ACADEMIC REGULATIONS
COURSE STRUCTURE
AND
DETAILED SYLLABUS

ELECTRICAL AND ELECTRONICS ENGINEERING

B.Tech Four Year Degree Course

(Applicable for the batches admitted from 2014-15)

GUDLAVALLERU ENGINEERING COLLEGE

(An Autonomous Institute with Permanent Affiliation to JNTUK, Kakinada)

Seshadri Rao Knowledge Village

GUDLAVALLERU - 521 356, Krishna District, Andhra Pradesh

CONTENTS

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VISION, MISSION

OF THE

COLLEGE & DEPARTMENT

PEOs & POs

ACADEMIC REGULATIONS

AND

CURRICULAR COMPONENTS

VISION & MISSION OF THE COLLEGE

Vision

To be a leading institution of engineering education and research, preparing students for leadership in their fields in a caring and challenging learning environment.

Mission

- To produce quality engineers by providing state-of-the-art engineering education.
- To attract and retain knowledgeable, creative, motivated and highly skilled individuals whose leadership and contributions uphold the college tenets of education, creativity, research and responsible public service.
- To develop faculty and resources to impart and disseminate knowledge and information to students and also to society that will enhance educational level, which in turn, will contribute to social and economic betterment of society.
- To provide an environment that values and encourages knowledge acquisition and academic freedom, making this a preferred institution for knowledge seekers.
- To provide quality assurance.
- To partner and collaborate with industry, government, and R and D institutes to develop new knowledge and sustainable technologies and serve as an engine for facilitating the nation's economic development.
- To impart personality development skills to students that will help them to succeed and lead.
- To instil in students the attitude, values and vision that will prepare them to lead lives of personal integrity and civic responsibility.
- To promote a campus environment that welcomes and makes students of all races, cultures and civilizations feel at home.
- Putting students face to face with industrial, governmental and societal challenges.

VISION & MISSION OF THE DEPARTMENT

Vision

To be a pioneer in electrical and electronics engineering education and research, preparing students for higher levels of intellectual attainment, and making significant contributions to profession and society.

Mission:

- To impart quality education in electrical and electronics engineering in dynamic learning environment and strive continuously for the interest of stake holders, industry and society.

- To create an environment conducive to student-centered learning and collaborative research.
- To provide students with knowledge, technical skills, and values to excel as engineers and leaders in their profession.

III. PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

- Graduates will have technical knowledge, skills and competence to identify, comprehend and solve problems of industry and society.
- Graduates learn and adapt themselves to the constantly evolving technology to pursue higher studies and undertake research.
- Graduates will engage in lifelong learning and work successfully in teams with professional, ethical and administrative acumen to handle critical situations. Graduates are expected to attain.

IV. PROGRAM OUTCOMES (POs)

The graduates of Electrical and Electronics Engineering program will be able to

- Apply knowledge of mathematics, science and engineering to formulate and solve complex electrical & electronics engineering problems.
- Ability to design and develop hardware and /or software system, a component thereof, and process in electrical and electronics engineering to meet desired performance needs, within realistic constraints.
- Use various techniques and modern tools for modeling and simulation of various components, conduct experiments to analyze and provide valid conclusions on the performance of various components in electrical and electronics engineering.
- Apply reasoning and contextual knowledge to solve various engineering, industry and societal problems
- Understand the role of electrical and electronics engineering for sustainable development in a global, economic, environmental and societal context.
- An ability to apply professional ethics, responsibilities and commitment to function effectively as an individual or as a member of a team to find successful design solutions to the problems related to electrical and electronics engineering.
- An ability to communicate effectively on complex engineering activities
- Apply principles of management and business practices to become good entrepreneur as well as in the industry.
- Engage in independent and lifelong learning and to have knowledge of contemporary technologies.

V. ACADEMIC REGULATIONS

Applicable for the students of B.Tech from the Academic Year 2014-15.

1. UG – B.Tech Programs

The following B.Tech Programs are offered at present

i. Civil Engineering (CE)
ii. Electrical and Electronics Engineering (EEE)
iii. Mechanical Engineering (ME)
iv. Electronics and Communication Engineering (ECE)
v. Computer Science and Engineering (CSE)
vi. Information Technology (IT)

2. Duration of the Program

The duration of the program is four academic years consisting of eight semesters. However, a student is permitted to complete the course work of B.Tech program in the stipulated time frame of **EIGHT** years from the date of joining. Students admitted into third semester of B.Tech program directly, through Lateral Entry (LE), shall have to complete the course work of B.Tech program in the stipulated time frame of **SIX** years from the date of joining.

3. Minimum Instruction Days

Each semester consists of a minimum of ninety instruction days.

4. Program Credits

i) Each discipline of the B.Tech program is designed to have a total of 180 credits and the student shall have to complete the four year course work and earn all the **180** credits for the award of B.Tech Degree.

ii) Students joining the B.Tech program into the third semester directly through Lateral Entry (LE) Scheme shall have to complete the three year course work and earn **132** credits for the award of B.Tech degree.

5. Attendance Regulations

5.1 A student shall be eligible to appear for End Semester Examinations if he acquires a minimum of 75% of attendance in aggregate of all the subjects.

5.2 Condoning of shortage of attendance in aggregate upto 10% (65% and above and below 75%) in each semester will be considered for genuine reasons such as medical grounds and participation in co-curricular and extra-curricular activities and shall be granted only after approval by a committee duly appointed by the college. The student should submit application for medical leave along with medical certificate from a registered medical practitioner within three days from reporting to the class work after the expiry of the Medical Leave. In case of participation in co-curricular and extra-curricular activities, either in the college or

other colleges, students must take prior written permission from HoD concerned and should also submit the certificate of participation from the organizer of the event within three days after the completion of the event. Only such cases will be considered for condoning attendance shortage.

5.3 A student shall be eligible to claim for condonation of attendance shortage for a maximum of two times during the four year (eight semesters) course work of regular B.Tech / three year (six semesters) course work of B.Tech, Lateral Entry.

5.4 A student will not be promoted to the next semester unless he satisfies the attendance requirement of the current semester. He may seek re-admission for that semester when offered next.

5.5 Shortage of Attendance below 65% in aggregate shall in *NO* case be condoned.

5.6 Students whose shortage of attendance is not condoned in any semester are not eligible to take their end examination of that class and their registration shall stand cancelled.

5.7 A fee stipulated by the college shall be payable towards condonation of attendance shortage.

5.8 A student is required to put up a minimum of 75% of attendance in the mandatory non-credit courses such as NSS and Games & Sports / Creative Arts.

5.9 A student whose shortage of attendance is condoned in the case of credit courses in that semester shall also be eligible for condoning shortage of attendance up to 10% in the case of mandatory non-credit courses also.

6. Examinations and Scheme of Evaluation

6.1 Theory Courses (3 Credits):

Each theory course shall be evaluated for a total of 100 marks, consisting of 40 marks for internal assessment and 60 marks for semester end examination.

Internal Assessment:

i) Out of 40 marks for internal assessment, 20 marks are for continuous assessment in the form of class tests and 20 marks are based on two mid-term examinations. The first mid-term examination shall be from the first three units of syllabus and second mid-term from the last three units of syllabus, conducted during the semester.

ii) Four class tests, two tests before first mid-term examination and the other two before second mid-term examination, each for 10 marks, with 45 minutes duration, are conducted in a semester and the average marks of the three best scored tests are scaled up for 20 marks and taken as marks for the continuous evaluation process.

iii) Each mid-term examination is conducted for 40 marks with two hours duration. Each mid-term examination consists of four questions, each for 10 marks. All the questions need to be answered. First question shall have 5 short questions, each of two marks or 10 objective questions each of one mark and the remaining three questions are of descriptive type, one from each unit of syllabus.

iv) Sum of the 75% marks of best scored mid-term examination and 25% marks of least scored mid-term examination are scaled down for 20 marks.

v) For the subjects such as Engineering Graphics, Engineering Drawing, Machine Drawing, Design & Drawing of R.C. structures, Steel structures, Irrigation structures, Estimation Cost and Valuation, Building Planning and Drawing etc., the distribution of 40 marks for internal evaluation shall be 20 marks for day-to-day work and 20 marks for internal tests (average of 2 tests) and 60 marks for semester end examination.

External Assessment:

i) Semester End Examination will have questions under Part-A and Part-B with three hours duration. **Part-A** is compulsory and consists of six 2 marks questions. **Part-B** consists of six questions, one question from each unit, out of which four questions are to be answered. All questions carry equal marks of 12 each.

ii) For subjects like Engineering Drawing / Engineering Graphics, Machine Drawing, Building Planning & Drawing, etc., the pattern of semester end examination is given along with the syllabus of respective subject.

6.2 Theory Courses (2 Credits):

Each theory course shall be evaluated for a total of 75 marks, consisting of 25 marks for internal assessment and 50 marks for semester end examination.

Internal Assessment:

i) Out of 25 marks for internal, 5 marks for assignments and 20 marks are based on two mid-term examinations.

ii) Two assignments, each for 10 marks, are evaluated in a semester and the average marks of two assignments are scaled down for 5 marks.

iii) Each mid-term examination is conducted for 40 marks with two hours duration. Each mid-term examination consists of four questions, each for 10 marks. All the questions need to be answered.

iv) Sum of the 75% marks of the best scored mid-term examination and 25% marks of the least scored mid-term examination are scaled down for 20 marks.

External Assessment:

i) Semester End Examination will have questions under Part-A and Part-B with three hours duration. **Part-A** is compulsory and consists of five 2 marks questions. **Part-B** consists of six questions, covering uniformly the entire syllabus, out of which four questions are to be answered. All questions carry equal marks of 10 each.

Employability Skills:

The distribution of marks shall be 25 marks for Internal Evaluation and 50 marks for the semester end examination. There shall be continuous evaluation by the internal subject teacher during the semester for 25 internal marks, of which 15 marks shall be for day-to-day performance and 10 marks shall be evaluated by conducting an internal test towards the end of semester.

Semester end examination shall be conducted by the teacher concerned and external examiner for 50 marks. The distribution of marks in the semester end examination will be:

Questionnaire / data collection	: 10 marks,
Project Report	: 10 marks,
Presentation of the Project	: 15 marks and
Viva-voce	: 15 marks

MOOCs (Massive Open Online Courses):

The evaluation procedures and award of grades in different MOOCs and equivalent letter grading of the college shall be prescribed for each MOOCs along with the notification of MOOCs.

6.3 Laboratory Courses:

i) For practical subjects the distribution shall be 25 marks for Internal Evaluation and 50 marks for the semester end examinations. There shall be continuous evaluation by the internal subject teacher during the semester for 25 internal marks of which 15 marks shall be for day-to-day performance (10 marks for day-to-day evaluation and 5 marks for Record) and 10 marks shall be evaluated by conducting an internal laboratory test towards the end of semester.

ii) Semester end examination shall be conducted by the teacher concerned and external examiner for 50 marks.

6.4 Mandatory Non-Credit Courses:

A student is required to take up two Non-Credit courses, viz. NSS and Sports & Games / Creative Arts, one in II year and the other in III year, either in the first semester or second semester. Marks are awarded based on the day-to-day participation and performance in the activities organized under each event. A student is required to score 40 marks out of 100 marks despite putting up a minimum of 75% attendance to be

declared satisfactory in each mandatory non-credit course. The B.Tech degree shall only be awarded if a student gets satisfactory grade in each of the two mandatory non-credit courses and besides acquiring 180 credits of the B.Tech degree course.

A student has to repeat the course if he does not get satisfactory grade in each non-credit course for getting the degree awarded.

NSS

There shall be internal valuation for 100 Marks, out of which 60 marks are for participation and involvement in day-to-day activities and 40 marks for participation and involvement in a three days NSS camp arranged during the semester.

Sports and Games / Creative Arts

There shall be two internal valuations, each for 50 marks, in the chosen activity, one in the middle of semester and the other towards the end of semester. Sum of the two valuations shall be taken as the final marks for 100.

6.5 Industrial / Practical Training:

Industrial / Practical training shall be evaluated for a total of 100 marks, consisting of 40 marks for internal assessment of day-to-day work and 60 marks for the assessment of the training report and viva-voce examination, conducted by a panel of examiners appointed by the college.

6.6 Mini Project:

Industrial / Practical training shall be evaluated for a total of 75 marks, consisting of 25 marks for internal assessment of day-to-day work and 50 marks for the assessment of the project report and viva-voce examination, conducted by a panel of examiners appointed by the college.

6.7 Project Work:

i) The final project work shall be carried out during the 8th semester and will be evaluated for 200 marks.

ii) Out of 200 marks, 80 marks shall be for Internal Evaluation and 120 marks for the assessment of project thesis and viva-voce examination.

iii) Each student needs to give two seminars on the topic of his project, and each seminar is evaluated for 40 marks by a committee consisting of the supervisor and a senior faculty of the department. The sum of the marks of two seminars is taken as internal marks for 80.

iv) The assessment of Project Thesis and Viva–Voce shall be conducted by the 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 the fourth year second semester.

7. Criteria for Passing a Course and Award of Grades:

7.1 Criteria for Passing a Course:

i) A candidate shall be declared to have passed in individual theory/ drawing/ design course if he secures a minimum of 40% aggregate marks (internal & semester end examination marks put together), subject to securing a minimum of 35% marks in the semester end examination.

ii) A candidate shall be declared to have passed in individual laboratory/ project course if he secures a minimum of 50% aggregate marks (internal & semester end examination marks put together), subject to securing a minimum of 40% marks in the semester end examination.

iii) The candidate shall be declared to have passed in Employability Skills / Industrial / Practical Training / Mini Project / Porject Work if he secures 50% marks.

iv) On passing a course of a program, the student shall earn the credits as asigned to that course.

7.2 Method of Awarding Letter Grade and Grade Points for a Course:

A letter grade and grade points will be awarded to a student in each course based on his performance, as per the grading system given below.

Theory / Drawing Course (%)	Laboratory / Employability Skills / Industrial / Practical Training/ Mini Project/ Project Work (%)	Grade Points	Letter Grade
≥ 90	≥ 90	10	O (Outstanding
≥ 80 & < 90	≥ 80 & < 90	9	A+ (Excellent)
≥ 70 & < 80	≥ 70 & < 80	8	A (Very Good)
≥ 60 & < 70	≥ 60 & < 70	7	B+ (Good)
≥ 50 & < 60	≥ 50 & < 60	6	B (Above Average)
≥ 45 & < 50	–	5	C (Average)
≥ 40 & < 45	–	4	P (Pass)
< 40	< 50	0	F (Fail)

7.3 Calculation of Semester Grade Point Average (SGPA)* for semester:

The performance of each student at the end of the each semester is indicated in terms of SGPA. The SGPA is calculated as given below:

$$\textbf{SGPA} = \frac{\sum (CR \; X \; GP)}{\sum CR}$$

where CR = Credits of a course
GP = Grade Points awarded for a course

* SGPA is calculated for a candidate who passed all the courses in that semester.

7.4 Eligibility for Award of B.Tech Degree:

A student will be declared eligible for the award of the B.Tech. Degree if he fulfills the following academic regulations.

i) 4 Year B.Tech Course:

(a) Pursued a course of study for not less than four academic years and not more than eight academic years.

(b) Registered for **180** credits and secured **180** credits.

(c) Students, who fail to complete their Four years Course of study within Eight years or fail to acquire the **180** Credits for the award of the degree within eight academic years from the year of their admission shall forfeit their seat in B.Tech course and their admission shall stand cancelled.

ii) 3 Year B.Tech Course under Lateral Entry:

(a) Pursued a course of study for not less than three academic years and not more than six academic years.

(b) Registered for **132** credits and secured **132** credits.

(c) Students, who fail to complete their Three years Course of study within Six years or fail to acquire the **132** Credits for the award of the degree within six academic years from the year of their admission shall forfeit their seat in B.Tech course and their admission shall stand cancelled.

7.5 Calculation of Cumulative Grade Point Average (CGPA) for Entire Program:

The CGPA is calculated as given below:

$$\textbf{CGPA} = \frac{\sum(CR\,X\,GP)}{\sum CR}$$

where CR = Credits of a course
GP = Grade points awarded for a course

7.6 Award of Division:

After satisfying the requirements prescribed for the completion of the program, the student shall be eligible for the award of B.Tech Degree and shall be placed in one of the following grades:

CGPA	Class
≥ 7.5	First Class with Distinction
≥ 6.5 & < 7.5	First Class
≥ 5.5 & < 6.5	Second Class
< 5.5	Pass Class

7.7 Consolidated Grade Card

A consolidated grade card containing credits & grades obtained by the candidate will be issued after completion of the four year B.Tech program.

8. Supplementary Examinations

i) Supplementary examinations will be conducted twice in a year at the end of odd and even semesters.

ii) Semester end supplementary examinations shall be conducted till next regulation comes into force for that semester, after the conduct of the last set of regular examinations under the present regulation.

iii) Thereafter, supplementary examinations will be conducted in the equivalent courses as decided by the Board of Studies concerned.

iv) **Advanced Supplementary Examinations:** Candidate(s), who failed in theory / project work courses in 4th B.Tech 2nd Semester can appear for advanced supplementary examination conducted within one month after declaration of the revaluation results. However, those candidates who fail in these advanced supplementary examinations shall appear for subsequent examination along with regular candidates in the examinations conducted at the end of the respective semester.

9. Conditions for Promotion

i) A student shall be eligible for promotion to next Semester of B.Tech program, if he satisfies the conditions as stipulated in Regulation 5.

ii) The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in Regulation 5 for promotion into III Year I semester and IV year I semester.

a) 4 Year B.Tech Program:

i) A student shall be promoted from II year to III year only if he acquires the academic requirement of a minimum of 50% credits up to second year second semester as shown below.
1.Two regular and two supplementary examinations of I year I semester,
2.Two regular and one supplementary examinations of I year II semester,
3.One regular and one supplementary examinations of II year I semester
4.One regular examination of II year II semester,
irrespective of whether the candidate takes the examination or not.

ii) A student shall be promoted from III year to IV year only if he acquires the academic requirement of a minimum of 50% of credits upto third year second semester as shown below.
1. Three Regular and three supplementary examinations of I year I sem.,
2. Three Regular and two supplementary examinations of I year II sem.,
3.Two Regular and two supplementary examinations of II year I semester,
4.Two Regular and one supplementary examinations of II Year II semester,
5.One Regular and one supplementary examinations of III Year I semester,
6.One regular examination of III Year II semester,
irrespective of whether the candidate takes the examination or not.

b) 3 Year B.Tech Program under Lateral Entry Scheme:

i) A student shall be promoted from III to IV year only if he acquires the academic requirement of a minimum of 50% credits up to third year second semester as shown below.

1. Two regular and two supplementary examinations of II year I semester,
2. Two Regular and one supplementary examinations of II year II semester,
3. One regular and one supplementary examinations of III year I semester
4. One regular examination of III year II semester,

irrespective of whether the candidate takes the examination or not.

10. Revaluation

i) Students can submit the applications for revaluation, along with the prescribed fee receipt for revaluation of his answer script(s) of theory course(s) as per the notification issued by the Controller of Examinations.

ii) The Controller of Examinations shall arrange for revaluation of such answer script(s).

iii) An external examiner, other than the first examiner, shall revaluate the answer script(s).

iv) If the variation in marks of two evaluations is less than 15% of total marks, the best mark of two evaluations shall be taken into consideration.

v) If the variation in marks of two evaluations is more than 15% of total marks, there shall be third evaluation by an examiner other than the first two examiners. The best marks of two evaluations (which are nearer) shall be taken into consideration.

11. Re-admission Criteria

i) A candidate, who is detained in a semester due to lack of attendance has to obtain written permission from the Principal for readmission into the same semester after duly fulfilling the required norms stipulated by the college and by paying the required tuition fee and special fee in addition to paying an administrative fee of Rs.1,000/-.

ii) A candidate, who is not promoted either to III year or IV year due to lack of required credits can seek admission into III / IV year in subsequent years after obtaining the required credits as stipulated in regulation 9 by paying the required tuition fee and special fee in addition to paying an administrative fee of Rs. 1,000/-.

12. Break in Study

Student, who discontinues the studies for what-so-ever reason, can get readmission into appropriate semester of B.Tech program only with the prior permission of the Principal of the College, provided such candidate shall follow the transitory regulations applicable to the batch he joins. An administrative

fee of Rs.2,000/- per each year of break in study in addition to the prescribed tuition and special fees should be paid by the candidate to condone his break in study.

13. Transitory Regulations

A candidate, who is detained or discontinued in a semester, on readmission shall be required to do all the courses in the curriculum prescribed for the batch of students in which the student joins subsequently. However, exemption will be given to those candidates who have already passed such courses in the earlier semester(s) he was originally admitted into and substitute subjects are offered in place of them as decided by the Board of Studies. However, the decision of the Board of Studies will be final.

a) Four Year B.Tech Regular course:

13.1 A student who is following JNTUK curriculum and detained due to shortage of attendance at the end of the first semester of first year shall join the autonomous batch of first year first semester. Such students shall study all the courses prescribed for the batch in which the student joins and considered on par with regular candidates of Autonomous stream and will be governed by the autonomous regulations.

13.2 A student who is following JNTUK curriculum, detained due to lack of credits or shortage of attendance at the end of the second semester of first year or at the subsequent semesters shall join with the autonomous batch in the appropriate semester. Such candidates shall be required to pass in all the courses in the program prescribed by the Board of Studies concerned for that batch of students from that semester onwards to be eligible for the award of degree. However, exemption will be given in the courses of the semester(s) of the batch which he had passed earlier and substitute subjects will be offered in place of them as decided by the Board of Studies. The student has to clear all his backlog subjects up to previous semester by appearing for the supplementary examinations conducted by JNTUK for the award of degree. The total number of credits to be secured for the award of the degree will be sum of the credits up to previous semester under JNTUK regulations and the credits prescribed for the semester in which a candidate seeks readmission and subsequent semesters under the autonomous stream. The class will be awarded based on the academic performance of a student in the autonomous pattern.

b) Three Year B.Tech program under Lateral Entry Scheme:

13.3 A student who is following JNTUK curriculum and detained due to

shortage of attendance at the end of the first semester of second year shall join the autonomous batch of second year first semester. Such students shall study all the courses prescribed for the batch in which the student joins and considered on par with Lateral Entry regular candidates of Autonomous stream and will be governed by the autonomous regulations.

13.4 A student who is following JNTUK curriculum, detained due to lack of credits or shortage of attendance at the end of the second semester of second year or at the subsequent semesters shall join with the autonomous batch in the appropriate semester. Such candidates shall be required to pass in all the courses in the program prescribed by the Board of Studies concerned for that batch of students from that semester onwards to be eligible for the award of degree. However, exemption will be given in the courses of the semester(s) of the batch which he had passed earlier and substitute subjects are offered in place of them as decided by the Board of Studies. The student has to clear all his backlog subjects up to previous semester by appearing for the supplementary examinations conducted by JNTUK for the award of degree. The total number of credits to be secured for the award of the degree will be sum of the credits up to previous semester under JNTUK regulations and the credits prescribed for the semester in which a candidate seeks readmission and subsequent semesters under the autonomous stream. The class will be awarded based on the academic performance of a student in the autonomous pattern.

c) Transfer candidates (from non-autonomous college affiliated to JNTUK):

13.5 A student who is following JNTUK curriculum, transferred from other college to this college in second year first semester or subsequent semesters shall join with the autonomous batch in the appropriate semester. Such candidates shall be required to pass in all the courses in the program prescribed by the Board of Studies concerned for that batch of students from that semester onwards to be eligible for the award of degree. However, exemption will be given in the courses of the semester(s) of the batch which he had passed earlier and substitute subjects are offered in their place as decided by the Board of Studies. The student has to clear all his backlog subjects up to previous semester by appearing for the supplementary examinations conducted by JNTUK for the award of degree. The total number of credits to be secured for the award of the degree will be the sum of the credits upto

previous semester under JNTUK regulations and the credits prescribed for the semester in which a candidate joined after transfer and subsequent semesters under the autonomous stream. The class will be awarded based on the academic performance of a student in the autonomous pattern.

d) Transfer candidates (from an autonomous college affiliated to JNTUK):

13.6 A student who has secured the required credits upto previous semesters as per the regulations of other autonomous institutions shall also be permitted to be transferred to this college. A student who is transferred from the other autonomous colleges to this college in second year first semester or subsequent semesters shall join with the autonomous batch in the appropriate semester. Such candidates shall be required to pass in all the courses in the program prescribed by the Board of Studies concerned for that batch of students from that semester onwards to be eligible for the award of degree. However, exemption will be given in the courses of the semester(s) of the batch which he had passed earlier and substitute subjects are offered in their place as decided by the Board of Studies. The total number of credits to be secured for the award of the degree will be the sum of the credits upto previous semester as per the regulations of the college from which he is transferred and the credits prescribed for the semester in which a candidate joined after transfer and subsequent semesters under the autonomous stream. The class will be awarded based on the academic performance of a student in the autonomous pattern.

14. 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.

15. Malpractices

i) The Principal shall refer the cases of malpractices in internal assessment tests and semester end examinations to a malpractice enquiry committee constituted by him for the purpose. Such committee shall follow the approved levels of punishment. The Principal shall take necessary action against the erring students based on the recommendations of the committee.

ii) Any action by the candidate trying to get undue advantage in the performance or trying to help another, or derive the same through unfair means is punishable according to the provisions contained hereunder.

DISCIPLINARY ACTION FOR MALPRACTICES/IMPROPER CONDUCT IN EXAMINATIONS

	Nature of Malpractices / Improper conduct	Punishment
If the candidate		
1.a	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination.)	Expulsion from the examination hall and cancellation of the performance in that subject only.
b	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through Cell phones with any candidates 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. The hall ticket of the candidate shall be cancelled.

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 the examinations of the remaining subjects of that semester. 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 impostor 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 takes out or arranges to send out the question paper during the examination or answer book during or after the examination.	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. 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 performance in that subject.

6.	Refuses to obey the orders of the Chief Superintendent/Assistant Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in or around the examination hall or organises a walkout or instigates others to walkout 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 of any of his relations or indulges in any other act of misconduct or mischief which results in damage to or destruction of property in the examination hall or any part of the 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. 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 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. 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 to appear for the remaining examinations of the subjects of that semester. 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.	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. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the college will be handed over to the police and a police case is 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.
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 examinations.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be referred to the Chief Superintendent of Examinations for future action towards suitable punishment.	

iii) The involvement of the staff, who are in charge of conducting examinations, valuing examination papers and preparing / keeping records of documents related to the examinations in such acts (inclusive of providing incorrect or misleading information) that infringe upon the course of natural justice to one and all concerned at the examination shall be viewed seriously and appropriate disciplinary action will be taken after thorough enquiry.

16. Other Matters

i) Physically challenged candidates who have availed additional examination time and a scribe during their Intermediate/EAMCET examinations will be given similar concessions on production of relevant proof/documents. Students who are suffering from contagious diseases are not allowed to appear either for internal or semester end examinations.

ii) The students who participated in coaching / tournaments held at State / National / International levels through University / Indian Olympic Association during semester end external examination period will be promoted to subsequent semesters as per the guidelines of University Grants Commission Letter No. F.1-5/88 (SPE/PES), dated 18-08-1994.

iii) The Principal shall deal in an appropriate manner with any academic problem which is not covered under these rules and regulations, in consultation with the Heads of the Departments and subsequently such actions shall be placed before the Academic Council for ratification. Any emergency modification of regulation, approved in the meetings of the Heads of the Departments shall be reported to the Academic Council for ratification.

17. General

i) The Academic Council may, from time to time, revise, amend or change the regulations, schemes of examination and /or syllabi.

ii) The academic regulations should be read as a whole for the purpose of any interpretation.

iii) 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.

iv) Wherever the word he, him or his occurs, it will also include she, her and hers.

