SRI VASAVI ENGINEERING COLLEGE (Autonomous)

Pedatadepalli, Tadepalligudem – 534 101.

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

Academic Rules and Regulations for B.Tech Programme

(Applicable to the Batches Admitted in 2018 and onwards)

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

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

2.0 ADMISSIONS:

ELIGIBILITY:

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

B.TECH – REGULAR:

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

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

B.TECH -LATERAL ENTRY:

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

2.1 ADMISSIONS UNDER SPECIAL CASES:

These may arise in the following situations.

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

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

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

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

3.0 DURATION OF THE PROGRAM AND MEDIUM OF INSTRUCTION:

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

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

3.1 Academic Activities Schedule:

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

3.2 EVALUATION:

For Theory Courses:

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

For Laboratory course:

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

4.0 PROGRAMS OF STUDY IN B.TECH:

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

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

4.2 Structure of the programme:

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

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

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

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

4.2.2 Contact hours:

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

4.2.3 Credits:

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

Theory Course: 1 hour per week - 1 credit

Laboratory Course: 1 hour per week - 0.5 credit

4.3 Curriculum for programme of study:

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

2. (After getting approval from the Academic Council, a copy of the curriculum along with rules and regulations for the programme shall be made available to all the students.)

The following table shows a typical curriculum frame work for the B.Tech programme.

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

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

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

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

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

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

5.0 EXAMINATION SYSTEM AND EVALUATION:

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

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

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

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

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

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

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

Two Mid semester examinations - 25 marks each

Comprehensive test - 10 marks

Assessment through

Alternate assessment tool (AAT)

2 times in a Semester - 05 marks each

CIE is computed as follows.

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

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

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

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

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

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

Engineering Graphics:

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

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

Total- 40 marks

5.4. Semester End Examination Evaluation:

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

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

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

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

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

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

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

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

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

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

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

6.0 ATTENDANCE REQUIREMENTS:

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

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

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

this period of absence shall be counted as present for the purpose of computation of attendance only.

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

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

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

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

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

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

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

7.0 CONDITIONS FOR PROMOTION:

Minimum academic requirements:

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

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

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

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

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

8.0 GRADING SYSYTEM:

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

TABLE: GRADES & GRADE POINTS

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

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

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

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

8.4 Award of Degree

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

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

9.0 GRADE POINT AVERAGE:

9.1 Computation of SGPA and CGPA:

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

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

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

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

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

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

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

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

Illustration for Computation of SGPA and CGPA:

Computation of SGPA at the end of 1st Semester

Illustration No.1:

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

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

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

Illustration No.2 (with one failure)

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

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

Illustration No.2 (a)

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

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

Illustration No.3

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

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

Performance in Second semester

SGPA of 2nd Semester= 182/22=8.27

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

CGPA calculation after Final Semester:

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

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

9.2 Eligibility for Award of B.Tech. Degree:

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

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

9.3 Award of Class:

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

TABLE: CGPA REQUIRED FOR AWARD OF DEGREE

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

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

9.4 Improvement of Class:

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

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

9.5 Supplementary Examination:

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

9.6 Malpractices:

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

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

9.7 Additional Academic Regulations:

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

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

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

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

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

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

9.8 Withholding of Results:

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

9.9 Transitory Regulations:

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

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

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

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

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

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

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

10.0 GENERAL:

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

11.0 B.Tech - LATERAL ENTRY SCHEME:

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

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

AWARD OF B. Tech. DEGREE – LES

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

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

Annexure-I

MALPRACTICES

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

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

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

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

I SEMESTER

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

Total Contact Hours: 25 Total Credits: 16.5

II SEMESTER

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

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

COURSE STRUCTURE OF FIRST YEAR B.TECH (CSE/ME)

(For 2018 – 2019 Admitted Batch)

I SEMESTER

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

Total Contact Hours: 28 Total Credits: 16.5

II SEMESTER

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

Total Contact Hours: 25 Total Credits: 19.5

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

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

(*MNC : Mandatory Non Credit Course)

Course Outcomes

CO-1
Understand human resources and their contribution to the society, listen to and read a text to comprehend, interpret and answer questions, and use prepositions and tenses appropriately.

CO-2
Appraise the problems of transport and the solutions, write the gist of a short-story, know the etymological roots of words, use prefixes and exhibit basic skills in writing.

CO-3
View Solar Energy as a viable alternative source, and read for comprehension, analysis and interpretation and present narratives in writing.

CO-4
Evaluate various alternative sources of energy, spell words appropriately, pronounce them with proper stress, punctuate sentences correctly and narrate instances and stories.

CO-5
Realize the value of our living environment, describe animals, birds, objects, events, processes, etc., write paragraphs coherently and use connectors effectively.

CO-6
Grasp the vital role of training in industrial organizations, use prepositions, take notes, follow the office etiquette and write impressive narrations.

Syllabus

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

Unit-2
Transport : Problems and Solutions (From 'English for Engineers and Technologists')
Etymological roots
Prefixes
Pronunciation
Parts of Speech

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

Unit-3

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

Unit-4

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

Unit-5

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

Unit-6

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

Books Prescribed:
1. **English for Engineers and Technologists**
   Orient BlackSwan Pvt Ltd.
2. **Panorama : A Course on Reading**, Oxford University Press

(Prescribed for I B.Tech students of the JNTUK, Kakinada under R16 Regulation)

Suggested Readings from AICTE

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

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

Books for further reference

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

** ** **

I B.Tech II Semester

English – II
(Common to All Branches)

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

Course Outcomes

CO-1
Understand the real import of education and work of noble men, use nouns, verbs and adjectives appropriately, identify and correct common errors in usage and write official letters.

CO-2
Derive inspiration from real life samples, interpret and speak on them, use synonyms and antonyms of words properly and do E-correspondence with required netiquette.

CO-3
Assimilate and adjust to new cultural environments, write on life-sketches, make the right use of tense and aspect and concord in sentences and plan and develop speech-writing.

CO-4
Imbibe ideas from the lives and works of successful men, use adverbs, develop view-points and topics and write different types of essays.

CO-5
Emulate personality-development inputs, elaborate on inspiring scientists use one-word substitutes, develop précis writing and write for the media.

CO-6
Learn from the paradigm of great contributors, use collocations and write professional and technical reports in standard formats.

Syllabus

Unit-1

The Greatest Resource – Education (From 'English Encounters')
Understanding the author's perspective
Making use of nouns
Vocabulary – deriving nouns from verbs and adjectives
Misplaced modifiers
Synonyms and Antonyms
Identifying common errors
Letter writing : Standard formats for official letters
A.P.J. Abdul Kalam (From 'The Great Indian Scientists')
Synonyms and Anonyms

Unit-2

Jadav Payeng : 'The Forest Man of India'
Vocabulary : deriving adjectives
Synonyms and Antonyms
Identifying common errors in the use of adjectives
E-correspondence with required Netiquette
Cliches
C.V. Raman (From 'The Great Indian Scientists')
Use of Synonyms and Antonyms of words in different contexts

Unit-3

Cultural Shock : Adjustment to New Cultural Environments
(From 'English Encounters')
Building Vocabulary – Verbs and nouns
Synonyms and Antonyms and appropriate usage

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

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

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

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

2. The Great Indian Scientists, Cengage

Suggested Readings from AICTE

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

Books for further reference

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

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

I B.Tech I Semester

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

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

Course Outcomes

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

Unit-1
Why Study Spoken English
Making Inquiries on the Phone, Thanking and
Responding to Thanks
Practice Work

Unit-2
Requests, Permissions, and Directions
Practice Work

Unit-3
Clarifying, Inviting, Complaining, Congratulating and
Expressing Sympathy
Apologising, Advising, Suggesting, Agreeing and Disagreeing
Practice Work

Unit-4
Letters and Sounds
Practice Work

Unit-5
The Sounds of English
Practice Work

Unit-6
Pronunciation
Stress and Intonation
Practice Work

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

Books for further reference

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

I B.Tech II Semester

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

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

Course Outcomes

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

Syllabus

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

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

I B.Tech I & II Semesters English
(Common to all branches)

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

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

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

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

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

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

UNIT I: Linear system of equations:

Rank-Echelon form-Normal form – Solution of linear systems – Gauss elimination – Gauss Jordon- Gauss Jacobi and Gauss Seidal methods.

Applications: Finding the current in electrical Circuits.

UNIT II: Eigen values - Eigen vectors and Cayley-Hamilton theorem:

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

UNIT-III: Differential equations of first order and first degree:

Linear-Bernoulli-Exact-Reducible to exact differential equations.

Applications: Newton's Law of cooling-Law of natural growth and decay-Orthogonal Trajectories.

UNIT IV: Linear differential equations of higher order:

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

UNIT V: Partial differentiation:

Introduction- Homogeneous function-Euler's theorem-total derivative-chain rule-generalized mean value theorem for single variable (without proof)-Taylor's and Maclaurin's series expansion of functions of two variables (without proof)– Functional dependence- Jacobian.

Applications: maxima and minima of functions of two variables without constraints and Lagrange's method (with constraints).

UNIT VI: First order Partial differential equations:

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

Text Books:

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

Reference Books:

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

I B.Tech II SEMESTER

MATHEMATICS-II
(Common to All Branches)

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

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

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

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

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

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

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

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

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

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

OPTICS AND WAVES

(For Civil Engineering & Mechanical Engineering)

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

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

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

UNIT-I

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

UNIT-II

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

UNIT-III

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

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

UNIT-IV

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

UNIT-V

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

UNIT-VI

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

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

Text Books:

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

Reference Books:

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

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

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

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

1. Expose the students to the basic concepts of Lasers, optical fibers and their properties.

2. Interpret wavelike behavior of matter and how this motivates the need to replace classical mechanics by a wave equation of motion for matter (the Schrödinger equations)

3. Distinguish fundamental physical laws for better understanding of materials and their properties for engineering applications.

4. Apply fundamental principles and processes to operational semiconductor devices and their uses.

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

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

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

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

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

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

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

Text Books:

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

Reference Books:

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

Optics & Waves Lab

For ME & CE

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

List of Experiments:

(Any eight of the following to be done)

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

Opto Electronics & Semiconductors Lab

For ECE, EEE & CSE

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

List of Experiments:

(Any eight of the following to be done)

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

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

(Common to all branches)

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

Course Outcomes:

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

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

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

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

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

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

CO6: Identify the important applications of advanced engineering materials.

UNIT I: HIGH POLYMERS

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

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

UNIT II: FUEL TECHNOLOGY

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

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

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

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

UNIT III: ELECTROCHEMICAL CELLS

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

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

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

UNIT IV: WATER TECHNOLOGY

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

UNIT V: CORROSION

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

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

UNIT VI: CHEMISTRY OF ADVANCED MATERIALS

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

Liquid crystals: Introduction – Types – Applications.

Biodegradable polymers – Conducting polymers.

Green Chemistry:Principles, Need for green Chemistry.

Text Books:

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

Reference Books:

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

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

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

Course Outcomes:

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

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

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

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

List of Experiments:

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

Reference Books:

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

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

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

Course Outcomes:

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

CO1: Identify the global environmental challenges and the possible means to combat them.
CO2: Examine the natural resources, their availability for the sustenance of the life and conservation.
CO3: Assess the concepts of the ecosystem and the need for protecting various ecosystems.
CO4: Discuss the biodiversity, threats and conservation practices to protect the biodiversity
CO5: Explain various attributes of the pollution and waste management practices.
CO6: Outline the environmental management and environmental legislations in India.

UNIT I: FUNDAMENTALS OF ENVIRONMENTAL STUDIES

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

UNIT II: NATURAL RESOURCES AND ASSOCIATED PROBLEMS

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

UNIT III: ECOSYSTEMS

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

UNIT IV: BIODIVERSITY AND ITS CONSERVATION

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

UNIT V: ENVIRONMENTAL POLLUTION

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

UNIT VI: ENVIRONMENTAL LEGISLATION AND THE MANAGEMENT

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

Text books:

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

I YEAR II SEMESTER

COMPUTER AIDED CIVIL ENGINEERING DRAWING

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

COURSE OUTCOMES:

After completion of the course the student should be able to

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

UNIT 1 :- INTRODUCTION TO CAD

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

UNIT 2:- COMPUTER AIDED MODELING

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

UNIT 3:- VIEW POINTS AND VIEW PORTS

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

UNIT 4 : - Plans 2-D

- Building Plans
- Section
- Elevation

UNIT 5 :- 3-D Modeling Concepts

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

REFERENCES

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

Electrical Engineering Workshop
(For EEE)

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

Any 12 of the following modules are to be conducted

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

Basic Electrical Engineering
(For ECE)

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

Module 1 : DC Circuits

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

Module 2: AC Circuits

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

Module 3: Magnetic Circuits

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

Module 4: DC Machines

Construction and working principle of DC generator–Magnetization characteristics,

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

Module 5: Transformers

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

Module 6: AC Machines

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

Text Books

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

Reference Books

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

INTRODUCTION TO ENGINEERING MECHANICS
(For EEE)

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

Course Outcomes:

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

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

CO2: Calculate Equilibrium of different force systems by using free body diagrams **(K3)**

CO3: Solve the 2D equilibrium problems by considering friction **(K3)**

CO4: Find the Centroid, Center of Gravity and Moment of Inertia for plane figures and bodies **(K3)**

CO5: Illustrate the different types of plane motions of a particle to compute its velocity, acceleration and force. **(K3)**

CO6: Illustrate the concept of Work and Energy (**K3)**

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

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

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

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

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

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

Text Books:

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

Reference Books:

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

ENGINEERING MECHANICS

(For ME, CE)

V18MET03	ENGINEERING MECHANICS	L	T	P	C
		3	1	0	4

Course Outcomes:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Text Books:

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

Reference Books:

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

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

V18MET01	**ENGINEERING GRAPHICS**	**L**	**P**	**C**
		1	**3**	**2.5**

Course Outcomes:

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

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

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

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

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

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

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

UNIT1: INTRODUCTION TO ENGINEERING GRAPHICS:

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

UNIT 2: SPECIAL CURVES & SCALES:

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

UNIT 3: ORTHOGRAPHIC PROJECTIONS:

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

UNIT 4: PROJECTIONS OF REGULAR SOLIDS:

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

UNIT 5: ISOMETRIC PROJECTIONS :

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

UNIT 6:

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

Text Books:

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

Reference Books:

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

I B.Tech I/II Semester **ENGINEERING WORKSHOP & IT WORKSHOP PRACTICE LAB**

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

Engineering Workshop

Course Outcomes:

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

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

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

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

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

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

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

Engineering Workshop

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

Carpentry

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

Tin Smithy

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

Fitting shop

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

Black smithy

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

House wiring

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

Welding shop (Arc welding)

1. Butt Joint
2. Lap Joint

V18MEL01	IT WORKSHOP LAB	L	P	C
		0	3	1.5

Course Outcomes:

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

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

PC Hardware:

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

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

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

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

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

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

Internet & Networking Infrastructure

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

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

Word

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

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

Excel

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

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

Power Point

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

TEXT BOOK:

Faculty to consolidate the workshop manuals using the following references

1. Computer Fundamentals, Anita Goel, Pearson.

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

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

4. Comdex Information Technology , Vikas Gupta, dreamtech.

REFERENCE BOOK:

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

2. PC Hardware trouble shooting made easy, TMH.

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

(Common to all branches)

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

Course Outcomes:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Text Books:

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

Reference Books:

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

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

(Common to all branches)

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

Course Outcomes:

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

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

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

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

LIST OF EXPERIMENTS:

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

Reference Books:

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

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

Academic Rules and Regulations for M.Tech Programme

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

1.0 ELIGIBILITY FOR ADMISSIONS:

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

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

1.1 ADMISSIONS UNDER SPECIAL CASES:

These may arise in the following situations.

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

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

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

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

2.0 AWARD OF M.Tech DEGREE:

i. A student shall be declared eligible for the award of the M. Tech Degree, if he pursues programme of study in not less than two and not more than four academic years.
ii. The student shall register for all 70 credits and secure all the 70 credits.
iii. The duration of each semester including examinations is 21 weeks.

3.0 SPECIALIZATION:

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

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

4.0 ATTENDANCE:

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

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

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

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

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

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

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

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

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

5.0 EVALUATION:

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

Theory Courses:

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

ii. Each Mid-term examination shall be conducted for 30 marks and duration of 120 minutes with 3 questions (without choice), each question for 10 marks.

The balance 10 marks is earmarked for alternate assessment tool like assignments etc.,

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

End Semester Examination shall be conducted for 60 marks.

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

Practical Courses:

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

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

Seminar:

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

MOOCS Courses:

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

Comprehensive Viva:

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

5.1 Minimum Academic requirement:

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

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

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

iv. For re-registration the candidates have to apply to the Dean Academics by paying the

requisite fees and get approval from the College before the start of the Semester in which re-registration is required.

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

6.0 EVALUATION OF PROJECT/DISSERTATION WORK:

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

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

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

6.1 Registration of Project Work:

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

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

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

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

6.2 Project Evaluation:

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

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

department.

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

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

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

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

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

7.0 GRADING SYSTEM:

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

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

8.0 GRADE POINT AVERAGE:

Computation of SGPA and CGPA:

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

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

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

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

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

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

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

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

Illustration for Computation of SGPA and CGPA:

Computation of SGPA at the end of 1st semester

Illustration No.1:

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

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

Illustration No.2 (with one failure)

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

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

Illustration No.2 (a)

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

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

Illustration No.3

Second Semester performance:

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

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

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

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

CGPA after Final Semester:

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

AWARD OF CLASS:

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

TABLE: CGPA Required for Award of Class

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

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

9.0 MALPRACTICES:

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

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

10.0 ADDITIONAL ACADEMIC REGULATIONS:

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

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

11.0 WITHHOLDING OF RESULTS

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

12.0 TRANSITORY REGULATIONS:

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

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

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

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

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

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

13.0 GENERAL:

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

Annexure-I

MALPRACTICES

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

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

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

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

COURSE STRUCTURE OF M.TECH (STRUCTURAL ENGINEERING)

I SEMESTER

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

II SEMESTER

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

III SEMESTER

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

MNC-Mandatory Non-credit

IV SEMESTER

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

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

I SEMESTER

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

II SEMESTER

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

MNC- Mandatory Non-Credit

III SEMESTER

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

IV SEMESTER

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

COURSE STRUCTURE OF M.TECH (MACHINE DESIGN)

I SEMESTER

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

II SEMESTER

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

III SEMESTER

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

MNC- Mandatory Non-credit

IV SMESTER

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

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

I SEMESTER

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

II SEMESTER

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

III SEMESTER

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

MNC- Mandatory Non-Credit

IV SEMESTER

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

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

I SEMESTER

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

Total Contact Hours=24

II SEMESTER

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

Total Contact Hours=24

III SEMESTER

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

MNC- Mandatory Non-Credit

IV SEMESTER

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

SYLLABUS FOR M.TECH (STRUCTURAL ENGINEERING)

I M.Tech- I Semester

Course Code: V18MAT05	**L**	**P**	**C**
	3	**0**	**3**

ADVANCED MATHEMATICS

Unit – I

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

Unit – II

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

UNIT-III

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

UNIT-IV

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

UNIT-V

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

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

TEXT BOOKS

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

I M.Tech- I Semester

Course Code: V18SET01

L	P	C
3	0	3

THEORY OF ELASTICITY

UNIT-I

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

UNIT -II

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

UNIT-III

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

UNIT-IV

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

UNIT-V

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

I M.Tech- I Semester

Course Code: V18SET02

L	P	C
3	0	3

MATRIX ANALYSIS OF STRUCTURES

UNIT-I

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

UNIT-II

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

UNIT-III

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

UNIT-IV

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

UNIT-V

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

TEXT BOOKS:

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

REFERENCES:

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

I M.Tech- I Semester

Course Code: V18SET03

L	P	C
3	0	3

STRUCTURAL DYNAMICS

UNIT-I

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

UNIT-II

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

UNIT-III

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

UNIT-IV

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

UNIT-V

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

TEXT BOOKS:

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

REFERENCES:

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

I M.Tech- I Semester

Course Code: V18SET04

L	P	C
3	0	3

PRESTRESSED CONCRETE
(ELECTIVE-I)

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

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

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

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

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

TEXT BOOKS:

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

REFERENCES:

1. Prestressed Concrete structures by P. Dayaratnam., P.sarah, MEDTECH publications, 7th edition.
2. Design of prestressed Concrete by T.Y.Lin and Ned H. Burns, Wiley (1981), 3rd edition, IS 1343-1980, Indian Standard code for Prestressed concrete.

I M.Tech- I Semester

Course Code: V18SET05

L	P	C
3	0	3

SUB-STRUCTURE DESIGN
(ELECTIVE I)

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

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

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

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

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

TEXT BOOKS:

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

REFERENCES:

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

I M.Tech- I Semester

Course Code: V18SET06

L	P	C
3	0	3

STRUCTURAL OPTMIZATION (ELECTIVE-I)

UNIT-I;

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

UNIT-II

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

UNIT-III

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

UNIT-IV

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

UNIT-V

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

TEXT BOOKS:

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

REFERENCES:

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

I M.Tech- I Semester

Course Code: V18SET07

L	P	C
3	0	3

REPAIR AND REHABILITATION OF STRUCTURES

(ELECTIVE-II)

UNIT-I

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

UNIT-II

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

UNIT-III

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

UNIT-IV

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

UNIT-V

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

TEXT BOOKS:

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

REFERENCES:

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

I M.Tech- I Semester

Course Code: V18SET08

L	P	C
3	0	3

ANALYSIS AND DESIGN OF TALL BUILDINGS
(ELECTIVE-II)

UNIT-I

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

UNIT-II

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

UNIT-III

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

UNIT-IV

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

UNIT-V

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

TEXT BOOKS:

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

REFERENCES:

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

I M.Tech- I Semester

Course Code: V18SET09

L	P	C
3	0	3

PLASTIC ANALYSIS AND DESIGN
(ELECTIVE-II)

UNIT-I

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

UNIT-II

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

UNIT-III

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

UNIT-IV

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

UNIT-V

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

REFERENCES:

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

I M.Tech- I Semester

Course Code: V18SEL01

L	P	C
0	4	2

ADVANCED STRUCTURAL ENGINEERING LABORATORY

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

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

REFERENCES:

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

I M.Tech- II Semester

Course Code: V18SET10

L	P	C
3	0	3

FINITE ELEMENT METHOD

UNIT-I

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

UNIT-II

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

UNIT-III

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

UNIT-IV

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

UNIT-V

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

REFERENCES:

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

I M.Tech- II Semester

Course Code: V18SET11

L	P	C
3	0	3

EARTHQUAKE RESISTANT DESIGN

UNIT-I

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

UNIT-II

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

UNIT-III

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

UNIT-IV

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

UNIT-V

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

TEXT BOOKS:

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

REFERENCES:

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

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

I M.Tech- II Semester

Course Code: V18SET12

L	P	C
3	0	3

STABILITY OF STRUCTURES

UNIT-I

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

UNIT-II

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

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

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

UNIT-III

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

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

UNIT-IV

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

UNIT-V

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

TEXT BOOKS:

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

REFERENCES:

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

I M.Tech- II Semester

Course Code: V18SET13

L	P	C
3	0	3

THEORY OF PLATES AND SHELLS

UNIT-I

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

UNIT-II

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

UNIT-III

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

UNIT-IV

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

UNIT-V

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

TEXT BOOKS:

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

REFERENCES:

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

I M.Tech- II Semester

Course Code: V18SET14

L	P	C
3	0	3

EXPERIMENTAL STRESS ANALYSIS
(ELECTIVE III)

UNIT-I

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

UNIT-II

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

UNIT-III

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

UNIT-IV

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

UNIT-V

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

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TEXT BOOKS:

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

REFERENCES:

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

I M.Tech- II Semester

Course Code: V18SET15

L	P	C
3	0	3

RELIABILITY ANALYSIS AND DESIGN (ELECTIVE-III)

UNIT-I

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

UNIT-II

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

UNIT-III

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

UNIT-IV

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

UNIT-V

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

TEXT BOOKS:

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

REFERENCES:

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

I M.Tech- II Semester

Course Code: V18SET16

L	P	C
3	0	3

ADVANCED CONCRETE TECHNOLOGY

(ELECTIVE-III)

UNIT-I

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

UNIT-II

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

UNIT-III

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

UNIT-IV

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

UNIT-V

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

TEXT BOOKS::

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

REFERENCES:

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

I M.Tech- II Semester

Course Code: V18SET17

L	P	C
3	0	3

INDUSTRIAL STRUCTURES (ELECTIVE –IV)

UNIT-I

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

UNIT-II

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

UNIT-III

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

UNIT-IV

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

UNIT-V

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

TEXT BOOKS:

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

REFERENCES:

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

I M.Tech- II Semester

Course Code: V18SET18

L	P	C
3	0	3

BRIDGE ENGINEERING
(ELECTIVE –IV)

UNIT-I

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

UNIT-II

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

UNIT-III

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

UNIT-IV

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

UNIT-V

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

TEXT BOOKS:

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

REFERENCES:

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

I M.Tech- II Semester

Course Code: V18SET19

L	P	C
3	0	3

EARTH RETAINING STRUCTURES (ELECTIVE –IV)

UNIT-I

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

UNIT-II

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

UNIT-III

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

UNIT-IV

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

UNIT-V

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

– TVA method and Cummins' methods.

TEXT BOOKS:

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

REFERENCES:

1. Soil Mechanics in Engineering Practice by Terzaghi K and Rolph B peck , John Wiley & Co 2nd edition.
2. Analysis and Design of Foundations and Retaining Structures by Prakash S and Saritha Prakashan.

I M.Tech- II Semester

Course Code: V18SEL02

L	P	C
0	4	2

CAD LABORATORY

Analysis and Design using STADD, STRAP, STRUDS, ANSYS

1. Programming for beams subject to different loading (mandatory).
2. Analysis of reinforced concrete multistoried building
3. Analysis of steel transmission line tower
4. Analysis of plane and space truss
5. Analysis of plane and space frame
6. Determination of mode shapes and frequencies of tall buildings using lumped mass (stick model) approximation
7. Wind analysis on tall structure
8. Analysis of pre stressed concrete bridge girder
9. Analysis of Cylindrical shell
10. Modal Analysis of a Cantilever Beam

NOTE: A minimum of eight (including item 1) from the above set have to be conducted.

REFERENCE:

1.Computer aided design laboratory (Civil Engineering) by Shesha Prakash and Suresh.S

SYLLABUS FOR M.TECH (POWER SYSTEM CONTROL & AUTOMATION)

I M.TECH-I SEMESTER

Course Code : V18PST01

POWER SYSTEM OPERATION AND CONTROL

[L: 3; T: 0; P: 0 (3 credits)]

UNIT-I

Unit commitment: Introduction, Simple & numeration, Constraints in UCP, UC solutions. Methods-priority list method, Dynamic programming Approach.

UNIT-II

Single area Load Frequency Control: Necessity of keeping frequency constant. Definition of control area, single area control, Block diagram representation of an isolated Power System, Steady State analysis, Dynamic response-Uncontrolled case. Proportional plus Integral control of single area and its block diagram representation, steady state response, load frequency control, Role of AGC. State spare model of an isolated system, pole placement design, optimal control design.

UNIT-III

Two area Load Frequency Control, uncontrolled case and controlled case, tie-line bias control. Optimal two-area LF control-steady state representation, performance Index and optimal parameter adjustment. State space model for a two are system

UNIT-IV

Generation with limited Energy supply, Take-or-pay fuel supply contract, and composite generation production cost function. Solution by gradient search techniques, hard limits and slack variables, Fuel scheduling by linear programming.

UNIT-V

Interchange Evaluation and Power Pools Economy Interchange, Economy interchange Evaluation, Interchange Evaluation with unit commitment, Multiple Interchange contracts. After the-fact production costing, Transmission Losses in transaction Evaluation, other types of Interchange, power pools.

Text Books

1. I.J.Nagrath&D.P.Kothari, “Modern Power System Analysis” Tata McGraw-Hill Publishing Company ltd, 2nd edition.
2. PSR Murthy, “Power system operation and control”,B.S publication.
3. A.J.Wood&B.F.Wollenberg, “Power Generation, Operation and Control”, Johnwiley& sons Inc. 1984.

Reference Books

1. O.I.Elgerd, “Electrical Energy Systems Theory”, Tata McGraw-Hill Publishing Company Ltd, 2nd edition.
2. TJE Miller, “Reactive Power Control in Electric Systems”, John Wiley & sons.

I M.TECH-I SEMESTER

Course Code : V18PST02

ADVANCED COMPUTER METHODS IN POWER SYSTEMS

[L : 3; T: 0; P: 0 (3 credits)]

UNIT-I

Network modeling – Single phase and three phase modeling of alternators, transformers and transmission lines, Conditioning of Y Matrix –- Incidence matrix method, Method of successive elimination, Triangular factorization

UNIT-II

Load flow analysis - Newton Raphson method, Fast Decoupled method, AC-DC load flow – Single and three phase methods – Sequential solution techniques and extension to multiple and multi-terminal DC systems.

UNIT-III

Fault Studies -Analysis of balanced and unbalanced three phase faults – fault calculations – Short circuit faults – open circuit faults

UNIT-IV

System optimization - strategy for two generator systems – generalized strategies – effect of transmission losses - Sensitivity of the objective function - Formulation of optimal power flow-solution by Gradient method-Newton's method

UNIT-V

State Estimation – method of least squares – statistics – errors – estimates – test for bad data – structure and formation of Hessian matrix – power system state estimation

Test Books:

1. Grainger, J.J. and Stevenson, W.D. "Power System Analysis" Tata McGraw hill, New Delhi, 2003.
2. G W Stagg and A H El Abiad, "Computer Methods in Power System Analysis", McGraw Hill, 1968
3. Pai, M.A., "Computer Techniques in Power System Analysis", Tata McGraw Hill, New Delhi, 2006.

References:

1. HadiSaadat, "Power System Analysis", Tata McGraw hill, New Delhi, 2002.
2. Arrillaga, J and Arnold, C.P., "Computer analysis of power systems" John Wiley and Sons, New York, 1997.

I M.TECH-I SEMESTER

Course Code : V18PST03

ADVANCED POWER SYSTEM PROTECTION

[L: 3; T: 0; P : 0 (3 credits)]

UNIT-I

Static Relays: Advantages of static relays-Basic construction of static relays-Level detectors-Replica impedance –Mixing circuits-General equation for two input phase and amplitude comparators-Duality between amplitude and phase comparators.

Amplitude Comparators: Circulating current type and opposed voltage type- rectifier bridge comparators, Direct and Instantaneous comparators, Static Over Current Relays**,**Differential Relays

UNIT-II

Static Distance Relays: Static impedance-reactance–MHO and angle impedance relay-sampling comparator –realization of reactance and MHO relay using sampling comparator.

Phase Comparators: Coincidence circuit type- block spike phase comparator, techniques to measure the period of coincidence-Integrating type-Rectifier and Vector product type- Phase comparators.

UNIT-III

Multi-Input Comparators: Conic section characteristics-Three input amplitude comparator –Hybrid comparator-switched distance schemes –Poly phase distance schemes- phase fault scheme –three phase scheme – combined and ground fault scheme. POWER SWINGS: Effect of power swings on the performance of distance relays –Power swing analysis-Principle of out of step tripping and blocking relays-effect of line and length and source impedance on distance relays.

UNIT-IV

Microprocessor Based Protective Relays (Block diagram and flowchart approach only)

Over current relays–impedance relays-directional relay-reactance relay .Generalized mathematical expressions for distance relays-measurement of resistance and reactance –MHO and offset MHO relays-Realization of MHO characteristics-Realization of offset MHO characteristics -Basic principle of Digital computer relaying.

UNIT-V

Digital Protection: Application of wavelet protection to power system protection- transmission line protection, transformer protection, synchronous generator protection. Numerical differential protection of generator and transformers.

Text Books

1. Badri Ram and D.N.Vishwakarma, “Power system protection and Switch gear”, TMH publication New Delhi 1995.
2. T.S. MadhavaRao, “Power system protection Static relays”, TMH 2nd edition 1981

Reference Books

1. Mason, “The Art and Science of protective relaying”, Wiley Eastern Ltd
2. C.L. Wadhwa, “Electrical power systems”, New Age International (P) Limited
3. Sunil S. Rao, “Switchgear and protection”, Khanna Publications

I M.TECH-I SEMESTER

Course Code : V18PST04

MICRO CONTROLLERS AND APPLICATIONS

[L: 3; T: 0; P: 0 (3 credits)]

UNIT-I

INTRODUCTION TO MICROCONTROLLERS

Overview of 8 bit and 16 bit Microcontrollers, CISC & RISC Processors, Harvard & Von-Neumann architectures, features of 8051 Micro Controller, PIN diagram, architecture, Memory organization, Different modes of operation of timer/counters.

UNIT II

PROGRAMMING OF 8051

Instruction set, Addressing modes, sample programs, introduction to embedded C, simple programs, development tools.

UNIT III

REAL TIME CONTROL: INTERRUPTS

Interrupt handling structure of an MCU – Interrupt Latency and Interrupt deadline – Multiple sources of the interrupts – Non-maskable interrupt sources – Enabling or Disabling of the sources – Polling to determine the Interrupt source and assignment of the priorities among them –Interrupt structure in Intel 8051.

UNIT IV

INTERFACING

LEDs & switches interfacing, keypad interfacing, Seven Segment Display interfacing, ADC & DAC interfacing, 2X16 LCD interfacing, stepper motor interfacing, serial port interfacing, high power devices, simple calculator development.

MICROCONTROLLER BASED INDUSTRIAL APPLICATIONS

Optical motor shaft encoders – Industrial control – Industrial process control system – Prototype MCU based Measuring instruments

UNIT V

PIC MICROCONTROLLERS

Overview and features, architecture of PIC 16C6X/7X, PIC memory organization, PIC 16C6X/7X instructions, addressing modes, I/O ports, Interrupts in PIC 16C61/71, PIC 16C61/71 timers.

UNIT VI

ARM 32 Bit MCUs:

Introduction to 16/32 Bit processors–ARMarchitecture and organization – ARM / Thumb programming model – ARM / Thumb instruction set.

Text Books

1. Kenneth J Ayala, “The 8051Microcontrollers: Architecture, Programming & Applications”, Second Edition, Penram International Publishing (India).
2. A.V. Deshmukh, “Microcontrollers (Theory & Applications)”, 6th Reprint, TMH, 2007.

Reference Books

1. Raj Kamal, “Microcontrollers Architecture, Programming, Interfacing and System Design”, 2nd Edition, Pearson Education, 2005.
2. Mazidi and Mazidi, “The 8051 Microcontroller and Embedded Systems”, 4th impression, PHI, 2000.

I M.TECH-I SEMESTER

Course Code : V18PST05

POWER SYSTEM RELIABILITY (ELECTIVE – I)

[L: 3; T: 0; P: 0 (3 credits)]

UNIT-I

Basic probability theory – rules for combining probabilities of events – Bernoulli's trials – probability density and distribution functions – binomial- distributions – expected value and standard deviation ofbinomial distribution.

UNIT -II

Network Modelling and Reliability Analysis of Series, Parallel, Series- Parallel networks – complex networks – decomposition method Reliability functions f(t), F(t), R(t), h(t) and their relationship – exponential distributions – Expected value and standard deviation of exponential distribution – Bath tub curve – reliability analysis of series parallel networks using exponential distribution – reliability measures MTTF, MTTR, MTBF.

UNIT –III

Markov chains – concept of stochastic transitional probability Matrix, Evaluation of limiting state Probabilities – Markov processes one component repairable system – time dependent probability evaluation using Laplace transform approach – evaluation of limiting state probabilities using STPM – two component repairable models – Frequency and duration concept – Evaluation of frequency of encountering state, mean cycletime, for one, two component repairable models – evaluation of cumulative probability and cumulative frequency of encountering merged states.

UNIT-IV

Generation system reliability analysis – reliability model of a generation system – recursive relation for unit addition and removal – load modelling – merging of generation load model – evaluation of transition rates for merged state model – cumulative Probability, cumulative frequency of failure evaluation – LOLP, LOLE.

UNIT-V

Composite system reliability analysis decomposition method – distribution system reliability analysis – radial networks – weather effects on transmission lines – Evaluation of load and energy indices.

Text Books

1. R.Billinton, R.N.Allan, "Reliability Evaluation of Engineering System", Plenum Press, New York.
2. R.Billinton, R.N.Allam, "Reliability Evaluation of Power System", Plenum Press, New York
3. Sharies E Ebeling, "An Introduction to Reliability and Maintainability Engineering", TATA McGraw Hill – Edition

Reference Books

1. J. Endrenyi, "Reliabilitymodelling in electric power system", John wiley and sons publications
2. Syed Ali, "Digital switching systems" system reliability and analysis", McGraw-Hill ,1997.

I M.TECH-I SEMESTER

Course Code : V18PST06

APPLICATION OF AI TECHNIQUES IN POWER SYSTEMS (ELECTIVE – I)

[L: 3; T: 0; P: 0 (3 credits)]

UNIT-I

Artificial Neural Networks:

Introduction Models of Neuron Network – Architectures – Knowledge representation – Artificial Intelligence and Neural networks–Learning process – Error correction learning – Hebbian learning – Competitive learning – Boltzman learning –Supervised learning – Unsupervised learning – Reinforcement learning – learning tasks.

UNIT-II

ANN Paradigms:

Multi – layer perceptron using Back propagation Algorithm (BPA) – Self – Organizing Map (SOM) – Radial Basis Function Network – Functional Link Network (FLN) – Hopfield Network.

UNIT-III

Fuzzy Logic:

Introduction – Fuzzy versus crisp – Fuzzy sets – Membership function – Basic Fuzzy set operations – Properties of Fuzzy sets – Fuzzy Cartesian Product – operations on Fuzzy relations – Fuzzy-logic – Fuzzy Quantifiers–Fuzzy Inference – Fuzzy Rule based system–Defuzzification methods.

UNIT-IV

Genetic Algorithms:

Introduction–Encoding – Fitness Function–Reproduction operators–Genetic Modeling – Genetic operators–Cross over – Single site cross over – Two point cross over – Multi point cross over – Uniform cross over – Matrix cross over–Cross over Rate –Inversion & Deletion – Mutation operator–Mutation – Mutation Rate–Bit–wise operators –Generational cycle – convergence of Genetic Algorithm.

