	V20MAT06	PROBABILITY THEORY STOCHASTIC PROCESS	37	8	29	21.62
50.	V18	CSE	V18CST02	DATA STRUCTURES AND ALGORITHMS	10	2	8	20
51.	V18	CSE	V18CST03	DISCRETE MATHEMATICS	13	2	11	15.38
52.	V18	CSE	V18CST04	OBJECT ORIENTED PROGRAMMING FOR PROBLEM SOLVING	19	6	13	31.58
53.	V18	CSE	V18CST60	TECHNICAL SKILLS-1	2	2	0	100
54.	V18	CSE	V18ECT06	DIGITAL ELECTRONICS	24	5	19	20.83
55.	V18	CSE	V18ENT03	PROFESSIONAL COMMUNICATION SKILLS-1	1	0	1	0
56.	V18	CSE	V18MAT04	PROBABILITY & STATISTICS	7	3	4	42.86
57.	V20	CSE	V20CSL03	OOPS THROUGH C++ LAB	2	1	1	50
58.	V20	CSE	V20CSL04	DATA STRUCTURES LAB	4	4	0	100
59.	V20	CSE	V20CST03	OOPS THROUGH C++	25	10	15	40
60.	V20	CSE	V20CST04	DATA STRUCTURES	15	4	11	26.67
61.	V20	CSE	V20CST05	COMPUTER ORGANIZATION AND ARCHITECTURE	23	8	15	34.78
62.	V20	CSE	V20ENT02	PROFESSIONAL COMMUNICATION SKILLS-I	1	1	0	100
63.	V20	CSE	V20MAT07	MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE	9	7	2	77.78
64.	V20	CSE	V20MBT51	MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS	10	1	9	10
65.	V18	CST	V18CST02	DATA STRUCTURES AND ALGORITHMS	5	1	4	20
66.	V18	CST	V18CST03	DISCRETE MATHEMATICS	4	0	4	0
67.	V18	CST	V18CST04	OBJECT ORIENTED PROGRAMMING FOR PROBLEM SOLVING	9	8	1	88.89
68.	V18	CST	V18ECT06	DIGITAL ELECTRONICS	10	4	6	40
69.	V18	CST	V18MAT04	PROBABILITY & STATISTICS	2	1	1	50
70.	V20	CST	V20CST03	OOPS THROUGH C++	6	3	3	50
71.	V20	CST	V20CST04	DATA STRUCTURES	4	1	3	25
72.	V20	CST	V20CST05	COMPUTER ORGANIZATION AND ARCHITECTURE	7	3	4	42.86
73.	V20	CST	V20MAT07	MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE	4	2	2	50
74.	V20	CST	V20MBT51	MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS	3	1	2	33.33
75.	V18	ECT	V18ECT01	ELECTRONIC DEVICES & CIRCUITS	4	2	2	50
76.	V18	ECT	V18ECT02	DIGITAL SYSTEM DESIGN	2	0	2	0
77.	V18	ECT	V18ECT03	SIGNALS & SYSTEMS	3	0	3	0
78.	V18	ECT	V18ECT04	NETWORK THEORY	4	4	0	100
79.	V18	ECT	V18ENT11	CONSTITUTION OF INDIA	2	0	2	0

Details enclosed in annexure-I

Item#2 B Tech V Semester (V18) Supplementary results August- 2022 for the ac. year 2021-22.

The summary of the results

a.Branch Wise Performance Analysis

S. No	Branch	No of Students Registered	No. of Courses			Course Wise Pass %
			Registered	Passed	Fail	
1.	CE	24	39	16	23	41.03
2.	EEE	23	38	26	12	68.42
3.	ME	49	98	36	62	36.73

4.	ECE	53	100	49	51	49.00
5.	CSE	68	167	61	106	36.53
6.	CST	24	62	24	38	38.71
7.	ECT	16	26	12	14	46.15
Overall		257	530	224	306	**42.26%**

b. Course Wise Performance Analysis

S. No	Regln.	Branch	Course Code	Course Name	Appeared	Passed	Fail	Pass %
1.	V18	CE	V18CET15	STRUCTURAL ANALYSIS-I	5	4	1	80
2.	V18	CE	V18CET16	GEOTECHNICAL ENGINEERING-I	14	5	9	35.71
3.	V18	CE	V18CET17	HYDROLOGY & WATER RESOURCES ENGINEERING	1	0	1	0
4.	V18	CE	V18CET18	DESIGN OF REINFORCED CONCRETE STRUCTURES	7	4	3	57.14
5.	V18	CE	V18CET19	TRANSPORTATION ENGINEERING-I	1	0	1	0
6.	V18	CE	V18ENT11	CONSTITUTION OF INDIA	11	3	8	27.27
7.	V18	EEE	V18EET12	SWITCHGEAR & PROTECTION	5	5	0	100
8.	V18	EEE	V18EET13	POWER ELECTRONICS	2	0	2	0
9.	V18	EEE	V18EET14	POWER SYSTEM ANALYSIS	9	3	6	33.33
10.	V18	EEE	V18EET15	CONTROL SYSTEMS	3	2	1	66.67
11.	V18	EEE	V18EET16	SIGNALS & SYSTEMS	15	12	3	80
12.	V18	EEE	V18ENT05	PROFESSIONAL COMMUNICATION SKILLS-III	2	2	0	100
13.	V18	EEE	V18MBT51	MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS	2	2	0	100
14.	V18	ME	V18MEL10	THERMAL ENGINEERING LAB	2	2	0	100
15.	V18	ME	V18MEL16	METAL CUTTING & MACHINE TOOLS LAB	1	1	0	100
16.	V18	ME	V18MET13	HEAT TRANSFER	31	17	14	54.84
17.	V18	ME	V18MET15	THEORY OF MACHINES-II	17	7	10	41.18
18.	V18	ME	V18MET16	DESIGN OF MACHINE ELEMENTS-I	26	3	23	11.54
19.	V18	ME	V18MET17	METAL CUTTING & MACHINE TOOLS	9	4	5	44.44
20.	V18	ME	V18MET37	INTERNAL COMBUSTION ENGINES	10	2	8	20
21.	V18	ME	V18MET46	INTELLECTUAL PROPERTY RIGHTS AND PATENTS	2	0	2	0
22.	V18	ECE	V18CST81	DATA STRUCTURES & ALGORITHMS	7	6	1	85.71
23.	V18	ECE	V18ECL07	MICROPROCESSOR & MICRO CONTROLLERS LAB	1	1	0	100
24.	V18	ECE	V18ECL08	VLSI DESIGN LAB	1	1	0	100
25.	V18	ECE	V18ECT11	VLSI DESIGN	9	4	5	44.44
26.	V18	ECE	V18ECT12	MICROPROCESSORS & MICROCONTROLLERS	22	8	14	36.36
27.	V18	ECE	V18ECT13	ANTENNA & WAVE PROPAGATION	23	6	17	26.09
28.	V18	ECE	V18ECT15	ENGINEER & SOCIETY	5	4	1	80
29.	V18	ECE	V18EET15	CONTROL SYSTEMS	30	17	13	56.67
30.	V18	ECE	V18ENT05	PROFESSIONAL COMMUNICATION SKILLS-III	2	2	0	100
31.	V18	CSE	V18CST10	DATABASE MANAGEMENT SYSTEMS	19	4	15	21.05
32.	V18	CSE	V18CST11	COMPUTER NETWORKS	7	1	6	14.29
33.	V18	CSE	V18CST12	OPERATING SYSTEMS	20	9	11	45
34.	V18	CSE	V18CST13	DESIGN AND ANALYSIS OF ALGORITHMS	41	15	26	36.59
35.	V18	CSE	V18CST14	UNIX PROGRAMMING	16	11	5	68.75
36.	V18	CSE	V18CST17	ARTIFICIAL INTELLIGENCE	47	17	30	36.17
37.	V18	CSE	V18CST62	TECHNICAL SKILLS-III	1	0	1	0
38.	V18	CSE	V18ENT05	PROFESSIONAL COMMUNICATION SKILLS-III	4	0	4	0

39.	V18	CSE	V18MBT53	ORGANIZATIONAL BEHAVIOR	12	4	8	33.33
40.	V18	CST	V18CST10	DATABASE MANAGEMENT SYSTEMS	7	2	5	28.57

Details enclosed in annexure-II

Item#3: MBA IV Semester (V18) Regular and Supplementary examinations August 2022 for the ac. year 2021-22.

The summary of the results

a. Branch Wise Performance Analysis

S.No	Branch	Registered	Passed	Fail	Pass
1	MBA	90	62	28	**68.89**
Overall		**90**	**62**	**28**	**68.89**

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Appeared	Pass	Fail	Pass %
1.	V18MAT08	EMPLOYABILITY SKILLS-IV (APTITUDE-2)	90	62	28	68.89
2.	V18MBP02	MAJOR PROJECT & VIVA VOCE	90	90	0	100
3.	V18MBT29	LOGISTICS & SUPPLY CHAIN MANAGEMENT	90	90	0	100
4.	V18MBT30	BUSINESS ANALYTICS	90	90	0	100
5.	V18MBT31	SERVICES MARKETING	18	17	1	94.44
6.	V18MBT32	SALES AND DISTRIBUTION MANAGEMENT	18	18	0	100
7.	V18MBT33	DIGITAL & SOCIAL MEDIA MARKETING	18	18	0	100
8.	V18MBT34	INTERNATIONAL MARKETING MANAGEMENT	18	18	0	100
9.	V18MBT35	FINANCIAL DERIVATIVES	38	38	0	100
10.	V18MBT36	PROJECT APPRAISAL AND FINANCE	38	38	0	100
11.	V18MBT37	BUSINESS TAXATION & PLANNING	38	38	0	100
12.	V18MBT38	INTERNATIONAL FINANCIAL MANAGEMENT	38	38	0	100
13.	V18MBT39	ORGANIZATIONAL CHANGE & DEVELOPMENT	34	34	0	100
14.	V18MBT40	MANAGEMENT OF INDUSTRIAL RELATIONS	34	34	0	100
15.	V18MBT41	LABOR WELFARE & LEGISLATION	34	34	0	100
16.	V18MBT42	INTERNATIONAL HRM	34	34	0	100

Details enclosed in annexure-III

- The committee has approved the results and accorded the permission for publication of the same.

S.No	Name	Designation	Member Role	Signature
1.	Dr.Guduru VNSR Ratnakara Rao	Principal, SVEC(A8)	Chairman	
2.	Dr. P Vinay Kumar	Addl.Controller of Examinations-JNTU Kakinada	University Nominee	
3.	Dr.M.Thamarai	Professor/ECE, SVEC(A8)	Member	
4.	Mr.V.S.R.Gopala Krishna Ch	CoE, SVEC(A8)	Member	
5.	Mr G V Subrahmanyam	Dy. CoE; SVEC(A8)	Member	

Dt: 11/10/2022

Minutes of the Meeting of the Result Committee

The Sri Vasavi Engineering College (Autonomous) result committee meeting was held on 02-10-2022 at 11:30 AM through online mode using Zoom application.

Link: https://us02web.zoom.us/j/87561411442

The following members were present in the meeting.

S.No	Name	Designation	Member Role
1.	Dr.Guduru VNSR Ratnakara Rao	Principal	Chairman
2.	Dr. P Vinay Kumar	Addl.Controller of Examinations-JNTU Kakinada	University Nominee
3.	Mr V.S.R.Gopala Krishna Ch	CoE; SVEC(A8)	Member
4.	Mr G V Subrahmanyam	Dy. CoE; SVEC(A8)	Member

Members Absent

S.No	Name	Designation	Member Role
1.	Dr M Thamarai	Prof./ECE- SVEC(A8)	Member

The following are the minutes of the results committee meeting.

Item#1: B Tech II Semester (V18 & V20) Regular and Supplementary results September- 2022 for the ac. year 2021-22.
The summary of the results

a. Branch Wise Performance Analysis

S.No	Branch	Registered	Passed	Fail	Pass
1	CE	47	31	16	65.96
2	ECT	66	46	20	69.70
3	EEE	102	74	28	72.55
4	AIM	64	55	9	85.94
5	CAI	65	56	9	86.15
6	ME	78	50	28	64.10
7	ECE	197	147	50	74.62
8	CSE	264	232	32	87.88
9	CST	64	50	14	78.13
Overall		**947**	**741**	**206**	**78.25**

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Appeared	Pass	Fail	Pass %
1.	V20CSL02	PYTHON PROGRAMMING LAB	457	457	0	100
2.	V20ENL02	HONE YOUR COMMUNICATION SKILLS LAB-II	948	947	1	99.89
3.	V20MEL01	ENGINEERING WORKSHOP	388	387	1	99.74
4.	V20PHL01	ENGINEERING PHYSICS LAB	430	426	4	99.07
5.	V20CSL04	DATA STRUCTURES LAB	129	127	2	98.45
6.	V20CHL01	ENGINEERING CHEMISTRY LAB	388	380	8	97.94
7.	V20CHT02	ENVIRONMENTAL SCIENCE	129	126	3	97.67
8.	V20CHT02	ENVIRONMENTAL STUDIES	440	429	11	97.5
9.	V20MAT10	INTEGRAL TRANSFORMATIONS AND VECTOR CALCULUS	129	125	4	96.9
10.	V20EEL03	ELECTRICAL ENGINEERING WORKSHOP	102	98	4	96.08
11.	V20PHT01	ENGINEERING PHYSICS	441	422	19	95.69
12.	V20MET01	ENGINEERING GRAPHICS	441	421	20	95.46
13.	V20AIT01	INTRODUCTION TO ARTIFICIAL INTELLIGENCE	129	123	6	95.35
14.	V20CST04	DATA STRUCTURES	129	123	6	95.35
15.	V20CSL01	PROGRAMMING LAB IN C FOR PROBLEM SOLVING	263	246	17	93.54
16.	V20CST02	PYTHON PROGRAMMING	471	437	34	92.78
17.	V20MAT02	NUMERICAL METHODS AND VECTOR CALCULUS	881	806	75	91.49
18.	V20EET02	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	151	136	15	90.07
19.	V20CHT01	ENGINEERING CHEMISTRY	415	362	53	87.23
20.	V20ECT01	SWITCHING THEORY AND LOGIC DESIGN	899	773	126	85.98
21.	V20EEL02	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB	125	102	23	81.6
22.	V20CST01	PROGRAMMING IN C FOR PROBLEM SOLVING	281	228	53	81.14
23.	V20EET03	ELECTRICAL CIRCUIT ANALYSIS-I	117	92	25	78.63
24.	V20MET02	ENGINEERING MECHANICS	158	124	34	78.48
25.	V18CHT02	ENVIRONMENTAL STUDIES	5	2	3	40
26.	V18ENT02	ENGLISH-II	3	1	2	33.33
27.	V18MET01	ENGINEERING GRAPHICS	27	7	20	25.93
28.	V18CHT01	ENGINEERING CHEMISTRY	40	10	30	25
29.	V18PHT02	OPTO ELECTRONICS AND SEMI CONDUCTORS	10	2	8	20
30.	V18CST01	PROGRAMMING IN C FOR PROBLEM SOLVING	44	8	36	18.18
31..	V18EET02	BASIC ELECTRICAL ENGINEERING	11	1	10	9.09

Details enclosed in annexure-I

Item#2: B Tech I Semester (V18 & V20) Supplementary results September- 2022 for the ac. year 2021-22.

The summary of the results

a.Branch Wise Performance Analysis

S. No	Branch	No of Students Registered	No. of Courses			Course Wise Pass %
			Registered	Passed	Fail	
1.	CE	26	63	18	45	28.57
2.	EEE	27	41	10	31	24.39
3.	ME	41	69	18	51	26.09
4.	ECE	52	82	28	54	34.15
5.	CSE	36	51	8	43	15.69

6.	CST	19	35	6	29	17.14
7.	ECT	14	23	8	15	34.78
8.	CSE-AI	4	5	3	2	60
9.	AIML	2	3	1	2	33.33
Overall		221	372	100	272	**26.88%**

b. Course Wise Performance Analysis

S. No	Regln.	Branch	Course Code	Course Name	Appeared	Passed	Fail	Pass %
1.	V18	CE	V18CHT01	ENGINEERING CHEMISTRY	3	1	2	33.33
2.	V18	CE	V18CST01	PROGRAMMING IN C FOR PROBLEM SOLVING	2	1	1	50
3.	V20	CE	V20CHT02	ENVIRONMENTAL STUDIES	11	5	6	45.45
4.	V20	CE	V20CSL01	PROGRAMMING LAB IN C FOR PROBLEM SOLVING	5	5	0	100
5.	V20	CE	V20CST01	PROGRAMMING IN C FOR PROBLEM SOLVING	17	0	17	0
6.	V20	CE	V20ENT01	ENGLISH FOR PROFESSIONAL ENHANCEMENT	1	1	0	100
7.	V20	CE	V20MAT01	LINEAR ALGEBRA AND DIFFERENTIAL EQUATIONS	7	4	3	57.14
8.	V20	CE	V20MET01	ENGINEERING GRAPHICS	8	1	7	12.5
9.	V20	CE	V20PHT01	ENGINEERING PHYSICS	9	0	9	0
10.	V18	EEE	V18CHT01	ENGINEERING CHEMISTRY	4	0	4	0
11.	V18	EEE	V18CST01	PROGRAMMING IN C FOR PROBLEM SOLVING	3	2	1	66.67
12.	V18	EEE	V18MET01	ENGINEERING GRAPHICS	3	2	1	66.67
13.	V20	EEE	V20CHT01	ENGINEERING CHEMISTRY	13	1	12	7.69
14.	V20	EEE	V20CSL01	PROGRAMMING LAB IN C FOR PROBLEM SOLVING	2	2	0	100
15.	V20	EEE	V20CST01	PROGRAMMING IN C FOR PROBLEM SOLVING	12	0	12	0
16.	V20	EEE	V20MAT01	LINEAR ALGEBRA AND DIFFERENTIAL EQUATIONS	3	2	1	66.67
17.	V20	EEE	V20MEL01	ENGINEERING WORKSHOP	1	1	0	100
18.	V18	ME	V18CHT02	ENVIRONMENTAL STUDIES	2	0	2	0
19.	V18	ME	V18EET01	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	7	0	7	0
20.	V18	ME	V18MAT01	ENGINEERING MATHEMATICS – I	1	0	1	0
21.	V18	ME	V18PHT01	OPTICS AND WAVES	3	0	3	0
22.	V20	ME	V20CHT02	ENVIRONMENTAL STUDIES	9	4	5	44.44
23.	V20	ME	V20CSL01	PROGRAMMING LAB IN C FOR PROBLEM SOLVING	8	8	0	100
24.	V20	ME	V20CST01	PROGRAMMING IN C FOR PROBLEM SOLVING	11	0	11	0
25.	V20	ME	V20ENT01	ENGLISH FOR PROFESSIONAL ENHANCEMENT	4	2	2	50
26.	V20	ME	V20MAT01	LINEAR ALGEBRA AND DIFFERENTIAL EQUATIONS	4	1	3	25
27.	V20	ME	V20MET01	ENGINEERING GRAPHICS	11	0	11	0
28.	V20	ME	V20PHL01	ENGINEERING PHYSICS LAB	1	1	0	100
29.	V20	ME	V20PHT01	ENGINEERING PHYSICS	8	2	6	25
30.	V18	ECE	V18CHT01	ENGINEERING CHEMISTRY	10	0	10	0
31.	V18	ECE	V18CSL01	PROGRAMMING LAB IN C FOR PROBLEM SOLVING	1	1	0	100
32.	V18	ECE	V18CST01	PROGRAMMING IN C FOR PROBLEM SOLVING	9	5	4	55.56
33.	V18	ECE	V18MAT01	ENGINEERING MATHEMATICS – I	3	3	0	100
34.	V18	ECE	V18MET01	ENGINEERING GRAPHICS	8	2	6	25
35.	V20	ECE	V20CHT02	ENVIRONMENTAL STUDIES	12	2	10	16.67
36.	V20	ECE	V20EET01	BASIC ELECTRICAL ENGINEERING	14	2	12	14.29

37.	V20	ECE	V20MAT01	LINEAR ALGEBRA AND DIFFERENTIAL EQUATIONS	12	6	6	50

Details enclosed in annexure-II

Item#3: Revaluation Results of B.Tech VIII Semester (V18) Advanced Supplementary examinations August 2022 for the ac. year 2021-22.

The summary of the results

a. Branch Wise Performance Analysis

S. No.	Branch	Revaluation(No of Courses)			
		Applied	Change	No Change	Pass %
1.	CE	3	0	3	----
2.	ECE	3	0	3	----

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Applied	Change	No change
1.	V18CET43	PRE-STRESSED CONCRETE	3	0	3
2.	V18ECT31	ELECTRONICS MEASUREMENTS & INSTRUMENTATION	2	0	2
3.	V18ECT34	SATELLITE COMMUNICATION	1	0	1

Details enclosed in annexure-III

- The committee has approved the results and accorded the permission for publication of the same.

S.No	Name	Designation	Member Role	Signature
1.	Dr.Guduru VNSR Ratnakara Rao	Principal, SVEC(A8)	Chairman	
2.	Dr. P Vinay Kumar	Addl.Controller of Examinations-JNTU Kakinada	University Nominee	
3.	Dr.M.Thamarai	Professor/ECE, SVEC(A8)	Member	
4.	Mr.V.S.R.Gopala Krishna Ch	CoE, SVEC(A8)	Member	
5.	Mr G V Subrahmanyam	Dy. CoE; SVEC(A8)	Member	

Dt: 03/11/2022

Minutes of the Meeting of the Result Committee

The Sri Vasavi Engineering College (Autonomous) result committee meeting was held on 02-11-2022 at 05:00 PM through online mode using Zoom application.

Link: https://us02web.zoom.us/j/84638180822

The following members were present in the meeting.

S.No	Name	Designation	Member Role
1.	Dr.Guduru VNSR Ratnakara Rao	Principal	Chairman
2.	Dr. P Vinay Kumar	Addl.Controller of Examinations-JNTU Kakinada	University Nominee
3.	Dr M Thamarai	Prof./ECE- SVEC(A8)	Member
4.	Mr V.S.R.Gopala Krishna Ch	CoE; SVEC(A8)	Member
5.	Mr G V Subrahmanyam	Dy. CoE; SVEC(A8)	Member

The following are the minutes of the results committee meeting.