VI. CURRICULAR COMPONENTS

Sl.No.	Course Work - Subject Areas	Credits %
1.	Humanities and Social Sciences (HSS)	11
2.	Baisc Sciences (BS)	15
3.	Engineering Sciences (ES)	12
4.	Professional Subjects Core (PSC)	40
5.	Professional Subjects Electives (PSE)	8
6.	Open Subjects Electives (OSE)	5
7.	Project / Industrial / Practical Training	9
8.	Non-Credit Courses	3

COURSE STRUCTURE

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SYLLABUS

COURSE STRUCTURE

I Year - I Semester

Sl. No.	Name of the Course / Laboratory	No.of Periods per week		No.of Credits
		L	P	
1	Professional Communication – I	3+1*	-	3
2	Mathematics – I	3+1*	-	3
3	Engineering Physics	3+1*	-	3
4	Environmental Studies	3+1*	-	3
5	Problem Solving Using C	3+1*	-	3
6	Engineering Drawing	1	3	3
7	Professional Communication Lab – I	-	3	2
8	Engineering Physics Lab	-	3	2
9	Programming Lab	-	3	2
	Total	**21**	**12**	**24**

I Year - II Semester

Sl. No.	Name of the Course / Laboratory	No.of Periods per week		No.of Credits
		L	P	
1	Professional Communication – II	3+1*	-	3
2	Mathematics – II	3+1*	-	3
3	Mathematical Methods	3+1*	-	3
4	Engineering Chemistry	3+1*	-	3
5	Fluid Mechanics & Hydraulic Machines	3+1*	-	3
6	Circuit Theory – I	3+1*	-	3
7	Professional Communication Lab – II	-	3	2
8	Engineering Chemistry Lab	-	3	2
9	Basic Electrical Engineering Lab	-	3	2
	Total	**24**	**9**	**24**

* **Tutorial**

II Year - I Semester

Sl. No.	Name of the Course / Laboratory	No.of Periods per week		No.of Credits
		L	P	
1	Complex Variables and Special Functions	3+1*	-	3
2	Semiconductor Devices and Circuits	3+1*	-	3
3	Electromagnetic Fields	3+1*	-	3
4	Circuit Theory – II	3+1*	-	3
5	Electrical Machines – I	3+1*	-	3
6	Power Systems – I	3+1*	-	3
7	Employability Skills	1	2	2
8	Fluid Mechanics & Hydraulic Machines Lab	-	3	2
9	Networks Lab	-	3	2
	Total	**25**	**8**	**24**
10	NSS (Mandatory Non-Credit Course)	-	2	-

II Year - II Semester

Sl. No.	Name of the Course / Laboratory	No.of Periods per week		No.of Credits
		L	P	
1	Digital Circuits	3+1*	-	3
2	Managerial Economics and Financial Analysis	3+1*	-	3
3	Electrical Machines – II	3+1*	-	3
4	Power Systems – II	3+1*	-	3
5	Electrical Measurements & Instrumentation	3+1*	-	3
6	Control Systems	3+1*	-	3
7	Professional Ethics and Patents	2	-	2
8	Semiconductor Devices & Circuits Lab	-	3	2
9	Electrical Machines Lab – I	-	3	2
	Total	**26**	**6**	**24**

* **Tutorial**

III Year - I Semester

Sl. No.	Name of the Course / Laboratory	No.of Periods per week		No.of Credits
		L	P	
1	Signals and Systems	3+1*	-	3
2	Pulse and Integrated Circuits	3+1*	-	3
3	Electrical Machines – III	3+1*	-	3
4	Power Electronics	3+1*	-	3
5	Open Elective – I (see the list of Open Electives)	3+1*	-	3
6	Electrical Measurements & Instrumentation Lab	-	3	2
7	Control Systems Lab	-	3	2
8	Mini Project	-	3	2
	Total	**20**	**9**	**21**
9	Sports & Games / Creative Arts (Mandatory Non-Credit Course)	-	2	-

III Year - II Semester

Sl. No.	Name of the Course / Laboratory	No.of Periods per week		No.of Credits
		L	P	
1	Power Semiconductor Drives	3+1*	-	3
2	Microprocessors and Microcontrollers	3+1*	-	3
3	Switchgear and Protection	3+1*	-	3
4	Elective – I i) Optimization Techniques ii) Advanced Control Systems iii) Power Systems Operation Control iv) Data Structures Using C	3+1*	-	3
5	Open Elective – II (see the list of Open Electives)	3+1*	-	3
6	Integrated Circuits & PDC Lab	-	3	2
7	Power Electronics and Drives Lab	-	3	2
8	Electrical Machines Lab – II	-	3	2
	Total	**20**	**9**	**21**

* **Tutorial**

IV Year - I Semester

Sl. No.	Name of the Course / Laboratory	No.of Periods per week		No.of Credits
		L	P	
1	Power System Analysis	3+1*	-	3
2	Utilization of Electrical Energy	3+1*	-	3
3	Elective – II i) Electrical Distribution Systems ii) HVDC Transmission Systems iii) VLSI Design iv) Special Electrical Machines	3+1*	-	3
4	Elective – III i) Electrical Machine Design ii) Programmable Logic Controller iii) Computer Organization & Architecture iv) Flexible AC Transmission Systems	3+1*	-	3
5	Open Elective – III (see the list of Open Electives)	3+1*	-	3
6	Microprocessors and Microcontrollers Lab	-	3	2
7	Electrical Systems Simulation Lab	-	3	2
8	Power Systems Lab	-	3	2
	Total	**20**	**9**	**21**

IV Year - II Semester

Sl. No.	Name of the Course / Laboratory	No.of Periods per week		No.of Credits
		L	P	
1	Elective – IV i) Electrical Costing & Estimation ii) Modeling and Analysis of Electrical Machines iii) High Voltage Engineering iv) Digital Signal Processing	3+1*	-	3
2	Elective – V i) Digital Control Systems ii) AI Techniques iii) EHV AC/DC Transmission Systems iv) Power Plant Instrumentation	3+1*	-	3
3	Self Study Course (see the list of Self Study Courses)	-	-	2
4	Industrial / Practical Training	-	-	4
5	Project Work	-	9	9
	Total	**8**	**9**	**21**

* **Tutorial**

Open Elective - I

Sl. No.	Title of the Subject	Department Offering the Subject	No.of Periods per week		No.of Credits
			L	P	
1	Remote Sensing and GIS Techniques	CE	3+1*	-	3
2	Elements of Civil Engineering (other than CE)	CE	3+1*	-	3
3	Modeling and Simulation of Engineering Systems	EEE	3+1*	-	3
4	Renewable Energy Sources	ME	3+1*	-	3
5	Elements of Mechanical Engineering(other than ME)	ME	3+1*	-	3
6	Computer Networks (other than CSE & IT)	CSE	3+1*	-	3
7	Object Oriented Programming (other than CSE & IT)	CSE	2+1*	-	3
8	Data Structures Using C (other than EEE,ECE,CSE&IT)	CSE	2+1*	-	3
9	Cyber Laws	CSE	3+1*	-	3
10	Open Source Software	IT	3+1*	-	3
11	Fundamentals of Data Base Management Systems (other than CSE & IT)	IT	3+1*	-	3
12	Fuzzy Mathematics	Maths	3+1*	-	3

* **Tutorial**

Open Elective - II

Sl. No.	Title of the Subject	Department Offering the Subject	No.of Periods per week		No.of Credits
			L	P	
1	Disaster Management	CE	3+1*	-	3
2	Solid Waste Management (other than CE)	CE	3+1*	-	3
3	Energy Audit, Conservation and Management	EEE	3+1*	-	3
4	Material Science (other than ME)	ME	3+1*	-	3
5	Automotive Electronics	ECE	3+1*	-	3
6	Introduction to MP&MC (other than EEE, ECE, CSE & IT)	ECE	3+1*	-	3
7	Cloud Computing (other than CSE & IT)	CSE	3+1*	-	3
8	Web Technologies(other than CSE & IT)	CSE	2+1*	-	3
9	Virtual Reality	CSE	3+1*	-	3
10	Scripting Languages	IT	3+1*	-	3
11	Big Data (other than CSE & IT)	IT	3+1*	-	3
12	Multi-variate analysis and Special Functions	Maths	3+1*	-	3

* **Tutorial**

Open Elective - III

Sl. No.	Title of the Subject	Department Offering the Subject	No.of Periods per week		No.of Credits
			L	P	
1	Building Services (other than CE)	CE	3+1*	-	3
2	Modern Optimization Techniques	EEE	3+1*	-	3
3	Electrical Power Utilization (other than EEE)	EEE	3+1*	-	3
4	Robotics (other than ME)	ME	3+1*	-	3
5	Assistive Technologies	ECE	3+1*	-	3
6	Introduction to Embedded Systems (other than ECE, CSE & IT)	ECE	3+1*	-	3
7	Social Networks	CSE	3+1*	-	3
8	Mobile Application Development (other than CSE & IT)	CSE	3+1*	-	3
9	Real-Time Systems	CSE	3+1*	-	3
10	Network Management Systems	IT	3+1*	-	3
11	Fundamentals of E-Commerce (other than CSE & IT)	IT	3+1*	-	3
12	Statistical Methods using R Software	Maths	3+1*	-	3

* **Tutorial**

Self Study Courses

Sl. No.	Title of the Subject	Department Offering the Subject	No.of Credits
1	Global Positioning Systems	CE	2
2	Interior Design	CE	2
3	Electrical Safety Management	EEE	2
4	Green Engineering	ME	2
5	Managing Innovation & Entrepreneurship	ME	2
6	Internet of Things	ECE	2
7	Consumer Electronics	ECE	2
8	e-Waste Management	CSE	2
9	Management Information Systems	CSE	2
10	Information & Communication Technology	IT	2
11	Organizational Behaviour	MBA	2
12	MOOCs	–	2

SYLLABUS

PROFESSIONAL COMMUNICATIONICS – I
(Common to All Branches)

I Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To equip students for their present and future academic pursuits: to understand classroom lectures, read textbooks, do reference reading, participate in classroom discussions, and write assignments and examination answers.
- To develop in them the communication skills and social graces necessary for functioning effectively in the social and other situations in which they may be called upon to use English.

Learning Outcomes:

Students will be able to:

- Produce and process language for academic, professional and social life.
- Produce coherent spoken and written discourse of various kinds with attention to appropriate strategies and conventions of speaking and writing.

Speaking, Listening, Intensive Reading and Grammar Practice

UNIT – I:

- To transfer textual information to a table
- To introduce yourself
- To make polite conversations
- To comprehend subject-verb agreement

UNIT – II:

- To communicate well with your peers
- To express your views on a topic
- The present simple and present continuous tenses
- To write a text that has unity

UNIT – III:

Extensive Reading

Simplified Classics from the series Great Stories in Easy English:

- A Tale of Two Cities by Charles Dickens
- Treasure Island by R.L.Stevenson

Vocabulary Builder: English in Contexts for students of Engineering and Technology'

- GRE words 75 words
- Collocations 15
- Idioms 25
- One word substitutes 25

Speaking, Listening, Intensive Reading and Grammar Practice

UNIT – IV:

- To interact with your faculty members
- To express futurity
- To write a text that has cohesion
- To make your writing clutter-free

UNIT – V:

- To represent information in a diagram
- To make notes
- To offer your advice/suggestions
- To understand and use auxiliary verbs
- To write a letter to a company

UNIT – VI:

Extensive Reading

Simplified Classics from the series *Great Stories in Easy English*

- *Tales from Shakespeare by Charles and Mary Lamb*

Vocabulary Builder: English in Contexts for students of Engineering and Technology'

- GRE words 75 words
- Idioms 25
- Words often confused 15
- Collocations 15
- One word substitutes 25
- Phrasal verbs 25

Text Books:

1. Samson, T. (2010). Innovate with English. Hyderabad : Foundation **Great Stories in Easy English Published by S.Chand & Company Limited:**
2. Treasure Island by R.L. Stevenson.
3. Tales From Shakespeare by Charles and Mary Lamb.
4. A Tale of Two Cities by Charles Dickens.
5. Vocabulary Builder: English in Contexts for students of Engineering and Technology

Reference Books:

1. Comfort, J. and others (2012). *Speaking Effectively.* U.K: Cambridge University Press.
2. Murphy, Raymond. *Intermediate English Grammar.* Cambridge University Press.
3. Lewis, N.(2005).*Word Power Made Easy.U.K: Bloomsbury.*
4. McCarthy and O'Dell. F (2008).*Test Your English Vocabulary in Use:* Upper – Intermediate U.K: Cambridge University Press.
5. O'Dell. F and McCarthy (2010).*English Collocations in Advanced Use.* New Delhi :Cambridge University Press.
6. Cambridge IELTS Examination Papers. New Delhi :Cambridge University Press.
7. TOEFL Examination Papers.
8. BEC Examination Papers.

   Hornby.A.S. (2010). *Oxford Advanced Learner's Dictionary*. New Delhi: Oxford University Press.

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MATHEMATICS – I
(Common to All Branches)
I Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To find the solutions of 1st and 2nd order Differential equations.
- To find the solutions of multiple integral problems using calculus and vector concepts.

Learning Outcomes:

Students will be able to

- apply 1st and 2nd order differential equations to various Engineering Problems.
- apply the techniques of partial differentiation to find maxima and minima of two variables.
- evaluate single and double integrals using various types of curves.
- apply the concepts of vector differentiation and integration to the surface and volume integrals.

UNIT – I: Linear Differential Equations of first order

Differential equations of first order – Exact – Equations reducible to Exact, Linear and Bernoulli.

Applications: Newton's law of cooling, law of natural growth and decay.

UNIT – II: Linear Differential Equations of Second and higher order

Linear differential equations of second and higher order with constant coefficients-Complete solution, Operator D, Rules for finding complementary function, Inverse operator for D, Rules for finding particular integral with Right hand side term of the type e^{ax}, Sin ax, cos ax, polynomials in x, e^{ax} V(x), x.V(x). Applications: LCR circuits.

UNIT – III: Partial Differentiation

Introduction - Total derivative - Chain rule - Functional dependence – Jacobian. Application: Maxima and Minima of functions of two / three variables with or without constraints

UNIT – IV: Multiple Integrals

Introduction to Curve Tracing [Cartesian and Polar Curves]. Change of order of integration, Areas by double integrals, Volumes by triple integrals.

UNIT – V: Vector Differentiation

Vector Differentiation: Gradient- Divergence- Curl - Laplacian operator

UNIT – VI: Vector Integration

Line, surface and volume integrals. Integral theorems: Greens - Stokes - Gauss Divergence Theorems (Without proof) and related problems. Applications: Work done, flux across the surface.

Text Books:

1. B.S.Grewal, Higher Engineering Mathematics : 42nd edition, Khanna Publishers,2012, New Delhi.
2. Dr. T.K.V.Iyengar, Dr. B.Krishna Gandhi, S.Ranganatham and Dr.M.V.S.S.N.Prasad, Engineering Mathematics, Volume-I : 11th edition, S. Chand Publishers, 2012, New Delhi.

Reference Books:

1. B.V.Ramana, Engineering Mathematics: 4th Edition, Tata McGraw Hill, 2009, New Delhi.
2. U.M.Swamy, A Text Book of Engineering Mathematics – I & II: 2nd Edition, Excel Books, 2011, New Delhi.
3. Erwin Kreyszig, Advanced Engineering Mathematics : 8th edition, Maitrey Printech Pvt. Ltd, 2009, Noida.

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ENGINEERING PHYSICS
(Common to CE, EEE & ME)

I Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To understand principles of solid state materials for use in the engineering applications.

Learning Outcomes:

Students will be able to

- apply the principles of light for optical communication.
- Identify the appropriate solid state materials for engineering applications.
- apply Quantum mechanics to study the behavior of a particle.

UNIT – I: Wave Optics

Interference:

Introduction – Interference in thin films by reflection –Newton's rings.

Diffraction:

Introduction – Fraunhofer diffraction - Fraunhofer diffraction at single slit– Diffraction grating – Resolving power of a grating

Polarization: Introduction – Types of Polarization – Double refraction – Quarter wave plate and Half Wave plate.

UNIT – II: Lasers & Fiber Optics

Lasers:

Introduction – coherent sources – Characteristics of lasers – Spontaneous and Stimulated emission of radiation – Einstein's coefficients– Population inversion – Helium Neon laser – Co_2 laser – semi conductor lasers.

Fiber Optics :

Introduction, Principle of Optical Fiber - Total Internal Reflection, Conditions for Light to Propagate - Numerical Aperture and Acceptance Angle, Optical Fiber Construction, Types of Optical Fibers - Step Index Fibers and Graded Index Fibers, Advantages of Optical Fibers in Communications.

UNIT – III: Introductory Solid State Physics

Crystal Structure

Introduction, Basic Terms - Lattice, Basis, Crystal Structure,CoordinationNumber, Atomic Radius, Packing Fraction, Free Volume, LatticeParameters, Unit Cell and Primitive Cell, Crystal Systems and Bravais Lattices, Structure and Packing Fractions of Simple Cubic, Body Centered Cubic and Face Centered Cubic Crystal Structures.

X-Ray Diffraction

Crystal Planes, Directions and Miller Indices, Distance of Separation between successive hkl Planes – Inter Planar Spacing, Diffraction of X-Rays by Crystal Planes – Bragg's Law

UNIT – IV: Essentials Of Materials Science

Magnetic Properties: Magnetic permeability – Magnetization – Orgin or magnetic moment – Classification of Magnetic materials – Dir, para, Ferro, Hysteresis curve.

Dielectric Properties: Introduction – Dielectric constant – Electronic, ionic and orientational polarization – internal fields – Clausius –Mossotti equation

Superconductivity: General properties – Meissner effect – Type I and Type II superconductors – BCS Theory – Penetration depth – DC and AC Josephson effects (Qualitative). Applications of Super conductors.

UNIT – V: Semiconductor

Introduction – Intrinsic semiconductor and carrier concentration – Equation for conductivity – Extrinsic semiconductor and carrier concentration – Drift and diffusion – Einstein s equation – Hall Effect – direct & indirect band gap semiconductors

UNIT – VI: Preliminary Quantum Mechanics & Solid State Physics

Preliminary Quantum Mechanics:

Introduction to matter waves – Schrodinger Time Independent and Time Dependent wave equations – Particle in a box.

Free Electron Theory and Band Theory (Solid State Physics):

Classical free electron theory – electrical conductivity – Fermi energy (Qualitative) -Quantum free electron theory – Bloch theorem (qualitative) – Kronig – Penney model.

Text Books:

1. Engineering Physics by Mani Naidu, Pearson Publications Chennai
2. A text book of Engineering Physics by M.N. Avadhanulu &P.G.Kshirasagar (S. Chand publications).
3. Engineering Physics by Gaur and Gupta.
4. Optics – 5th Edition – Ghatak (TMH Publications)

Reference Books:

1. Solid state Physics by A.J. Dekker (Mc Millan India Ltd).
2. Engineering Physics b;y M.R. Srinivasan (New Age international publishers)
3. Fundamental of Physics by Resnick, Halliday and Walker.

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ENVIRONMENTAL STUDIES
(Common to CE , EEE & ME)

I Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To know the multidisciplinary nature of Environment.
- To understand various measures of improvement & protection of Environment.

Learning Outcomes:

Students will be able to

- apply various mitigation measures to minimize environmental pollution.
- know the principles of Ecosystem.
- understand the various stages of Environmental Impact Assessment (EIA).

UNIT – I: Ecology & Environment

Multidisciplinary Nature of Environmental Studies:

Definition, Scope, Importance and public awareness of Environmental Studies - Concept of an Ecosystem – Components of an Ecosystem – Food Chain, Food Web, Ecological Pyramids – Energy flow – Bio-Geochemical Cycles – Ecological Succession – Major Types of Ecosystems – Forest, Grassland, Desert Land & aquatic Ecosystem.

UNIT – II: Natural Resource: **Classification and status**

Water Resources: Used and over utilization of surface & ground water – Conflicts over water – Big dams, Benefits and problems.

Land Resource: Land as a resource, Soil Erosion, Sources of Land degradation, Soil conservation practices – case studies.

Forest Resources:Use and over – Exploitation, deforestation – Timber extraction – Mining, dams and other effects on forest and tribal people – Case Studies related to deforestation.

Food & Fodder Resources: World food problems, changes caused by agriculture and overgrazing – effects of modern agriculture – fertilizer, pesticide related problems, water logging, Eutrophication, super pest, salinity, organic farming – Case studies.

Mineral Resources: Use and exploitation problems, environmental effects of extracting and using mineral resources – Case studies.

Energy Resources

UNIT – III: Biodiversity and its conservation

Introduction, Definition – genetic and ecosystem diversity – Biogeographical classification of India – value of biodiversity: consumptive use, productive use, social, ethical, Aesthetic, option values and ecosystem service values – India as a mega diversity nation – Threats to biodiversity: habitat loss, poaching of wild life – man, wild life conflicts – Endangered and endemic species of India – conservation of biodiversity: In – situ and Ex-situ conservation of biodiversity.

UNIT – IV: Environmental pollution

Definition, cause, effects and control measures of

a) Air pollution b) Water pollution
c) Noise pollution d) Soil pollution
e) Environmental Impact Assessment (EIA) – Definition, Significance & Classification.

UNIT – V: Waste Management

Industrial solid waste – Municipal solid waste – Industrial waste waters – Solid waste – Biomedical waste – hazardous waste – e-waste – Green building – Green Development Mechanism – Carbon Credits – Carbon Trading.

UNIT – VI: Social Issues and Environment

Climate change: Global warming, Acid rains, Ozone layer depletion – case studies.

Sustainable development and unsustainability–Rain water harvesting, watershed management, water conservation–Environmental Ethics–environmental Law (Air, Water, Wild life, forest, Environmental protection act)

Text Books:

1. Environmental studies: Anubha Kaushik,C.P.Kaushik:New Age International Publishers.
2. Society and Environment: Dr.Suresh K.Dhameja:S.K.Kataria and Sons.
3. Environmental Studies: Benny Joseph:Tata Mc Graw-Hill Publishing Company Limited.

Reference Books:

1. A text of Environmental Studies: Shashi chawala:Tata Mc graw Hill Education Private Limited.
2. Environmental Science & Engineering: P.Anandan, R.Kumaravelan, Scitech Publications (India) Pvt. Ltd.
3. Environmental Studies by R. Rajagopalan 2nd Edition 2011, Oxford University Press.
4. Environmental Studies by Deeshita Dave & P. Udaya Bhaskar, Cengage Learning.

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PROBLEM SOLVING USING C
(Common to EEE, ECE, CSE & IT)

I Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To introduce the steps of problem solving.
- To emphasize the role of logical flow charts and pseudo code in problem solving on computers.
- To impart skills for solving problems using C.

Learning Outcomes:

Students will be able to

- develop logical flow charts for solving problems.
- develop pseudo code for solving problems.
- solve simple to moderate problems on computer using C.
- self-learn advanced features of C.
- self-learn for solving complex problems on computers.

UNIT – I: Problem Solving Steps

Understanding problem, Formulating a mathematical model, Solving the mathematical model, Developing algorithm, Representingalgorithm as pseudo code or logical flow chart, Coding, Testing and Debugging.

General form of a C program, C Tokens – Constants, Identifiers, Operators, Punctuation and Keywords.

Basic data types, Data modifiers, Variable declaration statement, Console I/O statements, Assignment statement and Order of evaluation.Simple problems such as evaluating formulae.

UNIT – II: Control Statements

Selection Statements –if-else, nested if, switch, nested switch and ? Operator; Control Statements – For loop, while loop and do while loop; Jump Statements – return, goto, break, exit() and continue.

Problem Solving – Exchanging the values of two variables, Summation of a set of numbers, Factorial Computation, Sine function computation, Generation of Fibonacci sequence, reversing digits of an integer, Base conversion and Character to number conversion, LCM and GCD computation, Generating prime numbers, Computing prime factors of an integer, Raising a number to a large power, Computing the n^{th} Fibonacci number.

UNIT – III: Arrays

Declaring, initializing and accessing of one dimensional and two dimensional arrays and strings; and multidimensional arrays.

Problem Solving – Computing mean, range and variance of a set of numbers, Array order reversal, Histogramming, Removal of duplicates from an ordered array, Partitioning an array, Finding k^{th} smallest element and Longest monotone subsequence.

UNIT – IV: Pointers and functions

Pointers – Variables, Operators, Expressions and Multiple indirection.

Functions – General form of functions, Passing parameters by value and Passing parameters by address, Dynamic memory allocation functions, Pointers and arrays, Pointers and functions, recursive functions and String handling functions, Problem solving using functions.

UNIT – V: Structures and Unions

Structures -Definition, declaration, initialization of structures, accessing structure members, nested structures, arrays of structures, array within structures, structures and functions.

Unions - Bit-Fields and enumerations; Problem solving using structures, unions, Bit-fields and enumerations.

UNIT – VI: Files

File Handling- Text and binary files, commonly used C file system functions, File Processing Operations – inserting, deleting, searching and updating a record and displaying file contents. Random access files.

Problem solving – Billing at Checkout counter of a supermarket, Preparing consolidated attendance / marks statements, and Performing banking operations.

Text Books:

1. R G Dromey, How to Solve it by Computer, Prentice-Hall of India, 1999.
2. Jeri R Hanly and Elliot B Koffman, Problem Solving and Program Design in C, Seventh Edition, Pearson, 2014.
3. Herbert Schildt, C: The Complete Reference, Tata McGraw-Hill, 2008.

Reference Books:

1. C Programming, E Balaguruswamy, 3rd edition, TMH.
2. C Programming, A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE.
3. Programming in C, Second Edition Pradip Dey and Manas Ghosh, OXFORD Higher Education.

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ENGINEERING DRAWING
(Common to CE, EEE & ECE)

I Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To highlight the significance of universal language of engineers.
- To visualize and represent the 3-D objects in 2-D planes and pictorial views. with proper dimensioning and scaling.

Learning Outcomes:

Student will be able to

- apply principles of drawing in representing dimensions of an object.
- construct polygons, scales and curves.
- draw projections of points, lines and planes.
- draw projections of solids in different positions.
- convert orthographic views into isometric views and vice-versa.

UNIT – I: Introduction

Geometrical Construction,

Conic Sections: Ellipse, parabola, hyperbola – general method.

Scales: Plane, Vernier and Diagonal Scales.

UNIT – II: Orthographic Projections

Introduction to Orthographic Projections; Projections of Points; Projections of Straight Lines parallel to both planes; Projections of Straight Lines-Parallel to one and inclined to other plane.

UNIT – III: Projections of Straight Lines

Projections of Straight Lines inclined to both planes, determination of true lengths, angle of inclinations and traces.

UNIT – IV: Projections of Planes

Regular Planes Perpendicular / Parallel to one Reference Plane and inclined to other Reference Plane; inclined to both the Reference Planes.

UNIT – V: Projections of Solids

Prisms, Cylinders, Pyramids and Cones with the axis inclined to one Plane.

UNIT – VI: Transfermation of Projections

Conversion of Isometric Views to Orthographic Views and Orthographic to Isometric Views.

Semester End Examination Pattern:

Semester end examination paper consists of eight questions out of which five questions are to be answered. All questions carry equal marks.

Text Books:

1. Engineering Drawing by N.D. Bhatt, Chariot Publications.
2. Engineering Drawing by K. Venugopal, V. Prabhu Raja, G. Sreekanjana, New Age International Publishers.

Reference Books:

1. Engineering Drawing by M.B. Shah and B.C. Rana, Pearson Publishers.
2. Engineering Drawing by Dhananjay A. Jolhe, Tata McGraw Hill Publishers.
3. Engineering Graphics for Degree by K.C. John, PHI Publishers.

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PROFESSIONAL COMMUNICATION LAB - I
(Common to All Branches)

I Year – I Semester

Practical	: 3	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To strengthen the oral communication skills of the learners for communicative functions;
- To hone their pronunciation;
- To build confidence in them to communicate effectively in English.

Learning Outcomes:

Students will be able to

- enhance their basic communication skills to interact with people around them;
- shed their inhibition and take part in different speaking activities;
- respond in several contexts using the expressions they will have learned;
- speak English with reasonably good pronunciation.

UNIT – I:

- Greeting others
- Taking leave
- Introducing
- Identifying and pronouncing vowel sounds

UNIT – II:

- Asking for information
- Giving information
- Identifying and pronouncing diphthongs

UNIT – III:

- Inviting
- Accepting and declining invitations
- Identifying and pronouncing consonants

UNIT – IV:

- Giving commands or instructions
- Requesting
- Using accent on the appropriate syllable
- Speak rhythmically

UNIT – V:

- Giving suggestions
- Expressing opinions
- Using different tones in connected speech

Text Books:

1. Strengthen your communications skills by Maruthi Publications

Reference Books:

1. Strengthen your steps by Maruthi Publications
2. Speak well by Orient Blackswan.
3. Jones, D. English Pronunciation Dictionary.

ENGINEERING PHYSICS LAB
(Common to CE , EEE & ME)

I Year – I Semester

Practical	: 3	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To understand Active and Passive Electronic Components.
- To measure magnetic field along the axis of circular coil.
- To learn waves and oscillations.
- To explore the nature of light.

Learning Outcomes:

Students will be able to

- calculate the time constant of RC circuit & Predict resonance frequency of LCR circuit.
- verify magnetic field along the axis of a circular coil.
- observe the regulatory nature of Zener diode & Identify energy gap of semiconductor.
- estimate rigidity modulus of a given wire.
- determine radius of curvature of a given Plano convex lens.

S.N.	Name of the experiment- Aim
	Electromagnetism and Electronics
1	Study the variation of Magnetic field along the axis of a Solenoid coil using Stewart-Gee's Apparatus.
2	Draw the frequency response curves of LCR Series and Parallel circuits
3	Determine the time constant for a CR Circuit
4	Determine the Band Gap of a semiconductor using a PN junction diode.
5	Study of characteristic curves (I/V) of a Zener diode to determine its breakdown voltage.
6	Determine the rigidity modulus of given wire
7	Determine the radius of curvature of given planoconvex lens
8	Determine the thickness of thin objects by optical wedge method
9	Determine the velocity of sound in air by using volume resonator
10	Determine the wave length of Y1 and Y2 lines by diffraction grating normal incidence

Reference Books:

(lab manuals, equipment user manuals, text books, data books, code books, etc.)

1. College lab manuals
2. Practical Physics for engineering students by Vijay Kumar & T. Radha Krishna.
3. Lab manual of Engineering Physics by Dr. Y.Aparna and Dr. K.Venkateswara Rao (VGS Books links, Vijayawada)

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PROGRAMMING LAB
(Common to EEE, ECE, CSE & IT)

I Year – I Semester

Practical	: 3	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To familiarize with the discrete components of computers and networking components.
- To familiarize with usage of MS Office Tools.
- To provide the practice of solving problems on computer using C.

Learning Outcomes:

Students will be able to

- identify discrete components of computers and networking components and describe their functions.
- employ MS Office Tools for documentation and presentations and making computations.
- use computer for solving problems.

Part- A

Exercise - 1: IT Workshop

a) Identifying the discrete components of a computer and networking components
b) Demonstration of assembling a computer
c) Demonstrating installation of OS and applications

Exercise - 2: IT Workshop

a) Creating a document using MS Word
b) Creating a document using LaTeX

Exercise - 3: IT Workshop

a) Familiarizing with the usage and applications of MS Excel Using Excel.
b) Creating a presentation using MS Power point.

Exercise - 4: IT Workshop

Familiarizing with the Integrated Development Environment (IDE) for eveloping C programs

Part – B

Exercise - 5: Write a C program for the following

a) Calculate the area of triangle using the formula area = $(s\ (s-a)\ (s-b)(s-c))^{1/2}$ where $s= (a+b+c)/2$
b) Find the largest of three numbers using ternary operator.
c) Find the roots of a quadratic equation.

Exercise - 6: Develop a C program for the following

a) Read two integer operands and one operator form the user, perform the operation and then print the result. (Consider the operators +,-,*, /, % and use Switch Statement)
b) Check whether given number is Prime (or) not
c) Display first N natural numbers.
d) Calculate electricity bill for the consumed units – assume suitable constraints.
e) Find the sum of individual digits of a positive integer and find the reverse of the given number.

Exercise - 7: Design a C program for the following

a) Find the largest and smallest numbers in the array.
b) Search whether the given element is in the array.
c) Perform Addition, subtraction and multiplication of Matrices
d) Delete n Characters from a given position in a given string.
e) Illustrate at least five string handling functions.

Exercise - 8: Implement a C program for the following

a) Calculate mean, standard deviation and variance for a given set of values using functions
b) Sort a given set of numbers in ascending order using functions
c) Both recursive and non-recursive functions for the following
   i) To find the factorial of a given integer.
   ii) To find the GCD (greatest common divisor) of two given integers.
   iii) To generate Fibonacci sequence.

Exercise - 9: Prepare a C program for the following

a) To implement a structure to read and display the Name, date of Birth and salary of ten Employees.
b) To display the Name, Marks in five subjects and total marks of given number of students. (Using array of structures).
c) Functions to perform the following operations using Structure:
   i) Reading a complex number
   ii) Writing a complex number
   iii) Addition of two complex numbers
   iv) Multiplication of two complex numbers

Exercise - 10: Develop C program for the following

a) Function to exchange (Swap) values of two integers using call by reference.
b) Illustrate the usage of dynamic memory management functions.
c) Develop a program to operations on a file.
d) To copy contents of one file to another.
e) To count the number of characters, words and lines in a file.

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PROFESSIONAL COMMUNICATION - II
(Common to All Branches)

I Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To equip students for their present and future academic pursuits: to understand classroom lectures, read textbooks, do reference reading, participate in classroom discussions, and write assignments and examination answers.
- To develop in them the communication skills and social graces necessary for functioning effectively in the social and other situations in which they may be called upon to use English.
- To prepare them to secure employment and to function successfully in their career.

Learning Outcomes:

Students will be able to:

- Produce and process language for academic, professional and social life.
- Produce coherent spoken and written discourse of various kinds with attention to appropriate strategies and conventions of writing.
- To take part in job interviews with confidence and competence.

Speaking, Listening, Intensive Reading and Grammar Practice

UNIT – I:

- To make effective telephone conversations
- To use the modal auxiliaries *can* and *could*
- To write persuasive letters
- To write a winning resume

UNIT – II:

- To effectively participate in an informal meeting
- To use articles and other determiners
- To get some practice in composing professional emails
- To plan a professional presentation

UNIT – III:

Extensive Reading

Simplified Classics from the series Great Stories in Easy English:

- *Oliver Twist by Charles Dickens*
- *Robinson Crusoe by Daniel Defoe*

Vocabulary

'Vocabulary Builder: English in Contexts for students of Engineering and Technology'

- GRE words 75 words
- Idioms 25
- Words often confused 15
- Collocations 15
- One word substitutes 25
- Phrasal verbs 25

Speaking, Listening, Intensive Reading and Grammar Practice

UNIT – IV:

- To effectively participate in an informal meeting
- To use passive voice
- To identify the structure of reader-oriented technical reports

UNIT – V:

- To use prepositions
- To use visual aids in a presentation

UNIT – VI:

Extensive Reading

Simplified Classics from the series Great Stories in Easy English:

- *Round the World in Eighty Days by Jules Verne*

Vocabulary

'Vocabulary Builder: English in Contexts for students of Engineering and Technology'

- GRE words 75 words
- Idioms 25
- Words often confused 15
- Collocations 15
- One word substitutes 25
- Phrasal verbs 25

Text Books:

1. Samson, T. (2010). *Innovate with English*. Hyderabad : Foundation

Great Stories in Easy English Published by S.Chand & Company Limited:

1. *Oliver Twist* by Charles Dickens
2. *Robinson Crusoe* by Daniel Defoe
3. *Round the World in Eighty Days* by Jules Verne
4. *Vocabulary Builder : English in Contexts for Students of Engineering and Technology*

Reference Books:

1. Comfort, J. and others (2012). *Speaking Effectively*. U.K: Cambridge University Press.
2. Murphy, Raymond. *Intermediate English Grammar.* Cambridge University Press.
3. Lewis, N.(2005).*Word Power Made Easy.U.K: Bloomsbury.*
4. McCarthy and O'Dell. F (2008).*Test Your English Vocabulary in Use: Advanced* U.K: Cambridge University Press.
5. O'Dell. F and McCarthy (2010).*English Collocations in Advanced Use*. New Delhi: Cambridge University Press
6. Cambridge IELTS Examination Papers. New Delhi :Cambridge University Press.
7. TOEFL Examination Papers.
8. BEC Examination Papers.
9. Hornby.A.S. (2010). *Oxford Advanced Learner's Dictionary*. New Delhi: Oxford University Press.