UNIT-V

Applications of AI Techniques:

Load forecasting – Load flow studies – Economic load dispatch – Load frequency control – Single area system and two area system – Small Signal Stability (Dynamic stability) Reactive power control – speed control of DC and AC Motors.

Text books:

1. S.Rajasekaran and G.A.V.Pai,"Neural Networks, Fuzzy Logic & Genetic Algorithms", PHI, New Delhi, 2003.
2. Rober J. Schalkoff, "Artificial Neural Networks", Tata McGraw Hill Edition, 2011

Reference Books:

1. S. Rajasekaran and G.A.V. Pai"Neural Networks, Fuzzy Systems And Evolutionary Algorithms : Synthesis And Applications",PHI, New Delhi

I M.TECH-I SEMESTER

Course Code : V18PST07

ELECTRICAL DISTRIBUTION SYSTEMS (ELECTIVE – I)

[L: 3; T: 0; P: 0 (3 credits)]

UNIT- I

General : Introduction to Distribution systems, an overview of the role of computers in distribution system planning-Load modeling and characteristics: definition of basic terms like demand factor, utilization factor, load factor, plant factor, diversity factor, coincidence factor, contribution factor and loss factor-Relationship between the load factor and loss factor - Classification of loads (Residential, Commercial, Agricultural and Industrial) and their characteristics.

UNIT-II

Distribution Feeders and Substations

Design consideration of Distribution feeders: Radial and loop types of primary feeders, voltage levels, feeder-loading. Design practice of the secondary distribution system.

Location of Substations: Rating of a Distribution Substation, service area with primary feeders. Benefits derived through optimal location of substations. Distributed Generation placement and modelling.

UNIT -III

System Analysis: Voltage drop and power loss calculations - Derivation for volt-drop and power loss in lines, manual methods of solution for radial networks, three-phase balanced primary lines, non-three-phase primary lines.

UNIT- IV

Protective devices and coordination: Objectives of distribution system protection, types of common faults and procedure for fault calculation. Protective Devices: Principle of operation of fuses, circuit reclosers, line sectionalizer and circuit breakers. Coordination of protective devices General coordination procedure.

UNIT -V

Capacitive compensation for power factor control: Different types of power capacitors, shunt and series capacitors, effect of shunt capacitors (Fixed and Switched) power factor correction, capacitor location. Economic justification. Procedure to determine the best capacitor location. Voltage Control - Equipment for voltage control, effect of series capacitors, effect of AVB/AVR, line drop compensation.

Text Books:

1. TuranGonen, “Electric Power Distribution System Engineering”,Mc.Graw-Hill Book Company,1986.
2. A.S.Pabla “Electric Power Distribution”, Tata McGraw-Hill Publishing Company, 4th edition, 1997.

Reference Books:

1. V.Kamaraju, “Electrical Distribution”, McGraw Hill
2. Gorti Ramamurthy, “Handbook of Electrical Power Distribution”, Universities press.

I M.TECH-I SEMESTER

Course Code : V18PST08

POWER SYSTEM SECURITY (ELECTIVE – I)

[L: 3; T: 0; P: 0 (3 credits)]

UNIT-I

Short circuit analysis techniques in AC power Systems- Simulation of short circuit and open circuit faults using network theorems- fixed impedance short circuit analysis techniques-time domain short circuit analysis in large scale power systems- analysis of time variation of AC and DC short circuit components.

UNIT-II

Fixed impedance Short circuit analysis of large scale power systems general analysis of balanced, unbalanced and open circuit faults- 3- phase short circuit analysis in large scale power systems, Network equivalents and practical short circuit current assessments in large scale Ac power systems - uncertainties in short circuit current calculations.

UNIT-III

Risk assessment and safety considerations-control and limitation of high short circuit currents-limitation of short circuit currents in power system operation, Types of short circuit fault current limiters and their applications.

UNIT-IV

Power System Security analysis- concept of security- security analysis and monitoring- factors affecting power system security- detection of network problems, contingency analysis for generator and line outages by ILPF method – fast decoupled inverse Lemma-based approach, network sensitivity factors.

UNIT-V

Computer control power systems – need for real time and computer control of power systems-operating states of power system – SCADA implementation considerations – software requirements for implementing above functions.

Reference Books

1. Allen J. Wood and Bruce Woolenberg, “Power System Generation,Operation and Control”, 1st edition, John Willey and sons,1996.
2. John J.Grainger and William D Stevenson Jr.,“Power System, analysis”,McGraw Hill,ISE,1994.

Text Books

1. 1.NasserD.Tleis, “Power System Modelling and fault analysis”, Elsevier, 2008.
2. P.Venkatesh, B.V.Manikandan, S.Charles Raja, A.Srinivasan, “Electrical Power Systems, Analysis, Security and Deregulation”, kindle edition, PHI publication.

I M.TECH-I SEMESTER

Course Code : V18PST09

REACTIVE POWER COMPENSATION & MANAGEMENT (ELECTIVE – II)

[L: 3; T: 0; P: 0 (3 credits)]

UNIT-I

Load Compensation Objectives and specifications – reactive power characteristics – inductive and capacitive approximate biasing – Load compensator as a voltage regulator – phase balancing and power factor correction of unsymmetrical loads- examples.

UNIT- II

Reactive power compensation in transmission system: Steady state - Uncompensated line – types of compensation – Passive shunt and series and dynamic shunt compensation – examples Transient state - Characteristic time periods – passive shunt compensation – static compensations- series capacitor compensation –compensation using synchronous condensers – examples

UNIT-III

Reactive power coordination: Objective – Mathematical modelling – Operation planning – transmission benefits – Basic concepts of quality of power supply – disturbances- steady –state variations – effects of under voltages – frequency – Harmonics, radio frequency and
Electromagnetic interferences

UNIT-IV

Distribution side Reactive power Management: System losses –loss reduction methods – examples – Reactive power planning – objectives – Economics Planning capacitor placement – retrofitting of capacitor banks User side reactive power management: KVAR requirements for domestic appliances – Purpose of using capacitors – selection of capacitors – deciding factors – types of available capacitor, characteristics and Limitations

UNIT-V

Reactive power management in electric traction systems and are furnaces: Typical layout of traction systems – reactive power control requirements – distribution transformers- Electric arc furnaces – basic operations- furnaces transformer –filter requirements – remedialmeasures –power factor of an arc furnace

Text Books/ Reference Books

1. T.J.E.Miller, “Reactive power control in Electric power systems”, John Wiley and sons, 1982
2. D.M.Tagare, “Reactive power Management”, Tata McGraw Hill
3. W.Hofmann, J.Schlabbach, W. Just “Reactive power compensation, a practical guide”, John Wiley and sons

I M.TECH-I SEMESTER

Course Code : V18PST10

POWER QUALITY (ELECTIVE – II)

[L: 3; T:0; P: 0 (3 credits)]

UNIT-I: Introduction

Overview of Power Quality - Concern about the Power Quality - General Classes of PowerQuality Problems – Transients -Long-Duration Voltage Variations - Short-Duration VoltageVariations - Voltage Unbalance - Waveform Distortion - Voltage fluctuation - Power FrequencyVariations - Power Quality Terms - Voltage Sags and Interruptions - Sources of Sags andInterruptions – Nonlinear loads.

UNIT-II: Transient Over Voltages

Source of Transient over Voltages - Principles of Over Voltage Protection - Devices for OverVoltage Protection - Utility Capacitor Switching Transients - Utility Lightning Protection – LoadSwitching Transient Problems - Computer Tools for Transient Analysis

UNIT-III: Harmonic Distortion and solutions

Voltage vs. Current Distortion - Harmonics vs. Transients - Power System Quantities underNonsinusoidal Conditions - Harmonic Indices – Sources of harmonics - Locating Sources ofHarmonics – System Response Characteristics - Effects of Harmonic Distortion – Interharmonics-Harmonic Solutions Harmonic Distortion Evaluation - Devices for Controlling HarmonicDistortion - Harmonic Filter Design - Standards on Harmonics

UNIT- IV: Long Duration Voltage Variations

Principles of Regulating the Voltage - Device for Voltage Regulation - Utility Voltage RegulatorApplication - Capacitor for Voltage Regulation - End-user Capacitor Application – RegulatingUtility Voltage with Distributed Resources – Flicker

UNIT-V: Distributed Generation and Power Quality

Resurgence of Distributed Generation - DG Technologies - Interface to the Utility System -Power Quality Issues - Operating Conflicts - DG on Low Voltage Distribution Networks -Interconnection standards - Wiring and Grounding - Typical Wiring and Grounding Problems -Solution to Wiring and grounding Problems

Text Books:

1. Dugan R C, McGranaghan M F, Santoso S, and Beaty H W, “Electrical Power Systems Quality”, Second Edition, McGraw-Hill, 2002.
2. Kennedy B.W., “Power Quality Primer”, First Edition, McGraw-Hill, 2000.
3. W.E. Kazibwe and M.H. Sendula, “Electric power quality control techniques”, Springer.

Reference Books:

1. C. Shankaran, “Power Quality”, CRC Press, 2001
2. Franciso C.DE LA Rosa, “Harmonics and Power Systems”, CRC Press.
3. Ewald F. Fuchs, Mohammad A.S. Masoum, “Power Quality in Power Systems& Electrical Machines”, Academic Press.

I M.TECH-I SEMESTER

Course Code : V18PST11

POWER SYSTEM TRANSIENTS (ELECTIVE – II)

[L: 3; T: 0; P: 0 (3 credits)]

UNIT-I

Basic Concepts and Simple Switching Transients: Switching an RL,RC,RLC circuits

Transients Analysis of Three-Phase power Systems: Symmetrical components in Three-phase Systems, Sequence Components for Unbalanced Network Impedances, the Sequence Networks, analysis of Unsymmetrical Three-Phase Faults-single line-to-Ground Fault, Three phase-to-ground fault.

UNIT -II

Travelling Waves: Velocity of Travelling waves and Characteristic Impedance, Energy Contents of Travelling Waves, Attenuation and Distortion of Electromagnetic Waves, telegraph equations-lossless line, distortion less line, Reflection and Refraction of Travelling Waves, Reflection of Travelling Waves against Transformer-and-Generator windings, the Origin Transient Recovery voltages, bewley-lattice diagram. travelling waves and multi conductor system.

UNIT-III

Switching Transients: Arc interruption in circuit breaker, transient recovery voltage, arc-circuit interaction, interruption of capacitive currents, interruption of inverse currents, interruption of fault current in transmission line and transformers.

UNIT-IV

Power System Transient Recovery Voltages: Characteristics of the Transient Voltage- Short-circuit test duties based on IEC 60056 (1987),ANSI/IEEE Standards, the Harmonization between IEC and ANSI/ IEEE Standards with respect to Short-circuit Test duties, transient recovery voltage for Different types of faults.

UNIT-V

Lightning –Induced Transients: Mechanism of Lightning, wave shape of the lightning current, direct lighting Stroke to transmission line towers, direct lightening stroke to a line, lightning protection scheme. Numerical simulation of electrical transients, The Electromagnetic Transient Program, principles of numerical techniques used in transient simulation.

Text Books

1. Allen Greenwood, “Electrical Transients in Power System”, McGraw Hill 1990
2. A.P.SakisMeliopolous, “Power System Grounding and Transients: An Introduction”, Marcel Dekker, INC.
3. Lou Van Sluis, “Transients in power systems”, Wiley.

Reference Books

1. A.Ametani – “Power system transients theory and applications” CRC publications.
2. C.S. Indulkar, D.P. Kothari, K. Ramalingam, “Power system transients”, PHI publications.

I M.TECH-I SEMESTER

Course Code : V18PST12

VOLTAGE STABILITY (ELECTIVE – II)

[L: 3; T: 0; P: 0 (3 credits)]

UNIT-I

Reactive Power flow and voltage stability in power systems: Physical relationship indicating dependency of voltage on reactive power flow - reactive power, transient stability; Q-V curve; definition of voltage stability, voltage collapse and voltage security. Voltage collapse phenomenon, Factors of voltage collapse, effects of voltage collapse, voltage collapse analysis.

UNIT-II

Power system loads: Load characteristics that influence voltage stability such as – Discharge lighting, Induction motor, Air conditioning and heat pumps, Electronic power supplies, Over Headlines and cables.

UNIT-III

Reactive Power compensation: Generation and absorption of reactive power – Reactive power compensators & voltage controllers: - shunt capacitors, synchronous phase modifier – static VAR system – on load tap changing transformer, booster transformers.

UNIT-IV

Voltage stability static indices : Development of voltage collapse index – power flow studies – singular value decomposition – minimum singular value of voltage collapse – condition number as voltage collapse index.

UNIT-V

Voltage stability margins & Improvement of voltage stability: Stability margins, voltage stability margin of uncompensated and compensated power system. Dynamic voltage stability – voltage security, Methods of improving voltage stability and its practical aspects.

Text Books

1. Chakrabarti, D.P.Kothari, A.K. Mukhopadhyay, "Performance operation and control of EHV power transmission Systems", A H Wheeler Publishing Co Ltd
2. C.W. Taylor, "Power System Voltage Stability", Mc. Graw Hill, 1994

Reference Books

1. Francis T.S. Yu, "Electric power system dynamics", Academic Press
2. PrabhaKundur, "Power system stability & control" , Mc. Graw Hill Education.
3. K.R. Padiyar"Power system Dynamics, stability & control", BS publications.

I M.TECH-I SEMESTER

Course Code : V18PSL01

POWER SYSTEMS LAB-I

[L: 0; T: 0; P: 4 (2 credits)]

Any 10 of the following experiments are to be conducted

1. Formation of Y- Bus by Direct-Inspection Method.
2. Load Flow Solution Using Gauss-Siedel Method
3. Load Flow Solution Using Newton Raphson Method
4. Formation of Z-Bus by Z-bus building algorithm
5. Unsymmetrical Fault analysis using Z-bus
6. Economic Load Dispatch with transmission losses
7. Economic Load Dispatch without transmission losses
8. Transient Stability Analysis Using Point By Point Method
9. Load Frequency Control of Single Area Control& with andwithout controllers.
10. Load Frequency Control of Two AreaControlsystem with andwithout controllers
11. Load Flow Solution Using Fast De-coupled Method.
12. Symmetrical Fault analysis using Z-bus

I M.TECH-II SEMESTER

Course Code : V18PST13

MODERN CONTROL THEORY

[L: 3; T: 0; P: 0 (3 credits)]

UNIT –I

State Variable Analysis: The concept of state – State Equations for Dynamic systems – State diagram---- Linear Continuous time model for physical systems – Existence and Uniqueness of Solutions toContinuous – Time State Equations – Solutions – Linear Time Invariant Continuous – Time State Equations – State transition matrix and it's properties

UNIT – II

State Variable Techniques: General concept of Controllability – General concept of Observability Controllability tests for Continuous &Time Invariant systems - Observability tests for Continuous &Time Invariant systems - Controllability and Observability of state model in Jordan Canonical form - Controllability and Observability Canonical forms of State model – State feedback controller design through pole assignment.

UNIT – III

Non Linear Systems – 1: Introduction – Non Linear Systems – Types of Non – Linarites – Saturation – Dead – Zone – Backlash – Jump Phenomenon etc. - Singular Points – Introduction to Linearization ofnonlinear systems, properties of Non Linear Systems – Describing function – describing function analysis of nonlinear systems- Stability analysis of Non – Linear systems through describing functions.

UNIT – IV

Non Linear Systems – 11: Introduction to phase – plane analysis, Method of Isoclines for Constructing Trajectories, singular points, phase – plane analysis of nonlinear control systems.

UNIT – V

Stability Analysis Stability in the sense of Lyapunov, Lyapunov's stability and Lyapunov's instability theorems – Stability Analysis of the Linear Continuous time invariant systems by Lyapunovsecondmethod – Generation of Lyapunov functions – Variable gradient method – Krasooviski's method.

Text Books

1. M. Gopal, "Modern Control System Theory", New Age International – 1984
2. Ogata. K, "Modern Control Engineering", Prentice Hall – 1997

Reference Books

1. Hassan K. Klalil, "Nonlinear systems", Prentice Hall, 1996
2. Richard C. Dorf and Robert H. Bishop, "Modern control systems", 11th Edition, Pearson Edu, India, 2009

I M.TECH-II SEMESTER

Course Code : V18PST14

POWER SYSTEM DYNAMICS AND STABILITY

[L: 3; T: 0; P: 0 (3 credits)]

UNIT-I: System Dynamics

Synchronous machine model in state space: Synchronous Machine: Basic equations of a synchronous machine, dq0 Transformation and Park's transformation-
Computer representation for excitation and governor system – modeling of loads and induction machines.

UNIT-II: stability

Fundamental Concepts of Stability -Classification of Stability-
Steady state stability – steady state stability limit – Dynamics Stability limit – Dynamic stability analysis – State space representation of synchronous machine connected to infinite bus- time response – Stability by eign value approach.

UNIT-III:Simulation of Transient Stability

Equations of Motion: Swing Equation, calculation of inertia constant- Representation of loads – Alternate cycle solution method – Direct method of solution – Solution
Techniques: Modified Euler method – RungeKutta method – Concept of multi machine stability.

UNIT-IV: Excitation Systems

Excitation System Requirements, Elements of an Excitation System,
Types of Excitation System: Rotating Self-excited Exciter with direct acting Rheostatic type voltage regulator – Rotating main and Pilot Exciters with Indirect Acting Rheostatic Type Voltage Regulator – Rotating Main Exciter, Rotating Amplifier and Static Voltage Regulator – Static excitation scheme – Brushless excitation system - Effect of excitation on power system stability

UNIT-V: Speed Governing systems

Block diagram of speed governing system- Effect of governor action on power system stability- Effect of saturation, saliency & automatic voltage regulators on stability.

Text Books

1. K R Padiyar, "Power System Dynamics Stability and Control", B S Publications
2. P.Kundur, "Power System Stability & Control", Tata Mcgraw hill
3. Vijay Vittal, Bergen , "Power Systems Analysis", Pearson Education

Reference Books

1. P C CrauseViley, "Electric machinery and Drive Systems", IEEE Press .
2. P.M Anderson and A.A Fouad, "Power System Control and Stability", Iowa State University Press, Ames, Iowa, 1978.
3. R. Ramanujam, "Power System Dynamics, Analysis and Simulation", PHI Learning, New Delhi, January 2010.

I M.TECH-II SEMESTER

Course Code : V18PST15

SOLAR & WIND ENERGY

[L: 3; T: 0; P: 0 (3 credits)]

UNIT-I

SOLAR RESOURCES : Solar Energy - Availability - Solar radiation data and measurement - Estimation of average solar radiation - Solar water heater types – Heat balance – Flat plate collector efficiency – Efficiency of heat removal - Thermo siphon flow calculation - Forced circulation calculation - Evacuated collectors - Basics of solar concentrators- Solar Energy Applications - Solar air heaters – Solar Chimney - Crop driers – Passive solar system - Active solar systems - Water desalination – Principle of solar ponds.

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UNIT-II

SOLAR PHOTOVOLTAICS: The Photo Voltaic effect- p-n junction-different types of photovoltaic cells-PV cell characteristics- Effect of variation of temperature, insolation level & tilt angle on the characteristics- equivalent circuits- temperature effects on conversion efficiency- Fabrication and costs of PV cell.

PV SYSTEMS : Photovoltaic modules- module specifications- bypass diodes-PV arrays and PV systems-cabling, earthing and lightning protection- Battery storage: Lead and Nickel cadmium batteries- Charge regulators-LVD circuit-Voltage and current Source Inverters. Tracking Systems-Maximum power point tracking.

UNIT-III

WIND ENERGY-I: Nature of wind – Characteristics – Variation with height and time – Power in wind – Aerodynamics of Wind turbine – Momentum theory – Basics of aerodynamics – Aero foils and their characteristics– Wind turbine loads – Aerodynamic loads in steady operation – Yawed operation and tower shadow.

UNIT-IV

WIND ENERGY-II: Siting – Rotor selection –Annual energy output – Horizontal axis wind turbine (HAWT) – Vertical axis wind turbine (VAWT) – Rotor design considerations – Number of blades – Solidity - Blade profile – Upwind/Downwind – Yaw system – Tower – Braking system - Synchronous and asynchronous generators and loads – Integration of wind energy converters to electrical networks – Inverters – Control system – Requirement and strategies

UNIT-V

PV&WIND SYSTEM APPLICATIONS: Autonomous system; Grid Linked systems; Remote applications, System sizing; System Performance; Economics and future prospects.

Text Books

1. John Twidell and Tony Weir, “Renewable Energy Resources”, E &F.N.Spon
2. G.N.Tiwari and M.K.Ghosal, “Renewable Energy Resources Basic Principles and Applications”,Narosa

References Books

1. S.P.Sukhatme, “Solar Energy - Principles of thermal collection and storage”, TMH
2. Duffie& Beckman, “Solar Energy Thermal Processes”, Wiley
3. Tony Burton, David Sharpe, Nick Jenkins and Ervin Bossanyi / WileyWind Electrical Systems / S.N.Bhadra, D.Kastha and S.Banerjee , “Wind Energy Handbook”, Oxford

I M.TECH-II SEMESTER

Course Code : V18PST16

REAL TIME CONTROL OF POWER SYSTEMS

[L: 3; T: 0; P: 0 (3 credits)]

UNIT-I

State Estimation. Operating states of power systems. Different types of State Estimations, Theory of WLS state estimation, sequential and non-sequential methods to process measurements. Bad data observability, Bad data detection, identification and elimination.

UNIT-II

Security and Contingency Evaluation-Security concept, Security Analysis and monitoring, Contingency Analysis for Generator and line outages by iterative linear power flow method, and network sensitivity methods.

UNIT-III

Computer Control of Power Systems-Need for real time and computer control of power systems, SCADA - Supervisory control and Data Acquisition systems implementation considerations, energy control centres. Role of PMU in real time control.

UNIT-IV

Voltage Stability, voltage collapse, and voltage security, relation of voltage stability to rotor angle stability. Voltage stability analysis Introduction to voltage stability analysis `P-V'curves and `Q-V' curves, voltage stability in mature power systems, long-term voltage stability, power flow analysis for voltage stability, voltage stability static indices and Research Areas.

UNIT-V

Application of AI and ANN in Power System: Basic concepts and definitions, algorithms for load flow, short term load forecasting, fault diagnosis and state estimation.

Text Books

1. Allen J. Wood and Bruce F. Wollenberg "Power Generation, Operation & Control" 2nd edition, John Wiley and Sons.
2. I.J. Nagarath& D. P. Kothari , "Modern power system analysis" 4th Edition, TMH

Reference Books

1. John J.Grainger and William D.Stevenson, Jr.,"Power System Analysis", McGraw-Hill, 1994, International Edition
3. R.N.Dhar,"Computer Aided Power Systems Operation and Analysis", Tata McGraw Hill, 1982
4. L.P.Singh,"Advanced Power System Analysis and Dynamics", Wiley Eastern Ltd. 1986
5. PrabhaKundur, "Power System Stability and Control", McGraw Hill, 1994
6. P.D.Wasserman, "Neural Computing : Theory and Practice", Van Nostrand - Feinhold, New York.

I M.TECH-II SEMESTER

Course Code: V18PST17

ELECTRIC AND HYBRID VEHICLES (ELECTIVE-III)

[L: 3; T: 0; P: 0 (3 credits)]

Unit-I:

Introduction to Hybrid Electric Vehicles: History of hybrid and electric vehicles, social and environmental importance of hybrid and electric vehicles, impact of modern drive-trains on energy supplies.

Conventional Vehicles: Basics of vehicle performance, vehicle power source characterization & transmission characteristics.

Unit-II:

Hybrid Electric Drive-trains: Basic concept of hybrid traction, introduction to various hybrid drive-train topologies, power flow control in hybrid drive-train topologies, fuel efficiency analysis.

Electric Drive-trains: Basic concept of electric traction, introduction to various electric drive-train topologies, power flow control in electric drive-train topologies, fuel efficiency analysis.

Unit-III:

Electric Propulsion unit: Introduction to electric components used in hybrid and electric vehicles, Configuration and control of DC Motor drives, Configuration and control of Induction Motor drives

Unit-IV:

Energy Storage: Introduction to Energy Storage Requirements in Hybrid and Electric Vehicles, Battery based energy storage and its analysis, Fuel Cell based energy storage and its analysis, Hybridization of different energy storage devices

Unit-V:

Sizing the drive system: Matching the electric machine and the internal combustion engine (ICE), Sizing the propulsion motor, sizing the power electronics, selecting the energy storage technology, Communications, supporting subsystems.

Energy Management Strategies: Introduction to energy management strategies used in hybrid and electric vehicles, classification of different energy management strategies, comparison of different energy management strategies.

Text Books:

1. Iqbal Hussein, “Electric and Hybrid Vehicles, Design Fundamentals”, CRC Press, 2003.
2. James Larminie, “Electric Vehicle Technology Explained”, John Wiley & Sons, 2003.

Reference Books:

1. MehrdadEhsani, YimiGao, Sebastian E. Gay, Ali Emadi, “Modern Electric, Hybrid Electricand Fuel Cell Vehicles: Fundamentals, Theory and Design”, CRC Press, 2004.
2. SandeepDhameja, “Electric Vehicle Battery Systems”, Newnes, 2000.

I M.TECH-II SEMESTER

Course Code: V18PST18

POWER SYSTEM DEREGULATION (ELECTIVE – III)

[L: 3; T: 0; P: 0 (3 credits)]

UNIT-I

Need and conditions for deregulation. Introduction of Market structure, Market Architecture, Spot market, forward markets and settlements. Review of Concepts marginal cost of generation, least-cost operation, incremental cost of generation. Power System Operation ion deregulated environment and Indian Electricity act.

UNIT-II

Electricity sector structures and Ownership /management, the forms of Ownership and management. Different structure model like Monopoly model, Purchasing agency model, wholesale competition model, Retail competition model.

UNIT-III

FRAMEWORK and methods for the analysis of Bilateral and pool markets, LMP based markets, auction models and price formation, price based unit commitment, country practices.

UNIT-IV

Transmission network and market power. Power wheeling transactions and marginal costing, transmission costing. Congestion management methods- market splitting, counter-trading; Effect of congestion on LMPs- country practices

UNIT-V

Ancillary Services and System Security in Deregulation. Classifications and definitions, AS management in various markets- country practices. Technical, economic, & regulatory issues involved in the deregulation of the power industry.

Text Books

1. S. Stoft, “Power System Economics: Designing markets for electricity”
2. J. Wood and B. F. Wollenberg, “Power generation, operation and control”,
3. K. Bhattacharya, M.H.J. Bollen and J.E. Daalder, “Operation of restructured power systems”
4. LoiLeiLai, “Power system restructuring & Deregulation”, Wiley publications.

Reference Books

1. M. Shahidehpour, H. Yamin and Z. Li, “Market operations in electric power systems- Forecasting, Scheduling, and Risk Management” , A JOHN WILEY & SONS, INC., PUBLICATION
2. S. Kirschen and G. Strbac, “Fundamentals of power system economics”, Wiely publications

I M.TECH-II SEMESTER

Course Code : V18PST19

SMART GRID (ELECTIVE – III)

[L: 3; T: 0; P: 0 (3 credits)]

UNIT-I

Introduction to Smart Grid: Evolution of Electric Grid, Concept of Smart Grid, Definitions, Need of Smart Grid, Functions of Smart Grid, Opportunities & Barriers of Smart Grid, Difference between conventional & smart grid, Concept of Resilient & Self-Healing Grid, Present development& International policies on Smart Grid. Case study of Smart Grid.

UNIT-II

Smart Grid Technologies: Part 1: Introduction to Smart Meters, Real Time Prizing, Smart Appliances, Automatic Meter Reading (AMR), Outage Management System (OMS), Plug in Hybrid Electric Vehicles (PHEV), Vehicle to Grid, Smart Sensors, Home & Building Automation, Phase Shifting Transformers.

UNIT-III

Smart Grid Technologies: Part 2: Smart Substations, Substation Automation, Feeder Automation. Geographic Information System (GIS), Intelligent Electronic Devices (IED) & their application for monitoring & protection, Smart storage like Battery, SMES, Pumped Hydro, Compressed Air Energy Storage, Wide Area Measurement System (WAMS), Phase Measurement Unit (PMU).

UNIT-IV

Microgrids and Distributed Energy Resources: Concept of micro grid, need & applications of micro grid, formation of microgrid, Issues of interconnection, protection & control of microgrid. Plastic & Organic solar cells, Thin film solar cells, Variable speed wind generators, fuelcells, microturbines, Captive power plants, Integration of renewable energy sources.

UNIT-V

Power Quality Management in Smart Grid: Power Quality & EMC in Smart Grid, Power Quality issues of Grid connected Renewable Energy Sources, Power Quality Conditioners for Smart Grid, Web based Power Quality monitoring, Power Quality Audit.

Information and Communication Technology for Smart Grid: Advanced Metering Infrastructure (AMI), Home Area Network (HAN), Neighborhood Area Network (NAN), Wide Area Network (WAN).

Text Books:

1. Ali Keyhani, Mohammad N. Marwali, Min Dai “Integration of Green and Renewable Energy in Electric Power Systems”, Wiley
2. Clark W. Gellings, “The Smart Grid: Enabling Energy Efficiency and Demand Response”,CRC Press
3. JanakaEkanayake, Nick Jenkins, KithsiriLiyanage, Jianzhong Wu, Akihiko Yokoyama,“Smart Grid: Technology and Applications”, Wiley
4. Jean Claude Sabonnadière, NouredineHadjsaïd, “Smart Grids”, Wiley Blackwell 19
5. Peter S. Fox Penner, “Smart Power: Climate Changes, the Smart Grid, and the Futureof Electric Utilities”, Island Press; 1 edition 8 Jun 2010
6. S. Chowdhury, S. P. Chowdhury, P. Crossley, “Microgrids and Active Distribution Networks.” Institution of Engineering and Technology, 30 Jun 2009

7. Stuart Borlase, “Smart Grids (Power Engineering)”, CRC Press

Reference Books:

1. Andres Carvallo, John Cooper, “The Advanced Smart Grid: Edge Power Driving Sustainability: 1”, Artech House Publishers July 2011
2. James Northcote, Green, Robert G. Wilson “Control and Automation of Electric Power Distribution Systems (Power Engineering)”, CRC Press
3. MladenKezunovic, Mark G. Adamiak, Alexander P. Apostolov, Jeffrey George Gilbert “Substation Automation (Power Electronics and Power Systems)”, Springer
4. R. C. Dugan, Mark F. McGranghan, Surya Santoso, H. Wayne Beaty, “Electrical Power System Quality”, 2nd Edition, McGraw Hill Publication
5. Yang Xiao, “Communication and Networking in Smart Grids”, CRC Press

I M.TECH-II SEMESTER

Course Code : V18PST20

HIGH VOLTAGE ENGINEERING (ELECTIVE – III)

[L: 3; T: 0; P: 0 (3 credits)]

UNIT-I

Generation of High AC & DC Voltages: Direct Voltages: AC to DC conversion methods electrostatic generators-Cascaded Voltage Multipliers.

Alternating Voltages: Testing transformers-Resonant circuits and their applications, Tesla coil.

UNIT-II

Generation of Impulse Voltages: Impulse voltage specifications-Impulse generations circuits-Operation, construction and design of Impulse generators-Generation of switching and long duration impulses.

Impulse Currents: Generation of High impulse currents and high current pulses.

UNIT-III

Measurement of High AC & DC Voltages: Measurement of High D.C. Voltages: Series resistance meters, voltage dividers and generating voltmeters.

Measurement of High A.C. Voltages: Series impedance meters electrostatic voltmeters potential transformers and CVTS-voltage dividers and their applications.

Measurement of Peak Voltages: Chubb-Fortesque methods.

Measurement of Impulse Voltages &Currents: Voltage dividers and impulse measuring systems Faraday generators

UNIT-IV

High Voltage Testing of Power Apparatus: Need for testing standards– Standards for porcelain/Glass insulators-Classification of porcelain/glass insulator tests – Tests for cap and pin porcelain/Glass insulators.

UNIT-V

High voltage AC testing methods-Power frequency tests-Over voltage tests on insulators, Isolators, Circuit Breakers and power cables

Impulse Testing: Impulse testing of transformers, insulators, Surge diverters, Bushings, cables, circuit breakers.

Text Books

1. E.Kuffel and W.S.Zaengl., "High Voltage Engineering" PergamanPress Oxford, 1984.

2. M.S.Naidu and V.Kamaraju, "High Voltage Engineering"Mc.Graw-Hill Books Co., New Delhi, 2nd edition, 1995.

Reference Books

1. M.S.Naidu and V.Kamaraju, "High Voltage Engineering" Tata McGraw Hill Publishing Company Limited, New Delhi – 2001.

2. KREUGER, F.H., "Discharge Detection in H.V. Equipment", Haywood London – 1964.

I M.TECH-II SEMESTER

Course Code : V18PST21

CUSTOM POWER DEVICES (ELECTIVE – IV)

[L: 3; T: 0; P: 0 (3 credits)]

UNIT- I

Introduction Custom Power and Custom Power Devices - power quality variations in distribution circuits –Voltage Sags, Swells, and Interruptions - System Faults – Over voltages and Under voltages - Voltage Flicker - Harmonic Distortion - Voltage Notching – Transient Disturbances - Characteristics of Voltage Sags.

UNIT-II

Overview of Custom Power Devices Reactive Power and Harmonic Compensation Devices Compensation Devices for Voltage Sags and Momentary Interruptions - Backup Energy Supply Devices – Battery UPS – Super Conducting Magnetic Energy Storage systems – Flywheel – Voltage Source Converter - Multi-level converters.

UNIT-III

Reactive Power and Harmonic Compensation Devices Var control devices - Static Var Compensator – Topologies - Direct Connected Static Var Compensation for Distribution Systems – Static Series Compensator - Static Shunt Compensator (DSTATCOM) – Interaction with Distribution Equipment and System - Installation Considerations.

UNIT- IV

High-Speed Source Transfer Switches, Solid State Limiting, And Breaking Devices: Source Transfer Switch - Static Source Transfer Switch (SSTS) - Hybrid source transfer switch – High-speed mechanical source transfer switch - Solid state current limiter - Solid state breaker.

UNIT-V

Application of Custom Power Devices in Power Systems P-Q theory – Control of P and Q – Dynamic Voltage Restorer (DVR) – Operation and control – Interline Power Flow Controller (IPFC) – Operation and control – Unified Power Quality Conditioner (UPQC) – Operation and control. Recent custom power devices.

Text Books

1. "Guidebook on Custom Power Devices, Technical Report", Published by EPRI, Nov 2000

2. Gerard Ledwich, ArindamGhosh, "Power Quality Enhancement Using Custom Power Devices– Power Electronics and Power Systems", Kluwer Academic Publishers, 2002.

Reference Books

1. C. Shankaran, "Power Quality", CRC Press, 2001.

2. H. Akagiet.al., "Instantaneous power theory and application to power conditioning", IEEE Press, 2007.

3. ArindamGhosh and Gerard Ledwich, "Custom Power Devices - An Introduction", Springer, 2002.

4. Yash Pal et.al.,, "A Review of Compensating Type Custom Power Devices for Power Quality Improvement", Joint International Conference on Power System Technology and IEEE Power India Conference, 2008.POWERCON 2008.

I M.TECH-II SEMESTER

Course Code : V18PST22

EHVAC TRANSMISSION (ELECTIVE – IV)

[L: 3; T: 0; P: 0 (3 credits)]

Unit-1: E.H.V.A.C. Transmission line trends and preliminary aspect standard transmission voltages – Estimation at line and ground parameters - Bundle conductor systems inductance and capacitance of E.H.V. lines – positive, negative and zero sequence impedance.

Unit-2: Electrostatic field and voltage gradients – calculations of electrostatic field of AC lines – effect high electrostatic field on biological organisms and human beings surface voltage gradients and maximum gradients of actual transmission lines

Unit-3: Electrostatic induction in unenergised lines – measurements of field and voltage gradients for three phase single and double circuit lines – unenegised lines. Power Frequency Voltage control and over voltages in EHV lines: No load voltage – charging currents at power frequency - voltage control

Unit 4: shunt and series compensation – static VAR compensation. Corona in E.H.V. lines – Corona loss formulae attention of traveling waves due to Corona – Audio noise due to Corona, its generation, characteristic and limits

Unit 5: Measurements of audio noise radio interference due to Corona RF properties of radio noise – frequency spectrum of RI fields. Design of EHV lines based on steady state and transient limits.

REFERENCES:

1. Rokosh Das Begamudre, “Extra High Voltage AC Transmission Engineering”, Wiley EASTERN LTD., NEW DELHI – 1987.

2. “EHV Transmission line reference Books”, Edison Electric Institution (GEC 1968).

Text Books:

1. Sanjay Sharma,“EHVAC, HVDC Transmission and distribution engineering”, KHANNA PUBLISHERS
2. Schobhitgupta and Deepak Gupta, “EHV AC/DC Transmission”, Genius Publications

I M.TECH-II SEMESTER

Course Code : V18PST23

DEMAND SIDE ENERGY MANAGEMENT (ELECTIVE – IV)

[L: 3; T: 0; P: 0 (3 credits)]

UNIT-I

Energy Audit and Energy management information systems: Energy audit: Definitions-Need-concepts-Types of energy audit;

Energy Economics: Introduction-Cost benefit risk analysis-Payback period-Straight line depreciation-Sinking fund depreciation—Reducing balance depreciation-Net present value method-Internal rate of return method.

UNIT-II

Energy Conservation in Electric utilities and Industry: Electrical load management: Energy and load management devices-Conservation strategies; conservation in electric utilities and industry: Introduction- Energy conservation in utilities by improving load factor-Utility voltage regulation-Energy conservation in Industries.

UNIT-III

Energy –efficient electric motors: Energy efficient motors-construction and technical features-performance characteristics; Economics of EEMs and system: life cycle-direct savings and payback analysis-efficiency factor.

UNIT-IV

Electric Lighting: Introduction-Need for an energy management program-Building analysis-Modification of existing systems- Replacement of existing systems-priorities

Illumination requirement: Task lighting requirements-lighting levels system modifications-non illumination modifications-lighting for non-task areas-reflectance-space geometry; System elements: light sources - characteristics of families of lamps-lamp substitution in an existing systems-selection of Higher efficiency lamps for a new system- Luminaries-ballasts-energy conservation in lighting.