Item#1: B Tech I Semester (V18 & V20) Supplementary Revaluation results September- 2022 for the ac. year 2021-22.

The summary of the results

a. Branch Wise Performance Analysis

S. No.	Branch	Revaluation(No of Courses)			
		Applied	Change	No Change	Pass %
1.	CE	4	1	3	**25**
2.	EEE	2	0	2	----
3.	ME	3	2	1	**66.66**
4.	ECE	1	0	1	----
5.	CSE	6	1	5	**16.66**
6.	CST	2	0	2	---

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Applied	Change	No Change
1.	V18EET01	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	6	1	5
2.	V20CHT01	ENGINEERING CHEMISTRY	1	0	1
3.	V20CHT02	ENVIRONMENTAL STUDIES	2	0	2
4.	V20CST01	PROGRAMMING IN C FOR PROBLEM SOLVING	8	3	5
5.	V20PHT01	ENGINEERING PHYSICS	1	0	1

Details enclosed in annexure-I

Item#2: B Tech II Semester (V18 & V20) Regular and Supplementary Revaluation results September- 2022 for the ac. year 2021-22.

The summary of the results

a. Branch Wise Performance Analysis

S. No.	Branch	Revaluation(No of Courses)			
		Applied	Change	No Change	Pass %
1.	CE	9	1	8	**11.11**
2.	EEE	9	1	8	**11.11**
3.	ME	10	3	7	**30.00**
4.	ECE	42	21	21	**50.00**
5.	CSE	43	20	23	**46.51**
6.	CST	4	0	4	**---**
7.	ECT	8	3	5	**37.5**
8.	CSE(AI)	17	3	14	**21.4**
9.	AI &ML	5	0	5	**---**

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Applied	Change	No Change
1.	V18CHT01	ENGINEERING CHEMISTRY	4	1	3
2.	V18CHT02	ENVIRONMENTAL STUDIES	1	1	0
3.	V18CST01	PROGRAMMING IN C FOR PROBLEM SOLVING	4	0	4
4.	V18EET02	BASIC ELECTRICAL ENGINEERING	2	2	0
5.	V18MET01	ENGINEERING GRAPHICS	2	0	2

6.	V18MET02	INTRODUCTION TO ENGINEERING MECHANICS	1	0	1
7.	V18PHT02	OPTO ELECTRONICS AND SEMI CONDUCTORS	1	1	0
8.	V20AIT01	INTRODUCTION TO ARTIFICIAL INTELLIGENCE	6	2	4
9.	V20CHT01	ENGINEERING CHEMISTRY	23	10	13
10.	V20CHT02	ENVIRONMENTAL STUDIES	3	1	2
11.	V20CST01	PROGRAMMING IN C FOR PROBLEM SOLVING	18	9	9
12.	V20CST02	PYTHON PROGRAMMING	19	10	9
13.	V20CST04	DATA STRUCTURES	4	0	4
14.	V20ECT01	SWITCHING THEORY AND LOGIC DESIGN	35	6	29
15.	V20EET02	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	2	0	2
16.	V20EET03	ELECTRICAL CIRCUIT ANALYSIS-I	3	0	3
17.	V20MAT02	NUMERICAL METHODS AND VECTOR CALCULUS	9	4	5
18.	V20MAT10	INTEGRAL TRANSFORMATIONS AND VECTOR	1	0	1
19.	V20MET01	ENGINEERING GRAPHICS	6	4	2
20.	V20MET02	ENGINEERING MECHANICS	2	1	1
21.	V20PHT01	ENGINEERING PHYSICS	1	0	1

Details enclosed in annexure-II

Item#3: B Tech III Semester (V18 & V20) Supplementary Revaluation results August- 2022 for the ac. year 2021-22.
The summary of the results

a. Branch Wise Performance Analysis

S. No.	Branch	Revaluation(No of Courses)			
		Applied	Change	No Change	Pass %
1.	CE	5	0	5	---
2.	EEE	5	2	3	**40.00**
3.	ME	5	0	5	----
4.	ECE	27	2	25	**7.40**
5.	CSE	6	1	5	**16.66**
7.	ECT	3	0	3	---

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Applied	Change	No change
1.	V18CET04	STRENGTH OF MATERIALS-I	1	0	1
2.	V18CST03	DISCRETE MATHEMATICS	1	0	1
3.	V18CST04	OBJECT ORIENTED PROGRAMMING FOR PROBLEM	2	0	2
4.	V18ECT01	ELECTRONICS DEVICES & CIRCUITS	4	0	4
5.	V18ECT02	DIGITAL SYSTEM DESIGN	1	0	1
6.	V18ECT03	SIGNALS & SYSTEMS	7	0	7
7.	V18ECT04	NETWORK THEORY	7	1	6
8.	V18ECT05	ANALOG ELECTRONICS	1	0	1
9.	V18EET01	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	2	0	2
10	V18ENT11	CONSTITUTION OF INDIA	3	0	3
11	V18MET05	FLUID MECHANICS & FLUID MACHINES	4	0	4
12	V20CET01	STRENGTH OF MATERIALS	1	0	1
13	V20CET03	SURVEYING AND GEOMATICS	1	0	1
14	V20CST04	DATA STRUCTURES	1	0	1
15	V20CST05	COMPUTER ORGANIZATION AND ARCHITECTURE	2	1	1
16	V20ECT02	ELECTRONIC DEVICES, CIRCUITS & ANALYSIS	3	1	2
17	V20ECT05	SIGNALS & SYSTEMS	3	0	3
18	V20EET04	ELECTRICAL CIRCUIT ANALYSIS-II	2	1	1
19	V20EET05	ELECTRO MAGNETIC FIELDS	2	0	2
20	V20MAT06	PROBABILITY THEORY STOCHASTIC PROCESS	2	0	2
21	V20MET05	FLUID MECHANICS WITH MACHINE LEARNING	1	0	1

Details enclosed in annexure-III

Item#4: B Tech IV Semester (V18 & V20) Regular & Supplementary Revaluation results August- 2022 for the ac. year 2021-22.
The summary of the results

b. Branch Wise Performance Analysis

S. No.	Branch	Revaluation(No of Courses)			
		Applied	Change	No Change	Pass %
1.	CE	10	0	10	---
2.	EEE	25	8	17	**32.00**
3.	ME	45	9	36	**25.00**

4.	ECE	69	19	50	**27.53**
5.	CSE	60	13	47	**21.66**
7.	CST	8	0	8	**---**
8.	ECT	28	8	20	**28.57**

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Applied	Change	No change
1.	V18CET13	STRENGTH OF MATERIALS-II	4	0	4
2.	V18CST05	COMPUTER ORGANIZATION	4	1	3
3.	V18CST07	FORMAL LANGUAGES AND AUTOMATA THEORY	4	0	4
4.	V18CST08	JAVA PROGRAMMING	3	0	3
5.	V18CST09	PYTHON PROGRAMMING	2	0	2
6.	V18ECT07	ANALOG & DIGITAL COMMUNICATIONS	6	1	5
7.	V18ECT08	ANALOG CIRCUITS	1	0	1
8.	V18ECT09	PROBABILITY THEORY & STOCHASTIC PROCESS	5	3	2
9.	V18ECT10	ELECTROMAGNETIC WAVES & TRANSMISSION LINES	3	2	1
10	V18EET08	DIGITAL ELECTRONICS	1	0	1
11	V18ENT11	CONSTITUTION OF INDIA	13	4	9
12	V18MET06	THEORY OF MACHINES-I	1	0	1
13	V18MET08	MECHANICS OF SOLIDS	2	1	1
14	V20CET06	STRUCTURAL ANALYSIS-I	1	0	1
15	V20CST06	DESIGN AND ANALYSIS OF ALGORITHMS	9	2	7
16	V20CST07	SOFTWARE ENGINEERING	5	2	3
17	V20CST08	DATABASE MANAGEMENT SYSTEMS	6	0	6
18	V20CST09	JAVA PROGRAMMING	12	2	10
19	V20ECT07	ANALOG & DIGITAL COMMUNICATION	42	10	32
20	V20ECT08	DIGITAL IC APPLICATIONS	16	6	10
21	V20ECT09	ELECTRO MAGNETIC WAVES & TRANSMISSION LINES	4	0	4
22	V20EET07	SIGNALS AND SYSTEMS	8	3	5
23	V20EET08	ELECTRICAL MACHINES-II	4	1	3
24	V20EET09	ELECTRICAL AND ELECTRONIC MEASUREMENTS	3	1	2
25	V20EET10	ELECTRICAL POWER GENERATION AND TRANSMISSION	3	2	1

26	V20EET11	CONTROL SYSTEMS	6	2	4
27	V20ENT03	PROFESSIONAL COMMUNICATION SKILLS-II	10	0	10
28	V20MAT04	PROBABILITY AND STATISTICS	29	10	19
29	V20MBT51	MANAGERIAL ECONOMICS FINANCIAL ANALYSIS	23	2	21
30	V20MET07	KINEMATICS OF MACHINERY	5	0	5
31	V20MET08	MANUFACTURING SCIENCE WITH ARTIFICIAL	1	0	1
32	V20MET09	MECHANICAL MEASUREMENTS AND METROLOGY	4	3	1
33	V20MET10	APPLIED THERMODYNAMICS	8	0	8

Details enclosed in annexure-IV

Item#5: B Tech V Semester (V18) Supplementary Revaluation results August- 2022 for the ac. year 2021-22. The summary of the results

c. Branch Wise Performance Analysis

S. No.	Branch	Revaluation(No of Courses)			
		Applied	Change	No Change	Pass %
1.	CE	2	1	1	**50**
2.	ME	5	2	3	**66.66**
3.	ECE	19	2	17	**10.52**
4.	CSE	7	2	5	**28.57**
5.	CST	4	1	3	**25**
7.	ECT	5	1	4	**20**

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Applied	Change	No change
1.	V18CET16	GEOTECHNICAL ENGINEERING-I	2	1	1
2.	V18CST10	DATABASE MANAGEMENT SYSTEMS	3	0	3
3.	V18CST12	OPERATING SYSTEMS	1	0	1
4.	V18CST13	DESIGN AND ANALYSIS OF ALGORITHMS	2	1	1
5.	V18CST14	UNIX PROGRAMMING	1	0	1
6.	V18CST17	ARTIFICIAL INTELLIGENCE	4	2	2
7.	V18ECT11	VLSI DESIGN	1	0	1
8.	V18ECT12	MICROPROCESSORS & MICROCONTROLLERS	5	0	5
9.	V18ECT13	ANTENNA & WAVE PROPAGATION	12	3	9

10	V18ECT15	ENGINEER & SOCIETY	1	0	1
11	V18EET15	CONTROL SYSTEMS	4	0	4
12	V18MET13	HEAT TRANSFER	2	0	2
13	V18MET16	DESIGN OF MACHINE ELEMENTS-I	2	2	0
14	V18MET37	INTERNAL COMBUSTION ENGINES	1	0	1

Details enclosed in annexure-V

Item#6: B Tech VI Semester (V18) Regular & Supplementary Revaluation results August- 2022 for the ac. year 2021-22.
The summary of the results

d. Branch Wise Performance Analysis

S. No.	Branch	Revaluation(No of Courses)			
		Applied	Change	No Change	Pass %
1.	CE	11	1	10	**9.09**
2.	EEE	5	3	2	**60.00**
3.	ME	9	6	3	**66.66**
4.	ECE	22	7	15	**31.81**
5.	CSE	27	10	17	**37.03**
7.	CST	2	1	1	**50**
8.	ECT	3	0	3	----

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Applied	Change	No change
1.	V18CET20	STRUCTURAL ANALYSIS–II	1	0	1
2.	V18CET22	DESIGN OF STEEL STRUCTURES	4	0	4
3.	V18CET24	ENVIRONMENTAL ENGINEERING-I	1	0	1
4.	V18CST11	COMPUTER NETWORKS	5	1	4
5.	V18CST19	COMPILER DESIGN	4	1	3
6.	V18CST20	DATA MINING	3	0	3
7.	V18CST21	OBJECT ORIENTED ANALYSIS AND DESIGN THROUGH	1	0	1
8.	V18CST22	CRYPTOGRAPHY & NETWORK SECURITY	10	5	5
9.	V18CST23	SOFTWARE TESTING METHODOLOGIES	6	2	4
10	V18CST25	MACHINE LEARNING	2	0	2
11	V18CSTOE1	DATA BASE MANAGEMENT SYSTEMS	2	0	2

12	V18CSTOE3	PYTHON PROGRAMMING	18	7	11
13	V18ECT16	DIGITAL SIGNAL PROCESSING	3	1	2
14	V18ECT17	MICROWAVE ENGINEERING	5	3	2
15	V18ECT18	EMBEDDED SYSTEMS-I	1	1	0
16	V18ECT23	MICROPROCESSORS & MICROCONTROLLERS	1	1	0
17	V18ECTOE1	INTERNET OF THINGS	5	3	2
18	V18ENT06	PROFESSIONAL COMMUNICATION SKILLS-IV	3	3	0
19	V18MBT52	MANAGEMENT SCIENCE	3	1	2
20	V18MET10	METROLOGY	1	0	1
21	V18MET18	DESIGN OF MACHINE ELEMENTS–II	1	0	1
22	V18MET19	ROBOTICS	5	5	0

Details enclosed in annexure-VI

Item#7: MBA III Semester (V18) Supplementary Revaluation results August- 2022 for the ac. year 2021-22.
The summary of the results

e. Branch Wise Performance Analysis

S. No.	Programme	Revaluation(No of Courses)			
		Applied	Change	No Change	Pass %
1.	MBA	4	2	2	50

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Applied	Change	No change
1.	V18MAT07	EMPLOYABILITY SKILLS III (APTITUDE-I)	4	2	2

Details enclosed in annexure-VII

Item#8: MBA IV Semester (V18) Regular and Supplementary Revaluation results August- 2022 for the ac. year 2021-22.
The summary of the results

a. Branch Wise Performance Analysis

S. No.	Programme	Revaluation(No of Courses)			
		Applied	Change	No Change	Pass %
1.	MBA	23	9	14	39.13

b. Course Wise Performance Analysis

S. No	Course Code	Course Name	Applied	Change	No change
1.	V18MAT08	EMPLOYABILITY SKILLS IV (APTITUDE-II)	22	9	13
2.	V18MBT31	SERVICES MARKETING	1	0	1

Details enclosed in annexure-VIII

- The committee has approved the results and accorded the permission for publication of the same.

S.No	Name	Designation	Member Role	Signature
1.	Dr.Guduru VNSR Ratnakara Rao	Principal, SVEC(A8)	Chairman	
2.	Dr. P Vinay Kumar	Addl.Controller of Examinations-JNTU Kakinada	University Nominee	
3.	Dr.M.Thamarai	Professor/ECE, SVEC(A8)	Member	
4.	Mr.V.S.R.Gopala Krishna Ch	CoE, SVEC(A8)	Member	
5.	Mr G V Subrahmanyam	Dy. CoE; SVEC(A8)	Member	

S. No	PC No	CMM No	HT NO	NAME	FATHER NAME	Month of pass	Year of pass	Class Awarded	Aadhar No	Print Date	CGPA
1.	1822A0418	1822A0418	18A81A0125	MADASU SATYA VEERA SATHVIK	MADASU VENKATA RAMA PRASAD	August	2022	Second Class	7667 1979 4732	08/11/2022	6.25
2.	1822A0419	1822A0419	18A81A0136	SEETALA BALA RAMA KRISHNA	S PANNAGA BHUSHANAM	August	2022	Second Class	5074 8451 4553	08/11/2022	6.06
3.	1822A0420	1822A0420	18A81A0141	VELIGATLA SIVAKRISHNA	VELIGATLA VEERA RAGHAVULU	August	2022	Second Class	3716 5872 8831	08/11/2022	6.62
4.	1822A0421	1822A0421	18A81A0201	ARETI ANUSHA	ARETI RAMA KRISHNA	July	2022	First Class	9425 6975 6960	08/11/2022	7.1
5.	1822A0422	1822A0422	18A81A0239	SHAIK NAYEEM	SHAIK KHADAR VALI	August	2022	Second Class	4685 9958 0510	08/11/2022	6.68
6.	1822A0423	1822A0423	18A81A0302	AKULA RAJESH	AKULA HANUMANTHU RAO	September	2022	Second Class	2738 4526 6085	08/11/2022	6.12
7.	1822A0424	1822A0424	18A81A0307	BORRA SAI KUMAR	BORRA VENKATESWARLU	August	2022	Second Class	9921 4025 9377	08/11/2022	6.64
8.	1822A0425	1822A0425	18A81A0308	CHAMAKURI PAVAN KUMAR	CHAMAKURI SRINIVASA RAO	August	2022	First Class	7313 7446 0725	08/11/2022	6.85
9.	1822A0426	1822A0426	18A81A0328	NANDAMURI GOWTHAM SAI	SRINIVASA RAO	August	2022	Second Class	2680 8045 3766	08/11/2022	6.44
10.	1822A0427	1822A0427	18A81A0333	PENNADA PRAVEEN	PENNADA BABURAO	August	2022	First Class	2794 7518 9421	08/11/2022	7.02
11.	1822A0428	1822A0428	18A81A0348	DASARI TEJA VARA PRASAD	DASARI SRINIVAS	August	2022	Second Class	9600 6708 4282	08/11/2022	6.19
12.	1822A0429	1822A0429	18A81A0365	KUNDULA SATYA SANJAY	KUNDULA SRINU	September	2022	Second Class	6546 8414 6032	08/11/2022	6.12
13.	1822A0430	1822A0430	18A81A0422	KANIPEDA ISAAC GOOD NEWS	KANIPEDA ARJUNA RAO	July	2022	First Class	8067 7005 0427	08/11/2022	6.84
14.	1822A0431	1822A0431	18A81A0433	MORLA PURNA SRI	MORLA RANGA BABU	August	2022	First Class	9735 8096 2777	08/11/2022	7.28
15.	1822A0432	1822A0432	18A81A0434	MUDUNURI MOHITHA	MUDUNURI RAMARAJU	July	2022	Second Class	4637 4858 1810	08/11/2022	6.35
16.	1822A0433	1822A0433	18A81A0447	SAKHAMURI BINDU MADHAVI	SAKHAMURI RENUKA PRASAD	August	2022	First Class	7514 8672 4055	08/11/2022	6.75
17.	1822A0434	1822A0434	18A81A0497	MADDIPATLA KALI VARAPRASAD	MADDIPATLA RAMAKRISHNA	August	2022	Second Class	9780 2367 2526	08/11/2022	6.22
18.	1822A0435	1822A0435	18A81A04C0	YERRAMSETTI NAGA BHUSHANAM	YERRAMSETTI SATISH KUMAR	August	2022	Second Class	8784 1918 1339	08/11/2022	6.66
19.	1822A0436	1822A0436	18A81A04G0	SANKU KUMAR AVINASH	S M M T SURESH BABU	July	2022	First Class	7388 5361 5103	08/11/2022	6.94
20.	1822A0437	1822A0437	18A81A0504	BHIMAVARAPU TARUN TEJA	BHIMAVARAPU BULLIVENKAYYA	August	2022	Second Class	7647 3748 0091	08/11/2022	6.46
21.	1822A0438	1822A0438	18A81A0534	MEDURI VENKATA KAMALA PRAHARSHITHA	MEDURI V B S N MURTHY	September	2022	Second Class	4248 6270 5466	08/11/2022	6.68

S. No	PC No	CMM No	HT NO	NAME	FATHER NAME	Month of pass	Year of pass	Class Awarded	Aadhar No	Print Date	CGPA
22.	1822A0439	1822A0439	18A81A0556	VELAGALA SURYA SANDEEP REDDY	DHARMA REDDY	September	2022	Second Class	5460 1848 6283	08/11/2022	6.42
23.	1822A0440	1822A0440	18A81A0596	PERUMALLA PAVAN KUMAR	P JAGADISH	August	2022	First Class	5409 5352 1404	08/11/2022	6.82
24.	1822A0441	1822A0441	18A81A05A0	PUTCHAKAYALA TEJA SWAROOP	PUTCHAKAYALA KRUPAVARAM	September	2022	Second Class	9703 4789 8168	08/11/2022	6.65
25.	1822A0442	1822A0442	18A81A05E2	KODURI LIKITHA	KODURI RAJA	August	2022	Second Class	6418 3539 8976	08/11/2022	6.4
26.	1822A0443	1822A0443	18A81A05J4	GOWTHU JASWANTH MANIKANTA SAI	G RAGHU NAYAKULU	August	2022	First Class	3161 7403 6268	08/11/2022	6.79
27.	1822A0444	1822A0444	18A81A05M4	SANKURATHRI SARASWATHI PRIYANKA	SANKURATHRI NAGA SATISH BABU	August	2022	First Class	5333 0573 4399	08/11/2022	7.44
28.	1922A0160	1922A0160	19A85A0114	MOHAMMAD SAHIL	MOHAMMAD NIZAMUDDIN	August	2022	Second Class	6372 2299 9048	08/11/2022	5.91
29.	1922A0161	1922A0161	19A85A0207	CHANUMURI SANDEEP	CHANUMURI SIVA PRASAD	July	2022	Second Class	9817 0260 0573	08/11/2022	6.32
30.	1922A0162	1922A0162	19A85A0210	DODDI NAGENDRA	DODDI SIVA	August	2022	Second Class	2320 7513 6400	08/11/2022	6.44
31.	1922A0163	1922A0163	19A85A0232	KUDIPUDI LAKSHMINARAYANA	KUDIPUDI YEDUKONDALU	August	2022	First Class	9053 7498 3199	08/11/2022	6.87
32.	1922A0164	1922A0164	19A85A0233	KURUKURI SAI KRISHNA PRASAD	KURUKURI VENKATA RATNAM	August	2022	First Class	4131 3686 4254	08/11/2022	6.89
33.	1922A0165	1922A0165	19A85A0241	MUSUNURI RAMA KRISHNA	MUSUNURI NAGENDRA RAO	July	2022	First Class	7040 6781 1847	08/11/2022	6.99
34.	1922A0166	1922A0166	19A85A0247	PALADUGU DEVINADH	PALADUGU MURALI KRISHNA	July	2022	First Class	2661 5407 6850	08/11/2022	6.75
35.	1922A0167	1922A0167	19A85A0263	TANDRA SAIRAM	TANDRA RAVI	August	2022	Second Class	2172 7394 0577	08/11/2022	6.69
36.	1922A0168	1922A0168	19A85A0330	GUDURI PRAVEEN	GUDURI SATYANARAYANA	August	2022	First Class	6647 1621 6917	08/11/2022	6.86
37.	1922A0169	1922A0169	19A85A0404	KANDELLI DORABABU	KANDELLI SYAMBABU	August	2022	Second Class	5601 6719 0774	08/11/2022	6.52
38.	1922A0170	1922A0170	19A85A0405	MAHANTHI GANESH KUMAR	MAHANTHI RAMA KRISHNA	August	2022	Second Class	2939 0550 1424	08/11/2022	6.52
39.	1922A0171	1922A0171	19A85A0419	PANTHAM VAMSI	PANTHAM KRISHNA	August	2022	Second Class	4904 7286 1910	08/11/2022	6.4
40.	1922A0172	1922A0172	19A85A0505	SURAPUREDDY GEETASRI KRISHNA PRASAD	SURAPUREDDY K R S MANYESWARA RAO	August	2022	First Class	4366 0081 7600	08/11/2022	7.04
41.	1922A0173	1922A0173	19A85A0520	KATTA RAM SAI PAVAN	KATTA SATYA NARAYANA	August	2022	First Class	7288 7086 1314	08/11/2022	7.27
42.	1822A0001	1822A0001	18A81A05L8	PASUPULETI LITHIN VENKATA SAI	PASUPULETI SOMALINGAM	June	2022	First Class	5640 9343 4269	05/08/2022	7.32