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MATHEMATICS - II
(Common to All Branches)
I Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To determine the eigenvalues and eigenvectors.
- To understand the concepts of Fourier Series and Fourier Transforms.
- To solve partial differential equations of 1st and 2nd order.

Learning Outcomes:

Students will be able to

- use the concepts of eigenvalues and eigenvectors in Engineering problems.
- apply to transform a function into Fourier Series and Fourier Integral form.
- apply 1st and 2nd order partial differential equations to Engineering Problems.

UNIT – I: Matrices

Rank of Matrix- Echelon form, Normal form – System of Linear equations – Consistency-Gauss elimination Method. Applications to electrical circuits [Finding the current in an electric circuit].

UNIT – II: Eigenvalues & Eigenvectors

Eigenvalues - Eigenvectors – Properties – Cayley Hamilton Theorem (without proof) - Inverse and powers of a matrix using Cayley Hamilton theorem, Quadratic forms- Reduction of quadratic form to canonical form by Orthogonal Transformation– Rank - index – signature. Applications: Free vibration of a two mass system.

UNIT – III: Fourier Series

Fourier series: Determination of Fourier coefficients (without proof) – Fourier series – even and odd functions – Fourier series in an arbitrary interval– Half-range sine and cosine series.

UNIT – IV: Fourier Transforms

Fourier integral theorem (only statement) – Fourier transform – sine and cosine transforms – properties – inverse Fourier transforms – Finite Fourier transforms.

UNIT – V: 1st order Partial Differential equations

Formation of partial differential equations by eliminating arbitrary functions – solutions of quasi linear equations using Lagrange's method, solutions of non-linear equations by 4 strandard forms and Charpit's method.

UNIT – VI: 2nd order Partial Differential equations

Method of Separation of Variables. One dimensional Heat, Wave and Laplace equations.

Text Books:

1. B.S.Grewal, Higher Engineering Mathematics : 42nd edition,Khanna Publishers,2012 , New Delhi.
2. Dr. T.K.V.Iyengar, Dr. B.Krishna Gandhi, S.Ranganatham and Dr.M.V.S.S.N.Prasad, Engineering Mathematics – II : 6th edition, S.Chand Publications, 2012, New Delhi.

Reference Books:

1. B.V.Ramana, Mathematical Methods: 4th Edition, Tata McGraw Hill, 2009, New Delhi.
2. Ravindranath, V. and Vijayalaxmi, A. : 2nd edition, A Text Book on Mathematical Methods, Himalaya Publishing House,2012, Bombay.
3. Dean G. Duffy, Advanced engineering mathematics with MatLab, CRC Press.
4. Erwin Kreyszig, Advanced Engineering Mathematics:8th edition,Maitrey Printech Pvt. Ltd, 2009, Noida.

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MATHEMATICAL METHODS
(Common to CE, EEE & ME)

I Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To understand the various numerical techniques .
- To gain the knowledge of Laplace, z-transforms and their inverse transforms.

Learning Outcomes:

Students will be able to

- apply numerical techniques for solutions of Algebraic, transcendental and ordinary differential equations.
- transform ordinary function into Analytical function using Milne-Thompson Method.
- apply Laplace transforms to find the solutions of ordinary differential equations.
- apply Z–transforms to find solutions of difference equations.

UNIT – I: Algebraic and Transcendental Equations

Solution of Algebraic and Transcendental Equations- Introduction – Bisection Method – Method of False Position – Newton-Raphson Method.

UNIT – II: Interpolation

Interpolation- Introduction – Finite differences- Forward Differences –Back ward differences –Central differences – Symbolic relations – Newton formulae for interpolation – Lagranges interpolation.

UNIT – III: Numerical Solutions Of Ordinary Differential Equations

Solution by Taylors series – Euler and Modified Euler method – Picard method - 4^{th} order Runge-Kutta methods - Predictor and corrector method.

UNIT- IV: Introduction To Complex Variables

Continuity – Differentiability – Analyticity – Properties- Cauchy Riemann Equations in Cartesian and Polar coordinates. Harmonic functions and conjugates : Milne Thomson method.

UNIT – V: Laplace Transforms and Inverse Laplace Transforms

Laplace transforms of standard functions – Shifting Theorems, Transforms of derivatives and integrals – Unit step function –Dirac Delta function.

Applications : Evaluation of Improper Integrals.

Inverse Laplace transforms – Convolution theorem.

Application: Solution of ordinary differential equations.

UNIT – VI: Z- Transforms

Z-transform – properties – Damping rule – Shifting rule – Initial and final value theorems -Inverse z- transform using Partial fractions, Convolution theorem. Application: Solution of Difference equations by Z-transforms.

Text Books:

1. B.S.Grewal, Higher Engineering Mathematics : 42nd edition, Khanna Publishers,2012 , New Delhi.
2. Ravindranath. V, and Vijayalaxmi. A. : 2nd edition, A Text Book on Mathematical Methods, Himalaya Publishing House, Bombay.

Reference Books:

1. Dr. T.K.V.Iyengar, Dr. B.Krishna Gandhi, S.Ranganatham and Dr.M.V.S.S.N.Prasad, Mathematical Methods :6th edition, S. Chand Publications, 2011, New Delhi.
2. B.V.Ramana, Engineering Mathematics : 4th Edition, Tata McGraw Hill, 2009, New Delhi.
3. Erwin Kreyszig, Advanced Engineering Mathematics : 8th edition, Maitrey Printech Pvt. Ltd, 2009, Noida.

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ENGINEERING CHEMISTRY
(Common to CE, EEE & ME)

I Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To impart the knowledge of chemical and solar energy.
- To familiarize with various types of polymers, fuels and lubricants and their applications in engineering.

Learning Outcomes:

Students will be able to

- apply various methods of water treatment.
- understand the applications of chemical and solar energy in various engineering aspects.
- apply various chemical methods to prevent corrosion of metals.
- understand the process to prepare synthetic polymers used for various applications.
- know the characteristic features of lubricants and their applications.
- understand the need of green synthesis.

UNIT – I: Water and Its Treatment

Introduction, Hardness of water, types of hardness, Degree of hardness, Determination of hardness by EDTA Method, Numerical Problems on hardness of water by EDTA method. Softening of hard water by Permutit and Ion Exchange Processes, Treatment of brackish water by reverse osmosis, Potable Water, General Outline of municipal water treatment (Sedimentation, Filtration and chlorination).

UNIT – II: Energy Sources

Chemical Sources of Energy: Galvanic Cell - Single electrode potential – Electro chemical series-Problems on electrode potential using Nernst equation - Hydrogen and Calomel reference electrodes and measurement of pH by glass electrode – Leclanche cell, Lead **-** Acid accumulator, Hydrogen-Oxygen fuel cell and Methanol Fuel cell.

Solar Energy: Introduction–Harnessing of solar energy – Applications of solar energy - Photovoltaic cells-Solar reflectors (Parabolic trough, Solar dish and Solar tower) and Solar water heater.

UNIT – III: Corrosion and Its Prevention

Dry & wet corrosion – Mechanism – Pilling and Bedworth Rule - Factors influencing the rate of corrosion (Temperature, pH, Humidity of environment and position of metal in Galvanic series) - Types of Corrosion (galvanic corrosion, concentration

cell corrosion, pitting corrosion and stress corrosion) - Sacrificial Anodic method, Impressed voltage method – Metallic coatings (galvanization and tinning methods).

UNIT – IV: Polymers

Definitions of Polymer and Polymerization, Degree of polymerization and Functionality - Classification of polymers, Types of Polymerisation– Addition, Condensation and Co-polymerizations –Plastics – Thermoplastics – Thermosetting plastics, - Biodegradable polymers (PHBV & PHA). Preparation, properties and uses of poly styrene, PVC, PTFE, Bakelite, Buna-S rubber, Buna-N rubber, Thiokol rubber.

UNIT – V: Fuels & Lubricants

Fuels: Classification of fuels, calorific value, LCV & HCV and determination of calorific value of a solid fuel using Bomb calorimeter, Problems based on calorific values, Fischer-Tropsch Method and Bergius Method for preparation of Synthetic Petrol.

Lubricants: Definition and explanation of Lubrication-Types of Lubricants-Definition and significance of Viscosity, Flash and Fire Point, Pour and Cloud Point, Aniline point of a lubricant. - Engineering applications of lubricants.

UNIT – VI: Green Chemistry

Introduction- Principles of Green Chemistry, Methods of Green synthesis (aqueous phase, supercritical fluid extraction, green solvents and microwave induced methods), IWM (Integrated Waste Management), ZWT (Zero Waste Technology) Engineering Applications.

Text Books:

1. Text book of Engineering Chemistry by Jain & Jain. Dhanpat Rai Publishing Company.
2. Text book of Engineering Chemistry-II by Srinivasulu Doddaga, Ashima Srivastava, Roliverma. Parshva Publication.
3. Engineering Chemistry by Dr. Bharathi Kumari Yalamanchili,VGS Publication.

Reference Books:

1. A Text book of Engineering Chemistry by S.S.Dara. S.Chand&Company Ltd.
2. Engineering Chemistry by J.C.Kurisascose and J.Rajaram.Tata Mc Graw-Hill Publishing.
3. A Text book of Engineering Chemistry by Balaram Pani.Galgotia Publications
4. A Text book of Engineering Chemistry by Shashi Chawla. Dhanpat Rai Publications.
5. Industrial Chemistry by O.P.Veeramani and A.K.Narula. Galgotia Publications.
6. Text book of Engineering Chemistry by Jain & Jain. Dhanpat Rai Publishing Company.

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FLUID MECHANICS & HYDRAULIC MACHINES

I Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To introduce the properties of fluids and their kinematic and dynamic behavior through basic governing equations like Continuity, Bernoulli's and momentum equations.
- To study the working and performance characteristics of various hydraulic machines such as turbines and pumps.

Learning Outcomes:

- understand the basic concepts of fluid properties.
- analyze the different types of flows.
- apply the basic governing equations in fluid flow.
- analyze the various losses of fluid flow through pipes.
- determine the hydrodynamic force developed by impact of jet on vanes.
- analyze the performance characteristics of various types of hydraulic turbines and pumps.

UNIT – I: Fluid Statics

Physical Properties of Fluids - Mass Density, Specific Weight, Specific Gravity, Viscosity, Surface Tension. Atmospheric, Gauge and Vacuum Pressure, Measurement of Pressure - Piezometer, U-Tube and Differential Manometers.

Fluid Kinematics:

Classification of Flows - Steady & Unsteady, Uniform, Non Uniform, Laminar, Turbulent, Rotational and Irrotational Flows. Stream Line,Path Line, Streak Lines and Stream Tube. Equation of Continuity for one Dimensional Flow.

UNIT – II: Fluid Dynamics

Surface and Body Forces, Euler's and Bernoulli's Equations for Flow along a Stream Line, Momentum Equation and is application on Force on Pipe Bend.

UNIT – III: Closed Conduit Flow

Reynold's Experiment, Darcy Weisbach Equation, Minor Losses in Pipes, Pipes in Series and Pipes in Parallel, Total Energy Line and Hydraulic Gradient Line.Measurement of Flow: Venturimeter, Orifice Meter and Turbine Flow Meter.

UNIT – IV: Basics Of Turbo Machinery

Hydrodynamic Force of Jets on Stationary and Moving - Flat, Inclined and Curved Vanes. Jet Striking Centrally and at Tip, Velocity Diagrams, Work done and Efficiency, Flow over Radial Vanes.

UNIT – V: Hydraulic Turbines

Elements of Hydro Electric power station, Classification of Turbines, Pelton Wheel, Francis Turbine and Kaplan Turbine - Working Proportions, Work Done, Efficiencies, Hydraulic Design. Draft Tube - Theory, Function and Efficiency.

Performance Of Hydraulic Turbines:

Geometric Similarity, Unit and Specific Quantities, Characteristic Curves, Governing of Turbines, Cavitation.

UNIT - VI: Centrifugal Pumps

Component parts and working, Classification, Work done by impeller, Manomertic Head, Losses and Efficiencies, Specific Speed, Pumps in Series and Parallel, Performance Characteristic Curves, NPSH.

Reciprocating Pumps:

Component parts and working, Discharge, Slip, Indicator Diagrams.

Text Books:

1. Hydraulics, Fluid Mechanics and Hydraulic Machinery - Modi and Seth.
2. Fluid Mechanics and Hydraulic Machines - Rajput.

Reference Books:

1. Fluid Mechanics and Fluid Power Engineering - D.S. Kumar, Kotaria & Sons.
2. Fluid Mechanics and Machinery - D. Rama Durgaiah, New Age International.
3. Hydraulic Machines - Banga & Sharma, Khanna Publishers.

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CIRCUIT THEORY - I

I Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course objectives:

- To understand basic laws and theorems of Electrical circuits.
- To familiarize with the steady state behaviour of DC and single phase AC circuits.

Learning Outcomes:

Students will be able to

- apply various circuit laws to analyze the electrical circuits.
- apply the principles of topology to solve networks.
- analyze the steady state behavior of DC and AC circuits.
- apply network theorems to analyze and design the electrical circuits.
- apply the concepts of magnetic circuits to various electrical machines.
- analyze the behavior of electrical resonance.

UNIT – I: Introduction to Electrical Circuits

Network elements classification, Circuit concepts –Resistor(R)-Inductor(L)-capacitor(C)-Voltage and Current Sources (Ideal and Non-Ideal)- Independent and Dependent Sources-Source transformation-Voltage - Current relationship for passive bilateral elements (for different input signals-square, ramp, saw tooth, triangular)-Ohm's law - Kirchhoff's laws – Network reduction techniques series, parallel, series parallel, star-to-delta or delta-to-star transformation, Nodal analysis, mesh analysis, super node and super mesh for D.C excitations.

UNIT – II: Network Topology

Definitions – Graph – Tree, Basic cutset and Basic Tieset matrices for planar networks – Loop and Nodal methods of analysis of Networks with independent voltage and current sources – Duality & Dual networks.

UNIT – III: Single phase AC circuits

Generation of alternating sinusoidal quantities - R.M.S, Average values and form factor for different periodic wave forms – sinusoidal alternating quantities – Phase and Phase difference – Complex and polar forms of representations, Jotation, Steady state analysis of R,L and C (in series, parallel and series parallel combinations) with sinusoidal excitation-Concept of Reactance, Impedance, Susceptance and Admittance-Power Factor and significance of Real and Reactive power, Complex Power.

UNIT – IV: Locus Diagrams & Resonance

Locus diagrams - series R-L, R-C and parallel combination with variation of various parameters - Resonance-series, parallel circuits, concept of band width and Q factor.

UNIT – V: Network Theorems (without proof)

Superposition, Reciprocity, Thevenin's, Norton's, Maximum Power Transfer, Millman's Tellegen's and compensation theorems for D.C and sinusoidal excitations.

UNIT – VI: Magnetic Circuits

Magnetic circuits-Basic definition of MMF, flux and reluctance-Analogy between electrical and magnetic circuits, Faraday's laws of electromagnetic induction concept of self and mutual inductance-dot convention-coefficient of coupling-composite magnetic circuit-analysis of series and parallel magnetic circuits.

Text Books :

1. Engineering Circuit Analysis by William Hayt and Jack E.Kemmerley, Mc Graw Hill Company, 6th edition
2. Theory & Problems of Electric Circuits by Joseph A Edminister-schaum series, 6th edition
3. Electrical Circuits by A. Sudhakar and Shyammohan S Palli, Tata McGraw-Hill 6th edition.

Reference Books:

1. Fundamentals of Electric Circuits by Alexander & Sadiku, 2nd edition.
2. Network Analysis by Van Valkenburg, Prentice-Hall of India Private Ltd., 8th edition.
3. Network Analysis by N.C.Jagan, C.Lakshmi Narayana, BS publications 2nd edition.

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PROFESSIONAL COMMUNICATION LAB – II
(Common to All Branches)

I Year – II Semester

Practical	: 3	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To strengthen the oral communication skills of the learners for communicative functions at an advanced level;
- To train them in handling complex communication situation;
- To give them adequate practice for communication in professional situations like group discussions, presentations and interviews.

Learning Outcomes:

Student will be able to:

- enhance their oral communication skills to perform communicative functions;
- speak confidently in public and handle complex communication situation;
- face job interviews with confidence and competence.

UNIT – I:

- Body Language
- Know how body language is used in communication
- Interpret non-verbal symbols

UNIT – II:

- Dialogues
- Starting a conversation
- Useful functions
- Telephone Etiquette
- Making a small talk

UNIT – III:

- Presentation Skills
- Present information with confidence, clarity and conviction
- Use the language of presentations
- Evaluate presentations

UNIT – IV:

- Group Discussion
- Participate in a group discussion
- Expressing ideas logically
- Using appropriate language in group discussions

UNIT – V:

- Become aware of various types of interviews
- Be able to participate in interviews confidently

UNIT – VI:

- Debates
- Able to argue for or against something
- Able to participate in debates

Text Books:

1. Strengthen your communications skills by Maruthi Publications

Reference Books:

1. Strengthen your steps by Maruthi Publications
2. Speak well by Orient Blackswan.
3. Patnaik., Group Discussion and Interview Skills. by Foundation.

ENGINEERING CHEMISTRY LAB
(Common to CE, EEE & ME)

I Year – II Semester

Practical	: 3	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To practice the titrations of chemical analysis for determining the quality of water.
- To know the preparation of Bakelite.

Learning Outcomes:

Students will be able to

- apply various titrations required for water quality analysis.
- understand the preparation of resin.

List of Experiments

Introduction to Chemistry Lab (the teachers are expected to teach fundamentals like Primary, Secondary Standard Solutions , Normality, Molarity, Molality etc and laboratory ware used, error ,accuracy, precision, Theory of indicators, use of volumetric titrations.

1. Practice experiment-Determination of the amount of HCl using standard Na_2CO_3.
2. Determination of alkalinity of water sample.
3. Determination of acidity of water sample.
4. Determination of Ferrous iron by permanganometric method.
5. Determination of Ferric Iron using standard $K_2Cr_2O_7$ solution.
6. Determination of Total hardness of the water sample by EDTA method.
7. pH metric titrations - Determination of concentration of HCl using glass electrode.
8. Determination of pH of the water sample by using pH meter.
9. Determination of conductivity of the water sample by using conductivity meter.
10. Conductometric titrations between strong acid and strong base
11. Determination of turbidity of the water sample by using turbidity meter.
12. Estimation of total dissolved salts in water sample.
13. Preparation of Phenol - Formaldehyde resin.

Lab Manual:

1. Engineering chemistry laboratory manual &record By Srinivasulu. D Parshva publications.
2. Engineering Chemistry Lab Manual by Dr. K.Anji Reddy. Tulip publication.
3. Engineering Chemistry Lab Manual by Dr. Jyotsna Cherukuri. V.G.S publication.
4. K.Mukkanti (2009) Practical Engineering Chemistry, B.S. Publication.

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BASIC ELECTRICAL ENGINEERING LAB

I Year – II Semester

Practical	: 3	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To impart practical knowledge on basic principles of electrical engineering, devices and safety practices.
- To Familiarize with the various electrical wirings.

Learning Outcomes:

Students will be able to

- operate CRO and use various devices to measure electrical quantities.
- make basic house wiring connections.
- apply the safety rules in all types of electrical connections.

PART – A

Any Six experiments from the following list

Electrical Trade - House Wiring

1. Stair Case wiring.
2. Godown wiring.
3. Single Switch Single Load Control.
4. Two way and Three way Switch Control.
5. Fluorescent Lamp Fitting.
6. Measurement of Earth Resistance.
7. Parallel / Series Connection of three bulbs.
8. Determination of fusing characteristics and fusing factor of a given fuse.

PART – B

Any four experiments from the following list

1. Measurement of D.C. quantities.
2. Measurement of A.C. quantities.
3. To verify Ohm's law.
4. To verify Kirchhoff's current laws (Nodal analysis)
5. To verify Kirchhoff's voltage laws (Mesh analysis)
6. Measurement of RMS, Average, Form Factor of AC Signals Applied to a circuit using Cathode Ray Oscilloscope (CRO).

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COMPLEX VARIABLES AND SPECIAL FUNCTIONS

II Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To introduce the concept of special functions such as Bessel and Legengdre Functions and their applications to various engineering problems.
- To introduce the complex integration and complex power series expansions.
- To introduce the concepts of conformal and bilinear transformations of standard functions.

Learning Outcomes:

Students will be able to

- use the concept of special functions such as Bessel and Legengdre functions in their engineering problems.
- apply the concepts such as continuity and differentiability of complex functions able to check that given function is analytic or not.
- find the complex integration with the use of Cauchy's integral formula.
- expand a given function as either Taylor or Laurent series expansions.
- solve improper integrals with the help of Residues
- apply the concepts of conformal and bilinear transformations of standard functions.

UNIT – I: Special Functions

Bessel functions – Properties- Orthogonality. Legengdre Polynomials – Properties- Rodrigue's formula, Orthogonality.

UNIT – II: Functions of Complex variables

Continuity – Differentiability – Analyticity – Properties- Cauchy Riemann Equations in Cartesian and Polar coordinates(without proof). Harmonic functions and conjugates : Milne's method and introduction to complex functions[Definitions].

UNIT – III: Complex Integrations (without proofs)

Line integral – Evaluation along a path. Cauchy's integral formula – Generalized integral formula.

UNIT – IV: Complex Power Series (without proofs)

Radius of convergence- Taylor's and Laurent Series expansions – Singular point – pole of order m – Essential Singularity.

UNIT – V: Residues

Evaluation of Residue by formula and by Laurent series - Residue theorem (without proof). Evaluation of integrals of type:

$\int_0^{2\pi} f(\cos\theta, \sin\theta)d\theta$, $\int_{-\infty}^{\infty} f(x)dx$ and $\int_{-\infty}^{\infty} e^{imx} f(x)dx$

UNIT – VI: Conformal Mapping

Transformation by e^z, z^2, z^n (n is +ve integer), sin z, cos z, z + a/z translation, rotation, inversion and bilinear transformation- cross ration – properties – determination of bilinear transformation mapping 3 given points.

Text Books:

1. Higher Engineering Mathematics, 42nd edition, 2012 - B. S. Grewal, Khanna Publishers, New Delhi.
2. A text book of Engineering Mathematics, Volume-III,, Dr. T.K.V.Iyengar & others, S. Chand Publishers.

Reference Books:

1. Engineering Mathematics - B. V. Ramana, Tata McGraw Hill, New Delhi.
2. Advanced Engineering Mathematics, 8th edition, 2009, Erwin Kreyszig- Shree Maitrey Printech Pvt. Ltd, Noida.

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SEMICONDUCTOR DEVICES AND CIRCUITS

II Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To study the conductivity of metals based on energy band diagrams and the physics of semiconductors.
- To familiarize with the volt-ampere characteristics and applications of PN-junction diode, various special semiconductor devices, BJT, JFET and MOSFET.

Learning Outcomes:

Students will be able to

- understand the electrical conducting properties of semiconductors and principle of Hall Effect.
- understand the operation and I-V characteristics of Diodes, BJT, FET, MOSFET, UJT and SCR and use them for various applications.
- understand the biasing of BJT and FETs.
- develop small signal models for BJT and FET.

UNIT – I: Semiconductor Diode Characteristics

Open-circuited P-N Junction, Current Components in a p-n diode, Diode Forward and Reverse currents, The Volt-ampere characteristic, Temperature Dependence of the V/I characteristic, Diode parameters- Resistance, Transition capacitance, Diffusion Capacitance, Diode Specifications.

Special Semiconductor Devices: Breakdown Diodes, Tunnel Diode, Varactor Diode, Photo Diode, LED (Characteristics only).

UNIT – II: Rectifiers And Filters

Diode as a Rectifier, Half wave, Full wave Rectifiers and comparison, Full wave rectifier with-inductor filter, Capacitor filter, L section and ð- section filters and comparison, Zener diode as voltage regulator.

UNIT – III: Bipolar Junction Transistor

Construction of a transistor, Transistor current components, Transistor Configurations- CB, CE and CC, Early Effect, Comparison of CB, CE and CC, Transistor operating regions, Typical Transistor- Junction Voltages, Maximum

Voltage Rating, Transistor as an Amplifier, UJT, Phototransistor, SCR (Characteristics only)

UNIT – IV: Transistor Biasing And Stabilization

Operating point, Bias Stability, Biasing techniques, Self-bias, Stabilization Against Variation in I_{CO}, V_{BE}, and â, Bias Compensation techniques- Thermistor and Sensistor Compensation, Thermal Runaway, Thermal Stability.

UNIT – V: Field Effect Transistor

Classification of FETs, Construction of JFET (p channel & n channel), Characteristics of FET, FET as a Voltage Variable Resistor (VVR), Transfer characteristics, Comparison with BJT, Depletion type MOSFET, Enhancement type MOSFET, CMOSFET, voltage divider biasing of JFET.

UNIT – VI: Small Signal Low Frequency Transistor Model

Two-Port Devices and the Hybrid Model, Transistor Hybrid Model for CB, CE and CC, Determination of h-parameters from the characteristics, Analysis of Transistor Amplifier Circuits using h-parameters- CE Amplifier, CC amplifier, Typical h-parameter values of CB, CE and CC amplifiers, Simplified CE, CB & CC Hybrid Model, CE Amplifier with an Emitter Resistance, FET Small Signal Model.

Text Books:

1. Jacob Millman and Christos C Halkias, Electronic Devices and Circuits, 2nd Edition,TMH, 2002.(UNIT I – IV& UNIT VI)
2. Robert L Boylested and Louis Nashelsky, Electronic Devices and Circuit Theory, 8th Edition, PHI, 2003 (UNIT V)

Reference Books:

1. K.Raja rajeswari, B.Visvesvara rao, K.Bhaskara Rama Murthy and P.Chalam raju pantulu- Electronic Devices and Circuits, 2nd Edition, Pearson Education
2. David A Bell, Electronic Devices and Circuits, 4th Edition, PHI, 2003
3. Floyd, Thomas, Electronic devices, Pearson Education, 5th Edition.
4. S. C. Sarkar, Electronic Devices and Circuits-1, The Millennium Edition, 2001.

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ELECTROMAGNETIC FIELDS

II Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To gain knowledge on Electromagnetic fields for a particular electrical engineering application.
- To familiarize the students with various laws and equations of Electrostatic and magnetic fields.

Learning Outcomes:

Students will be able to

- apply the knowledge of Mathematics and physical science in analyzing the concepts of electro-magnetic fields for faradays laws of induction.
- demonstrate the knowledge and understanding of the fundamental laws associated with Electromagnetic fields.
- determine the energy stored in Inductor and Capacitor.
- describe the concepts of force in magnetic and electric fields.
- analyze Maxwell's equations and pointing vector in electromagnetic fields.
- analyze – Faraday's laws of electromagnetic induction and – Poynting Theorem.

UNIT – I: Electrostatics - I

Electrostatic Fields – Coulomb's Law – Electric Field Intensity (EFI) – EFI due to a line and a surface charge – Work done in moving a point charge in an electrostatic field – Electric Potential – Properties of potential function – Potential gradient.

UNIT – II: Electrostatics - II

Gauss's law – Application of Gauss's Law – Maxwell's first law, div (D)=p_v- Laplace's and Poison's equations – Electric dipole – Dipole moment – potential and EFI due to an electric dipole – Torque on an Electric dipole in an electric field – Behavior of conductors in an electric field – Conductors and Insulators.

Electric field inside a dielectric material – polarization – Dielectric – Conductor and Dielectric – Dielectric boundary conditions, Capacitance – Capacitance of parallel plate and spherical and co-axial capacitors with composite dielectrics – Energy stored and energy density in a static electric field – Current density – conduction and Convection current densities – Ohm's law in point form – Equation of continuity.

UNIT – III: Magneto Statics

Static magnetic fields – Biot-Savart's law – Oesterd's experiment - Magnetic field intensity (MFI) – MFI due to a straight current carrying filament – MFI due to circular, square and solenoid current – Carrying wire – Relation between magnetic flux, magnetic flux density and MFI – Maxwell's second Equation,div(B)=0.

Ampere's circuital law and its applications: Ampere's circuital law and its applications viz. MFI due to an infinite sheet of current and a long current carrying filament – Point form of Ampere's circuital law – Maxwell's third equation, Curl (H)=Jc, Field due to a circular loop.

UNIT – IV: Force in Magnetic fields

Magnetic force - Moving charges in a Magnetic field – Lorentz force equation – force on a current element in a magnetic field – Force on a straight and a long current carrying conductor in a magnetic field – Force between two straight long and parallel current carrying conductors – Magnetic dipole and dipole moment – a differential current loop as a magnetic dipole – Torque on a current loop placed in a magnetic field.

UNIT – V: Self and Mutual Inductance

Self and Mutual inductance – Neumann's formulae – determination of self-inductance of a solenoid and toroid and mutual inductance between a straight long wire and a square loop wire in the same plane – energy stored and density in a magnetic field.

UNIT – VI: Time Varying Fields

Time varying fields – Faraday's laws of electromagnetic induction – Its integral and point forms – Maxwell's fourth equation, Curl (E)=-dB/dt – Statically and Dynamically induced EMFs – Simple problems -Modification of Maxwell's equations for time varying fields – Displacement current – Poynting Theorem and Poynting vector.

Text Books

1. "Engineering Electromagnetic" by William H. Hayt & John. A. Buck Mc. Graw-Hill Companies, 7th Editon.2006.
2. "Principles of Electromagnetics" by Sadiku, Oxford Publications,4th edition

Reference Books :

1. "Introduction to Electro Dynamics" by D J Griffiths, Prentice-Hall of India Pvt.Ltd, 2nd edition.
2. "Electromagnetics" by J. D Kraus Mc Graw-Hill Inc. 4th edition 1992.

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CIRCUIT THEORY – II

II Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To understand Three phase balanced and unbalanced systems.
- To familiarize the students to transients, two port networks and network synthesis.
- To gain knowledge on fourier series and its application to circuits.

Learning Outcomes:

Student will be able to

- analyse three phase circuits with both balanced and unbalanced loads.
- analyse the transient behavior of R-L, R-C and R-L-C circuits for different excitations.
- evaluate different two port network parameters.
- synthesize the given network using Foster form or Cauer form of realizations
- find the Fourier series expansions for any non-sinusoidal periodic waveforms
- analyse the given network for non-sinusoidal excitations using Fourier series expansions.

UNIT – I: Three Phase Circuits

Three phase circuits: Phase sequence- Star and delta connection-Relation between line and phase voltages and currents in balanced systems-Analysis of balanced three phase circuits- Analysis of Three Phase unbalanced circuits-Loop Method-Application of Millman's Theorem- Star Delta Transformation Technique – Measurement of Active and Reactive power in balanced Three phase systems - Two Wattmeter Method of measurement of three phase power.