UNIT-V

Space Heating, Ventilation, Air-Conditioning (HVAC) and Water Heating: Introduction-Heating of buildings-Transfer of Heat-Space heating methods-Ventilation and air-conditioning-Insulation-Cooling load- Electric water heating systems-Energy conservation methods.

Co-generation and storage: Combined cycle cogeneration-energy storage: pumped hydro schemes-compressed air energy storage (CAES)-storage batteries-superconducting magnetic energy storage (SMES)

Text Books

1. Wayne C.Turner, “Energy management Hand book”,,John Wiley and sons publications
2. S C Tripathy, “Electric Energy Utilization and Conservation”, Tata McGraw hill publishing company ltd. New Delhi
3. John C.Andreas, “Energy efficient electric motors selection and application”.

Reference Books

1. Amit Kumar Tyagi, “Hand book on Energy Audit and Management”, TERI (Tata energy research Institute)
2. Paul W.O’ Callaghan, “Energy management”, McGraw hill book company
3. Rakosh Das Begamudre, “Energy conversion systems”, New age international publishers

I M.TECH-II SEMESTER

Course Code : V18PST22

H.V.D.C AND FACTS (ELECTIVE – IV)

[L: 3; T: 0; P: 0 (3 credits)]

UNIT-I:H.V.DC Transmission: General consideration, Power Handling Capabilities of HVDC lines, static converter configuration. Static Power Converters: 3 pulse, 6 pulse & 12 pulse converters, converter station and terminal equipment communication process, Rectifier and inverter operation

UNIT-II: Control of HVDC converter and systems: constant current, constant extinction angle and constant ignition angle control. Individual phase control and equidistant firing angle control. Harmonics in HVDC systems, Characteristic and uncharacteristic harmonics-troubles due to harmonics-harmonic filters.

UNIT-III: Converter faults and protection in HVDC systems: Converter faults, over current protection- valve group and DC line protection. Over voltage protection of converters.

UNIT-IV: FACTS concepts, importance of controllable parameters, basic types of FACTS controllers**,** Objectives of shunt compensation, midpoint voltage regulation, voltage instability prevention, improvement of transient stability, methods of controllable var generation, variable impedance type static var generators, switching converter type var generators.

UNIT-V: Concept of series capacitive compensation, improvement of transient stability, power oscillation damping, functional requirements. GTO thyristor controlled series capacitor (GSC), thyristor switched series capacitor (TSSC), and thyristor controlled series capacitor (TCSC), control schemes for GSC, TSSC and TCSC.

Text Books

1. E.W.Kimbark,"Direct current Transmission", Wiely inter Science- New york.
2. J.Arillaga,"H.V.D.C.Tranmission", peter peregrilnus ltd., London UK 1983
3. N.G.Hingorani and L.Guygi, "Understanding FACTS Devices", IEEE Press. Indian Edition is available:— Standard Publications

References Books

1. "EHV Transmission line reference Books", Edison Electric Institution (GEC 1968).
2. K.R.Padiyar,"High Voltage Direct current Transmission", Wiely Eastern Ltd
3. E.Uhlman,"Power Transmission by Direct Current", Springer Verlag, Berlin
4. Sang.Y.H and John.A.T, "Flexible AC Transmission systems", IEEE Press (2006).
5. Vijay K.Sood, "HVDC & FACTS Controllers: applications of static converters in power systems", Springer publishers

I M.TECH-II SEMESTER

Course Code : V18PSL02

POWER SYSTEMS LAB-II

[L: 0; T: 0; P: 4 (2 credits)]

Any 10 of the following experiments are to be conducted

1. Determination of Sequence Impedance of an Alternator by direct method.
2. Determination of break down strength of Transformer oil Testing.
3. Measurement of sequence impedance of a three phase transformer by application of sequence voltage.
4. Power angle characteristics of a salient pole Synchronous Machine.
5. Scott connection of transformer.
6. Determination of equivalent circuit of 3-winding Transformer.
7. Measurement of ABCD parameters on transmission line model.
8. Optimal power flow.
9. Reactive power compensation Br minimization of power loss using PSO
10. State estimation of power systems.

SYLLABUS FOR M.TECH (MACHINE DESIGN)

I M.TECH – I SEMESTER

VI8MAT06	COMPUTATIONAL METHODS IN ENGINEERING	L	P	C
		3	0	3

Unit – I

Introduction to numerical methods applied to engineering problems: Examples, solving sets of equations – Matrix notation – Determinants and inversion – Iterative methods – Relaxation methods – System of non-linear equations. Least square approximation fitting of non-linear curves by least squares –regression analysis- multiple linear regression, non linear regression -computer programs.

Unit – II

Boundry value problems and charecteristic value problems: Shooting method – Solution through a set of equations – Derivative boundary conditions – Rayleigh – Ritz method – Characteristic value problems.

Unit – III

Transformation Techniques: Continuous fourier series, frequency and time domains, laplace transform, fourier integral and transform, discrete fourier transform (DFT), Fast fourier transform (FFT).

Unit – IV

Numerical solutions of partial differential equations: Laplace's equations – Representations as a difference equation – Iterative methods for Laplace's equations – poisson equation – Examples – Derivative boundary conditions – Irregular and non – rectangular grids – Matrix patterns, sparseness – ADI method – Finite element method.

Unit – V

Partial differential equations: Explicit method – Crank-Nickelson method – Derivative boundary condition – Stability and convergence criteria. Solving wave equation by finite differences-stability of numerical method –method of characteristics-wave equation in two space dimensions-computer programs.

TEXT BOOKS:

1. Steven C.Chapra, Raymond P.Canale "Numerical Methods for Engineers" Tata Mc-Graw Hill, 7th edition
2. Curtis F.Gerald, Partick. O.Wheatly," Applied numerical analysis" Addison-Wesley, 1989, 7th edition
3. Douglas J.Faires, Riched Burden"Numerical methods", Brooks/Cole publishing Company, 1998, Second edition

References:

1. Ward Cheney and David Kincaid "Numerical mathematics and computing" Brooks/Cole publishing company1999, Fourth edition.
2. Riley K.F,. M.P.Hobson and Bence S.J,"Mathematical methods for physics and engineering", Cambridge University press, 1999.
3. Kreysis, Advanced Mathematics, 9thedition ,2006

I M.TECH – I SEMESTER

VI8MDT01	ADVANCED MECHANICS OF SOLIDS	L	P	C
		3	0	3

Unit I

Theories of stress and strain, Definition of stress at a point, stress notation, principal stresses, other properties, differential equations of motion of a deformable body, deformation of a deformable body, strain theory, principal strains, strain of a volume element, small displacement theory.

Stress –strain temperature relations: Elastic and non elastic response of a solid, first law of thermodynamics, Hooke's Law, Anisotropic elasticity, Hooke's Law, Isotropic elasticity, initiation of Yield, Yield criteria.

Unit II

Failure criteria: Modes of failure, Failure criteria, Excessive deflections, Yield initiation, fracture, Progressive fracture, (High Cycle fatigue for number of cycles $N > 10^6$, buckling. Application of energy methods: Elastic deflections and statically indeterminate members and structures: Principle of stationary potential energy, Castiglione's theorem on deflections, Castiglione's theorem on deflections for linear load deflection relations, deflections of statically determinate structures.

Unit III

Unsymmetrical bending: Bending stresses in Beams subjected to Nonsymmetrical bending; Deflection of straight beams due to nonsymmetrical bending.

Curved beam theory: Winkler Bach formula for circumferential stress – Limitations – Correction factors –Radial stress in curved beams – closed ring subjected to concentrated and uniform loads-stresses in chain links.

Unit IV

Torsion : Linear elastic solution; Prandtl elastic membrane (Soap-Film) Analogy; Narrow rectangular cross Section ;Hollow thin wall torsion members ,Multiply connected Cross Section.

Unit V

Contact stresses: Introduction; problem of determining contact stresses; Assumptions on which a solution for contact stresses is based; Expressions for principal stresses; Method of computing contact stresses; Deflection of bodies in point contact; Stresses for two bodies in contact over narrow rectangular area (Line contact), Loads normal to area; Stresses for two bodies in line contact, Normal and Tangent to contact area.

Textbooks:

1. Advanced Mechanics of materials by Boresi & Sidebottom-Wiely International, 6th edition.
2. Advanced Mechanics of Solids, L.S Srinath- Tata Mc-Graw Hill, 3rd edition

References:

1. Advanced strength of materials by Den Hortog J.P. , DOVER PUBLICATIONS.INC
2. Theory of plates & shells – Timoshenko, 2nd edition
3. Strength of materials & Theory of structures(Vol I&II)by B.C Punmia, laxmi publications, 9th edition
4. 4. Strength of materials by Sadhu singh, kanna publications , 11th edition, 2014

I M.TECH – I SEMESTER

VI8MDT02	ADVANCED MECHANISMS	L	P	C
		3	0	3

Unit – I: Introduction: Elements of Mechanisms; Mobility Criterion for Planar mechanisms and manipulators; Mobility Criterion for spatial mechanisms and manipulators. Spherical mechanisms-spherical trigonometry.

Unit – II: Advanced Kinematics of plane motion- I: The Inflection circle ; Euler – Savary Equation; Analytical and graphical determination of di ; Bobillier's Construction; Collineastion axis; Hartmann's Construction ;Inflection circle for the relative motion of two moving planes; Application of the Inflection circle to kinematic analysis.

Advanced Kinematics of plane motion - II: Polode curvature; Hall's Equation; Polode curvature in the four bar mechanism; coupler motion; relative motion of the output and input links; Determination of the output angular acceleration and its Rate of change; Freudenstein's collineation –axis theorem; Carter –Hall circle; The circling – point curve for the Coupler of of a four bar mechanism.

Unit – III: Introduction to Synthesis-Graphical Methods - I: The Four bar linkage ;Guiding a body through Two distinct positions; Guiding a body through Three distinct positions; The Rotocenter triangle ; Guiding a body through Four distinct positions; Burmester's curve.

Introduction to Synthesis-Graphical Methods - II: Function generation- General discussion; Function generation: Relative –rotocenter method, Overlay's method, Function generation-Velocity – pole method; Path generation: Hrones's and Nelson's motion Atlas, Roberts's theorem.

Unit – IV: Introduction to Synthesis-Analytical Methods: Function Generation: Freudenstien's equation, Precision point approximation, Precision – derivative approximation; Path Generation: Synthesis of Four-bar Mechanisms for specified instantaneous condition; Method of components; Synthesis of Four-bar Mechanisms for prescribed extreme values of the angular velocity of driven link; Method of components.

Unit – V: Manipulator kinematics : D-H transformation matrix ; Direct and Inverse kinematic analysis of Serial manipulators: Articulated, spherical & industrial robot manipulators- PUMA, SCARA,STANFORD ARM, MICROBOT.

Text Books:

1. Jeremy Hirschhorn, Kinematics and Dynamics of plane mechanisms,McGraw-Hill,1962.
2. L.Sciavicco and B.Siciliano, Modelling and control of Robot manipulators, Second edition , Springer -Verlag,London,2000.
3. Amitabh Ghosh and Ashok Kumar Mallik, Theory of Mechanisms and Machines. E.W.P.Publishers.

Reference Books:

1. Allen S.Hall Jr., Kinematics and Linkage Design, PHI,1964.
2. J.E Shigley and J.J . Uicker Jr., Theory of Machines and Mechanisms , McGraw-Hill, 1995.
3. Joseph Duffy, Analysis of mechanisms and Robot manipulators, Edward Arnold, 1980

I M.TECH – I SEMESTER

VI8MDT03	MECHANICAL VIBRATIONS	L	P	C
		3	0	3

Unit I

Single degree of Freedom systems: Undamped and damped free vibrations: forced vibrations ; coulomb damping; Response to harmonic excitation; rotating unbalance and support excitation, Vibration isolation and transmissibility, Vibrometers, velocity meters & accelerometers.

Unit II

Response to Non Periodic Excitations: unit Impulse, unit step and unit Ramp functions; response to arbitrary excitations, The Convolution Integral; shock spectrum; System response by the Laplace Transformation method.

Unit III

Multi degree freedom systems: Principal modes – undamped and damped free and forced vibrations ; undamped vibration absorbers, Matrix formulation, stiffness and flexibility influence coefficients; Eigen value problem; normal modes and their properties; Free and forced vibration by Modal analysis; Method of matrix inversion; Torsional vibrations of multi – rotor systems and geared systems; Discrete-Time systems.

Unit IV

Numerical Methods: Rayliegh's, stodola's, Matrix iteration, Rayleigh-Ritz Method and Holzer's methods

Unit V

Application of concepts: Free vibration of strings – longitudinal oscillations of bars- transverse vibrations of beams- Torsional vibrations of shafts. Critical speeds without and with damping, secondary critical speed.

Text books:

1. Elements of Vibration Analysis by Meirovitch. 2nd edition Tata Mc Graw Hill
2. Mechanical Vibrations by G.K. Groover. 2009 8th edition

References:

1. Vibrations by W.T. Thomson,1961
2. Mechanical Vibrations – Schaum series., Mc Graw Hill 1996
3. Vibration problems in Engineering by S.P. Timoshenko. 5th editon, 1990
4. Mechanical Vibrations–V.Ram Murthy. Alpha Science International, 2000

I M.TECH – I SEMESTER

VI8MDT04	DESIGN OF AUTOMOBILE SYSTEMS (ELECTIVE-I)	L	P	C
		3	0	3

UNIT I

Conceptual design of automobiles: body shape definition based on aerodynamic structure safety, sub - systems integration considerations, road load analysis, transmission of road loadsto structure.

UNTI II

Detail design of structural elements, load analysis for different vehicles, safety consideration, design for bending, torsion conditions, criteria for toppling, based on cornering loads.

UNIT III

Suspension system integration with vehicle for ride comfort, methods of mounting suspension and power train systems.

UNIT IV

Driver cabin/seat design, design of control systems based on ergonomics, anthropometry, human factors engineering considerations.

UNIT V

Safety aspects of automobiles, devices, energy absorbing systems, crash worthiness, legislation relating to safety, vehicle performance requirements, sub systems packaging and verification of vehicle performance through testing(lab, field testing).

TEXT BOOKS

1. 1 Donald E.Males, Fundamentals of automobile body structure design(R-394), 2011 SAE international
2. W.F.Milliker, D.L.Milliker,Maurice Olly, Chassis design: principles an analysis
3. (R-206) 2002 SAE international
4. 3. J.H Smith, Modern Vehicle System Design, 2001

I M.TECH – I SEMESTER

VI8MDT05	PRODUCT DESIGN (ELECTIVE-I)	L	P	C
		3	0	3

UNIT- I

Introduction -Need for IPPD – strategic importance of product development – integration of customer, designer, material supplier and process planner, Competitor and costumer – behavior analysis. Understanding customer – promoting customer understanding – involve customer in development and managing requirements – Organization – process management and improvement – Plan and establish product specification.

UNIT - II

CONCEPT GENERATION AND SELECTION: Task – Structured approaches – Clarification – Search – Externally and internally – explore systematically – reflect on the solutions and process – concept selection – methodology – benefits.

PRODUCT ARCHETECTURE: Implications – Product change – variety – component standardization – product performance – manufacturability.

UNIT - III

PRODUCT DEVELOPMENT MANAGEMENT: Establishing the architecture – creation – clustering – geometric layout development – fundamental and incidental interactions – related system level design issues – secondary systems – architecture of the chunks – creating detailed interface specifications.

INDUSTRIAL DESIGN: Integrate process design – Managing costs – Robust design – Integrating CAE, CAD, CAM tools – simulating product performance and manufacturing processing electronically – Need for industrial design – impact – design process.

UNIT - IV

Investigation of customer needs – conceptualization – refinement – management of the industrial design process – technology driven products – user – driven products – assessing the quality of industrial design.

UNIT - V

DESIGN FOR MANUFACTURING AND PRODUCTY DEVELOPMENT: Definition – Estimation of manufacturing cost – reducing the component costs and assembly costs – Minimize system complexity. Prototype basics – Principles of prototyping – planning for prototypes – Economics analysis – Understanding and representing tasks – baseline project planning – accelerating the project execution.

TEXT BOOKS:

1. Product Design and Development / Kari T. Ulrich and Steven D. Eppinger / McGraw Hill International Edns. 1999.5th edition
2. Concurrent Engg/integrated Product development / Kemnneth Crow / DRM Associates, 26/3, Via Olivera, Palos Verdes, CA 90274(310)377-569, Workshop Book.

REFERENCES:

1. Effective Product Design and Development / Stephen Rosenthal / Business One Orwin, Homewood, 1992, ISBN, 1-55623-603-4.
2. Tool Design–Integrated Methods for Successful Product Engineering / Staurt Pugh / Addsion Wesley Publishing, Neyourk, NY, 1991, ISBN 0-202-41369-5.
3. Production and Operations Management/Chase/TMH, 8th edition, 1997

I M.TECH – I SEMESTER

VI8MDT06	GEOMETRIC MODELING (ELECTIVE-I)	L	P	C
		3	0	3

Unit - I

Cubic spline –I Definition, Explicit and implicit equations, parametric equations, Algebraic and geometric form of cubic spline, Hermite cubic spline, tangent vectors, parametric space of a curve, blending functions.

Unit - II

Cubic Splines-II:

four point form, reparametrization, truncating and subdividing of curves. Graphic construction and interpretation, composite pc curves.

Bezier Curves: Bernstein basis, equations of Bezier curves, properties, derivatives.

Unit - III

B-Spline Curves: B-Spline basis, equations, knot vectors, properties, and derivatives.

Unit – IV

Surfaces: Bicubic surfaces, Coon's surfaces, Bezier surfaces, B-Spline surfaces, surfaces of revolutions, Sweep surfaces, ruled surfaces, tabulated cylinder, bilinear surfaces, Gaussian curvature.

Unit – V

Solids: Tricubic solid, Algebraic and geometric form.

Solid modeling concepts: Wire frames, Boundary representation, Half space modeling, spatial cell, cell decomposition, classification problem.

TEXT BOOKS:

1. Elements of Computer Graphics by Roger & Adams Tata McGraw Hill. 2nd edition
2. Geometric Modeling by Micheal E. Mortenson, McGraw Hill Publishers, 3rd edition

REFERENCES:

1. Computer Aided Design and Manufacturing, K.Lalit Narayan, K.Mallikarjuna Rao, MMM Sarcar, PHI Publishers

I M.TECH – I SEMESTER

VI8MDT07	NON-DESTRUCTIVE EVALUATION (ELECTIVE-I)	L	P	C
		3	0	3

UNIT – I

General Methods: Flaw Detection Using Dye Penetrants. Magnetic Particle Inspection introduction to electrical impedance, Principles of Eddy Current testing, Flaw detection using eddy currents

UNIT – II

X-Ray Radiography: The Radiographic process, X-Ray and Gamma-ray sources, Geometric Principles, Factors Governing Exposure, Radio graphic screens, Scattered radiation, Arithmetic of exposure, Radiographic image quality and detail visibility, Industrial X-Ray films, Fundamentals of processing techniques, Process control, The processing Room, Special Processing techniques, Paper Radiography, Sensitometric characteristics of x-ray films, Film graininess signal to noise ratio in radiographs, The photographic latent image, Radiation Protection,

UNIT – III

Generation of ultrasonic waves, Horizontal and shear waves, Near field and far field acoustic wave description, Ultrasonic probes- straight beam, direct contact type, Angle beam, Transmission/reflection type, and delay line transducers, acoustic coupling and media, Transmission and pulse echo methods, A-scan, B-scan, C-scan, F-scan and P-scan modes, Flaw sizing in ultrasonic inspection: AVG, Amplitude, Transmission, TOFD, Satellite pulse, Multi-modal transducer, Zonal method using focused beam. Flow location methods, Signal processing in Ultrasonic NDT; Mimics, spurious echos and noise. Ultrasonic flaw evaluation.

UNIT – IV

Holography: Principles and practices of Optical holography, acoustical, microwave, x-ray and electron beam holography techniques.

UNIT – V

Applications: NDT in flaw analysis of Pressure vessels, piping, NDT in Castings, Welded constructions, etc., Case studies.

TEXT BOOKS:

1. Ultrasonic testing by Krautkramer and Krautkramer, 4th edition Springer.
2. Ultrasonic inspection to Training for NDT : E. A. Gingel, Prometheus Press,2006.
3. Metals and alloys, ASTM Standards, Vol 3.01

I M.TECH – I SEMESTER

VI8MDT08	FRACTURE MECHANICS (ELECTIVE-II)	L	P	C
		3	0	3

UNIT-I

Introduction: Prediction of mechanical failure. Macroscopic failure modes; brittle and ductile behavior. Fracture in brittle and ductile materials – characteristics of fracture surfaces; inter-granular and intra-granular failure, cleavage and micro-ductility, growth of fatigue cracks, The ductile/brittle fracture transition temperature for notched and unnotched components. Fracture at elevated temperature.

UNIT-II

Griffiths analysis: Concept of energy release rate, G, and fracture energy, R. Modification for ductile materials, loading conditions. Concept of R curves.

Linear Elastic Fracture Mechanics, (LEFM). Three loading modes and the state of stress ahead of the crack tip, stress concentration factor, stress intensity factor and the material parameter the critical stress intensity factor, crack tip plasticity, effect of thickness on fracture toughness.

UNIT-III

Elastic-Plastic Fracture Mechanics; (EPFM). The definition of alternative

failure prediction parameters, Crack Tip Opening Displacement, and the J integral. Measurement of parameters and examples of use.

UNIT-IV

Fatigue: definition of terms used to describe fatigue cycles, High Cycle Fatigue, Low Cycle Fatigue, mean stress R ratio, strain and load control. S-N curves. Goodmans rule and Miners rule. Micromechanisms of fatigue damage, fatigue limits and initiation and propagation control, leading to a consideration of factors enhancing fatigue resistance. Total life and damage tolerant approaches to life prediction.

UNIT-V

Creep deformation: the evolution of creep damage, primary, secondary and tertiary creep. Micro-mechanisms of creep in materials and the role of diffusion. Ashby creep deformation maps. Stress dependence of creep – power law dependence. Comparison of creep performance under different conditions – extrapolation and the use of Larson-Miller parameters. Creep-fatigue interactions,Examples

TEXT BOOKS

1. T.L. Anderson, Fracture Mechanics Fundamentals and Applications, 2nd Ed. CRC press, (1995)
2. B. Lawn, Fracture of Brittle Solids, Cambridge Solid State Science Series 2nd ed1993. 3. J.F. Knott, Fundamentals of Fracture Mechanics, Butterworths (1973)
3. J.F. Knott, P Withey, Worked examples in Fracture Mechanics, Institute of Materials. 5. H.L.Ewald and R.J.H. Wanhill Fracture Mechanics, Edward Arnold, (1984).
4. S. Suresh, Fatigue of Materials, Cambridge University Press, (1998)
5. L.B. Freund and S. Suresh, Thin Film Materials Cambridge University Press,(2003). 8. G. E. Dieter, Mechanical Metallurgy, McGraw Hill, (1988)
6. D.C. Stouffer and L.T. Dame, Inelastic Deformation of Metals, Wiley (1996)
7. F.R.N. Nabarro, H.L. deVilliers, The Physics of Creep, Taylor and Francis, (1995)

I M.TECH – I SEMESTER

VI8MDT09	GEAR ENGINEERING (PSG Design data Book is allowed) (ELECTIVE-II)	L	P	C
		3	0	3

UNIT – I

Introduction: Principles of gear tooth action, Generation of Cycloid and Involute gears, Involutometry, gear manufacturing processes and inspection, gear tooth failure modes, stresses, selection of right kind of gears.

UNIT – II

Spur Gears, Helical gears, Bevel gears and worm gears, Tooth loads, Principles of Geometry, Design considerations and methodology, Complete design of spur gear teeth considering Lewis beam strength, Buckingham's dynamic load and wear load, Design of gear shaft and bearings.

UNIT –III

Gear trains: Simple, compound and epicyclic gear trains, Ray diagrams, Design of a gear box of an automobile, Design of gear trains from the propeller shafts of airplanes for auxiliary systems.

UNIT – IV

Gear failures

Analysis of gear tooth failures, Nomenclature of gear tooth wear and failure, tooth breakage, pitting, scoring, wear, overloading, gear-casing problems, lubrication failures

UNIT – V

Optimal Gear design: Optimization of gear design parameters, Weight minimization, Constraints in gear train design-space, interference, strength, dynamic considerations, rigidity etc. Compact design of gear trains, multi objective optimization of gear trains. Application of Traditional and non-traditional optimization techniques

TEXT BOOKS:

1. Maleev and Hartman, Machine Design, C.B.S. Publishers, India.6th edition 2015
2. Henry E.Merrit,Gear engineering ,Wheeler publishing,Allahabad,1992.
3. Practical Gear design by Darle W. Dudley,first edition McGraw-Hill book company

REFERENCES:

1. Earle Buckingham, Analytical mechanics of gears, Dover publications, New York, 1949.
2. G.M.Maitha, Hand book of gear design, Tata Mc.Graw Hill publishing company Ltd., New Delhi, 1994.

I M.TECH – I SEMESTER

VI8MDT10	DESIGN FOR MANUFACTURING AND ASSEMBLY (ELECTIVE-II)	L	P	C
		3	0	3

UNIT - I

Introduction to DFM, DFMA: How Does DFMA Work? Reasons for Not Implementing DFMA, What Are the Advantages of Applying DFMA During Product Design?, Typical DFMA Case Studies, Overall Impact of DFMA on Industry.

Design for Manual Assembly: General Design Guidelines for Manual Assembly, Development of the Systematic DFA Methodology, Assembly Efficiency, Effect of Part Symmetry, Thickness, Weight on Handling Time, Effects of Combinations of Factors, Application of the DFA Methodology.

UNIT - II

Machining processes: Overview of various machining processes-general design rules for machining-dimensional tolerance and surface roughness-Design for machining – ease – redesigning of components for machining ease with suitable examples. General design recommendations for machined parts.

UNIT - III

Metal casting: Appraisal of various casting processes, selection of casting process,-general design considerations for casting-casting tolerance-use of solidification, simulation in casting design-product design rules for sand casting.

Extrusion & Sheet metal work: Design guide lines extruded sections-design principles for punching, blanking, bending, deep drawing-Keeler Goodman forging line diagram – component design for blanking.

UNIT - IV

Metal joining: Appraisal of various welding processes, factors in design of weldments – general design guidelines-pre and post treatment of welds-effects of thermal stresses in weld joints-design of brazed joints. Forging: Design factors for forging – closed die forging design – parting lines of dies – drop forging die design – general design recommendations.

UNIT – V

Design for Assembly Automation: Fundamentals of automated assembly systems, System configurations, parts delivery system at workstations, various escapement and placement devices used in automated assembly systems, Quantitative analysis of Assembly systems, Multi station assembly systems, single station assembly lines.

TEXT BOOKS:

1. Design for manufacture, John cobert, Adisson Wesley. 1995
2. Design for Manufacture and assembly by Boothroyd,3rd edition CRC press
3. Design for manufacture, James Bralla, 2nd edition Mc Graw Hill

REFERENCE:

1. ASM Hand book Vol.20, Taylor & Francis 1997

I M.TECH – I SEMESTER

VI8MDT11	CONTINUUM MECHANICS (ELECTIVE-II)	L	P	C
		3	0	3

UNIT – I

Tensor calculus:

Tensor calculus, Multi linear forms, Definition of Tensor over including vector spaces, Alternating tensors, determinants, orientation, tensor products, kinematics of deformations and motion, strain analysis, rotation of tensors, calculations of tensors, internal calculations of tensors and integral identities.

UNIT – II

Eulerian and Lagrangian description of a continuous, discrete systems, continua, physical quantities and their derivatives. Rigid body motion, Relation between continuum models and real materials.

UNIT – III

Conservation laws in a continuum: Mass conservation in Lagrangen and Eulerian frames, Conservation of momentum in Lagrangen and Eulerian frames.

UNIT – IV

Conservation in angular momentum in lagrengian form. Conservation of energy in in Lagrangen and Eulerian frames.Strain and decomposition. Finite deformation, infinitesimal displacements

UNIT - V

Material frame indifference, Elastic Materials, Viscous fluids, linear visco-elasticity, case studies for metals and polymers.

TEXT BOOK

1. Continuous mechanics, George Backus, Samizdat Press, 1997

REFERENCES:

1. Mechanics of Continua, A.C. Eringan, 1962
2. Continuous Physics, Vol. 1, A.C. Eringan, 1967, Academic press
3. Introduction to Continuous Mechanics, B.L.N. Kennett, Cambridge, 1st edition 2001
4. Quick introduction to Tensor analysis, R.Sharipov, 2004, Samizdat Press.
5. Non-linear continuum mech-win, SEACAS theory manuals part II, T.A.Laursen, S.W.Attaway and R.I.Zadoks

I M.TECH – I SEMESTER

		L	P	C
VI8MDL01	**MACHINE DYNAMICS LABORATORY**	**0**	**4**	**2**

EXPERIMENTS:

1. Determination of damped natural frequency of vibration of the vibrating system with different viscous oils.
2. Determination of steady state amplitude of a forced vibratory system.
3. Static balancing using steel balls & Determination of the magnitude and orientation of the balancing mass in dynamic balancing.
4. Field balancing of the thin rotors using vibration pickups.
5. Determination of the magnitude of gyroscopic couple, angular velocity of precession, and representation of vectors.
6. Determination of natural frequency of given structure using FFT analyzer.
7. Diagnosis of a machine using FFT analyzer.
8. Direct kinematic analysis of a robot.
9. Inverse kinematic analysis of a robot.
10. An experiment on friction, wear, pin-on-disc.
11. An experiment on stress intensity factors/fatigue, fracture.
12. Modal analysis of beams and plates.

I M.TECH – II SEMESTER

VI8MDT12	OPTIMIZATION AND RELIABILITY	L	P	C
		3	0	3

UNIT - I

CLASSICAL OPTIMIZATION TECHNIQUES: Single variable optimization with and without constraints, multi – variable optimization without constraints, multi – variable optimization with constraints – method of Lagrange multipliers, Kuhn-Tucker conditions, merits and demerits of classical optimization techniques.

UNIT - II

NUMERICAL METHODS FOR OPTIMIZATION: Nelder Mead's Simplex search method, Gradient of a function, Steepest descent method, Newton's method, Pattern search methods, conjugate method, types of penalty methods for handling constraints, advantages of numerical methods.

UNIT - III

GENETIC ALGORITHM (GA) : Differences and similarities between conventional and evolutionary algorithms, working principle, reproduction, crossover, mutation, termination criteria, different reproduction and crossover operators, GA for constrained optimization, draw backs of GA,

GENETIC PROGRAMMING (GP): Principles of genetic programming, terminal sets, functional sets, differences between GA & GP, random population generation, solving differential equations using GP.

MULTI-OBJECTIVE GA: Pareto's analysis, Non-dominated front, multi – objective GA, Non-dominated sorted GA, convergence criterion, applications of multi-objective problems .

UNIT – IV

APPLICATIONS OF OPTIMIZATION IN DESIGN AND MANUFACTURING SYSTEMS: Some typical applications like optimization of path synthesis of a four-bar mechanism, minimization of weight of a cantilever beam, optimization of springs and gears, general optimization model of a machining process, optimization of arc welding parameters, and general procedure in optimizing machining operations sequence.

UNIT V

RELIABILITY: Concepts of Engineering Statistics, risk and reliability, probabilistic approach to design, reliability theory, design for reliability, numerical problems, hazard analysis.

TEXT BOOKS:

1. Optimization for Engineering Design – Kalyanmoy Deb, PHI Publishers, 2nd edition
2. Engineering Optimization – S.S.Rao, New Age Publishers, 3rd edition
3. Reliability Engineering by L.S.Srinath, 3rd edition.2005, East West publications
4. Multi objective genetic algorithm by Kalyanmoy Deb, 2nd edition PHI Publishers, 2012

REFERENCES:

1. Genetic algorithms in Search, Optimization, and Machine learning – D.E.Goldberg, Addison-Wesley Publishers
2. Optimal design – Jasbir Arora, Mc Graw Hill (International) Publishers, 4th edition 2017
3. An Introduction to Reliability and Maintainability Engineering by CE Ebeling, Waveland Printers Inc.,8th edition 2007
4. Reliability Theory and Practice by I Bazovsky, Dover Publications, 2013

I M.TECH – II SEMESTER

VI8MDT13	THEORY OF PLASTICITY (ELECTIVE-IV)	L	P	C
		3	0	3

UNIT-I

Introduction: Modeling Uniaxial behavior in Plasticity. Index notation, Cartesian tensors.

Yield and failure criteria Stress, stress deviator tensors. Invariants, principal, mean stresses. Elastic strain energy. Mohr's representation of stress in 2 & 3 dimensions. Haigh-Westergaard stress space. Equilibrium equations of a body. Yield criteria: Tresca's, von Mises rules, Drucker-Prager criterion, anisotropic yield criteria.

Strain at point: Cauchy's formulae for strains, principal strains, principal shear strains, derivative strain tensor. Strain-displacement relationships. Linear elastic stress strain relations, Generalized Hooke's law, nonlinear elastic stress strain relations

UNIT – II

Principle of virtual work and its rate forms: Drucker's stability postulate, normality, convexity and uniqueness for an elastic solid. Incremental stress strain relations.

Criteria for loading and unloading: Elastic and plastic strain increment tensors, Plastic potential and flow rule associated with different Yield criteria, Convexity, normality and uniqueness considerations for elastic–plastic materials. Expansion of a thick walled cylinder.

UNIT – III

Incremental stress strain relationships: Prandtl-Reuss material model. J_2 deformation theory, Drucker-Prager material, General Isotropic materials.

Deformation theory of plasticity: Loading surface, Hardening rules. Flow rule and Druckers stability postulate. Concept of effective stress and effective strain, mixed hardening material. Problems.

UNIT – IV

Finite element formulation for an elastic plastic matrix: Numerical algorithms for solving non linear equations, Convergence criteria, Numerical implementations of the elastic plastic incremental constitutive relations

UNIT – V

Bounding surface theory: Uniaxial and multiaxial loading anisotropic material behaviour Theroms of limit analysis: Statically admissible stress field and kinematically admissible velocity field. Upper and lower bound theorms, examples and problems.

TEXT BOOK:

1. Plasticity for structural engineering W.F.Chen s and D.J.Han, J. Ross Publishing, 2007

REFERENCES:

1. Mechanics of Materials –II, Victor E. Saouma.
2. Theory of plasticity, Sadhu Singh Khanna publications

I M.TECH – II SEMESTER

VI8MDT14	FINITE ELEMENT METHOD	L	P	C
		3	0	3

UNIT - I

Formulation Techniques: Methodology, Engineering problems and governing differential equations, finite elements. Variational methods-potential energy method, Raleigh Ritz method, strong and weak forms, Galerkin and weighted residual methods, calculus of variations, Essential and natural boundary conditions.

UNIT – II

One-dimensional elements: Bar, trusses, beams and frames, displacements, stresses and temperature effects.

UNIT – III

Two dimensional problems: CST, LST, four noded and eight nodded rectangular elements, Lagrange basis for triangles and rectangles, serendipity interpolation functions. Axisymmetric Problems: Axisymmetric formulations, Element matrices, boundary conditions. Heat Transfer problems: Conduction and convection, examples: - two-dimensional fin.

UNIT – IV

Isoparametric formulation: Concepts, sub parametric, super parametric elements, numerical integration, Requirements for convergence, h-refinement and p-refinement, complete and incomplete interpolation functions, pascal's triangle, Patch test.

UNIT – V

Finite elements in Structural Analysis: Static and dynamic analysis, eigen value problems, and their solution methods, case studies using commercial finite element packages.

TEXT BOOK:

1. Finite element methods by Chandrubatla & Belagondu.4th edition, 2011

REFERENCES:

1. J.N. Reddy, Finite element method in Heat transfer and fluid dynamics, CRC press, 1994
2. Zienckiwicz O.C. & R. L. Taylor, Finite Element Method, McGraw-Hill,1983.
3. 3. K. J. Bathe, Finite element procedures, Prentice-Hall, 1996

I M.TECH – II SEMESTER

VI8MDT15	DESIGN WITH ADVANCED MATERIALS	L	P	C
		3	0	3

Unit – I

Fundamentals of material science: Elasticity in metals, mechanism of plastic deformation, slip twinning, role of dislocations, yield stress, shear strength of perfect and real crystals, strengthening mechanism, work hardening, solid solution, grain boundary strengthening, Poly phase mixture, precipitation, particle, fiber and dispersion strengthening, effect of temperature, strain and strain rate on plastic behavior, super plasticity. Yield criteria: Von mises and Tresca criteria.

Unit – II

Motivation of selection, cost basis and service requirements, selection for mechanical properties, strength, toughness, fatigue, impact and creep, use of material property charts for material selection.

Unit – III

Modern metallic Materials: Dual phase steels, micro alloyed steels, high strength low alloy (HSLA) Steel, maraging steel, intermetalics, Ni and Ti aluminides, super alloys.

Unit – IV

Non metallic materials: Polymeric materials and their molecular structures, production techniques for fibers, foams, adhesives and coatings, structure, properties and applications of engineering polymers. composites; Introduction, reinforcement, types of composite materials, -properties, processing and application of composite materials.

Unit – V

Properties, structure and applications of Smart materials, shape memory alloys, metallic glass, quasi crystal and nano crystalline materials, ceramic materials, ceremets, high temperature materials, refractory materials.

TEXT BOOKS:

1. Mechanical behavior of materials/Thomas H. Courtney/2nd Edition, McGraw-Hill, 2000
2. Mechanical Metallurgy/George E.Dieter/McGraw Hill, 1998
3. Material selction in mechanical design by M.F Ashby. Bott

REFERENCES:

1. Selection and use of Engineering Materials 3rd edition /Charles J.A/Butterworth Heiremann.
2. Material science and metallurgy by VD Kodgire 2017

I M.TECH – II SEMESTER

VI8MDT16	TRIBOLOGY (ELECTIVE- III)	L	P	C
		3	0	3

UNIT – I

Introduction: Nature of surfaces and contact-Surface topography-friction and wear mechanisms, wear maps, effect of lubricants- methods of fluid film formation.

Lubrication: Choice of lubricants, types of oil, Grease and solid lubricants-additives-lubrication systems and their selection.

UNIT – II

Selection of rolling element bearings: Nominal life, static and dynamic capacity-Equivalent load, probabilities of survival- cubic mean load- bearing mounting details, pre loading of bearings, conditioning monitoring using shock pulse method.