S. No	PC No	CMM No	HT NO	NAME	FATHER NAME	Month of pass	Year of pass	Class Awarded	Aadhar No	Print Date	CGPA
43.	1822A0002	1822A0002	18A81A0573	GOPIREDDY CHANDRA LEENA	GOPIREDDY SURESH KUMAR	June	2022	First Class with Distinction	2794 2498 7780	08/08/2022	8.13
44.	1822A0003	1822A0003	18A81A05H9	YALLABANDI HARSHINI	YALLABANDI BANGARAYYA	June	2022	First Class with Distinction	6003 8460 3417	08/08/2022	8.88
45.	1822A0004	1822A0004	18A81A0103	APPANA RAMA SAI HARSHITH	APPANA NAGA VENKATA SATYA SRINIVAS	June	2022	First Class	3282 4379 4667	10/08/2022	7.06
46.	1822A0005	1822A0005	18A81A0104	ATYAM VANDANA	ATYAM VENKATA GANESH KUMAR	June	2022	First Class with Distinction	7967 4778 3182	10/08/2022	8.94
47.	1822A0006	1822A0006	18A81A0106	BALAJI REVANTH SAI	BALAJI RADHA KRISHNAJI	June	2022	First Class with Distinction	5289 6306 7860	10/08/2022	7.86
48.	1822A0007	1822A0007	18A81A0108	BODAVARAPU CHANDRIKA	BODAVARAPU VENKATA REDDY	June	2022	First Class	3909 9853 7280	10/08/2022	7.43
49.	1822A0008	1822A0008	18A81A0109	BODDUPALLI PAVAN KALYAN	BODDUPALLI SRINIVASA RAO	June	2022	First Class	3370 4042 5513	10/08/2022	7.05
50.	1822A0009	1822A0009	18A81A0111	BUDDA YUVA RAJU	BUDDHA PAIDE GANA PATHI	June	2022	First Class	6172 8198 8167	10/08/2022	7.31
51.	1822A0010	1822A0010	18A81A0115	GAJAVALLI DURGA LAKSHMI SAI SUMANTH	GAJAVALLI DURGA LAKSHMI PRASADA RAO	June	2022	First Class with Distinction	2737 4276 5855	10/08/2022	8.55
52.	1822A0011	1822A0011	18A81A0116	GATTIM KRUPARAO	GATTIM VENKATESWARA RAO	June	2022	First Class with Distinction	3374 3876 7570	10/08/2022	8.65
53.	1822A0012	1822A0012	18A81A0117	GATTU SATYA SAI RAM	GATTU BULLABBULU	June	2022	First Class with Distinction	4061 9427 0620	10/08/2022	7.84
54.	1822A0013	1822A0013	18A81A0120	KETHA VENKATA RAVI VARMA	KETHA SUBRAHMANYAM	June	2022	First Class with Distinction	4100 8922 3386	10/08/2022	8.05

S. No	PC No	CMM No	HT NO	NAME	FATHER NAME	Month of pass	Year of pass	Class Awarded	Aadhar No	Print Date	CGPA
55.	1822A0014	1822A0014	18A81A0121	KOMATLAPALLI VINAY CHOWDARY	KOMATLAPALLI VENKATESWARA RAO	June	2022	First Class	5964 2756 6609	10/08/2022	7.17
56.	1822A0015	1822A0015	18A81A0122	KONDEPARTHI VENKATA PRAVALLIKA	K SRINIVASA RAO	June	2022	Second Class	4158 5178 3782	10/08/2022	6.26
57.	1822A0016	1822A0016	18A81A0123	KOVVURI SAI CHAITANYA REDDY	K VIJAY SRI VENKATESWARA REDDY	June	2022	Second Class	4156 9432 3550	10/08/2022	6.46
58.	1822A0017	1822A0017	18A81A0127	MALLULA TANUJA DEVI	M RAMA KRISHNA	June	2022	Second Class	8869 4771 7522	10/08/2022	6.55
59.	1822A0018	1822A0018	18A81A0129	MOHANTY SUBHAM	MOHANTY HEMANTH KUMAR	June	2022	First Class	4475 4927 8235	10/08/2022	6.86
60.	1822A0019	1822A0019	18A81A0130	MOTHUKURI NAVYA	MOTHUKURI LAKSHMANA MURTHY	June	2022	First Class	3234 8335 2150	10/08/2022	7.63
61.	1822A0020	1822A0020	18A81A0132	MUMMIDIVARAPU YASWANTH	MUMMIDIVARAPU CHANTIBABU	June	2022	First Class	5026 4240 8712	10/08/2022	6.77
62.	1822A0021	1822A0021	18A81A0135	POLISETTI ANIL KUMAR	POLISETTI SRINU	June	2022	Second Class	3142 8027 9827	10/08/2022	6.27
63.	1822A0022	1822A0022	18A81A0139	UPPULURI LAKSHMI SANTOSH	UPPULURI SRINIVASARAO	June	2022	First Class	8279 9914 3770	10/08/2022	7.49
64.	1822A0023	1822A0023	18A81A0202	BANDHAKAVI NRUSIMHA SATYA DATTA MOUDGALYA	BANDHAKAVIVENKATA RAMA NARAYANA RAO	June	2022	First Class	8021 3202 0150	10/08/2022	7.65
65.	1822A0024	1822A0024	18A81A0203	BEJAWADA NEELIMA DIVYA	BEJAWADA SRINU	June	2022	First Class with Distinction	4097 5381 1629	10/08/2022	7.83
66.	1822A0025	1822A0025	18A81A0204	BOLLAM RAMYA SRI	BOLLAM YEDUKONDALU	June	2022	First Class with Distinction	4020 7289 6746	10/08/2022	7.93
67.	1822A0026	1822A0026	18A81A0205	BONTHU PAVAN KUMAR	BONTHU PRABHAKAR RAO	June	2022	First Class with Distinction	4398 1361 5321	10/08/2022	8.58
68.	1822A0027	1822A0027	18A81A0206	CHALLA NAGENDRA	CHALLA ANJANEYULU	June	2022	First Class with Distinction	5368 3057 3252	10/08/2022	8.18
69.	1822A0028	1822A0028	18A81A0207	CHAMARTHI RAJYA LAKSHMI	CHAMARTHI SRINIVASA KUMAR	June	2022	First Class	9748 4928 6261	10/08/2022	7.29

S. No	PC No	CMM No	HT NO	NAME	FATHER NAME	Month of pass	Year of pass	Class Awarded	Aadhar No	Print Date	CGPA
70.	1822A0029	1822A0029	18A81A0208	CHELLABOYINA HEMANTH KALI KUMAR	SRINIVASA RAO	June	2022	First Class with Distinction	2231 8423 5098	10/08/2022	8.17
71.	1822A0030	1822A0030	18A81A0209	CHILAKA SAI RAMA BHARGAVI	CHILAKA SRINIVASA RAO	June	2022	First Class with Distinction	7134 4911 9123	10/08/2022	8.03
72.	1822A0031	1822A0031	18A81A0210	CHINTALAPUDI CHANDRA SEKHAR	CHINTALAPUDI KRISHNA	June	2022	First Class	2968 3960 6839	10/08/2022	7.68
73.	1822A0032	1822A0032	18A81A0211	DATLA LAKSHMI SATHWIKA	VENKATA SATYANARAYANA RAJU	June	2022	First Class with Distinction	8519 9669 8464	10/08/2022	8.94
74.	1822A0033	1822A0033	18A81A0212	DONDAPATI GANGA BHAVANI	DONDAPATI RAMU	June	2022	First Class with Distinction	4623 3821 7501	10/08/2022	8.62
75.	1822A0034	1822A0034	18A81A0214	GORU CHANDRA MOULI	GORU SRINIVASA RAO	June	2022	First Class	9399 8748 2979	10/08/2022	7.44
76.	1822A0035	1822A0035	18A81A0215	GRANDHI DURGA SIVA SANDEEP	GRANDHI RAMA KRISHNA	June	2022	First Class with Distinction	7831 5637 1023	10/08/2022	9.05
77.	1822A0036	1822A0036	18A81A0216	JUVVALA SHARMILA	JUVVALA KRISHNA MURTHY	June	2022	First Class	9279 7774 7054	10/08/2022	7.03
78.	1822A0037	1822A0037	18A81A0218	KALAGANTI HARIKA VARMA	KALAGANTI RAMESH	June	2022	First Class with Distinction	3357 6918 3533	10/08/2022	8.31
79.	1822A0038	1822A0038	18A81A0220	KARRI PRASANNA LAKSHMI	KARRI DANA REDDY	June	2022	First Class with Distinction	5633 2944 8228	10/08/2022	8.82
80.	1822A0039	1822A0039	18A81A0223	KOVVURI SAI SUDHA	KOVVURI CHANDRA REDDY	June	2022	First Class with Distinction	7029 2773 3990	10/08/2022	8.41
81.	1822A0040	1822A0040	18A81A0224	KOYI LAKSHMI VINEETHA	KOYI SUBBARAO	June	2022	First Class with Distinction	8320 8727 1502	10/08/2022	9.46

S. No	PC No	CMM No	HT NO	NAME	FATHER NAME	Month of pass	Year of pass	Class Awarded	Aadhar No	Print Date	CGPA
82.	1822A0041	1822A0041	18A81A0225	MADDULA GOWRI SWAPNA MADHURI	MADDULA SURYA PRASAD	June	2022	First Class with Distinction	7336 3300 2299	10/08/2022	7.85
83.	1822A0042	1822A0042	18A81A0226	MADHYAHNAPU BABY SRI	MADYAHAPU RAMESH	June	2022	First Class with Distinction	4151 1732 4263	10/08/2022	8.58
84.	1822A0043	1822A0043	18A81A0228	MALISETTI PRIYANKA	MALISETTI RAJU	June	2022	First Class with Distinction	6714 5063 7756	10/08/2022	7.82
85.	1822A0044	1822A0044	18A81A0230	NADIKATLA GOPI MANIKANTA	NADIKATLA RAMBABU	June	2022	First Class with Distinction	7099 2052 7773	10/08/2022	8.33
86.	1822A0045	1822A0045	18A81A0232	PALIVELA BANGARU SRI SAI MUKESH	PALIVELA VIJAY KUMAR	June	2022	First Class with Distinction	7271 1719 5720	10/08/2022	8.61
87.	1822A0046	1822A0046	18A81A0233	PALURI PURNA TULASI	PALURI LAKSHMANARAO	June	2022	First Class with Distinction	8415 2606 2847	10/08/2022	9.5
88.	1822A0047	1822A0047	18A81A0234	PINDI JAYA LAKSHMI	PINDI SURYA CHANDRA RAO	June	2022	First Class with Distinction	9277 9262 8820	10/08/2022	7.98
89.	1822A0048	1822A0048	18A81A0235	PONNAPALLI JYOTHIKA	PONNAPALLI SATYANARYANA	June	2022	First Class with Distinction	3949 1315 6683	10/08/2022	8.39
90.	1822A0049	1822A0049	18A81A0236	PRATTI VAMSI KRISHNA	PARATTI VENKATA RAMANJANEYULU	June	2022	First Class	9578 8866 7475	10/08/2022	7.36
91.	1822A0050	1822A0050	18A81A0237	PUPPALA ANUSHA	P VENKATRAMAYYA	June	2022	First Class	8884 5086 9461	10/08/2022	7.49
92.	1822A0051	1822A0051	18A81A0242	TATAVARTHI SURYA VAMSI	TATAVARTHI PURUSHOTHAM	June	2022	First Class with Distinction	7933 1472 0566	10/08/2022	8.81
93.	1822A0052	1822A0052	18A81A0243	VADAPALLI LEPAKSHI KALYAN	VADAPALLI SRINIVASU	June	2022	First Class	4060 7799 1903	10/08/2022	7.35

S. No	PC No	CMM No	HT NO	NAME	FATHER NAME	Month of pass	Year of pass	Class Awarded	Aadhar No	Print Date	CGPA
94.	1822A0053	1822A0053	18A81A0246	VIJJU BINDHU NAGA SWATHIKA DEVI	VIJJU KRISHNA MURTHY	June	2022	First Class with Distinction	2038 5069 9047	10/08/2022	8.43
95.	1822A0054	1822A0054	18A81A0247	VINUKONDA SAI SRINIVAS	VINUKONDA PEDDI RAJU	June	2022	First Class	2039 3822 2414	10/08/2022	7.41
96.	1822A0055	1822A0055	18A81A0248	YALAMARTHI NAVYA	YALAMARTHI SATYANARAYANA	June	2022	First Class with Distinction	6414 5955 6856	10/08/2022	8.07
97.	1822A0056	1822A0056	18A81A0249	YALAMATI DEVI TANUJA	YALAMATI SRINIVAS	June	2022	First Class with Distinction	9550 9980 4513	10/08/2022	8.17
98.	1822A0057	1822A0057	18A81A0250	TANGIRALA N P S E P S V KRISHNA	T VENKATA SUBRAMANYAM	June	2022	First Class with Distinction	8897 5838 5821	10/08/2022	8.38
99.	1822A0058	1822A0058	18A81A0301	ADAPA PARDHA SARATHI	ADAPA SRINIVAS RAO	June	2022	First Class	7196 2750 8160	10/08/2022	7.61
100.	1822A0059	1822A0059	18A81A0304	ARASAVALLI LEELA KRISHNA VAMSI	ARASAVALLI SUBRAHMANYAM	June	2022	Second Class	9183 5350 2952	10/08/2022	6.6
101.	1822A0060	1822A0060	18A81A0309	CHAMANA VAMSI KRISHNA	CHAMANA NAGA SATYANARAYANA	June	2022	First Class with Distinction	8975 0253 0000	10/08/2022	8.1
102.	1822A0061	1822A0061	18A81A0311	CHINTA AKHIL	CHINTA RAMESH KUMAR	June	2022	First Class	5438 4508 3596	10/08/2022	7.53
103.	1822A0062	1822A0062	18A81A0331	AKSHAY PANTHAGANI	PANTHAGANI SOMAYYA	June	2022	Second Class	4573 9860 3050	10/08/2022	6.45
104.	1822A0063	1822A0063	18A81A0335	SAADU BALA SURENDRA SAI PRAKASH	SAADU NAGA RAJU	June	2022	First Class	3467 7494 8959	10/08/2022	7.31
105.	1822A0064	1822A0064	18A81A0336	SANABOINA DURGA PRASAD	SANABOINA JOGA RAO	June	2022	First Class	5879 6511 5320	10/08/2022	6.99
106.	1822A0065	1822A0065	18A81A0338	SAYYAD VAZEER	SAYYAD YAKOBUVALLI	June	2022	First Class	5409 5680 2121	10/08/2022	7.18
107.	1822A0066	1822A0066	18A81A0342	VAKACHARLA SAI MANI BABU	VAKACHARLA SURYA NARAYANA MURTHI	June	2022	First Class	2349 9750 6421	10/08/2022	7.64
108.	1822A0067	1822A0067	18A81A0344	VEERAMALLA VENKATA RAMANA	VEERAMALLA SRINU	June	2022	First Class	6609 0262 1360	10/08/2022	7.38
109.	1822A0068	1822A0068	18A81A0345	VELAGA GOWTHAM KRISHNA	VELAGA DURGA PRASAD RAO	June	2022	First Class	6126 5639 3079	10/08/2022	7.39

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110.	1822A0069	1822A0069	18A81A0351	DUPPANAPUDI DURGA PHANEENDRA	DUPPANAPUDI SATYANARAYANA	June	2022	First Class	3271 1434 6035	10/08/2022	7.23
111.	1822A0070	1822A0070	18A81A0352	DWARAPUDI RAMA DEVA VENKATA MANIKANTA	DWARAPUDI NUKA RAJU	June	2022	First Class with Distinction	4154 4040 1507	10/08/2022	7.99
112.	1822A0071	1822A0071	18A81A0354	GIDDA MANIKANTA DURGA PRASAD	GIDDA SESHANNA	June	2022	Second Class	4483 7270 3838	10/08/2022	6.19
113.	1822A0072	1822A0072	18A81A0355	GOTETI VENKATA SATYA MADHU BABU	GOTETI SRINIVASU	June	2022	First Class	3144 0941 3134	10/08/2022	6.79
114.	1822A0073	1822A0073	18A81A0356	GUNDUBOINA VINESH	GUNDUBOINA RAMBABU	June	2022	Second Class	4028 2648 6274	10/08/2022	6.7
115.	1822A0074	1822A0074	18A81A0357	KAKANI GOPI KRISHNA	KAKANI AMMI RAJU	June	2022	First Class	9797 0561 9264	10/08/2022	7.57
116.	1822A0075	1822A0075	18A81A0358	KANKATALA SAI SANDEEP	KANKATATALA HARINADH	June	2022	First Class with Distinction	4481 3041 8938	10/08/2022	7.79
117.	1822A0076	1822A0076	18A81A0359	KARELLA R V G D SATYA SAIRAM	KARELLA SRINIVASA RAO	June	2022	First Class with Distinction	9692 3989 4114	10/08/2022	8.47
118.	1822A0077	1822A0077	18A81A0360	KATTA BALA VENKATA SAI	KATTA MUNESWARA RAO	June	2022	First Class with Distinction	8492 3732 4319	10/08/2022	7.91
119.	1822A0078	1822A0078	18A81A0361	KONAKALLA SAI TEJA	KONAKALLA PANDURANGARAO	June	2022	First Class with Distinction	7940 1198 0648	10/08/2022	7.79
120.	1822A0079	1822A0079	18A81A0363	KONIJETI SRI MANIKANTA	KONIJETI RAMU	June	2022	First Class with Distinction	8606 7959 2344	10/08/2022	8.61
121.	1822A0080	1822A0080	18A81A0366	MATANGI JAYAPAUL	MATANGI SRINIVASARAO	June	2022	First Class with Distinction	4736 5225 9558	10/08/2022	7.8

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122.	1822A0081	1822A0081	18A81A0368	NARNI SWAMY VINAY	NARNI NAGALINGESWARA RAO	June	2022	First Class with Distinction	7781 1870 4719	10/08/2022	8.61
123.	1822A0082	1822A0082	18A81A0369	PABBISETTI VENKATA KALYAN	PABBISETTI VENKATESWARA RAO	June	2022	First Class	4414 5696 6546	10/08/2022	7.48
124.	1822A0083	1822A0083	18A81A0370	PADILAM RAMAKRISHNA	PADILAM PULLAIAH	June	2022	First Class	3031 5596 4647	10/08/2022	7.26
125.	1822A0084	1822A0084	18A81A0371	PATCHIPULUSU V V SITA RAMA SAI	PATCHIPULUSU VENKATESWARA RAO	June	2022	First Class	2797 7244 0744	10/08/2022	7.53
126.	1822A0085	1822A0085	18A81A0372	PECCHETTI TRINADH	PECCHETTI DEVI VARA PRASAD	June	2022	First Class with Distinction	8024 8807 3439	10/08/2022	7.75
127.	1822A0086	1822A0086	18A81A0374	POSINA CHARAN KUMAR	POSINA SRINUVASU	June	2022	First Class with Distinction	7933 2210 4387	10/08/2022	7.96
128.	1822A0087	1822A0087	18A81A0375	PURAM SAIKUMAR	PURAM KRISHNA RAO	June	2022	First Class	5234 8286 1751	10/08/2022	7.62
129.	1822A0088	1822A0088	18A81A0376	RAJAMAHENDRAVARAPU GOPICHAND	RAJAMAHENDRAVARAPU ISRAYELU	June	2022	First Class	3353 6872 7353	10/08/2022	7.27
130.	1822A0089	1822A0089	18A81A0377	RELANGI BHANUPRASAD	RELANGI DHANESWARARAO	June	2022	First Class	8719 5171 5970	10/08/2022	6.94
131.	1822A0090	1822A0090	18A81A0378	SALADI BHAGAVAN SREEDHAR	SALADI CHINA VENKATA NARAYANA	June	2022	First Class with Distinction	3317 1252 9720	10/08/2022	7.79
132.	1822A0091	1822A0091	18A81A0379	SODUM YASASVIREDDY	SODUM VIJAYABHASKARA REDDY	June	2022	First Class with Distinction	3126 8470 7777	10/08/2022	8.1
133.	1822A0092	1822A0092	18A81A0380	SUTHAPALLI SATYA SURYA SAI LOKESH	SUTHAPALLI RAMA KRISHNA	June	2022	First Class with Distinction	2220 2511 6320	10/08/2022	7.96
134.	1822A0093	1822A0093	18A81A0401	AMUDALA RANCY SRI	AMUDALA RAJU	June	2022	First Class with Distinction	5463 5013 1992	10/08/2022	7.97
135.	1822A0094	1822A0094	18A81A0403	BAHUROTHU SRAVANI	BAHUROTHU BHASKAR RAO	June	2022	First Class	5392 3199 7299	10/08/2022	7.3