UNIT – II: Transient Analysis

Transient response of R-L, R-C, R-L-C series circuits for D.C excitation-Initial conditions-solution method using differential equation and laplace transforms, Transient response of R-L, R-C, R-L-C series circuits for sinusoidal excitations-Initial conditions-Solution method using differential equations and laplace transforms

UNIT – III: Two port Networks

Two port network parameters – Z, Y, ABCD and hybrid parameters and their relations, Cascaded networks.

UNIT – IV: Network Functions

Network function for one port and two port networks, ladder networks, general network - poles and zeros of network functions, Restriction on poles and zeros for driving point functions and transfer functions.

UNIT – V: Network Synthesis

Real positive function – Basic synthesis procedure – LC Imittance Functions – RC Impedance functions – RL Impedance functions or RC admittance functions - Foster and Cauer methods.

UNIT – VI: Applications Of Fourier Series

Introduction, Effective value and average values of non sinusoidal periodic waves, application in circuit analysis, circuit analysis using Fourier series.

Text Books:

1. Engineering Circuit Analysis by William Hayt and Jack E.Kimmerley,Mc Graw Hill Company,6th edition
2. Engineering Network Analysis and Filter Design by Gopal G.Bhise, Prem R. Chada, Durgesh C. Kulshreshtha, Umesh Publications 1st edition.
3. Electrical Circuits by A. Sudhakar and Shyammohan S Palli, Tata McGraw-Hill 6th edition.
4. Network Analysis: Van Valkenburg; Prentice-Hall of India Private Ltd.

Reference Books:

1. Network Theory by A. Sudhakar and Shyammohan S Palli, Tata McGraw-Hill Publications,first edition
2. Fundamentals of Electric Circuits by Alexander & Sadiku
3. Introduction to circuit analysis and design by Tildon Glisson, Jr. Springer Publications.

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ELECTRICAL MACHINES – I

II Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To familiarize the students with the constructional details, working principles of D.C. machines and the remedial measures required to overcome the practical problems associated with the operation of these machines.
- To develop an understanding of various starting, speed control and testing methods of D.C. Machines in students.
- To familiarize the students with the constructional details, working principles, operating characteristics of single phase transformers.

Learning Outcomes:

Students will be able to

- demonstrate the knowledge and understanding of the fundamental principles and control practices associated with D.C. machines.
- determine the performance and operational related problems of the D.C machines and suggest the remedial measures to solve them.
- test, measure and provide valid conclusions on the performance of D.C. machines using the tools/equipment.
- select an appropriate machine to meet specified performance requirements for a particular application.
- demonstrate the knowledge and understanding of the fundamental principles and control practices associated with transformers.
- describe and determine the operational characteristics of the single phase transformers.

UNIT – I: D.C. Generators - Construction & Operation

D.C. Generators – Principle of operation – Constructional Features- E.M.F Equation –Armature windings - Armature reaction – Commutation Process. Types of DC generators.

UNIT – II: D.C. Motors

D.C Motors – Principle of operation – Back E.M.F. - Torque equation – characteristics of shunt, series and compound motors – Losses and Efficiency.

UNIT – III: Speed Control of D.C. Motors

Speed control of d.c. Motors: Armature voltage and field flux control methods. Ward-Leonard system. Principle of 3 point and 4 point starters - Applications of DC Motors.

UNIT – IV: Testing of D.C. Machines

Testing of DC machines: methods of testing – Direct & Indirect testing: Swinburne's method- Hopkinson's method - separation of losses.

UNIT – V: Introduction & performance to Single Phase Transformers

Single phase transformers-types - constructional details- EMF equation - operation on no load and on load - Phasor Diagrams - Equivalent Circuit – Regulation - Losses and efficiency - All Day Efficiency.

UNIT – VI: Testing of Single Phase Transformer and Autotransformer

OC and SC tests - Sumpner's test - parallel operation - auto transformers-equivalent circuit -comparison with two winding transformers.

Text Books:

1. Electrical Machines - P.S. Bimbra, Khanna Publishers, 7th Edition, 2007.
2. Electrical Machines - D P.Kothari & I.J.Nagarth, TMH, 4th Edition, 2010.
3. Electrical Machines - J.B.Gupta, S.K.Kataria & Sons

Reference Books:

1. Electrical Machinery - A.E.Fitzgerald & Charles Kingsley, TMH, 6th Edition, 2002.
2. Problems in Electrical Engineering – Parker Smith, CBS Publishers, 9th edition, 1984.
3. Electrical Machines – S.K. Bhattacharya, TMH, 3rd Edition, 2009.
4. Performance and Design of Direct Current Machines - Clayton &Hancock, ELBS.
5. Electrical Machines – A. Chakrabarti & S. Dednath – Mc Graw - Hill Education, 1st Edition, 2015

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POWER SYSTEMS – I

II Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To Introduce the operation of thermal, hydal and nuclear power plants in power generation earn Problem solving aspects.
- To gain the knowledge of Economic aspects and different tariff methods\

Learning Outcomes:

Student should be able to

- describe the important features and functions of thermal power Station components.
- suggest different materials used to control the chain reaction in nuclear power plants.
- select an appropriate type of power plant to meet the specified load requirement.
- describe the bus bar arrangements in substation.
- describe the importance of feeder, distributor and service main in a distribution scheme.
- select the suitable tariff methods for various consumer levels

UNIT – I: Thermal Power Stations

Single line diagram of Thermal Power Station showing paths of coal, steam, water, air, ash and fluegasses-Briefdescription of TPS components: Economizers, Boilers, super heaters, Turbines ,condensers,chimneyand cooling towers

UNIT – II: Nuclear Power Stations

Working principle, Nuclear fuels. Nuclear reactor Components: Moderators, Control roads, Reflectors and Coolants. Types of Nuclear reactors and brief description of PWR, BWR and FBR. Radiation: Radiation hazards and Shielding.

UNIT – III: Hydal and Gas power stations

Selection of site, block diagram approach of hydro electric power plant and classification of pumped storage power plants. Gas power stations: principle of operation and components(block diagram approach only)

UNIT – IV: Distribution Systems

Classification of distribution systems, design features of distribution systems, radial distribution, ring main distribution, voltage drop calculations DC distributors for following cases: radial DC distributor fed at one end and at both ends (equal /

unequal voltages), ring main distributor, stepped distributor and AC distribution. Comparison of DC and AC distribution.

UNIT – V: Air insulated substations & Gas insulated substations

Classification of substations: **-** Indoor & Outdoor substations: Substations layout showing the location of all the substation equipment.Bus bar arrangements in the Sub-Stations and their classification. Advantages of Gas insulated substations, different types of gas insulated substations, Single line diagram of gas insulated substations, bus bar, construction aspects of GIS, Installation and maintenance of GIS, Comparison of Air insulated substations and Gas insulated substations.

UNIT – VI: Heading Economic Aspects of Power Generation& Tariff Methods

Load curve, load duration and integrated load duration curves, Discussion on economic aspects: connected load, maximum demand, demand factor, load factor, diversity factor, capacity factor, utilization factor, capacity, utilization and plant use factors- Numerical Problems. Costs of Generation and their division into Fixed, Semi-fixed and Running Costs. Desirable Characteristics of a Tariff Method. Tariff Methods: Simple rate, Flat Rate, Block-Rate, two-part, three –part, and power factor tariff methods.

Text Books:

1. A Text Book on Power System Engineering by M.L.Soni, P.V.Gupta, U.S.Bhatnagar and A.Chakrabarti, Dhanpat Rai & Co. Pvt. Ltd., 1999.

Reference Books:

1. Principles of Power Systems by V.K Mehta and Rohit Mehta S.Chand& Company Ltd.New Delhi 2004.
2. Electrical Power Systems by C.L.Wadhawa New age International (P) Limited, Publishers 1997.
3. Electrical Power Generation, Transmission and Distribution by S.N.Singh., PHI, 2003.

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EMPLOYABILITY SKILLS
(Common to EEE, ME & ECE)
II Year – I Semester

Lecture	: 1	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To equip the learners to gain employability skills and to have successful careers.
- To enable them to use English in different socio-cultural and professional contexts.
- To assist them to communicate their ideas relevantly and coherently in globalized contexts.

Learning Outcomes:

Students will be able to

- gain employment and function successfully in their careers.
- use English successfully in different socio-cultural and professional contexts
- communicate their ideas coherently in globalized situations.

Syllabus:

Listening:

- Listening Comprehension- 4 exercises
- Active Listening

Reading:

- Reading Comprehension – 4 Passages
- Book Review-Any Novel among the list prescribed by the Department
- Cloze Test

Speaking:

- Extempore
- One Act Plays
- Public Speaking
- Group Discussions
- Interpersonal skills
- Ad Making
- Poster presentation
- Mock Interviews
- Assertiveness

Writing:

- Information Transfer
- Report Writing
- Team building
- Paragraph Writing
- Project Work

Vocabulary:

- Business Vocabulary

Short Films:

- Creativity
- Leadership

Books Recommended:

1. Effective Technical Communication, M. Ashraf Rizvi, Tata Mc. Graw-Hill Publishing Company Ltd.
2. Communication Skills by Leena Sen, Prentice-Hall of India, 2005.
3. Academic Writing- A Practical guide for students by Stephen Bailey, Rontledge Falmer, London & New York, 2004.
4. English Language Communication: A Reader cum Lab Manual Dr A Ramakrishna Rao, Dr G Natanam & Prof SA Sankaranarayanan, Anuradha Publications, Chennai.
5. Body Language- Your Success Mantra by Dr. Shalini Verma, S. Chand, 2006.
6. DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice, New Age International (P) Ltd., Publishers, New Delhi.
7. Books on TOEFL/GRE/GMAT/CAT by Barron's/cup.
8. IELTS series with CDs by Cambridge University Press.
9. Technical Report Writing Today by Daniel G. Riordan & Steven E. Pauley, Biztantra Publishers, 2005.
10. Communication Skills for Engineers by Sunita Mishra & C. Muralikrishna, Pearson Education, 2007.
11. Objective English by Edgar Thorpe & Showick Thorpe, 2nd edition, Pearson Education, 2007.
12. Cambridge Preparation for the TOEFL Test by Jolene Gear & Robert Gear, 4th Edition.

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FLUID MECHANICS & HYDRAULIC MACHINES LAB

II Year – I Semester

Practical	: 3	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- The course will give the student an insight into working of various fluid machines and be able to compare the performance of fluid machines under different working conditions.

Learning Outcomes:

Students will be able to

- gain Knowledge On Working Of Centrifugal Pumps Reciprocating Pumps, Hydraulic Turbines, Centrifugal Blowers And Steam Turbines And Compare The Performance At Different Operating Conditions.

List of Experiments:

Any 10 of the following experiments are to be conducted:

1. Calibration of Venturimeter.
2. Calibration of Orifice meter.
3. Determination of friction factor for a given pipe line.
4. Determination of loss of head due to sudden contraction in a pipeline.
5. Turbine flow meter.
6. Verification of Bernoulis equation
7. Calibration of V-Notch
8. calibration of orifice
9. Calibration of Mouth Piece
10. Impact of jets on Vanes.
11. Performance Test on Pelton Wheel.
12. Performance Test on Francis Turbine.
13. Performance Test on Kaplan Turbine.
14. Performance Test on Single Stage Centrifugal Pump.
15. Performance Test on Multi Stage Centrifugal Pump.
16. Performance Test on Reciprocating Pump.

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NETWORKS LAB

II Year – I Semester

Practical	: 3	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To impart pratical knowledge on basic principles of circuit theory.
- To familiarize with application of various network theoremto circuits.

Learning Outcomes:

Student should be able to

- apply the concepts of Thévenin's and Norton's theorems for a given electrical circuit.
- design and test RLC series and parallel resonant circuits.
- evaluate the time constant of simple RC and RL circuits.
- relate physical observations and measurements involving electrical circuits to theoretical principles.

List of the Experiments:

Any 10 of the following experiments are to be conducted:

1. Series and Parallel Resonance.
2. Determination of Self, Mutual Inductances and Coefficient of coupling.
3. Verification of Superposition & Reciprocity Theorems.
4. Verification of Thevenin's and Norton's Theorems.
5. Verification of Maximum Power Transfer Theorem on A.C & D.C.
6. Verification of Compensation & Millmann's Theorems.
7. Z and Y Parameters.
8. Transmission and hybrid parameters.
9. Measurement of Active Power for Star and Delta connected balanced loads.
10. Measurement of Reactive Power for Star and Delta connected balanced loads.
11. Time response of first order RL/RC network for periodic non-sinusoidal inputs.
12. Determination of form factor for non-sinusoidal waveform.

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DIGITAL CIRCUITS

II Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To familiarize with the concepts of different number systems and Boolean algebra
- To familiarize with the design of combinational and sequential logic circuits.

Learning Outcomes:

Students will be able to

- understand various number systems, Boolean algebra and codes.
- realize Boolean expressions.
- design combinational and sequential logic circuits.
- apply different models of Finite State Machines for design of sequential circuits.

UNIT – I: Number Systems

Representation of numbers, conversion of numbers from one radix to another radix, r-1's complement and r's complement of unsigned numbers subtraction, Signed binary numbers, different forms, Weighted and Non-weighted codes, Error detection and correction codes-Parity checking, even parity, odd parity, Hamming code.

UNIT – II: **Logic Operations**

Basic logic operations-NOT, OR, AND, Universal building blocks, EX-OR, EX-NOR gates, Standard SOP & POS forms, Two level NAND – NAND and NOR-NOR realizations, Basic Theorems and properties of Boolean Algebra.

Gate level Minimization: Minimization of logic functions using Boolean theorems, Minimizations of switching functions using K-Maps(up to four variables), Tabular minimization, Design of code converters using K-maps.

UNIT – III: Combinational Logic Circuits

Introduction to combinational logic circuits, design of Half adder, full adder, half subtractor, full subtractor, 4-bit adder-subtractor circuit, BCD adder, Excess-3 adder, look-a-head carry adder, 2-bit Binary comparator,decoder, Demultiplexer, encoder, multiplexers, realization of Boolean functions using decoders and multiplexer, priority encoder.

UNIT – IV: **Programmable Logic Devices**

Introduction to PLDs, realization of switching functions using PROM, PLA and PAL, comparison of PROM, PLA and PAL.

Logic Families: Introduction to logic families, Bipolar logic, Transistor logic, CMOS logic, CMOS steady state electrical behavior, CMOS dynamic electrical behavior, other CMOS and TTL logic families, CMOS/TTL interfacing Emitter coupled logic, Comparison of logic families.

UNIT – V: Sequential Circuits

Classification, basic latches and flip-flops, truth tables and excitation tables, Conversion of flip-flops. Design of ripple counters, synchronous counters, Johnson counters, ring counters, registers, Buffer register, control buffer register, shift register, bi-directional shift register, universal shift register.

UNIT – VI: **Finite State Machines**

Capabilities and limitations of finite state machine, reduction of state tables using Partition technique and state assignment, Realization of circuits using various flip-flops. Mealy to Moore conversion and vice-versa.

Text books:

1. Digital design by M. Morris Mano 2nd edition PHI.(Units -I to V).
2. Digital design Principles & Practices by John F. Wakerly, Third edition updated, Pearson Education (Unit- V).

Reference books:

1. Fundamentals of Logic Design by Charles H.Roth, Jr, Fourth Edition, Jaico Publishers.
2. Digital Fundamentals by Thomas L. Floyd, Third edition, Universal Book Stall.
3. Introduction to Logic Design by Ala B. Marcovitz, Tata McGraw Hill Edition. (Unit- VI)

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MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

II Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To learn about various types of business organizations.
- To access the demand for a particular product.
- To study the various types of cost concepts.
- To have an idea about the types of markets.
- To make the students expertise in account principles and concepts.

Learning Outcomes:

Students will be able to

- know the various factors that influence demand of particular product.
- forecast the future demand using various tools & techniques.
- take the further decisions based on the demand.
- aware of costs incurred in the production.
- alter the combination of inputs to attain the desired results.
- Access the minimum level of production that a firm should carry by using BEP.
- understand which market is suitable to introduce the product.
- ability to know various methods to determine the pricing.

UNIT – I: Introduction to Managerial Economics

Definition, Nature and Scope of Managerial Economics– Relation of Managerial Economics with other disciplines.

Demand Analysis: Demand Determinants, Law of Demand and its exceptions, Significance & Types of Elasticity of Demand. Factors governing demand forecasting- Methods of Demand forecasting.

UNIT – II: Theory of Production and Cost Analysis

Production Function – Isoquants and Isocosts, MRTS, Least Cost Combination of Inputs, Cobb-Douglas production function. Production function, Laws of Returns, Internal and External Economies of Scale.**Cost Analysis**: Cost concepts & BEP Analysis Break-Even Point (simple problems)

UNIT – III: Introduction to Markets & Pricing strategies

Market structures: Types of competition, Features of Perfect competition, Monopoly and Monopolistic Competition. Price & output determination under Perfect Competition

Pricing strategies: Methods of Pricing: Cost Plus Pricing, Marginal Cost Pricing, Sealed Bid Pricing, Going Rate Pricing, Limit Pricing, Market Skimming Pricing, Penetration Pricing, Block Pricing, Bundling Pricing, Peak Load Pricing, Cross Subsidization.

UNIT – IV: Introduction to Business Organizations

Characteristic features of Business, Features and evaluation of Sole Proprietorship, Partnership, Joint Stock Company, Public Enterprises and their types, Changing Business Environment in Post-liberalization scenario & Phases of Business Cycle.

UNIT – V: Introduction to accountancy

Introduction to Accountancy, Types of Accounts, Ledgers, Maintenance of Ledgers & Trial Balance, Introduction to Final Accounts, Problems on Trading , Profit & Loss Account and Balance sheet, Problems with simple adjustments

UNIT – VI: Ratio Analysis & Capital Budgeting

Ratio Analysis: Introduction to financial Analysis; analysis& Interpretation of financial statements through Liquidity ratios, Profitability & Solvency ratios, turnover ratios

Capital budgeting: capital & its significance, estimation of fixed & working capital requirements, methods of raising capital, introduction to capital budgeting, traditional methods of capital budgeting & discounted cash flow methods(simple problems)

Text Books:

1. Aryasri: Managerial Economics and Financial Analysis, 2/e, TMH, 2005.
2. Varshney & Maheswari: Managerial Economics, Sultan Chand, 2003.

References:

1. Ambrish Gupta, Financial Accounting for Management, Pearson Education, New Delhi.
2. H. Craig Peterson & W. Cris Lewis, Managerial Economics, PHI, 4th Ed.
3. Suma Damodaran, Managerial Economics, Oxford University Press.
4. Lipsey & Chrystel, Economics, Oxford University Press.
5. S. A. Siddiqui & A. S. Siddiqui, Managerial Economics & Financial Analysis, New age International Space Publications.
6. Domnick Salvatore: Managerial Economics in a Global Economy, 4th Edition, Thomson.
7. Narayanaswamy: Financial Accounting—A Managerial Perspective, PHI.

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ELECTRICAL MACHINES – II

II Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To familiarize the students with the constructional details, working principles, operating characteristics of 3-ph transformers and induction motors.
- To expose students to the practical problems associated with the operation of transformer and ind-motor and identify the remedial measures required to overcome them.

Learning Outcomes:

Students will be able to

- demonstrate the knowledge and understanding of the fundamental principles and control practices associated with 3-ph transformers and induction motors.
- describe and determine the operational characteristics of the induction motors.
- demonstrate competencies in application of 3-phase transformers with various configurations.
- test, measure and provide valid conclusions on the performance of transformer and induction motors using the tools/equipment.
- select an appropriate machine to meet specified performance requirements.
- review considerations and industry best practices for transformer loading and loss of life

UNIT – I: Poly phase Transformers

Poly phase transformers – Poly phase connections - $Y/_{\Delta}$, $\Delta/_{Y}$, $\Delta/_{\Delta}$ and open Delta, off load and on load tap changing; Scott connection.

UNIT – II: 3-ph Induction Motors

Construction details-production of a rotating magnetic field-principle of operation-rotor emf and rotor frequency-rotor current and pf at standstill and during running conditions-Rotor power input, rotor copper loss and mechanical power developed and their inter relationship.

UNIT – III: Characteristics of Induction Motors

Torque equation-expressions for maximum torque and starting torque – torque slip characteristic - equivalent circuit - crawling and cogging.

UNIT – IV: Testing

No load and blocked rotor tests - Circle diagram

UNIT – V: Starting &Speed Control Methods

Methods of starting – Elementary idea of speed control methods.

UNIT – VI: Single Phase Motors

Single phase induction motor - Constructional features - Double revolving field theory- Elementary idea of cross-field theory - split-phase motors - shaded pole motor.

Text Books:

1. Electrical machines – P.S. Bhimbra, Khanna Publishers, 7th Edition, 2007.
2. Electrical Machines - D P.Kothari & I.J.Nagarth, TMH, 4th Edition, 2010.
3. Performance and Design of Alternating Current Machines – M.G. Say, John Wiley and Sons Publications, 3rd Edition, 1983.

Reference Books:

1. Electrical Machines – S.K. Bhattacharya, TMH, 3rd Edition, 2009.
2. Electrical Machines - J.B.Gupta, S.K.Kataria & Sons.
3. Problems in Electrical Engineering – Parker Smith, CBS Publishers, 9th edition, 1984.
4. Theory of Alternating Current Machinery- Langsdorf, TMH

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POWER SYSTEMS – II

II Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To introduce the transmission line parameters and methods for calculation of line parameters for the single phase and three phase circuits.
- To familiarize students with different types of Materials used for transmission line conductors and different types of transmission line conductors employing in over head transmission system.

Learning Outcomes:

Students will be able to

- apply the knowledge of mathematics for deriving the inductance and capacitance for various conductor configurations and able to explain the various factors governing the line inductance and capacitance.
- describe how the transmission lines are classified Analyze the performance in terms of efficiency and voltage regulation for transmission lines.
- analyze the factors affecting the power loss due to corona and suggest methods to minimize the corona loss.
- describe the importance of insulator in transmission and distribution systems and suggest suitable insulator for a specified application.
- describes the necessity for grading of a cable to equalize the stress in dielectric of cable.

UNIT – I: Transmission Line Parameters

Types of conductors - calculation of resistance for solid conductors - Calculation of inductance for single phase and three phase, single and double circuit lines, concept of GMR & GMD, symmetrical and asymmetrical conductor configuration with and without transposition, Numerical Problems. Calculation of capacitance for 2 wire and 3 wire systems, effect of ground on capacitance, capacitance calculations for symmetrical and asymmetrical single and three phase, introduction of double circuit lines, Numerical Problems.

UNIT – II: Performance of Short and Medium Length Transmission Lines

Classification of Transmission Lines - Short, medium, long line and their model representations -Nominal-T, Nominal-Pie and A, B, C, D Constants for symmetrical & Asymmetrical Networks, Numerical Problems. Mathematical Solutions to estimate regulation and efficiency of all types of lines - Numerical Problems

UNIT – III: Performance of Long Transmission Lines

content Long Transmission Line-Rigorous Solution, evaluation of A,B,C,D Constants, Interpretation of the Long Line Equations, Incident, Reflected and Refracted Waves -Surge Impedance and SIL of Long Lines, Wave Length and Velocity of Propagation of Waves - Representation of Long Lines - Equivalent-T and Equivalent Pie network models (numerical problems).

UNIT – IV: Underground Cables

Types of Cables, Construction, Types of insulating materials, Calculations of insulation resistance and stress in insulation, Numerical Problems Capacitance of single and 3-Core belted Cables, of Intersheath -Grading Numerical Problems Grading of Cables-Capacitance grading, Numerical Problems, Description

UNIT – V: Various Factors Governing the Performance of Transmission line Power Factor Improvement & Voltage Control

Skin and Proximity effects - Description and effect on Resistance of Solid Conductors -Ferranti effect - Charging Current - Effect on Regulation of the Transmission Line, Shunt Compensation. Corona - Description of the phenomenon, factors affecting corona, critical voltages and power loss, Radio Interference. Power factor improvement, Voltage Control, introduction to line compensation

UNIT – VI: Sag and Tension Calculations& Overhead Line Insulators

Sag and Tension calculations with equal and unequal heights of towers, effect of Wind and Ice on weight of Conductor, numerical Problems - Stringing chart and sag template and its applications. Types of Insulators, String efficiency and Methods for improvement, Numerical Problems – voltage distribution, calculation of string efficiency, Capacitance grading and Static Shielding.

Text Books:

1. A Text Book on Power System Engineering by M.L.Soni, P.V.Gupta, U.S.Bhatnagar, A.Chakrabarthy, Dhanpat Rai & Co Pvt. Ltd.
2. Electrical power systems - by C.L.Wadhwa, New Age International (P) Limited, Publishers,1998.

Reference Books:

1. Power system Analysis-by John J Grainger William D Stevenson, TMC Companies, 4th edition.
2. Power System Analysis and Design by B.R.Gupta, Wheeler Publishing.
3. Power System Analysis by Hadi Saadat – TMH Edition.
4. Modern Power System Analysis by I.J.Nagaraj and D.P.Kothari, Tata McGraw Hill, 2nd Edition.

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ELECTRICAL MEASUREMENTS & INSTRUMENTATION

II Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To sketch the basic construction of a CRT and explain its operation
- To introduce the concepts of classification of measuring instruments, types of Errors, operating torques and Moving Coil & Moving Iron Instruments.
- To list the Different methods for the measurement of low, medium and high resistances.
- To classify transducers and explain the operation of transducers like Piezo-electric, LVDT etc.

Learning Outcomes:

Students will be able to

- measure amplitude and frequencies using CRO.
- describe the principle of operation of various electrical measuring instruments.
- describe the Differences between Watt meter, Energy Meter and Calibrate Dynamo meter watt meter and Induction Energy meter.
- demonstrate the principle of operation Potentio Meter and Calibrate the Volt meter, Ammeter using Potentio meters.
- conduct suitable experiment for the measurement of resistance.
- measure physical parameters like force, pressure etc.

UNIT – I: Oscilloscopes

Cathode ray oscilloscope-Cathode ray tube-time base generator-horizontal and vertical amplifiers, applications of CRO-Measurement of phase and frequency-lissajous patterns-Sampling oscilloscope-analog and digital type.

UNIT – II: Measuring Instruments

Classification ,Error Analysis– deflecting, controlling and damping torques – Ammeters and Voltmeters – PMMC, Moving iron type instruments – expression for the deflecting torque and control torque – Errors And compensations. Extension of range using shunts and series resistance

UNIT – III: Measurement of Power and Energy

Single phase and three phase dynamometer wattmeter, LPF and UPF, expression for Deflecting and control torques – Extension of range of wattmeter using instrument transformers. Single Phase induction type energy meter – driving and braking torques – errors and compensations –Testing of Energy meter.

UNIT – IV: Potentiometers & DC Bridges

Principle and operation of DC Crompton's potentiometer. Standardization – Measurement of Unknown resistance, current, voltage. Method of measuring low, medium and high resistance – sensitivity of Wheat stone's bridge - Kelvin's double bridge for measuring low resistance– loss of charge Method for measurement of high resistance.

UNIT – V: Transducers

Definition of transducer, Classification of transducers, Advantages of Electrical transducers ,Characteristics and choice of transducers; Principle operation of resistor, inductor, LVDT and capacitor transducers, Strain gauge and its principle of operation- guage factor, Thermistors, Piezo electric transducers, Hall sensors.

UNIT – VI: Digital meters

Digital Voltmeter-Successive approximation, ramp and dual slope integrating type-continuous balance type-Micro processor based ramp type. Extension Digits-Digital frequency Meter, phase angle meter, LCR Q-meter.

Text Books:

1. Electrical Measurements and measuring Instruments – by E.W. Golding and F.C Widdis, fifth Edition, Wheeler Publishing.
2. A course in Electrical & Electronic Measurements & Instrumentation by A.K.Sawhney, Dhanpat Rai & Co. Publications.
3. Modern Electronic Instrumentation and Measurement Techniques – A.D. Helfrick and W.D. Cooper, PHI, 5th Edition, 2002.
4. Transducers and Instrumentation by D.V.S Murthy, Prentice Hall of India

Reference Books:

1. Electrical Measurements – by Buckingham and Price, Prentice – Hall.
2. Electrical Measurements: Fundamentals, Concepts, Applications – by Reissland, M.U,New Age International (P) Limited, Publishers.

3 Electrical and Electronic Measurements –by G.K. Banerjee, PHI Learning PrivateLtd, New Delhi-2012.

4. Principles of Measurement and Instrumentation – by A.S Morris, Pearson / Prentice Hall of India.
5. Electronic Instrumentation-by H.S.Kalsi Tata MCGraw-Hill Edition, 1995.

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CONTROL SYSTEMS

II Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To introduce the basic principles of control systems to develop mathematical models for physical systems.
- To familiarize the students on the basic concepts of feedback characteristics of control systems for standard test signals.
- To familiarize the students on finding stability of control systems using time and frequency domain techniques.

Learning Outcomes:

Students will be able to

- develop mathematical models for physical systems using the knowledge of fundamental principles of mathematics and control systems.
- apply the knowledge of various controlling techniques to develop suitable controller to meet specific requirements.
- describe and determine the various time and frequency domain specifications.
- select appropriate stability techniques to determine performance characteristics of physical systems.

UNIT – I: Introduction

Concepts of Control Systems- Open Loop and closed loop control systems and their differences- Different examples of control systems- Classification of control systems, Feed-Back Characteristics, Effects of feedback. Mathematical models – Differential equations, Impulse Response and transfer functions.

UNIT – II: Control Systems Components

Transfer Function of DC Servo motor - AC Servo motor- Synchro transmitter and Receiver, Block diagram representation of systems considering -Block diagram algebra – Representation by Signal flow graph - Reduction is using Mason's gain formula.

UNIT – III: Time Response Analysis

Standard test signals - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications – Steady state response - Steady state errors and error constants – Effects of proportional derivative, proportional integral, proportional integral derivative systems.

UNIT – IV: Stability Analysis in S-Domain

The concept of stability – Routh's stability criterion – qualitative stability and conditional stability – limitations of Routh's stability.

Root Locus Technique: The root locus concept - construction of root loci-effects of adding poles and zeros to G(s)H(s) on the root loci.

UNIT – V: Frequency Response Analysis

Introduction, Frequency domain specifications-Bode diagrams-Determination of Frequency domain specifications and transfer function from the Bode Diagram-Phase margin and Gain margin-Stability Analysis from Bode Plots. Polar Plots-Nyquist Plots-Stability Analysis.

UNIT – VI: State Space Analysis of Continuous Systems

Concepts of state, state variables and state model, derivation of state models from block diagrams, Diagonalization- Solving the Time invariant state Equations-State Transition Matrix and it's Properties – Concepts of Controllability and Observability.

Text Books:

1. Control Systems Engineering – by I. J. Nagrath and M. Gopal, New Age International Limited Publishers, 2nd edition.
2. Automatic control system – B.C.Kuo , john wiley and son's 8th edition, 2003.

Reference Books:

1. Modern control engineering – K.Ogata , prentice Hall of India Pvt. Ltd., 3rd Edition, 1998.
2. Control system – N.K.Sinha, New Age International (p) Limited Publishers, 3rd Edition, 1998.
3. Control system engineering – Norman S-Nice, Willey Studio Edition, 4th Edition. Feed back and control system – Joseph J Distefano-III, Allen R. Stubberud, Ivan J. Willioms, Tata Mc-graw Hill, 2nd Edition.

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PROFESSIONAL ETHICS AND PATENTS
(Common to EEE, ME & ECE)

II Year – II Semester

Lecture	: 2	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To understand the basic concepts of Ethics and Human values.
- To enable the students understand the role and importance of ethics in Engineering.
- To familiarize the rights and responsibilities of Engineers.
- To know the laws and protect author's rights.
- To understand the legal aspects present in intellectual property law.