UNIT – III

Hydrostatic Bearings: Thrust bearings – pad coefficients- restriction- optimum film thickness-journal bearings – design procedure –Aerostatic bearings; Thrust bearings and Journal bearings – design procedure.

UNIT – IV

Hydrodynamic bearings: Fundamentals of fluid formation – Reynold's equation; Hydrodynamic journal bearings – Sommerfield number- performance parameters – optimum bearing with maximum load capacity – Friction – Heat generated and Heat dissipated. Hydrodynamic thrust bearings; Raimondi and Boyd solution for hydrodynamic thrust bearings-fixed tilting pads, single and multiple pad bearings-optimum condition with largest minimum film thickness.

UNIT – V

Seals: different type-mechanical seals, lip seals, packed glands, soft piston seals, Mechanical piston rod packing, labyrinth seals and throttling bushes, oil flinger rings and drain grooves – selection of mechanical seals.

Failure of Tribological components: Failure analysis of plain bearings, rolling bearings, gears and seals, wear analysis using soap and Ferrography.

Dry rubbing Bearings: porous metal bearings and oscillatory journal bearings – qualitative approach only.

TEXT BOOKS:

1. Rowe WW& O' Dionoghue,"Hydrostatic and Hybrid bearing design" Butter worths & Co.Publishers Ltd,1983.
2. Collacott R.A," Mechanical Fault diagnosis and condition monitoring", Chapman and Hall, London 1977.
3. Bernard J.Hamrock, " Fundamentals of fluid film lubricant", Mc Graw-Hill Co.,1994.

REFERENCES:

1. Neale MJ, (Editor) " Tribology hand Book"Neumann Butterworths, 1975.
2. Connor and Boyd JJO (Editors) " Standard hand book of lubrication engineers " ASLE,Mc Graw Hill Book & Co.,1968
3. Shigley J, E Charles," Mechanical Engineering Design", McGraw Hill Co., 1989

I M.TECH – II SEMESTER

VI8MDT17	SIGNAL ANALYSIS AND CONDITION MONITORING (ELECTIVE- III)	L	P	C
		3	0	3

UNIT-I

Introduction, Basic concepts. Fourier analysis. Bandwidth. Signal types. Convolution.

Signal analysis: Filter response time. Detectors. Recorders. Analog analyzer types.

UNIT-II

PRACTICAL ANALYSIS OF STATIONARY SIGNALS: Stepped filter analysis. Swept filter analysis. High speed analysis. Real-time analysis.

UNIT-III

PRACTICAL ANALYSIS OF CONTINUOUS NON-STATIONARY SIGNALS: Choice of window type. Choice of window length. Choice of incremental step. Practical details. Scaling of the results.

UNIT-IV

PRACTICAL ANALYSIS OF TRANSIENTS: Analysis as a periodic signal. Analysis by repeated playback (constant bandwidth). Analysis by repeated playback (variable bandwidth).

UNIT-V

CONDITION MONITORING IN REAL SYSTEMS: Diagnostic tools. Condition monitoring of two stage compressor. Cement mill foundation. I.D. fan. Sugar centrifugal. Cooling tower fan. Air separator. Preheater fan. Field balancing of rotors. ISO standards on vibrations, active, passive hybrid methods of condition monitoring

TEXT BOOK:

1. Mechanical Fault diagnosis and condition monitoring by R. A .Collacott, Chapman and Hall, 1977

REFERENCES:

1. Frequency Analysis by R.B.Randall.3rd edition 2011
2. Mechanical Vibrations Practice with Basic Theory by V. Ramamurti, Narosa Publishing House.
3. Theory of Machines and Mechanisms by Amitabh Ghosh & AK Malik2nd edition, EWP

I M.TECH – II SEMESTER

VI8MDT18	COMPUTATIONAL FLUID DYNAMICS (ELECTIVE- III)	L	P	C
		3	0	3

UNIT – I

Introduction: Finite difference method, finite volume method, finite element method, governing equations and boundary conditions. Derivation of finite difference equations.

Solution methods: Solution methods of elliptical equations – finite difference formulations, interactive solution methods, direct method with Gaussian elimination.

Parabolic equations-explicit schemes and Von Neumann stability analysis, implicit schemes, alternating direction implicit schemes, approximate factorization, fractional step methods, direct method with tridiagonal matrix algorithm.

UNIT – II

Hyperbolic equations: explicit schemes and Von Neumann stability analysis, implicit schemes, multi step methods, nonlinear problems, second order one-dimensional wave equations.

Burgers equations: Explicit and implicit schemes, Runge-Kutta method.

UNIT – III

Formulations of incompressible viscous flows: Formulations of incompressible viscous flows by finite difference methods, pressure correction methods, vortex methods.

Treatment of compressible flows: potential equation, Eluer equations, Navier-stokes system of equations, flow field-dependent variation methods, boundary conditions, example problems.

UNIT – IV

Finite volume method: Finite volume method via finite difference method, formulations for two and three-dimensional problems.

UNIT – V

Standard variational methods: Linear fluid flow problems, steady state problems, Transient problems.

TEXT BOOK:

1. Computational fluid dynamics, T. J.Chung, Cambridge University press, 2nd edition 2002.

REFERENCE:

1. Text book of fluid dynamics, Frank Chorlton, CBS Publishers &distributors, 1985.

I M.TECH – II SEMESTER

VI8MDT19	**DESIGN SYNTHESIS (ELECTIVE- III)**	**L**	**P**	**C**
		3	**0**	**3**

UNIT – I

Design process and methodologies of systematic design conceptual design variants and evaluation; Standardization and its exploitation in design.

UNIT – II

Tolerance from process and function; interchangeability and selective assembly; selection of fits for different design situations, surface finish. Load transmission, load equalization lightweight and rigid constructions.

UNIT – III

Design of cast forged sheet metal parts and welded constructions Machining considerations.

UNIT – IV

Design for assembly and dismantling; Modular constructions erection, operation inspection and maintenance considerations; Ergonomics Design of accuracy; Location pins and registers, Machining in assembly, adjustment, Backlash and Clearance adjustment.

UNIT – V

Problems formulation for design optimization Example illustration the various principles available design variants for some of the common basic functional requirements.

TEXT BOOK:

1. Engineering Design a material and processing approach/ George Dieter/ McGraw Hill international book company 5th edition 2012

REFERENCES:

1. Engineering Design a systematic approach/ G. Phal W. Beitz/ Springer /3rd Edition
2. Mechanical Design Theory Methodology/ Manjula B. Waldron and Kenneth J. Waldron/ Springer Verlag New York 1996.

I M.TECH – II SEMESTER

VI8MDT20	PRESSURE VESSEL DESIGN (ELECTIVE-IV)	L	P	C
		3	0	3

UNIT – I

Introduction: Materials-shapes of Vessels-stresses in cylindrical, spherical and arbitrary, shaped shells. Cylindrical Vessels subjected to internal pressure, wind load, bending and torque for computation of pressure vessels-conical and tetrahedral vessels.

UNIT – II

Theory of thick cylinders: Shrink fit stresses in built up cylinders-auto frettage of thick cylinders. Thermal stresses in Pressure Vessels.

UNIT – III

Theory of rectangular plates: Pure bending-different edge conditions.

Theory circular plates: Simple supported and clamped ends subjected to concentrated and uniformly distributed loads-stresses from local loads. Design of dome bends, shell connections, flat heads and cone openings.

UNIT – IV

Discontinuity stresses in pressure vessels: Introduction, beam on an elastic foundation, infinitely long beam, semi infinite beam, cylindrical vessel under axially symmetrical loading, extent and significance of load deformations on pressure vessels, discontinuity stresses in vessels, stresses in a bimetallic joints, deformation and stresses in flanges.

UNIT – V

Pressure vessel materials and their environment: Introduction, ductile material tensile tests, structure and strength of steel, Leuder's lines, determination of stress patterns from plastic flow observations, behaviour of steel beyond the yield point, effect of cold work or strain hardening on the physical properties of pressure vessel steels, fracture types in tension, toughness of materials, effect of neutron irradiation of steels, fatigue of metals, fatigue crack growth, fatigue life prediction, cumulative fatigue damage, stress theory of failure of vessels subject to steady state and fatigue conditions.

TEXT BOOKS:

1. Theory and design of modern Pressure Vessels by John F.Harvey, Van nostrand Reihold Company, New York., 1980
2. Pressure Vessel Design and Analysis by Bickell, M.B.Ruizcs.,2009

REFERENCES:

1. Process Equipment design- Beowll & Yound Ett, WILEY 2009
2. Pressure Vessel Design Hand Book, Henry H.Bednar, P.E., C.B.S.Publishers, New Delhi. 1987
3. Theory of plates and shells- Timoshenko & Noinosky.Mc Graw Hill, 2nd edition, 2017

I M.TECH – II SEMESTER

VI8MDT21	MECHANICS OF COMPOSITE MATERIALS (ELECTIVE-IV)	L	P	C
		3	0	3

UNIT-I

Introduction to Composites: Introduction, Classification, matrix materials, reinforced matrix of composites

UNIT-II

Hooke's Law for a Two-Dimensional Angle Lamina, Engineering Constants of an Angle Lamina, Invariant Form of Stiffness and Compliance Matrices for an Angle Lamina Strength Failure Theories of an Angle Lamina : Maximum Stress Failure Theory Strength Ratio, Failure Envelopes,Maximum Strain Failure Theory ,Tsai–Hill Failure Theory, Tsai–Wu Failure Theory, Comparison of Experimental Results with Failure Theories. Hygrothermal Stresses and Strains in a Lamina: Hygrothermal Stress–Strain Relationships for a Unidirectional Lamina, Hygrothermal Stress–Strain Relationships for an Angle Lamina

UNIT-III

Macromechanical Analysis of a Lamina :Introduction ,Definitions: Stress, Strain ,Elastic Moduli, Strain Energy. Hooke's Law for Different Types of Materials, Hooke's Law for a Two-Dimensional Unidirectional Lamina, Plane Stress Assumption, Reduction of Hooke's Law in Three Dimensions to Two Dimensions, Relationship of Compliance and Stiffness Matrix to Engineering Elastic Constants of a Lamina,

UNIT-IV

Micromechanical Analysis of a Lamina :Introduction, Volume and Mass Fractions, Density, and Void Content, Evaluation of the Four Elastic Moduli, Strength of Materials Approach, Semi-Empirical Models ,Elasticity Approach, Elastic Moduli of Lamina with Transversely Isotropic Fibers, Ultimate Strengths of a Unidirectional Lamina, Coefficients of Thermal Expansion, Coefficients of Moisture Expansion

Macromechanical Analysis of Laminates: Introduction, Laminate Code , Stress–Strain Relations for a Laminate, In-Plane and Flexural Modulus of a Laminate, Hygrothermal Effects in a Laminate, Warpage of Laminates, hybrid laminates

UNIT-V

Design of Laminates: Introduction, thin plate theory, specially orthotropic plate, cross and angle ply laminated plates, problems using thin plate theory, Failure Criterion for a Laminate, Design of a Laminated Composites.

TEXT BOOKS:

1. Engineering Mechanics of Composite Materials by Isaac and M Daniel, Oxford University Press, 1994.
2. B. D. Agarwal and L. J. Broutman, Analysis and performance of fibre Composites, Wiley-Interscience, New York, 1980.
3. Mechanics of Composite Materials, Second Edition (Mechanical Engineering), By Autar K. Kaw Publisher, 2nd edition

REFERENCES:

1. R. M. Jones, Mechanics of Composite Materials, Mc Graw Hill Company, New York,1975.
2. L. R. Calcote, Analysis of Laminated Composite Structures, Van Nostrand Rainfold, New York, 1969.

I M.TECH – II SEMESTER

VI8MDT22	MECHATRONICS (ELECTIVE-IV)	L	P	C
		3	0	3

UNIT – I

Introduction: Definition of Mechatronics products, design considerations and trade offs. Overview of Mechtronic products. Intelligent machine Vs Automatic machine economic and social justification.

Actuators and drive systems: Mechanical, Electrical, hydraulic drive systems, Characteristics of mechanical, Electrical, Hydraulic and pneumatic actuators and their limitations.

UNIT – II

Motion Control: Control parameters and system objectives, Mechanical Configurations, Popular control system configurations. S-curve, motor/load inertia matching, design with linear slides.

Motion Control algorithms: Significance of feed forward control loops, shortfalls, fundamentals concepts of adaptive and fuzzy – control. Fuzzy logic compensatory control of transformation and deformation non- linearity's.

UNIT – III

Sensor interfacing: Analog and digital sensors for motion measurement, digital transducers, human-Machine and machine- Machine inter facing devices and strategy.

Architecture of intelligent machines: Introduction to Microprocessor and programmable logic controls and identification of systems. System design classification, motion control aspects in design.

UNIT – IV

Machine vision: Feature and pattern recognition methods, concepts of perception and cognition in decision-making, basics of image processing, binary and grey scale images, sharpening and smoothening of images.

UNIT – V

Micromechatronic Sytems: Micro sensors, micro actuators, smart instrumentation, micro-fabrication methods – lithography, etching, micro-joing.

TEXT BOOKS:

1. "Mechatronics and Measurement systems"by .Michel B.Histand and david G. Alciatore.4th edition
2. Introduction to Mechatronics and Measurement systems, Tata Mc Graw Hill. 3rd edition 2007
3. Control sensors and actuators C.W.desilva, Prentice Hall.CRC Press, 2007

I M.TECH – II SEMESTER

VI8MDT23	EXPERIMENTAL STRESS ANALYSIS	L	P	C
		3	0	3

UNIT – I

Introduction: Stress, strain, Plane stress and plane strain conditions, Compatibility conditions. Problems using plane stress and plane strain conditions, stress functions, mohrs circle for stress strain, Three-dimensional stress strain relations.

UNIT – II

Strain Measurement and Recordings: Various types of strain gauges, Electrical Resistance strain gauges, semiconductor strain gauges, strain gauge circuits. Introduction, static recording and data logging, dynamic recording at very low frequencies, dynamic recording at intermediate frequencies, dynamic recording at high frequencies, dynamic recording at very high frequencies, telemetry systems.

UNIT – III

Photo elasticity: Photo elasticity – Polariscope – Plane and circularly polarized light, Bright and dark field setups, Photo elastic materials – Isochromatic fringes – Isoclinics

Three dimensional Photo elasticity : Introduction, locking in model deformation, materials for three-dimensional photo elasticity, machining cementing and slicing three-dimensional models, slicing the model and interpretation of the resulting fringe patterns, effective stresses, the shear-difference method in three dimensions, applications of the Frozen-stress method, the scattered-light method.

UNIT – IV

Brittle coatings: Introduction, coating stresses, failure theories, brittle coating crack patterns, crack detection, ceramic based brittle coatings, resin based brittle coatings, test procedures for brittle coatings analysis, calibration procedures, analysis of brittle coating data.

Moire Methods: Introduction, mechanism of formation of Moire fringes, the geometrical approach to Moire-Fringe analysis, the displacement field approach to Moire-Fringe analysis, out of plane displacement measurements, out of plane slope measurements, sharpening and multiplication of Moire-Fringes, experimental procedure and techniques.

UNIT – V Birefringent coatings

Introduction, Coating stresses and strains, coating sensitivity, coating materials, application of coatings, effects of coating thickness, Fringe-order determinations in coatings, stress separation methods.

TEXT BOOKS :

1. Theory of Elasticity by Timoshenke and Goodier Jr, 3rd edition, 2010 Mc Graw-Hill
2. Experimental stress analysis by Dally and Riley, , 3rd edition, 1991, Mc Graw-Hill

REFERENCES:

1. A treatise on Mathematical theory of Elasticity by LOVE .A.H 4th edition 1927, Cambridge
2. Photo Elasticity by Frocht, Volume 1 Wiley Publications, 1941
3. Experimental stress analysis, Video course by K.Ramesh / NPTEL

I M.TECH – II SEMESTER

VI8MDL02	DESIGN PRACTICE LABORATORY	L	P	C
		-	4	2

I. Modeling

1. Surface modeling
2. Solid modeling
3. Drafting
4. Assembling

II. Structural Analysis using any FEA Package for different structures that can be discredited with 1-D, 2-D & 3-D elements

1. Static Analysis
2. Modal Analysis
3. Harmonic Analysis
4. Spectrum Analysis
5. Buckling Analysis
6. Analysis of Composites
7. Fracture mechanics

III. Thermal Analysis using any FEA Package for different structures that can be discretised with 1-D,2-D & 3-D elements

1. Steady state thermal analysis
2. Transient thermal analysis

IV. Transient analysis using any FEA Package for different structures that can be discretised with 1-D,2-D & 3-D elements

V. Prudent Design – a case study

REFERENCES:

User manuals of ANSYS package Version 9.0 I-DEAS Package Version 9.0

SYLLABUS FOR M.TECH (VLSI & EMBEDED SYSTEMS)

I M.TECH - I SEMESTER

Course Code	Course Name	L	T	P	C
V18VLT01	DIGITAL SYSTEM DESIGN	3	-	-	3

Course Outcome:

The student will be able to

1. Describe the algorithms for minimization of functions
2. Describe the algorithms for minimization of PLDs.
3. Design large scale digital systems.
4. Discuss the fault model and diagnosis in combinational and sequential circuits.

UNIT-I: Minimization Procedures and CAMP Algorithm

Review on minimization of switching functions using tabular methods, k-map, QM algorithm, CAMP-I algorithm, Phase-I: Determination of Adjacencies, DA, CSC, SSMs and EPCs, CAMPI algorithm, Phase-II: Passport checking, Determination of SPC, CAMP-II algorithm: Determination of solution cube, Cube based operations, determination of selected cubes are wholly within the given switching function or not, Introduction to cube based algorithms.

UNIT-II: PLA Design, PLA Minimization and Folding Algorithms

Introduction to PLDs, basic configurations and advantages of PLDs, PLA-Introduction, Block diagram of PLA, size of PLA, PLA design aspects, PLA minimization algorithm (IISc algorithm), PLA folding algorithm(COMPACT algorithm)-Illustration of algorithms with suitable examples.

UNIT -III: Design of Large Scale Digital Systems

Algorithmic state machine charts-Introduction, Derivation of SM Charts, Realization of SM Chart, control implementation, control unit design, data processor design, ROM design, PAL design aspects, digital system design approaches using CPLDs, FPGAs and ASICs.

UNIT-IV: Fault Diagnosis in Combinational Circuits

Faults classes and models, fault diagnosis and testing, fault detection test, test generation, testing process, obtaining a minimal complete test set, circuit under test methods- Path sensitization method, Boolean difference method, properties of Boolean differences, Kohavi algorithm, faults in PLAs, DFT schemes, built in self-test.

UNIT-V: Fault Diagnosis in Sequential Circuits

Fault detection and location in sequential circuits, circuit test approach, initial state identification, Haming experiments, synchronizing experiments, machine identification, distinguishing experiment, adaptive distinguishing experiments.

TEXT BOOKS:

1. Logic Design Theory-N. N. Biswas, PHI
2. Switching and Finite Automata Theory-Z. Kohavi , 2nd Edition, 2001, TMH
3. Digital system Design using PLDd-Lala

REFERENCE BOOKS:

1. Fundamentals of Logic Design – Charles H. Roth, 5th Ed., Cengage Learning.
2. Digital Systems Testing and Testable Design – MironAbramovici, Melvin A.
Breuer and Arthur D. Friedman- John Wiley & Sons Inc.

I M.TECH - I SEMESTER

Course Code	Course Name	L	T	P	C
V18VLT02	VLSI TECHNOLOGY AND DESIGN	3	-	-	3

Course Outcome:

The student will be able to

1. Describe the Microelectronics and MOS Technologies
2. Describe various processes in IC Production.
3. Sketch the Layout Design.
4. Discuss the Floor Planning, Architecture Design.

UNIT-I: Review of Microelectronics and Introduction to MOS Technologies:

MOS, CMOS, Bi-CMOS Technology Trends and Projections Electronic design automation concept, ASIC and FPGA design flows, SOC designs, IC fabrication process.

UNIT-II: IC Production Process - I

Crystal Growth and Wafer Preparation: Introduction, Electronic-Grade Silicon, Czochralski Crystal Growing, Silicon Shaping, Process Considerations, Epitaxy: Introduction, Vapour-Phase Epitaxy, Molecular Beam Epitaxy, Silicon on Insulators, Epitaxial Evaluation.

UNIT-III: IC Production Process – II

Lithography: Introduction, Various Lithography techniques: Optical Lithography, Electron Lithography, X-ray Lithography, Ion Lithography. Etching Techniques, Deposition Processes, Ion Implantation, Metallization.

UNIT-IV: Layout Design and Tools:

Transistor Structures, Wires and Vias, Scalable Design Rules, Layout Design Tools.

Subsystem Design and Layout: Some architectural issues, switch logic, gate logic, examples of

structured design (combinational logic), some clocked sequential circuits, other system considerations.

UNIT-V:

Floor Planning: Introduction**,** Floor planning methods, off-chip connections.

Architecture Design: Introduction, Register-Transfer design, high-level synthesis, architectures

for low power, architecture testing.

Chip Design: Introduction and design methodologies.

TEXT BOOKS:

1. S. M. Sze, "VLSI Technology", McGraw-Hill, Second Edition.
2. Essentials of VLSI Circuits and Systems, K. Eshraghian, Douglas A. Pucknell, Sholeh Eshraghian, 2005, PHI Publications.
3. Modern VLSI Design-Wayne Wolf, 3rd Ed., 1997, Pearson Education.

REFERENCE BOOKS:

1. VLSI Design Technologies for Analog and Digital Circuits, Randall L. Geiger, PhillipE. Allen, Noel R. Strader, TMH Publications, 2010.
2. Introduction to VLSI Systems: A Logic, Circuit and System Perspective- Ming-BO Lin,CRC Press, 2011.
3. Principals of CMOS VLSI Design-N.H.E Weste, K. Eshraghian, 2nd Edition, AddisonWesley.

I M.TECH - I SEMESTER

Course Code	Course Name	L	T	P	C
V18VLT03	CMOS ANALOG IC DESIGN	3	-	-	3

Course Outcome:

The student will be able to

1. Describe the concept of MOS device and modeling of MOS drain current for large and small signal anaysis
2. Design and analyze Analog CMOS Sub-Circuits.
3. Distinguish Large signal and small signal analysis of CMOS Amplifiers
4. Describe the CMOS Op-Amps & Applications.

UNIT -I: MOS Devices and Modeling

The MOS Transistor, Passive Components- Capacitor & Resistor, Integrated circuit Layout, CMOS Device Modeling - Simple MOS Large-Signal Model, Other Model Parameters, Small-Signal Model for the MOS Transistor, Computer Simulation Models, Sub-threshold MOS Model.

UNIT -II: Analog CMOS Sub-Circuits

MOS Switch, MOS Diode, MOS Active Resistor, Current Sinks and Sources, Current Mirrors-Cascode current Mirror and Wilson Current Mirror, Current and Voltage References, Band gap Reference.

UNIT -III: CMOS Amplifiers-I

Inverters- Active load inverter, current source inverter, push-pull inverter, Differential Amplifiers- large signal analysis, small signal analysis, design of differential amplifier,

UNIT -IV: CMOS Amplifiers-II

Cascode Amplifiers- Large signal analysis, small signal analysis and frequency response, design of cascade amplifier, Current Amplifiers- single ended input current amplifier, differential input current amplifier, Output Amplifiers- class-a amplifier, source follower, push pull CS amplifier, High Gain Amplifiers Architectures.

UNIT -V: CMOS Op-Amps & Applications

Design of CMOS Op Amps, Compensation of Op Amps, Design of Two-Stage Op Amps,Power-Supply Rejection Ratio of Two-Stage Op Amps, Cascode Op Amps, Measurement Techniques of OP Amp, Characterization of Comparator, Two-Stage comparator design.

TEXT BOOKS:

1. CMOS Analog Circuit Design - Philip E. Allen and Douglas R. Holberg, OxfordUniversity Press, International Second Edition/Indian Edition, 2010.
2. Design of Analog CMOS Integrated Circuits- BehzadRazavi, TMH Edition.

REFERENCE BOOKS:

1. Analog Integrated Circuit Design- David A.Johns, Ken Martin, Wiley Student Edn, 2016.
2. Analysis and Design of Analog Integrated Circuits- Paul R. Gray, Paul J. Hurst, S. Lewisand R. G. Meyer, Wiley India, Fifth Edition, 2010.
3. CMOS: Circuit Design, Layout and Simulation- Baker, Li and Boyce, PHI.

I M.TECH - I SEMESTER

Course Code	Course Name	L	T	P	C
V18VLT04	EMBEDDED SYSTEMS DESIGN-I	3	-	-	3

Course Outcome:

The student will be able to

1. Describe the basic concepts of an embedded system and its design
2. Differentiate the hardware and software components required to develop an embedded system
3. Generalize the Embedded System design and development life cycle model and case studies

UNIT-I: Introduction

An Embedded System-Definition, Examples, Current Technologies, Integration in system Design, Embedded system design flow, hardware design concepts, software development, processor in an embedded system and other hardware units, introduction to processor based embedded system design concepts.

UNIT-II: Embedded Hardware

Embedded hardware building blocks, Embedded Processors – ISA architecture models, Internal processor design, processor performance, Board Memory – ROM, RAM, Auxiliary Memory, Memory Management of External Memory, Board Memory and performance. Embedded board Input / output – Serial versus Parallel I/O, interfacing the I/O components, I/O components and performance, Board buses – Bus arbitration and timing, Integrating the Bus with other board components, Bus performance.

UNIT-III: Embedded Software

Device drivers, Device Drivers for interrupt-Handling, Memory device drivers, On-board bus device drivers, Board I/O drivers, Explanation about above drivers with suitable examples, Board support packages, Middleware and Application Software – Middle ware, Middleware examples, Application layer software examples.

UNIT-IV: Embedded System Design, Development, Implementation and Testing

Embedded system design and development lifecycle model, creating an embedded systemarchitecture, introduction to embedded software development process and tools-Host and Targetmachines, linking and locating software, Getting embedded software into the target system,issues in Hardware-Software design and co-design, Implementing the design-The main software utility tool, CAD and the hardware, Translationtools, Debugging tools, testing on host machine, simulators, Laboratory tools, System Boot-Up.

UNIT-V: Embedded System Design-Case Studies

Case studies- Processor design approach of an embedded system, Micro Blaze Processor based Embedded system design on Xilinx platform-NiosII Processor based Embedded system design on Altera platform

TEXT BOOKS:

1. Tammy Noergaard “Embedded Systems Architecture: A Comprehensive Guide for Engineers and Programmers”, Elsevier(Singapore) Pvt.Ltd.Publications, 2005.
2. Frank Vahid, Tony D. Givargis, “Embedded system Design: A Unified Hardware/Software Introduction”, John Wily & Sons Inc.2002.

REFERENCE BOOKS:

1. Peter Marwedel, “Embedded System Design”, Science Publishers, 2007.
2. Arnold S Burger, “Embedded System Design”, CMP.
3. Rajkamal, “Embedded Systems: Architecture, Programming and Design”, TMH Publications,
4. Second Edition, 2008.

I M.TECH - I SEMESTER

Course Code	Course Name	L	T	P	C
V18VLT05	EMBEDDED C (Elective-1)	3	-	-	3

Course Outcome:

The student will be able to

- Describe the basic concepts of programming in embedded system using C.
- Illustrate the 8051 Microcontroller Family
- Develop the methods of Reading Switches
- Develop the structure using Object-oriented programming with C
- Identify the Real-Time Constraints and case studies

UNIT-I: Programming Embedded Systems in C

Introduction, What is an embedded system, Which processor should you use, Which programming language should you use, Which operating system should you use, How do you develop embedded software, Conclusions

Introducing the 8051 Microcontroller Family

Introduction, What's in a name, The external interface of the Standard 8051, Reset requirements, Clock frequency and performance, Memory issues, I/O pins, Timers, Interrupts, Serial interface,

Power consumption, Conclusions

UNIT-II: Reading Switches

Introduction, Basic techniques for reading from port pins, Example: Reading and writing bytes, Example: Reading and writing bits (simple version), Example: Reading and writing bits (generic version), the need for pull-up resistors, Dealing with switch bounce, Example: Reading switch inputs (basic code), Example: Counting goats, Conclusions

UNIT-III: Adding Structure to the Code

Introduction, Object-oriented programming with C, The Project Header (MAIN.H), The Port Header (PORT.H), Example: Restructuring the 'Hello Embedded World' example, Example: Restructuring the goat-counting example, Further examples, Conclusions

UNIT-IV: Meeting Real-Time Constraints

Introduction, Creating 'hardware delays' using Timer 0 and Timer 1, Example: Generating a precise 50 ms delay, Example: Creating a portable hardware delay, Why not use Timer 2?, The need for 'timeout' mechanisms, Creating loop timeouts, Example: Testing loop timeouts, Example: A more reliable switch interface, Creating hardware timeouts, Example: Testing a hardware timeout, Conclusions

UNIT-V: Case Study-Intruder Alarm System

Introduction, The software architecture, Key software components used in this example, running the program, the software, Conclusions

TEXT BOOKS:

1. Embedded C - Michael J. Pont, 2nd Ed., Pearson Education, 2008.

REFERENCE BOOKS:

1. PIC MCU C-An introduction to programming, The Microchip PIC in CCS C – Nigel Gardner.

I M.TECH - I SEMESTER

Course Code	Course Name	L	T	P	C
V18VLT06	DIGITAL SIGNAL PROCESSORS &ARCHITECTURES (Elective-1)	3	-	-	3

Course Outcome:

The student will be able to

1. Apply the FFT algorithm for solving the DFT of a given signal.
2. Describe the computational accuracy.
3. Describe the features and Architectures for Programmable DSP Devices.

UNIT-I: Introduction to Digital Signal Processing: Introduction, a Digital signal processing system, the sampling process, discrete time sequences. Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT), Linear time-invariant systems, Digital filters, Decimation and interpolation.

Computational Accuracy in DSP Implementations: Number formats for signals and coefficients in DSP systems, Dynamic Range and Precision, Sources of error in DSP implementations, A/D Conversion errors, DSP Computational errors, D/A Conversion Errors, Compensating filter.

UNIT-II

Architectures for Programmable DSP Devices Basic Architectural features, DSP Computational Building Blocks, Bus Architecture and Memory, Data Addressing Capabilities, Address Generation UNIT, Programmability and Program Execution, Speed Issues, Features for External interfacing.

UNIT-III

Programmable Digital Signal Processors Commercial Digital signal processing Devices, Data Addressing modes of TMS320C54XX DSPs, Data Addressing modes of TMS320C54XX Processors, Memory space of TMS320C54XX Processors, Program Control, TMS320C54XX Instructions and Programming, On-Chip Peripherals, Interrupts of TMS320C54XX Processors, Pipeline Operation of TMS320C54XX Processors.

UNIT-IV

Analog Devices Family of DSP Devices Analog Devices Family of DSP Devices – ALU and MAC block diagram, Shifter Instruction, Base Architecture of ADSP 2100, ADSP-2181 high performance Processor.

Introduction to Black fin Processor - The Black fin Processor, Introduction to Micro Signal Architecture, Overview of Hardware Processing Units and Register files, Address Arithmetic Unit, Control Unit, Bus Architecture and Memory, Basic Peripherals.

UNIT-V

Interfacing Memory and I/O Peripherals to Programmable DSP Devices Memory space organization, External bus interfacing signals, Memory interface, Parallel I/O interface, Programmed I/O, Interrupts and I/O, Direct memory access (DMA).

TEXT BOOKS:

1. Digital Signal Processing – Avtar Singh and S. Srinivasan, Thomson Publications, 2004.
2. A Practical Approach To Digital Signal Processing-K Padmanabhan, R. Vijayarajeswaran, Ananthi. S, New Age International, 2006/2009
3. Digital Signal Processors, Architecture, Programming and Applications- B. Venkataramani and M. Bhaskar, 2002, TMH

REFERENCE BOOKS:

1. Embedded Signal Processing with the Micro Signal Architecture: Woon-SengGan, Sen M. Kuo, Wiley-IEEE Press, 2007.
2. DSP Processor Fundamentals, Architectures & Features – Lapsleyetal. 2000, S. Chand & Co.
3. Digital Signal Processing Applications Using the ADSP-2100 Family by The Applications Engineering Staff of Analog Devices, DSP Division, Edited by Amy Mar, PHI
4. The Scientist and Engineer's Guide to Digital Signal Processing by Steven W. Smith, Ph.D., California Technical Publishing, ISBN 0-9660176-3-3, 1997

I M.TECH - I SEMESTER

Course Code	Course Name	L	T	P	C
V18VLT07	SYSTEM ON CHIP (Elective-1)	3	-	-	3

Course Outcome:

The student will be able to

1. Describe SOC System Approach, design and its Architecture.
2. Describe Memory Design for SOC
3. Explain the concepts of bus models and Interconnect Architectures
4. Describe Application Studies and Case Studies

UNIT-I:

Introduction to the System Approach System Architecture, Components of the system, Hardware & Software, Processor Architectures, Memory and Addressing. System level interconnection, An approach for SOC Design, System Architecture and Complexity.

UNIT-II:

Processors Introduction , Processor Selection for SOC, Basic concepts in Processor Architecture, Basic concepts in Processor Micro Architecture, Basic elements in Instruction handling. Buffers: minimizing Pipeline Delays, Branches, More Robust Processors, Vector Processors and Vector Instructions extensions, VLIW Processors, Superscalar Processors.

UNIT-III:

Memory Design for SOC Overview of SOC external memory, Internal Memory, Size, Scratchpads and Cache memory, Cache Organization, Cache data, Write Policies, Strategies for line replacement at miss time, Types of Cache, Split – I, and D – Caches, Multilevel Caches, Virtual to real translation , SOC Memory System, Models of Simple Processor – memory interaction.

UNIT-IV:

Interconnect Customization and Configuration Inter Connect Architectures, Bus: Basic Architectures, SOC Standard Buses, Analytic Bus Models, Using the Bus model, Effects of Bus transactions and contention time. SOC Customization: An overview, Customizing Instruction Processor, Reconfiguration Technologies, Mapping design onto Reconfigurable devices, Instance- Specific design, Customizable Soft Processor, Reconfiguration - overhead analysis and trade-off analysis on reconfigurable Parallelism.

UNIT-V:

Application Studies/Case Studies SOC Design approach, AES algorithms, Design and evaluation, Image compression – JPEG compression. Concepts of IP (Intellectual Property) cores and integration in SOC

TEXT BOOKS:

1. Computer System Design System-on-Chip - Michael J. Flynn and Wayne Luk, Wiely India Pvt. Ltd.
2. ARM System on Chip Architecture – Steve Furber –2nd Ed., 2000, Addison Wesley Professional.

REFERENCE BOOKS:

1. Design of System on a Chip: Devices and Components – Ricardo Reis, 1st Ed., 2004, Springer
2. Co-Verification of Hardware and Software for ARM System on Chip Design (Embedded Technology) – Jason Andrews – Newnes, BK and CDROM.
3. System on Chip Verification – Methodologies and Techniques – PrakashRashinkar, Peter Paterson and Leena Singh L, 2001, Kluwer Academic Publishers.

I M.TECH - I SEMESTER

Course Code	Course Name	L	T	P	C
V18VLT08	SOFT COMPUTING TECHNIQUES (Elective-1)	3	-	-	3

Course Outcome:

The student will be able to

1. Describe Artificial Neural Networks, Fuzzy Logic System modeling and control
2. Describe Genetic Algorithm
3. Apply Neural Networks in different areas using MATLAB

UNIT –I: Introduction:

Approaches to intelligent control, Architecture for intelligent control, Symbolic reasoning system, Rule-based systems, the AI approach, Knowledge representation - Expert systems.

UNIT –II: Artificial Neural Networks:

Concept of Artificial Neural Networks and its basic mathematical model, McCulloch-Pitts neuron model, simple perceptron, Adaline and Madaline, Feed-forward Multilayer Perceptron, Learning and Training the neural network, Data Processing: Scaling, Fourier transformation, principal-component analysis and wavelet transformations, Hopfield network, Self-organizing network and Recurrent network, Neural Network based controller.

UNIT –III: Fuzzy Logic System:

Introduction to crisp sets and fuzzy sets, basic fuzzy set operation and approximate reasoning, Introduction to fuzzy logic modeling and control, Fuzzification, inferencing and defuzzification, Fuzzy knowledge and rule bases, Fuzzy modeling and control schemes for nonlinear systems, Self-organizing fuzzy logic control, Fuzzy logic control for nonlinear time delay system.

UNIT –IV: Genetic Algorithm:

Basic concept of Genetic algorithm and detail algorithmic steps, Adjustment of free parameters, Solution of typical control problems using genetic algorithm, Concept on some other search techniques like Tabu search and anD-colony search techniques for solving optimization problems.

UNIT –V: Applications:

GA application to power system optimisation problem, Case studies: Identification and control of linear and nonlinear dynamic systems using MATLAB-Neural Network toolbox, Stability analysis of Neural-Network interconnection systems, Implementation of fuzzy logic controller using MATLAB fuzzy-logic toolbox, Stability analysis of fuzzy control systems.

TEXT BOOKS:

1. Introduction to Artificial Neural Systems - Jacek.M.Zurada, Jaico Publishing House, 1999.
2. Neural Networks and Fuzzy Systems - Kosko, B., Prentice-Hall of India Pvt. Ltd., 1994.

REFERENCE BOOKS:

1. Fuzzy Sets, Uncertainty and Information - Klir G.J. &Folger T.A., Prentice-Hall of India Pvt. Ltd., 1993.
2. Fuzzy Set Theory and Its Applications - Zimmerman H.J. Kluwer Academic Publishers, 1994.
3. Introduction to Fuzzy Control - Driankov, Hellendroon, Narosa Publishers.
4. Artificial Neural Networks - Dr. B. Yagananarayana, 1999, PHI, New Delhi.
5. Elements of Artificial Neural Networks - KishanMehrotra, Chelkuri K. Mohan, Sanjay Ranka, Penram International.
6. Artificial Neural Network –Simon Haykin, 2nd Ed., Pearson Education.
7. Introduction Neural Networks Using MATLAB 6.0 - S.N. Shivanandam, S. Sumati, S. N. Deepa,1/e, TMH, New Delhi.