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136.	1822A0095	1822A0095	18A81A0405	BALLE SUNEELA	BALLE RAMESH BABU	June	2022	First Class	3694 7019 8080	10/08/2022	7.56
137.	1822A0096	1822A0096	18A81A0406	BATTU ANUSHA	BATTU BHARATH ANJANEYULU	June	2022	First Class	2410 8331 2423	10/08/2022	7.28
138.	1822A0097	1822A0097	18A81A0407	BOKKA BEULA RANI	BOKKA KRISHNA	June	2022	First Class	5327 0506 8961	10/08/2022	7.52
139.	1822A0098	1822A0098	18A81A0410	DARABATTHULA LAKSHMI PRASANNA	DARABATTHULA VEERA VENKATA SATYANARAYANA	June	2022	First Class	7373 3111 8707	10/08/2022	7.03
140.	1822A0099	1822A0099	18A81A0411	DASARI TEJASWINI	DASARI DHARMA RAJU	June	2022	First Class	9876 5488 6342	10/08/2022	6.98
141.	1822A0100	1822A0100	18A81A0413	DONGALA MADHU	DONGALA NAGARAJU	June	2022	First Class	6561 2627 5725	10/08/2022	7.56
142.	1822A0101	1822A0101	18A81A0416	GUNDUMOGULA MOHANA LAKSHMI BHAVANI	GUNDUMOGULA SURYA CHANDRA RAO	June	2022	First Class	9385 4127 5975	10/08/2022	7.65
143.	1822A0102	1822A0102	18A81A0419	JUNGA BHAVYA SAI SWARUPA LAKSHMI	JUNGA KARAMCHAND GANDHI	June	2022	First Class	6105 2367 0011	10/08/2022	7.41
144.	1822A0103	1822A0103	18A81A0420	KALIGIPUDI KALYANI	KALIGIPUDI MURALI KRISHNA	June	2022	First Class with Distinction	6416 3265 3737	10/08/2022	8.05
145.	1822A0104	1822A0104	18A81A0423	KANTIPUDI SWATHI	KANTIPUDI VENKATA SUBBA RAO	June	2022	First Class	4691 7470 3689	10/08/2022	7.59
146.	1822A0105	1822A0105	18A81A0425	KOMARAVOLU KRISHNA PRIYA	KOMARAVOLU SATYANARAYANA	June	2022	First Class with Distinction	8538 4340 8484	10/08/2022	8.14
147.	1822A0106	1822A0106	18A81A0426	KONAKALLA MANIKANTA	KONAKALLA CHINNARAO	June	2022	First Class with Distinction	2895 6726 9597	10/08/2022	8.38
148.	1822A0107	1822A0107	18A81A0427	KONDETI LIKITH SRI PRAVEEN GOWD	K GOGI RAJU	June	2022	First Class with Distinction	7094 5216 5841	10/08/2022	8.5
149.	1822A0108	1822A0108	18A81A0428	KONE LOHITHA RAMYA	KONE NAGA RAJU	June	2022	First Class with Distinction	3535 2382 0021	10/08/2022	8.02
150.	1822A0109	1822A0109	18A81A0430	MADDULA YOGA SATYA SAI HARINI	MADDULA SIVA SANKAR	June	2022	First Class	6745 1937 4716	10/08/2022	7.51

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151.	1822A0110	1822A0110	18A81A0431	MADHU BABU BIRDIGANTI	VENKAT RATNAM BIRDIGANTI	June	2022	Second Class	3671 0572 9630	10/08/2022	6.6
152.	1822A0111	1822A0111	18A81A0432	MARNI NARENDRA	MARNI SRINIVASU	June	2022	First Class with Distinction	7337 7296 2400	10/08/2022	8.15
153.	1822A0112	1822A0112	18A81A0435	NADIMINTI GOWTHAMI	NADIMINTI DURGA PRASAD	June	2022	First Class with Distinction	7717 4630 5399	10/08/2022	8.34
154.	1822A0113	1822A0113	18A81A0438	PAILA VENKATA SURESH	PAILA SATYANARAYANA	June	2022	First Class with Distinction	2810 3819 3713	10/08/2022	7.86
155.	1822A0114	1822A0114	18A81A0442	PEKETI HARIBABU	PEKETI SURIBABU	June	2022	Second Class	6499 7320 2175	10/08/2022	6.49
156.	1822A0115	1822A0115	18A81A0444	REGANI KAVYA SRI	REGANI BULLI ABBULU	June	2022	First Class with Distinction	4640 6752 9216	10/08/2022	8.37
157.	1822A0116	1822A0116	18A81A0449	SEELABOINA DILEEP KUMAR	SEELABOINA V V SATYANARAYANA	June	2022	First Class	3317 0723 9901	10/08/2022	7.19
158.	1822A0117	1822A0117	18A81A0450	SHAIK IMRAN	SHAIK KALESHA VALI	June	2022	First Class	7255 7506 9625	10/08/2022	7.3
159.	1822A0118	1822A0118	18A81A0451	SHAIK RUHI	SHAIK BABJI	June	2022	First Class	3529 8561 4254	10/08/2022	7.55
160.	1822A0119	1822A0119	18A81A0452	SHAIK SHAHABAJ	SHAIK ANSAR	June	2022	First Class	2840 5823 4876	10/08/2022	6.92
161.	1822A0120	1822A0120	18A81A0453	THAMMINENI LEELA SATYA NAGA SAI	THAMMINENI GOPALAKRISHNA	June	2022	First Class	7402 2149 7629	10/08/2022	7.02
162.	1822A0121	1822A0121	18A81A0456	VATTIKUTI BHARATH	VATTIKUTI RAMESH	June	2022	First Class	3944 8855 7759	10/08/2022	6.83
163.	1822A0122	1822A0122	18A81A0457	VEERANKI CHANDANAMALA	DHARMA RAO	June	2022	First Class	9382 6802 8722	10/08/2022	7.45
164.	1822A0123	1822A0123	18A81A0458	VEERAVALLI DEEPIKA	VEERAVALLI VENKATA RAO	June	2022	First Class	2822 1874 4465	10/08/2022	7.57
165.	1822A0124	1822A0124	18A81A0460	YEDIDA VENKATA NAGA SRI	YEDIDA VENKATA RAMA RAO	June	2022	First Class with Distinction	3410 9529 0179	10/08/2022	7.84
166.	1822A0125	1822A0125	18A81A0461	ADAPA BHAVANA SAI	ADAPA SRINIVASA RAO	June	2022	First Class	3087 2688 5411	10/08/2022	7.08

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167.	1822A0126	1822A0126	18A81A0462	ADDANKI SAI SUSHMA	ADDANKI VARA PRASAD	June	2022	First Class with Distinction	4367 7698 3860	10/08/2022	8.05
168.	1822A0127	1822A0127	18A81A0463	ANKAM VENKATESH	ANKAM VEERA VENKATA SATYA NARAYANA	June	2022	First Class with Distinction	7413 7789 0794	10/08/2022	9.17
169.	1822A0128	1822A0128	18A81A0464	BADDIREDDY NAVEENA	BADDIREDDY DHARMA RAJU	June	2022	First Class with Distinction	9757 2036 7045	10/08/2022	8.34
170.	1822A0129	1822A0129	18A81A0465	BANDARU SAIDURGA	BANDARU RAMAKRISHNA	June	2022	First Class with Distinction	9812 4918 0364	10/08/2022	7.8
171.	1822A0130	1822A0130	18A81A0466	BHAGAVATULA SRI MADHURI	BHAGAVATULA KRISHNA MOHAN	June	2022	First Class	8164 4251 1398	10/08/2022	7.31
172.	1822A0131	1822A0131	18A81A0467	BHUPATHI SHEBA RANI	BHUPATHI JOSEPH	June	2022	First Class	3102 8132 0882	10/08/2022	7.4
173.	1822A0132	1822A0132	18A81A0469	BODDU UMA SAI LAKSHMI	BODDU KONDALA RAO	June	2022	First Class	6624 1715 3688	10/08/2022	7.36
174.	1822A0133	1822A0133	18A81A0470	BORRA MADHURI DEVI	BORRA PRASAD	June	2022	First Class with Distinction	4985 9893 0498	10/08/2022	7.85
175.	1822A0134	1822A0134	18A81A0471	CHELLARI VIJAY KRISHNA	CHELLARI VENKAT RAO	June	2022	First Class with Distinction	2279 3653 4423	10/08/2022	8.41
176.	1822A0135	1822A0135	18A81A0472	CHINTA PAVAN KUMAR	CHINTA YESU BABU	June	2022	First Class with Distinction	8808 4339 9130	10/08/2022	8.31
177.	1822A0136	1822A0136	18A81A0474	CHINTHADA BARGHAV RAM	CHINTHADA SANJEEVI RAO	June	2022	First Class with Distinction	8310 3340 8338	10/08/2022	7.79
178.	1822A0137	1822A0137	18A81A0475	CHITIKENA VENKATA NAGA SRAVANI	VENKATA NAGESWARA RAO	June	2022	First Class with Distinction	5552 1892 0863	10/08/2022	7.85

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179.	1822A0138	1822A0138	18A81A0476	CHUKKA MANI MALA	CHUKKA VENKATA RAO	June	2022	First Class	9310 9380 0642	10/08/2022	7.58
180.	1822A0139	1822A0139	18A81A0478	NAGA VENKATA LAKSHMI GANTA	SURYA CHANDRA RAO GANTA	June	2022	First Class with Distinction	7758 1366 3594	10/08/2022	8.31
181.	1822A0140	1822A0140	18A81A0479	GEDALA SAI DURGA PRASAD	GEDALA ANJI	June	2022	First Class	9617 3615 2274	10/08/2022	7.66
182.	1822A0141	1822A0141	18A81A0481	GORRELA LOKESWARI	GORRELA NAGA KRISHNAM RAJU	June	2022	First Class with Distinction	9492 4796 4856	10/08/2022	8.71
183.	1822A0142	1822A0142	18A81A0482	GUNDU SRI RANGA SAI MUKESH	NAGA VENKATA SATYA AKKIRAJU	June	2022	First Class	6068 3019 0702	10/08/2022	7.22
184.	1822A0143	1822A0143	18A81A0484	JUTTUGA KESAVANAGENDRA	JUTTUGA SRINUVASU	June	2022	First Class with Distinction	3864 0649 5181	10/08/2022	8.47
185.	1822A0144	1822A0144	18A81A0485	KADALI KAVYA SREE	KADALI SATYANARAYANA	June	2022	First Class with Distinction	5036 2948 2609	10/08/2022	8.38
186.	1822A0145	1822A0145	18A81A0486	KADALI V VENKATA SATYA PRUDHVI RAJ KUMAR	KADALI LAKSHMANA RAO	June	2022	First Class	2064 5363 4314	10/08/2022	6.96
187.	1822A0146	1822A0146	18A81A0487	KAKI PUSHPAKUMARI	KAKI MEERA	June	2022	First Class	8786 0933 8779	10/08/2022	7.24
188.	1822A0147	1822A0147	18A81A0488	KANDUKURI PAVANI	KANDUKURI VENKATA SATYABABJI	June	2022	First Class with Distinction	7417 7048 7473	10/08/2022	9.12
189.	1822A0148	1822A0148	18A81A0489	KANKATALA SAI LAKSHMI PRAPOORNA	KANKATALA V B V SRIRAMA MURTHY	June	2022	First Class with Distinction	8954 1595 5619	10/08/2022	8.94
190.	1822A0149	1822A0149	18A81A0490	KAPU SRINIVAS	KAPU PRABHAKARARAO	June	2022	First Class with Distinction	3614 7355 1429	10/08/2022	8.62
191.	1822A0150	1822A0150	18A81A0492	KOLA VEDA HARINI	KOLA VEERA VENKATA RAO	June	2022	First Class with Distinction	5229 2382 3903	10/08/2022	7.78

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192.	1822A0151	1822A0151	18A81A0493	KORSA GOWTHAMI	KORSA VENKATESWARARAO	June	2022	First Class with Distinction	5099 9771 4800	10/08/2022	8.14
193.	1822A0152	1822A0152	18A81A0494	KOSURI LAKSHMI BHANU PRIYA	KOSURI SANYASI RAO	June	2022	First Class with Distinction	7959 0178 2616	10/08/2022	8.75
194.	1822A0153	1822A0153	18A81A0495	KUKUNURI KEERTHANA	KUKUNURI NAGA VENKATA SATYA NARAYANA	June	2022	First Class with Distinction	8714 0433 2096	10/08/2022	9.04
195.	1822A0154	1822A0154	18A81A0496	MADDALA MOHANA SAI CHANDANA	MADDALA SRINIVAS	June	2022	First Class with Distinction	7380 0830 7145	10/08/2022	8.27
196.	1822A0155	1822A0155	18A81A0499	MOHAMMAD ARSHAD	MOHAMMAD RASHEED	June	2022	First Class	8762 1687 4340	10/08/2022	7.68
197.	1822A0156	1822A0156	18A81A04A0	MOTAMARRI THOYAJA PRIYA	MOTAMARRI UMAMAHESWARA RAO	June	2022	First Class with Distinction	5582 9186 9836	10/08/2022	8.81
198.	1822A0157	1822A0157	18A81A04A2	NALLAMILLI GEETHA SAHITHI	NALLAMILLI GOPI REDDY	June	2022	First Class	8613 8418 0465	10/08/2022	7.74
199.	1822A0158	1822A0158	18A81A04A3	PADALA RAKESH	PADALA SRISAILAM	June	2022	First Class with Distinction	7637 6538 1574	10/08/2022	8.17
200.	1822A0159	1822A0159	18A81A04A4	PECCHETTI JANANI	PECCHETTI SIVANNARAYANA	June	2022	First Class	8305 8164 2984	10/08/2022	7.66
201.	1822A0160	1822A0160	18A81A04A5	POLISETTY TEJA SAI PAVANI	POLISETTY RAMA CHANDRA RAO	June	2022	First Class with Distinction	9833 6863 0949	10/08/2022	9.38
202.	1822A0161	1822A0161	18A81A04A6	PORANKI VIDYA	PORANKI VENKATA RAMA KRISHNAM RAJU	June	2022	First Class with Distinction	5224 1277 5197	10/08/2022	8.49
203.	1822A0162	1822A0162	18A81A04A7	PUDI ABHIRAM	PUDI NAGARAJU	June	2022	First Class	6883 3335 1412	10/08/2022	7.19
204.	1822A0163	1822A0163	18A81A04A8	RELANGI R D MANI MOHAN	RELANGI T V RAMA RAO	June	2022	First Class with Distinction	8496 7825 3699	10/08/2022	8.36

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205.	1822A0164	1822A0164	18A81A04A9	SAMAVEDAM NAGA ANAGHA SAVARNIKA	SAMAVEDAM NAGA SURYA SRINIVASA PAVAN	June	2022	First Class	2483 4430 2704	10/08/2022	7.4
206.	1822A0165	1822A0165	18A81A04B0	SAYALA BHAGYA SRI	SAYALA POTHU RAJU	June	2022	First Class with Distinction	3187 1211 5298	10/08/2022	8.43
207.	1822A0166	1822A0166	18A81A04B1	SHAIK AHAMAD	SHAIK HUZUR BASHA	June	2022	First Class	4122 2025 5055	10/08/2022	7.5
208.	1822A0167	1822A0167	18A81A04B2	SODAGIRI MANUROOP	SODAGIRI J F TAGORE	June	2022	First Class with Distinction	6788 8737 8384	10/08/2022	8.12
209.	1822A0168	1822A0168	18A81A04B3	TATAVARTHI VENKATA LEELA ALEKYA	VENKATA JAGADEESWARA RAO	June	2022	First Class	7840 5383 5142	10/08/2022	7.25
210.	1822A0169	1822A0169	18A81A04B4	THANANKI VENKATA JAYA LAKSHMI	THANANKI RAMESH	June	2022	First Class with Distinction	8393 9967 9566	10/08/2022	9.17
211.	1822A0170	1822A0170	18A81A04B5	THOTA RISHI	THOTA SREENIVAS	June	2022	First Class with Distinction	2418 2969 9055	10/08/2022	7.88
212.	1822A0171	1822A0171	18A81A04B7	VELAGANI SIREESHA	VELAGANI NAGESWARA RAO	June	2022	First Class with Distinction	7258 5107 6670	10/08/2022	8.36
213.	1822A0172	1822A0172	18A81A04B8	VENDRA NAVYA SRI	VENDRA VAMSI KRISHNA	June	2022	First Class	9115 7939 1898	10/08/2022	7.25
214.	1822A0173	1822A0173	18A81A04B9	VILLURI BALA VEERA SESHU	VILLURI SATYANARAYANA MURTHY	June	2022	First Class with Distinction	7965 7676 1168	10/08/2022	7.91
215.	1822A0174	1822A0174	18A81A04C1	ADABALA SARITHA SRI	ADABALA SRINIVAS	June	2022	First Class with Distinction	2995 7148 4179	10/08/2022	9.11
216.	1822A0175	1822A0175	18A81A04C2	SAMPRATHI VINAY SAI VARSHITH	SAMPATHI NARAYANA MURTHY	June	2022	First Class with Distinction	8702 7616 9351	10/08/2022	8.16
217.	1822A0176	1822A0176	18A81A04C3	ANDROTU NAGA VENKAT	ANDROTU BALAYOGI	June	2022	First Class	7799 5613 4351	10/08/2022	7.38

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218.	1822A0177	1822A0177	18A81A04C4	BOIENA SAIHANUMAN	BOIENA VENKATARAMAYYA	June	2022	First Class with Distinction	6173 7517 7396	10/08/2022	8.49
219.	1822A0178	1822A0178	18A81A04C5	BURUGUPALLI NANDA KISHORE	BURUGUPALLI PULLARAO	June	2022	First Class with Distinction	6560 5607 0546	10/08/2022	9.14
220.	1822A0179	1822A0179	18A81A04C6	CHAGANTIPATI BHANU SANDEEP	CHAGANTIPATI V V S SRINIVASARAO	June	2022	First Class with Distinction	6068 1640 8543	10/08/2022	8.02
221.	1822A0180	1822A0180	18A81A04C7	CHALLA SAI MOULI	CHALLA NAGESWARA RAO	June	2022	First Class with Distinction	2742 0896 9706	10/08/2022	9.38
222.	1822A0181	1822A0181	18A81A04C8	CHANDURI SAI SOWJANYA	CHANDURI SATYA VENKATA NAGA SAIRAM	June	2022	First Class with Distinction	5486 3187 8829	10/08/2022	8.55
223.	1822A0182	1822A0182	18A81A04D0	CHIKKALA SAI SREE SOWMYA	CHIKKALA BALA SUBRAHMANYAM	June	2022	First Class with Distinction	7521 9968 6080	10/08/2022	9.46
224.	1822A0183	1822A0183	18A81A04D1	CHIKKALA V V NAGA SATYASAI LAKSHMI APOORVA	CHIKKALA VEERA GAVARAYYA	June	2022	First Class with Distinction	3194 7740 7441	10/08/2022	8.12
225.	1822A0184	1822A0184	18A81A04D2	CHITRAJU SARITHA	CHITRAJU PADMANABHA RAJU	June	2022	First Class with Distinction	6822 4486 0018	10/08/2022	8.53
226.	1822A0185	1822A0185	18A81A04D3	CHODAPANEEDI LAKSHMI PADMA PRIYANKA	CHODAPANEEDI SATYANARAYANA	June	2022	First Class with Distinction	7418 9227 8989	10/08/2022	9.3
227.	1822A0186	1822A0186	18A81A04D4	DANGETI BALA RAMA KRISHNA	DANGETI NAGESWARA RAO	June	2022	First Class with Distinction	3162 7442 1669	10/08/2022	8.07

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228.	1822A0187	1822A0187	18A81A04D5	DAVULURI DURGA PRANUSHA	DAVALURI SURYA CHANDRA RAO	June	2022	First Class with Distinction	9551 8994 0409	10/08/2022	8.61
229.	1822A0188	1822A0188	18A81A04D7	DURGAM SATYA SUNDARA UMA SRIVALLI	DURGAM VENKATESWARA RAO	June	2022	First Class with Distinction	4074 7941 4350	10/08/2022	8.61
230.	1822A0189	1822A0189	18A81A04D8	EDUPUGANTI SANJAY	EDUPUGANTI RAMA KRISHNA	June	2022	First Class	5675 4183 5771	10/08/2022	7.38
231.	1822A0190	1822A0190	18A81A04D9	GANDROTHU V L PRASANNA	GANDROTHU ARAVALA RAJU	June	2022	First Class with Distinction	3031 8552 6576	10/08/2022	8.88
232.	1822A0191	1822A0191	18A81A04E0	GOWTHU LAKSHMI SOWJANYA	GOWTHU RAMA CHANDRASEKHAR	June	2022	First Class	3614 6318 4703	10/08/2022	7.24
233.	1822A0192	1822A0192	18A81A04E1	JAYAMANGALA SATYANARAYANA	JAYAMANGALA NAGARAJU	June	2022	First Class	9786 5913 5286	10/08/2022	7.49
234.	1822A0193	1822A0193	18A81A04E2	KAGITHA JAGADEESH	KAGITHA RAVI	June	2022	First Class	8728 3115 4484	10/08/2022	7.19
235.	1822A0194	1822A0194	18A81A04E3	KALLEPALLI KRISHNA PRAKASH	KALLEPALLI GANDHI	June	2022	First Class with Distinction	6254 9779 4490	10/08/2022	8.47
236.	1822A0195	1822A0195	18A81A04E4	KOMMINA MOHAN SAI	KOMMINA VENKATESWARA RAO	June	2022	First Class	7680 0767 3302	10/08/2022	7.61
237.	1822A0196	1822A0196	18A81A04E5	KOPALLI HANUMA SAI SATYANARAYANA	KOPALLI VENKATESWARARAO	June	2022	First Class with Distinction	2816 9717 1591	10/08/2022	9.24
238.	1822A0197	1822A0197	18A81A04E6	MANCHA YASASWINI GAYATHRI	MANCHA VENKATA CHARI	June	2022	First Class	8980 3786 5164	10/08/2022	7.51
239.	1822A0198	1822A0198	18A81A04E7	MANDALA JAIJAIVENKATARAMANA	MANDALA VENKATESWARARAO	June	2022	First Class with Distinction	5616 1331 8964	10/08/2022	9.34
240.	1822A0199	1822A0199	18A81A04E8	MARAM SRENITHA	MARAM VENKATA KIRAN KUMAR	June	2022	First Class with Distinction	8928 2964 4366	10/08/2022	8.54