Learning Outcomes:

Students will be able to

- comprehend different Moral Perspectives and enabling him to frame one's own Ethical standards.
- find solutions for issues related to growth with reference to absolute ethical tenets.
- resolve Professional/Moral Dilemmas and be able to guide productivity.
- analyze the likelihood of confusion in Trademark Claims.
- understand different forms of infringement of Intellectual Property Rights.
- recognize the relevant criteria for protecting Creativity.

UNIT – I: Human Values

Morals, Values and Ethics – Integrity – Work Ethics – Service Learning – Civic Virtue -Value time – Co-operation – Commitment – Empathy – Self-confidence – Character.

Ethics- Types of Inquiry – Kohlberg's Theory – Gilligan's Argument – Heinz's Dilemma.

UNIT – II: Engineers' Responsibilities and Rights

Safety and Risk – Types of Risks – Voluntary vs. Involuntary Risk- Short Term vs Long Term Consequences - Expected Probability - Reversible Effects - Threshold Levels for Risk - Delayed vs Immediate. Risk Collegiality – Techniques for achieving Collegiality – Group / Team – Two Senses of Loyalty, Rights – Professional Responsibilities – Confidential and Proprietary information – Conflict of Interest – Conflict resolution – Self-interest.

UNIT – III: Patent Law, Trade Marks and Copyrights

Introduction – Rights and Limitations – Application process – Patent requirements – Ownership – Transfer – Infringement – Litigation – International Patent Law – Double Patenting – New development in Patent Law.

Trade Mark and Copyrights: Introduction – Registration Process – Transfer – Infringement – Dilution of Ownership – Imitation – Litigations.

UNIT – IV: Cyber Law

Introduction to Cyber Law – Cyber Crime and E-Commerce – Online Crime – Innovations and Inventions in Trade Related Intellectual Property Rights.

Text Books:

1. "Principia Ethica" by Goerge Edward Moore, Cambridge University Press, 11-Nov-1993, Cambridge.
2. "Engineering Ethics includes Human Values" by M.Govindarajan, S.Natarajan and V.S.SenthilKumar-PHI Learning Pvt. Ltd-2009.
3. Deborah E.Bouchoux: "Intellectual Property", Cengage Learning, New Delhi

Reference Books:

1. "Professional Ethics and Human Values" by A.Alavudeen, R.Kalil Rahman and M.Jayakumaran- Laxmi Publications.
2. R.Radha Krishnan, S.Balasubramanian: "Intellectual Property Rights",Excel Books, New Delhi.
3. Prabhuddha Ganguli: "Intellectual Property Rights" Tata Mc-Graw- Hill, New Delhi.

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SEMICONDUCTOR DEVICES AND CIRCUITS LAB

II Year – II Semester

Practical	: 3	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To familiarize students with basic laboratory equipments.
- To construct various electronic circuits using BJTs and diodes.

Learning Outcomes:

Students will be able to

- study and test different electronic components and understand the working of various electronic lab equipment.
- obtain the I-V characteristics of PN junction diode, Zener diode, BJT, FET, UJT and SCR.
- obtain the performance characteristics of Half wave and Full wave rectifiers without and with filters, Zener voltage regulator.
- measure the h-parameters of BJT.
- obtain the frequency response characteristics of CE, CC and FET CS amplifiers.

List of Experiments:

I) Study Experiments:

1. Identification, specification and Testing of R, L, C component (color codes) & Bread boards.
2. Identification, specifications and testing of active devices, Diodes, BJTs, JFETs, MOSFETs, LEDs, LCDs, SCR, UJT, DIAC, TRIAC .
3. Soldering practice –simple circuits using active and passive components.
4. Study of operation of CRO, Function generator, Regulated power supply, and Multimeter.

II) Practical Experiments: (Any ten)

1. PN Junction Diode V-I characteristics & Switching application.
2. Zener diode V-I characteristics & Regulation characteristics.
3. Half wave rectifier with and without capacitor Filter.
4. Full wave rectifier with and without capacitor Filter.
5. Transistor CB characteristics (h-parameter calculation).
6. Transistor CE characteristics (h-parameter calculation).
7. FET characteristics.
8. SCR characteristics.
9. UJT characteristics.
10. CE amplifier
11. CC amplifier
12. UJT relaxition oscillator

Equipments required for Laboratory:

1. RPSs
2. CROs
3. Functions Generators
4. Multimeters
5. Components

ELECTRICAL MACHINES LAB – I

II Year – II Semester

Practical	: 3	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To impart practical knowlege on performance of various DC machines and transformers.

Learning Outcomes:

Students will be able to

- prepare laboratory reports that clearly communicate experimental information in a logical and scientific manner.
- understand the concept of efficiency and regulation transformer from open circuit test, short circuit test, and load test.
- study the parallel operation of transformers.
- experimentally obtain the load characteristics of various dc motors and generators.

List of the Experiments

Any 10 of the following experiments are to be conducted:

1. Magnetization characteristics of DC shunt generator. Determination of critical field resistance and ciritical speed.
2. Swinburne's test on DC shut machine.
3. Speed control of DC shunt motor by field and armature control.
4. Brake test on DC compound motor.Determination of performance curves.
5. Brake test on DC series motor.
6. O.C and S.C tests on single phase transformer.
7. Sumpner's test on single phase transformer.
8. Scott connection of transformers.
9. Parallel operation of single phase transformers.
10. RLC load test on a single phase transformer.
11. Hopkinson's test on DC shunt machines.
12. Load test on DC compound generator.

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SIGNALS AND SYSTEMS

III Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To introduce the concepts of approximation of signals using orthogonal functions and their transformation techniques.
- To develop an understanding of Signal transmission through the systems.

Learning Outcomes:

Students will be able to

- perform the signal approximation using orthogonal functions.
- analyze the signal transmission through linear systems.
- apply correlation and convolution techniques for different signals.
- perform transformations on signals.

UNIT – I: Signal Analysis

Introduction to Signals and Systems, Classification of Signals, Basic Operations on Signals, Elementary Signals, and Systems viewed as Interconnection of Operations, Properties of Systems. Analogy between Vectors and Signals, Orthogonal Signal Space, Approximation of a function by a set of mutually orthogonal functions, Evaluation of mean square error, Representation of a function by a closed or complete set of mutually Orthogonal functions, Orthogonality in complex functions.

UNIT – II: Fourier Series Representation of Continuous Time Signals

Trigonometric and Exponential Fourier series, Relationship between Trigonometric and Exponential Fourier series, Representation of a periodic function by the Fourier series over the entire interval, Convergence of Fourier series, Alternate form of Trigonometric series, Symmetry conditions, Properties of Fourier Series, Complex Fourier spectrum.

UNIT – III: Fourier Transform

Representation of an arbitrary function over the entire interval: Fourier transform, existence of Fourier transform, Fourier transform of some useful functions, Fourier transform of periodic function, Properties of Fourier transform, Energy Density spectrum, Parseval's Theorem.

Sampling: Sampling theorem for band limited signals: Explanation and reconstruction of signal from samples, aliasing, Sampling Techniques: impulse sampling, natural and flat top sampling.

UNIT – IV: LTI Systems

Linear Time Invariant (LTI) System, Response of LTI system: Convolution Integral, Graphical interpretation, Properties of LTI system, Transfer function and Frequency Response of LTI system.

Signal Transmission Through LTI Systems: Filter characteristics of LTI systems, Distortion less transmission through LTI system, Signal bandwidth, System bandwidth, Ideal LP, HPF and BPF characteristics, Causality and Physical realizably-Paley-Wiener Criterion, Relationship between bandwidth and rise-time.

UNIT – V: Correlation of Continuous Time Signals

Cross correlation and auto correlation of Continuous time signals, Relation between Convolution and Correlation, Properties of Cross correlation and autocorrelation, Power density Spectrum, Relation between auto correlation function and energy/power spectral density function

UNIT – VI: Laplace Transform

Laplace transform of signals, Convergence of Laplace transform, Properties of ROC, Unilateral Laplace transform, Properties of Unilateral Laplace transform, Inversion of unilateral and Bilateral Laplace transform, Relationship between Laplace transform and Fourier transform.

Z-Transform: Z Transform of sequence, Properties of ROC, Properties of Z transform, Inverse Z transform: Long Division, residue, partial fraction and convolution methods, Relationship between S-plane and Z-plane.

Text Books:

1. Signals and Systems- A.V. Oppenheim, A.S. Willsky and S.H.Nawab, PHI, 2nd Edn.
2. Signals and Systems- Narayan Iyer and K Satya Prasad, Cenage Pub

Reference Books:

1. Signals, Systems &Communications- B.P.Lathi, BS Publications, 2003.
2. Signals &Systems- Simon Haykin and Van Veen, Wiley, 2nd edition.
3. Signals and Systems- K.R.Rajeswari, B.V.Rao, PHI 2009.

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PULSE AND INTEGRATED CIRCUITS

III Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To familiarize with the characteristics of linear and non- linear wave shaping circuits for various inputs.
- To familiarize with the operation and characteristics of multivibrators.
- To familiarize with the functioning of Op-amp and data converters.

Learning Outcomes:

Students will be able to

- design different RC differentiator and integrator circuits.
- design non-linear waveshaping circuits.
- Analyze the characteristics of op-amps.
- Understand A to D and D to A Conversion techniques

UNIT – I: Linear Wave Shaping

Response of High pass and Low pass RC Circuits for sine, step, pulse and square wave inputs. High pass RC circuit as a differentiator, low pass RC circuit as an integrator.

UNIT – II: Non–Linear Wave Shaping

Clipping circuits, Diode clippers, the transistor clipper, clipping at two independent levels, comparators. The clamping operation, clamping circuits taking source and diode resistances into account, clamping circuit theorem, practical clamping circuits.

UNIT – III: Multivibrators

The Stable states of a binary, fixed bias transistor binary, self biased transistor binary, commutating capacitors,Schmitt trigger circuit.The monostable multivibrator, gate width and wave forms of a collector-coupled monostable multivibrator, triggering of the monostable multivibrator, the astable collector-coupled multivibrator.

UNIT – IV: Operational Amplifier

The Operational Amplifier- Block Diagram, Schematic symbol, Equivalent circuit, ideal and practical Op-amp specifications, DC and AC characteristics, compensation techniques, IC 741-Pin diagram, Specifications, Electrical Characteristics.

UNIT – V: Applications Of Op- Amp

inverting and non-inverting amplifier, integrator and differentiator, difference amplifier, v to i, i to v converters. instrumentation amplifier, log and anti log amplifiers, precision rectifiers, comparator, schmitt trigger, triangular wave generator.

UNIT – VI: D To A and A To D Converters

Need for Analog to Digital and Digital to Analog conversion, Basic DAC techniques-Weighted Resistor DAC, R-2R Ladder DAC and Inverted R-2R Ladder DAC;Direct Type ADCs – The parallel comparator (FLASH) type ADC, The Counter type ADC, The successive approximation ADC, Indirect Type ADCs- The Dual-Slope ADC.

Text books:

1. Jacob Millman and Herbert Taub, "Pulse, Digital and Switching Waveforms", TMH1st Edition. (Units-I to III).
2. OP-Amps & Linear ICs - Ramakanth A. Gayakwad, PHI, 1987. (Units – IV to VI).

Reference books:

1. "Fundamentals of Pulse and Digital circuits", Ronald J.Tocci, PHI 3rd Edition.
2. Linear Integrated Circuits – D. Roy Chowdhury, New Age International (p) Ltd, 2nd Edition,2003.

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ELECTRICAL MACHINES – III

III Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To familiarize the students with constructional details, working principles, and starting methods of synchronous machines.
- To impart knowledge on various methods used to determine the voltage regulation of alternators.
- To expose students to the practical problems associated with the operation of synchronous machines and identify the remedial measures required to overcome them.

Learning Outcomes:

Students will be able to:

- describe the constructional details, working principles characteristics of Synchronous machines.
- demonstrate the knowledge and understanding on various types of AC armature windings and the effect of winding factor on emf generated.
- determine the voltage regulation of alternators by various graphical methods with the data obtained experimentally.
- analyze the performance and operational related problems associated with the synchronous machines and suggest the methods to overcome them.
- determine the variation of current and power factor for various excitations.
- select an appropriate A.C.machine to meet specified performance requirements for a particular application.

UNIT – I: Construction & Operation of Synchronous Machines

Constructional Features - Distributed and Concentrated windings - Full pitch and Short pitch windings - Distribution, pitch and winding factors - E.M.F Equation - Harmonics in generated e.m.f. - suppression of harmonics –

UNIT – II: Synchronous Machine characteristics

Armature reaction – load characteristics- leakage reactance - synchronous impedance - short circuit ratio, Phasor diagrams-Voltage regulation of non-salient pole machines by synchronous impedance method

UNIT – III: Voltage Regulation of Alternators

Magneto Motive Force method, Zero Power Factor method–Two reaction theory – Experimental determination of x_d and x_q (Slip test).

UNIT – IV: Parallel Operation of Alternators

Synchronization – Methods of synchronizing alternators with infinite bus bars - synchronizing power- synchronizing torque - parallel operation and load sharing - Effect of change of excitation and mechanical power input.

UNIT – V:Synchronous Motors

Principle of operation - phasor diagrams - Variation of current and power factor with excitation – Excitation and power circles –synchronous condensers -hunting and its suppression - Methods of starting.

UNIT – VI: Introduction to Special Machines

A.C. series motor – Universal Motor - Reluctance Motor.

Text Books:

1. Electrical machines – P.S. Bhimbra, Khanna Publishers, 7th Edition, 2007.
2. Electrical Machines - D P.Kothari & I.J.Nagarth, TMH, 4th Edition, 2010.
3. Performance and Design of Alternating Current Machines – M.G. Say, John Wiley and Sons Publications, 3rd Edition, 1983.

Reference Books:

1. Electrical Machinery – S.K. Bhattacharya, TMH, 3rd Edition, 2009.
2. Electrical Machines - J.B.Gupta, S.K.Kataria & Sons.
3. Problems in Electrical Engineering – Parker Smith, CBS Publishers, 9th edition, 1984.
4. Theory of Alternating Current Machinery- Langsdorf, TMH

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POWER ELECTRONICS

III Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To introduce the basic concepts of operation, control and design of various power electronic converters.
- To develop an understanding of the switching behavior and design of power electronics circuits such as DC/DC, AC/DC, DC/AC and AC/AC converters

Learning Outcomes:

Students will be able to

- describe the characteristics of power semiconductor devices and select a suitable switch for a given application.
- analyze controlled and uncontrolled single- and three-phase converter.
- describe the operation of A C voltage controllers and cycloconverters.
- analyze dc-ac converters, and use of pulse-width modulation techniques.
- describe the role of power electronics in power systems and drives and select a suitable converter for a given application.
- model, Design, build and test a simple power electronic circuit in lab environment.

UNIT – I: Power Semi Conductor Devices

Thyristors – Silicon Controlled Rectifiers (SCR's) – Power MOSFET – Power IGBT and their characteristics – Basic theory of operation of SCR ,Turn on methods– Static characteristics, Dynamic characteristics of SCR – SCR firing circuit, Series and parallel connections of SCR's– Snubber circuits– Specifications and Ratings of SCR's – Numerical problems –

UNIT – II: Single Phase Converters

Phase control technique – Single phase half wave converter with Resistive, RL loads and RLE load– Derivation of average load voltage and current. Half control converters with R and RL loads.

Fully controlled converters: Midpoint and Bridge connections with Resistive, RL loads and RLE load without and with Freewheeling Diode – Derivation of average load voltage and current, Effect of source inductance.

UNIT – III: Three Phase Converters

Three phase converters – Three pulse and six pulse converters – Mid-point and bridge connections -average load voltage with R and RL loads – Effect of Source inductance–Dual converters (both single phase and three phase).

UNIT – IV: AC Voltage Controllers & Cyclo Converters

Single phase AC voltage controllers –two SCR's in anti parallel – With R and RL loads – modes of operation of Triac – Derivation of RMS load voltage,current and power factor – Numerical problems.

Cyclo converters: Single phase mid-point cyclo converters with Resistive and inductive load (Principle of operation only) – Bridge configuration of single phase cyclo converter (Principle of operation only).

UNIT – V: Choppers and Commutation Circuits

Choppers – Forced commutation circuits ,Time ratio control and Current limit control strategies – Step down choppers, Derivation of load voltage and currents with R, RL and RLE loads- Step up Chopper – load voltage expression.

UNIT – VI: Inverters

Single phase inverter – Basic series inverter – Basic parallel Capacitor inverter - bridge inverter– Waveforms – Voltage control techniques for inverters, three phase –120^{o} and 180^{0} modes of operation

Text Books:

1. Power Electronics – by P.S.Bhimbra, Khanna Publishers.
2. Power Electronics : Circuits, Devices and Applications – by M. H. Rashid, Prentice Hall of India, 2nd edition, 1998.
3. Power Electronics: converters, applications & design by Nedmohan, Tore M. Undeland,Riobbins by Wiley India Pvt. Ltd.

Reference Books:

1. Power Electronics – by Vedam Subramanyam, New Age International (P) Limited, Publishers.
2. Power Electronics - by V.R.Murthy , 1st edition -2005, OXFORD University Press.
3. Power Electronics-by P.C.Sen,Tata Mc Graw-Hill Publishing.
4. Thyristorised Power Controllers – by G. K. Dubey, S. R. Doradra, A. Joshi and R. M. K.Sinha, New Age International (P) Limited Publishers, 1996.

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Open Elective - I

REMOTE SENSING AND GIS TECHNIQUES

III Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course objectives:

- To introduce the students to the basic concepts and principles of various components of remote sensin.
- To provide an exposure to GIS and its practical applications in civil engineering.
- To demonstrate the process of remote sensing and theories related to EMR.
- To establish the interpretation of spatial data in various platforms.

Learning Outcomes:

Students will be able to

- identify various satellites, which are advantage for managing the resources available on earth.
- develop thematic maps with the help of raster and vector data.
- employ the analysis and interpretation techniques in the data models.
- apply the strategies of GIS in land information highway system.

UNIT – I: EMR and Its Interaction with Atmosphere & Earth Material

Definition of remote sensing and its components – Electromagnetic spectrum – wavelength regions important to remote sensing – Wave theory, Particle theory, Stefan-Boltzmann and Wien's Displacement Law – Atmospheric scattering, absorption – Atmospheric windows – spectral signature concepts – typical spectral reflective characteristics of water, vegetation and soil.

UNIT – II: Platforms and Sensors

Types of platforms – orbit types, Sun-synchronous and Geosynchronous – Passive and Active sensors – resolution concept – Pay load description of important Earth Resources and Meteorological satellites – Airborne and spaceborne TIR and microwave sensors.

UNIT – III: Image Interpretation and Analysis

Types of Data Products – types of image interpretation – basic elements of image interpretation - visual interpretation keys – Digital Image Processing – Pre-processing – image enhancement techniques – multispectral image classification – Supervised and unsupervised.

UNIT – IV: Geographic Information System

Introduction – Maps – Definitions – Map projections – types of map projections – map analysis – GIS definition – basic components of GIS – standard GIS software's – Data type – Spatial and non-spatial (attribute) data – measurement scales – Data Base Management Systems(DBMS).

UNIT – V: Data Entry, Stprage amd Analysis

Data models – vector and raster data – data compression – data input by digitization and scanning – attribute data analysis – integrated data analysis – Modeling in GIS Highway alignment studies – Land Information System.

UNIT VI: RS and GIS Applications

Land cover and land use, agriculture, forestry, geology, geomorphology, urban applications, hydrology- flood zone delineation and mapping, groundwater prospects and recharge, reservoir storage estimation.

Text Books:

1. Remote sensing by Basudeb Bhatta, Oxford University Press.
2. Anji Reddy, M. (2001). Textbook of Remote Sensing and Geographical Information System. Second edn. BS Publications, Hyderabad.

Reference Books:

1. Remote sensing and its applications by LRA Narayana University Press 1999.
2. Basics of Remote Sensing & GIS by S.Kumar, Laxmi Publications.
3. Lo. C.P.and A.K.W.Yeung (2002). Concepts and Techniques of Geographic Information Systems. Prentice-Hall of India Pvt. Ltd., New Delhi. Pp:492.
4. Peter A.Burrough, Rachael A.McDonnell (2000). Principles of GIS. Oxford University Press.
5. Ian Heywood (2000). An Introduction to GIS. Pearson Education Asia

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Open Elective - I

ELEMENTS OF CIVIL ENGINEERING
(Other than CE)
III Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To understand different methods of surveying for various applications.
- To familiarize with various types of building materials, structures and transport systems.

Learning Outcomes:

Students will be able to

- carry out simple land survey and prepare maps showing the existing details.
- find out area of irregular shaped plane areas.
- understand building plan, elevation and section.
- get acquainted with construction materials and transportation systems

UNIT – I: Introduction

Introduction, history of the civil engineering, sub – disciplines of civil engineering.

UNIT – II: Surveying

Introduction, divisions of surveying, classification of surveying, principles of surveying. Linear measurements and errors–introduction, methods of linear measurements, chaining instruments, types of error and correction. Compass surveying – introduction, angular measurement using compass, whole circle bearing and reduced bearing, fore bearing and back bearing. Traverse surveying – introduction, chain and compass traversing, closing error and adjustments. Leveling – introduction, types of leveling instruments, dumpy level, adjustment of level, leveling staff.

UNIT – III: Building Materials and Construction

Materials: Introduction to construction materials like ferrous and non ferrous metals, alloys, Stones, Bricks, Lime, Cement, Timber, Sand, Aggregates, Mortar, Concrete and bitumen.**Construction:**Types of building, different loads considered in building design, types of foundation in building, other developments and constructions of buildings.

UNIT – IV: Fire and Earthquake Protection in Building

Introduction, fire protection in building, structural and architectural safety requirements of resistive structures, fire resistive properties of building materials,

fire exit requirements, force and acceleration on building due to earthquake, building response characteristics, building drift.

UNIT – V: Water Supply, Sanitary and Electrical Works in Building

Introduction, water supply system, water supply layout of a building, house drainage, traps, electrical works in building.

UNIT – VI: Highway Engineering

Introduction, historical background of road or highway, classification of roads, pavements and roads, traffic control mechanism.

Text Books:

1. Elements of Civil Engineering Author: Mimi Das Saikia, Bhargab Mohan Das and Madan Mohan Das Publisher: PHI Learning Private Limited New Delhi.
2. Elements of Civil Engineering Author: Dr. R.K. Jain and Dr. P.P. Lodha Publisher: McGraw Hill Education, India Pvt. Ltd.
3. Surveying Vol. I Author: Dr. B. C. Punmia, Ashokkumar Jain, Arunkumar Jain16th Edition Publisher: Laxmi Publication Delhi.
4. Building drawing Author: M.G.Shah, C.M.Kale and S.Y.Patki Publisher: Tata McGraw Hill.

Reference Books:

1. Surveying Theory and Practice (7th Edition) Author: James M Anderson and Edward M Mikhail Publisher: McGraw Hill Education, India Pvt. Ltd.
2. Surveying and Leveling Author: R. Subramanian Publisher: Oxford University.
3. Building drawing Author: M.G.Shah, C.M.Kale and S.Y.Patki Publisher: Tata McGraw Hill.
4. Civil Engg. Drawing Author: S. C. Rangwala Publisher: Charotar Pub. House Anand.

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Open Elective - I

MODELING AND SIMULATION OF ENGINEERING SYSTEMS

III Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To Familiarize with programming skills in Equation Solving Software.
- To build Graphic user interface.

Learning Outcomes:

Students will be able to

- develop a Model of a Physical System.
- develop a systematic method to simulate engineering system and asses its performance.

UNIT – I: **Variables, scripts, and operations**

Getting Started, Scripts, Making Variables, Manipulating Variables, Basic Plotting

UNIT – II: Visualization and programming

Functions, Flow Control, Line Plots, Image/Surface Plots, Vectorization

UNIT – III: Solving equations and curve fitting

Linear Algebra, Polynomials, Optimization, Differentiation/Integration, Differential Equations

UNIT – IV: Advanced methods

Probability and Statistics, Data Structures, Images and Animation, Debugging, Online Resources

UNIT – V: Symbolics, Simulink®, file I/O, building GUIs

Symbolic Math, Simulink, File I/O, Graphical User Interfaces

UNIT – VI:

Examples on statistics, optimization, plots

Text Books:

1. "Getting started with MATLAB" by Rudra pratap, Oxford University, 2002.
2. MATLAB and SIMULINK for Engineers by Agam Kumar Tyagi,OUP 2011

Reference Books:

1. Spencer, R.L. and Ware, M (2008), Introduction to MATLAB, Brigham Young Unviersity, available online, accessed, 7, 2008.
2. David F.Griffiths, October (2012) "An introduction to MATLAB" the Unviersity of Dundee, available online, Acessed, October 2012..

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Open Elective - I

RENEWABLE ENERGY SOURCES

III Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To study various types of non-conventional sources of energy and techniques used in exploiting solar, wind, tidal and geothermal sources of energy and bio-fuels.

Learning Outcomes:

Students will be able to

- analyze the significance of renewable energy.
- understand the principles of solar radiation and design the solar collectors.
- know the functioning of basic components of wind energy and understand the utilization of biomass in power generation.
- understand the working principles of geothermal, ocean, tidal and wave energy techniques.
- know the functioning of direct energy conversion techniques.

UNIT – I:

Introduction: Energy Sources and their availability, Role and potential of renewable source.

Principles of Solar Radiation: The solar constant, Solar Radiation outside the Earth's atmosphere, Solar Radiation at the Earth's surface, instruments for measuring solar radiation and sun shine, solar radiation data, solar radiation Geometry, solar radiation on titled surfaces with numerical problems.

UNIT – II:

Solar Energy Storage and Applications: Different methods, Sensible, latent heat and stratified storage, solar ponds. Solar Applications-solar heating/cooling technique, solar distillation, drying, photovoltaic energy conversion. Solar central power tower concept and solar Chimney

UNIT – III:

Wind Energy: Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria

Bio-Mass: Bio fuels, Methods for obtaining energy from Biomass, Anaerobic/ aerobic digestion, types of Bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I.C.Engine operation and economic aspects. Thermal gasification of Biomass.

UNIT – IV:

Geothermal Energy: Resources, types of wells, methods of harnessing the energy, potential in India.

Ocean Energy: OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles.

Tidal and wave energy: Potential and conversion techniques, Mini-hydel power plants and their economics.

UNIT – V:

Direct Energy Conversion: Need for DEC, limitations, principles of DEC. Thermo-electric Power – See-beck, Peltier, joule, Thomson effects, Thermo-electric Power generators, Figure of merit, Selection of materials, applications.

UNIT – VI:

MHD power Generation: Principles, dissociation and ionization, Hall Effect, magnetic flux, MHD accelerator, MHD Engine, power generation systems, electron gas dynamic conversion, economic aspects.

Fuel cells: Principles, faraday's law's, thermodynamic aspects, selection of fuels and operating conditions.

Text Books:

1. Tiwari and Ghosal, "Renewable energy resources", Narosa.
2. G.D. Rai, "Non-Conventional Energy Sources", Dhanpat Rai and Sons

Reference Books:

1. Twidell & Weir, "Renewable Energy Sources "
2. Sukhatme, "Solar Energy", Tata McGraw-Hill Education.
3. B.S Magal Frank Kreith & J.F Kreith, "Solar Power Engineering "
4. Frank Krieth & John F Kreider, "Principles of Solar Energy"

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Open Elective - I

ELEMENTS OF MECHANCIAL ENGINEERING
(Other than ME)
III Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objective:

- To familiarize with the basic principles of Mechanical Engineering required in various fields of engineering.

Learning Outcomes:

Students will be able to

- understand the fundamentals of mechanical systems.
- understand and appreciate significance of mechanical engineering in different fields of engineering.

UNIT – I: Simple stress and strains

Elasticity and plasticity – Types of stresses & strains–Hooke's law – stress – strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson's ratio & volumetric strain – Elastic Moduli & the relationship between them.

UNIT – II: Power Transmission Devices

Introduction to power transmission, belt, rope, chain and gear drives, couplings, clutches (Theoretical treatment only)

Power Transmission through Shafts: Introduction, Torsion of Circular Shafts, Torsion equation, Hollow Circular Shafts, Torsional Rigidity, Power Transmitted by the Shaft (simple Problems).

UNIT – III: Basic Manufacturing Methods

Principles of casting , green sand moulds , Advantages and applications of casting ; Principles of gas welding and arc welding, Soldering and Brazing ; Hot working – hot rolling , Cold working – cold rolling ;

UNIT – IV: Basics of Machine Tools and Engineering Materials

Basics of Machine Tools: Description of basic machine tools- Lathe – operations – turning, threading, taper turning and drilling ;

Engineering Materials : Classification of engineering material, Composition of cast iron and carbon steels on Iron-Carbon diagram and their mechanical properties. Alloy steels and their application

UNIT – V: IC Engines

Introduction , Main components of IC engines , working of 4-stroke petrol engine and diesel engine , working of 2- stroke petrol engine and diesel engine , differences between petrol and diesel engines, differences between 4- stroke and 2- stroke engines. (Theoretical treatment only)

Steam Boilers: Function, classification, differences between water and fire tube boilers, mountings and accessories with their functions, construction and working of cochran, vertical, Lancashire and Babcock & Wilcox boiler (Theoretical treatment only).

UNIT – VI:

Power Plants: Introduction, working principle of steam and gas turbine power plant, working of hydraulic turbines and pumps (Theoretical treatment only).

Refrigeration & Air conditioning: Definition – COP, Unit of Refrigeration, Applications of refrigeration system, vapour compression refrigeration system , simple layout of summer and winter air conditioning system (Theoretical treatment only).

Text Books:

1. Elements of Mechanical Engineering – R.K.Rajput, Lakmi Pub., Delhi.
2. Elements of Mechanical Engineering – D.S.Kumar, S.K. Kataria and Sons

Reference Books:

1. Elements of Mechanical Engineering – K.R.Golala Krishnan, S.Gopala Krishnana, S.C.Sharma, Subhas Stores.
2. Elements of Mechanical Engineering – S.Tryambaka Murthy, I.K. International publishing house pvt. Ltd.

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Open Elective - I

COMPUTER NETWORKS
(Other than CSE & IT)

III Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To familiarize with different transmission media.
- To gain knowledge of various protocols used for efficient transmission of data over network.

Learning Outcomes:

Students will be able to

- understand basic network topologies.
- choose appropriate transmission media for establishing a network.
- differentiate various data link layer protocols.
- choose appropriate routing algorithm suitable for the network for an organization.
- differentiate various transport layer protocols.
- analyze the type of network used in an organization.

UNIT – I: Introduction

OSI, TCP/IP, Examples of Networks: Novel Networks, Arpanet, Internet, Network Topologies, Classification of networks: LAN, MAN, WAN.

UNIT – II: Physical Layer

Transmission media- copper, twisted pair, wireless, switching and encoding asynchronous communications, Narrow band, broad band ISDN.

UNIT – III: Data link layer & Medium Access sub layer

Data link layer: Design issues, framing, error detection and correction, CRC, Elementary Protocol-stop and wait, Sliding Window, Data link layer in HDLC, Slip, and PPP.

Medium Access sub layer: ALOHA, Carrier sense multiple access. IEEE 802.x Standards, wireless LANs. Bridges

UNIT – IV: Network Layer

Virtual circuit and Datagram subnets, Routing algorithms- shortest path routing, Flooding, Hierarchical routing, Broad cast, Multi cast, distance vector routing, congestion control algorithms.

UNIT –V: Transport Layer

Transport Services, TCP, SCTP and UDP protocols.

UNIT – VI: Application Layer

Domain name system, SNMP, Electronic Mail, WWW

Text Books:

1. Computer Networks — Andrew S Tanenbaum, 4th Edition. Pearson Education/ PHI
2. Data Communications and Networking – Behrouz A. Forouzan.Third Edition TMH.