I M.TECH - I SEMESTER

Course Code	Course Name	L	T	P	C
V18VLT09	DIGITAL DESIGN THROUGH HDL (Elective -2)	3	-	-	3

Course Outcome:

The student will be able to

1. Describe the basic concepts of Hardware Description Languages.
2. Develop programs for Combinational and Sequential Logic Circuits HDL
3. Construct the synthesis of Digital Logic Circuit Design
4. Describe Testing of Digital Logic Circuits and CAD Tools

UNIT-I: Digital Logic Design using VHDL

Introduction, designing with VHDL, design entry methods, logic synthesis, entities, architecture, packages and configurations, types of models: dataflow, behavioral, structural, signals vs. variables, generics, data types, concurrent vs. sequential statements, loops and program controls. Digital Logic Design using Verilog HDL Introduction, Verilog Data types and Operators, Binary data manipulation, Combinational and Sequential logic design, Structural Models of Combinational Logic, Logic Simulation, Design Verification and Test Methodology, Propagation Delay, Truth Table models using Verilog.

UNIT-II: Combinational Logic Circuit Design using VHDL

Combinational circuits building blocks: Multiplexers, Decoders, Encoders, Code converters, Arithmetic comparison circuits, VHDL for combinational circuits, Adders-Half Adder, Full Adder, Ripple-Carry Adder, Carry Look-Ahead Adder, Subtraction, Multiplication. Sequential Logic Circuit Design using VHDL Flip-flops, registers & counters, synchronous sequential circuits: Basic design steps, Mealy State model, Design of FSM using CAD tools, Serial Adder Example, State Minimization, Design of Counter using sequential Circuit approach.

UNIT-III: Digital Logic Circuit DesignExamples using Verilog HDL

Behavioral modeling, Data types, Boolean-Equation-Based behavioral models of combinational logics, Propagation delay and continuous assignments, latches and level-sensitive circuits in Verilog, Cyclic behavioral models of flip-flops and latches and Edge detection, comparison of styles for behavioral model; Behavioral model, Multiplexers, Encoders and Decoders, Counters, Shift Registers, Register files, Dataflow models of a linear feedback shift register, Machines with multi cycle operations, ASM and ASMD charts for behavioral modeling, Design examples, Keypad scanner and encoder.

UNIT-IV: Synthesis of Digital Logic Circuit Design:

Introduction to Synthesis, Synthesis of combinational logic, Synthesis of sequential logic with latches and flip-flops, Synthesis of Explicit and Implicit State Machines, Registers and counters.

UNIT-V: Testing of Digital Logic Circuits and CAD Tools :

Testing of logic circuits, fault model, complexity of a test set, path-sensitization, circuits with tree structure, random tests, testing of sequential circuits, built in self test, printed circuit boards, computer aided design tools, synthesis, physical design.

TEXT BOOKS:

1. Stephen Brown &ZvonkoVranesic, “Fundamentals of Digital logic design with VHDL”, Tata McGraw Hill, 2nd edition.
2. Michael D. Ciletti, “Advanced digital design with the Verilog HDL”, Eastern economy edition, PHI.

REFERENCE BOOKS:

1. Stephen Brown &ZvonkoVranesic, “Fundamentals of Digital logic with Verilog design”, Tata McGraw Hill,2nd edition.
2. Bhaskar, “VHDL Primer”,3rd Edition, PHI Publications.
3. Ian Grout, “Digital systems design with FPGAs and CPLDs”, Elsevier Publications.

I M.TECH - I SEMESTER

Course Code	Course Name	L	T	P	C
V18VLT10	**CPLD & FPGA ARCHITECURES AND APPLICATIONS (Elective -2)**	**3**	**-**	**-**	**3**

Course Outcome:

The student will be able to

1. Describe the Programmable Logic Devices
2. Distinguish the various types of Field Programmable Gate Arrays
3. Apply the typical applications on FPGAs

UNIT-I: Introduction to Programmable Logic Devices

Introduction, Simple Programmable Logic Devices – Read Only Memories, Programmable Logic Arrays, Programmable Array Logic, Programmable Logic Devices/Generic Array Logic; Complex Programmable Logic Devices –Architecture of Xilinx Cool Runner XCR3064XL Organization of FPGAs, FPGA Programming CPLD, CPLD Implementation of a Parallel Adder with Accumulation.

UNIT-II: Field Programmable Gate Arrays

Technologies, Programmable Logic Block Architectures, Programmable Interconnects, Programmable I/O blocks in FPGAs, Dedicated Specialized Components of FPGAs, Applications of FPGAs.

UNIT –III: SRAM Programmable FPGAs:

Introduction, Programming Technology, Device Architecture, The Xilinx XC2000, XC3000 and XC4000 Architectures.

UNIT –IV: Anti-Fuse Programmed FPGAs

Introduction, Programming Technology, Device Architecture, TheActel ACT1, ACT2 and ACT3 Architectures.

UNIT –V: Design Applications

General Design Issues, Counter Examples, A Fast Video Controller, A Fast DMA Controller, Designing Counters with ACT devices, Designing Adders and Accumulators with the ACT Architecture.

TEXT BOOKS:

1. Field Programmable Gate Array Technology - Stephen M. Trimberger, Springer International Edition.

2. Digital Systems Design - Charles H. Roth Jr, LizyKurian John, Cengage Learning.

REFERENCE BOOKS:

1. Field Programmable Gate Arrays - John V. Oldfield, Richard C. Dorf, Wiley India.

2. Digital Design Using Field Programmable Gate Arrays - Pak K. Chan/ SamihaMourad, Pearson Low Price Edition.

3. Digital Systems Design with FPGAs and CPLDs - Ian Grout, Elsevier, Newnes.

4. FPGA based System Design - Wayne Wolf, Prentice Hall Modern Semiconductor Design Series.

I M.TECH - I SEMESTER

Course Code	Course Name	L	T	P	C
V18VLT11	ALGORITHMS FOR VLSI DESIGN –AUTOMATION (Elective-2)	3	-	-	3

Course Outcome:

The student will be able to

- Describe Logic Synthesis
- Discuss VLSI Automation Algorithms
- Identify Placement, Floor Planning & Pin Assignment and Routing techniques

UNIT-I: Logic Synthesis & Verification:

Introduction to combinational logic synthesis, Binary Decision Diagram, Hardware models for High-level synthesis.

UNIT-II: VLSI Automation Algorithms:

Partitioning: Problem formulation, classification of partitioning algorithms, Group migration algorithms, simulated annealing & evolution, other partitioning algorithms.

UNIT-III: Placement, Floor Planning & Pin Assignment:

Problem formulation, simulation base placement algorithms, other placement algorithms, constraint based floor planning, floor planning algorithms for mixed block & cell design. General & channel pin assignment

UNIT-IV: Global Routing:

Problem formulation, classification of global routing algorithms, Maze routing algorithm, line probe algorithm, Steiner Tree based algorithms, ILP based approaches

UNIT-V: Detailed Routing:

problem formulation, classification of routing algorithms, single layer routing algorithms, two layer channel routing algorithms, three layer channel routing algorithms, and switchbox routing algorithms. Over The Cell Routing & Via Minimization: Two layers over the cell routers, constrained & unconstrained via minimization.

REFERENCE BOOKS:

1. NaveedShervani, “Algorithms for VLSI physical design Automation”, Kluwer Academic Publisher, Second edition.

2. ChristophnMeinel& Thorsten Theobold, “Algorithm and Data Structures for VLSI Design”, KAP, 2002.

3. Rolf Drechsheler : “Evolutionary Algorithm for VLSI”, Second edition

4. Trimburger, “Introduction to CAD for VLSI”, Kluwer Academic publisher, 2002 .

I M.TECH - I SEMESTER

COURSE CODE	COURSE NAME	L	T	P	C
V18VLT12	VLSI SIGNAL PROCESSING (Elective-2)	3	-	-	3

Course Outcome:

The student will be able to

1. Describe digital signal processing algorithms and processing.
2. Distinguish folding and unfolding algorithms.
3. Explain systolic architectures
4. Explain various convolution algorithms.
5. Describe applications of DSP processor in low power design.

UNIT-I:

Introduction to DSP: Typical DSP algorithms, DSP algorithms benefits, Representation of DSP algorithms.

Pipelining and Parallel Processing: Introduction, Pipelining of FIR Digital filters, Parallel Processing, Pipelining and Parallel Processing for Low Power.

Retiming: Introduction – Definitions and Properties – Solving System of Inequalities – Retiming Techniques.

UNIT-II:

Folding: Introduction -Folding Transform - Register minimization Techniques – Register minimization in folded architectures – folding of multirate systems

Unfolding: Introduction – An Algorithm for Unfolding – Properties of Unfolding – critical Path, Unfolding and Retiming – Applications of Unfolding

UNIT-III:

Systolic Architecture Design: Introduction – Systolic Array Design Methodology – FIR Systolic Arrays – Selection of Scheduling Vector – Matrix Multiplication and 2D Systolic Array Design – Systolic Design for Space Representations contain Delays

UNIT-IV:

Fast Convolution: Introduction – Cook-Toom Algorithm – Winograd algorithm – Iterated Convolution – Cyclic Convolution – Design of Fast Convolution algorithm by Inspection

UNIT-V:

Low Power Design: Scaling Vs Power Consumption –Power Analysis, Power Reduction techniques – Power Estimation Approaches Programmable DSP: Evaluation of Programmable Digital Signal Processors, DSP Processors for Mobile and Wireless Communications, Processors for Multimedia Signal Processing.

TEXT BOOKS:

1. VLSI Digital Signal Processing- System Design and Implementation – Keshab K. Parhi, 1998, Wiley Inter Science.
2. VLSI and Modern Signal Processing – Kung S. Y, H. J. While House, T. Kailath, 1985, Prentice Hall.

REFERENCE BOOKS:

1. Design of Analog – Digital VLSI Circuits for Telecommunications and Signal Processing – Jose E. France, YannisTsividis, 1994, Prentice Hall.
2. VLSI Digital Signal Processing – Medisetti V. K, 1995, IEEE Press (NY), USA

I M.TECH - I SEMESTER

Course Code	Course Name	L	T	P	C
V18VLL01	**VLSI LAB**	**-**	**-**	**4**	**2**

PART-A: VLSI Lab (Front-end Environment)

--The students are required to design the logic circuit to perform the followingexperiments using necessary simulator (Xilinx ISE Simulator/ Mentor GraphicsQuesta Simulator) to verify the logical /functional operation and to perform theanalysis with appropriate synthesizer (Xilinx ISE Synthesizer/Mentor GraphicsPrecision RTL) and then verify the implemented logic with different hardwaremodules/kits (CPLD/FPGA kits).

--The students are required to acquire the knowledge in both the Platforms (Xilinxand Mentor graphics) by perform at least Five experiments on each Platform.

List of Experiments:

1. Adder-Substractor.

2. Priority Encoder.

3. LFSR

4. Synchronous RAM.

5. ALU.

6. Up Counter/Down Counter.

7. Fire Detection and Control System using Combinational Logic circuits.

8. Traffic Light Controller using Sequential Logic circuits

9. Pattern Detection using Moore Machine.

10. Finite State Machine (FSM) based logic circuit.

PART-A: VLSI Lab (Back-end Environment)

--The students are required to design and implement the Layout of the following experiments of any Five using CMOS 130nm Technology with Mentor Graphics Tool.

List of Experiments:

1. Inverter Characteristics.

2. Full Adder.

3. RS-Latch, D-Latch and Clock Divider.

4. Synchronous Counter and Asynchronous Counter.

5. Static and Dynamic RAM.

6. ROM

7. Differential Amplifier.

8. Ring Oscillator

9. Digital-to-Analog-Converter.

10. Analog-to-Digital Converter.

Lab Requirements:

Software: Xilinx ISE Suite, Mentor Graphics-Questa Simulator, Mentor Graphics-Precision RTL, Mentor Graphics Back End/Tanner Software tool.

Hardware: Personal Computer with necessary peripherals, configuration and operating Systemand relevant VLSI (CPLD/FPGA) hardware Kits.

I M.TECH - II SEMESTER

COURSE CODE	COURSE NAME	L	T	P	C
V18VLT13	DESIGN FOR TESTABILITY	3	-	-	3

Course Outcome:

The students will be able to

1. Interpret the concepts of modeling digital circuits and simulation.
2. Describe modeling of faults and its testing for SSF.
3. Explain various techniques of testing.

UNIT-I: Modeling:

Modeling digital circuits at logic level, register level and structural level. Levels of modeling.

Logic Simulation: Types of simulation, delay models, element evaluation, hazard detection, gate level event driven simulation.

UNIT-II: Fault Modeling:

Logic fault models, fault detection and redundancy, fault equivalence and fault location. Single stuck and multiple stuck – fault models. Fault simulation applications, general techniques for combinational circuits.

UNIT-III: Testing for Single Stuck Faults (SSF):

Automated test pattern generation (ATPG/ATG) for SSFs in combinational and sequential circuits, functional testing with specific fault models. Vector simulation – ATPG vectors, formats, compaction and compression, selecting ATPG tool.

UNIT-IV: Design for Testability:

Testability trade-offs, techniques. Scan architectures and testing – controllability and observability, generic boundary scan, fully integrated scan, storage cells for scan design. Board level and system level DFT approaches. Boundary scan standards. Compression techniques – different techniques, syndrome test and signature analysis.

UNIT-V: Built-in-Self-Test (BIST):

BIST concepts and test pattern generation, specific BIST architectures – CSBL, BEST, RTS, LOCST, STUMPS, CBIST, RTD, SST, CATS, CSTP, BILBO. Brief ideas on some advanced BIST concepts and design for self-test at board level.

Reference Books

1. MironAbramovici, Melvin A.Breur, Arthur D.Friedman, Digital Systems Testing and Testable Design, Jaico Publishing House, 2001.
2. Michael L.Bushnell, VishwaniD.Agrawal, Essentials of Electronic Testing, Springer, 2000.
3. Michael D.Ciletti, Modeling, Synthesis, and Rapid Prototyping with the Verilog HDL., Prentice Hall, 1999.

I M.TECH - II SEMESTER

COURSE CODE	COURSE NAME	L	T	P	C
V18VLT14	CMOS DIGITAL IC DESIGN	3	-	-	3

Course Outcome:

The student will be able to

1. Describe the concepts of MOS design.
2. Demonstrate the combinational, sequential and dynamic CMOS logic circuits.
3. Explain various semiconductor memories.

UNIT-I: MOS Design

NMOS & Pseudo NMOS Logic – Inverter, Inverter threshold voltage, Output high voltage, Output Low Voltage, Gain at gate threshold voltage, Transient response, Rise time, Fall time; CMOS logic - Inverter, logic gates.

UNIT-II: Combinational MOS Logic Circuits:

MOS logic circuits with NMOS loads, Primitive CMOS logic gates – NOR & NAND gate, Complex Logic circuits design – Realizing Boolean expressions using NMOS gates and CMOS gates, AOI and OIA gates, CMOS full adder, CMOS transmission gates, Designing with Transmission gates.

UNIT-III: Sequential MOS Logic Circuits

Behaviour of bistable elements, Latch, Clocked latch and flip flop circuits, CMOS D latch and edge triggered flip-flop.

UNIT-IV: Dynamic Logic Circuits

Basic principle, Voltage Bootstrapping, Synchronous dynamic pass transistor circuits, Dynamic CMOS transmission gate logic, High performance Dynamic CMOS circuits – Domino logic, NORA logic.

UNIT-V: Semiconductor Memories

Types, RAM array organization, DRAM – Types, Operation, Leakage currents in DRAM cell and refresh operation, SRAM operation Leakage currents in SRAM cells, Flash Memory- NOR flash and NAND flash.

TEXT BOOKS:

1. Digital Integrated Circuit Design – Ken Martin, Oxford University Press, 2011.

2. CMOS Digital Integrated Circuits Analysis and Design – Sung-Mo Kang, Yusuf Leblebici,

TMH, 3rd Ed., 2011.

REFERENCE BOOKS:

1. Introduction to VLSI Systems: A Logic, Circuit and System Perspective – Ming-BO Lin,CRC Press, 2011

2.Digital Integrated Circuits– A Design Perspective, Jan M. Rabaey, AnanthaChandrakasan,BorivojeNikolic, 2nd Ed., PHI.

I M.TECH - II SEMESTER

COURSE CODE	COURSE NAME	L	T	P	C
V18VLT15	EMBEDDED SYSTEM DESIGN - II	3	-	-	3

Course Outcome:

The student will be able to

1. Describe the ARM architecture and its memory management.
2. Apply instruction set for Arm programming.
3. Develop basic ARM programs using C.
4. Describe the concepts of memory management.

UNIT-I:

ARM Architecture ARM Design Philosophy, Registers, PSR, Pipeline, Interrupts and Vector Table, Architecture Revision, ARM Processor Families. Introduction to ARM Cortex.

UNIT-II:

ARM Programming Model-I Instruction Set: Data Processing Instructions, Branch, Load, Store Instructions, PSR Instructions, Conditional Instructions.

UNIT-III:

ARM Programming Model-II Thumb Instruction Set: Register Usage, Other Branch Instructions, Data Processing Instructions, Single-Register and Multi Register Load-Store Instructions, Stack, Software Interrupt Instructions.

UNIT-IV:

ARM Programming: Simple C Programs using Function Calls, Pointers, Structures, Integer and Floating Point Arithmetic, Assembly Code using Instruction Scheduling, Register Allocation, Conditional Execution and Loops.

UNIT-V:

Memory Management Cache Architecture, Polices, Flushing and Caches, MMU, Page Tables, Translation, Access Permissions, Content Switch.

TEXT BOOKS:

1. ARM Systems Developer's Guides- Designing & Optimizing System Software – Andrew N. Sloss, Dominic Symes, Chris Wright, 2008, Elsevier.

2. ARM System-on-chip Architecture- Stephen Bo Furber - Addison-Wesley, 2000

REFERENCE BOOKS:

1. Embedded Microcomputer Systems, Real Time Interfacing – Jonathan W. Valvano – Brookes / Cole, 1999, Thomas Learning.

I M.TECH - II SEMESTER

Course Code	Course Name	L	T	P	C
V18VLT16	EMBEDDED REAL TIME SYSTEMS	3	-	-	3

Course Outcome:

The student will be able to

1. Describe the concepts of real time operating system.
2. Explain various RTOS and their programming concepts.
3. Express program modeling for case studies.
4. Construct an image for a target board.
5. Describe RT Linux

UNIT-I: Introduction

OS Services, Process Management, Timer Functions, Event Functions, Memory Management, Device, File and IO Systems Management, Interrupt Routines in RTOS Environment and Handling of Interrupt Source Calls, Inter Process communication Functions, Real-Time Operating Systems, Basic Design Using an RTOS, RTOS Task Scheduling Models, Interrupt Latency and Response of the Tasks as Performance Metrics, OS Security Issues.

UNIT-II: RTOS Programming

Basic Functions and Types of RTOS for Embedded Systems, RTOS mCOS-II, RTOS Vx Works,

Programming concepts of above RTOS with relevant Examples, Programming concepts of RTOS Windows CE, RTOS OSEK, RTOS Linux 2.6.x and RTOS RT Linux.

UNIT-III: Program Modeling – Case Studies

Case study of embedded system design and coding for an Automatic Chocolate Vending Machine (ACVM) Using Mucos RTOS, case study of digital camera hardware and software architecture, case study of coding for sending application layer byte streams on a TCP/IP Network Using RTOS Vx Works, Case Study of Embedded System for an Adaptive Cruise Control (ACC) System in Car, Case Study of Embedded System for a Smart Card, Case Study of Embedded System of Mobile Phone Software for Key Inputs.

UNIT-IV: Target Image Creation & Programming in Linux

Off-The-Shelf Operating Systems, Operating System Software, Target Image Creation for Window XP Embedded, Porting RTOS on a Micro Controller based Development Board. Overview and programming concepts of Unix/Linux Programming, Shell Programming, System Programming.

UNIT-V: Programming in RT Linux

Overview of RT Linux, Core RT Linux API, Program to display a message periodically, semaphore management, Mutex, Management, Case Study of Appliance Control by RT Linux System.

TEXT BOOKS:

1. Dr. K.V.K.K. Prasad: “Embedded/Real-Time Systems” Dream Tech Publications, Blackpad book.
2. Rajkamal: “Embedded Systems-Architecture, Programming and Design”, Tata McGraw Hill Publications, Second Edition, 2008.

REFERENCES:

1. Labrosse, “Embedding system building blocks “, CMP publishers.
2. Rob Williams,” Real time Systems Development”, Butterworth Heinemann Publications.

I M.TECH - II SEMESTER

COURSE CODE	COURSE NAME	L	T	P	C
V18VLT17	LOW POWER VLSI (ELECTIVE-III)	3	-	-	3

Course Outcome:

The students will be able to

1. Identify various sources of power consumption
2. Estimate the power consumption sing simulation and probabilistic approaches.
3. Discuss low power design at various levels of abstraction.
4. Discuss clock distribution for low power dissipation.

UNIT-I: Introduction

Need for low power VLSI chips, Sources of power dissipation. Emerging Low power approaches. Dynamic dissipation in CMOS, Transistor sizing & gate oxide thickness, Impact of technology Scaling, Technology & Device innovation.

UNIT-II: Power estimation Simulation Power analysis:

SPICE circuit simulators, gate level logic simulation, capacitive power estimation, static state power, gate level capacitance estimation, architecture level analysis, data correlation analysis in DSP systems. Monte Carlo simulation.

Probabilistic power analysis:

Random logic signals, probability & frequency, probabilistic power analysis techniques, signal entropy.

UNIT-III: Low Power Design Circuit level:

Power consumption in circuits. Flip Flops & Latches design, high capacitance nodes, low power digital cells library

Logic level:

Gate reorganization, signal gating, logic encoding, state machine encoding, pre-computation logic

UNIT-IV: Low power Architecture & Systems:

Power & performance management, switching activity reduction, parallel architecture with voltage reduction, flow graph transformation, low power arithmetic components, low power memory design.

UNIT-V: Low power Clock Distribution:

Power dissipation in clock distribution, single driver Vs distributed buffers, Zero skew Vs tolerable skew, chip & package co design of clock network

Algorithm &architectural level methodologies: Introduction, design flow, Algorithmic level analysis & optimization, Architectural level estimation & synthesis.

TEXTBOOKS:

1. Gary K. Yeap, “Practical Low Power Digital VLSI Design”, KAP, 2002
2. Rabaey, Pedram, “Low power design methodologies” Kluwer Academic, 1997

REFERENCES BOOKS:

1. Kaushik Roy, Sharat Prasad, “Low-Power CMOS VLSI Circuit Design” Wiley, 2000

I M.TECH - II SEMESTER

COURSE CODE	COURSE NAME	L	T	P	C
V18VLT18	CMOS MIXED SIGNAL CIRCUIT DESIGN (ELECTIVE-III)	3	-	-	3

Course Outcome:

The students will be able to

1. Design Mixed signal based circuits starting from basics constraints to advanced constraints.
2. Analyze and design filter architectures using switched capacitor integrator circuits.
3. Design circuits like PLL,A/D and D/A converters.
4. Design over sampling circuits and higher order modulators.

UNIT-I: Switched Capacitor Circuits

Introduction to Switched Capacitor circuits- basic building blocks, Operation and Analysis, Non ideal effects in switched capacitor circuits, Switched capacitor integrators first order filters, Switch sharing, bi quad filters.

UNIT-II: Phased Lock Loop (PLL)

Basic PLL topology, Dynamics of simple PLL, Charge pump PLLs-Lock acquisition, Phase/Frequency detector and charge pump, Basic charge pump PLL, Non-ideal effects in PLLs- PFD/CP non-idealities, Dead zone, Jitter in PLLs; applications.

Unit III: Sampling Circuits

Basic sampling circuits for analog signal sampling, performance metrics of sampling circuits, different types of sampling switches. Sample-and-Hold Architectures- Open-loop & closed-loop architectures, open-loop architecture with miller capacitance, multiplexed-input architectures, recycling architecture, switched capacitor architecture, current-mode architecture.

UNIT-IV: D/A Converters

Nyquist rate D/A converters- Decoder based converters, Binary-Scaled converters, Thermometer-code converters, Hybrid converters.

UNIT-V: A/D Converters

Successive approximation converters, Flash converter, Two-step A/D converters, Interpolating A/D converters, Folding A/D converters, Pipelined A/D converters, Time-interleaved converters.

TEXT BOOKS:

1. Design of Analog CMOS Integrated Circuits- BehzadRazavi, TMH Edition, 2002

2. CMOS Analog Circuit Design - Philip E. Allen and Douglas R. Holberg, Oxford University Press, International Second Edition/Indian Edition, 2010.

3. Analog Integrated Circuit Design- David A. Johns,Ken Martin, Wiley Student Edition,

2016

REFERENCE BOOKS:

1. CMOS Integrated Analog-to- Digital and Digital-to-Analog converters-Rudy Van De Plassche, Kluwer Academic Publishers, 2003

2. Describeing Delta-Sigma Data converters-Richard Schreier, Wiley Interscience, 2005.

3. CMOS Mixed-Signal Circuit Design - R. Jacob Baker, Wiley Interscience, 2009.

I M.TECH - II SEMESTER

COURSE CODE	COURSE NAME	L	T	P	C
V18VLT19	SYSTEM VERILOG (ELECTIVE-III)	3	-	-	3

Course Outcome:

The students will be able to

1. Describe data types, RTL models and rules in SystemVerilog.
2. Demonstrate user defined, enumerated data types and structures in SystemVerilog.
3. Explain the procedural blocks, FSM and interfaces in SystemVerilog.

UNIT-I: Introduction to SystemVerilog:

SystemVerilog Declaration Spaces: Packages, unit compilation-unit declarations, Declarations in unnamed statement blocks, Simulation time units and precision

SystemVerilog Literal Values and Built-in Data Types

Enhanced literal value assignments, 'define enhancements, SystemVerilog variables, Using 2-state types in RTL models, Relaxation of type rules, Signed and unsigned modifiers, Static and automatic variables, Deterministic variable initialization, Type casting

UNIT-II: SystemVerilog User-Defined and Enumerated Types

User-defined types, Enumerated types

SystemVerilog Arrays, Structures and Unions Structures, Unions, Arrays, The for each array looping construct, Array querying system functions, The bits "size of" system function, Dynamic arrays, associative arrays, sparse arrays and strings

UNIT-III: SystemVerilog Procedural Blocks, Tasks and Functions

Verilog general purpose always procedural block, SystemVerilog specialized procedural blocks, Enhancements to tasks and functions

UNIT-IV: SystemVerilog Procedural Statements

New operators, Operand enhancements, Enhanced for loops, Bottom testing do...while loop, The for each array looping construct, Enhanced block names, Statement labels, Enhanced case statements, Enhanced if...else decisions

Modeling Finite State Machines with SystemVerilog

Modeling state machines with enumerated types, Using 2-state types in FSM models

UNIT-V: SystemVerilog Interfaces

Interface concepts, Interface declarations, Using interfaces as module ports, Instantiating and connecting interfaces, Referencing signals within an interface, Interface mod ports, Using tasks and functions in interfaces, Using procedural blocks in interfaces, Reconfigurable interfaces, Verification with interfaces

TEXTBOOKS:

1. Sutherland, "Systemverilog for Design", Springer publications

2. Christian B Spear, "SystemVerilog for Verification: A guide to learning the Testbench language features", Springer publications, 3 rd edition.

3. VijayaRaghavan, "SystemVerilog Assertions", Springer publications, 2005

COURSE CODE	COURSE NAME	L	T	P	C
V18VLT20	SEMICONDUCTOR MEMORY DESIGN AND TESTING (Elective-iii)	3	-	-	3

I M.TECH - II SEMESTER

Course Outcome:

The students will be able to

1. Describe concepts of volatile and non volatile memory technologies.
2. Discuss the fault modeling and testing memory devices.
3. Explain the reliability and radiation effects of memory devices.
4. Describe the advanced memory technologies.

UNIT-I: Random Access Memory Technologies

SRAM – SRAM Cell structures, MOS SRAM Architecture, MOS SRAM cell and peripheral circuit operation, Bipolar SRAM technologies, SOI technology, Advanced SRAM architectures and technologies, Application specific SRAMs, DRAM – DRAM technology development, CMOS DRAM, DRAM cell theory and advanced cell structures, BICMOS DRAM, soft error failure in DRAM, Advanced DRAM design and architecture, Application specific DRAM.

UNIT-II: Non-volatile Memories

Masked ROMs, High density ROM, PROM, Bipolar ROM, CMOS PROMS, EPROM, Floating gate EPROM cell, One time programmable EPROM, EEPROM, EEPROM technology and architecture, Non-volatile SRAM, Flash Memories (EPROM or EEPROM), advanced Flash memory architecture.

UNIT-III: Memory Fault Modeling Testing and Memory Design for Testability and Fault Tolerance

RAM fault modeling, Electrical testing, Pseudo Random testing, Megabit DRAM Testing, nonvolatile memory modeling and testing, IDDQ fault modeling and testing, Application specific memory testing, RAM fault modeling, BIST techniques for memory.

UNIT-IV: Semiconductor Memory Reliability and Radiation Effects

General reliability issues RAM failure modes and mechanism, Non-volatile memory reliability, reliability modeling and failure rate prediction, Design for Reliability, Reliability Test Structures, Reliability Screening and qualification, Radiation effects, Single Event Phenomenon (SEP), Radiation Hardening techniques, Radiation Hardening Process and Design Issues, Radiation Hardened Memory characteristics, Radiation Hardness Assurance and Testing, Radiation. Dosimetry, Water Level Radiation Testing and Test structures.

UNIT-V: Advanced Memory Technologies and High-density Memory Packing Technologies

Ferroelectric RAMs (FRAMs), GaAs FRAMs, Analog memories, magneto resistive RAMs (MRAMs), Experimental memory devices, Memory Hybrids and MCMs (2D), Memory Stacks and MCMs (3D), Memory MCM testing and reliability issues, Memory cards, High Density Memory Packaging Future Directions.

TEXT BOOKS:

1. Semiconductor Memories Technology – Ashok K. Sharma, 2002, Wiley.
2. Advanced Semiconductor Memories – Architecture, Design and Applications - Ashok K. Sharma- 2002, Wiley.
3. Modern Semiconductor Devices for Integrated Circuits – Chenming C Hu, 1st Ed., Prentice Hall.

I M.TECH - II SEMESTER

COURSE CODE	COURSE NAME	L	T	P	C
V18VLT21	HARDWARE SOFTWARE CO-DESIGN (Elective-iv)	3	-	-	3

Course Outcome:

The students will be able to

1. Describe co-design architectures, methods and algorithms.
2. Describe prototyping emulation and target architecture using embedded systems.
3. Explain the compilation techniques.
4. Distinguish the various design specifications and verifications.
5. Describe the system level specifications and design using languages.

UNIT-I: Co- Design Issues:

Co- Design Models, Architectures, Languages, A Generic Co-design Methodology.

Co- Synthesis Algorithms Hardware software synthesis algorithms: hardware – software partitioning distributed system co-synthesis.

UNIT-II:

Prototyping and Emulation Prototyping and emulation techniques, prototyping and emulation environments, future developments in emulation and prototyping architecture specialization techniques, system communication infrastructure

Target Architectures Architecture Specialization techniques, System Communication infrastructure, Target Architecture and Application System classes, Architecture for control dominated systems (8051-Architectures for High performance control), Architecture for Data dominated systems (ADSP21060, TMS320C60), Mixed Systems.

UNIT-III:

Compilation Techniques and Tools for Embedded Processor Architectures Modern embedded architectures, embedded software development needs, compilation technologies, practical consideration in a compiler development environment.

UNIT-IV:

Design Specification and Verification Design, co-design, the co-design computational model, concurrency coordinating con current computations, interfacing components, design verification, implementation verification, verification tools, interface verification.

UNIT-V:

Languages for System-Level Specification and Design-I System-level specification, design representation for system level synthesis, system level specification languages.

Languages for System-Level Specification and Design-II

Heterogeneous specifications and multi-language co-simulation, the cosyma system and lycos system.

TEXT BOOKS:

1. Hardware / Software Co- Design Principles and Practice – JorgenStaunstrup, Wayne Wolf – 2009, Springer.

2. Hardware / Software Co- Design - Giovanni De Micheli, MariagiovannaSami, 2002, Kluwer Academic Publishers.

REFERENCE BOOKS:

1. A Practical Introduction to Hardware/Software Co-design -Patrick R.Schaumont - 2010 – Springer Publications.

I M.TECH - II SEMESTER

COURSE CODE	COURSE NAME	L	T	P	C
V18VLT22	EMBEDDED COMPUTING (Elective-iv)	3	-	-	3

Course Outcome:

The students will be able to

1. Apply the concepts of Linux OS and programming
2. Describe the different software development tools and interfacing modules
3. Discuss the networking basics
4. Describe the IA32 instruction set

UNIT – I:

Programming on Linux Platform:

System Calls, Scheduling, Memory Allocation, Timers, Embedded Linux, Root File System, Busy Box. **Operating System Overview**: Processes, Tasks, Threads, Multi-Threading, Semaphore, Message Queue.

UNIT – II:

Introduction to Software Development Tools:

GNU GCC, make, gdb, static and dynamic linking, C libraries, compiler options, code optimization switches, lint, code profiling tools.

UNIT – III:

Interfacing Modules:

Sensor and actuator interface, data transfer and control, GPS, GSM module interfacing with data processing and display, OpenCV for machine vision, Audio signal processing.

UNIT – IV:

Networking Basics:

Sockets, ports, UDP, TCP/IP, client server model, socket programming, 802.11, Bluetooth, ZigBee, SSH, firewalls, network security.

UNIT – V:

IA32 Instruction Set: application binary interface, exception and interrupt handling, interruptlatency, assemblers, assembler directives, macros, simulation and debugging tools.

TEXT BOOKS:

1. Peter Barry and Patrick Crowley, "Modern Embedded Computing",1st Edition. Elsevier/Morgan Kaufmann, 2012.
2. Linux Application Development - Michael K. Johnson, Erik W. Troan, Adission Wesley, 1998.
3. Assembly Language for x86 Processors by Kip R. Irvine
4. Intel® 64 and IA-32 Architectures Software Developer Manuals

REFERENCE BOOKS

1. Abraham Silberschatz, Peter B. Galvin and Greg Gagne, "Operating System Concepts", Wiley
2. Maurice J. Bach, "The Design of the UNIX Operating System", Prentice-Hall
3. W. Richard Stevens, "UNIX Network Programming", Pearson

I M.TECH - II SEMESTER

COURSE CODE	COURSE NAME	L	T	P	C
V18VLT23	DESIGN FOR INTERNET OF THINGS (Elective-iv)	3	-	-	3

Course Outcome:
The student will be able to

1. Describe M2M and IOT technologies
2. Identify the layers and protocols in IOT
3. Describe various communication technologies used in IOT
4. Demonstrate various hardware components required for IOT applications

UNIT I – INTRODUCTION

Introduction from M2M to IoT, M2M and IoT Technology Fundamentals - Devices and gateways. IoT - An Architectural Overview – Building architecture, Main design principles and needed capabilities.

UNIT II – IOT PROTOCOLS

Functionality of Layers in IoT –Study of protocols - WirelessHART, Z-Wave, 6LoWPAN, RPL, CoAP, MQTT, oneM2M, ETSI M2M.

UNIT III COMMUNICATION TECHNOLOGIES IN IOT

IoT Connectivity – IEEE 802.15.4, WiFi, Bluetooth, Zigbee, Short Range Communications, LPWAN, Cellular Systems, Challenges and Solutions in 5G Era.

UNIT IV SYSTEM HARDWARE AND PROTOTYPING

Sensors, Actuators, Radio Frequency Identification, Wireless Sensor Networks and Participatory Sensing Technology, Prototyping the Embedded Devices for IoTs.

UNIT V – IOT APPLICATIONS

BUILDING IoT Application WITH RASPBERRY PI - Physical device – Raspberry Pi Interfaces – Programming – APIs / Packages – Web services, Real time applications of IoT- Connecting IoT to cloud – Cloud Storage for IoT.**Case Studies** - Smart and Connected Cities, Public Safety.

TEXTBOOKS:

1. Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, StamatisKarnouskos, David Boyle, “From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence”, 1 st Edition, Academic Press, 2014.
2. IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things, David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry, Cisco Press 800 East 96th Street Indianapolis, Indiana 46240 USA
3. Daniel Minoli, “Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications”, ISBN: 978-1-118- 47347-4, Willy Publications
4. IOT (Internet of Things) Programming: A Simple and Fast Way of Learning IOT by David Etter(Author)
5. Internet of Things - By Raj Kamal, McGraw-Hill Education. Copyright.

REFERENCE BOOKS:

1. From Internet of Things to Smart Cities: Enabling Technologies - edited by Hongjian Sun, Chao Wang, Bashar I. Ahmad, CRC Press -2018.
2. Peter Waher, “Learning Internet of Things”, PACKT publishing, BIRMINGHAM
3. Bernd Scholz-Reiter, Florian Michahelles, “Architecting the Internet of Things”, ISBN 978-3-642-19156-5 e-ISBN 978-3-642-19157-2, Springer
4. Vijay Madisetti and ArshdeepBahga, “Internet of Things (A Hands-on- Approach)”, 1 st Edition, VPT, 2014.

I M.TECH - II SEMESTER

COURSE CODE	COURSE NAME	L	T	P	C
V18VLT24	SOFTWARE FOR EMBEDDED SYSTEMS (Elective-iv)	3	-	-	3

Course outcomes:

The student will be able to

1. Describe the fundamentals of embedded Programming.
2. Describe the GNU C Programming Tool Chain in Linux.
3. Explain time driven architecture, Serial Interface with a case study.
4. Illustrate the concepts of embedded Java for Web Enabling of systems.

UNIT I EMBEDDED PROGRAMMING

C and Assembly - Programming Style - Declarations and Expressions - Arrays, Qualifiers and Reading Numbers - Decision and Control Statements - Programming Process - More Control Statements - Variable Scope and Functions - C Preprocessor - Advanced Types – Simple Pointers - Debugging and Optimization – In-line Assembly.