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241.	1822A0200	1822A0200	18A81A04F0	NALLAN CHAKRAVARTHULA MVRNSPS HARSHA	NALLAN CHAKRAVARTHULA NARASIMHACHARYULU	June	2022	First Class with Distinction	6925 8427 7320	10/08/2022	8.35
242.	1822A0201	1822A0201	18A81A04F1	NIMMALA JASWANTH	NIMMALA SITARAMBABU	June	2022	First Class	4375 8073 4905	10/08/2022	7.17
243.	1822A0202	1822A0202	18A81A04F2	PATHIVADA LEELA MANIKANTA SWAMY	PATHIVADA SRINIVASA RAO	June	2022	First Class with Distinction	2912 0900 2394	10/08/2022	8.62
244.	1822A0203	1822A0203	18A81A04F3	POLNATI SRI VENKATA SHIVA SUBRAHMANYAM	POLNATI VENKATA RAO	June	2022	First Class	8419 6125 2016	10/08/2022	7.26
245.	1822A0204	1822A0204	18A81A04F4	PRASADAM VENKATESH KUMAR	PRASADAM SIVANNARAYANA	June	2022	First Class with Distinction	2760 0517 1544	10/08/2022	9.21
246.	1822A0205	1822A0205	18A81A04F5	PULIPATI BINDHU KANKSHA	PULIPATI HARI KRISHNA	June	2022	First Class with Distinction	7366 1159 0463	10/08/2022	9.25
247.	1822A0206	1822A0206	18A81A04F6	RAMISETTI HEMADIVYA	RAMISETTI SIVA PRASAD	June	2022	First Class with Distinction	6813 4323 2276	10/08/2022	9.11
248.	1822A0207	1822A0207	18A81A04F7	SABBELLA SRIKAR REDDY	SABBELLA VENKATA KRISHNA REDDY	June	2022	First Class with Distinction	3329 0614 7596	10/08/2022	8.6
249.	1822A0208	1822A0208	18A81A04F8	SADANALA PAVAN KUMAR	SADANALA V R L MURTHY	June	2022	First Class with Distinction	3300 1324 8530	10/08/2022	8.78
250.	1822A0209	1822A0209	18A81A04F9	SANKA RAMA LAKSHMI DEEPIKA	SANKA SRINIVAS RAO	June	2022	First Class with Distinction	4358 9211 8888	10/08/2022	9.29
251.	1822A0210	1822A0210	18A81A04G1	SATTI ADITYA SATISH REDDY	SATTI SRINIVAS REDDY	June	2022	First Class	2749 3576 1593	10/08/2022	6.75
252.	1822A0211	1822A0211	18A81A04G2	SATYA SAI PRABHU DINESH SONTENAM	PRAKASH SONTENAM	June	2022	First Class with Distinction	6134 3543 7191	10/08/2022	9.04

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253.	1822A0212	1822A0212	18A81A04G3	SRIMATIRANGANTI UDAYKIRAN	SRIMATIRANGANTI SRIKAKULA SRINIVAS	June	2022	First Class with Distinction	9406 9336 0502	10/08/2022	7.85
254.	1822A0213	1822A0213	18A81A04G4	SUNKARA APPANNA BABU	SUNKARA SURI BABU	June	2022	First Class with Distinction	6358 5274 9042	10/08/2022	8.87
255.	1822A0214	1822A0214	18A81A04G5	TALLURI GNANA DEEPIKA	TALLURI SRINIVASA REDDY	June	2022	First Class with Distinction	6580 2549 3609	10/08/2022	8.8
256.	1822A0215	1822A0215	18A81A04G6	TETHALI NIRMALA SAI	TETHALI SANJEEVA REDDY	June	2022	First Class with Distinction	3827 1623 3290	10/08/2022	7.79
257.	1822A0216	1822A0216	18A81A04G7	THOTA SAIGANESH	THOTA RAMAKRISHNA	June	2022	First Class with Distinction	7008 9394 3193	10/08/2022	8.7
258.	1822A0217	1822A0217	18A81A04G8	TUMMAPUDI BLESSY	TUMMAPUDI RAVI KUMAR	June	2022	First Class with Distinction	2295 0695 4491	10/08/2022	8.35
259.	1822A0218	1822A0218	18A81A04G9	UNDI PAVAN MURALI	UNDI SRINU	June	2022	First Class	3138 5925 6700	10/08/2022	7.31
260.	1822A0219	1822A0219	18A81A04H0	UPPALAPATI TARUN SATYA KUMAR	UPPALAPATI VENKATA APPARAO	June	2022	First Class	9465 2536 3837	10/08/2022	7.57
261.	1822A0220	1822A0220	18A81A04H1	VADDI MEGHANA	VADDI SATYANARAYANA MURTHY	June	2022	First Class with Distinction	5580 1334 5781	10/08/2022	8.09
262.	1822A0221	1822A0221	18A81A04H2	VARDHINEEDI ESWARI SAI LAKSHMI DURGA	VARDHINEEDI SRIDHAR	June	2022	First Class with Distinction	8833 4032 5005	10/08/2022	8.93
263.	1822A0222	1822A0222	18A81A04H3	VEDANTHAM S V S BHASKARA RAMA KRISHNA	VEDANTHAM SURESH	June	2022	First Class with Distinction	9657 4243 6722	10/08/2022	9.49

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264.	1822A0223	1822A0223	18A81A04H4	VELAGALA SATISH REDDY	VELAGALA SRINIVAS SATYANARAYANA REDDY	June	2022	First Class with Distinction	5086 1758 4946	10/08/2022	7.94
265.	1822A0224	1822A0224	18A81A04H5	VEMULA SRINIVASA KUMAR	VEMULA NAGESWARA RAO	June	2022	Second Class	3292 9906 9781	10/08/2022	6.69
266.	1822A0225	1822A0225	18A81A04H6	VUTUKURI SUCHARITHA	VUTUKURI MADHAVA RAO	June	2022	First Class with Distinction	9279 1927 9237	10/08/2022	8.62
267.	1822A0226	1822A0226	18A81A04H7	YAGANTI LAVANYA	YAGANTI RAGHAVAIAH	June	2022	First Class with Distinction	8991 0952 1995	10/08/2022	8.82
268.	1822A0227	1822A0227	18A81A04H8	YELLI BHARGAV CHOWDARY	YELLI VENKATA BHUPATI	June	2022	First Class with Distinction	5729 1837 9951	10/08/2022	8.3
269.	1822A0228	1822A0228	18A81A04H9	AKUNURI MONIKA	AKUNURI RAMA RAO	June	2022	First Class with Distinction	4287 9351 1224	10/08/2022	8.86
270.	1822A0229	1822A0229	18A81A04I0	KALLA RAMYA	KALLA YERAKAYYA	June	2022	First Class	3781 2549 8528	10/08/2022	7.06
271.	1822A0230	1822A0230	18A81A0501	ABHIMALLA SRI HARSHA	ABHIMALLA SEKHAR	June	2022	Second Class	5664 0686 0275	10/08/2022	6.41
272.	1822A0231	1822A0231	18A81A0502	ARUMALLA VENKATA GOWTHAM	ARUMALLA KOTIREDDY	June	2022	First Class	6465 6473 4431	10/08/2022	7.71
273.	1822A0232	1822A0232	18A81A0505	BONDILI SHRIYA SINGH THAKUR	BONDILI DEVENDRA SINGH	June	2022	Second Class	6967 9960 0311	10/08/2022	6.52
274.	1822A0233	1822A0233	18A81A0506	BURUGU NEELIMA	BURUGU RATNARAJU	June	2022	First Class	4504 0285 8500	10/08/2022	7.42
275.	1822A0234	1822A0234	18A81A0509	CHATLA SHINY ASHREETHA	CHATLA VINOD KUMAR	June	2022	First Class	7295 6478 8026	10/08/2022	7.68
276.	1822A0235	1822A0235	18A81A0514	DHANETI SHANMUKA SAI GOVIND RAJ	DHANETI VENKATA RAO	June	2022	First Class	2694 7493 7353	10/08/2022	6.82
277.	1822A0236	1822A0236	18A81A0515	DIGUMARTHI ANUSHA	DIGUMARTHI NARASIMHA MURTHY	June	2022	First Class	3028 9699 2258	10/08/2022	6.89
278.	1822A0237	1822A0237	18A81A0516	GEDDADA BHANU TEJA	GEDDADA VIJAYKUMAR	June	2022	First Class	2120 5137 8004	10/08/2022	7.49

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279.	1822A0238	1822A0238	18A81A0517	GUDALA DIVYA	GUDALA SRINIVASARAO	June	2022	First Class with Distinction	7617 6000 5426	10/08/2022	8.62
280.	1822A0239	1822A0239	18A81A0521	KESIREDDY SRI SATYA SPANDANA	PANDU RANGA RAO	June	2022	Second Class	9583 5790 2961	10/08/2022	6.69
281.	1822A0240	1822A0240	18A81A0522	KESARAPALLI PRIYA DARSHINI	KESARAPALLI VENKATARAO	June	2022	First Class	6989 6884 4939	10/08/2022	6.78
282.	1822A0241	1822A0241	18A81A0524	KODURI SATYA LAKSHMI SRAVYA SRI	KODURI VENKATA KASI VISWESWARA RAO	June	2022	First Class	9778 4534 6955	10/08/2022	7.51
283.	1822A0242	1822A0242	18A81A0525	KOLLEPARA NAGA SATYA BALA VARA MANJUSHA	KOLLEPARA V R BALAKRISHNA MURTHY	June	2022	First Class	5864 9784 8782	10/08/2022	6.75
284.	1822A0243	1822A0243	18A81A0527	KORAPATI MOUNIKA	KORAPATI NAGESWARARAO	June	2022	First Class with Distinction	6026 4483 1219	10/08/2022	8.1
285.	1822A0244	1822A0244	18A81A0529	LAKKAPRAGADA SAI RAMA KRISHNAVAMSI	LAKKAPRAGADA VISWESWARARAO	June	2022	First Class	2875 1780 7015	10/08/2022	7.49
286.	1822A0245	1822A0245	18A81A0530	MAMIDISETTI SIVA KISHORE	MAMIDISETTI SRINIVAS	June	2022	First Class	3418 8310 9486	10/08/2022	7.18
287.	1822A0246	1822A0246	18A81A0535	NALAM JNVSKSV CHALLARAO	NALAM VVSSG NARASIMHAM	June	2022	First Class with Distinction	4830 5214 7351	10/08/2022	8.41
288.	1822A0247	1822A0247	18A81A0536	NARAHARISETTI PAVAN KUMAR	NARAHARISETTI GANESH	June	2022	Second Class	5435 8680 9351	10/08/2022	6.68
289.	1822A0248	1822A0248	18A81A0537	OGIRALA ADARSH	OGIRALA RAMBABU	June	2022	First Class with Distinction	3017 6569 7330	10/08/2022	8.62
290.	1822A0249	1822A0249	18A81A0538	PAMARTHI SESHA SAI	PAMARTHI KRISHNANJANEYULU	June	2022	First Class with Distinction	4223 7446 9619	10/08/2022	8.94
291.	1822A0250	1822A0250	18A81A0541	PEDAPOLU SAHITI SRI	PEDAPOLU GANGADHARA RAO	June	2022	First Class	2325 4792 0592	10/08/2022	7.37
292.	1822A0251	1822A0251	18A81A0542	PENUGURTHI RAKESH	PENUGURTHI ISSAK	June	2022	First Class	4036 0818 6129	10/08/2022	7.36
293.	1822A0252	1822A0252	18A81A0544	PILLI VENI	PILLI SATYANARAYANA	June	2022	First Class	2653 4175 6247	10/08/2022	6.78

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294.	1822A0253	1822A0253	18A81A0545	PIPPARA LAKSHMI DURGA	PIPPARA SATHIYYA	June	2022	First Class with Distinction	2727 6426 4173	10/08/2022	8.39
295.	1822A0254	1822A0254	18A81A0547	POLIMATI JHANSI	POLIMATI STUTHI KUMAR	June	2022	First Class	2716 9951 8672	10/08/2022	7.06
296.	1822A0255	1822A0255	18A81A0548	POTHAMSETTI TANUJA	POTHAMSETTI DHANA VENKATA KRISHNA REDDY	June	2022	Second Class	5389 2018 9340	10/08/2022	6.63
297.	1822A0256	1822A0256	18A81A0550	PYBOYINA SATYA DEV	P VENKATARAMAYYA	June	2022	Second Class	8925 0242 1661	10/08/2022	6.57
298.	1822A0257	1822A0257	18A81A0551	SATTI SIVA THATHA REDDY	SATTI SAI RAMA REDDY	June	2022	First Class	3567 8080 2074	10/08/2022	7.21
299.	1822A0258	1822A0258	18A81A0553	VANAPALLI DEVI	VANAPALLI CHITTI BABU	June	2022	First Class	3561 7175 1806	10/08/2022	6.78
300.	1822A0259	1822A0259	18A81A0561	ANUPOJU NAGA LAKSHMI SRAVANTHI	ANUPOJU SRIRANGA SRINIVASA RAO	June	2022	First Class with Distinction	7128 4392 8609	10/08/2022	8.36
301.	1822A0260	1822A0260	18A81A0562	BATTULA SHANMUKHA SAI NITHIN	BATTULA TRIVIKRAMA RAO	June	2022	First Class	4468 5154 9895	10/08/2022	7.12
302.	1822A0261	1822A0261	18A81A0563	BOLLOJU BHARATHI	BOLLOJU RAVI KUMAR	June	2022	First Class with Distinction	5091 8914 9065	10/08/2022	7.91
303.	1822A0262	1822A0262	18A81A0564	CHAPPIDI HEMA LAKSHMI SRI	CHAPPIDI SRI RAMAKRISHNA	June	2022	First Class with Distinction	4188 2571 0457	10/08/2022	8.9
304.	1822A0263	1822A0263	18A81A0565	CHILUKOTI MOUSMI	CHILUKOTI VENKATA SATYA PANDURANGA RAO	June	2022	First Class with Distinction	7348 2518 0816	10/08/2022	8.52
305.	1822A0264	1822A0264	18A81A0566	CHITAKANA HARSHAVARDHAN	CHITAKANA SATYANARAYANA	June	2022	First Class with Distinction	4380 2577 2004	10/08/2022	7.94
306.	1822A0265	1822A0265	18A81A0567	DAKE CHANDU SUJINI BALA	DAKE POTHU RAJU	June	2022	First Class with Distinction	7126 4315 1364	10/08/2022	8.6
307.	1822A0266	1822A0266	18A81A0568	DANETI RAJESH	DANETI NARASIMHA RAO	June	2022	First Class	6806 0553 2352	10/08/2022	7.65

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308.	1822A0267	1822A0267	18A81A0569	DAVULURI SAI RAMYA	MOHAN KRISHNA	June	2022	First Class with Distinction	9819 9154 2449	10/08/2022	8.66
309.	1822A0268	1822A0268	18A81A0570	GADAMSETTI R S N VENKATA DURGA DANESWARI	GADAMSETTI DHANA VENKATA GANAPATHI RAO	June	2022	Second Class	2258 8439 3082	10/08/2022	6.65
310.	1822A0269	1822A0269	18A81A0571	GADI JAHNAVI	SRINIVASARAO	June	2022	First Class with Distinction	7046 6848 6629	10/08/2022	8.27
311.	1822A0270	1822A0270	18A81A0572	GAJJARAPU MOHAN KRISHNA VAGDEVI	GAJJARAPU V V SATYANARAYANA	June	2022	First Class with Distinction	4494 4642 8710	10/08/2022	8.72
312.	1822A0271	1822A0271	18A81A0574	GORRELA PURNA SRI LAKSHMI	GORRELA SATYANARAYANA	June	2022	First Class with Distinction	3715 7928 7642	10/08/2022	8
313.	1822A0272	1822A0272	18A81A0575	GORRIPATI CHAITANYA SATYA KUMAR	GORRIPATI SRINIVASA VARA PRASAD	June	2022	First Class	9665 7792 6989	10/08/2022	7.02
314.	1822A0273	1822A0273	18A81A0576	GUDURI KUSHMITA PRIYAVALLI	GUDURI SRINU	June	2022	First Class with Distinction	6723 7514 5036	10/08/2022	8.57
315.	1822A0274	1822A0274	18A81A0577	INUMARTHI SRAVYA	INUMARTHI SRINIVAS	June	2022	First Class with Distinction	8094 7561 5438	10/08/2022	8.85
316.	1822A0275	1822A0275	18A81A0578	KANTAMANI BHAVYA SRI	KANTAMANI SRINIVASA RAO	June	2022	First Class with Distinction	2269 1256 2339	10/08/2022	8.3
317.	1822A0276	1822A0276	18A81A0579	KONDURU SOWJANYA	KONDURU PRASAD	June	2022	First Class with Distinction	9508 2263 2717	10/08/2022	8.28
318.	1822A0277	1822A0277	18A81A0580	KOPPULA LAVANYA	KOPPULA NAGA RAJU	June	2022	First Class with Distinction	9310 4004 5833	10/08/2022	8.85

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319.	1822A0278	1822A0278	18A81A0581	KORLEPARA KRISHNA BHAGAVAN	KORLEPARA RAJENDRA KUMAR	June	2022	First Class with Distinction	9018 5228 3317	10/08/2022	8.2
320.	1822A0279	1822A0279	18A81A0582	MADDIMSETTI RUPA SRI	MADDIMSETTI GANGADHARAM	June	2022	First Class with Distinction	2340 7748 8120	10/08/2022	8.98
321.	1822A0280	1822A0280	18A81A0583	MADUGULA LIKHITHA PRIYA	MADUGULA DURGA RAO	June	2022	First Class with Distinction	7785 6765 0285	10/08/2022	8.31
322.	1822A0281	1822A0281	18A81A0585	MANDAPAKA PHANEENDRA	MANDAPAKA SRINIVAS	June	2022	First Class	4396 5690 5028	10/08/2022	7.39
323.	1822A0282	1822A0282	18A81A0586	MANDAPATI SHYAMALA	MAHANKALI RAO	June	2022	First Class with Distinction	5131 4271 1497	10/08/2022	8.48
324.	1822A0283	1822A0283	18A81A0587	MANEPALLI MOUSHMI	MANEPALLI SRINIVASA GUPTA	June	2022	First Class with Distinction	4886 3210 1359	10/08/2022	8.38
325.	1822A0284	1822A0284	18A81A0588	MOHAMMAD GOUSE MOHIDDIN	MOHAMMAD MAXOOD AHAMAD	June	2022	First Class	9707 3807 4258	10/08/2022	7.08
326.	1822A0285	1822A0285	18A81A0589	MOHAMMAD HASNATH BEGUM	MOHAMMAD ABDUL WAHAB	June	2022	First Class with Distinction	3043 0794 0244	10/08/2022	8.65
327.	1822A0286	1822A0286	18A81A0590	NADIMPALLI PRANATHI	NADIMPALLI SRINIVASARAJU	June	2022	First Class with Distinction	4967 1835 5864	10/08/2022	7.96
328.	1822A0287	1822A0287	18A81A0591	NARAYANA SWATHI SRI	VENKATA RAMANA RAO	June	2022	First Class with Distinction	5888 1215 8714	10/08/2022	8.2
329.	1822A0288	1822A0288	18A81A0592	ORUSU VENKATESH	ORUSU DHANAYYA	June	2022	First Class with Distinction	9147 5659 0287	10/08/2022	8.15
330.	1822A0289	1822A0289	18A81A0593	PANGIDI HARIKA	PANGIDI RAMBABU	June	2022	First Class	3526 8238 6611	10/08/2022	7.62

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331.	1822A0290	1822A0290	18A81A0595	PECHETTI BHAVANI DURGA	PECHETTI SATYANARAYANA	June	2022	First Class	2726 9052 8493	10/08/2022	7.22
332.	1822A0291	1822A0291	18A81A0597	POLAMARASETTI PADMA LEELA	POLAMARASETTI SRINIVASA RAO	June	2022	First Class with Distinction	5443 0416 0638	10/08/2022	8.82
333.	1822A0292	1822A0292	18A81A0598	POLUMATI SASIDHAR	POLUMATI MURALI MOHAN	June	2022	First Class	4331 0310 1414	10/08/2022	7.63
334.	1822A0293	1822A0293	18A81A0599	PRASADAM SANDYA RANI	PRASADAM SUDHAKARA RAO	June	2022	First Class with Distinction	6394 1545 4232	10/08/2022	8.28
335.	1822A0294	1822A0294	18A81A05A1	RUDRARAJU NAGA SAI VARA LAKSHMI REVATHI	RUDRARAJU RANGA RAJU	June	2022	First Class	4678 7623 2047	10/08/2022	7.38
336.	1822A0295	1822A0295	18A81A05A2	SAIDU KIRAN	SAIDU GOPI	June	2022	First Class	8177 9700 2340	10/08/2022	6.76
337.	1822A0296	1822A0296	18A81A05A3	SANABOINA SUNEESHA	SANABOINA NAGESWARA RAO	June	2022	First Class with Distinction	9241 5913 8513	10/08/2022	8.48
338.	1822A0297	1822A0297	18A81A05A4	SANKU RAMYA SRI VARDHINI	SANKU HANUMANTHA RAO	June	2022	First Class with Distinction	6230 8176 8159	10/08/2022	8.37
339.	1822A0298	1822A0298	18A81A05A5	SARIDE SAI VIDYA ANUSHA PRAVEENA	SARIDE KESAVARAO	June	2022	First Class with Distinction	4228 3068 0207	10/08/2022	8.02
340.	1822A0299	1822A0299	18A81A05A6	SATAGOPAM HARI PRASAD	SATAGOPAM CHINA VENKATA PULLAYYA	June	2022	First Class	5784 4368 9218	10/08/2022	7.51
341.	1822A0300	1822A0300	18A81A05A7	SHAIK ASMA SALONA	SHAIK VALI	June	2022	First Class	6993 7771 1903	10/08/2022	7.1
342.	1822A0301	1822A0301	18A81A05A9	SINGAMSETTI UMA SAI	SINGAMSETTI V S E NAGA BHASKARA RAO	June	2022	First Class	9783 2991 4491	10/08/2022	7.58
343.	1822A0302	1822A0302	18A81A05B0	TAMMINENI DEEPTHI	TAMMINENI APPARAO	June	2022	First Class with Distinction	5233 2478 2175	10/08/2022	7.92
344.	1822A0303	1822A0303	18A81A05B1	TIRUMALLA KOTESWARA RAO	TIRUMALLA SATYANARAYANA	June	2022	First Class	7246 9231 3424	10/08/2022	7.71
345.	1822A0304	1822A0304	18A81A05B2	UPPALAPATI MEGHANA	UPPALAPATI NAGA VENKATA SATYANARAYANA	June	2022	First Class	2314 4600 6014	10/08/2022	7.23