Refence Books:

1. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition, Pearson Education.
2. Understanding communications and Networks, 3rd Edition, W.A. Shay, Thomson.

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Open Elective - I

OBJECT ORIENTED PROGRAMMING
(Other than CSE & IT)
III Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To get acquainted with the concepts of object-oriented programming.
- To create GUI using AWT components

Learning Outcomes:

Students will be able to

- understand the programming constructs of JAVA.
- apply concepts of inheritance.
- implement interfaces and packages through JAVA.
- simulate the concept of multi threading.
- handle run time errors.
- design and implement an effective GUI for various applications.

UNIT – I: Fundamentals of OOP and Java

Need of OOP, Principles of OOP Languages, Procedural Languages vs OOP, Applications of OOP, History of JAVA, Java Virtual Machine, Java Features.

Java Programming constructs: variables, primitive data types, identifiers, keywords, literals, operators, arrays, type conversion and casting,

UNIT – II: Class Fundamentals and Inheritance

Class fundamentals, declaring objects, methods, constructors, this keyword, garbage collection, overloading methods and constructors, argument passing, recursion, access control.

Inheritance- Basics, types, using super keyword, method overriding, dynamic method dispatch, abstract classes, using final with inheritance, object class, string class.

UNIT – III: Interfaces and Packages

Interfaces: Defining an interface, implementing interfaces, nested interfaces, applying interfaces, variables in interfaces and extending interfaces.

Packages: Defining, creating and accessing a package.

UNIT – IV: Exception Handling and Multithreading

Exception Handling- exception-handling fundamentals, exception types, uncaught exceptions, using try and catch, multiple catch clauses, nested try statements, throw, throws, finally, java's built-in exceptions, user-defined exception sub classes.

MultiThreading- differences between multi threading and multitasking, thread life cycle, creating threads, synchronizing threads, daemon threads, thread groups.

UNIT – V: Applets and Event Handling

Applets- Concepts of Applets, differences between applets and applications, life cycle of an applet, creating applets.

Event Handling- Events, Event sources, Event classes, Event Listeners, Delegation event model, handling mouse and keyboard events, Adapter classes.

UNIT – VI: AWT

The AWT class hierarchy, user interface components- label, button, checkbox, checkboxgroup, choice, list, scrollbar, menubar, layout managers –Flow, Border, Grid, Card, GridBag.

Text Books:

1. Herbert schildt, Java The complete reference, TMH, 7th edition.
2. Sachin Malhotra, Saurabh choudhary, Programming in JAVA, Oxford.

Reference Books:

1. Joyce Farrel, Ankit R.Bhavsar, JAVA for Beginners, Cengage Learning, 4th edition.
2. Y.Daniel Liang, Introduction to Java Programming, Pearson, 7th edition.
3. P.Radha Krishna, Object Oriented Programming Through Java, Universities Press.

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Open Elective - I

DATA STRUCTURES USING C
(Other than EEE, ECE, CSE & IT)
III Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To gain knowledge of linear and non-linear data structures.
- To familiarize with different sorting and searching techniques.

Learning Outcomes:

Students will be able to

- implement single, circular and double linked list.
- implement stacks and queues using arrays and linked lists.
- implement various operations on binary trees.
- apply appropriate sorting and searching techniques for the given data.
- implement various operations on Graphs.

UNIT – I: Linked lists

Introduction- Concept of data structures, overview of data structures, implementation of data structures.

Linked Lists- Single linked list, Circularlinked list, Double linked list, Circular double linked list.

UNIT – II: Stacks

Representation using Arrays and Linked List, operations on stack, factorial calculation, evaluation of arithmetic expression.

UNIT – III: Queues

Representation using Arrays and Linked List, operations on queue, circular queue, queue using stack.

UNIT - IV: Trees

Binary Trees: Basic tree concepts, Properties, Representation of Binary Trees using Arrays and Linked List, Binary Tree Traversals, threaded binary tree.

Binary search trees: Basic concepts, BST operations: Search, insertion, deletion and traversals, Creation of binary search tree from in-order and pre (post)order traversals.

UNIT - V: Sorting and Searching

Searching: Linear Search, Binary Search, Fibonacci search.

Sorting (Internal): Basic concepts, Sorting by: insertion (Insertion sort), selection (selection sort), exchange (Bubble sort, quick sort), distribution (radix sort) and merging (merge sort).

UNIT - VI: Graphs

Basic concepts, representations of graphs, operations on graphs- vertex insertion, vertex deletion, find vertex, edge addition, edge deletion, graph traversals (BFS & DFS).

Text Books:

1. Debasis samanta, Classic Data Structures, PHI, 2nd edition, 2011.
2. Richard F, Gilberg , Forouzan, Data Structures, 2nd edition, , Cengage.

Reference Books:

1. Seymour Lipschutz, Data Structure with C, TMH.
2. G. A. V. Pai, Data Structures and Algorithms, TMH, 2008.
3. Horowitz, Sahni, Anderson Freed, Fundamentals of Data Structure in C, University Press, 2nd edition.

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Open Elective - I

CYBER LAWS

III Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To expose the need of cyber laws to prosecute cybercrimes in the society.
- To understand the IT ACT 2000 for Cyber Crime and Cyber Justice.
- To introduce the Criminal Activities based on Internet.
- To familiarize various Licensing Issues Authorities for Digital Signatures.

Learning Outcomes:

Students will be able to

- outline the pros and cons of Internet.
- operate on Confidential data in a precautious manner.
- demonstrate about the Criminal Justice in India and its Implications.
- define the Cyber Consumers under the consumer Protection Act.
- devise the legal framework for Confidential Information.
- outline e-commerce issue for copyright protection and Defend Personal Data from being hacked.

UNIT – I: The IT Act, 2000- A Ccritique

Crimes in this Millennium, Section 80 of the IT Act, 2000 – A Weapon or a Farce?, Forgetting the Line between Cognizable and Non - Cognizable Officers, Arrest for "About to Commit" an Offence Under the IT Act, A Tribute to Darco, Arrest But No Punishment.

UNIT – II: Cyber Crime and Criminal Justice

Penalties, Adjudication and Appeals Under the IT Act, 2000: Concept of Cyber Crime and the IT Act, 2000, Hacking, Teenage Web Vandals, Cyber fraud and Cyber Cheating, Virus on Internet Deformation, Harassment and E- mail Abuse

UNIT – III: Cyber Pornography

Cyber Pornography, Other IT Offences, Monetary Penalties, Adjudication and Appeals Under IT Act 2000, Network Service Providers, Jurisdiction and Cyber Crimes, Nature of Cyber Criminality Strategies to Tackle Cyber Crime and Trends, Criminal Justice in India and Implications.

UNIT – IV: Digital Signatures, Certifying Authorities and e-Governance

Introduction to Digital Signatures, Certifying Authorities and Liability in the Event of Digital Signature compromise, E - Governance in the India. A Warming to

Babudom, Are Cyber Consumers Covered under the Consumer Protection, Goods and Services, Consumer Complaint Defect in Goods and Deficiency in Services Restrictive and Unfair Trade Practices

UNIT – V: Traditional Computer Crime

Early Hacker and Theft of Components Traditional problems, Recognizing and Defining Computer Crime, Phreakers: Yesterday's Hackers, Hacking, Computers as Commodities, Theft of intellectual Property

UNIT – VI: Web Based Criminal Activity

Interference with Lawful Use of Computers, Malware, DoS (Denial of Service) and DDoS (Distributed Denial of Service) Attacks, Spam ,Ransomware and Kidnapping of Information, Theft of Information, Data Manipulation, and Web Encroachment Online Gambling Online Fraud, Securities Fraud and stock Manipulation, Ancillary crimes

Text Books:

1. Vivek Sood, " Cyber Law Simplefied", Tata McGraw Hill.
2. Marjie T. Britz, "Computer Forensics and Cyber Crime", Pearson

Reference Book:

1. Cyber Laws Texts and Cases, Ferrera, CENGAGE.

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Open Elective - I

OPEN SOURCE SOFTWARE

III Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To understand the opportunities for open source software in the global market.
- To familiarize the different steps in implementing the open source.

Learning Outcomes:

Students will be able to

- analyze the open source software need and applications.
- explain LINUX operating systems concepts.
- work with MySQL database.
- design and develop a web application using PHP.

UNIT – I: Introduction

Introduction to Open sources – Need of Open Sources – Advantages of Open Sources–Application of Open Sources.

UNIT – II: LINUX

LINUX Introduction – General Overview – Kernel Mode and user mode , Process – Advanced Concepts – Scheduling – Personalities – Cloning – Signals – Development with Linux.

UNIT – III: Introduction to MySQL

MySQL: Introduction – Setting up account – Starting, terminating and writing your own SQL programs – Record selection Technology – Working with strings – Date and Time

UNIT – IV: Working with MySQL

Sorting Query Results – Generating Summary – Working with metadata – Using sequences – MySQL and Web.

UNIT – V: Open Source Programming Languages

PHP- Introduction – Programming in web environment – variables – constants – data types – operators – Statements – Functions – Arrays – OOP – String Manipulation and regular expression – File handling and data storage

UNIT – VI: PHP and SQL

PHP and SQL database –PHP and LDAP – PHP Connectivity – Sending and receiving E-mails –Debugging and error handling – Security – Templates.

Text Books:

1. Remy Card, Eric Dumas and Frank Mevel, “The Linux Kernel Book”, Wiley Publications,2003.
2. Steve Suchring, “MySQL Bible”, John Wiley, 2002

Reference Books:

1. Rasmus Lerdorf and Levin Tatroe, “Programming PHP”, O’Reilly, 2002.
1. Steven Holzner, “PHP: The Complete Reference”, 2nd Edition, Tata McGraw-Hill Publishing Company Limited, Indian Reprint 2009.
3. Vikram Vaswani, “MYSQL: The Complete Reference”, 2nd Edition, Tata McGraw –Hill Publishing Company Limited, Indian Reprint 2009.

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Open Elective - I

FUNDAMENTALS OF DATA BASE MANAGEMENT SYSTEMS
(Other than CSE & IT)

III Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives

- To introduce the database management systems and applications, Database System Architectures.
- To expose E- R Modeling and Design.
- To explain Relational Data Model and Relational Algebra.
- To demonstrate Structured Query Language and apply different operations on Database.
- To explain Transaction management.

Learning Outcomes:

Students will be able to

- develop Conceptual(ER- modeling) and Logical models specified requirements of data base.
- describe the basics of SQL. Can construct tables and answer queries using SQL.
- perform Schema refinement.
- interpret the basic issues of transaction processing.

UNIT – I: Introduction to Data Base

Purpose of Database Systems Vs File System, Data Models, Schema and instances, DBMS Architecture, E- R Model- Attributes and Keys, Relationship Types, Weak Entity set, Strong Entity Set.
(Practice: Execute DDL, DML, DCL and TCL Commands.)

UNIT – II: Enhanced E–R Modeling

Specialization and Generalization, Database design for Banking Enterprise, Relational model concepts, constraints.
(Practice:. Execute basic SELECT operations.)

UNIT – III:SQL

DDL, DML, DCL, Set operations, Aggregate Functions, Null values, Nested queries. Defining different constraints on a table, apply joins on tables, Creating Views and Indices.
(Practice: Execute a single line and group functions for a table, set operations on various Relations.)

UNIT – IV: Database Bottom Up Design

Functional Dependencies and Normalization for Relational Databases: Informal design guidelines for relation schemes, Functional dependencies,
(Practice: Execute Orderby, Groupby clause on various Relations)

UNIT – V: Normal forms

First, second and third normal forms, Boyce- Cod normal form, Multi valued & Join Dependencies, 4th & 5th Normal forms.
(Practice: Implement the following Integrity Constraints
a. Primary Key b. Foreign Key c. Unique d. Not NULL and Check.)

UNIT – VI: Transaction Management

Transaction concept, ACID properties, Concurrent execution of transactions
(Practice: Execute Nested Queries)

Text Books

1. Korth & Sudarshan *Database system concept*, TMH.
2. Raghu Ramakrishnan, Johannes Gehrke *Database Management Systems,* TMH

Reference Books

1. Peter Rob & C Coronel *Database Systems design, Implementation, and Management*, 7th Edition.
2. Elmasri Navrate *Fundamentals of Database Systems* , Pearson Education.
3. C.J.Date *Introduction to Database Systems,* Pearson Education.

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Open Elective - I

FUZZY MATHEMATICS

III Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To know the fundamentals of fuzzy algebra.
- To know the basic definitions of fuzzy theory.
- To know the applications of fuzzy Technology.

Learning Outcomes:

Students will be able to

- understand the fundamentals of fuzzy algebra.
- apply fuzzy logic.

UNIT – I:

Introduction – Fuzzy subsets – Lattices and Boolean Algebras – L fuzzy sets.

UNIT – II:

Operations on fuzzy - α levels sets – properties of fuzzy subsets of a set. Sections 1.1-1.10.

UNIT – III:

Algebraic product and sum of two fuzzy subsets – properties satisfied by addition and product – Cartesian product of fuzzy subsets. Sections 1.11 -1.13.

UNIT – IV:

Introduction – Algebra of fuzzy relations – logic – connectives. Sections 2.1-2.4.

UNIT – V:

Some more connectives – introduction – fuzzy subgroup – homomorphic image and Pre-image of subgroupoid. Sections 2.5,3.1-3.3.

UNIT – VI:

Fuzzy invariant subgroups - fuzzy subrings. Section 3.4 and 3.5.

Text Books:

1. Recommended Text S.Nanda and N.R.Das "Fuzzy Mathematical concepts, Narosa Publishing House, New Delhi.

Reference Books:

1. Fuzzy Logic with Engineering Applications, Second Edition, Wiley Publications, Timothy J.Ross.
2. Fuzzy Set Theory and Its Applications, Fourth Edition,Yes Dee Publishing Pvt. Ltd., Springer, H.-J. Zimmermann.

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ELECTRICAL MEASUREMENTS & INSTRUMENTATION LAB

III Year – I Semester

Practical	: 3	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To know the need of measuring various electrical quantities, to measure various circuit elements.
- To understand the working & construction of various electrical measuring instruments.

Learning Outcomes:

Students will be able to

- identify the measuring instruments used for measuring electrical quantities.
- select appropriate measuring instrument with range for measurement of various electrical quantities.
- select appropriate instrument for measurement of power, energy.
- calibrate Ammeter, Votmeter.
- select appropriate Transducer for the measurement of strain.
- measure the Inductance and Capacitance values

PART – A

Any five experiments from the following list

1. Calibration and Testing of single phase energy Meter
2. Calibration of dynamometer power factor meter.
3. Crompton D.C. Potentiometer – Calibration of PMMC ammeter and PMMC voltmeter.
4. Capacitance Measurement using Schering bridge.
5. Inductance Measurement using Anderson bridge.
6. Measurement of parameters of a choke coil using 3 voltmeter and 3 ammeter methods.

PART – B

Any five experiments from the following list

1. Measurement of 3 phases reactive power with single-phase wattmeter for balanced loading.
2. Calibration LPF wattmeter – by Phantom testing.
3. Dielectric oil testing using H.T. testing Kit.
4. LVDT– characteristics and Calibration.
5. Resistance strain gauge – strain measurement and Calibration.
6. Kelvin's double Bridge – Measurement of low resistance.

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CONTROL SYSTEMS LAB

III Year – I Semester

Practical	: 3	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To introduce the principles and applications of control systems in everyday life.
- To understand the basics of block diagram reductions, time domain analysis solutions to time invariant systems.
- To familiarize the students on finding stability of control systems using time and frequency domain techniques
- To expose students to MATLAB software to solve the linear control systems concepts in time and frequency domains.

Learning Outcomes:

Students will be able to

- prepare laboratory reports that clearly communicate experimental information in a logical and scientific manner.
- apply the knowledge of various controlling techniques to develop suitable controller to meet specific requirements.
- analyze lead-lag, lag, lead compensators.
- analyze and design the various time and frequency domain specifications.
- verify the Boolean expressions using Programmable Logic Controller

List of Experiments

Any Eight experiments from the following list are required to be conducted.

1. Time response of Second order system.
2. Effect of feedback on DC servo motor.
3. Characteristics of Synchros.
4. Effect of P, PD, PI, PID Controller on a second order systems.
5. Programmable logic controller – Study and Verification of truth Tables of logic gates, simple Boolean expressions and application of speed control of motor.
6. Temperature controller using PID
7. Lag and lead compensation – Magnitude and phase plot.
8. Characteristics of magnetic amplifiers.
9. Characteristics of AC servo motor.
10. Transfer function of DC Motor.
11. Transfer function of DC generator.
12. Transfer function of Operational Amplifier.

In addition to the above eight experiments, at least any two of the experiments from the following list are required to be conducted.

13. Stability Analysis (Root locus, Bode, Nyquist) of Linear Time Invariant System
14. State space model for classical transfer functions using MATLAB–Verification.
15. Traffic Light Control System
16. Analysis of time response of series RLC circuit.

POWER SEMICONDUCTOR DRIVES

III Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To introduce the principle and working of speed control of DC motor by using single phase and Three- phase full controlled and half controlled rectifier.
- To familiarize the students with the Four-quadrant operation of DC motor and electric braking.
- To develop and understanding of various Chopper controlled DC drives.
- To familiarize the students with the speed control of Induction motor from stator and rotor side.
- To develop and understanding the principle of speed control of Synchronous motor.

Learning Outcomes:

Students will be able to

- select an appropriate speed control for dc drive to meet the requirements of application in Industry.
- describe and determine the operational characteristics of DC drive in all four quadrants.
- demonstrate the knowledge and understanding the concepts of Chopper controlled DC drives.
- select an appropriate speed control for Induction motor drive to meet the requirements of application in Industry.
- provide valid conclusions on static Scherbious and Kramers drives.
- select an appropriate speed control for Synchronous motor drive to meet the requirements of application in Industry.

UNIT – I: Control of DC motors by Single phase and Three Phase Converters

Introduction to Thyristor controlled Drives, Single Phase semi and Fully controlled converters connected to d.c separately excited and d.c series motors – continuous current operation – output voltage and current waveforms – Speed and Torque expressions – Speed – Torque Characteristics- Problems on Converter fed d.c motors.

Three phase semi and fully controlled converters connected to d.c separately excited and d.c series motors – output voltage and current waveforms – Speed and Torque expressions – Speed – Torque characteristics – Problems.

UNIT – II: Four Quadrant operation of DC Drives

Introduction to Four quadrant operation – Motoring operations, Electric Braking – Plugging, Dynamic and Regenerative Braking operations. Four quadrant operation

of D.C motors by dual converters – Closed loop operation of DC motor (Block Diagram Only).

UNIT – III: Control of DC motors by Choppers

Single quadrant, Two –quadrant and four quadrant chopper fed dc separately excited and series excited motors – Continuos current operation – Output voltage and current wave forms – Speed torque expressions – speed torque characteristics – Problems on Chopper fed d.c Motors – Closed Loop operation (Block Diagram Only).

UNIT – IV: Control of Induction Motor from stator side

Variable voltage characteristics-Control of Induction Motor by Ac Voltage Controllers – Waveforms –speed torque characteristics. Variable frequency characteristics-Variable frequency control of induction motor by Voltage source Inverter- PWM control–Speed torque characteristics – numerical problems on induction motor drives – Closed loop operation ofinduction motor drives (Block Diagram Only)

UNIT – V: Control of Induction motor of Rotor side

Static rotor resistance control – Slip power recovery – Static Scherbius drive – Static Kramer Drive – their performance and speed torque characteristics – advantages applications – problems.

UNIT – VI: Control of Synchronous Motors

Separate control & self control of synchronous motors – Operation of self controlled synchronous motors by VSI – Operation – Waveforms – speed torque characteristics – Applications – Advantages and Numerical Problems – Closed Loop control operation of synchronous motor drives (Block Diagram Only), variable frequency control.

Text Books:

1. Fundamentals of Electric Drives – by G K Dubey Narosa Publications.
2. Power Electronic Circuits, Devices and applications by M.H.Rashid, PHI.

Reference Books:

1. Power Electronics – MD Singh and K B Khanchandani, Tata – McGraw-Hill Publishing company,1998.
2. Modern Power Electronics and AC Drives by B.K.Bose, PHI.
3. Thyristor Control of Electric drives – Vedam Subramanyam Tata McGraw Hill Publilcations.
4. A First course on Electrical Drives – S K Pillai New Age International(P) Ltd. 2nd Editon.

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MICROPROCESSORS AND MICROCONTROLLERS

III Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To familiarize the students with architecture of 8086 microprocessor and 8051 microcontroller.
- To introduce the assembly language programming concepts of 8086 processor
- To expose the students to various interfacing devices with 8086 using 8255.
- To introduce the concepts of interrupt mechanism and serial communication standards.

Learning Outcomes:

Students will be able to

- understand the architecture and instruction set of 8086 microprocessor and 8051 micro controller.
- design and develop various interfacing circuits with 8086 using 8255.
- understand the concepts of interrupt mechanism and serial communication. Develop 8051 based different kinds of applications.

UNIT – I: **8086 Microprocessor**

Introduction 8086 Processor, Architecture-Functional diagram, Register Organization, Memory Segmentation, Physical memory organization, signal descriptions of 8086- common function signals, Minimum and Maximum mode signals, Timing diagrams.

UNIT – II: **Instruction Set And Assembly Language Programming OF8086**

Instruction formats, addressing modes, instruction set, assembler directives, macros, simple programs involving logical, branch and call instructions, sorting, evaluating arithmetic expressions, string manipulations.

UNIT – III: **Basic Peripherals And Their Interfacing**

8255 PPI various modes of operation and interfacing to 8086. Interfacing keyboard, display, stepper motor interfacing, D/A and A/D converter, Keyboard/Display Controller-8279,

Memory interfacing to 8086, Interfacing DMA controller 8257 to 8086

UNIT – IV: **Interrupt Structure & Serial Communication**

Interrupt structure of 8086, Vector interrupt table, Interrupt service routine, Interfacing Interrupt Controller 8259, Serial communication standards, Serial data transfer schemes,8251 USART architecture and interfacing, RS- 232, IEEE-4-88, Prototyping and trouble shooting.

UNIT – V: **Introduction To 8051 Microcontroller**

Overview of 8051 microcontroller, Architecture, I/O Ports, Memory organization, addressing modes and instruction set of 8051, Interrupts, timer/ Counter and serial communication.

UNIT – VI: **Interfacing And Applications of 8051**

Interfacing 8051 to LED's, Push button, Relays and latch Connections, Keyboard Interfacing, Interfacing Seven segment display, ADC and DAC Interfacing

Text Books:

1. D. V. Hall. Microprocessors and Interfacing, TMGH.2'1 edition 2006.
2. Kenneth. J. Ayala. The 8051 microcontroller, 3rd edition, Cengage learning, 2010.

Reference Books:

1. The Intel Microprocessors – Barry B.Brey, PHI, 7th edition 2006.
2. The 8051 Microcontrollers and Embedded Systems-Muhammad Ali Mazidi, Janice Gillispie Mazidi and Rolin D. McKinlay, Pearson, 2nd Ed.
3. Micro Computer System 8086/8088 Family Architecture. Programming and Design - By Liu and GA Gibson, PHI, 2nd Ed.,
4. Microcontrollers and application, Ajay. V. Deshmukh, TMGH 2005\

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SWITCHGEAR AND PROTECTION

III Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To analyze the behavior of travelling wave at various terminal equipments.
- To understand the operating principals of various Electromagnetic and induction relays.
- To Design a suitable protection schemes for Alternators, Busbars and Transformers

Learning Outcomes:

Students will be able to

- apply the knowledge of travelleing waves in selecting a suitable circuit breaker for a specified application.
- understand the operating principals of various Electromagnetic and induction relays.
- design a suitable protection schemes for Alternator, Transformer and Busbars
- identify the causes of faults in power system.
- design the suitable tests and carry analysis on performance of a protecting devices.
- demonstrate various grounding practices and identify their relative merits and demerits

UNIT – I: Travelling Waves

Types of System Transients - Travelling or Propagation of Surges - Attenuation, Distortion, Reflection and Refraction Coefficients - Termination of lines with different types of conditions - Open Circuited Line, Short Circuited Line, T-Junction, Lumped Reactive Junctions (Numerical Problems). Bewley's Lattice Diagrams (for all the cases mentioned with numerical examples).

UNIT – II: Circuit Breakers

Circuit Breakers: Elementary principles of arc interruption, Recovery, Restriking Voltage and Recovery voltages.- Restriking Phenomenon, Average and Max. RRRV, Numerical Problems - Current Chopping and Resistance Switching - CB ratings and Specifications : Types and Numerical Problems. – Auto reclosures. Description and Operation of following types of circuit breakers: Minimum Oil Circuit breakers, Air Blast Circuit Breakers, Vacuum and SF6 circuit breakers

UNIT – III: Electromagnetic and Static Relays

Principle of Operation and Construction of Attracted armature, Balanced Beam, induction Disc and Induction Cup relays.Relays Classification: Instantaneous, DMT and IDMT types.

Application of relays: Over current/ Under voltage relays, Direction relays, Differential Relays and Percentage Differential Relays.Universal torque equation, Distance relays: Impedance, Reactance and Mho and Off-Set Mho relays,Characteristics of Distance Relays and Comparison.

Static Relays: Static Relays verses Electromagnetic Relays.

UNIT – IV: Generator & Transformer Protection

Protection of generators against Stator faults, Rotor faults, and Abnormal Conditions. Restricted Earth fault and Inter-turn fault Protection. Numerical Problems on % Winding Unprotected.

Protection of transformers: Percentage Differential Protection, Numerical Problem on Design of CT s Ratio, Buchholtz relay Protection

UNIT – V: Feeder and Bus-Bar Protection

Protection of Lines: Over Current, Carrier Current and Three-zone distance relay protection using Impedance relays. Translay Relay. Protection of Bus bars – Differential protection.

UNIT – VI: Neutral Grounding and Protection against over voltages

Grounded and Ungrounded Neutral Systems.- Effects of Ungrounded Neutral on system performance. Methods of Neutral Grounding: Solid, Resistance, Reactance - Arcing Grounds and Grounding Practices. Generation of Over Voltages in Power Systems.-Protection against Lightning Over Voltages - Valve typeand Zinc-Oxide Lighting Arresters - Insulation Coordination -BIL, Impulse Ratio, Standard Impulse Test Wave, Volt-Time Characteristics

Text Books:

1. Electrical Power Systems – by C.L.Wadhwa, New Age international (P) Limited, Publishers, 3rd editon.
2. Power System Engineering by B.L.Soni, Gupta, Bhatnagar, Chakrabarthy, Dhanpat Rai & Co.
3. Switchgear Protection And Power Systems by Sunil S. Rao, Khanna Publishers, 2008 edition.

Reference Books:

1. Fundamentals of Power System Protection by Paithankar and S.R.Bhide.,PHI, 2003.
2. Art & Science of Protective Relaying – by C R Mason, Wiley Eastern Ltd.

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Elective - I

OPTIMIZATION TECHNIQUES

III Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To introduce the concepts of optimization techniques.
- To familiarize the students with linear and non-linear programming , linear and non-linear optimization & decisions–making strategies for an existing system.

Learning Outcomes:

Students will be able to

- apply the knowledge of Mathematics and physical science in analyzing and developing the concepts of Linear Programming Problem to Engineering Problems.
- describe Graphical Interpretation to formulate a model for various physical systems.
- determine the space computation for a given system.
- select an effective decision–making strategy for a given system.
- perform review analysis and synthesis to select a suitable method in optimizing a given engineering problem.
- apply CPM and PERT for optimizing social problems.

UNIT – I: Linear Programming.

Standard form of linear programming problem, Geometry of L.P.P., Graphical solution.

UNIT – II: Linear Optimization

Simplex algorithm, simplex methods, Big-M method, Two phase Simplex method, duality in optimization, duals of linear and quadratic programming problems.

UNIT – III: Non Linear Programming

Single-Dimensional minimization methods: unimodal function, three interval search method, Fibonacci method, and Golden mean search method.

UNIT – IV: Nonlinear Optimization

Necessary and sufficient conditions for optima, Kuhn-Tucker conditions, penalty and barrier function methods.

UNIT – V: Probability Optimization and Review

Conditional probability, Discrete and continuous distributions, Expectation and variance, Sums of random variables, Exponential and normal distributions

UNIT – VI: CPM and PERT:

Basic Terminology, Network representation of project, critical path-The PERT method, Optimum scheduling by CPM, LP formulation of CPM-PERT problems.

Text Books:

1. S.S. Rao - "Optimization Theory and Applications", Wiley Eastern Limited, New Delhi, 1991.
2. Schaum's Series – "Operation Research", Tata Mcgraw Hill. 1997

Reference Books:

1. Operation Research-S.Kalavathi.
2. Operations Research: Applications and Algorithms,Wayne L Winston.
3. Taha, Hamdy, Operations Research, 7th edition, (USA: Macmillan Publishing Company), 2003.
4. J K Sharma, Operations Research Theory & Applications , Macmillan India Ltd, 2007.
5. P. K. Gupta and D. S. Hira, Operations Research, S. Chand & co., 2007.
6. N.V.S. Raju, Operations Research, HI-TECH, 2002

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Elective - I

ADVANCED CONTROL SYSTEMS

III Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To understand the implementation of compensators in frequency domain.
- To gain knowledge on different types of state variable forms for the LTI and LTV systems.
- To familiarize the students on various components of nonlinear control systems.
- To familiarize the students on the construction of Lyapanov function and to determine the stability of a nonlinear system.
- To understand the design of state feedback controllers.

Learning Outcomes:

Studeants will be able to

- describe the fundamental principles of control systems and design a compensator for continuous time systems.
- apply the concepts of controllability and observability in evaluating the performance of control system.
- apply the fundamental principles of nonlinearities to a nonlinear system.
- determine the stability of a given nonlinear system.
- design an appropriate feedback controller and implement an observer to estimate unmeasured states of physical plants.
- apply the knowledge of mathematics for formation of an optimal control problem and to suggest solution for it.

UNIT – I: Classical Control Design Techniques

Compensation techniques – lag, lead, lag-lead controllers design in frequency domain, PID controller tuning using Z-N method.

UNIT – II: Concept of Controllability and Observability

Controllable Canonical Form, Observable Canonical Form, Jordan Canonical Form. Tests for controllability and observability for continuous time systems – Time varying case, time invariant case, Principle of Duality, Controllability and observability form Jordan canonical form and other canonical forms.

UNIT – III: Describing Function Analysis

Introduction to nonlinear systems, Types of nonlinearities, describing functions, describing function analysis of nonlinear control systems.

UNIT IV: Stability Analysis Stability in the sense of Lyapunov's Lyapunov's stability and Lypanov's instability theorems. Direct method of Lypanov's for the Linear and Nonlinear continuous time autonomous systems.

UNIT – V: Modal Control

Effect of state feedback on controllability and observability, Design of State Feedback Control through Pole placement. Full order observer and reduced order observer.

UNIT – VI: Optimal Control

Formation of optimal control problem – minimum time, minimum energy, minimum fuel problems. State regulator problem. Output regulator problem tracking problem, continuous – time linear regulator. Minimization of functional of single function, constrained minimization Euler Lagrangine Equation.

Text Books:

1. Modern Control System Theory – by M. Gopal, New Age International Publishers, 2nd edition, 1996.
2. Modern control engineering – K.Ogata, prentice Hall Of India, 3rd edtion, 1998.
3. Optimal control theory and Introduction – Kirk Donald E, Dover publication.
4. Control system Engineering – I.J. Nagarath, M.Gopal. New Age International Publications, 5th edition.