UNIT II C PROGRAMMING TOOLCHAIN IN LINUX

C preprocessor - Stages of Compilation - Introduction to GCC - Debugging with GDB – The Make utility - GNU Configure and Build System - GNU Binary utilities - Profiling - using *gprof* - Memory Leak Detection with *valgrind* - Introduction to GNU C Library

UNIT III EMBEDDED C AND EMBEDDED OS

Adding Structure to 'C' Code: Object oriented programming with C, Header files for Project and Port, Examples. Meeting Real-time constraints: Creating hardware delays - Need for timeout mechanism - Creating loop timeouts - Creating hardware timeouts. Creating embedded operating system: Basis of a simple embedded OS, Introduction to sEOS, Using Timer 0 and Timer 1, Portability issue, Alternative system architecture, Important design considerations when using sEOS.

UNIT IV TIME-DRIVEN MULTI-STATE ARCHITECTURE AND HARDWARE

Multi-State systems and function sequences: Implementing multi-state (Timed) system - Implementing a Multi-state (Input/Timed) system. Using the Serial Interface: RS232 - The Basic RS-232 Protocol - Asynchronous data transmission and baud rates - Flow control – Software architecture - Using on-chip UART for RS-232 communication - Memory requirements – The serial menu architecture - Examples. Case study: Intruder alarm system.

UNIT V EMBEDDED JAVA

Introduction to Embedded Java and J2ME – Smart Card basics – Java card technology overview – Java card objects – Java card applets – working with APDUs – Web Technology for Embedded Systems.

TEXTBOOKS:

1. Steve Oualline, 'Practical C Programming 3rd Edition', O'Reilly Media, Inc, 2006.

2. Stephen Kochan, "Programming in C", 3rd Edition, Sams Publishing, 2009.

3. Michael J Pont, "Embedded C", Pearson Education, 2007.

4. Zhiqun Chen, 'Java Card Technology for Smart Cards: Architecture and Programmer's Guide', Addison-Wesley Professional, 2000.

I M.TECH - II SEMESTER

COURSE CODE	COURSE NAME	L	T	P	C
V18VLL02	EMBEDDED SYSTEM DESIGN LAB	-	-	4	2

1. The Students are required to write the programs using C-Language according to the Experiment requirements using RTOS Library Functions and macros ARM-926 developer kits and ARM-Cortex.
2. The following experiments are required to develop the algorithms, flow diagrams, source code and perform the compilation, execution and implement the same using necessary hardware kits for verification. The programs developed for the implementation should be at the level of an embedded system design.
3. The students are required to perform THREE experiments from Part-I and ALL experiments from Part-II and Part-III.

List of Experiments:

Part-I: Experiments using ARM-926 with PERFECT RTOS

1. Register a new command in CLI.

2. Create a new Task.

3. Interrupt handling.

4. Allocate resource using semaphores.

5. Share resource using MUTEX.

6. Reader's Writer's Problem for concurrent Tasks.

Part-II Experiments on ARM-CORTEX processor using any open source RTOS.

(Coo-Cox-Software-Platform)

1. Implement the interfacing of display with the ARM- CORTEX processor.

2. Interface ADC and DAC ports with the Input and Output sensitive devices.

3. Sensor interface with ARM-Cortex processor

Part-III Experiments on Raspberry PI (RPI) & ESP8266

1. RPI interfacing with sensor.

2. Sensor data upload to cloud using RPI.

3. ESP8266 interfacing with sensor.

4. Sensor data upload to cloud using ESP8266.

Lab Requirements:

Software:

1. Eclipse IDE for C and C++ (YAGARTO Eclipse IDE), Perfect RTOS Library, COO-COX Software Platform, YAGARTO TOOLS, and TFTP SERVER.

2. LINUX Environment for the compilation using Eclipse IDE & Java with latest version.

3. Arduino IDE

4. Python

Hardware:

1. The development kits of ARM-926 Developer Kits, ARM-Cortex Boards, Raspberry PI Board and ESP 8266 Board

2. Serial Cables, Network Cables and recommended power supply for the board.

3. Sensors for interfacing.

SYLLABUS FOR M.TECH (COMPUTER SCIENCE AND ENGINEERING)

I M.TECH – I SEMESTER

		L	T	P	C
V18CTT01	**OBJECT ORIENTED SOFTWARE ENGINEERING**	**3**	**0**	**0**	**3**

Course Outcomes:

After completion of this course the students will be able to:

1. Describe Software development life cycle for Object-Oriented solutions of Real-world problems.
2. Discuss Planning, Estimation and CASE tools.
3. Apply OO concepts along with their applicability contexts.
4. Demonstrate object oriented analysis and design.
5. Describe Implementation, Integration and Maintenance phases.

UNIT I: Introduction to Classical software Engineering: Historical, Economic and Maintenance aspects. Introduction to OO Paradigm. Different phases in structured paradigm and OO Paradigm. Software Process and different life cycle models and corresponding strengths and weaknesses.

UNIT II: Planning and Estimation: Estimation of Duration and Cost, COCOMO components of software. Project Management plan. Planning Object-Oriented Projects. **Tools for step wised refinement:** Cost - Benefit analysis, Introduction to software metrics and CASE tools. Taxonomy and scope of CASE tools.

UNIT III: Modules to objects: Cohesion and Coupling, Data Encapsulation and Information hiding aspects of Objects. Inheritance, Polymorphism and Dynamic Binding aspects. Cohesion and coupling of objects. Reusability, Portability and Interoperability aspects. Introduction to testing, with focus on Utility, Reliability, Robustness, Performance, Correctness.

UNIT IV: Requirement phase: Rapid Prototyping method, Specification phase, Specification Document, Formal methods of developing specification document, Examples of other semi - formal methods of using Finite-State- Machines, Petri nets and E- Language.

Analysis phase: Use case Modeling, Class Modeling, Dynamic Modeling, Testing during OO Analysis.

UNIT V: Design phase: Data oriented design, Object Oriented design, and Formal techniques for detailed design. Challenges in design phase.**IIM Phases:** Implementation, Integration and maintenance phases, OOSE aspects in these phases.

TEXT BOOKS:

1. Object oriented and Classical Software Engineering, **7/e**, Stephen R. Schach, TMH

2. Object oriented and classical software Engineering, Timothy Lethbridge, Robert Laganiere, TMH, **Second Edition**.

REFERENCE BOOKS:

1. Component-based software engineering: 7th international symposium, **CBSE 2004**, Ivica Crnkovic, Springer.

I M.TECH – I SEMESTER

V18CTT02	**NOSQL Database**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Outcomes:

1. After successful completion of the course students should be able to:
2. Define, compare and use the four types of NoSQL Databases (Document-oriented, KeyValue Pairs, Column oriented and Graph).
3. Demonstrate an understanding of the detailed architecture, define objects, load data, query data
4. Performance tune Column-oriented NoSQL databases.
5. Explain the detailed architecture, define objects, load data, query data and performance tune Document oriented NoSQL databases.

UNIT I: Introduction: Overview and History of NoSQL Databases Definition of the Four Types of NoSQL Database, The Value of Relational Databases, Getting at Persistent Data, Concurrency, Integration, Impedance Mismatch, Application and Integration Databases, Attack of the Clusters, The Emergence of NoSQL, Key Points, Comparison of relational databases to new NoSQL stores, MongoDB, Cassandra, HBASE, Neo4j use and deployment, Application, RDBMS approach, Challenges NoSQL approach, Key-Value and Document Data Models, Column-Family Stores, Aggregate-Oriented Databases.

UNIT II: Replication and sharding, MapReduce on databases. Distribution Models, Single Server, Sharding, Master-Slave Replication, Peer-to-Peer Replication, Combining Sharding and Replication.

UNIT III: NoSQL Key/Value databases using MongoDB, Document Databases, What Is a Document Database? Features, Consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases, Event Logging, Content Management Systems, Blogging Platforms, Web Analytics or Real-Time Analytics, E-Commerce Applications, When Not to Use, Complex Transactions Spanning Different Operations, Queries against Varying Aggregate Structure.

UNIT IV: Column- oriented NoSQL databases using Apache HBASE, Column-oriented NoSQL databases using Apache Cassandra, Architecture of HBASE, What Is a Column-Family Data Store? Features, Consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases, Event Logging, Content Management Systems, Blogging Platforms, Counters, Expiring Usage, When Not to Use

UNIT V: NoSQL Key/Value databases using Riak, Key-Value Databases, What Is a Key-Value Store, KeyValue Store Features, Consistency, Transactions, Query Features, Structure of Data, Scaling, Suitable Use Cases, Storing Session Information, User Profiles, Preferences, Shopping Cart Data, When Not to Use, Relationships among Data, Multi operation Transactions, Query by Data, Operations by Sets, Graph NoSQL databases using Neo4,NoSQL database development tools and programming languages, Graph Databases, What Is a Graph Database? Features, Consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases, Connected Data, Routing, Dispatch, and Location-Based Services, Recommendation Engines, When Not to Use

TEXT BOOKS:

1. NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence , **1st Edition, 2012.** Authors: Sadalage, P. & Fowler, Publication: Pearson Education.
2. The Definitive Guide to MongoDB: A complete guide to dealing with Big Data using MongoDB, 3rd Edition, December, 2015. Authors: Eelco Plegge, David Hows, Peter Membrey, Tim Hawkins, Apress Publishers

REFERENCE BOOKS:

1. Redmond, E. ,Wilson, Perkins: Seven Databases in Seven Weeks: A Guide to Modern Databases and the NoSQL Movement Edition**: 2nd Edition,2018**, O'Reilly Publishers.

I M.TECH – I SEMESTER

V18CTT03	**ADVANCED COMPUTER ARCHITECTURE**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Outcomes

After completion of this course, student will be able to:

1. Identify different types of parallel computer models
2. Describe various processor and memory organizations.
3. Explain Pipelining, Multiprocessors and Multicomputers concepts.
4. Explain Multivector, SIMD Computers and Multithreaded, Dataflow Architectures.
5. Illustrate the parallel programming models and instruction level parallelism.

UNIT – I: Parallel computer models: The state of computing, Multiprocessors and Multicomputers, Multivector and SIMD computers. **Program and network properties:** Conditions of parallelism, Program partitioning and scheduling, Program flow mechanisms.

UNIT – II: Processors: Advanced Processor Technology, Superscalar Processors and Vector Processors. **Memory Hierarchy, Cache and Shared Memory:** Memory Hierarchy Technology, Virtual Memory Technology, Cache Memory Organizations, Shared-Memory Organizations.

UNIT – III: Pipelining: Linear Pipeline Processors, Nonlinear Pipeline Processors, Instruction Pipeline Design, Arithmetic Pipeline Design.**Multiprocessors and Multicomputers:** Multiprocessor System Interconnects, Cache Coherence and Synchronization Mechanisms, Message Passing Mechanisms.

UNIT – IV: Multivector and SIMD Computers: Vector Processing Principles, Compound Vector Processing.**Scalable, Multithreaded, Dataflow Architectures:** Latency-Hiding Techniques, Principles of Multithreading.

UNIT – V: Parallel Models, Languages: Parallel Programming Models, Parallel Languages and Compilers.**Instruction Level Parallelism:** Problem Definition, Model of a Typical Processor, Compiler- detected Instruction Level Parallelism, Operand Forwarding, Reorder Buffer, Register Renaming, Tomasulo's Algorithm, Branch Prediction.

TEXT BOOKS:

Advanced Computer Architecture: Parallelism, Scalability, Programmability, Kai Hwang, Naresh Jotwani, **Second Edition**, Tata McGraw Hill Education

REFERENCE BOOKS:

1. Computer Organization and Design, David A. Patterson and John. L. Hennessy, **Fifth Edition**, Morgan Kaufmann Series.
2. Computer Architecture and Organization, John P. Hayes, **Third Edition**, McGraw Hill Education.
3. Computer Architecture and Organization: Design Principles and Applications, B. Govindarajulu, **Second Edition**, McGraw Hill Education.

I M.TECH – I SEMESTER

V18CTT04	**ADVANCED OPERATING SYSTEMS**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Outcomes:

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

1. Define, Explain, and Apply Distributed Operating System Concepts: Architectures of Distributed Systems, Distributed Mutual Exclusion, Issues and its Inherent Limitations.
2. Describe the concepts of Distributed Resource Management, Dead lock Detection and Resolution
3. Explain the concepts of Distributed Shared Memory, Distributed Scheduling, Failure Recovery and Fault tolerance
4. Describe the concepts of Cryptography and Data Security in Distributed System
5. Describe Multiprocessor Operating System and Database Operating System: Concepts, Architecture and Design issues

UNIT - I:Architectures of Distributed Systems - System Architecture types - issues in distributed operating systems - communication networks - communication primitives. Theoretical Foundations – inherent limitations of a distributed system - lamp ports logical clocks - vector clocks - casual ordering of messages - global state - cuts of a distributed computation - termination detection. Distributed Mutual Exclusion - introduction - the classification of mutual exclusion and associated algorithms – a comparative performance analysis.

UNIT-II: Distributed Deadlock Detection -Introduction - deadlock handling strategies in distributed systems - issues in deadlock detection and resolution - control organizations for distributed deadlock detection - centralized and distributed deadlock detection algorithms - hierarchical deadlock detection algorithms. Agreement protocols - introduction-the system model, a classification of agreement problems, solutions to the Byzantine agreement problem, applications of agreement algorithms. Distributed resource management: introduction-architecture - mechanism for building distributed file systems - design issues - log structured file systems.

UNIT-III: Distributed shared memory-Architecture- algorithms for implementing DSM - memory coherence and protocols - design issues. Distributed Scheduling - introduction - issues in load distributing - components of a load distributing algorithm - stability - load distributing algorithm – performance comparison - selecting a suitable load sharing algorithm - requirements for load distributing –task migration and associated issues. Failure Recovery and Fault tolerance: introduction- basic concepts - classification of failures - backward and forward error recovery, backward error recovery- recovery in concurrent systems - consistent set of check points - synchronous and asynchronous check pointing and recovery - check pointing for distributed database systems- recovery in replicated distributed databases.

UNIT-IV: Protection and security -preliminaries, the access matrix model and its implementations.- safety in matrix model- advanced models of protection. Data security - cryptography: Model of cryptography, conventional cryptography- modern cryptography, private key cryptography, data encryption standard public key cryptography - multiple encryption - authentication in distributed systems.

UNIT-V: Multiprocessor Operating Systems - basic multiprocessor system architectures - inter connection networks for multiprocessor systems - caching - hypercube architecture. Multiprocessor Operating System - structures of multiprocessor operating system, operating system design issues- threads- process synchronization and scheduling. Database Operating systems :Introduction- requirements of a database operating system Concurrency control : theoretical aspects - introduction, database systems - a concurrency control model of database systems- the problem of concurrency control - serializability theory- distributed database systems, concurrency control

algorithms - introduction, basic synchronization primitives, lock based algorithms-timestamp based algorithms, optimistic algorithms - concurrency control algorithms, data replication.

TEXT BOOKS:

1. Mukesh Singhal, Niranjan G.Shivaratri, "Advanced concepts in operating systems: Distributed, Database and multiprocessor operating systems", **TMH, 2001**

REFERENCE BOOKS:

1. Andrew S.Tanenbaum, "Modern operating system", **PHI, 2003**
2. Pradeep K.Sinha, "Distributed operating system-Concepts and design", PHI, 2003.
3. Andrew S.Tanenbaum, "Distributed operating system", Pearson education, 2003.

I M.TECH – I SEMESTER

V18CTT05	**ADVANCED DATA STRUCTURES AND ALGORITHM ANALYSIS**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Outcomes:

After completion of this course, student will be able to:

1. Build Linear data structures using static and dynamic memory allocation.
2. Construct different types of trees.
3. Implement different types of graph algorithms.
4. Analyze algorithms and to determine correctness and time efficiency of algorithm.
5. Implement dynamic programming for different types of problems.

UNIT – I: Performance analysis, asymptotic notation, performance measurement. Linear Data Structures-Abstract Data Types, Linked list - Single, double and Circular linked list, Skip list. Stacks and Queues implement using Array representation and Linked list representation, Circular Queues, applications of stacks and queues.

UNIT – II: Trees – Introduction to trees, Binary tree, Threaded Binary tree, Binary Search Tree, AVL Trees, Red Black Trees, Splay tree. Multi way trees: B- Trees , B^* Tress, B^+ Trees , prefix B^+ Tress, 2-4 trees, tree traversal techniques, tries.

UNIT – III: Graphs – Introduction to Graphs, Graph representation(array and linked list), Graph traversing algorithms, complexity analysis of BFS and DFS, Spanning trees, Shortest path calculation, topological sort and graph applications.

UNIT – IV: Algorithm analysis – Introduction, Greedy Method and its applications (I/o Knapsack Problem and topological sort). Divide and conquer and its applications (Merge sort and quick sort).

UNIT – V: Dynamic programming and its applications (I/o Knapsack problem and all pairs shortest path), Back Tracking and its applications (I/o Knapsack problem, travelling sales person). Branch and bound and its applications (I/o Knapsack problem, travelling sales person).

TEXT BOOKS:

1. "Data Structures, Algorithms and Applications in C++ ", ,Sartaj Sahni, University Press **Second Edition**.
2. "Data Structures and algorithms in JAVA", Adam Drozdek, Thomson Course Technology, Indian edition, **second edition**.

REFERENCE BOOKS:

1. Data Structures, A Pseudocode Approach, Richard F Gilberg, Behrouz A Forouzan, Cengage **Second Edition**.
2. Data structures and Algorithm Analysis in C, 2nd edition, Mark Allen Weiss, Pearson
3. Classic Data Structures, **2/e**, Debasis, Samanta, PHI, **2009.**

I M.TECH – I SEMESTER

V18CTT06	**MACHINE LEARNING**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Outcomes:

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

1. Recognize the characteristics of machine learning that make it useful to real-world Problems.
2. Characterize machine learning algorithms as supervised, semi-supervised, and unsupervised.
3. Have heard of a few machine learning toolboxes.
4. Be able to use support vector machines.
5. Be able to use regularized regression algorithms.

UNIT - I: The ingredients of machine learning, Tasks: the problems that can be solved with machine learning, Models: the output of machine learning, Features, the workhorses of machine learning. Binary classification and related tasks: Classification, Scoring and ranking, Class probability estimation.

UNIT-II: Beyond binary Classification: Handling more than two classes, Regression, Unsupervised and descriptive learning. **Concept learning:** The hypothesis space, Paths through the hypothesis space, Beyond conjunctive concepts.

UNIT-III: Tree models: Decision trees, Ranking and probability estimation trees, Tree learning as variance reduction. **Rule models:** Learning ordered rule lists, Learning unordered rule sets, Descriptive rule learning, First-order rule learning

UNIT-IV: Linear models: The least-squares method, The perceptron: a heuristic learning algorithm for linear classifiers, Support vector machines, obtaining probabilities from linear classifiers, Going beyond linearity with kernel methods. **Distance Based Models:** Introduction, Neighbours and exemplars, Nearest Neighbours classification, Distance Based Clustering, Hierarchical Clustering.

UNIT-V: Probabilistic models: The normal distribution and its geometric interpretations, Probabilistic models for categorical data, Discriminative learning by optimising conditional likelihood Probabilistic models with hidden variables. **Features:** Kinds of feature, Feature transformations, Feature construction and selection. Model ensembles: Bagging and random forests, Boosting

TEXT BOOKS:

1. Machine Learning: The art and science of algorithms that make sense of data, Peter Flach, Cambridge,**2012**.
2. Machine Learning, Tom M. Mitchell, MGH,2017.

REFERENCE BOOKS:

1. UnderstandingMachine Learning: From Theory to Algorithms, Shai Shalev-Shwartz, ShaiBenDavid, Cambridge,**2014**.
2. Machine Learning in Action, Peter Harington, **2012**, Cengage.

I M.TECH – I SEMESTER

V18CTL01	**NOSQL Database Laboratory**	**L**	**T**	**P**	**C**
		0	**0**	**2**	**1**

Course Outcomes

After successful completion of the course students should be able to:

1. Install and run MongoDb
2. Identify differences between relational and NoSQL database systems
3. Execute various operations in Mongo DB
4. Apply Mapreduce for problem solving
5. Know Column oriented databases

LIST OF EXPERIMENTS

1. Introduction to MongoDB and its Installation on Windows & Linux
2. Description of mongo Shell, Create database and show database
3. Commands for MongoDB and To study operations in MongoDB – Insert, Query, Update, Delete and Projection
4. Where Clause equivalent in MongoDB
5. To study operations in MongoDB – AND in MongoDB, OR in MongoDB, Limit Records and Sort Records. To study operations in MongoDB – Indexing, Advanced Indexing, Aggregation and Map Reduce.
6. Practice with 'macdonalds' collection data for document oriented database. Import restaurants collection and apply some queries to get specified output.
7. Simple Querying using simple select(row and column) and Hive functions
8. Advanced querying using table joins, sampling in hive and subqueries
9. Define an external Hive table and review the results
10. Column oriented databases study, queries and practices

I M.TECH – I SEMESTER

V18CTL02	**ADVANCED DATA STRUCTURES AND ALGORITHM ANALYSIS LAB**	**L**	**T**	**P**	**C**
		0	**0**	**2**	**1**

Course Outcomes:

After completion of this course, student will be able to:

1. Design and analyze simple linear and non linear data structures
2. Implement ADT for Data Structures
3. Implement algorithms using different types of technique.
4. Strengthen the ability to identify and apply the suitable data structure for the given real world problem

List of Experiments

Implement the following list of experiments using C++:

1. Write a program to implement single linked list, double linked list and circular linked list using ADT.
2. Implement stack and queue using ADT.
3. Implementation of Multitask in a Single Array
4. Implement evolution of expression
5. Implement AVL Trees operations and display the tree elements using any one non recursive traversing technique.
6. Construct a graph and implement BFS and DFS graph traversal techniques.
7. Construct a graph and implement Prims and Krushkals minimum spanning trees.
8. Implement single source and all pair shortest path algorithms.
9. Implement Merge sort and quick sort using divide and conquer technique
10. Implement I/o Knapsack Problem using greedy technique
11. Implement travelling sales person problem using back tracking.
12. Implement any algorithm using Branch and Bound technique.

I M.TECH – II SEMESTER

V18CTT07	**DATA SCIENCE**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Outcomes:

After completion of this course, student will be able to:

1. Understand the process of data validation and its role in decision making
2. Understand, create, and modify analytic and exploratory algorithms operating over data. Verify and quantify the validity of hypothesis using data analytics.
3. Know the privacy and data protection legislation and the data scientist professional code and ethics.

UNIT-1: Introduction: What is Data Science? What roles exist in Data Science? Current landscape of perspectives. Define the workflow, tools and approaches data scientists use to analyze data. Define a problem and identify appropriate data sets using the data science workflow. Walkthrough the data science workflow using a case study.

UNIT-II: Statistics Fundamentals: Exploratory Data Analysis and the Data Science Process-analyze datasets using basic summary statistics: mean, median, mode, max, min, quartile, inter-quartile, range, variance, standard deviation and correlation.

UNIT-III: Data Visualization – scatter plots, scatter matrix, line graph, box blots, and histograms. Identify a normal distribution within a dataset using summary statistics and visualization. Causation vs. Correlation. Test a hypothesis within a sample case study. Validate your findings using statistical analysis.

UNIT-IV: Foundations of Data Modeling: Introduction Regression – data modelling and linear regression. Categorical variables versus Continuous variables. Build the linear regression/logistic regression model using a dataset. Fit model – regularization, bias and error metrics. Evaluate model fit using loss functions – MSE (Mean Square Error), RMSE (Root MSE), Mean Absolute Error(MAE). Apply different regression models based on fit and complexity. Evaluate model using metrics such as accuracy/error, Confusion matrix, ROC curve and Cross Validation.

UNIT-V:Dimensionality Reduction – perform dimensionality reduction using topic models such as PCA and SVD. Refine and extract data/information from sample datasets. Introduction to Classification - define classification model, apply k-NN, Naïve Classifier and Decision trees. Build the classification model using a dataset and evaluate.

TEXT BOOKS:

1. The Art of Data Science: A Guide for Anyone Who Works with Data, Roger D. Peng, Elizabeth Matsui, Lean Pub, **2015**.
2. Doing Data Science, Straight Talk from The Frontline, Cathy O'Neil and Rachel Schutt. O'Reilly. **2014**.
3. Data Science for Business: What You Need to Know about Data Mining and Data-analytic Thinking, Foster Provost and Tom Fawcett**. 2013**
4. Elements of Statistical Learning, Trevor Hastie, Robert Tibshirani and Jerome Friedman, Springer, **2009**.

REFERENCE BOOKS:

1. Mining of Massive Datasets, JureLeskovek, AnandRajaraman and Jeffrey Ullman. Cambridge University Press. **2014**.
2. Machine Learning: A Probabilistic Perspective.Kevin P. Murphy, MIT Press, **2013**.
3. Data Mining and Analysis: Fundamental Concepts and Algorithms, Mohammed J. Zaki and Wagner Miera Jr., Cambridge University Press. **2014**.
4. R Programming for Data Science, Roger D. Peng, LeanPub, **2015**.
5. Python for Data Science for Dummies, Luca Massaron and John Paul Mueller, John Wiley and Sons, **2015.**

I M.TECH – II SEMESTER

V18CTT08	**Advanced Web Technologies**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Outcomes:

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

1. Understand the current technologies in Internet world
2. Design interactive web pages using HTML & Style Sheets and design Individual Graphical User Interfaces
3. Acquire knowledge of XML fundamentals and usage of XML technology in electronic data Interchange and creation of desktop applications using swings and beans.
4. Know the fundamentals of client side scripting such as JavaScript and apply it for data validation.
5. Design and develop web based enterprise systems for the enterprises using technologies like JSP with database.
6. Implement client side programming using java script, CSS
7. Learn and implement advanced and current technologies like AJAX, JQuery, PHP, Servlets and JSP
8. Learn to implement web services

UNIT-I

HTML & CSS: Introduction **-** Elements, Tags, Attributes, Heading, Paragraph. Formatting, Link, Image, Table, List, Block, Form, Frame Layout, DHTML, Basic Web Page Development, CSS- Create Class Styles, Create ID Styles ,Span, Colors.HTML5 in brief.

JavaScript : Introduction **-** JavaScript in Web Pages, The Advantages of JavaScript Writing JavaScript into HTML; Building Up JavaScript Syntax; Basic Programming Techniques; Operators and Expressions in JavaScript; JavaScript Programming Constructs; Conditional Checking Functions in JavaScript, Dialog Boxes, Statements, comments, variable, comparison, condition, switch, loop, break. Object – string, array. Function, Errors, Validation. The JavaScript Document Object Model-Introduction (Instance, Hierarchy); The JavaScript Assisted Style Sheets DOM; Understanding Objects in HTML (Properties of HTML objects, Methods of HTML objects); Browser Objects, Handling Events Using JavaScript

UNIT-II

Extensible Markup Language (XML):- Brief Over View of XML – XML Document structure, XML namespaces, Defining structure in XML documents, Reuse of XML schemes, Document navigation and transformation, Tree, Syntax, Elements, Attributes, Validation, and Viewing. XHTML in brief

Installing and Configuring MySQL:- Current and Future Versions of MySQl , How to Get MySQL, Installing MySQL on Windows, Trouble Shooting your Installation, Basic Security Guidelines

UNIT-III

Advanced Dynamic Web Client Side Programming: AJAX-xml Http Request object-AJAX applications-AJAX frame work -java script libraries - JQuery-basics – event handling, DOM,AJAX-effects- jQuery UI Web design Frameworks: Responsive web design-overview on Twitter bootstrap-DoJo- YahooUI-Google web toolkit libraries-Applets-overview on javaFX applets

UNIT-IV

Server Side Programming with PHP: The Building blocks of PHP, Variables, Data Types, Operators and Expressions, Constants. Flow Control Functions in PHP: Switching Flow, Loops, Code Blocks and Browser Output.

Functions: What is function? Calling functions, Defining Functions. Variable Scope, more about arguments working with Arrays and Some Array-Related Functions.

Working with Objects: Creating Objects, Object Instance Working with Strings, Dates and Time: Formatting strings with PHP, Investigating Strings with PHP, Manipulating Strings with PHP, Using Date and Time Functions in PHP

Working with Forms: Creating Forms, Accessing Form Input with User defined Arrays, Combining HTML and PHP code on a single Page, Using Hidden Fields to save state, Redirecting the user, Sending Mail on Form Submission, and Working with File Uploads.

Learning basic SQL Commands: Learning the MySQL Data types, Learning the Table Creation Syntax, Using Insert Command, Using SELECT Command, Using WHERE in your Queries, Selecting from Multiple Tables, Using the UPDATE command to modify records, Using the DELETE Command, Frequently used string functions in MySQL, Using Date and Time Functions in MySQL.

Interacting with MySQL using PHP: MySQL Versus MySQLi Functions, Connecting to MySQL with PHP, Working with MySQL Data.

UNIT-V

Server Side Programming With Servlets and JSP: Web Servers and Servlets: Tomcat web server, Introduction to Servelets: Lifecycle of a Serverlet, JSDK, The Servelet API, The javax.servelet Package, Reading Servelet parameters, Reading Initialization parameters. The javax.servelet HTTP package, Handling Http Request & Responses, Using Cookies-Session Tracking, Security Issues, Introduction to JSP: The Anatomy of a JSP Page. JSP Application Design with MVC , JSP Application Development: Generating Dynamic Content, Using Scripting Elements Implicit JSP Objects, Conditional Processing Sharing Session and Application Data Memory Usage Considerations

TEXT BOOKS:

1. "*Java server programming java JavaEE5 Black Book*", Kogent Solutions Dreamtech Press, Inc, ISBN-13 9788177228359 ISBN-10 8177228358, 2008.
2. "*AJAX black book*", new edition, Kogent Solutions Inc, Dreamtech Press, ISBN:10-81-7722-838-2 ISBN:13-978-81-7722-838-063. Jonathan Chaffer, Karl Swedberg, "*Learning jQuery*", 3rd Edition , , ISBN 13: 9781849516549, 2011
3. Chris Bates,*Web Programming- building internet applications*, 2nd edition, WILEY, Dreamtech, 2006
4. Patrick Naughton and Herbert Schildt, The *complete Reference Java seventhEdition*,TMH, 2007
5. Hans Bergsten, Java *Server Pages*, SPD O'Reilly, 2000
6. Robert W.Sebesta,*Programming world wide web*,Pearson Education,4th edition,2010
7. Marty Hall and Larry Brown,*Servlets And Java Server Pages Volume 1: CORE Technologies,*Pearson,2003.
8. Patrick Naughton and Herbert Schildt, The *complete Reference Java2fifth Edition*, TMH,1999.
9. "Internet and world wide web – How to Program", Deitel & Deitel, Goldberg, Pearson Education, **4th Edition,2008**.

REFERENCE BOOKS:

1. Professional Java Server Programming,S.Allamaraju and othersApress (dreamtech), J2EE 1.3ed, **2007**.
2. Java Server Programming ,Ivan Bayross and others,The X Team,SPD, 2nd Edition.
3. Web Warrior Guide to Web Programmming-Bai/Ekedaw-Thomas ,1st Edition.
4. Beginning Web Programming-Jon Duckett WROX, August 2004.
5. Java Server Pages, Pekowsky, Pearson, 2nd Edition.
6. Java Script,D.Flanagan,O'Reilly,6th Edition.

I M.TECH – II SEMESTER

V18CTT09	**CLOUD COMPUTING**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Outcomes are:

After completion of the course the student will be able to

1. Able to understand about Cloud Computing Platforms and Technologies.
2. Students will be aware about Architecture and Open Challenges in Cloud Computing.
3. Students will be able to monitor and manage cloud computing applications.
4. Students will be able to describe the mechanisms needed to harness Cloud Computing in their own respective endeavors.
5. Students will be able to solve case studies related to Cloud Computing.

UNIT-I

Overview of Computing Paradigm: Recent trends in Computing Grid Computing, Cluster Computing, Distributed Computing, Utility Computing, Cloud Computing Evolution of cloud computing Business driver for adopting cloud computing

Introduction to Cloud Computing Cloud Computing (NIST Model) Introduction to Cloud Computing, History of Cloud Computing, Cloud service providers Properties, Characteristics &Disadvantages Pros and Cons of Cloud Computing, Benefits of Cloud Computing, Cloud computing vs. Cluster computing vs. Grid computing Role of Open Standards

UNIT-II

Cloud Computing Architecture Cloud computing stack Comparison with traditional computing architecture (client/server), Services provided at various levels, How Cloud Computing Works, Role of Networks in Cloud computing, protocols used, Role of Web services Service Models (XaaS) Infrastructure as a Service(IaaS) , Platform as a Service(PaaS), Software as a Service(SaaS) Deployment Models Public cloud, Private cloud, Hybrid cloud, Community cloud.

UNIT-III

Infrastructure as a Service(IaaS) Introduction to IaaS IaaS definition, Introduction to virtualization, Different approaches to virtualization, Hypervisors, Machine Image, Virtual Machine(VM) Resource Virtualization Server, Storage, Network Virtual Machine (resource) provisioning and manageability, storage as a service, Data storage in cloud computing(storage as a service) Examples Amazon EC2 Renting, EC2 Compute Unit, Platform and Storage, pricing, customers Eucalyptus

Platform as a Service(PaaS) Introduction to PaaS What is PaaS, Service Oriented Architecture (SOA) Cloud Platform and Management Computation Storage Examples Google App Engine Microsoft Azure

Software as a Service (PaaS) Introduction to SaaS, Web services, Web 2.0, Web OS, Case Study on SaaS

UNIT-IV

Service Management in Cloud Computing Service Level Agreements(SLAs), Billing & Accounting, Comparing Scaling Hardware: Traditional vs. Cloud, Economics of scaling: Benefitting enormously Managing Data Looking at Data, Scalability & Cloud Services Database & Data Stores in Cloud Large Scale Data Processing

UNIT-V

Cloud Security Infrastructure Security Network level security, Host level security, Application level security Data security and Storage Data privacy and security Issues, Jurisdictional issues raised by Data location Identity & Access Management, Access Control, Trust, Reputation, Risk, Authentication in cloud computing, Client access in cloud, Cloud contracting Model, Commercial and business considerations

TEXT BOOKS:

1. Cloud Computing Bible, Barrie Sosinsky, Wiley-India, **2010**
2. Cloud Computing: Principles and Paradigms, Editors: Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, Wile, **2011.**
3. Cloud Computing: Principles, Systems and Applications, Editors: Nikos Antonopoulos, Lee Gillam, Springer, **2012.**
4. Cloud Security: A Comprehensive Guide to Secure Cloud Computing, Ronald L. Krutz, Russell Dean Vines, Wiley-India**, 2010**.
5. Gautam Shroff, "*Enterprise Cloud Computing Technology Architecture Applications*", Cambridge University Press; 1 edition, [ISBN: 978-0521137355**], 2010**.
6. Toby Velte, Anthony Velte, Robert Elsenpeter, "*Cloud Computing, A Practical Approach"* McGraw-Hill Osborne Media; 1 edition [ISBN: 0071626948], **2009.**
7. Dimitris N. Chorafas, "*Cloud Computing Strategies"* CRC Press; 1 edition [ISBN: 1439834539],**2010**.
8. Cloud Computing for Dummies by Judith Hurwitz, R.Bloor, M.Kanfman, F.Halper (Wiley India Edition)

REFERENCE BOOKS:

1. Enterprise Cloud Computing by Gautam Shroff,Cambridge,**2010.**
2. Rajkumar Buyya, Christian Vecchiola and S. Thamarai Selvi, Mastering Cloud Computing, published by McGraw Hill Publication (India) Private Limited, 2013 (ISBN 978-1-25-902995-0).
3. John W. Rittinghouse, James F. Ransome, Cloud Computing implementation, management and security, CRC Press, Taylor & Francis group, 2010.
4. Anthony T.velte, Toby J.velte Robert Elsenpeter, Cloud computing a practical approach, Tata Mc Graw Hill edition, 2010.

I M.TECH – II SEMESTER

V18CTT10	**INTERNET OF THINGS**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Outcomes:
After completion of this course, student will be able to:

1. Demonstrate knowledge and understanding of the security and ethical issues of the Internet of Things
2. Conceptually identify vulnerabilities, including recent attacks, involving the Internet of Things
3. Develop critical thinking skills
4. Compare and contrast the threat environment based on industry and/or device type

UNIT – I: The Internet of Things: An Overview of Internet of things,Internet of Things Technology, behind IoTs Sources of the IoTs, M2M Communication, Examples OF IoTs, Design Principles For Connected Devices

UNIT – II: Business Models for Business Processes in the Internet of Things ,IoT/M2M systems LAYERS AND designs standardizations ,Modified OSI Stack for the IoT/M2M Systems ,ETSI M2M domains and High-level capabilities ,Communication Technologies, Data Enrichment and Consolidation and Device Management Gateway Ease of designing and affordability

UNIT – III: Design Principles for the Web Connectivity for connected-Devices, Web Communication protocols for Connected Devices, Message Communication protocols for Connected Devices, Web Connectivity for connected-Devices.

UNIT – IV: Internet Connectivity Principles, Internet connectivity, Application Layer Protocols: HTTP, HTTPS, FTP, Telnet.

UNIT – V: Data Acquiring, Organizing and Analytics in IoT/M2M, Applications/Services/Business Processes, IOT/M2M Data Acquiring and Storage, Business Models for Business Processes in the Internet Of Things, Organizing Data, Transactions, Business Processes, Integration and Enterprise Systems.

TEXT BOOKS:

1. Internet of Things: Architecture, Design Principles And Applications, Rajkamal, McGraw Hill Higher Education,**2017**.
2. Internet of Things, A.Bahgya and V.Madisetti, Univesity Press, **2015.**

REFERENCES

1. Designing the Internet of Things, Adrian McEwen and Hakim Cassimally, Wiley,**2013.**
2. Getting Started with the Internet of Things CunoPfister , Oreilly,May 2011.