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346.	1822A0305	1822A0305	18A81A05B3	VALLURI JAHNAVI SRIYA	VALLURI JNANA KISHORE	June	2022	First Class with Distinction	8093 9635 0232	10/08/2022	8.72
347.	1822A0306	1822A0306	18A81A05B4	VALLURI SHARMISRI	VALLURI SATYANARAYANA CHOWDARY	June	2022	First Class with Distinction	5150 6100 2392	10/08/2022	8.34
348.	1822A0307	1822A0307	18A81A05B5	VEERABATHULA RUCHITHA SAI LAKSHMI	VEERABATHULA VEERA VENKATESWARA RAO	June	2022	First Class with Distinction	3350 0587 3248	10/08/2022	9.34
349.	1822A0308	1822A0308	18A81A05B6	VUYYURI KEERTHI	VUYYURI ADINARAYANA	June	2022	First Class with Distinction	9411 4482 2226	10/08/2022	8.28
350.	1822A0309	1822A0309	18A81A05B7	YADLAPALLI SATYA SAI VAMSI	YADLAPALLI SRINIVAS	June	2022	First Class	5965 4407 6549	10/08/2022	6.9
351.	1822A0310	1822A0310	18A81A05B9	YALAVARTHI RAGHAVA RAO	YALAVARTHI SRINIVASA RAO	June	2022	First Class with Distinction	2557 9733 0048	10/08/2022	8.4
352.	1822A0311	1822A0311	18A81A05C0	YESUPOGU SUNIL JOSHI	YESUPOGU ASHOK KUMAR	June	2022	First Class with Distinction	8138 5436 8371	10/08/2022	8.52
353.	1822A0312	1822A0312	18A81A05C1	ADADADI KAMESH	ADADADI MOHANA KRISHNA	June	2022	First Class with Distinction	3355 4771 5661	10/08/2022	7.98
354.	1822A0313	1822A0313	18A81A05C2	ADDADA LAKSHMIPRIYANKA	ADDADA RAMARAJU	June	2022	First Class with Distinction	5280 7727 7244	10/08/2022	8.13
355.	1822A0314	1822A0314	18A81A05C3	ADDEPALLI VEDA SRAVANI	ADDEPALLI V V SATYANARAYANA MURTHY	June	2022	First Class with Distinction	9815 1272 2317	10/08/2022	9.37
356.	1822A0315	1822A0315	18A81A05C4	AKULA SAI RAM	AKULA SRINIVASA RAO	June	2022	First Class	5978 8168 5957	10/08/2022	7.4
357.	1822A0316	1822A0316	18A81A05C6	ANNAM VENKATA SAI SIVA KARTHIK	ANNAM CHANDRA SEKHAR	June	2022	First Class with Distinction	7847 5218 2988	10/08/2022	8.71

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358.	1822A0317	1822A0317	18A81A05C7	ATHULURI DINUSHA	ATHULURI SRINIVASA RAO	June	2022	First Class with Distinction	2846 1726 7114	10/08/2022	9.06
359.	1822A0318	1822A0318	18A81A05C8	BADANA SOWMYA	BADANA SATYAM	June	2022	First Class with Distinction	4848 6119 5792	10/08/2022	8.63
360.	1822A0319	1822A0319	18A81A05C9	CHEERA RAJ PAVAN	CHEERA RAMAKRISHNA	June	2022	First Class	8042 3038 0517	10/08/2022	7.01
361.	1822A0320	1822A0320	18A81A05D0	GADISETTI DINESH SRINIVAS	GADISETTI BABJI	June	2022	First Class with Distinction	4878 7012 5114	10/08/2022	8.23
362.	1822A0321	1822A0321	18A81A05D1	GAMIDI LAKSHMI SAHITHI	GAMIDI SATYANARAYANA MURTHY	June	2022	First Class with Distinction	3908 3900 3696	10/08/2022	9
363.	1822A0322	1822A0322	18A81A05D3	GATTEM NAGA CHANDANA	GATTEM SATYANARAYANA	June	2022	First Class with Distinction	6845 0963 0077	10/08/2022	9.27
364.	1822A0323	1822A0323	18A81A05D4	GUDIMETLA NAGA SAI SANTHI KEERTHI	GUDIMETLA SRINIVASA GOPALA REDDY	June	2022	First Class with Distinction	5797 8360 4028	10/08/2022	8.76
365.	1822A0324	1822A0324	18A81A05D5	GUNDAPANENI BRAHMATEJA	GUNDAPANENI SUDHAKAR	June	2022	First Class with Distinction	8068 7555 2593	10/08/2022	8.62
366.	1822A0325	1822A0325	18A81A05D6	INDUKURI NEELIMA	INDUKURI SRINIVASA RAJU	June	2022	First Class with Distinction	5035 8212 8972	10/08/2022	7.77
367.	1822A0326	1822A0326	18A81A05D7	KAJULURI VENKATA SAI NAGADURGA	KAJULURI DURGA MALLESWARARAO	June	2022	First Class with Distinction	4789 5269 7150	10/08/2022	8.87
368.	1822A0327	1822A0327	18A81A05D8	KALE SAI SRI BHAVANA	KALE MADHUSUDHANA RAO	June	2022	First Class with Distinction	4803 9824 6067	10/08/2022	8.44
369.	1822A0328	1822A0328	18A81A05D9	KARRI KYATHI SRI JYOTHI	KARRI SRINIVASA RAO	June	2022	First Class	6117 7530 6036	10/08/2022	7.73

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370.	1822A0329	1822A0329	18A81A05E0	KATTA AMBIKA	KATTA SRINU	June	2022	First Class with Distinction	8159 0569 8676	10/08/2022	8.43
371.	1822A0330	1822A0330	18A81A05E1	KETHA PRUDHVI RAJU	KETHA SRINIVASA RAO	June	2022	First Class	3703 1283 6789	10/08/2022	7.29
372.	1822A0331	1822A0331	18A81A05E3	KONE TARUN DEEPAK	KONE SATYANARAYANA	June	2022	First Class with Distinction	3434 3239 2941	10/08/2022	8.79
373.	1822A0332	1822A0332	18A81A05E4	KUCHIPUDI VENKATA GAYATHRI	KUCHIPUDI DASARADHA RAMAYYA	June	2022	First Class with Distinction	8757 7224 4727	10/08/2022	8.71
374.	1822A0333	1822A0333	18A81A05E5	KURADA ASHA JYOTHI	KURADA NAGA BHADRAM	June	2022	First Class with Distinction	2037 1846 7286	10/08/2022	8.71
375.	1822A0334	1822A0334	18A81A05E6	KUSAM JAHNAVI	KUSAM JOHN PRASAD REDDY	June	2022	First Class with Distinction	4730 2740 6931	10/08/2022	7.83
376.	1822A0335	1822A0335	18A81A05E7	MAKA PRASANNA LAKSHMI	MAKA SRINIVAS	June	2022	First Class with Distinction	7047 3250 3046	10/08/2022	8.09
377.	1822A0336	1822A0336	18A81A05E8	MAMATHA SAI JILLELLAMUDI	J VENKATESWARA RAO	June	2022	First Class	2629 7096 3436	10/08/2022	7.66
378.	1822A0337	1822A0337	18A81A05E9	MAMIDISETTY ASWINI	GOPI	June	2022	First Class with Distinction	7995 2217 4145	10/08/2022	8.13
379.	1822A0338	1822A0338	18A81A05F0	MANNE GOVINDA RAJU	MANNE VEERANNA	June	2022	First Class with Distinction	2178 4330 4061	10/08/2022	8.79
380.	1822A0339	1822A0339	18A81A05F1	MOGASATI V V P VARMA	MOGASATI SITA RAMA RAJU	June	2022	First Class with Distinction	9106 2161 4964	10/08/2022	8
381.	1822A0340	1822A0340	18A81A05F2	MOLLETI RENUKA SAI	MOLLETI JAGADEESWARA RAO	June	2022	First Class with Distinction	8400 1144 8310	10/08/2022	8.07

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382.	1822A0341	1822A0341	18A81A05F3	MULLAPUDI NAVYA SRI	MULLAPUDI RAMA KRISHNA	June	2022	First Class with Distinction	2474 7087 4259	10/08/2022	8.23
383.	1822A0342	1822A0342	18A81A05F4	MUNIKOTI SRI CHARAN	MUNIKOTI VENU	June	2022	First Class with Distinction	6263 0763 5208	10/08/2022	8.45
384.	1822A0343	1822A0343	18A81A05F5	NAGIREDDY YAMINI LAKSHMI	NAGIREDDY SATYANARAYANA	June	2022	First Class with Distinction	9713 5223 9982	10/08/2022	8.15
385.	1822A0344	1822A0344	18A81A05F6	NALLI SWATHI	NALLI VENKATESWARA RAO	June	2022	First Class with Distinction	7312 6394 2479	10/08/2022	9.04
386.	1822A0345	1822A0345	18A81A05F7	NANDIKAM LAKSHMI AISWARYA	NANDIKAM V V SITA RAMA MURTHY	June	2022	First Class with Distinction	3530 2596 2048	10/08/2022	9.2
387.	1822A0346	1822A0346	18A81A05F8	NEELAPALA RAMYA	NEELAPALA SOMA RAJU	June	2022	First Class with Distinction	3585 0187 9609	10/08/2022	7.9
388.	1822A0347	1822A0347	18A81A05F9	NULI D L NAGA SATYA VASAVI GAYATRI ANMISHA	NULI NAGA VENKATA NARSIMHA RAJU	June	2022	First Class with Distinction	6015 0965 1030	10/08/2022	8.89
389.	1822A0348	1822A0348	18A81A05G2	PATTHIPATI RAJKUMAR	PATTHIPATI SUBBA RAO	June	2022	First Class with Distinction	9325 3522 5373	10/08/2022	9.03
390.	1822A0349	1822A0349	18A81A05G3	PRAGALLAPATI ROHIT	PRAGALLAPATI RAMBABU	June	2022	First Class with Distinction	5747 1526 3915	10/08/2022	8.54
391.	1822A0350	1822A0350	18A81A05G4	RAJANA JYOTSNA SREE VARSHITA	RAJANA APPALA NAIDU	June	2022	First Class with Distinction	2933 7519 8573	10/08/2022	9.27

S. No	PC No	CMM No	HT NO	NAME	FATHER NAME	Month of pass	Year of pass	Class Awarded	Aadhar No	Print Date	CGPA
392.	1822A0351	1822A0351	18A81A05G5	REDDY TEJA SRINIVAS	REDDY RAMANJANEYULU	June	2022	First Class with Distinction	2738 3979 6298	10/08/2022	8.23
393.	1822A0352	1822A0352	18A81A05G6	SAI NAMMI	NAMMI SURI BABU	June	2022	First Class with Distinction	2171 0796 3466	10/08/2022	8.14
394.	1822A0353	1822A0353	18A81A05G7	SIKKANDAR JAINAB FATHIMA	SYED SIKKANDAR ALI	June	2022	First Class with Distinction	9015 7530 6183	10/08/2022	9.31
395.	1822A0354	1822A0354	18A81A05G8	SUNKARA SAI DURGA LASYA	SUNKARA RAVI KUMAR	June	2022	First Class with Distinction	7285 6965 1638	10/08/2022	8.93
396.	1822A0355	1822A0355	18A81A05G9	TERLI DURGA PRASAD	TERLI TRIMURTHULU	June	2022	First Class with Distinction	3744 0727 1720	10/08/2022	9.04
397.	1822A0356	1822A0356	18A81A05H0	THIRTHALA LEESHA PALLAVI	T SRINIVASA RAO	June	2022	First Class with Distinction	6290 0982 4805	10/08/2022	8.02
398.	1822A0357	1822A0357	18A81A05H1	TILLAPUDI BHARGAV	TILLAPUDI SRINIVASA RAO	June	2022	First Class	4408 2339 5400	10/08/2022	7.32
399.	1822A0358	1822A0358	18A81A05H2	UDATHALA DURGA BHARATHI	UDATHALA ANANDAM	June	2022	First Class with Distinction	5366 3197 0297	10/08/2022	8.41
400.	1822A0359	1822A0359	18A81A05H3	VANIMIREDDY BHANU TEJA	VANIMIREDDY RAVIRAMA TYAGA RAJU	June	2022	First Class with Distinction	2028 3352 0207	10/08/2022	8.98
401.	1822A0360	1822A0360	18A81A05H4	VARIKUTI LAKSHMI SAI PRASANNA	VARIKUTI SRINIVASARAO	June	2022	First Class with Distinction	3759 9182 6046	10/08/2022	8.65
402.	1822A0361	1822A0361	18A81A05H5	VATTIKUTI SESHA SIRISHA	VATTIKUTI VENKATA SUBBA RAYUDU	June	2022	First Class with Distinction	2299 9773 1956	10/08/2022	7.88

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403.	1822A0362	1822A0362	18A81A05H7	VEERAMALLU YUVARAJ	VEERAMALLU NAGESWARARAO	June	2022	First Class with Distinction	7078 9338 8815	10/08/2022	8.17
404.	1822A0363	1822A0363	18A81A05H8	VELUGONDA BHARGAVI	VELUGONDA APPALA RAJU	June	2022	First Class with Distinction	8644 3716 6848	10/08/2022	8.69
405.	1822A0364	1822A0364	18A81A05I0	YARNAGULA INDIRA	YARNAGULA VENKATA RAMANA	June	2022	First Class with Distinction	2080 7252 8443	10/08/2022	9.36
406.	1822A0365	1822A0365	18A81A05I2	AKETI DANESWARI	AKETI SAI BABA	June	2022	First Class with Distinction	4133 1196 4292	10/08/2022	9.34
407.	1822A0366	1822A0366	18A81A05I3	BADIGA MANI KANTA	BADIGA HARI KRISHNA	June	2022	First Class	9627 2049 6999	10/08/2022	7.71
408.	1822A0367	1822A0367	18A81A05I4	CHINNAM CHANDANA	CHINNAM NAGESWARA RAO	June	2022	First Class with Distinction	4621 3243 3595	10/08/2022	9.39
409.	1822A0368	1822A0368	18A81A05I5	CHINTALAPATI HARSHAVARDHAN SIDDARTHA VARMA	CHINTALAPATI RAMANJANEYA RAJU	June	2022	First Class with Distinction	5678 5203 8173	10/08/2022	8.38
410.	1822A0369	1822A0369	18A81A05I6	CHITTURI JAI KRISHNAVAMSI	CHITTURI SRINIVAS	June	2022	First Class	8769 3652 9165	10/08/2022	7.03
411.	1822A0370	1822A0370	18A81A05I7	DARAPUREDDY SAHITHI	DARAPUREDDY APPANNA DORA BABU	June	2022	First Class with Distinction	4374 1217 0897	10/08/2022	9.15
412.	1822A0371	1822A0371	18A81A05I8	DATLA SRIYA	DATLA SAI KRISHNAM RAJU	June	2022	First Class with Distinction	3939 8415 6881	10/08/2022	9.55
413.	1822A0372	1822A0372	18A81A05I9	DHARANI TALARI	VENKATA SUBBA RAO TALARI	June	2022	First Class with Distinction	2073 6653 4438	10/08/2022	8.49
414.	1822A0373	1822A0373	18A81A05J0	GADDE LIKHITHA SAI	GADDE SARATH BABU	June	2022	First Class with Distinction	7635 6799 0234	10/08/2022	7.95

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415.	1822A0374	1822A0374	18A81A05J1	GANTA P N SAI LAKSHMI	GANTA SAMBA MURTHY	June	2022	First Class with Distinction	3006 5243 1446	10/08/2022	7.97
416.	1822A0375	1822A0375	18A81A05J3	GIDDA VENKATA SINDHU RUCHITHA	GIDDA DURGA RAO	June	2022	First Class with Distinction	8215 7000 8670	10/08/2022	8.95
417.	1822A0376	1822A0376	18A81A05J5	HANUMANTHU ANITHA	HANUMANTHU SRINIVASU	June	2022	First Class	7237 7762 1821	10/08/2022	7.41
418.	1822A0377	1822A0377	18A81A05J6	INDUGAPALLI LAKSHMI PRASANNA	INDUGAPALLI VEERA RAGHAVENDRA RAO	June	2022	First Class with Distinction	3222 9649 0704	10/08/2022	8.75
419.	1822A0378	1822A0378	18A81A05J7	KADAGALLA BALA KRISHNAVENI	KADAGALLA VENKATA SATYANARAYANA	June	2022	First Class with Distinction	2301 4474 8220	10/08/2022	8.78
420.	1822A0379	1822A0379	18A81A05J8	KALLA GAYATRI	KALLA LAKSHMANA RAO	June	2022	First Class with Distinction	7188 2068 8437	10/08/2022	9.36
421.	1822A0380	1822A0380	18A81A05J9	KANDULA VENKATASAI	KANDULA SRINIVASU	June	2022	First Class with Distinction	8498 9343 3908	10/08/2022	8.87
422.	1822A0381	1822A0381	18A81A05K0	KANKATALA SUREKHA	KANKATALA BUTCHI RAMAYYA	June	2022	First Class with Distinction	7578 2454 4127	10/08/2022	8.2
423.	1822A0382	1822A0382	18A81A05K1	KANURI YOGESWARI	KANURI VEERA VENKATA SATYANARAYANA	June	2022	First Class with Distinction	3633 9622 4365	10/08/2022	9.11
424.	1822A0383	1822A0383	18A81A05K3	KARELLA BABY BHARGAVI	KARELLA SUBBARAYUDU	June	2022	First Class with Distinction	7788 8274 8480	10/08/2022	9.22
425.	1822A0384	1822A0384	18A81A05K4	KARPURAPU UMA SASANK	KARPURAPU APPALARAJA	June	2022	First Class with Distinction	7543 7948 7450	10/08/2022	8.2

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426.	1822A0385	1822A0385	18A81A05K5	KOMATLAPALLI LEELA NAGA LAKSHMI PRIYA	KOMATLAPALLI SRIRAMA CHANDRA MURTHY	June	2022	First Class with Distinction	4521 7460 1172	10/08/2022	9.16
427.	1822A0386	1822A0386	18A81A05K6	KONDAPALLI THORANI SOWMYA	KONDAPALLI NAGA BHUSHANAM	June	2022	First Class with Distinction	3044 7582 6125	10/08/2022	9.44
428.	1822A0387	1822A0387	18A81A05K7	KOPPULA SAI PRASANNA	KOPPULA VEERA SOMA RAJU	June	2022	First Class with Distinction	3487 6574 2090	10/08/2022	8.26
429.	1822A0388	1822A0388	18A81A05K8	KORIPALLI NAGA SINDHU	KORIPALLI SAI BABU	June	2022	First Class with Distinction	5124 4233 1793	10/08/2022	8.32
430.	1822A0389	1822A0389	18A81A05K9	KOTHA DHANA LAKSHMI	KOTHA ANJANEYULU	June	2022	First Class with Distinction	7803 3724 2284	10/08/2022	8.96
431.	1822A0390	1822A0390	18A81A05L0	KOTHAPALLI MOHIT ADARSH	K VENKATA RAJESWARA RAO	June	2022	First Class	8357 2513 8735	10/08/2022	7.05
432.	1822A0391	1822A0391	18A81A05L1	KOTTA NARESH	KOTTA CHITTI BABU	June	2022	First Class	7110 8427 1758	10/08/2022	7.38
433.	1822A0392	1822A0392	18A81A05L2	MANEPALLI PAVANA SWARAJYA SRINEHA	MANEPALLI VENKATA SIVA PRASAD	June	2022	First Class with Distinction	6895 7513 3166	10/08/2022	9.25
434.	1822A0393	1822A0393	18A81A05L3	MANEPALLI RAMYA SRI	MANEPALLI RAM MOHANA RAO	June	2022	First Class with Distinction	6849 8004 0538	10/08/2022	9.26
435.	1822A0394	1822A0394	18A81A05L4	METLA PADMA PRIYA	METLA VENKATESWARAO	June	2022	First Class with Distinction	7409 0448 6072	10/08/2022	7.77
436.	1822A0395	1822A0395	18A81A05L5	MOPIDEVI SRI SARADA SANKARI	MOPIDEVI PRASAD	June	2022	First Class with Distinction	8827 4438 4183	10/08/2022	9.03
437.	1822A0396	1822A0396	18A81A05L6	PADALA JAYASRI HARSHITHA	PADALA RAMA SUMAN GANDHI	June	2022	First Class with Distinction	5404 9783 0037	10/08/2022	8.42