Reference Books:

1. Digital Control and State Variable Methods – by M. Gopal, Tata Mc Graw-Hill Companies, 1997.
2. Systems and Control by Stainslaw H. Zak, Oxford Press, 2003.
3. Automatic feedback control system synthesis – Truxal, International student edition.
4. Optimal control systems – Desineni Subbaram Naidu, CRC Perss, 2nd edition.

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Elective - I

POWER SYSTEMS OPERATION CONTROL

III Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To distinguish between optimal generation allocation with and without losses.
- To understand transmission loss formula and hydrothermal scheduling.
- To model speed governor, generator-load system.
- To understand steady state and dynamic response of single and two area systems.
- To understand various reactive power control, stability enhancement methods and centre of inertia.

Learning Outcomes:

Students will be able to

- calculate optimal allocation with and without losses.
- compute loss coefficients and transmission losses.
- solve short term hydrothermal scheduling problems.
- determine the steady state changes in frequency in single area load frequency control.
- determine the steady state changes in frequency and tie-line power in two area load frequency control.
- suggest different voltage control methods for different applications.

UNIT – I: Economic Operation Power System – 1

Optimal operation of Generators in Thermal Power Stations, heat rate Curve – Cost Curve, Incremental fuel and Production costs, input output characteristics, Optimum generation allocation with line losses neglected.

UNIT – II: Economic Operation of Power Systems - 2

Optimum generation allocation including the effect of transmission line losses – Loss Coefficients, General transmission line loss formula.

UNIT – III: Hydrothermal Scheduling

Optimal scheduling of Hydrothermal System. Hydroelectric power plant models, scheduling problems – short term Hydrothermal scheduling problem.

UNIT – IV: Single Area Load Frequency Control

Necessity of keeping frequency constant, modeling of steam turbine, generator, mathematical modeling of speed governing system – Transfer function - Definitions of Control area – Single are control – Block diagram representation of isolated power system – Steady state analysis – Dynamic response – Uncontrolled case.

UNIT – V: Load Frequency Controllers & Tow Area Load Frequency Control

Proportional plus integral control of single area and its block diagram representation, steady state response – Load frequency control and economic dispatch control. Load frequency control of two area system – uncontrolled case and controlled case, tie-line bias control.

UNIT – VI: Reactive Power & Emergency Control

Relation between reactive power & voltage, different voltage control methods: Shunt & Series compensation, on-load tap changing transformer, booster transformer, Alternator voltage regulator (AVR), Concepts, Preventive & Energy Control, Coherent area dynamics, stability enhancement methods, Average system frequency, center of Inertia.

Text Books:

1. Electric Energy systems theory: Olle I.Elgerd TMH, 2nd edition.
2. Power Systems Engineering : IJ Nagarath & DP Kothari – TMH

Reference Books:

1. Power System Analysis: Hadi Saadat - TMH.
2. Power System Analysis & Stability – S.S vadhera Khanna Publishers
3. Power System Engineering, Chakravarthy, Soni, Gupta & Bhatnagar, Dhanapat Rai & Sons.

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Elective - I

DATA STRUCTURES USING C

III Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To gain knowledge of linear and non-linear data structures.
- To familiarize with different sorting and searching techniques.

Learning Outcomes:

Students will be able to

- implement single, circular and double linked list.
- implement stacks and queues using arrays and linked lists.
- implement various operations on binary trees.
- apply appropriate sorting and searching techniques for the given data.
- implement various operations on Graphs.

UNIT – I: Introduction

Concept of data structures, overview of data structures, implementation of data structures.

Linked Lists: Single linked list, Circular linked list, Double linked list, Circular double linked list.

UNIT – II: Stacks

Representation using Arrays and Linked List, operations on stack, factorial calculation, evaluation of arithmetic expression.

UNIT – III: Queues

Representation using Arrays and Linked List, operations on queue, circular queue, queue using stack.

UNIT – IV: Trees

Binary Trees: Basic tree concepts, Properties, Representation of Binary Trees using Arrays and Linked List, Binary Tree Traversals (recursive and non-recursive), Creation of binary tree from in-order and pre (post)order traversals, threaded binary tree.

Binary search trees: Basic concepts, BST operations: Search, insertion, deletion and traversals.

UNIT – V: Sorting and Searching

Searching: Linear Search, Binary Search, Fibonacci search.

Sorting (Internal): Basic concepts, Sorting by: insertion (Insertion sort), selection (selection sort), exchange (Bubble sort, quick sort), distribution (radix sort) and merging (merge sort).

UNIT – VI: Graphs

Basic concepts, Representations of Graphs, Operations on Graphs: Vertex insertion, vertex deletion, find vertex, edge addition, edge deletion, Graph Traversals (BFS & DFS).

Text Books:

1. Debasis samanta, Classic Data Structures, PHI, 2nd edition, 2011.
2. Richard F, Gilberg , Forouzan, Data Structures, 2nd edition, , Cengage.

Reference Books:

1. Seymour Lipschutz, Data Structure with C, TMH.
2. G. A. V. Pai, Data Structures and Algorithms, TMH, 2008.
3. Horowitz, Sahni, Anderson Freed, Fundamentals of Data Structure in C, University Press, 2nd edition.

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Open Elective - II

DISASTER MANAGEMENT

III Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To learn about disaster occurrence, strategies and remedial measures.

Learning Outcomes:

Students will be able to

- explain the aspects of disaster management and adopt remedial measures.
- access the impact of hazards on structures.
- explain the vulnerability conditions.
- adopt the rehabilitation procedures.

UNIT – I: Introduction

Concept of Disaster Management. Types of Disasters. Disaster mitigating agencies and their organizational structure at different levels.

UNIT – II: Overview of Disaster Situations in India

Vulnerability of profile of India and Vulnerability mapping including disaster – pone areas, communities, places. Disaster preparedness – ways and means; skills and strategies; rescue, relief reconstruction. Case Studies: Lessons and Experiences from Various Important Disasters in India

UNIT – III: Flood and Drought Disaster

Raising flood damage, assessing flood risk, flood hazard assessment, flood impact assessment, flood risk reduction options. Drought and development, relief management and prevention, drought mitigation and management- integrating technology and people.

UNIT – IV: Landslide and Earthquake Disaster

Land slide hazards zonation mapping and geo environmental problems associated with the occurrence of landslides. The use of electrical resistivity method in the study of landslide. Studies in rock mass classification and land slide management in a part of Garwal-Himalaya, India. Causes and effects of earth quakes. Secondary effects. Criteria for earthquake resistant design.

UNIT – V: Cyclone and Fire Disaster

Cyclone occurrence and hazards. Cyclone resistant house for coastal areas. Disaster resistant construction role of insurance sector. Types of fire. Fire safety and fire fighting method, fire detectors , fire extinguishers.

UNIT – VI: Rehabilitation

Rehabilitation programmes, Management of Relief Camp, information systems & decision making tools

Text Books:

1. Disaster Management, RB Singh (Ed), Rawat Publications, 2000.
2. Disaster Management Future Challenges and Opportunities, jagbir singh, I.K international publishing house

Reference Books:

1. Natural Hazards in the Urban habitat by Iyengar, CBRI, Tata McGraw Hill
2. Natural Disaster management, Jon Ingleton (Ed), Tulor Rose, 1999
3. Anthropology of Disaster management, Sachindra Narayan, Gyan Publishing house, 2000.

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Open Elective - II

SOLID WASTE MANAGEMENT
(Other than CE)
III Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To learn about Solid Waste management
- To describe the collection, treatment and disposal methods of Solid waste

Learning Outcomes:

Students will able to

- identify the types and sources of solid waste, and its characteristics.
- employ the treatment and disposal methods of solid waste.
- apply the concepts of solid waste management.

UNIT – I: Introduction

Definition of solid waste, garbage, rubbish-Sources and Types of solid wastes-Municipal waste, industrial waste, plastic waste, electronic waste, bio-medical waste and hazardous waste - Characteristics of Solid Wastes: Physical, chemical and biological characteristics- Problems due to improper disposal of solid waste.

UNIT – II: Functional Elements of Solid Waste Management

Waste generation and handling at source-onsite storage-Collection of solid wastes-Collection methods and services-storage of solid waste- guidelines for collection route layout.

UNIT – III: Transfer and Transport of Wastes

Transfer station-types of vehicles used for transportation of solid waste-Processing and segregation of the solid waste- various methods of material segregation.

UNIT – IV: Processing and Transformation of Solid Wastes

Recycling and recovery principles of waste management- Composting: definition-methods of composting-advantages of composting- Incineration: definition-methods of incineration advantages and disadvantages of incineration.

UNIT – V: Treatment and Disposal of Solid Waste

Volume reduction, Open dumping, land filling techniques, Landfills: classification-Design and Operation of landfills, Land Farming, Deep well injection.

UNIT – VI: Waste Minimization

Introduction to waste minimization, waste minimization techniques-5R (refuse, reduce, reuse, recover, recycle), municipal waste minimization, industrial waste minimization.

Text Books:

1. Solid and hazardous waste management by M.N.Rao and Razia sultana, BS publications
2. Environmental Engineering by Howard S.Peavy, Donald R.Rowe and George Tchobanognous

Refence Books:

1. Integrated Solid Waste Management by Tchobanognous.
2. Environmental engineering by Y.Anjaneyulu, B.S publication.
3. Environmental Pollution Control Engineering by C.S. Rao; Wiley Eastern Ltd., New Delhi.
4. Environmental engineering by Gerad Kiley, Tata Mc Graw Hill

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Open Elective - II

ENERGY AUDIT, CONSERVATION AND MANAGEMENT

III Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To introduce the basic concepts of Energy Auditing and Management.
- To familiarize the various Techniques of Electrical Energy Conservation.

Learning Outcomes:

Students will be able to

- understand the Process of Energy Audit of Industries.
- apply the concepts of Energy management for Efficient Energy Utilization and Conservation.
- identify a suitable method for Energy Conservation of various electric devices.
- analyze the benefits of energy conservation from the Economic aspects.

UNIT – I: Basic Principles of Energy Audit

Energy audit- definitions, concept , types of audit, energy index, cost index ,pie charts, Sankey diagrams, load profiles, Energy conservation schemes- Energy audit of industries- energy saving potential, energy audit of process industry, thermal power station, building energy audit.

UNIT – II: Energy Management

Principles of energy management, organizing energy management program, initiating, planning,controlling, promoting, monitoring, reporting- Energy manger, Qualities and functions, language, Questionnaire – check list for top management.

UNIT – III: Energy Efficient Motors

Energy efficient motors , factors affecting efficiency, loss distribution , constructional details, characteristics - variable speed , variable duty cycle systems, RMS hp-voltage variation-voltage unbalance- over motoring- motor energy audit.

UNIT – IV: Power Factor Improvement

Power factor – methods of improvement, location of capacitors, Pf with non linear loads, effect of harmonics on power factor, power factor motor controllers

UNIT – V: Lighting and Energy Instruments

Good lighting system design andpractice, lighting control ,lighting energy audit – Energy. Instruments- wattmeter, data loggers, thermocouples, pyrometers, lux meters, tongue testers, application of PLC's.

UNIT – VI: Economic Aspects and Analysis

Economics Analysis-Depreciation Methods, time value of money, rate of return , present worth method , replacement analysis, life cycle costing analysis- Energy efficient motors- calculation of simple payback method, net present worth method- Power factor correction, lighting - Applications of life cycle costing analysis, return on investment .

Text Books:

1. Energy management by W.R. Murphy AND G. Mckay Butter worth, Heinemann publications.
2. Energy management by Paul o' Callaghan, Mc-graw Hill Book company-1st edition, 1998

Reference Books:

1. Energy efficient electric motors by John .C. Andreas, Marcel Dekker Inc Ltd-2nd edition,1995.
2. Energy management hand book by W.C.Turner, John wiley and sons.
3. Energy management and good lighting practice: fuel efficiency- booklet12-EEO

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Open Elective - II

MATERIAL SCIENCE
(Other than ME)
III Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- Familiarise with the crystallography of materials and their properties i.e. Mechanical, Electrical and Optical and their field of applications.

Learning Outcomes:

Students will be able to

- understand of contemporary issues relevant to Crystal Structures.
- identify the defects in crystals and understand the mechanisms of plastic deformation.
- draw Equilibrium/phase diagrams.
- understand Mechanical, Electrical, Optical properties of Materials.

UNIT – I: Crystal Structure

Introduction, Space lattice, Unit cell, Lattice parameters, Bravis lattices, Structure and packing fractions of simple cubic, Body centred cubic, Face centred cubic crystals. Directions and planes in crystals, miller indices, Diffraction of X-rays by crystal planes, Bragg's law.

UNIT – II: Plastic Deformation

Plastic deformation of single crystals. Deformation by slip, CRSS for slip, Deformation of single crystal. Deformation by twinning, Stacking faults, hot working, and cold working. Recovery, recrystallization and grain growth. Grain size, Halt-Petch equation. Dislocations, types, Burgers' Vector, Dislocation movement by climb and cross slip.

UNIT – III: Equilibrium Diagrams and Phase Transformation

Solid solutions, Hume-Rothery's rules, Intermediate compounds, Phase diagrams, Gibb's phase rule, Equilibrium diagram of a binary system. Applications of phase transformations, Iron –carbon equilibrium diagram.

UNIT – IV: Mechanical properties

Tensile stress-strain diagrams, proof stress, yield stress diagrams, modules of elasticity. Hardness Testing: -Rockwell, Brinell and Vickers. Impact , toughness, Charpy V-Notch, fracture, ductile, brittle, Griffith criteria for brittle failure, creep, creep mechanisms, fatigue-mechanism-factors to improve fatigue resistance.

UNIT – V: Electrical Properties of Materials

Electronic conductivity, free electron theory, Super conductivity, Magnetic properties, Dia, para, ferro, ferri magnetism. Soft and hard magnetic materials.

UNIT – VI: Optical Properties

Optical properties of materials. Reflection, Refraction, Absorption and transmission of electromagnetic radiation in solids Polymerization, classification of polymers. Uses of polymers.

Text Books:

1. Materials Science and Engineering by V.Raghavan, Prentice Hall of India, Fifth edition.
2. Mechanical Metallurgy – GE Dieter., Mechanical metallurgy, 1988, edition, McGraw-Hill.
3. Material science and Engineering an introduction William D. callister, David G. Rethwisch.

References Books:

1. Essentials of Material Science by A.G.Guy, McGraw-Hill(1976).
2. Material Science for Engineers – Schakleford.

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Open Elective - II

AUTOMOTIVE ELECTRONICS

III Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To familiarize with the electronic systems inside automotive vehicle.
- To know the advanced safety systems

Learning Outcomes

Students will be able to

- broad understanding of automotive technology
- knowledge in operating principles and performance of various subsystems of automotive systems.
- understand the operation of microcomputer systems.
- acquire knowledge in automotive sensors and control systems.
- develop communications & navigation/routing in automotive telematics

UNIT – I: Automotive Fundamentals

Use of electronics in the automobile, evolution of automotive electronics, the automobile physical configuration, evolution of electronics in the automobile, survey of major automotive systems, engine control or electronic control unit, ignition system

UNIT – II: Electronics Fundamentals

Semiconductor devices- diodes, rectifier circuit, transistors, field effect transistors; transistor amplifiers, use of feedback in op amps, summing mode amplifier, analog computers, digital circuits- binary number system, combinational- Basic logic gates, multiplexer (IC 74151), 3 to8 decoder (IC74138) , sequential- flip flops, decade counters(IC 7490).

UNIT – III: Automotive Micro-Computer System

Microcomputer fundamentals-digital versus analog computers, basic computer block diagram, microcomputer operations, CPU registers, accumulator registers, condition code register-branching; microprocessor architecture, memory-ROM, RAM; I/O parallel interface, digital to analog converter and analog to digital converters with block diagram, microcomputer application in automotive systems.

UNIT – IV: Basics of Electronics Engine Control

Motivation for electronic engine control, exhaust emissions, fuel economy, concept of an electronic engine control system, engine functions and control, electronic fuel control configuration, electronic ignition with sensors.

UNIT – V: Sensors and Actuators

Introduction; Basic sensor arrangement; Types of Sensors such as oxygen sensors, Crank angle position sensors, fuel Metering/vehicle speed sensors and detonation sensors, altitude sensors, flow Sensors, throttle position sensors, solenoids, stepper motors, relays. Actuators – Fuel Metering Actuator, Fuel Injector, Ignition Actuator

UNIT – VI: Future Automotive Electronic Systems

Telematics, Safety: Collision Avoidance Radar warning System with block diagram, speech synthesis, sensor multiplexing, control signal multiplexing with block diagram, fiber optics inside the car, automotive internal navigation system, GPS navigation system, voice recognition cell phone dialling, advanced cruise control system.

Text Books:

1. William B. Ribbens, "Understanding Automotive Electronics", 6th Edition, SAMS/Elsevier Publishing (UNIT I to VI).
2. Robert Bosch Gambh, "Automotive Electrics Automotive Electronics Systems and Components", 5th edition, John Wiley& Sons Ltd., 2007.

Reference Books:

1. Ronald K Jurgen, "Automotive Electronics Handbook", 2nd Edition, McGraw-Hill,1999.
2. G. Meyer, J. Valldorf and W. Gessner, "Advanced Microsystems for Automotive Applications", Springer, 2009.
3. Robert Bosch, "Automotive Hand Book" SAE, 5th Edition, 2000.

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Open Elective - II

INTRODUCTION TO MICROPROCESSORS AND MICROCONTROLLERS
(Other than EEE, ECE, CSE & IT)

III Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives

- To familiarize the students with architecture of 8086 microprocessor and 8051 microcontroller.
- To introduce the assembly language programming concepts of 8086 processor.
- To expose the students to various interfacing devices with 8086 using 8255.
- To introduce the concepts of interrupt mechanism and serial communication standards.

Learning Outcomes:

Students will be able to

- understand the architecture and instruction set of 8086 Microprocessor and 8051 micro controller.
- design and develop various interfacing circuits with 8086 using 8255.
- understand the concepts of interrupt mechanism and serial communication.
- develop 8051 based different kinds of applications.

UNIT – I: **8086 Microprocessor**

Introduction 8086 Processor, Architecture-Functional diagram, Register Organization, Memory Segmentation, Physical memory organization, signal descriptions of 8086- common function signals, Minimum and Maximum mode signals, Timing diagrams.

UNIT – II: **Instruction Set and Assembly Language Programming of 8086**

Instruction formats, addressing modes, instruction set, assembler directives, macros, simple programs involving logical, branch and call instructions, sorting, evaluating arithmetic expressions, string manipulations.

UNIT – III: **Basic Peripherals and Their Interfacing**

8255 PPI various modes of operation and interfacing to 8086. Interfacing keyboard, display, stepper motor interfacing, D/A and A/D converter, Keyboard/Display Controller-8279,

Memory interfacing to 8086, Interfacing DMA controller 8257 to 8086

UNIT – IV: **Interrupt Structure and Serial Communication**

Interrupt structure of 8086, Vector interrupt table, Interrupt service routine, Interfacing Interrupt Controller 8259, Serial communication standards, Serial data transfer schemes,8251 USART architecture and interfacing, RS- 232, IEEE-4-88, Prototyping and trouble shooting.

UNIT – V: **Introduction to 8051 Microcontroller**

Overview of 8051 microcontroller, Architecture, I/O Ports, Memory organization, addressing modes and instruction set of 8051, Interrupts, timer/ Counter and serial communication.

UNIT – VI: **Interfacing and Applications of 8051**

Interfacing 8051 to LED's, Push button, Relays and latch Connections, Keyboard Interfacing, Interfacing Seven segment display, ADC and DAC Interfacing

Text Books:

1. D. V. Hall' "Microprocessors and Interfacing", TMGH.2'1 edition 2006.(I to IV Units).
2. Muhammad Ali Mazidi, Janice Gillispie Mazidi and Rolin D. McKinlay, "The 8051 Microcontrollers and Embedded Systems", Pearson, 2nd Ed.(IV to VI Units)

Reference Books:

1. Barry B.Brey, "The Intel Microprocessors", PHI, 7th Edition 2006.
2. Liu and GA Gibson, "Micro Computer System 8086/8088 Family Architecture. Programming and Design", PHI, 2nd Ed.,
3. Kenneth. J. Ayala, "The 8051 Microcontroller", 3rd Edition, Cengage Learning, 2010.

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Open Elective - II

CLOUD COMPUTING
(Other than CSE & IT)
III Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To understand Virtualization, Virtual Machine and different models of VM.
- To familiarize Cloud computing architecture and its security aspects.

Learning Outcomes

Students will be able to

- know about basics of cloud computing.
- cloud computing and its services available today.
- distinguish Virtualization and Virtual Machine and its need, Types of Virtualization.
- understand how to provide security for the cloud .
- understand disaster recovery and disaster management.
- design a Cloud for an Enterprise.

UNIT – I: Cloud computing

Introduction, what it is and what it isn't, from collaborations to cloud- a short history of cloud computing, the network is the computer- How cloud computing works, companies in the cloud- Cloud computing today.

UNIT – II: Ready for Computing in the cloud

The pros and cons of Cloud Computing, Developing Cloud Services- Why Develop Web-Based Applications?, The Pros and Cons of Cloud Service Development, Types of Cloud Service Development, Discovering Cloud Services Development services and Tools.

UNIT – III: Virtulization

Virtualization for cloud, Need for Virtualization – Pros and cons of Virtualization – Types of Virtualization –System Vm, Process VM, Virtual Machine monitor – Virtual machine properties - Interpretation and binary translation, HLL VM - Hypervisors – Xen, KVM , VMWare, Virtual Box, Hyper-V.

UNIT – IV: Security

Data Security, Data Control Encrypt Everything, Regulatory and Standards compliances, Network Security, Firewall rules, Network Intrusion detection, Host Security, System Hardening, Antivirus Protection, Host Intrusion detection, Data segmentation, Credential Management.

UNIT – V: Disaster

What is Disaster, Disaster Recovery Planning, The Recovery Point objective, The Recovery Time Objective, Disasters in the Cloud, Backups and data retention, Geographic redundancy, Organizational redundancy, Disaster Management, Monitoring, Load Balancer Recovery, Application server recovery, Database Recovery.

UNIT – VI: Defining Clouds for the Enterprise

Storage-as-a-Service, Database-as-a- Service, Information-as-a-Service, Process-as-a-Service, Application-as-a- Service, Platform-as-a-Service, Integration-as-a-Service, Security-as-a-Service, Management/Governance-as-a-Service, Testing-as-a-Service Infrastructure-as- a-Service.

Text Books:

1. Michael Miller, Cloud Computing – Web Based Applications That change the way you work and Collaborate Online –Person Education.
2. George Reese Cloud Application Architectures, Ist Edition O'Reilly Media.

Reference Books:

1. David S. Linthicum, Cloud Computing and SOA Convergence in your Enterprise : A Step-by-Step Guide- Addison-Wesley Professional.
2. Kai Hwang, Geoffery C.Fox, Jack J, Dongarra, Distributed & Cloud Computing From Parallel Processing to the Internet of Things.

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Open Elective - II

WEB TECHNOLOGIES
(Other than CSE & IT)
III Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:
- To develop real time web applications.
- To get acquainted with skills for creating websites and web apps through learning various technologies like HTML, CSS, JavaScript, XML, Servlets, JSP and JDBC.

Learning Outcomes:
Students will be able to
- develop UI for web applications using markup languages.
- build dynamic web pages using Java Script .
- build web pages using XML.
- design and implement one or more Java servlets; test and debug the servlets; deploy the servlets.
- design and implement one or more Java Server Pages; test and debug the JSPs; deploy the JSPs.
- update and retrieve the data from the databases using JDBC-ODBC.

UNIT – I: HTML & CSS
HTML- Basic HTML Tags, Working with Lists, Tables, Forms, Frames, Images and Image maps.
Cascading Style sheets- CSS rules, Selectors, Types of CSS, CSS Properties for Styling Backgrounds, Text, Fonts, Links, Lists, Tables and Positioning.

UNIT – II: Java Script
Introduction to Java Script, Variables, Data types, Functions, Operators, Control flow statements, Objects in Java Script, Event Handling. DHTML with Java Script

UNIT – III: XML
Basic building blocks, Validating XML Documents using DTD and XML Schemas, XML DOM, XML Parsers- DOM and SAX, XSLT, using CSS with XML.

UNIT – IV: Web Servers and Servlets
Tomcat web server, Introduction to Servlets, Lifecycle of a Servlet, JSDK, The Servlet API, The javax.servlet Package, Reading Servlet parameters, Reading Initialization parameters, The javax.servlet HTTP package, Using Cookies-Session Tracking.

UNIT – V: JSP

The Problem with Servlet. The Anatomy of a JSP Page, Generating Dynamic Content, Using Scripting Elements, Implicit JSP Objects, Declaring Variables and Methods, Passing Control and Data between Pages, Sharing Session and Application Data.

UNIT – VI: Database Access

JDBC Drivers, Database Programming using JDBC, Studying Javax.sql.* package, accessing a database from a JSP Page and a Servlet page, introduction to struts.

Text Books:

1. Web Technologies, "Black book", Kogent Learning Solutions, Dreamtech press.
2. Chris Bates, "Web Programming: building internet applications", WILEY Dreamtech, 2nd edition.

Reference Books:

1. Uttam K Roy, "Web Technologies", Oxford.
2. John Duckett, "Beginning Web Programming".
3. Wang Thomson, "An Introduction to web design and Programming".
4. Robert W Sebesta, "Programming the World Wide Web", Pearson publications, Fourth edition.

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Open Elective - II

VIRTUAL REALITY

III Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To Understand key elements of virtual Reality with the components in VR systems.
- To gain knowledge of various input and output devices required for interacting in virtual world along with rendering and modeling.

Learning Outcomes:

Students will be able to

- identify basic elements of virtual Reality with the components in VR systems
- describe various input and output devices required for interacting in virtual world along with rendering and modeling.
- differentiate various types of modeling,
- apply the concepts of Virtual Reality for an application.

UNIT – I: Introduction

The three I's of virtual reality, commercial VR technology and the five classic components of a VR system

UNIT – II: Input Devices

Trackers, Navigation, and Gesture Interfaces- Three-dimensional position trackers, Navigation and manipulation, interfaces and gesture interfaces.

UNIT – III: Output Devices

Graphics displays, sound displays & haptic feedback.

UNIT – IV: Modeling

Geometric modeling, kinematics modeling, physical modeling, behavior modeling, model Management.

UNIT – V: Human Factors

Methodology and terminology, user performance studies, VR health and safety issues.

UNIT – VI: Applications

Medical applications, military applications, robotics applications.

Text Books:

1. Virtual Reality Systems, John Vince, Pearson Education.
2. Virtual Reality Technology, Second Edition, Gregory C. Burdea & Philippe Coiffet, John Wiley & Sons, Inc.,

Reference Books:

1. Understanding Virtual Reality, interface, Application and Design, William R.Sherman, Alan Craig, Elsevier (Morgan Kaufmann).

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Open Elective - II

SCRIPTING LANGUAGES

III Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To gain knowledge of various scripting languages.
- To familiar with development of web application using scripting languages.

Learning Outcomes:

Students will be able to

- employ JavaScript as a general purpose web-based client-side scripting language.
- utilize both XML and PHP to develop interactive web applications.
- describe and apply files concepts in traditional web applications.
- utilize PERL to solve a wide range of text processing problems.

UNIT – I: Advanced Java Script

Java Script Events, Objects, DHTML, DOM and Forms, Introduction to AJAX

UNIT – II: XML

XML Introduction and Overview, XML Syntax, XML Namespaces, Document Type Definitions (DTDs), XML Schemas, Parsing XML,X Path and XML Transformation

UNIT – III: Python

Syntax and Style – Python Objects – Numbers – Sequences – Strings – Lists and Tuples –Dictionaries – Conditionals and Loops

UNIT – IV: Files

Files – Input and Output – Errors and Exceptions – Functions – Modules – Classes and OOP –Execution Environment.

UNIT – V: Introduction to PERL

Perl backgrounder – Perl overview – Perl parsing rules – Variables and Data – Statements and Control structures – Subroutines

UNIT – VI: Working with PERL

Packages and Modules- Working with Files –Data Manipulation.

Text Books:

1. Web Technologies , Uttam Roy, OXFORD University press.
2. Remy Card, Eric Dumas and Frank Mevel, “The Linux Kernel Book”, Wiley Publications,2003.

Reference Books:

1. Wesley J. Chun, “Core Phython Programming”, Prentice Hall, 2001.
2. Martin C. Brown, “Perl: The Complete Reference”, 2nd Edition, Tata McGraw-Hill Publishing Company Limited, Indian Reprint 2009.

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Open Elective - II

BIG DATA
(Other than CSE & IT)
III Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To familiarize the fundamental concepts of cloud for laying a strong foundation of Apache Hadoop (Big data framework).
- To gain knowledge of HDFS file system, MapReduce frameworks and relevant tools.

Learning Outcomes:

Students will be able to

- describe the fundamentals of Bigdata and cloud architectures.
- utilize HDFS file structure and MapReduce frameworks to solve complex problems.
- know how to analyze data using UNIX tools and Hadoop.
- understand how to develop environment for analyzing Bigdata.
- understand how to use mapper and reducer functions

UNIT – I: Introduction to Big Data

What is Big Data, Why Big Data is Important, Meet Hadoop- data, Data Storage and Analysis, Comparison with other systems, Grid Computing, a brief history of Hadoop, Apache Hadoop and the Hadoop Eco System.

UNIT – II: MapReduce

Analyzing data with unix tools, Analyzing data with hadoop, Java MapReduce classes (new API), Data flow, combiner functions, Running a distributed MapReduce Job.

UNIT – III: Hadoop Distributed File System

HDFS concepts, Command line interface to HDFS, Hadoop File systems, Interfaces, Java Interface to Hadoop, Anatomy of a file read, and write, Replica placement and Coherency Model

UNIT – IV: Developing a MapReduce Application

Setting up the development environment, Managing configuration, Writing a unit test with MRUnit, Running a job in local job runner, Running on a cluster, Launching a job.

UNIT – V: MapReduce Working-I

Classic MapReduce, Job submission, Job Initialization, Task Assignment, Task execution, Progress and status updates

UNIT – VI: MapReduce Working-II

Job Completion, Shuffle and sort on Map and reducer side, Configuration tuning, MapReduce Types, Input formats, Output formats .

Text Books:

1. Tom White, Hadoop,"The Definitive Guide", 3rd Edition, O'Reilly Publications, 2012.
1. Dirk deRoos, Chris Eaton, George Lapis, Paul Zikopoulos, Tom Deutsch, "Understanding Big Data Analytics for Enterprise Class Hadoop and Streaming Data", 1st Edition, TMH,2012.

Reference Book:

1. Frank J.Ohlhorst, "Big Data Analytics: Turning Big Data Into Big Money",2nd Edition, TMH,2012.

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Open Elective - II

MULTI-VARIATE ANALYSIS AND SPECIAL FUNCTIONS

III Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To understand the multivariate analysis concepts.
- To know special functions.

Learning Outcomes:

Students will be able to

- to analyze the multivariate data using dependence techniques.
- to apply interdependence techniques.

UNIT – I: Introduction

Nature of multivariate analysis – classifying multivariate techniques - Analysis of dependence.

UNIT – II: Analysis

Analysis of inter dependence - influence of measurement scales.

UNIT – III: Analysis of Dependence

Multiple regression analysis – Discriminant analysis – Multivariate Analysis of variance (MANOVA)

UNIT – IV: Analysis of inter Dependence

Factor Analysis – Cluster analysis – Multidimensional scaling.

UNIT – V: Legendre Functions

Legendre Polynomials. Properties, Rodrigue's formula, Recurrence Relations and orthoganality.

UNIT – VI: Bessel Functions

Solution of Bessel's equation, Properties, Recurrence Relations, orthoganality.