I M.TECH – II SEMESTER

		L	T	P	C
V18CTT11	**CYBER SECURITY (Elective-I)**	**3**	**0**	**0**	**3**

Course Outcomes:

After completion of this course, student will be able to:

1. Understand the broad set of technical, social & political aspects of Cyber Security.
2. Appreciate the vulnerabilities and threats posed by criminals, terrorist and nation states to national infrastructure.
3. Understand the nature of secure software development, operating systems and data base design.
4. Recognized the role security management plays in cyber security defense.
5. Understand the security management methods to maintain security protection.
6. Understand the legal and social issues at play in developing solutions

UNIT-I: Systems Vulnerability Scanning: Overview of vulnerability scanning, Open Port / Service Identification, Banner /Version Check, Traffic Probe, Vulnerability Probe, Vulnerability examples, OpenVAS, Metasploit. Networks Vulnerability Scanning - Netcat, Socat, understanding Port and Services tools - Datapipe, Fpipe, WinRelay, Network Reconnaissance Nmap, THC-Amap and System tools. Network Sniffers and Injection tools – Tcpdump and Windump, Wireshark, Ettercap, Hping Kismet

UNIT – II: Network Defense tools: Firewalls and Packet Filters: Firewall Basics, Packet Filter Vs Firewall, How a Firewall Protects a Network, Packet Characteristic to Filter, Stateless Vs Stateful Firewalls, Network Address Translation (NAT) and Port Forwarding, the basic of Virtual Private Networks, Linux Firewall, Windows Firewall, Snort: Introduction Detection System.

UNIT – III: Web Application Tools: Scanning for web vulnerabilities tools: Nikto, W3af, HTTP utilities - Curl, Open SSL and Stunnel, Application Inspection tools – Zed Attack Proxy, Sqlmap. DVWA, Webgoat, Password Cracking and Brute-Force Tools – John the Ripper, L0htcrack, Pwdump, HTC-Hydra

UNIT – IV:Introduction to Cyber Crime and law: Cyber Crimes, Types of Cybercrime, Hacking, Attack vectors, Cyberspace and Criminal Behavior, Clarification of Terms, Traditional Problems Associated with Computer Crime, Introduction to Incident Response, Digital Forensics, Computer Language, Network Language, Realms of the Cyber world, A Brief History of the Internet, Recognizing and Defining Computer Crime, Contemporary Crimes, Computers as Targets, Contaminants and Destruction of Data, Indian IT ACT 2000.

UNIT – V:Introduction to Cyber Crime Investigation: Firewalls and Packet Filters, password Cracking,Keyloggers and Spyware, Virus and Warms, Trojan and backdoors, Steganography, DOS and DDOS attack, SQL injection, Buffer Overflow, Attack on wireless Networks.

TEXT BOOKS:

1. Anti-Hacker Tool Kit (Indian Edition) by Mike Shema, Publication Mc Graw Hill, **Fourth Edition,2014.**
2. Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by Nina Godbole and Sunit Belpure, Publication Wiley, **First Edition, 2011.**

REFERENCE BOOKS:

1. The Official CHFI Study Guide for Computer Hacking Forensic Investigator by Dave Kleiman,**First Edition,2007.**
2. CISSP Study Guide**, 6th Edition** by James M. Stewart

I M.TECH – II SEMESTER

V18CTT12	**ARTIFICIAL INTELLIGENCE (Elective-I)**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Outcomes:

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

1. Describe Artificial Intelligence Techniques.
2. Illustrate Knowledge Representation in AI
3. Explain the concepts of planning and learning in AI

UNIT – I: Artificial Intelligence Introduction: The AI Problems, AI Technique, Defining the Problem as a State Space Search, Production Systems, Problem Characteristics, Production System Characteristics, Issues in the Design of Search Programs.

UNIT –II: Heuristic Search Techniques: Generate and Test, Hill Climbing, Best First Approach, Problem Reduction, Constraint Satisfaction, Means-Ends analysis.

UNIT –III: Knowledge Representation using Predicate Logic and Rules: Representing Simple Facts in Logic, Representing Instance and ISA Relationships, Computable Functions and Predicates, Resolution, Natural Deduction, Logic Programming, Forward Versus Backward Reasoning, Matching, Control Knowledge.

UNIT –IV: Planning: The Blocks World Example, Components of a Planning System, Goal Stack Planning, Nonlinear planning using constraint posting, Hierarchical Planning, Reactive Systems.

UNIT –V: Learning: Rote Learning, Learning by taking advice, Learning in problem solving, Learning from examples, Explanation Based Learning, Discovery, Analogy, Formal Learning Theory.

TEXTBOOK:

1. Artificial Intelligence, Elaine Rich, Kevin Knight, Shivashankar B Nair, Third Edition, Tata McGraw Hill Education Private Limited., **2009**

REFERENCES:

1. Artificial intelligence A modern Approach **, 3rd Edition**, Stuart Russel, Peter Norvig, Pearson Education.
2. Artificial Intelligence, A new Synthesis, Nils J Nilsson, Elsevier,**1st Edition, 1997**.

I M.TECH – II SEMESTER

V18CTT13	**BIO INFORMATICS (Elective-I)**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Outcomes:

After completion of the course the student will be able to

1. **Broad Understanding of Biology**: Students will interpret relationships among living things and analyze and solve biological problems, from the molecular to ecosystem level using basic biological concepts, grounded in foundational theories."
2. **Computer Programming**: Students will create computer programs that facilitate bioinformatics.
3. The students will be able to describe the contents and properties of the most important bioinformatics databases, perform text- and sequence-based searches, and analyze and discuss the results in light of molecular biological knowledge
4. The students will be able to explain the major steps in pairwise and multiple sequence alignment, explain the principle for, and execute Pairwise sequence alignment by dynamic programming

UNIT-I: Basic Biology: What is life? The unity and the diversity of living things, Prokaryotes and Eukaryotes, Yeast and People, Evolutionary time and relatedness, Living parts: Tissues, cells, compartments and organelles, Central dogma of molecular biology, Concept of DNA, RNA, Protein and metabolic pathway.

Bio Informatics: Introduction, What is Bioinformatics? Recent challenges in Bioinformatics, Sequencing, Biological sequence/structure, Genome Projects, Pattern recognition an prediction

UNIT-II: Biological databases: Their needs and challenges. Example of different biological databases – sequence, structure, function, micro-array, pathway, etc, Primary sequence databases, Protein Sequence databases, Secondary databases, Protein pattern databases, and Structure classification databases, Genome Information Resources DNA sequence databases, specialized genomic resources

UNIT-III : Sequence Analysis: Importance of DNA analysis, Gene structure and DNA sequences, Features of DNA sequence analysis, EST (Expressed Sequence Tag) searches, Gene hunting, Profile of a cell, EST analysis, Effects of EST data on DNA databases.**Theory and Tools:** - Pairwise alignment – Different local and global search alignment, Heuristic searches (like BLAST) applicable to search against database, Multiple alignment algorithms, Whole genome comparison, Database searching, Alphabets and complexity, Algorithm and programs, Comparing two sequences, sub-sequences, Identity and similarity, The Dotplot, Local and global similarity, different alignment techniques, Dynamic Programming, Pair wise database searching.

UNIT-IV:Walk through the genome: Prediction of regulatory motifs, Operon, Gene, splices site, etc.

Markov models: Hidden Markov models – The evaluation, decoding and estimation problem and the algorithms. Application in sequence analysis

UNIT-V:Molecular phylogeny: maximum Parsimony, distance Matrix and maximum likelihood methods. Concepts of adaptive evolution.**Application of graph theory in Biology**: Biochemical Pathway, Protein-protein interaction network, Regulatory network and their analysis.

TEXT BOOKS:

1. Bioinformatics: Sequence, Structure and Databanks: A Practical Approach (The Practical Approach Series, 236), Des Higgins (Editor), Willie Taylor. **1st edition, October 2000, Oxford University Press. ISBN: 978-0199637904.**
2. Bioinformatics: Sequence and Genome Analysis, David W. Mount. **2nd edition, June2004**, Cold spring harbor laboratory press. ISBN: 978-0879697129
3. Biological Sequence Analysis: Probabilistic Models of Proteins and Nucleic acids, R. Durbin, S.R. Eddy, A. Krogh and G. Mitchison, **1st Edition**.
4. Introduction to Bioinformatics, by T K Attwood & D J Parry-Smith **A**ddison Wesley Longman ,**1999**.
5. Bioinformatics - A Beginner's Guide by Jean-Michel Claveriw, Cerdric Notredame, WILEY dreamlech India Pvt. Ltd, **2nd Edition,2006.**

REFERENCE BOOKS:

1. Introduction to Bioinformatics by Arthur.Lesk OXFORD publishers ,**2014.**
2. Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins, Second Edition, Andreas D. Baxevanis, B. F. Francis Ouellette. **3nd edition, October 2004**, A John Wiley & Sons, Inc., Publication. ISBN: 978-0471478782.

I M.TECH – II SEMESTER

V18CTT14	**WIRELESS SENSOR NETWORKS (Elective-I)**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Outcomes:

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

1. Identify the applications and challenges of MANETs
2. Explain Ad-hoc network routing protocols
3. Describe Broadcasting, Multicasting and Geocasting Routing Protocols
4. Describe and Discriminate Wireless LANs, Wireless PANs & Wireless Mesh Networks

UNIT-I: Introduction: Introduction to MANETs, Applications of MANETs, Challenges

UNIT-II: Routing in Ad hoc networks: Topology-Based versus Position Based Approaches, Topology-Based routing Protocols, Position-Based Routing, Other Routing Protocols

UNIT-III: Broadcasting, Multicasting and Geocasting: The Broadcasting Storm, Broadcasting in a MANET, Multicasting, Issues in providing Multicast in a MANET, Geocasting, Geocast Routing Protocols

UNIT-IV: Wireless LANs: Why Wireless LANs, Transmission Techniques, Medium Access Control Protocol Issues, The IEEE 802.11 Standard for Wireless LANs, Enhancement to IEEE 802.1 MAC

UNIT-V: Wireless PANs & Wireless Mesh Networks: Why Wireless PANs, The Bluetooth Technology, Enhancements to Bluetooth, Wireless Mesh Network Architecture, MR Deployment, IGW Deployment, Channel Assignment

TEXT BOOK:

1. Ad hoc and Sensor Networks Theory and Applications, Carlos de Morais Cordeiro, Dharma Prakash Agarwal, Second Edition, World Scientific, **2011**

REFERENCE BOOKS:

1. Adhoc Wireless Networks — Architectures and Protocols, C.Siva Ram Murthy, B.S.Murthy, Pearson Education, **2004**
2. Ad hoc Networking, Charles E.Perkins, Pearson Education, 2001

I M.TECH – II SEMESTER

V18CTT15	**IMAGE PROCESSING (Elective-II)**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Outcomes:

After completion of this course, student will be able to:

1. Understand the basics of image processing.
2. Understand 2 D Transformations.
3. Learn the Digital image properties.
4. Acquire the knowledge of mathematical concepts for application on image morphing.
5. Be able to conduct independent study and analysis of image processing problems and techniques.

UNIT-I: Introduction: Applications of Computer Graphics and Image Processing, Fundamentals on Pixel concepts, effect of Aliasing and Jaggles, Advantages of high resolution systems DDA line algorithms: Bresenhams line and circle derivations and algorithms.

UNIT-II: 2-D Transformations: Translations, Scaling, rotation, reflection and shear transformations, Homogeneous coordinates, Composite Transformations- Reflection about an arbitrary line; Windowing and clipping, viewing transformations, Cohen- Sutherland clipping algorithm.

UNIT-III: Digital Image Properties: Metric and topological properties of Digital Images, Histogram, entropy, Visual Perception, Image Quality, Color perceived by humans, Color Spaces, Palette Images, color Constancy Color Images: Pixel brightness transformations, Local Preprocessing, image smoothing, Edge detectors, Robert Operators, Laplace, Prewitt, Sobel, Fri-chen, Canny Edge detection.

UNIT-IV: Mathematical Morphology: Basic Mathematical Concepts, Binary dilation and Erosion, Opening and closing, Gray Scale dilation and erosion, Skeleton, Thinning , Thickening Ultimate erosion, Geodesic transformations, Morphology and reconstruction, Morphological Segmentation.

UNIT-V: Segmentation: Threshold detection methods, Optimal Thresholding, Edge based SegmentationEdge image thresholding, Edge relaxation, Border tracing, Hough Transforms, Region based segmentation: Region Mergingm Region Splitting, Splitting and Merging, Watershed Segmentation. Image Data Compression: Image data Properties, Discrete Image Transformations in data compression, Discrete Cosine and Wavelet Transforms, Types of DWT and merits; Predicative Compression methods, Hierarchical and Progressive Compression methods, Comparison of Compression methods, JPEG- MPEG Image Compression methods.

TEXT BOOKS:

1. Computer Graphics C Version, Donald Hearn, M Paulli Baker, Pearson Education India, **1997, Second Edition** (Unit I and Unit II)
2. Image Processing, Analysis and Machine Vision, Millan Sonka, Vaclov Halvoc, Roger Boyle, Cengage Learning, 3ed, (Unit III, Unit IV, Unit V and Unit VI)

REFERENCE BOOKS:

1. Computer & Machine Vision, Theory, Algorithms, Practicles, E R Davies, Elsevier, **4ed**
2. Digital Image Processing with MATLAB and LABVIEW, Vipul Singh, Elsevier,2012.

I M.TECH – II SEMESTER

V18CTT16	**PARALLEL ALGORITHMS (Elective-II)**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Outcome:

At the end of this course the student be able to

1. Understand the various application areas.
2. Understand the Efficiency of parallel algorithms,
3. Understand parallel sorting network
4. Understand parallel searching algorithm,

UNIT-I: Introduction:

Computational demand in various application areas, advent of parallel processing, terminology-pipelining, Data parallelism and control parallelism-Amdahl's law.

UNIT-II: Scheduling:

Organizational features of Processor Arrays, Multi processors and multi-computers. Mapping and scheduling aspects of algorithms. Mapping into meshes and hyper cubes-Load balancing-List scheduling algorithm Coffman-graham scheduling algorithm for parallel processors.

UNIT-III: Algorithms:

Elementary Parallel algorithms on SIMD and MIMD machines, Analysis of these algorithms. Matrix Multiplication algorithms on SIMD and MIMD models. Fast Fourier Transform algorithms. Implementation on Hyper cube architectures. Solving linear file -system of equations, parallelizing aspects of sequential methods back substitution and Tri diagonal.

UNIT-IV: Sorting:

Parallel sorting methods, Odd-even transposition Sorting on processor arrays, Biotonic, merge sort on shuffle - exchange ID , Array processor,2D-Mesh processor and Hypercube Processor Array. Parallel Quick-sort on Multi processors. Hyper Quick sort on hypercube multi computers. Parallel search operations. Ellis algorithm and Manber and ladner's Algorithms for dictionary operations.

UNIT-V: Searching:

Parallel algorithms for Graph searching, All Pairs shortest paths and inimum cost spanning tree. Parallelization aspects of combinatorial search algorithms with Focus on Branch and Bound Methods and Alpha-beta Search methods.

TEXTBOOKS:

1. Parallel computing theory and practice, Michel J.Quinn,**2002,Second Edition.**
2. Programming Parallel Algorithms, Guy E. Blelloch, Communications of the ACM,**1996**.

I M.TECH – II SEMESTER

V18CTT17	**MOBILE COMPUTING (Elective-II)**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Outcomes:

After completion of this course, student will be able to:

1. Describe the basic concepts and principles in mobile computing.
2. Understand the concept of Wireless LANs, PAN, Mobile Networks, and Sensor Networks.
3. Understand positioning techniques and location based services and applications.
4. Describe the important issues and concerns on security and privacy.

UNIT–I: Introduction to Mobile Communications and Computing: Introduction to cellular concept, Frequency Reuse, Handoff, GSM: Mobile services, System architecture, Radio interface, Protocols, Localization and calling, Handover, Security, and New data services, Introduction to mobile computing, novel applications, limitations, and architecture.

UNIT - II: **Wireless LANs:** Introduction, Advantages and Disadvantages of WLANs, WLAN Topologies, Introduction to Wireless Local Area Network standard IEEE 802.11, Comparison of IEEE 802.11a, b, g and n standards, Wireless PANs, Hiper LAN, Wireless Local Loop

UNIT - III: **Wireless Networking:** Introduction, Various generations of wireless networks, Fixed network transmission hierarchy, Differences in wireless and fixed telephone networks, Traffic routing in wireless networks, WAN link connection technologies, X.25 protocol, Frame Relay, ATM, Virtual private networks, Wireless data services, Common channel signaling, Various networks for connecting to the internet.

UNIT - IV: **Database Issues:** Data management issues, data replication for mobile computers, adaptive clustering for mobile wireless networks, file system, disconnected operations.

UNIT - V: **Data Dissemination:** Communications asymmetry, classification of new data delivery mechanisms, push-based mechanisms, pull-based mechanisms, hybrid mechanisms, selective tuning (indexing) techniques.

TEXT BOOKS:

1. Gottapu Sasibhushana Rao, "Mobile Cellular Communication", Pearson Education, **First Edition, 2013.**
2. Stojmenovic and Cacute, "Handbook of Wireless Networks and Mobile Computing", **Wiley, 2002.**

REFERENCE BOOKS:

1. Reza Behravanfar, "Mobile Computing Principles: Designing and Developing Mobile Applications with UML and XML", ISBN: 0521817331, Cambridge University Press, **October 2004.**
2. Adelstein, Frank, Gupta, Sandeep KS, Richard III, Golden , Schwiebert, Loren, "Fundamentals of Mobile and Pervasive Computing", ISBN: 0071412379, McGraw-Hill Professional, **2005**.
3. Hansmann, Merk, Nicklous, Stober, "Principles of Mobile Computing", Springer, second edition, **2003.**
4. Martyn Mallick, "Mobile and Wireless Design Essentials", Wiley DreamTech, **2003.**

I M.TECH – II SEMESTER

V18CTT18	**GRID COMPUTING (Elective-II)**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Outcomes:

After completion of this course, student will be able to:

1. Understand the need for and evolution of Grids in the context of processor- and data-intensive applications
2. Be familiar with the fundamental components of Grid environments, such as authentication, authorization, resource access, and resource discovery
3. Be able to design and implement Grid computing.
4. Be able to justify the applicability, or non-applicability, of Grid technologies for a specific application.

UNIT - I: **Introduction:** Introduction to Parallel, Distributed Computing, Cluster Computing and Grid Computing, Characterization of Grids, Organizations and their Roles, Grid Computing Road Maps.

UNIT - II: **Architecture:** Architecture of Grid and Grid Computing, Review of Web Services-OGSA-WSRF.

UNIT - III: **Grid Monitoring:** Grid Monitoring Architecture (GMA) - An Overview of Grid Monitoring Systems- GridICE - JAMM -MDS-Network Weather Service-R-GMA-Other Monitoring Systems- Ganglia and GridM **Grid Middleware:** List of globally available Middlewares - Case Studies-Recent version of Globus Toolkit and gLite - Architecture, Components and Features.

UNIT - IV: **Data Management And Grid Portals:** Data Management, Categories and Origins of Structured Data, Data Management Challenges, Architectural Approaches, Collective Data Management Services, Federation Services, Grid Portals, First-Generation Grid Portals, Second Generation Grid Portals.

UNIT - V: **Semantic Grid and Autonomic Computing:** Meta data and Ontology in the Semantic Web, Semantic Web services, Layered structure of the Semantic Grid, Semantic Grid activities, Autonomic Computing **Grid Security and Resource Management:** Grid Security, A Brief Security Primer, PKI-X509 Certificates, Grid Security, Scheduling and Resource Management, Scheduling Paradigms, Working principles of Scheduling, A Review of Condor, SGE, PBS and LSF - Grid Scheduling with QoS.

TEXT BOOKS:

1. Grid Computing, Joshy Joseph and Craig Fellenstein, Pearson Education **2004.**
2. The Grid Core Technologies, Maozhen Li, Mark Baker, John Wiley and Sons, **2005.**

REFERENCE BOOKS:

1. The Grid 2 - Blueprint for a New Computing Infrastructure, Ian Foster and Carl Kesselman, Morgan Kaufman - **2004.**
2. Grid Computing: Making the Global Infrastructure a reality, Fran Berman, Geoffrey Fox, Anthony J.G. Hey, John Wiley and sons, **2003**.

I M.TECH – II SEMESTER

V18CTL03	**DATA SCIENCE LAB**	**L**	**T**	**P**	**C**
		0	**0**	**2**	**1**

Course Outcomes:

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

1. Understand the Concepts of R and Programming.
2. Understand the mathematics from a numerical point of view, including the application of these concepts root-finding, numerical integration and optimization
3. Understand the purpose for random variable and expectations required to understand simulations
4. Implement the Monte carlo and Stochastic Modelling
5. Work effectively in teams on data science projects using R

LIST OF EXPERIMENTS

1. R Environment Setup & R as calculating environment
2. R Basic programming, Input and output
3. Programming with functions & Sophisticated Data structures
4. Better Graphics using Graphics parameters
5. Frames and environments & Object –oriented Programming
6. Numerical Accuracy and program efficiency
7. Probability & Statistics: The law of Total probability
8. Simulation: Monte Carlo Integration – Hit and miss method
9. Data Modelling: Linear and Multiple Regression Models

Case Study

Consider the data set of Ozone levels in United States for the year 2014 and do the following analysis

1. Formulate your questions
2. Read in your data
3. Check the packaging
4. Look at the top and the bottom of your data
5. Check your "n" s
6. Validate with at least one external data source
7. Make a plot
8. Follow up

TEXT BOOKS:

1. Introduction to Scientific Programming and Simulation Using R, Owen Jones, Robert Maillardet and Andrew Robinson, Second Edition, CRC Press, 2014
2. The Art of Data Science: A Guide for Anyone Who Works with Data, Roger D. Peng, Elizabeth Matsui, LeanPub, 2015.
3. Data Science for Business: What You Need to Know about Data Mining and Data - analytic Thinking, Foster Provost and Tom Fawcett. 2013
4. Elements of Statistical Learning, Trevor Hastie, Robert Tibshirani and Jerome Friedman, Springer, 2009.

REFERENCE BOOKS:

1. Mining of Massive Datasets, JureLeskovek, Anand Rajaraman and Jeffrey Ullman, Cambridge University Press. 2014.
2. Machine Learning: A Probabilistic Perspective.Kevin P. Murphy, MIT Press, 2013.
3. Avrim Blum, John Hopcroft and Ravindran Kannan. Foundations of Data Science.
4. Data Mining and Analysis: Fundamental Concepts and Algorithms, Mohammed J. Zaki and Wagner Miera Jr., Cambridge University Press. 2014.
5. R Programming for Data Science, Roger D. Peng, LeanPub, 2015.
6. Python for Data Science for Dummies, Luca Massaron and John Paul Mueller, John Wiley and Sons, 2015.

I M.TECH – II SEMESTER

V18CTL04	**ADVANCED WEB TECHNOLOGIES LAB**	**L**	**T**	**P**	**C**
		0	**0**	**2**	**1**

List of Experiments

1. a) A Simple HTML home page provides links to move to other pages like hobbies, educational info, personal info etc.
   b) A HTML program to illustrate the use of frame and frameset tags of HTML.
   c) A HTML Program which use a HTML controls to create a student information form to collect student's information like name, address, phone, email, sex, birth date, hobbies etc.
2. a) Create a webpage which displays "Hello World" with font size 20 pixels, bold format, in "Times New Roman" font and green in colour using inline CSS, embedded CSS and external CSS.
   b) Create a webpage which displays the class time table and apply the following effects on the table:

➔ For the table header apply *blue* as the background colour and *white* for the colour of the text in the table header.
➔ Display *day names* (Mon, Tue etc...) in bold format with the first letter in the day name in uppercase.
➔ Display *lunch* slightly in bigger font other than the remaining text.

c) Create a webpage to manage personal details like name, class, qualifications, photo, address etc., using tables and other suitable HTML tags. Apply the following style information:

➔ Display the heading of the page in *Times New Roman* font and with 24px size.
➔ Align all the field names like Name, Class, Photo etc to *right* in the table.
➔ Apply *light blue* as background colour for the left side cells in the table which contains field names like Name, Class etc...
➔ Also display your college logo as background image in the top right position of the web page.

d) Create a web page containing two images, where one image overlaps another image by using the *z-index* CSS property.

1. a) A HTML Program which demonstrates loops like for loop, do while, while in java script.
   b) A HTML Program which demonstrates the use of functions in java script.
   c) A HTML Program which demonstrates various events like onclick, ondbclick, onfocus, onblur, onchange, onmouseover, onmouseover, window event, onload, onunload event.
   d) A HTML Program to create various functions and sub routines to validate the data entered by user in form.
2. a) Create a program to illustrate the concept of associative array in PHP.
   b) Create PHP program to implement the concept of Session management.
   c) Create a PHP program to display student information in webpage. Student's data is stored in My SQL database.
   d) Create a PHP program to insert student information from HTML form. Student's data is stored in My SQL database.

3. a) Create a well-formed XML document.
   b) Create a valid XML document using DTD.
   c) Create a valid XML document using XML Schema.
   d) Create a XML document which contains details of cars and display the same as a table using XSLT.
   e) Write a Java program to parse the XML document containing car details using SAXAPI.

4. a) Create a servlet to display "Hello World" in the browser.
   b) Create a servlet to store email-id as an initialization parameter and print the same email-id by reading the initialization parameter from the web.xml file.
   c) Create a servlet to retrieve name and branch details from a html page and print the same using the servlet.
   e) Create a HTML page which accepts book id, book name and book price and a submit button. When the user clicks the submit button, all the values assigned to the previous text fields must be stored in a session object and the control forwards to another servlet where the values stored in the session are retrieved and displayed.
5. a) Create a JSP page to display "Hello World" in the browser.
   b) Create a JSP page to store email-id as an initialization parameter and print the same email-id by reading the initialization parameter from the web.xml file.
   c) Create a JSP page to retrieve name and branch details from a html page and print the same using a servlet.
   d) Create a HTML page which accepts book id, book name and book price and a submit button. When the user clicks the submit button, all the values assigned to the previous text fields must be stored in a session object and the control forwards to a JSP page where the values stored in the session are retrieved and displayed.
6. Create a HTML page which accepts student regd.no. and prints the results of that student by retrieving the results from the database. Use AJAX to display the "please wait..." while the server is processing the request and print the result of the student when the server returns the result. Server resource can be either servlet or JSP or PHP

Reference Books:

1. "*Java server programming java JavaEE5 Black Book*", Kogent Solutions Dreamtech Press, Inc, ISBN-13 9788177228359 ISBN-10 8177228358, 2008.
2. "AJAX black book", new edition, Kogent Solutions Inc, Dreamtech Press, ISBN:10-81-7722- 838-2 ISBN:13-978-81-7722-838-06
3. Jonathan Chaffer, Karl Swedberg, "Learning jQuery", 3rd Edition, ISBN 13: 9781849516549, 2011
4. Chris Bates,Web Programming- building internet applications, 2nd edition, WILEY Dreamtech, 2006
5. Patrick Naughton and Herbert Schildt, The complete Reference Java seventhEdition,TMH, 2007
6. Hans Bergsten, Java Server Pages, SPD O'Reilly, 2000
7. Java Server Programming ,Ivan Bayross and others,The X Team,SPD
8. Web Warrior Guide to Web Programmming-Bai/Ekedaw-Thomas
9. Beginning Web Programming-Jon Duckett WROX.
10. Java Server Pages, Pekowsky, Pearson.
11. Java Script, D.Flanagan, O'Reilly, SPD.

Minutes of the 2nd Academic Council meeting on 01/07/2018
Item No: 9
Annexure No: VI

Academic Rules and Regulations for MBA Programme

(Effective for the students admitted into first year from the academic year 2018-2019)

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

1.0 ELIGIBILITY FOR ADMISSIONS:

Admission to the above program shall be made subject to eligibility criteria, qualification and specialization as prescribed from time to time. Admissions shall be made on the basis of merit/rank obtained by the candidates at the Qualifying Examination/Entrance Test conducted by the University or on the basis of any other order of merit as approved by the University, subject to reservations as laid down by the Govt. from time to time.

2.1 ADMISSIONS UNDER SPECIAL CASES:

These may arise in the following situations.

7. When a student gets detained due to academic regulations and re-joins the college to complete the programme in a new regulation.
8. When a student discontinues for some time and re-joins the college to complete the programme in a new regulation.
9. When a student seeks transfer from other colleges to SVEC and intends to pursue MBA programme.

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

   In all such cases for admission if necessary permissions from the statutory bodies are to be obtained and the programme of study at the college will be governed by the transitory regulations stipulated in **11.0.**

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

2.0 AWARD OF MBA DEGREE:

a) A Student shall be declared eligible for the award of MBA degree, if he pursues a course of study and completes it successfully in not less than two academic years and not more than four academic years.

b) A Student, who fails to fulfill all the academic requirements for the award of the degree within FOUR academic years from the year of their admission, shall forfeit his seat in MBA course.

c) The duration of each semester including examinations is 21 weeks.

3.0 ATTENDANCE :

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

3.1 Condonation of shortage of attendance in aggregate up to 10% (65% and above and below

75%) in a given semester may be granted by the College Academic Committee on medical grounds provided the student has submitted the application for medical leave along with medical certificate from a Registered medical practitioner within three days form reporting to the class work after the expiry of the medical leave. However, a student can avail this concession on medical grounds for not more than once during entire duration of the program.

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

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

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

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

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

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

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

4.0 EVALUATION

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

4.1 Theory Courses:

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

iv. Each Mid-term examination shall be conducted for 20 marks and duration of 120 minutes with 4 questions (without choice), each question for 5 marks.

The balance 20 marks is earmarked for Mini report (10 marks for preparation of report and 10 marks for presentation in the class room in each course.

Internal Evaluation= Average of two mid examinations (20)+Mini report (20)

End Semester Examination shall be conducted for 60 marks.

There shall be 6 questions of 10 marks each and all questions shall be compulsory.

Each of these questions from 1 to 5 (with internal choice) shall cover each unit of the syllabus. The 6th question shall be a case study without internal choice.

4.2 Practical Courses:

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

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

4.3 Special instructions for Business Analytics Course

Related software tools like SPSS, R, MS- Excel etc., shall be used for Business Analytics. For the above course the relative weightage for internal evaluation and end semester examination shall be 40% and 60% respectively. For internal evaluation day to day work shall be evaluated for 20 marks by the course teacher concerned based on the reports/ submission prepared in the class. The remaining 20 marks shall be awarded on the basis of internal evaluation through a written test along with viva with equal weightage. The end semester examination pattern for this course is similar to that of other courses.

4.4 Minimum Academic Requirements:

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

ii. In case the candidate does not secure the minimum academic requirement in any course (as specified above in 4.4(i)) he has to re appear for the end semester examination in that course.

iii. A Candidate shall be given one chance to re-register for each course provided the internal marks secured by a candidate are less than 50% and he has failed in the end examination. In such a case, candidate must re-register for the course(s) and secure required minimum attendance.

iv. Attendance in the re-registered course(s) has to be calculated separately to become eligible to write the end examination in the re-registered course(s). The attendance in the re-registered course(s) shall be calculated separately to decide his eligibility for writing the end examination in those course(s). In the event of taking another chance, the internal marks and end examination marks obtained in the previous attempt are nullified. At a given time a candidate is permitted to re-register for a maximum of two course(s) in addition to

the subjects of a regular semester.

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

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

vi. A Candidate shall be allowed to submit the project report only after fulfilling the attendance requirement of all the semesters.

vii. Laboratory examination for MBA course must be conducted with two Examiners, one of them being Laboratory Class Teacher and second examiner shall be other than Class Teacher from other college.

viii. Every student has to register for a MOOCs course at the beginning of first semester as approved by the departmental committee and complete it before commencement of the third semester. A student shall submit the certificate of completion to the department. Students those who cannot complete MOOCs course in the stipulated period, they can do mini project during third semester as approved the departmental committee. A student shall submit a report and give a seminar on mini project before departmental committee. The Committee consists of the Head of the Department, the Supervisor of mini project and one senior faculty member from the department.

5.0 EVALUATION OF PROJECT WORK:

5.1 **A Project Review Committee** (PRC) will be constituted with Head of the Department, and two other senior faculty members of the department.

5.2 **Registration of Project work**: A Candidate is permitted to register for the project work after satisfying the attendance requirement up to II semester.

5.3 Every candidate shall work on projects approved by the PRC.

5.4 A student has to undergo practical training for a period of 5 weeks in a Corporate Enterprise (as a part of the project) after the Second Semester. In training period, the candidates should work on a specific problem related to the elective course.

At the end of practical training, the student should submit a certificate obtained from the organization.

The student should prepare a Project Report under the supervision of a guide from the faculty of management of the college. However, the students who prepare Project Report in the area of systems can also work under the guidance of a Faculty member from Computer Science Department.

5.5 The progress of the project work shall be periodically reviewed by PRC. The PRC shall

authorize/approve change of guide/topic/title as deemed fit. A student shall submit status report in line with the recommended project calendar as approved by PRC. Three copies of Project dissertation certified by the Project Supervisor shall be submitted to the College.

5.6 The project is evaluated for 100 Marks at the end of IV Semester. A student shall engage a minimum of 2 hours per week in III and IV semester in consolidating the data, report writing, results & analysis, conclusions etc. Evaluation shall comprise of internal and external assessment.

Internal: 40 Marks

External: 60 Marks

Out of a total of 100 Marks for the dissertation 40 Marks shall be for internal evaluation and 60 Marks for the end semester project evaluation and viva voce. The internal evaluation shall be made by the departmental committee on the basis of the two seminars given by the student on the topic of his/her dissertation. The end semester project report evaluation and viva voce shall be adjudicated by one external examiner selected from a panel of 5 examiners outside the college. For this Head of the department shall submit a 5 member panel who are eminent in the field of study.

5.7 An internal departmental committee consisting of HOD, Supervisor and one senior faculty shall monitor the progress of the project work.

5.8 The project evaluation and viva voce examination shall be conducted by a board consisting of External examiner, HOD and Supervisor. A Candidate shall be allowed to take viva voce examination of the project, after fulfilling the attendance requirements.

5.9 The Candidate should secure minimum 40% marks in External assessment of Project Evaluation & viva-voce. If the candidate fails to secure minimum 50% of marks in project internal and End semester project Evaluation & viva-voce together, the candidate should retake the viva-voce examination after three months. If he fails to get minimum marks at the second viva-voce examination, he will not be eligible for the award of the degree, unless the candidate is asked to revise and resubmit. If the candidate fails to secure minimum marks again, the project shall be summarily rejected.

6.0 GRADING SYSTEM:

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

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

A student who earns a minimum of 6 grade points (D grade) in a course is declared to have successfully completed the course, and is deemed to have earned the credits assigned to that course.

7.0 GRADE POINT AVERAGE:

Computation of SGPA and CGPA:

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

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

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

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

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

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

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

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

Illustration for Computation of SGPA and CGPA:

Computation of SGPA at the end of 1^{st} semester

Illustration No.1:

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

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

Illustration No.2 (with one failure)

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

Thus, **SGPA= 141/20=7.05**

Illustration No.2 (a)

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

Thus, recalculated **SGPA** after clearing the course **=159/20=7.95**

Illustration No.3

Second Semester Performance:

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

Thus, SGPA of 2nd semester= 168/20=8.4

Thus, CGPA at the end of 2nd semester= $\frac{20*x8+20x8.4}{40}$ =328/40=8.2

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

CGPA after Final Semester:

Thus, CGPA= $\frac{20*7+20*8.5+20*9.2+20*6.86}{80}$ **= 7.70**

AWARD OF DEGREE & CLASS:

A candidate who becomes eligible for the award of M.B.A. Degree shall be placed in one of the following Classes based on CGPA.

TABLE: CGPA REQUIRED FOR AWARD OF DEGREE

Distinction with First Class	**≥ 7.75***
First Class	**≥ 6.75**
Second Class	**≥ 6.00**

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

8.0 MALPRACTICES:

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

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

9.0 ADDITIONAL ACADEMIC REGULATIONS:

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

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

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

10.0 WITHHOLDING OF RESULTS:

If the candidate has not paid any dues to the college or if any case of indiscipline is pending against him, the result of the candidate will be withheld.

The issue of degree is liable to be withheld in such cases.

11.0 TRANSITORY REGULATIONS:

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

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

1. Equivalent courses completed by the student are established by the BOS concerned.

2. Marks/Credits are transferred for all such equivalent courses and treated as successfully cleared in the Programme of study prescribed by SVEC.
3. A Programme chart of residual courses not cleared will be derived and a Programme of study with duration specified will be prescribed for pursuit at SVEC.
4. Marks obtained in the previous system if the case be, are converted to grades and CGPA is calculated accordingly.

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

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

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

12.0 GENERAL :

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

Annexure-I

MALPRACTICES

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

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

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

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

COURSE STRUCTURE OF MBA PROGRAMME

I SEMESTER

SNo	Course Code	Course	L	P	C	I	E	TM
1	V18MBT01	Management Theory & Organizational Behavior	4	--	4	40	60	100
2	V18MBT02	Managerial Economics	4	--	4	40	60	100
3	V18MBT03	Accounting for Managers	4	--	4	40	60	100
4	V18MBT04	Indian Economy & Policy	4	--	4	40	60	100
5	V18MBT05	Business Communication	4	--	4	40	60	100
6	V18MBT06	Quantitative Analysis for Business Decisions	4	--	4	40	60	100
7	V18MBL01	IT-LAB	---	6	3	40	60	100
8	V18ENT03	Employability Skills - I (English Communication Skills)	2	--	--	--	--	MNC
TOTAL			26	6	27	280	420	700

II SEMESTER

SNo	Course Code	Course	L	P	C	I	E	TM
1	V18MBT07	Financial Management	4	--	4	40	60	100
2	V18MBT08	Human Resource Management	4	--	4	40	60	100
3	V18MBT09	Marketing Management	4	--	4	40	60	100
4	V18MBT10	Production and Operations Management	4	--	4	40	60	100
5	V18MBT11	Business Research & Statistical Analysis	4	--	4	40	60	100
6	V18MBT12	Legal Environment for Business	4	--	4	40	60	100
7	V18MBT13	Business Ethics & Corporate Governance	4	--	4	40	60	100
8	V18ENT04	Employability Skills - II (Soft Skills)	2	--	--	--	--	MNC
TOTAL			30	--	28	280	420	700

III SEMESTER

SNo	Course Code	Course	L	P	C	I	E	TM
1	V18MBT14	Business Policy & Corporate Strategy	4	--	4	40	60	100
2	V18MBT15	Entrepreneurship Development	4	--	4	40	60	100
3	V18MBT16	E-Business	4	--	4	40	60	100
4		Elective-1	4	--	4	40	60	100
5		Elective-2	4	--	4	40	60	100
6		Elective-3	4	--	4	40	60	100
7		Elective-4	4	--	4	40	60	100
8	V18MBM01 V18MBP01	MOOCs/ Mini Project	--	--	--	--	--	MNC
9	V18ENT05	Employability Skills – III (Aptitude-1)	2	--	--	--	--	MNC
TOTAL			30	--	28	280	420	700

IV SEMESTER

SNo	Course Code	Course	L	P	C	I	E	TM
1	V18MBT29	Logistics & Supply Chain Management	4	--	4	40	60	100
2	V18MBT30	Business Analytics	3	4	4	40	60	100
3		Elective-5	4	--	4	40	60	100
4		Elective-6	4	--	4	40	60	100
5		Elective-7	4	--	4	40	60	100
6		Elective-8	4	--	4	40	60	100
7	V18MBP02	Major Project & Viva voce	--	--	6	40	60	100
8	V18ENT06	Employability Skills – IV (Aptitude-2)	2	--	--	--	--	MNC
TOTAL			25	04	30	280	420	700
GRAND TOTAL			111	10	113	1120	1680	2800

L-LECTURE HOURS, P-PRACTICAL HOURS, C-CREDITS, I-INTERNAL MARKS, E-EXTERNAL MARKS, TM-TOTAL MARKS, MNC: Mandatory Non credit course

Single Specialization:

The Specialization papers will be offered in the areas of Marketing, Finance, and Human Resource Management (HRM). The students should choose any **one** of the listed Specialization areas in the beginning of the third semester of MBA. Specialization will be offered subject to a minimum of 20 students.

