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)
ponsored by Sri Vasavi Educational Society)
ved 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)**

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

SRI VASAVI ENGINEERING COLLEGE
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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)

Department Vision:
- To evolve as a centre of excellence in Electrical and Electronics Engineering that produces graduates of high quality with ethical values.

Department Mission:
- To impart technical knowledge through learner-centric education supplemented with practical exposure.
- To provide opportunities that promote personality development through co-curricular and extra-curricular activities.
- To inculcate human values & team spirit that enables the Electrical and Electronics Engineers to face the future challenges.

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

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 ; 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: V18CST20	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 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.

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.

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

VI Sem	**Database Management Systems**	Course Code:V18CSTOE01	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.

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, 3rd Edition,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**	**V18MET31 –** 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 **V18MET41-** Unconventional Machining Process **V18MET42-** Computer Aided Design **V18MET44-** Condition Monitoring & Machine learning **V18MET45-** Entrepreneurship	**Open Elective –III** **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

V18MEL16	Metal Cutting & Machine Tools 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	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.

V18MEL06	METROLOGY AND INSTRUMENTATION & CONTROL SYSTEMS LAB	L	T	P	C
		0	0	3	1.5

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 3rdmeeting 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, 2□m double metal, double poly – CMOS/BiCMOS rules, 1.2□m 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)
(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

V18ENT06	**PROFESSIONAL COMMUNICATION SKILLS – IV**	**L**	**T**	**P**	**C**
		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

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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**		

PRINCIPAL

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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

***