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438.	1822A0397	1822A0397	18A81A05L7	PALAVANCHA THIRUMALA K MADHURI	NARASIMHACHARYULU	June	2022	First Class with Distinction	7941 9876 0040	10/08/2022	8.36
439.	1822A0398	1822A0398	18A81A05L9	PENMETSA SUSHMA	PENMETSA BANGARU RAJU	June	2022	First Class with Distinction	9966 1980 6815	10/08/2022	8.98
440.	1822A0399	1822A0399	18A81A05M0	PURNA NAGA VENKATA SAI KOLLA	K SATYANARAYANA	June	2022	First Class	3326 1667 5670	10/08/2022	7.3
441.	1822A0400	1822A0400	18A81A05M1	RAJULAPATI YOGANANDA MADHU GOPAL	RAJULAPATI MUTYALA RAO	June	2022	First Class with Distinction	7804 8237 0240	10/08/2022	9.04
442.	1822A0401	1822A0401	18A81A05M2	RAVURI DIVYA	RAVURI RAMU	June	2022	First Class with Distinction	5893 6352 0486	10/08/2022	8.52
443.	1822A0402	1822A0402	18A81A05M3	SAINA MOHITHA SAI	SAINA RAMA KRISHNA	June	2022	First Class with Distinction	7992 9495 8056	10/08/2022	9.08
444.	1822A0403	1822A0403	18A81A05M5	SATTI NAGA PHANENDRA REDDY	SATTI SATTI REDDY	June	2022	First Class	6045 8202 9623	10/08/2022	7.44
445.	1822A0404	1822A0404	18A81A05M6	SIDDANA VIJAYA LAKSHMI	SIDDANA VEERRAJU	June	2022	First Class with Distinction	4552 5957 3826	10/08/2022	8.21
446.	1822A0405	1822A0405	18A81A05M7	SUNKARA LALITHA	SUNKARA SRINIVASA RAO	June	2022	First Class with Distinction	6875 9264 7423	10/08/2022	9.33
447.	1822A0406	1822A0406	18A81A05M8	SUNKARA NIKHITA	SUNKARA LAKSHMANA SWAMY	June	2022	First Class	2552 0709 9608	10/08/2022	7.5
448.	1822A0407	1822A0407	18A81A05M9	TAMMANA NAGA SWATHI	TAMMANA GOVINDARAJU	June	2022	First Class with Distinction	5703 1113 4923	10/08/2022	8.76

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449.	1822A0408	1822A0408	18A81A05N0	TAMMINEEDI BINDU JYOTHSNA	TAMMINEEDI RAMU	June	2022	First Class with Distinction	3210 1069 5582	10/08/2022	8.85
450.	1822A0409	1822A0409	18A81A05N2	TURAGA SRAVYA	TURAGA SOMA SUNDARA SRINIVASA RAO	June	2022	First Class with Distinction	9956 2416 4830	10/08/2022	8.13
451.	1822A0410	1822A0410	18A81A05N3	UPPALAPATI GAMYA SRI	UPPALAPATI SUBBA RAO	June	2022	First Class with Distinction	4222 1415 6513	10/08/2022	8.67
452.	1822A0411	1822A0411	18A81A05N4	VANKA RENUKA RAJESWARI	VANKA RANGA RAO	June	2022	First Class with Distinction	8416 3121 5007	10/08/2022	9.08
453.	1822A0412	1822A0412	18A81A05N5	VARDHINEEDI SURYA KAMAL	VARDHINEEDI VENKANNA DORA	June	2022	First Class with Distinction	9134 4864 7210	10/08/2022	7.82
454.	1822A0413	1822A0413	18A81A05N6	VATALA SASIDHAR	VATALA RAMALINGESWARA RAO	June	2022	First Class with Distinction	5695 5920 3386	10/08/2022	8.15
455.	1822A0414	1822A0414	18A81A05N7	VEDULLA BALA ANUHYA	VEDULLA LAKSHMI NARASIMHA RAO	June	2022	First Class with Distinction	7798 7415 8222	10/08/2022	9.03
456.	1822A0415	1822A0415	18A81A05N8	VEGI PUJITHA	VEERA ANJANEYULU	June	2022	First Class	9765 4515 9700	10/08/2022	7.51
457.	1822A0416	1822A0416	18A81A05N9	VILLURI DEVI RAJINI	VILLURI SATYANARAYANA	June	2022	First Class with Distinction	2487 8488 8045	10/08/2022	8.52
458.	1822A0417	1822A0417	18A81A05O0	VUMMIDI SAHITHI ANUJA	VUMMIDI VENKATA SITA RAMAYYA	June	2022	First Class	7451 0556 6066	10/08/2022	7.39
459.	1922A0001	1922A0001	19A85A0101	ADDALA LEELA SATYA SAI PAVAN KUMAR	ADDALA NAGESWARA RAO	June	2022	First Class	7666 7709 6140	10/08/2022	7.72
460.	1922A0002	1922A0002	19A85A0102	AVUGADDA KRISHNA VARMA	AVUGADDA APPARAO	June	2022	First Class	5646 0823 3538	10/08/2022	7.5

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461.	1922A0003	1922A0003	19A85A0105	CHALLA GOWTHAM SAI	CHALLA NAGESWARA RAO	June	2022	First Class with Distinction	3921 6423 8147	10/08/2022	7.93
462.	1922A0004	1922A0004	19A85A0106	DASI VINEETH KUMAR	DASI SUVARNA RAJU	June	2022	First Class	4315 2038 9797	10/08/2022	6.9
463.	1922A0005	1922A0005	19A85A0107	ENAGANTI LEELAKRISHNA	ENAGANTI VENKATASRINIVASARAO	June	2022	First Class	6529 2980 2797	10/08/2022	6.9
464.	1922A0006	1922A0006	19A85A0108	GATTI GOPICHAND	GATTI DHARMA SURESH	June	2022	First Class with Distinction	8369 9209 7360	10/08/2022	8.79
465.	1922A0007	1922A0007	19A85A0109	JUTTIGA CHAITANYA KRISHNA	JUTTIGA CHANDRA MOHAN	June	2022	First Class with Distinction	7499 9383 9586	10/08/2022	8.4
466.	1922A0008	1922A0008	19A85A0110	KAPPALA BUDDHA RAJEE	KAPPALA RAVI	June	2022	First Class	5729 8845 9251	10/08/2022	7.51
467.	1922A0009	1922A0009	19A85A0111	KASANI NARESH	KASANI DURGA PRASAD	June	2022	First Class with Distinction	7583 9722 7349	10/08/2022	8.14
468.	1922A0010	1922A0010	19A85A0112	KUNAPULI RAVI KUMAR	KUNAPULI ADI NARAYANA	June	2022	First Class with Distinction	3943 0916 8788	10/08/2022	7.75
469.	1922A0011	1922A0011	19A85A0115	MOHAMMED MEHER FARZANA	MOHAMMED JEELANI	June	2022	First Class	8997 9606 3783	10/08/2022	7.24
470.	1922A0012	1922A0012	19A85A0117	NALLAMOTHU SAI KUMAR	RAMESH	June	2022	First Class	4365 9994 9552	10/08/2022	7.17
471.	1922A0013	1922A0013	19A85A0118	NEERUKONDA RAVI TEJA	NEERUKONDA KESAVA SWAMY	June	2022	First Class with Distinction	9303 4153 1028	10/08/2022	8.94
472.	1922A0014	1922A0014	19A85A0119	PALA SURENDRA	PALA NAGA RAJU	June	2022	First Class	6370 6470 4019	10/08/2022	7.62
473.	1922A0015	1922A0015	19A85A0120	PALNATI DIVYA MANI	PALNATI ANJIBABU	June	2022	First Class	3525 8972 6630	10/08/2022	7.71
474.	1922A0016	1922A0016	19A85A0121	PALURI VENKATA GANAPATHI SAI PRAKASH	PALURI SATYANARAYANA	June	2022	First Class with Distinction	2636 6970 4614	10/08/2022	7.96

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475.	1922A0017	1922A0017	19A85A0122	SUNKARA DIVYA SRI	SUNKARA RAMESH	June	2022	First Class with Distinction	9712 3954 0759	10/08/2022	7.9
476.	1922A0018	1922A0018	19A85A0124	GADDE MANJU SRI	GADDE V V S SIVA PRASAD	June	2022	First Class	4745 3208 2339	10/08/2022	7.09
477.	1922A0019	1922A0019	19A85A0201	ADAVIKOLANU SUMA HARIKA	ADAVIKOLANU SUBRAHMANYAM	June	2022	First Class with Distinction	2140 6362 0720	10/08/2022	9.01
478.	1922A0020	1922A0020	19A85A0202	AKULA DURGA VENKATA SAI	AKULA SRINIVASARAO	June	2022	First Class	6171 4818 1446	10/08/2022	7.36
479.	1922A0021	1922A0021	19A85A0203	BASAVA LOKESH	BASAVA BALAJI SUBRAHMANYAM	June	2022	First Class	5034 7482 1643	10/08/2022	7.35
480.	1922A0022	1922A0022	19A85A0204	BATTAVALLI PAVAN SAI	BATTAVALLI MUTYALA RAO	June	2022	First Class with Distinction	4123 3446 0232	10/08/2022	8.03
481.	1922A0023	1922A0023	19A85A0205	BEJAWADA DEVI MOUNIKA	BEJAWADA RADHA KRISHNA	June	2022	First Class	2126 5716 9752	10/08/2022	7.51
482.	1922A0024	1922A0024	19A85A0208	DASI LAKSHMI PRASANNA	DASI SUVARNA RAJU	June	2022	First Class with Distinction	8244 0571 6130	10/08/2022	9.15
483.	1922A0025	1922A0025	19A85A0209	DIDDE PREETHI	DIDDE VELASLI BABU	June	2022	First Class with Distinction	6863 1934 9381	10/08/2022	9.53
484.	1922A0026	1922A0026	19A85A0211	DODLA DEVIKA	DODLA SRINIVASA RAO	June	2022	First Class with Distinction	8970 1735 5144	10/08/2022	9.22
485.	1922A0027	1922A0027	19A85A0212	DUDDUPUDI MADHAVI	DUDDUPUDI SRINIVAS	June	2022	First Class with Distinction	5416 2277 4551	10/08/2022	8.3
486.	1922A0028	1922A0028	19A85A0213	DURGAM SATYANARAYANA	DURGAM SIVAYYA	June	2022	First Class with Distinction	2205 6081 6500	10/08/2022	8.28
487.	1922A0029	1922A0029	19A85A0214	EDUBILLI BHARGAVA RAJA	E APPA RAO	June	2022	First Class	7810 4842 7051	10/08/2022	7.6
488.	1922A0030	1922A0030	19A85A0215	ELURI MANOHAR JOSHI	ELURI JOHN BABU	June	2022	First Class	4264 1153 2550	10/08/2022	7.44

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489.	1922A0031	1922A0031	19A85A0216	GARA ANIL	GARA POLISU	June	2022	First Class	2717 1546 7748	10/08/2022	7.15
490.	1922A0032	1922A0032	19A85A0217	GUMMULURI PAVAN KUMAR	GUMMULURI VENKATA SATYA NARAYANA	June	2022	First Class	7219 6737 3357	10/08/2022	7.18
491.	1922A0033	1922A0033	19A85A0218	GUNDUBOLU NAGA VENKATA SATYA SAI KRISHNA	GUNDUBOLU VENKATA SOMESWARA RAO	June	2022	First Class with Distinction	3614 3118 6374	10/08/2022	9.38
492.	1922A0034	1922A0034	19A85A0219	GUNNAM PRAVEEN VAMSI	GUNNAM GANESH	June	2022	First Class	5719 9379 0419	10/08/2022	7.19
493.	1922A0035	1922A0035	19A85A0220	HANUMANTHU NAGA SAI KOTESWARARAO	HANUMANTHU SATYANARAYANA	June	2022	First Class	6782 5353 5008	10/08/2022	7.07
494.	1922A0036	1922A0036	19A85A0221	JETTI MAHESH SRINU	JETTI DURGARAO	June	2022	First Class with Distinction	6236 1328 4987	10/08/2022	9.53
495.	1922A0037	1922A0037	19A85A0222	JULURI SAI VISWANADH GUPTA	JULURI SAI HARI PRASAD	June	2022	First Class with Distinction	7112 2028 3764	10/08/2022	7.78
496.	1922A0038	1922A0038	19A85A0223	JYOTHULA SIVA NARAYANA	JYOTHULA VENKATESWARARAO	June	2022	First Class	8152 3646 2964	10/08/2022	7.16
497.	1922A0039	1922A0039	19A85A0224	KAKULAPATI NAVYA LAKSHMI	KAKULAPATI SAI BABU	June	2022	First Class with Distinction	3459 2193 5383	10/08/2022	9.36
498.	1922A0040	1922A0040	19A85A0225	KALADASI KISHORE	KALADASI VARA PRASAD	June	2022	First Class with Distinction	2015 0850 4521	10/08/2022	8.67
499.	1922A0041	1922A0041	19A85A0226	KANTHETI SAMPATH KUMAR	KANTHETI CHINNAYYA	June	2022	First Class	6956 6165 3109	10/08/2022	7.21
500.	1922A0042	1922A0042	19A85A0227	KATIKIREDDI NAVEEN	KATIKIREDDI THRIMURTHULU	June	2022	First Class	7045 7355 3559	10/08/2022	7.38
501.	1922A0043	1922A0043	19A85A0228	KOLLURI GANESH NAIDU	KOLLURI VENKATESWARLU	June	2022	First Class	6476 7453 7493	10/08/2022	7.73
502.	1922A0044	1922A0044	19A85A0229	KONA LAKSHMI NARAYANA	KONA VENKATESWARA RAO	June	2022	First Class	8757 8230 3462	10/08/2022	7.12
503.	1922A0045	1922A0045	19A85A0230	KONDETI JASWANTH KRISHNA	KONDETI VENUGOPALARAO	June	2022	First Class with Distinction	8576 5087 2766	10/08/2022	7.94
504.	1922A0046	1922A0046	19A85A0231	KOYYALA TEJA	KOYYALA SRINIVAS	June	2022	First Class	8721 0256 4224	10/08/2022	7.56

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505.	1922A0047	1922A0047	19A85A0234	LINGALA HEMA SOMASEKHAR	LINGALA NAGESWARA RAO	June	2022	First Class	5991 4456 8787	10/08/2022	7.26
506.	1922A0048	1922A0048	19A85A0235	MADAKAM SIVARAMA KRISHNA	MADAKAM BATCHI RAJU	June	2022	First Class	3995 4023 6046	10/08/2022	6.98
507.	1922A0049	1922A0049	19A85A0236	MATTALA VIJAYA KUMAR	MATTALA RAMESH	June	2022	First Class	9075 5210 3034	10/08/2022	7.25
508.	1922A0050	1922A0050	19A85A0237	MUDUNURU SAI RAMA RAJU	MUDUNURU SEETA RAMA RAJU	June	2022	First Class with Distinction	4061 7218 9941	10/08/2022	8.24
509.	1922A0051	1922A0051	19A85A0238	MULAPARTHI HEMA DIVYAJA	M VENKATESWARA RAO	June	2022	First Class with Distinction	4883 7113 7561	10/08/2022	8.01
510.	1922A0052	1922A0052	19A85A0239	MUPPIDI GIGEESHIYA	MUPPIDI P RAMUDU	June	2022	First Class with Distinction	8428 5125 3051	10/08/2022	8.91
511.	1922A0053	1922A0053	19A85A0240	MURALA JOHN SELVARAJ	MURALA SOMESWARA RAO	June	2022	First Class	6227 1150 7696	10/08/2022	7.64
512.	1922A0054	1922A0054	19A85A0242	MUTYALA PURNESH	MUTYALA BHARANI TRIMURTHY VITTAL NAIDU	June	2022	Second Class	8984 2155 6655	10/08/2022	6.58
513.	1922A0055	1922A0055	19A85A0243	NADIPUDI DURGA SAI PRASAD	NADIPUDI SRINIVAS	June	2022	First Class	8722 7932 3402	10/08/2022	7.46
514.	1922A0056	1922A0056	19A85A0244	NAGOTHU KOTI RAJESH	NAGOTHU SRINIVASULU	June	2022	First Class	6937 1512 1772	10/08/2022	6.98
515.	1922A0057	1922A0057	19A85A0245	NIMMALA SURESH	NIMMALA VENKATRAO	June	2022	First Class with Distinction	5133 6076 6449	10/08/2022	8.17
516.	1922A0058	1922A0058	19A85A0246	PADAM CHANDRA SAI	PADAM VEERASWAMY	June	2022	First Class	3333 4102 3374	10/08/2022	7.4
517.	1922A0059	1922A0059	19A85A0249	PALIVELA BHANU PRASANTH	PALIVELA SATYANARAYANA	June	2022	First Class with Distinction	6106 0029 7367	10/08/2022	7.92
518.	1922A0060	1922A0060	19A85A0250	PALLETI NAGARAJU	PALLETI BABURAO	June	2022	First Class	3840 2862 0158	10/08/2022	7.31
519.	1922A0061	1922A0061	19A85A0251	PANDI PAVAN KUMAR	PANDI NAGA RAJU	June	2022	First Class	8742 1723 4186	10/08/2022	7.31
520.	1922A0062	1922A0062	19A85A0252	PERURI YASWANTH KUMAR	PERURI LAKSHMI NARAYANA	June	2022	First Class	4927 2795 5009	10/08/2022	7.29
521.	1922A0063	1922A0063	19A85A0253	POLA LOKESH	POLA SAIDESWARA RAO	June	2022	First Class	8742 7913 2157	10/08/2022	7
522.	1922A0064	1922A0064	19A85A0254	POLAMURI TANUJA	POLAMURI RAMA KRISHNA	June	2022	First Class	2506 7304 9247	10/08/2022	6.99

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523.	1922A0065	1922A0065	19A85A0255	PURELLA ELISHA	PURELLA KRISHNA	June	2022	First Class	2771 8715 7178	10/08/2022	6.97
524.	1922A0066	1922A0066	19A85A0256	RAHUL CHANDRA GUMPULA	VENKATA CHANDRA SRINU BABU GUMPULA	June	2022	First Class	4642 3002 8920	10/08/2022	6.77
525.	1922A0067	1922A0067	19A85A0257	RAVULAPUDI JITENDRA KUMAR	RAVULAPUDI VENKATA RANGA RAO	June	2022	First Class	7241 2415 7252	10/08/2022	6.85
526.	1922A0068	1922A0068	19A85A0258	RYALI PRAVEEN	RYALI PRABHAKARA RAO	June	2022	First Class with Distinction	5516 2867 3174	10/08/2022	7.77
527.	1922A0069	1922A0069	19A85A0259	SEETHALA GOWTHAMI	SEETHALA MURALI KRISHNA	June	2022	First Class with Distinction	5446 3746 0479	10/08/2022	8.76
528.	1922A0070	1922A0070	19A85A0260	SODADASI ASEESH	SODADASI DASU	June	2022	First Class	8687 7192 4501	10/08/2022	7.19
529.	1922A0071	1922A0071	19A85A0261	SUNKARA SIVA GANESH	SUNKARA SUBBA RAO (LATE)	June	2022	First Class with Distinction	9406 8242 4832	10/08/2022	8.53
530.	1922A0072	1922A0072	19A85A0262	TAMIRI NAGA SURYA VAMSI	TAMIRI MURALI	June	2022	First Class	7792 4182 2699	10/08/2022	7.25
531.	1922A0073	1922A0073	19A85A0264	TATIPARTHI VAMSI	TATIPARTHI PEDDA PRASAD	June	2022	Second Class	7289 8788 8537	10/08/2022	6.47
532.	1922A0074	1922A0074	19A85A0265	THOTA DILIP KUMAR	THOTA VENKATA RAMANA	June	2022	First Class	8934 5809 0300	10/08/2022	7.26
533.	1922A0075	1922A0075	19A85A0266	UPPULURI SOMA SAI LOKESH	UPPULURI VEERA BHADRA RAO	June	2022	First Class	3890 0403 3011	10/08/2022	7.36
534.	1922A0076	1922A0076	19A85A0267	VAISHNAPU YASWANTH	VAISHNAPU VEERRAJU	June	2022	First Class	4733 4015 0071	10/08/2022	7.32
535.	1922A0077	1922A0077	19A85A0268	VATTIKUTI JNANESWAR	VATTIKUTI KESAVA RAO	June	2022	First Class with Distinction	6896 2074 6633	10/08/2022	7.9
536.	1922A0078	1922A0078	19A85A0269	VELUDURTI VIJAYA BHASKAR	VELUDURTI SIVA PRASAD	June	2022	First Class	4122 3015 8952	10/08/2022	6.97
537.	1922A0079	1922A0079	19A85A0270	VUDDAGIRI HARI KIRAN	VUDDAGIRI PUSHKARA RAO	June	2022	First Class with Distinction	3139 4852 0338	10/08/2022	8.24
538.	1922A0080	1922A0080	19A85A0271	YANDRAPU SOMASEKHAR	YANDRAPU SRINIVAS	June	2022	First Class with Distinction	4278 3416 2408	10/08/2022	7.94

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539.	1922A0081	1922A0081	19A85A0272	YARAMATI DILEEP CHOWDARY	YARAMATI RAMBABU	June	2022	First Class with Distinction	5580 7074 2617	10/08/2022	8.53
540.	1922A0082	1922A0082	19A85A0273	YATHAM TEJAHANUMAN	YATHAM DHANA RAJU	June	2022	First Class with Distinction	8240 9910 5036	10/08/2022	7.75
541.	1922A0083	1922A0083	19A85A0274	KALIGATLA SASI KUMAR	KALIGATLA RAMBABU	June	2022	First Class	4865 3291 0985	10/08/2022	6.86
542.	1922A0084	1922A0084	19A85A0275	TIKKISETTI SAI SNEHA	TIKKISETTI NAGARAJU	June	2022	First Class with Distinction	9041 2535 4459	10/08/2022	8.66
543.	1922A0085	1922A0085	19A85A0302	BHUREDDI VENKATA APPARAO	BHUREDDI SRINUVASU	June	2022	First Class	3528 4069 5562	10/08/2022	7.6
544.	1922A0086	1922A0086	19A85A0303	BOBBILI SOLOMONU RAJU	BOBBILI RAMBABU	June	2022	First Class with Distinction	4043 1677 4719	10/08/2022	7.84
545.	1922A0087	1922A0087	19A85A0304	DWARAMPUDI MUKESH KUMAR REDDY	DWARAMPUDI GUNA KRISHNA REDDY	June	2022	First Class with Distinction	7822 8046 6899	10/08/2022	8.37
546.	1922A0088	1922A0088	19A85A0305	DODDA VEERA VENKATA SRI SAI	DODDA KASI	June	2022	First Class with Distinction	3573 1878 4236	10/08/2022	8.44
547.	1922A0089	1922A0089	19A85A0306	EEDARADA SRI SAI RAMA KRISHNA CHARYULU	EEDARADA BHASKARACHARYULU	June	2022	First Class	2861 2450 5141	10/08/2022	7.34
548.	1922A0090	1922A0090	19A85A0307	EEMANI LAKSHMI NARAYANA	EEMANI SATYA GOPALA KRISHNA	June	2022	First Class	2935 1587 9051	10/08/2022	7.56
549.	1922A0091	1922A0091	19A85A0309	JOGURUPATI MOHITH SHARAN KUMAR	JOGURUPATI VENKATESWARA RAO	June	2022	First Class with Distinction	9333 8646 2406	10/08/2022	8.35
550.	1922A0092	1922A0092	19A85A0310	KALLA CHANDRAMOULI	KALLA SATYANARAYANA	June	2022	First Class	6778 7447 8701	10/08/2022	7.24