Semester-III

Specialization I: Marketing

S.No.	Course Code	Course
1.	V18MBT17	Consumer Behavior
2.	V18MBT18	Retail Management
3.	V18MBT19	Integrated Marketing Communication
4.	V18MBT20	Product & Brand Management

Specialization II: Finance

S.No.	Course Code	Course
1.	V18MBT21	Security Analysis & Portfolio Management
2.	V18MBT22	Advance Management Accounting
3.	V18MBT23	Financial Markets & Services
4.	V18MBT24	Banking & Insurance Management

Specialization III: HRM

S.No.	Course Code	Course
1.	V18MBT25	Human Resource Planning & Development
2.	V18MBT26	Compensation and Reward Management
3.	V18MBT27	Performance Management
4.	V18MBT28	Strategic Human Resource Management

Semester-IV

Specialization I: Marketing

S.No.	Course Code	Course
1.	V18MBT31	Services Marketing
2.	V18MBT32	Sales and Distribution Management
3.	V18MBT33	Digital & Social media Marketing
4.	V18MBT34	International Marketing Management

Specialization II: Finance

S.No.	Course Code	Course
1.	V18MBT35	Financial Derivatives
2.	V18MBT36	Project Appraisal and Finance
3.	V18MBT37	Business Taxation & Planning
4.	V18MBT38	International Financial Management

Specialization III: HRM

S.No.	Course Code	Course
1.	V18MBT39	Organizational Change & Development
2.	V18MBT40	Management of Industrial Relations
3.	V18MBT41	Labour Welfare & Legislations
4.	V18MBT42	International HRM

SYLLABUS FOR MBA PROGRAMME

I MBA- I SEMESTER
Course Code: V18MBT01

MANAGEMENT PROCESS & ORGANIZATIONAL BEHAVIOR

L	T	P	C
4	0	0	4

Course Outcomes:

1. Understand the fundamentals of management and develop holistic perspective towards an organization.
2. Use the models of decision making and controlling in an organizational context.
3. Understand various dimensions of individual behavior.
4. Identify the dynamics of group and also emerge as a good team member.
5. Emerge as a leader who can understand the culture of an organization.

Unit-I:
Role of Management – Concept – Significance – Functions – Principles of Management - Patterns of Management: Scientific – Behavioral – Systems – Contingency

Unit-II:
Decision Making and Controlling – Process – Techniques. Planning – Process – Problems- Making it Effective. Controlling - System of Controlling – Controlling Techniques – Making Controlling Effective.

Unit-III:
Organizational Behavior – Introduction to OB – Organizing Process – Departmentation Types – Making Organizing Effective - Understanding Individual Behavior – Perception – Learning – Personality Types – Johor window- Transactional Analysis

Unit-IV:
Group Dynamics and Motivation – Benefits of Groups – Types of Groups – Group Formation and Development, Motivation – Concept of Motivation - Motivational Theories of Maslow, Herzberg, David Mc Clelland, and Porter and Lawler

Unit-V:
Leadership and Organizational Culture and Climate: Leadership – Traits Theory – Managerial Grid – Transactional vs. Transformational Leadership – Qualities of good Leader, Change Management – Conflict Management.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. Essentials of Management- An International Perspective, 8th Edition, Koontz & Werich, TMH
2. Management: Text & Cases, 2nd Edition, Satya Raju & Parthasarthy ,PHI
3. Business Organization and Principles of Management, A. Roy, TMH
4. Management, Text & Cases, V.S. P. Rao &Harikrishna, Excel Books,2009
5. Mgmt. Concept & Strategies, Chandan, Vikas Publications
6. Management Science, Rao, Scitech
7. Principal & Practice of Management. Ghanekar, EPH,2005
8. Principal & Practice of Management, Amrita Singh, EPH
9. Organizational Behavior, Stephen P. Robbins,16th Edition, Pearson Education.
10. Organizational Behaviour,4th Edition, S.S.Khanka, S.Chand,2002
11. Organizational Behavior 1st Edition, Mishra .M.N ,Vikas Publishing
12. Organizational behavior, Pierce Gardner, Cengage, Weihrich&Aryasri, TMH,2009.
13. Organizational Behaviour, Subbarao P, Third Revised Edition, Himalaya Publishing House,2017.
14. Organizational Behaviour, Sarma, Jaico Publications,2009.

I MBA- I SEMESTER
Course Code: V18MBT02

MANAGERIAL ECONOMICS

L	T	P	C
4	0	0	4

Course Outcomes:

1. Apply the concepts of Managerial economics in managerial decision making.
2. Understand the relationship between Price, demand & supply and determine changes in market equilibrium.
3. Explain the relationship between inputs and productivity using various production functions and their applicability in real world business.
4. Develop various cost structures and determine the relationship between costs and output in short and long run.
5. Determine the profit maximizing price and output in various competitive markets in short and long run.

UNIT 1:
Introduction to Managerial Economics: Definition, Nature and Scope, Relationship with other areas in Economics, The role of managerial economist. Concept of opportunity cost, Incremental concept, time perspective, Risk & uncertainty.

UNIT 2:
Demand Analysis: Elasticity of demand, types and significance of Elasticity of Demand - Measurement of price Elasticity of Demand – law of Supply, Elasticity of Supply -Need for Demand forecasting, forecasting techniques.

UNIT 3:
Production Analysis: Production function, Marginal Rate of Technical Substitution, Production function with one/two variables, Cobb-Douglas Production Function, Returns to Scale and Laws of returns.

UNIT 4:
Cost and Revenue Analysis: Cost concepts, determinants of cost, cost – output relationship in the short run and long run – Modern development in cost theory –Envelop shaped long run curve- Total, Average and Marginal cost and revenue curves– Cost - Volume – Profit analysis

UNIT 5:
Market Structure and Pricing practices: Features and Types of different Markets – Price- Output determination in Perfect competition, Monopoly, Monopolistic competition and Oligopoly both in the long run and short run. Pricing methods in practice –- Managerial Theories of a firm. .

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References

1. Paul, Koushil: "**Managerial Economics**", Cengage Learning, New Delhi,
2. Siddiqui S A,Siddiqui A S: "**Managerial Economics**", and Financial Analysis", New Age International Publishers, New Delhi, 2008.
3. Vanita Agarwal: "**Managerial Economics**", Pearson, New Delhi, 2013.
4. Dominick Salvatore: "**Managerial Economics**", Oxford University Press, New Delhi,2010.
5. D.L. Ahuja: "**Managerial Economics**", S. Chand & Company ltd,New Delhi-55.
6. O'Sullivan, Sheffrin, Perez "Micro Economics: Principles, Applications and Tools", Pearson Education.
7. Mithani D M: **''Managerial Economics**", Himalaya Publishing House, Mumbai, 2008.
8. Atmanand: "**Managerial Economics**", Excel Publications. New Delhi, 2012.
9. Varshney, R.L and Maheswari, K L: **''Managerial Economics**", Sultan Chand and Sons, New Delhi, 2002.
10. Narayanan Nadar E, Vijayan S: **''Managerial Economics**", PHI Private Limited, New Delhi,2009.

I MBA- I SEMESTER
Course Code: V18MBT03

ACCOUNTING FOR MANAGERS

L	T	P	C
4	0	0	4

Course Outcomes:

1. Understand Nature, objectives and principles of financial accounting,
2. Able to prepare the financial statements of organization.
3. Apply various tools to analysis the financial position of the organization.
4. Understood the fundamental concepts of cost accounting which help the organization in decision making.
5. Aware of contemporary practices in the area of financial accounting.

Unit-I:

Introduction to Financial Accounting: Definition – Scope – Nature – Objectives – Users of Accounting Information – Accounting Principles: Concepts and Conventions – Accounting Standards. **Branches of Accounting:** Financial Accounting – Cost Accounting – Management Accounting.

Unit-II:

Accounting Cycle & Preparation of Financial Statements: Book keeping, **Double Entry System, Classification of Accounts – Journal – ledger and Trial Balance preparation**. Capital and Revenue Expenditure. **Preparation** of Final Accounts: Trading, profit and loss account and Balance Sheet – Methods of Depreciation.

Unit-III:

Financial Statement Analysis: Comparative - Common size, Trend Analysis, Ratio Analysis – Funds Flow Analysis (simple problems) – Cash Flow Statements (simple problems)

Unit-IV:

Cost Accounting for Managerial Decisions: Meaning of Cost, Costing, cost accounting, Classification of Costs, Elements of Cost and Preparation of Cost Sheet. Marginal Costing: Break Even Analysis

Unit–V:

Contemporary Developments in Accounting: Window Dressing, Methods of Window dressing, **Ethical issues in preparation of accounts.** Human Resource Accounting – Social Accounting - Responsibility Accounting – Reporting to Management (Theory)- Forensic Accounting and Audit.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. G .Prasad& V. Chandra Sekhara Rao, Accounting for managers, jai Bharat publications.
2. Jelsy Joseph Kuppapally – Accounting for Managers – PHI (2008).
3. I.M. Pandey: Management Accounting, Third Revised Edition, Vikas Publishing House. New Delhi.
4. Jawaharlal, Accounting for Management, Himalaya, Mumbai,2012
5. Khan and Jain, Management Accounting, 5th Edition, Tata Mc Graw Hill, Delhi.
6. Gupta R.L. and Radhaswamy M: Advanced Accountancy, Sultan Chand Publications-2014.
7. Maheswari S.N: Advanced Accountancy, 5th Edition, Vikas Publishing House. New Delhi.
8. Grewal T.S. Introduction to Accountancy, 2009, S Chand Publishers

I MBA- I SEMESTER
Course Code: V18MBT04

INDIAN ECONOMY & POLICY

L	T	P	C
4	0	0	4

Course Outcomes:

1. Understand the composition of Indian economy.
2. Able to analyze the internal and external factors which impact the functionality of a business unit.
3. Understand the industrial environment prevails in India towards industrial development.
4. Know the functioning of various financial organs in Indian economic system.
5. Understand how Indian economy integrated to the global business.

Unit-I:

Demographic Environment: India's mixed Economic system - Occupational Structure; population trends; growth trends in basic sectors- National income and distribution of wealth- Poverty and unemployment- Recent trends and government policy.

Unit-II:

Economic & Business Environment - Appraisal of Fiscal and monitory policies; Industrial Policy, 1991; Liberalisation, Privatisation and Globalisation- Foreign Trade policy – FEMA; Consumer Protection Act; Consumer Rights and redressal Mechanism; Environmental degradation and protection

Unit-III:

Industrial Environment: Industrial Growth; structure and performance; Public sector in India; Role and growth; Disinvestment and privatization of PSUs; Industrial sickness in India- incidence, nature and causes; Government's remedial policy measures

Unit-IV:

Financial Environment- Money market; Capital market; structure, Role and problems of growth- impact of Global Financial crisis – Reforms in Indian Capital markets- Commercial Banking - Recent trends; Reforms; problem of NPAs; Govt. Measures.

Unit-V:

International Environment- Foreign Investments and Multinational Corporations; Implications of FDI and Portfolio Investments; Social and economic implications of MNCs in India- Indian economy under WTO regime; Impact of WTO policies on Agriculture, small business and employment- Impact of World Bank and IMF policies on Indian Economy.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. Dutt, Ruddar& KPM Sundaram, Indian Economy, S. Chand & Co. New Delhi,2016
2. Misra&Puri, Indian Economy, Himalaya Publishing House, Delhi,2015
3. Ahuja, H. L., Economic Environment of Business,7th Edition, S. Chand & Co, New Delhi
4. Adhikari,M., Economic Environment of Business, Sultan Chand & Sons, Delhi,2012
5. Fernando, A. C., Business Environment, Pearson, Delhi,2016
6. Ashwathappa, K, Essentials of Business Environment, Himalaya, Delhi,2018.
7. The Economic Times, Financial Express, Business Standard, Dailies

I MBA- I SEMESTER
Course Code: V18MBT05

BUSINESS COMMUNICATION

L	T	P	C
4	0	0	4

Course Outcomes:

1. Understand the communication process, importance and classification.
2. Familiar with managing organizational communication
3. Understand influencing factors of interpersonal communication.
4. Learn various business writing skills
5. Preparations of reports for different occasions.

UNIT 1:
Role of Communication in Business: Objective of Communication – The Process of Human Communication – Media of Communication - Written Communication - Oral Communication – Visual Communication - Audio Visual Communication – Silence - Developing Listening Skills – Improving Non-verbal communication skills – Cross Cultural Communication – problems and challenges.
UNIT 2:
Managing Organization Communication: Formal and Informal Communication–intrapersonal Communication – Models for Inter Personal Communication - Exchange Theory, Johari Window and Transactional Analysis.
UNIT 3:
Motivational factors to influence Interpersonal Communication: Inter-Personal communication – Role of Emotion in Inter Personal Communication – Communication Styles – Barriers to Communication – gateways to Effective Interpersonal Communication.
UNIT 4:
Business Writing Skills: Significance of Business Correspondence – Preparing agenda for meetings, recording minutes of meeting, Letter Writing (Employment related correspondence, Correspondence with Govt./Authorities, Office Orders, Enquiries and Replies), Press release, Writing CV - Telephone Communication – email and SMS etiquette.
UNIT 5:
Report Writing – Meaning and Significance-Structure of Reports - Negative, Persuasive and Special Reporting: Informal Report – Proposals, Formal Reports. Techniques of Presentation – Types of Presentation.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.
References:

1) C.S.G. Krishnamacharyulu and Lalitha Rama Krishnan, Business Communication, Himalaya Publishing House, Mumbai,2016.
2) Urmila Rani and S. M. Roy, Business Communication, Himalaya Publishing House.
3) Nirmala Sing, Business Communication, Deep and Deep Publications Pvt. Ltd..
4) R. K. Madhukar, Business Communication, VIKAS Publications,2018.
5) Business and Professional Communication, Texas Aandm. Sage Publications ,2017
6) The Basics of Communication, Steve Duck, Sage Publications,2012
7) Professional Speaking Skills, Aruna koneru, Oxford University Press,2015
8) English Grammar, RajeevanKaral, Oxford University Press
9) Spoken English, Sabina Pillai, Oxford University Press,2016.

I MBA- I SEMESTER
Course Code: V18MBT06

QUANTITATIVE TECHNIQUES FOR BUSINESS DECISIONS

	L	T	P	C
Course Outcomes:	4	0	0	4

1. Obtain basic knowledge of statistics, probability and probability distributions.
2. Understand decisions making process and familiar with various supporting tools for decision making.
3. Able to formulate Linear Programming models for various managerial problems.
4. Can optimally utilize resources using Transportation, Assignment models. Formulate strategies using Game theory.
5. Understand project management techniques using PERT and CPM.

UNIT 1:

Basic Measures of Central Tendency – Measures of Dispersion –Simple Correlation and Regression analysis - Concept of Probability- Probability Rules – Joint and Marginal Probability – Baye'sTheorem- Probability Distributions- Binomial, Poisson, Normal and Probability Distributions.

UNIT 2:

Introduction to Operations Research. Decision Theory: Steps involved in Decision Making, different environments in which decisions are made, Criteria for Decision Making, Decision making under uncertainty, Decision making under conditions of Risk-Utility as a decision criterion, Decision trees, Graphic displays of the decision making process.

UNIT 3:

Linear Programming: Formation of mathematical modeling, Graphical method, the Simplex Method; Justification, interpretation of Significance of All Elements in the Simplex Tableau, Artificial variable techniques.

UNIT 4:

Transportation, Assignment Models & Game theory: Definition and application of the transportation model, solution of the transportation problem, the Assignment Model, Traveling Salesman Problem. Game Theory: Introduction – Two Person Zero-Sum Games, Pure Strategies, Games with Saddle Point, Mixed strategies, Rules of Dominance, Solution Methods of Games without Saddle point – Algebraic, matrix and arithmetic methods.

UNIT 5:

Network Analysis: PERT & CPM.- Drawing networks – identifying critical path – probability of completing the project within given time- project crashing –optimum cost and optimum duration..

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References

1. N.D.Vohra: "***Quantitative Techniques in Management***", Tata-McGraw Hill Private Limited, New Delhi, 2011.
2. J. K. Sharma, "***Operations Research: Theory and Applications***", Macmillan Gupta S.P:"***Statistical Methods***", S. Chand and Sons, New Delhi,
3. Anand Sharma: "**Quantitative Techniques for Business decision Making**", HimalayaPublishers, New Delhi,2012;
4. D P Apte: "***Operation Research and Quantitative Techniques***", Excel Publication, New Delhi,2013
5. Hamdy, A.Taha: "***Operations Research: An Introduction***", Prentice-Hall of India, New Delhi2003.
6. Anderson: "**Quantitative Methods for Business**", Cengage Learning, New Delhi 2013
7. Sancheti, Dc & VK Kapoor, "**Business Mathematics**", S Chand and Sons, New Delhi

I MBA- I SEMESTER
Course Code: V18MBL01

INFORMATION TECHNOLOGY LAB (100% LAB)

L	T	P	C
4	0	6	3

Course Outcomes:

1. Able to prepare various office reports using MS-Office, run queries using SQL.
2. Compute various financial calculations using MS-Excel.
3. Calculate and apply statistical functions using MS-Excel.
4. Understand the concept flow diagrams, TQM methodologies.

UNIT 1:

Introduction of various software used for business: Significance in the current business environments - Introduction of software MS Office, SQL.

UNIT 2:

Financial modeling: Present value of cash flows, Valuations, Financial ratio analysis, Forecasting, Trend analysis of data, Random input generations

UNIT 3:

Statistics for Management - correlation and regression analysis data presentation techniques. Spread sheet showing the monthly payments with changing interest rate over a period of loan. (Using excel)

UNIT 4:

Data Collection and analyzing techniques: Charts, Flow diagrams TQM methodologies

References:

1. Shelly, Cashman: “Microsoft copies 2007”, Cengage Learning, New Delhi. 2012

I MBA- II SEMESTER
Course Code: V18MBT07

FINANCIAL MANAGEMENT

L	T	P	C
4	0	0	4

Course Outcomes:

1. Understood the fundamental concepts of financial Management
2. Able to construct optimal capital structure by identification of financial sources and evaluating cost of capital.
3. Evaluating long term investment projects by applying capital budgeting techniques.
4. Get through knowledge of working capital, cash, inventory and receivables management
5. Aware of various forms of corporate restructuring and Merger & Acquisition trends.

UNIT 1:

Financial Management: Concept - Nature and Scope - Evolution of financial Management objectives of financial Management - Profit maximization- Wealth maximization and EPS maximization – Major decisions of financial manager Challenges of Financial manager in contemporary scenario, Agency problem, - Risk-Return - trade off.

UNIT 2:

Financing Decision: Sources of finance - financial instruments - Concept and financial effects of leverage – Preparation Capital Structure decision - EBIT – EPS analysis. Cost of Capital: The concept – Average vs. Marginal Cost of Capital. Measurement of Cost of Capital – Component Costs and weighted Average Cost.

UNIT 3:

Investment and Dividend Decision: Investment decision process- Concept and Techniques of Time Value of money - Capital budgeting decisions: Developing Cash Flow Data - Evaluation Techniques-Traditional and DCF methods - NPV vs. IRR, PI- Risk Analysis in capital budgeting: Measurement of Risk. Risk Adjusted Discount Rate – Sensitivity analysis - Decision Tree Approach. Dividend Decision: Major forms of dividends - The theoretical backdrop– relevant, irrelevant theories of dividend. .

UNIT-4:

Working Capital Management: Concepts and characteristics of working capital. Factors determining the working capital - Estimating working capital requirements - Working capital policy - Management of current assets like Cash, Receivables and Inventory.

UNIT-5:

Corporate Restructuring: Mergers and Acquisitions, Types of Mergers, Evaluation of Merger Proposal, Take-over, Amalgamation, Leverage buy-out, Management buy-out, Merger and Acquisition trends in India.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. P.Vijaya Kumar, P.S. Ravindra, Kiran Kumar, "Financial Management", Himalaya Publishing House PVT Ltd, 2014.
2. Rajiv Srivastava, Anil Misra: "**Financial Management**", Oxford University Press, New Delhi,2012
3. Brigham,E.F: "**Financial Management Theory and Practice**", Cengae Learning, New Delhi, 2013
4. Prasanna Chandra: "**Financial Management Theory and Practice**", Tata McGrawHill 2011.
5. I.M. Pandey: "**Financial Management",** Vikas Publishers, New Delhi, 2013.
6. RM Srivastava, Financial Management, Himalaya Publishing house, 4th edition.
7. Khan and Jain: Financial Management, Tata McGraw Hill, New Delhi,
8. Pradip Kumar Sinha: "**Financial Management**", Excel Books, New Delhi, 2009.
9. Vyuptakesh Sharan: "**Fundamentals Financial Management**", Pearson, New Delhi, 2012.

I MBA- II SEMESTER
Course Code: V18MBT08

HUMAN RESOURCE MANAGEMENT

L	T	P	C
4	0	0	4

Course Outcomes:

1. Understand the fundamentals of HRM with a global perspective.
2. Calculate the type and number of personnel required to the organization in future by considering the demand and supply of manpower.
3. Learn various methods to assess the performance of employees.
4. Design compensation system that conforms to the legal framework.
5. Learn the functionality of trade unions and also have ability to balance between work and life.

UNIT 1:
HRM: Significance - Definition and Functions – evolution of HRM- Principles - Ethical Aspects of HRM- - HR policies, Strategies to increase firm performance - Role and position of HR department – aligning HR strategy with organizational strategy - HRM at global perspective challenges – cross-cultural problems – emerging trends in HRM.

UNIT 2:
Investment perspectives of HRM: HR Planning – Demand and Supply forecasting- Recruitment and Selection- Sources of recruitment - Tests and Interview Techniques – Training and Development – Methods and techniques – Training evaluation - retention - Job Analysis –job description and specifications - Management development - HRD concepts.

UNIT 3:
Performance Evaluation: Importance – Methods – Traditional and Modern methods – Latest trends in performance appraisal - Career Development and Counseling- Compensation, Concepts and Principles- Influencing Factors- Current Trends in Compensation- Methods of Payments - compensation mechanisms at international level.

UNIT 4:
Wage and Salary Administration: Concept- Wage Structure- Wage and Salary Policies- Legal Frame Work- Determinants of Payment of Wages- Wage Differentials - Job design and Evaluation- - Incentive Payment Systems. Welfare management: Nature and concepts – statutory and non-statutory welfare measures – incentive mechanisms-Fringe Benefits-ESOPs

UNIT 5:
Managing Industrial Relations: Trade Unions - Employee Participation Schemes-Collective Bargaining– Grievances and disputes resolution mechanisms – Safety at work – nature and importance – work hazards – safety mechanisms- Quality of Work Life (QWL).

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References

1. K Aswathappa: "***Human Resource and Personnel Management***", Tata McGraw Hill, New Delhi, 2013
2. N.Sambasiva Rao and Dr. Nirmal Kumar: "**Human Resource Management and Industrial Relations**", Himalaya Publishing House, Mumbai
3. Mathis, Jackson,Tripathy:"***Human Resource Management:Asouth-Asin Perspective***", Cengage Learning, New Delhi, 2013
4. Subba Rao P: "***Personnel and Human Resource Management-Text and Cases***", Himalaya Publications, Mumbai, 2013.
5. Madhurima Lall, Sakina Qasim Zasidi: "**Human Resource Management**", Excel Books, New Delhi, 2010

I MBA- II SEMESTER
Course Code: V18MBT09

MARKETING MANAGEMENT

	L	T	P	C
Course Outcomes:	4	0	0	4

1. Know the concepts and constituents of Market and Marketing.
2. Understand marketing mix elements
3. Understand the process of develop pricing strategies.
4. Learn various marketing communication tools and techniques
5. Obtain the information on changing paradigm of marketing.

UNIT 1:
Introduction to Marketing: Concept of Market and Marketing – Philosophies of Marketing – Marketing Planning Process-Creation of Customer Value and Satisfaction.

UNIT 2:
Marketing MIX : Elements of marketing Mix - Product: Classification of Products - New Product Development - Product Life Cycle- BCG Matrix - Market Segmentation, Targeting and positioning strategies.

UNIT 3:
Pricing Strategy: Objectives of Pricing - Methods of Pricing - Selecting the Final price - Adopting price - Initiating the price cuts - Imitating price increases - Responding to Competitor's price changes.

UNIT 4:
Marketing Communication: Communication Process – Communication Mix – Managing Advertising Sales Promotion - Public relations and Direct Marketing - Sales force - Objectives of Sales force - Structure and Size - Sales force Compensation.

UNIT 5:
Branding and New Horizons of Marketing: Brand and Branding – Creation of Brand - Brand Identity – Brand positioning and equity. Online Marketing – Green Marketing – Neuro Marketing – Guerilla Marketing – Experiential Marketing – Internal Marketing.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References
1. Lamb, Hair, Sharma: "**MKTG**" Cengage Learning , New Delhi, 2013
2. Phillip Kotler: "**Marketing Management** ", Pearson Publishers, New Delhi, 2013.
3. Rajan Sexena: "**Marketing Management**", Tata McGraw Hill, New Delhi, 2012.
4. R.Srinivasan: "**Case Studies in Marketing**", PHI Learning, New Delhi, 2012
5. Tapan K Pand: "**Marketing Management**", Excel Books, New Delhi, 2012
6. Paul Baines, Chris Fill, Kelly Page Adapted by Sinha K: "**Marketing**", Oxford University Press, Chenni, 2013.

I MBA- II SEMESTER
Course Code: V18MBT10

PRODUCTION & OPERATIONS MANAGEMENT

L	T	P	C
4	0	0	4

Course Outcomes:

1) Understand the evolution and fundamental concepts of production and operations management
2) Familiar with production planning and control strategies.
3) Learn concepts of Waste Management, Quality Assurance, Quality Circles and application of various Statistical Quality Control techniques.
4) Understand basic concepts of Quality Improvement tools like six sigma, ISO 9000-2000 clauses and coverage and factors effecting Productivity.
5) Gain knowledge on stores management and Inventory Control techniques.

UNIT 1:
Introduction: Overview & Definition of Production and Operations Management- Nature and Scope of Production and Operations Management-Historical Evolution –Role & responsibilities of the production manager - Types of Manufacturing Processes.
UNIT 2:
Production Planning and Control: Stages in PPC – Gantt – PPC in Mass, Batch, and Job Order Manufacturing- Aggregate planning and Master Scheduling, MRP, CRP. Maintenance management & Industrial Safety. Plant Location & Layout Planning- Factors influencing location - types of layouts. Capacity Planning – Optimal Production Strategies: Scheduling and Sequencing of Operations. Work Design: Method Study and Work Measurement – Work Sampling.
UNIT 3:
Managing of Work Environment: –Automation --Technology Management – Waste Management. Quality Assurance and Quality Circles – Statistical Quality Control –Control Charts for Variables- Average, Range and Control charts for Attributes. Acceptance Sampling Plans.
UNIT 4:
Quality Improvement: Basic concepts of quality, dimensions of quality, Juran's quality trilogy, Deming's 14 principles, Quality improvement and cost reduction, ISO 9000-2000 clauses & coverage. Six Sigma, Productivity –factors affecting productivity, measurement & improvements in productivity - new product development and design - stages & techniques. Total Productive Maintenance (TPM).
UNIT 5:
Stores Management: Purchase functions and Procedure - Objectives of Stores Management – Requirements for efficient-Management of Stores – safety stock- Different Systems of Inventory Control -Inventory control techniques- EOQ, ABC, VED and FNSD analysis- JIT, VMI
Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References
1. Panner Selvem: "**Production and Operation Management**", Prentice Hall of India, NewDelhi, 2012.
2. K.Aswathappa, K. Shridhara: "**Production & Operation Management**", Himalaya Publishing House, New Delhi, 2012
3. Ajay K Garg: "**Production and Operation Management**", TMH, New Delhi,2012
4. Deepak Kumar Battacharya: "**Production & Operation Management**", University Press, New Delhi, 2012
5. AlanMuhlemann, JohnOakland,jasti Katyayani: "**Production and Operation Management**", Pearson, New Delhi,2013
6. O.P.Khanna, " Industrial Engineering and Management" Dhanpad Rai Publications

I MBA- II SEMESTER
Course Code: V18MBT11

BUSINESS RESEARCH & STATSTICAL ANALYSIS

L	T	P	C
4	0	0	4

Course Outcomes:

1. Understand the concept of research, research process in detail
2. Understand various scaling techniques and research report preparation process.
3. Apply various statistical tools to test hypothesis.
4. Familiar with Bivariate and Multivariate analysis concepts.
5. Use SPSS for Hypothesis testing.

UNIT 1:
Introduction : Nature and Importance of research, The role of business research, Research process, types of research, Defining Research Problem. Research Design –Types of Research design-Sampling and Sampling Design – Sampling Methods –Probability and Non probability sampling. Discussion on primary data and secondary data, tools and techniques of collecting data. Methods of collecting data- Designing of Questionnaire.

UNIT 2:
Measurement and Scaling – Nominal Scale – Ordinal Scale –Interval Scale – Ratio Scale – Guttman Scale – Likert Scale – Schematic Differential Scale. Editing – Coding – Classification of Data – Tables and Graphic Presentation – Preparation and Presentation of Research Report

UNIT 3:
Data Analysis: Formulation of hypothesis-types of hypothesis- Type I and Type II errors, Hypothesis testing procedure, parametric tests -t distribution, Z test,

UNIT 4:
F test and ANOVA - one way and two ways test- Chi Square test- Goodness of fit- Independence- Bivariate and Multivariate analysis concepts.

UNIT 5:
Automated Data Analysis: SPSS Applications – Tabulation and Cross Tabulation of Data: Univariate, Bivariate Data Analysis and Tests of Hypothesis.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References

1. Navdeep and Guptha : "**Statistical Techniques & Research Methodology**", Kalyani Publishers
2. Willam G.Zikmund, Adhkari: "***Business Research Methods***", Cengage Learning, New Delhi, 2013.
3. S.Shajahan: "***Research Methods for management***", JAICO Publishing House, New Delhi, 2009.
4. UWE FLICK: "**Introducing *Research Methodology***", SAGE, New Delhi,2012.
5. Cooper R.Donald and Schindler S. Pamela: "***Business Research Methods***", 9/e, Tata MCGraw Hill, New Delhi.
6. M.V.Kulkarni: "**Research Methodology**" , Everest Publishing House, New Delhi, 2010.
7. Sachdeva: "***Business Research Methods***", Himalaya Publishing House, Mumbai, 2011.
8. Ranjit Kumar: "**Research Methodology",** Pearson,New Delhi,2012.
9. Deepak Chawla , Neena Sondhi: "**Research Methodology, Concepts and Cases**" Vikas Publishing House, New Delhi, 2011.
10. Alan Bryman, Emma Bell: "**Business Research Methods**", Oxford University Press, New Delhi, 2011.

I MBA- II SEMESTER
Course Code: V18MBT12

LEGAL ENVIRONMENT FOR BUSINESS

L	T	P	C
4	0	0	4

Course Outcomes:

1. Understand the classification and essentials of valid contract under the Indian contract act-1872
2. Student will get awareness about the sale and agreement to sale and also on the rights of a consumer to protect himself in the unfair trade practice
3. Understand contract of agency in detail and also the issue of various negotiable instruments and their consequences.
4. Understand the concepts of partnership according to the Indian Partnership Act 1932(types, registration, partnership deed, dissolution of partnership)
5. Aware the legal aspect at various stages of functioning of a company complying with Companies Act 2013.

UNIT 1:
Importance of Commercial Law: The Indian Contracts Act, 1872 – Nature of the Act and Classification of Contracts – Essentials of a Valid Contract – Offer and Acceptance – Capacity – Consideration –Free Consent – Legality of Object –Performance of a Contract – Discharge of a Contract – Breach of a Contract and Remedies.

UNIT 2
Sales of Goods Act: Distinction between Sales and Agreement to Sell – Conditions and Warranties – Performance of Contract of Sale –Transfer of Ownership – Rights of an Unpaid Seller. Consumer Protection Act, 1986: Consumer Right –Machinery for Redressal of Consumer Grievances.- Information Technology Act 2000.

UNIT 3:
Contract of Agency: Kinds of Agents –Creation of Agency- Duties and Rights of Principal and Agents-Principal's Liability for the Acts of the Agent-Liability of Agent –Termination of Agency. Negotiable Instruments Act, 1881- Kinds of a Negotiable Instruments and endorsement- Presentation and discharge of Negotiable Instrument.

UNIT 4:
Indian Partnership Act, 1932: Meaning and Essentials of Partnership- Registration – Types of Partnership-Duties and Rights of Partners – Dissolution of Partnership.

UNIT 5
Company Act 2013: Nature and Types of Companies – Formation – Memorandum of Association-Articles of Association –Kinds of Shares –Duties of Directors-Winding up.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. Kuchhal M. C. – Business Law (Vikas Publication, 4th Edition)
2. Gulshan S. S. – Business Law Including Company Law (Excel Books)
3. Avtar Singh – Principles of Mercantile Law (Eastern Book Company, 7th Edition).
4. N.D. Kapoor & Rajni Abbi-General Laws & Procedures (Sultan Chand & Sons)
5. Kumar, Ravinder (2016), Legal aspects of Business – 4th edition, Cengage Publishers, New Delhi.
6. Relevant Acts

I MBA- II SEMESTER

Course Code: V18MBT13

BUSINESS ETHICS & CORPORATE GOVERNANCE

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4	0	0	4

COURSE OUTCOMES:

1. Understand the importance of ethics and ethical practices at work place
2. Know various factors influencing Business ethics in India. Also get understanding of various scams.
3. Understand the ethical practices in functional areas such as Marketing, Hrm & Finance.
4. Understand the overview of corporate governance in India.
5. Gain knowledge in various governance issues related to Directors and Auditors.

UNIT 1:

Importance of Business Ethics: Values and Ethics- Business Ethics and Law – Ethics in Work Place – Ethical Decision Making- Theories of Business Ethics – Management and Ethics- Indian Ethical Traditions.

UNIT 2:

Impact of Globalization on Indian Business Ethics: Reasons for Unethical Practices among Indian companies – Development of Indian Capital Markets – Various studies on Ethical Attitudes of Managers Major Indian Scams.

UNIT 3:

Ethics in Marketing, HRM and Finance: Product safety and Pricing-Ethical responsibility in Product-Advertising and Target Marketing Ethics of sales, advertising and product placement and Consumer Autonomy. Ethics in HRM & Finance – HR related ethical issues - Institutional Culture – Frauds in Banks - Measures against Bank Frauds – Frauds in Insurance sector.

UNIT 4:

Corporate Governance: An overview – Theory and Practice of Governance- Indian model of Governance-Good Corporate Governance – Land marks in emergence of Governance OECD Principles – Sarbanes-Oxley Act 2002- SEBI Initiatives.

UNIT 5:

Corporate Governance Indian Scenario: Role of Government in Ensuring Corporate Governance – Governance issues relating to Board of Directors – Duties and responsibilities of Auditors – Governance under limited competition – Role of Media – Corporate Governance in Developing and Transiting Economies.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. S.K.Mandal: “Ethics in Business and Corporate Governance”, TMH, New Delhi, 2012.
2. Marianne M Jennings: “Cases in Business Ethics”, Cengage Learning, New Delhi,2012.
3. S.Prabhakaran: “Business Ethics and Corporate Governance”, Excel Books, New Delhi, 2011.
4. N.Balasubramanyam: “A Case Book on Corporate Governance and Stewardship”,TMH., New Delhi, 2011.
5. A.C.Fernando: “Business Ethics and Corporate Governance”, Pearson Publishers, New Delhi, 2013.

Minutes of the 2nd Academic Council meeting on 01/07/2018
Item No: 11
Annexure No: VIII

Academic Calendar (Autonomous)

Each Semester duration: 21 weeks (total)

Instruction	- 16 weeks
MID Semester exams	-1 week
Comprehensive Test	- 1 week
Practical exams	-1 week
End semester exams	-2 weeks

I Year (2018-19)

I Semester

S.No	Form	To	Activity	No. of Weeks
1	09/7/2018	21/7/2018	Induction Programme	2 weeks
2	23/7/2018	15/9/2018	Instruction	8 weeks
3	17/09/2018	19/9/2018	Mid-I	3 days
4	20/09/2018	14/11/2018	Instruction	8 weeks
5	15/11/2018	17/11/2018	Mid-II	3 days
6	19/11/2018	24/11/2018	Comprehensive test	1 week
7	26/11/2018	1/12/2018	Practical Exams	1 week
8	03/12/2018	15/12/2018	End Semester Exams	2 weeks
Total				**2+21=23**
1 Week Winter Break				

II SEMSTER

1	24/12/2018	16/2/2019	Instruction	8 weeks
2	18/2/2019	20/2/2019	Mid-I	3 days
3	21/2/2019	24/4/2019	Instruction	8 weeks
4	25/4/2019	27/4/2019	Mid-II	3 days
5	29/4/2019	4/5/2019	Comprehensive test	1 week
6	06/5/2019	11/5/2019	Practical exams	1 week
7	13/05/2019	25/5/2019	End Semester Exams	2 weeks
Total				21
5 weeks Summer Break				
Commencement of II Year- 01/07/2019				