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551.	1922A0093	1922A0093	19A85A0311	KATARI LOKESWAR	KATARI AMMAIAH	June	2022	First Class with Distinction	3734 3916 3903	10/08/2022	8.12
552.	1922A0094	1922A0094	19A85A0312	KODE SAI RATNAKAR	KODE VARA PRASAD	June	2022	First Class with Distinction	6990 6329 5713	10/08/2022	7.9
553.	1922A0095	1922A0095	19A85A0313	MADHAVARAPU POSIBABU	MADHAVARAPU VEERRAJU	June	2022	First Class	2975 0168 0852	10/08/2022	7.29
554.	1922A0096	1922A0096	19A85A0314	NAGULAPALLI VENKATESH	NAGULAPALLI POTHURAJU	June	2022	First Class	6457 3678 2713	10/08/2022	7.74
555.	1922A0097	1922A0097	19A85A0315	NANDAM SRISAI SURESH	NANDAM NAGESWARA RAO	June	2022	First Class	3113 1625 6574	10/08/2022	7.22
556.	1922A0098	1922A0098	19A85A0316	POTHULA VIJAY KUMAR	POTHULA YESU RATNAM	June	2022	First Class	9577 5077 2503	10/08/2022	6.98
557.	1922A0099	1922A0099	19A85A0317	PUSAPATI VISHNU VARDHAN RAJU	PUSAPATI PULLAM RAJU	June	2022	First Class with Distinction	3012 2462 5418	10/08/2022	7.77
558.	1922A0100	1922A0100	19A85A0318	SHAIK ZABIRULLAH	SHAIK HYDER BASHA	June	2022	First Class with Distinction	5466 0570 7357	10/08/2022	8.17
559.	1922A0101	1922A0101	19A85A0319	TADEPALLI VIJAY	TADEPALLI SRINIVAS	June	2022	First Class	7551 7638 3810	10/08/2022	7.36
560.	1922A0102	1922A0102	19A85A0320	TUMMACHARLA MADHUVAN	TUMMACHARLA VENKATA RAO	June	2022	First Class with Distinction	5081 2636 5713	10/08/2022	8.23
561.	1922A0103	1922A0103	19A85A0321	VENNETI DURGA NAGA VENKATA VAMSI	VENNETI SRINU	June	2022	First Class with Distinction	6939 6223 2114	10/08/2022	7.92
562.	1922A0104	1922A0104	19A85A0322	VAKATI YASWANTH NAGAKUMAR	VAKATI CHANDRASEKHAR	June	2022	First Class with Distinction	8463 5242 8413	10/08/2022	7.78
563.	1922A0105	1922A0105	19A85A0323	VALLABHA SRI HARSHAVARDHAN	VALLABHA SATYANARAYANA	June	2022	First Class with Distinction	7542 8489 3833	10/08/2022	8.25

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564.	1922A0106	1922A0106	19A85A0324	VANJARAPU DILEEP	VANJARAPU MOHAN RAO	June	2022	First Class with Distinction	5007 8483 8548	10/08/2022	7.84
565.	1922A0107	1922A0107	19A85A0326	BELLANI RAMESH	BELLANI SIMHACHALAM	June	2022	First Class	7507 9214 7727	10/08/2022	7.58
566.	1922A0108	1922A0108	19A85A0327	CHADALAWADA NARESH	CHADALAWADA RAMBABU	June	2022	First Class	3222 6215 5662	10/08/2022	7.37
567.	1922A0109	1922A0109	19A85A0328	CHINTAPALLI NAVA TEJA	CHINTAPALLI SRINIVAS	June	2022	First Class with Distinction	9284 7156 2995	10/08/2022	7.76
568.	1922A0110	1922A0110	19A85A0329	GOLLAPALLI SUNEEL	GOLLAPALLI GANGADHARARAO	June	2022	First Class	6879 4870 4860	10/08/2022	7.32
569.	1922A0111	1922A0111	19A85A0331	JONNA VENKATA BHAVANI SANKAR	JONNA LAKSHMINARAYANA	June	2022	First Class with Distinction	3510 4566 5036	10/08/2022	8
570.	1922A0112	1922A0112	19A85A0332	JAGAN MOHAN BHOGISETTI	NAGESWARA RAO BHOGISETTI	June	2022	First Class	6092 2208 7919	10/08/2022	7.01
571.	1922A0113	1922A0113	19A85A0333	KSHATRI BOLA SHANKAR BHAVANI SINGH	KSHATRI KISHAN SINGH	June	2022	First Class	2077 5782 2999	10/08/2022	7.63
572.	1922A0114	1922A0114	19A85A0334	KANDURI SRINIDHI	KANDURI ADI NARAYANA	June	2022	First Class with Distinction	3564 1186 2892	10/08/2022	8
573.	1922A0115	1922A0115	19A85A0335	KOPANATHI AKASH	KOPANATHI RAMA KRISHNA	June	2022	First Class with Distinction	2786 9137 1401	10/08/2022	8.05
574.	1922A0116	1922A0116	19A85A0336	KUPPALA SUDHEER KUMAR	KUPPALA DURGARAO	June	2022	First Class	2497 6821 3408	10/08/2022	7.26
575.	1922A0117	1922A0117	19A85A0337	MAJJI BHANU DURGA PRASAD	MAJJI RAMU	June	2022	First Class with Distinction	8750 3559 1530	10/08/2022	8.29
576.	1922A0118	1922A0118	19A85A0338	MARAPATLA BHARATH SAI KUMAR	MARAPATLA PREM KUMAR	June	2022	First Class	9952 4126 8736	10/08/2022	7.47
577.	1922A0119	1922A0119	19A85A0339	PAKERLA SURYA MOHAN	PAKERLA SUNDARARAO	June	2022	First Class	3375 9087 1058	10/08/2022	6.88
578.	1922A0120	1922A0120	19A85A0340	PENUBOINA MANI KUMAR	PENUBOINA VENKATA RAJU	June	2022	First Class	8008 2414 7512	10/08/2022	7.34

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579.	1922A0121	1922A0121	19A85A0341	RYALI TATARAO	RYALI SATYANARAYANA	June	2022	First Class with Distinction	7820 2870 5577	10/08/2022	8.6
580.	1922A0122	1922A0122	19A85A0342	SUTAPALLI RAMA KRISHNA SATYA SAI BALAJI	SUTAPALLI PADMA RAMA CHANDRA RAO	June	2022	First Class with Distinction	7559 1312 4707	10/08/2022	7.96
581.	1922A0123	1922A0123	19A85A0343	SIVA SUBRAHMANYA CHANTIBABU PRATHI	RATHNAJI PRATHI	June	2022	First Class	6985 9424 3632	10/08/2022	7.33
582.	1922A0124	1922A0124	19A85A0344	SHEIK FARUKH	SHEIK BAJI	June	2022	First Class	9987 1289 9559	10/08/2022	7.27
583.	1922A0125	1922A0125	19A85A0345	SIRIMALLA RAJESH	SIRIMALLA SIDDAYYA	June	2022	First Class with Distinction	9122 8922 7023	10/08/2022	7.97
584.	1922A0126	1922A0126	19A85A0346	TELU SREEMANNARAYANA	TELU VENKATESWARA RAO	June	2022	First Class with Distinction	4726 0639 2767	10/08/2022	8.06
585.	1922A0127	1922A0127	19A85A0347	VADAPALLI VENKATA MANI KRISHNA PHANEENDRA	VADAPALLI CHAKRAPANI ACHARYULU	June	2022	First Class	9726 6135 3355	10/08/2022	7.02
586.	1922A0128	1922A0128	19A85A0348	VARDHINEDI MANJUNADH	VARDHINEDI SIVA KUMAR	June	2022	First Class with Distinction	3311 9887 7747	10/08/2022	8.3
587.	1922A0129	1922A0129	19A85A0349	VEERAMALLA SANDEEP GANESH	VEERAMALLA VENKATA KRISHNAMACHARI	June	2022	First Class with Distinction	4839 4439 6779	10/08/2022	7.76
588.	1922A0130	1922A0130	19A85A0350	DONDAPATI VENKATESH	DONDAPATI SRINIVASA RAO	June	2022	First Class with Distinction	8635 6315 8949	10/08/2022	8.79
589.	1922A0131	1922A0131	19A85A0401	AMUDALAPALLI DHANUSH	AMUDALAPALLI SATYANARAYANA	June	2022	First Class	9738 8890 4174	10/08/2022	7.36
590.	1922A0132	1922A0132	19A85A0402	DASI PRAVALLIKA	DASI RAMESH	June	2022	First Class	5575 5080 8601	10/08/2022	7.02
591.	1922A0133	1922A0133	19A85A0403	KOMARTHI ACHYUT V CHANDRA SIVA PRASAD	KOMARTHI PARDHA SARADHI	June	2022	First Class	2435 4949 1397	10/08/2022	6.94

S. No	PC No	CMM No	HT NO	NAME	FATHER NAME	Month of pass	Year of pass	Class Awarded	Aadhar No	Print Date	CGPA
592.	1922A0134	1922A0134	19A85A0406	MANEPALLI CHANDANA PRABHA	MANEPALLI VENKATA DURGARAO	June	2022	First Class with Distinction	6026 9928 4296	10/08/2022	8.77
593.	1922A0135	1922A0135	19A85A0407	RAYUDU PREM SAGAR	RAYUDU SATYANARAYANA	June	2022	First Class	9097 1122 1977	10/08/2022	7.48
594.	1922A0136	1922A0136	19A85A0408	GANGULA BALA GOPINADH	GANGULA SHESHA RAO	June	2022	Second Class	6843 7650 0024	10/08/2022	6.56
595.	1922A0137	1922A0137	19A85A0410	KARELLA SHYAM KUMAR	KARELLA CHENNA KESAVA RAO	June	2022	First Class	7885 0585 1949	10/08/2022	7.01
596.	1922A0138	1922A0138	19A85A0411	KASIREDDY MOHINIAMULYA	KASIREDDY NARASIMHA RAO	June	2022	First Class with Distinction	2998 2025 9850	10/08/2022	8.42
597.	1922A0139	1922A0139	19A85A0412	SALADI SHANMUKHA SRINIVAS	SALADI VENKATA SIVA RAO	June	2022	First Class	6154 7144 5294	10/08/2022	7.73
598.	1922A0140	1922A0140	19A85A0413	SAVARAPU ARUNA	SAVARAPU RAVI	June	2022	First Class	8134 7879 3789	10/08/2022	7.45
599.	1922A0141	1922A0141	19A85A0414	YALAMARTHI NAGA SANDEEP	YALAMARTHI VENKATA SRINIVASA RAO	June	2022	First Class	3627 7891 4012	10/08/2022	7.65
600.	1922A0142	1922A0142	19A85A0415	CHEEKATLA VENKATA SUBBARAO	CHEEKATLA VENKATA NARAYANA MURTHY	June	2022	First Class with Distinction	3854 9595 9357	10/08/2022	8.46
601.	1922A0143	1922A0143	19A85A0416	MIDATHANI DEVI	MIDATHANI SRINIVASA RAO	June	2022	First Class	2622 7112 1922	10/08/2022	7.24
602.	1922A0144	1922A0144	19A85A0417	MOHAMMAD HANEEF	MOHAMMAD KHAJA AJMEER	June	2022	First Class	2903 1259 8434	10/08/2022	7.26
603.	1922A0145	1922A0145	19A85A0418	NIMMALA PRASANTH	NIMMALA SIVA NAGA BALAKRISHNA	June	2022	First Class	8752 1775 5547	10/08/2022	7.06
604.	1922A0146	1922A0146	19A85A0420	RAJA PURNA VENKATA SATYA ADITYA	RAJA DURGA PRASADA RAO	June	2022	First Class	4644 8895 3515	10/08/2022	7.64
605.	1922A0147	1922A0147	19A85A0501	AKULA CHAITANYA SAI	AKULA KRISHNA RAO	June	2022	First Class	8715 4068 8433	10/08/2022	6.95
606.	1922A0148	1922A0148	19A85A0503	KASUKURTHI AVINASH	KASUKURTHI SURYA CHANDRA RAO	June	2022	First Class	7461 5974 1998	10/08/2022	7.33
607.	1922A0149	1922A0149	19A85A0504	KONA PUJA DEVI	KONA SUBBARAO	June	2022	First Class	8552 2071 0263	10/08/2022	7.38
608.	1922A0150	1922A0150	19A85A0507	ADARI DHANA SURESH	OME SANKAR	June	2022	First Class	4251 2698 8782	10/08/2022	7.25

S. No	PC No	CMM No	HT NO	NAME	FATHER NAME	Month of pass	Year of pass	Class Awarded	Aadhar No	Print Date	CGPA
609.	1922A0151	1922A0151	19A85A0509	KAMBALA HEMA NAGA VENKATA CHANDRAVATHI	KAMBALA DHARMA RAJU	June	2022	First Class	9056 9669 3192	10/08/2022	7.38
610.	1922A0152	1922A0152	19A85A0512	PADAGA MOHAN	PADAGA KANYAKA PARAMESWARARAO	June	2022	First Class	2923 7029 2621	10/08/2022	7.39
611.	1922A0153	1922A0153	19A85A0514	PUTTA CHANDRA MOULI	PUTTA VENKATA NAGAESWARA RAO	June	2022	Second Class	6039 8885 3865	10/08/2022	6.65
612.	1922A0154	1922A0154	19A85A0515	RAJENDRA KUMAR MANDRU	RAMANA RAO MANDRU	June	2022	Second Class	5529 0882 3565	10/08/2022	6.35
613.	1922A0155	1922A0155	19A85A0518	VADAPALLI LAKSHMI DURGA MADHURI	VADAPALLI CHAKRAPANI ACHARYULU	June	2022	Second Class	9781 4241 0584	10/08/2022	6.67
614.	1922A0156	1922A0156	19A85A0519	GRANDHI AVINASH	GRANDHI RAMA LAKSHMANA GOVINDA RAJU	June	2022	First Class with Distinction	3250 2598 1743	10/08/2022	8.38
615.	1922A0157	1922A0157	19A85A0522	TONTA RAVI PRAKASH	TONTA VENKATA SATYANARAYANA	June	2022	First Class	4553 5964 9165	10/08/2022	7.7
616.	1922A0158	1922A0158	19A85A0524	YARRAMSETTI KIRAN	YARRAMSETTI SRINU	June	2022	First Class with Distinction	3236 3263 3316	10/08/2022	8.41
617.	1922A0048	1922A0048	19A85A0235	MADAKAM SIVARAMA KRISHNA	MADAKAM BUTCHI RAJU	June	2022	First Class	3995 4023 6046	10/08/2022	6.98
618.	1922A0576	1922A0159	19A85A0116	MUPPIDI PRAVEEN BABU	MUPPIDI VANDANAM	August	2022	Second Class	5248 6347 2381	03/11/2022	6.48
619.	1822A0177	1822A0177	18A81A04C4	BOIENA SAIHANUMAN	BOIENA VENKATRAMAYYA	June	2022	First Class with Distinction	6173 7517 7396	04/11/2022	8.49
620.	1822A0049	1822A0049	18A81A0236	PRATTI VAMSI KRISHNA	PRATTI VENKATA RAMANJANEYULU	June	2022	First Class	9578 8866 7475	04/11/2022	7.36

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Pedatadepalli, **TADEPALLIGUDEM – 534 101.** W.G.Dist. **(A.P)**

Principal's Office
Date: 17-10-2022

Academic Calendar
For I Year B.Tech , (2022 Admitted Batch)
Academic Year 2022-23

I Semester			
Description	**From**	**To**	**Weeks**
Commencement of Class Work	**03.11.2022**		
Induction Classes	**03.11.2022**	**05.11.2022**	
I Unit of Instructions	07.11.2022	31.12.2022	8 W
I Mid Examinations	02.01.2023	07.01.2023	1 W
II Unit of Instructions	09.01.2023	04.03.2023	8 W
II Mid Examinations	06.03.2023	11.03.2023	1 W
Preparation & Practicals	13.03.2023	18.03.2023	1 W
End Examinations	20.03.2023	01.04.2023	2 W
Commencement of II Semester Class Work	**03.04.2023**		
II Semester			
I Unit of Instructions	03.04.2023	27.05.2023	8 W
I Mid Examinations	29.05.2023	03.06.2023	1 W
II Unit of Instructions	05.06.2023	29.07.2023	8 W
II Mid Examinations	31.07.2023	05.08.2023	1 W
Preparation & Practicals	07.08.2023	12.08.2023	1 W
End Examinations	14.08.2023	26.08.2023	2 W

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- To produce Engineering graduates of professional quality and global perspective through learner-centric education.
- To establish linkages with government, industry and Research laboratories to promote R&D activities and to disseminate innovations.
- To create an eco-system in the institute that leads to holistic development and ability for life-long learning.

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Principal's Office
Date: 17-09-2022

Academic Calendar
For B.Tech III and IV Semesters, Academic Year 2022-23

III Semester			
Description	**From**	**To**	**Weeks**
Commencement of Class Work	**03.10.2022**		
I Unit of Instructions	03.10.2022	19.11.2022	7 W
I Mid Examinations	21.11.2022	26.11.2022	1 W
II Unit of Instructions	28.11.2022	14.01.2023	7 W
II Mid Examinations	16.01.2023	21.01.2023	1 W
Preparation & Practicals	23.01.2023	28.01.2023	1 W
End Examinations	30.01.2023	11.02.2023	2 W
Commencement of IV Semester Class Work	**13.02.2023**		
IV Semester			
Description	**From**	**To**	**Weeks**
Commencement of Class Work	**13.02.2023**		
I Unit of Instructions	13.02.2023	01.04.2023	7 W
I Mid Examinations	03.04.2023	08.04.2023	1 W
II Unit of Instructions	10.04.2023	27.05.2023	7 W
II Mid Examinations	29.05.2023	03.06.2023	1 W
Preparation & Practicals	05.06.2023	10.06.2023	1 W
End Examinations	12.06.2023	23.06.2023	2 W

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Principal's Office
Date: 02-08-2022

Academic Calendar
For B.Tech V and VI Semesters , Academic Year 2022-23

V Semester			
Description	**From**	**To**	**Weeks**
Commencement of Class Work	**08.08.2022**		
I Unit of Instructions	08.08.2022	24.09.2022	7 W
I Mid Examinations	26.09.2022	01.10.2022	1 W
II Unit of Instructions	03.10.2022	19.11.2022	7 W
II Mid Examinations	21.11.2022	26.11.2022	1 W
Preparation and Practicals	28.11.2022	03.12.2022	1 W
End Examinations	05.12.2022	16.12.2022	2 W
Commencement of VI Semester Class Work	**19.12.2022**		
VI Semester			
I Unit of Instructions	19.12.2022	04.02.2023	7 W
I Mid Examinations	06.02.2023	11.02.2023	1 W
II Unit of Instructions	13.02.2023	01.04.2023	7 W
II Mid Examinations	03.04.2023	08.04.2023	1 W
Preparation and Practicals	10.04.2023	15.04.2023	1 W
End Examinations	17.04.2023	28.04.2023	1 W
Next Semester Class Work	**12.06.2023**		

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Principal's Office
Date: 02-08-2022

Academic Calendar
For B.Tech VII and VIII Semesters , Academic Year 2022-23

VII Semester			
Description	**From**	**To**	**Weeks**
Commencement of Class Work	**04.08.2022**		
I Unit of Instructions	04.08.2022	24.09.2022	7 W
I Mid Examinations	26.09.2022	01.10.2022	1 W
II Unit of Instructions	03.10.2022	19.11.2022	7 W
II Mid Examinations	21.11.2022	26.11.2022	1 W
Comprehensive Examinations	28.11.2022	03.12.2022	1 W
Preparation and Practicals	05.12.2022	09.12.2022	1 W
End Examinations	12.12.2022	23.12.2022	2 W
Commencement of VIII Semester Class Work	**26.12.2022**		
VIII Semester			
I Unit of Instructions	26.12.2022	11.02.2023	7 W
I Mid Examinations	13.02.2023	18.02.2023	1 W
II Unit of Instructions	20.02.2023	08.04.2023	7 W
II Mid Examinations & Comprehensive Examinations	10.04.2023	18.04.2023	1 W
End Examinations	24.04.2023	02.05.2023	1 W
Project Viva Voce Examinations	01.05.2023	06.05.2023	1 W

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Principal's Office
Date: 17-10-2022

Academic Calendar
For MBA 3rd & 4th Semesters (2021 Admitted Batch)
Academic Year 2022-23

III Semester			
Description	**From**	**To**	**Weeks**
Commencement of Class Work	**12.12.2022**		
I Unit of Instructions	12.12.2022	28.01.2023	7 W
I Mid Examinations	30.01.2023	04.02.2023	1 W
II Unit of Instructions	06.02.2023	25.03.2023	7 W
II Mid Examinations	27.03.2023	01.04.2023	1 W
End Examinations	03.04.2023	15.04.2023	2 W
Commencement of IV Semester Class Work	**17.04.2023**		
IV Semester			
I Unit of Instructions	17.04.2023	03.06.2023	7 W
I Mid Examinations	05.06.2023	10.06.2023	1 W
II Unit of Instructions	12.06.2023	29.07.2023	7 W
II Mid Examinations	31.07.2023	05.08.2023	1 W
End Examinations	07.08.2023	19.08.2023	2 W
Project Viva - Voce	21.08.2023	02.09.2023	2 W

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