Text Books:

1. Richard Arnold Johnson, Dean W. Wichern, Applied Multivariate Statistical Analysis, Pearson Prentice Hall, 2007.
2. William G.Zikmund, Business Research Methods 7th Edition, Cengage Learning.
3. Tabachnick B., Fidell, L using multivariate statistics, 5th Edition, Pearson Education, Inc 2007.
4. J.N.Sharma, R.K.Gupta, Special Functions, Krishna Prakashan Media (p) Ltd., Meerut.

Reference Books:

1. Yang, K, Trewn, J. Multivariate Statistical Methods in Quality Management Mc Graw-Hill.
2. Larry C. Andrew, Special Functions of Mathematics for Engineers, SPIE Press, 1992.

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INTEGRATED CIRCUITS & PDC LAB

III Year – II Semester

Practical	: 3	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To understand the working non linear circuits for different input waveforms.
- To familiarize the students with functional verification of various analog circuits

Learning Outcomes:

Students will be able to

- design different RC differentiator and integrator circuits.
- understand the application of clippers, clampers and Multivibrators.
- design and develop various linear circuits using MSI ICs.
- work in a team using available resources to design circuits to meet a given specification.

List of Experiments:

Any 10 experiments from the following list are required to be conducted

1. Adder/ Subtractor/ Comparator/Integrator/Differentiator-IC 741.
2. Square/ Triangular waveform Generators - IC 741
3. Weighted Resistor/ R-2R ladder Digital to Analog Converters-IC 741
4. Analysis, design and Test low pass and high pass RC circuits for the given cutoff frequency.
5. Analysis, design and Test a Clipper circuits.
6. Analysis, design and Test Clamper circuits.
7. Design of Astable Multivibrator for the given specifications.
8. Design of MonoMultivibrator for the given specifications.
9. Design of Schmitt Trigger for the given specifications.
10. Identify stable states in BistableMultivibrator.
11. Implement the given logic expression by using universal GATES.

Equipment required for Laboratories:

1. RPS - 0 – 30 V
2. CRO - 0 – 20 M Hz.
3. Function Generators - 0 – 1 M Hz
4. Components
5. Multi Meters
6. Analog ICs

Reference Books:

1. Jacob Millman and Herbert Taub, “Pulse, Digital and Switching Waveforms”, TMH1st Edition.
2. “Fundamentals of Pulse and Digital circuits”, Ronald J.Tocci, PHI 3rd Edition.
3. OP-Amps & Linear ICs - Ramakanth A. Gayakwad, PHI, 1987.
4. Linear Integrated Circuits – D. Roy Chowdhury, New Age International (p) Ltd, 2nd Edition,2003.

POWER ELECTRONCIS AND DRIVES LAB

III Year – II Semester

Practical	: 3	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To provide a practical background on power electronic devices.
- To provide Knowledge on how to conduct an experiment on different power converter Circuits and to analyze the behavior of circuits.
- To equip with required skills to derive the criteria for the design of power converters for UPS, Drives etc.,
- To expose students to the practical problems associated with control and firing circuits of power converters.

Learning Outcomes:

Students will be able to

- understand the significance of characteristics for various power semiconductor switches.
- design, analyze, model, and test the operation of simple power electronic circuits in a lab environment.
- test, measure and determine the various parameters of single phase and three phase converters and provide valid conclusions on the performance of these different power converters.
- describe and determine the operational characteristics of DC drive in all four quadrants.
- diagnose the various causes of harmonics and design a PWM converter.
- design converter fed dc drives and chopper fed dc drives

List of Experiments:

Any 10 experiments from the following list are required to be conducted

1. Study of Characteristics of SCR,MOSFET & IGBT.
2. Gate firing circuits for SCR's
3. Forced Commutation circuits (Class A, B, C, D & E).
4. Single Phase Half controlled converter with R and RL load.
5. Single Phase fully controlled bridge converter with R and RL load.
6. Single Phase AC Voltage Controller with R and RL load.
7. Single Phase Cyclo – converter with R and RL load.
8. Single Phase bridge inverter with R and RL load.
9. Single Phase series inverter with R and RL load.
10. Single Phase Parallel, inverter with R and RL load.
11. Single Phase dual converter with RL load
12. Three Phase half controlled bridge converter with RL – Load
13. Chopper Controlled DC Motor

ELECTRICAL MACHINES LAB – II

III Year – II Semester

Practical	: 3	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To impart practical knowledge on AC electrical machines.

Learning Outcomes:

Students will be able to

- prepare laboratory reports that clearly communicate experimental information in a logical and scientific manner.
- determine the sequence impedances and reactance's of Synchronous machine.
- obtain the regulation of an alternator by optimistic and pessimistic methods.
- understand the starting and connecting procedures of synchronous generators, and to obtain the 'V' curves of synchronous motors.
- experimentally obtain the load characteristics, starting current and starting torque of a squirrel-cage induction motor and to derive circuit parameters from no-load and blocked-rotor tests.

List of Experiments:

Any 10 of the following experiments are to be conducted:

1. No Load and Blocked rotor tests on three phase Induction motor.
2. Brake test on three phase Induction motor.
3. Equivalent circuit of a single phase Induction motor.
4. Regulation of a three phase alternator by synchronous impedance method & m.m.f methods.
5. Measurement of sequence impedance of a three phase alternator.
6. V and inverted V curves of a three phase synchronous motor.
7. Regulation of a three phase alternator by z.p.f method.
8. Determination of X_d and X_q of a salient pole synchronous machine.
9. Load test on a three phase alternator.
10. Characteristics of Line excited Induction generator.
11. Speed control of Schrage Motor.
12. Load test on single phase repulsion motor.

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POWER SYSTEM ANALYSIS

IV Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- Analyze multi-node power systems using an admittance matrix or impedance matrix representation of the power system.
- Understand the formulation of power flow problem and have the ability to cast any given system in this framework.
- Develop understanding of the concepts of fault analysis in interconnected systems.

Learning Outcomes:

Students will be able to

- convert a power system from one base to another base.
- modify an impedance matrix with any addition or removal of element.
- formulate the power flow problem and analyze the power system.
- develop and solve the positive, negative, and zero sequence networks for systems consisting of machines, transmission lines and transformers.
- solve for the fault voltages and currents for various faults.

UNIT – I: Representation

Per UNIT quantities, single line diagram, Impedance diagram of a power system, Graph theory definition, formulation of Y-Bus & Z-Bus.

UNIT – II: Power flow studies-I

Necessity of power flow studies – Derivation of Static power flow equations-Guass-Seidel method(limited to 3 buses),algorithm.

UNIT – III: Power flow studies-II

Newton-Raphson method in rectangular and polar coordinates form-Derivation of Jacobian matrix, Power flow solution using N-R method(3 bus),Decoupled and Fast decoupled method(3 bus),algorithms.

UNIT – IV: Symmetrical Fault analysis & Symmetrical Components

Three phase short circuit currents and reactance's of synchronous machines, short circuit MVA calculations, synthesis of unsymmetrical phasors from their symmetrical components, operators, symmetrical components of unsymmetrical phasors, power in terms of symmetrical components, sequence networks-Positive, negative and zero sequence network.

UNIT – V: Unsymmetrical Fault analysis

Various types of unsymmetrical faults, LG, LL, LLG on unloaded alternator, unsymmetrical faults on power systems.

UNIT – VI: Power system stability analysis

Classification of stability, description of steady state stability power limits, transfer reactance, synchronizing power coefficient, power angle curve and determination of steady state stability, Derivation of swing equation, determination of transient stability by equal area criterion , application of equal area criterion ,methods to improve steady state and transient state stability.

Text Books:

1. Modern Power system analysis-I.J.Nagrath and D.P.Kothari- TMH,2nd edition.
2. Computer methods in power systems analysis-Glenn W.Stagg, Ahmed H.EI. Abiad- Mc. Graw- Hill International Editions.

Reference Books:

1. Power system analysis-Grainger and Stevenson, Tata Mc. Graw-Hill.
2. Power system analysis-A.R.Bergen,PHI.
3. Power system analysis-Hadi saadat- TMH edition.
4. Power system analysis-B.R.Gupta-Wheeler Publications.
5. Electrical Power systems –C.L.Wadhwa -New Age International.

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UTILIZATION OF ELECTRICAL ENERGY

IV Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To introduce the laws of illumination, working principles of different lamps.
- To provide basic concepts on various types of electric heating and welding methods for residential, commercial and industrial sectors.
- To introduce the basic concepts of electric traction and electric braking.

Learning Outcomes:

Students will be able to

- select an appropriate electric drive for a particular application.
- design proper illumination level for residential, commercial and industrial environments.
- describe different types of electric heating and welding methods for residential, commercial and industrial needs.
- apply the knowledge of electric traction for specifying different types of traction services.
- select appropriate motor for traction purpose.

UNIT – I: Electric Drives

Type of electric drives, choice of motor, starting and running characteristics, speed control, temperature rise, particular applications of electric drives, types of industrial loads, continuous, intermittent and variable loads, load qualization.

UNIT – II: Electric Heating

Advantages and methods of electric heating, resistance heating induction heating and dielectric heating.

UNIT – III: Electric Welding

Electric welding, resistance and arc welding, electric welding equipment, comparison between A.C. and D.C. Welding.

UNIT – IV: Illumination

Introduction, terms used in illumination, laws of illumination,sources of light,Discharge lamps, MV and SV lamps – comparison between tungsten filament lamps and fluorescent tubes, Types and design of lighting and flood lighting.

UNIT – V: Electric Traction – I

Systems of electric traction and track electrification. Review of existing electric traction systems in India. Special features of traction motor - Mechanics of train movement- Speed-time curves for different services – trapezoidal and quadrilateral speed time curves

UNIT – VI: Electric Traction – II

Calculations of tractive effort, power,Specific energy consumption for given run, effect of varying acceleration and braking retardation, adhesive weight and braking retardation adhesive weight and coefficient of adhesion.

Text Book:

1. "Utlization of Electric Energy" Gargand Girdhar, Khanna Publishers, 1982..
2. Art & Science of Utilization of electrical Energy – by Partab, Dhanpat Rai & Sons.

Reference Books:

1. Utilization of Electrical Power including Electric drives and Electric traction – by N.V.Suryanarayana, New Age International (P) Limited, Publishers, 1996.
2. Generation, Distribution and Utilization of electrical Energy – by C.L. Wadhwa, New Age International (P) Limited, Publishers, 1997.

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Elective - II

ELECTRICAL DISTRIBUTION SYSTEMS

IV Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To analyze primary feeder design concepts.
- To understand various coordination procedures among the protective devices.

Learning Outcomes:

Students will be able to

- eesign primary feeder rating in the distribution systems
- design optimum location of the substation.d
- design new system configuration by forecasting the loads.
- identify the optimum location of the capacitor bank in the distribution systems.
- select appropriate protective devices in the distribution systems

UNIT – I: General Concepts

Introduction to distribution systems, Load modeling and characteristics. Coincidence factor, contribution factor loss factor – relationship between the load factor and loss factor. Classification of loads (residential, commercial, agricultural and Industrial) and their characteristics.

UNIT – II: Distribution Feeders

Design Considerations of Distribution Feeders; Radial and loop types of primary feeders, voltage levels, feeder loading; basic design practice of the secondary distribution system.

UNIT – III: Substations

Location of Substations: Rating of distribution substation, service area within primary feeders. Benefits derived through optimal location of substations.

UNIT – IV: System Analysis

Voltage drop and power – loss calculations: Derivation for voltage drop and power loss in lines, manual methods of solution for radial networks, three phase balanced primary lines.

UNIT – V: Protection

Objectives of distribution system protection, types of common faults and procedure for fault calculations. Protective Devices: Principle of operation of Fuses, Circuit Reclosures, and line sectionalizes, and circuit breakers.

Coordination: Coordination of Protective Devices: General coordination procedure, residual current circuit breaker RCCB (Wikipedia)

UNIT – VI: Compensation for Power Factor Improvement & Voltage Control

Capacitive compensation for power factor control, Different types of power capacitors, shunt and series capacitors, effect of shunt capacitors (Fixed and switched), Power factor correction, capacitor allocation- Economic justification- Procedure to determine the best capacitor location.

Voltage Control: Equipment for voltage control, effect of series capacitors, effect of AVB/AVR, line drop compensation.

Text Book:

1. "Electric Power Distribution System Engineering"- by Turan Gonen, Mc Graw-hill Book Company.

Reference Books:

1. Electric Power Distribution- by A. S. Pabla, Tata Mc Graw – hill Publishing Company, 4th edition, 1997.
2. Electrical Power Distribution Systems by V. Kamaraju, Right Publishers.

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Elective - II

HVDC TRANSMISSION SYSTEMS

IV Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To introduce the concepts of HVDC Transmission.
- To familiarize with various converters , controllers and networks used in HVDC Transmission.

Learning Outcomes:

Students will be able to

- design the voltage level and ratings of the HVDC system for a given amount of power transfer.
- identify the suitable converter and its control scheme in HVDC Transmission.
- estimate the amount of reactive power to be compensated for a given HVDC Transmission system.
- develop a suitable model for a given AC- DC network.
- choose appropriate protecting device for various faults in HVDC stations.
- design a suitable filter to eliminate harmonics in the HVDC System.

UNIT – I: Basic Concepts

Economics & Terminal equipment of HVDC transmission systems: Types of HVDC Links – Apparatus required for HVDC Systems – Comparison of AC &DC Transmission, Application of DC Transmission System – Planning & Modern trends in D.C. Transmission.

UNIT – II: Analysis Of HVDC Converters

Choice of Converter configuration – analysis of Graetz – characteristics of 6 Pulse & 12 Pulse converters –Cases of two 3 phase converters in star –star mode – their performance. Principal of DC Link Control – Converters Control Characteristics – Firing angle control – Current and extinction angle control – Effect of source inductance on the system; Starting and stopping of DC link; Power Control.

UNIT – III: Reactive Power Control And In HVDC

Reactive Power Requirements in steady state-Conventional control strategies-Alternate control strategies sources of reactive power-AC Filters – shunt capacitors-synchronous condensers.

UNIT – IV: Power Flow Analysis in AC/DC Systems

Modelling of DC Links-DC Network-DC Converter-Controller Equations-Solution of DC loadflow – P.U.System for d.c. quantities-solution of AC-DC Power flow-Simultaneous method-Sequential method.

UNIT – V: Converter Faults, Harmonics & Protection

Converter faults – protection against over current and over voltage in converter station – surge arresters – DC breakers –Audible noise-space charge field-corona effects on DC lines-Radio interference. Generation of Harmonics, Characteristics and Non- Characteristics harmonics, Calculation of voltage & Current harmonics – Effect of Pulse number on harmonics. Types of AC filters, Design of Single tuned filters –Design of High pass filters.

Text Books:

1. HVDC Power Transmission Systems: Technology and system Interactions – by K.R.Padiyar, New Age International (P) Limited Publishers, First Edition, 2005.
2. EHVAC and HVDC Transmission Engineering and Practice – S.Rao. Khanna Publishers, 1990.

Reference Books:

1. HVDC Transmission – J.Arrillaga. published by the institution of electrical engineering, London, UK, 1998.
2. Direct Current Transmission – by E.W.Kimbark, John Wiley & Sons, First Edition.
3. Power Transmission by Direct Current – by E.Uhlmann, B.S.Publications, First Edition.

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Elective - II

VLSI DESIGN

IV Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To introduce the students about IC technology, electrical properties of MOS and BiCMOS circuits.
- To make the students familiar with VLSI design steps and chip design methodologies.

Learning Outcomes:

Students will be able to

- familiarize about IC fabrication technology and various electrical properties of MOS, BiCMOS devices.
- design various logic circuit functions using MOS transistors.
- familiarize with various chip design methods.
- synthesize various digital circuits using VHDL.

UNIT – I: Introduction to IC Technology

IC Era, Technology trends, planar process technology: Crystal growth of the wafer, Thermal oxidation,Photo Lithography, Etching, Diffusion, Ion implantation, Metallization. Fabrication processing steps forBipolar and MOS transistors (NMOS, PMOS, CMOS and BiCMOS).

UNIT – II: Basic Electrical properties of MOS, CMOS and BiCMOS

Basic MOS transistor operation, Threshold Voltage Vt, Ids to Vds relationship, Transconductance gm, output conductance gds, Figure of merit $ù_0$, MOS, CMOS, BiCMOS inverters, Switch logic, Zpu/Zpd ratios of inverters, Latch-up in CMOS circuits.

UNIT – III: VLSI Circuit Design Process

VLSI circuit design process, MOS layers, Stick and layout representations of layers, Lambda and Micron based Design rules, Stick and Layout diagrams for NMOS and CMOS inverters, and other design examples such as NAND, NOR gates etc.,

UNIT – IV: Basic Circuit Concepts and Scaling

Sheet resistance, Rsh concept applied to NMOS and CMOS inverters, Area capacitance of layers, StandardUNIT of capacitance, some area capacitance

calculations, Wiring capacitance, Delay UNIT and Inverter delays. Scaling models and scaling factors, scaling factors for various device parameters, Limitations of Scaling.

UNIT – V: Chip Design Methodologies and Testing

Full custom Design, Semicustom Design-Standard cells, Gate arrays, Programmable designs- CPLD,FPGA. Importance of testing, Types of Testing, DFT techniques Ad-hoc, Scan based and Self-testtechniques.

UNIT – VI: High Level Design Flow:

Design flow, RTL simulation, logic synthesis, functional gate level verification, place and route, post layout timing simulation, static timing, VHDL synthesis programming approach.

Text Books:

1. Essentials of VLSI Circuits and Systems-Kamran Eshraghian, Douglas A Pucknell and Sholeh Eshraghian, Prentice-Hall of India, 2005 Edition.
2. VHDL programming by example-Douglas L Perry, 4th Edition, TMH Publishers, 2003.
3. Principles of CMOS VLSI Design- Weste, neil H.E, 2nd Edition.

Reference Books:

1. VLSI Design-K.Lal Kishore and V.S.V.Prabhakar, 2009 Edition.
2. VLSI Design –Debaprasad Das, Oxford University Press, 2010.
3. Digital Design Principles & practices-John F.Wakerly, 3rd Edition.

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Elective - II

SPECIAL ELECTRICAL MACHINES

IV Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To familiarize the students with the constructional details, operating principles, theory of torque production and characteristics of various electrical machines.
- To expose the students to different power controllers and control practices associated with various electrical machines.

Learning Outcomes:

Students will be able to

- demonstrate the knowledge and understanding of constructional details, working principles and control practices associated with various electrical machines.
- describe the process of emf generation and torque production in various electrical machines.
- analyze the speed-torque characteristics of various electrical machines.
- apply the knowledge of Mathematics and Physical Science in designing the closed loop control strategy for various electrical machines to meet specified performance requirements.
- suggest and select an appropriate electrical machine for a specified application.

UNIT – I: Switched Reluctance Motors

Constructional features – Principle of operation – Theory of torque production – Speed and torque control – Closed loop control of SRM – Applications

UNIT – II: Synchronous Reluctance Motors

Constructional features – Types – Axial and Radial flux motors – Operating principles –Variable Reluctance and Hybrid Motors – SYNREL Motors – Voltage and Torque Equations - Phasor diagram – Characteristics

UNIT – III: Permanent Magnet Brushless D.C. Motors

Construction – Principle of operation – EMF and Torque equations – Torque and Speed characteristics – power controllers –applications

UNIT – IV: Permanent Magnet Synchronous Motors

Construction – Principle of operation – Phasor diagram – EMF and Torque equations – Torque and Speed characteristics – power controllers – Applications

UNIT – V: Stepper Motors

Constructional features – Principle of operation – Theory of torque production – Types of motors – Closed loop control – Applications

UNIT VI: Linear Motors

Linear Induction motor (LIM) classification – Construction – Principle of operation – DC Linear motor (DCLM) types – Circuit equation – DCLM control – Linear Synchronous motor (LSM) – Types – Performance equations – Applications of Linear Motors.

Text Books:

1. 'Special Electrical Machines' K.Venkata Ratnam, University press, 2009, New Delhi.
2. "Brushless Permanent Magnet & Reluctance Motor Drives', T.J.E. Miller, Clarenden press, , 1989, Oxford.
3. "Stepping Motors: A Guide to Modern theory and practice", P.P.Acarnley, Peter Peregrines, London, 2002

Reference Books:

1. 'Linear Electric Motors: Theory Design and Practical Applications', Naser, A. and Boldea.L, Prentice Hall of India, 1987.
2. 'Stepping Motors and their Microprocessor Controls', Kenjo, T., Clarendon Press, 1984.
3. 'Electric Motor Drives - Modeling, Analysis, and Control', R.Krishnan, Prentice Hall of India Pvt Ltd, 2003.
4. 'Dynamic Simulation of Electric Machinery Using Matlab/Simulink', C.M. Ong, Prentice Hall, 1998.

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Elective - III

ELECTRICAL MACHINE DESIGN

IV Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To expose the students to the various types of electrical materials, modes of heat dissipation and cooling methods used in electrical machines.
- To develop an understanding on the winding diagrams of various types of windings used in electrical machines.
- To familiarize the students with the constructional details, and design procedure of various electrical machines.

Learning Outcomes:

Students will be able to

- describe the material selection and appropriate cooling method used in various electrical machines.
- adescribe the general design procedure for electrical machines.
- suggest the suitable type of winding and draw the winding diagrams of various electrical machines.
- apply the knowledge of Mathematics and Physical Science in designing the stator and rotor of various electrical machines.
- demonstrate the knowledge and understanding of constructional details, principle of operation, output equation of various electrical machines.
- determine the optimal design of electrical machine to meet specified performance requirements.

UNIT – I: Introduction to Electrical Machine Design

Design concepts, Design factors, Limitations in design, General design procedure, electrical materials –conducting, insulating and magnetic materials, Modes of heat dissipation - conduction, radiation and convection, cooling of rotating electrical machines and transformers.

UNIT – II: Armature Windings (DC & AC)

Single layer and double layer windings, lap and wave windings, Distributed and concentrated windings, Integral slot and fractional slot windings, developed diagrams of armature windings.

UNIT – III: DC Machines

Constructional details, Choice of specific electric and magnetic loadings, Choice of number of poles, Output equation, separation of D and L, Design of yoke, pole, shunt field winding and series field winding, number of armature - conductors, coils, and slots, Cross-section of armature conductors, slot dimensions, design of commutator and brushes.

UNIT – IV: Transformers

Construction details - single phase and three phase transformers, Comparison of core and shell type, Choice of flux density, Output equation, Design of core and yoke, Transformer windings, Coil design, determination of - number of turns, Resistance, Leakage reactance, no load current, losses and efficiency.

UNIT – V: Induction Motors

Principles of operation, choice of specific electric and magnetic loadings, output equation, choice of conductor rating, stator winding, and stator slots. Squirrel cage rotor design - air gap length. rotor slots and rotor bars. Design of wound rotor - rotor slots, windings, short circuit (blocked rotor currents) .

UNIT – VI: Synchronous Machines

Constructional features, Output equation, Specific loadings, Main dimensions, short circuit ratio and its effect on machine performance, number of stator slots, turns per phase, Conductor section, Design of damper windings, Design of field windings.

Text Books:

1. "A course in Electrical Machine Design", A.K.Sawhney, Dhanpath Rai & Co
2. "Design of Electrical Machines",V.N.Mittle & A.Mittal, Standard Publishers Distributors, Delhi

Reference Books:

1. "Principles of Electrical Machine Design", R.K. Agarwal, S.K.Kataria and Sons, Delhi
2. "Performance and Design of DC Machines", Clayton & Hancock, ELBS.
3. "Performance and Design of AC Machines", M.G.Say, Pitman, ELBS.

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Elective - III

PROGRAMMABLE LOGIC CONTROLLER

IV Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To introduce the basic concepts of programmable logic controllers and its applications.
- To familiarize the students in programming formats and construction of PLC ladder diagrams.

Learning Outcomes:

Students will be able to

- describe the Characteristics of Registers, module addressing, holding registers, input registers, output registers and determine its importance in Ladder diagram.
- apply the knowledge of programming formats for construction of PLC ladder diagrams in Boolean algebra systems.
- develop ladder diagrams for process control.
- describe the Analog modules and systems, Analog signal processing, multi bit data processing.
- expose students various Industrial applications of PLC.

UNIT – I: PLC Basics

PLC system, I/O modules and interfacing, CPU processor, programming equipment, programming formats, construction of PLC ladder diagrams, devices connected to I/O modules.

UNIT – II: PLC Programming

Input instructions, outputs, operational procedures, programming examples using contacts and coils. Drill press operation.

Digital logic gates, programming in the Boolean algebra system, conversion examples. Ladder diagrams for process control: Ladder diagrams and sequence listings, ladder diagram construction and flow chart for spray process system.

UNIT – III: PLC Registers

Characteristics of Registers, module addressing, holding registers, input registers, output registers.

UNIT – IV: PLC Functions

PLC Functions: Timer functions and Industrial applications, counters, counter function industrial applications, Arithmetic functions, Number comparison functions, number conversion functions.

UNIT – V: Data handling functions

Data handling functions: SKIP, Master control Relay, Jump, Move, FIFO, FAL, ONS, CLR and Sweep functions and their applications. Bit Pattern and changing a bit shift register, sequence functions and applications, controlling of two axes and three axis Robots with PLC, Matrix functions

UNIT – VI: Analog PLC operation

Analog modules and systems, Analog signal processing, multi bit data processing, analog output application examples, PID principles, position indicator with PID control, PID modules, PID tuning, PID functions.

Text Books:

1. Programmable Logic Controllers – Principle and Applications by John W. Webb and Ronald A. Reiss, Fifth Edition, PHI.
2. Programmable Logic Controllers – Programming Method and Applications by JR. Hackworth and F.D Hackworth Jr. – Pearson, 2004.

Reference Books:

1. Programmable Logic Controllers Hardware and Programming by Max Rabiee Goodheart-Wilcox.
2. Programmable Logic Controllers by Frank D.Petuzeela McGraw-Hill.
3. Industrial Automation and Process control by Jon Stenerson Prentice-Hall.

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Elective - III

COMPUTER ORGANIZATION AND ARCHITECTURE

IV Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To familiarize with organizational aspects of memory, processor and I/O.

Learning Outcomes:

Students will be able to

- understand different types of instructions.
- differentiate micro-programmed and hard-wired control units.
- represent data in fixed and floating point formats.
- analyze the performance of the hierarchical organization of memory.
- summarize different data transfer techniques.
- demonstrate the use of pipelining and multiprocessor.

UNIT – I:

Computer Types, functional units, Computer Registres, Register Transfer language, Register Transfer Bus and memory transfers, Arithmetic, logic and shift micro-operations, Arithmetic logic shift unit.

Instruction codes, Computer instructions, Instruction cycle.

Memory – Reference Instructions, Input – Output and Interrupt, STACK organization, Instruction formats, Addressing modes, RISC.

UNIT – II: Micro Programmed Control

Control memory, Address sequencing, design of control unit - Hard wired control, Micro programmed control.

UNIT – III: Computer Arithmetic

Data representation- Fixed point, Floating point, Addition and subtraction, multiplication Algorithms, Division Algorithms, Floating – point Arithmetic operations, Decimal Arithmetic operations.

UNIT – IV: Memory

Memory Hierarchy, main memory, auxiliary memory, associative memory, cache memory, virtual memory, memory management hardware.

UNIT – V: Input-Output Organization

Peripheral Devices, Input-Output Interface, Asynchronous data transfer, Modes of Transfer, Priority Interrupt, Direct memory Access, Input –Output Processor (IOP) Serial communication.

UNIT – VI: Pipeline

Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline.

Multi-Proicessors: Characteristics of Multiprocessors, Interconnection Structures, Inter processor Arbitration, Inter Processor Communication and Synchronization, Cache Coherence.

Text Books:

1. M. Moris Mano, Computer Systems Architecture, Pearson/PHI, 3rd edition.

Reference Books:

1. Carl Hamacher, Zvonks Vranesic, SafeaZaky, Computer Organization, McGraw Hill, 5th edition.
2. William Stallings, Computer Organization and Architecture, Pearson/PHI, 6th edition.
3. John L. Hennessy and David A. Patterson, Computer Architecture a quantitative approach, Elsevier, 4th Edition.

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Elective - III

FLEXIBLE AC TRANSMISSION SYSTEMS

IV Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To Introduce the Flexible AC Transmission System devices for understanding the power flow in transmission lines.
- To familiarize the students with the basic types of FACTS controllers.
- To develop an understanding of different types of converters and their operation in different modes.
- To expose students to the practical problems associated with the operation of Power system and the necessity of FACTS devices.
- To gain the knowledge of selection of appropriate FACTS device for a particular application.

Learning Outcomes:

Students will be able to

- apply the knowledge of FACTS devices for enhancing power handling capacity in the transmission network.
- demonstrate the knowledge and understanding of the fundamental principles and control practices associated with FACTS controllers.
- describe different types of FACTS controllers.
- determine the operational related problems of transmission system and suggest the remedial measures.
- select an appropriate FACTS controller to meet specified performance requirements.

UNIT – I: FACTS concepts

FACTS concepts, Transmission interconnections, power flow in an AC System, loading capability limits, Dynamic stability considerations, importance of controllable parameters, basic types of FACTS controllers, benefits from FACTS controllers.

UNIT – II: Voltage source converters

Single phase, three phases, full wave bridge converters, transformer connections for 12 pulse, 24 and 48 pulse operation. Three level voltage source converter, pulse width modulation converter, basic concept of current source converters, and comparison of current source converters with voltage source converters.

UNIT – III: Static shunt compensation

Objectives of shunt compensation, midpoint voltage regulation, voltage instability prevention, improvement of transient stability, Power oscillation damping, methods of controllable var generation, variable impedance type static var generators, switching converter type var generators, hybrid var generators.

UNIT – IV: SVC and STATCOM

The regulation and slope transfer function and dynamic performance, transient stability enhancement and power oscillation damping, operating point control and summary of compensation control.

UNIT – V: Static series compensators

Concept of series capacitive compensation, improvement of transient stability, power oscillation damping, functional requirements. GTO thyristor controlled series capacitor (GSC), thyristor switched series capacitor (TSSC), and thyristor controlled series capacitor (TCSC), control schemes for GSC, TSSC and TCSC.

UNIT – VI: Static Voltage and Phase Angle Regulators

Voltage and phase angle regulation, power flow control by phase angle regulators, real and reactive loop power flow control, improvement of transient stability and power oscillation damping with phase angle regulators, functional requirements, continuously controllable thyristor tap changers, thyristor tap changer with discrete level control, switching converter-based voltage and phase angle regulators, hybrid phase angle regulators

Text Books:

1. "Understanding FACTS Devices" N.G.Hingorani and L.Guygi, IEEE Press, Indian Edition is available:—Standard Publications

Reference Books:

1. HVDC & FACTS Controllers: applications of static converters in power systems-Vijay K.Sood- Springer publishers.
2. Sang.Y.H and John.A.T, "Flexible AC Transmission systems" IEEE Press (2006).

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Open Elective - III

BUILDING SERVICES
(Other than CE)
IV Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To introduce the concepts of basic services and its applications.
- To equip students with the required information and technologies of building services.
- To application of this knowledge in architectural design project.
- To evolving understanding in students to choose appropriate systems and integrate the same in their design projects.

Learning Outcomes:

Students will be able to

- understand the measures to be taken while planning for sanitation and installation of various sanitary units.
- identify the minimizing and disposal techniques of waste and garbage.
- evaluate the illumination strategies by consuming less energy resources.
- acquaint with distribution of electricity to all units of the project.
- provide fire protection units at service points.

UNIT – I: Water Supply

Tapping of water, Storage and distribution of water in premises, Pipes, piping network, specials, materials, joinery, installation of network both open and concealed, all appurtenances required for installations e.g. taps, faucets, mixing units, valves, flushing cisterns, flushing valves and other fittings.

UNIT – II: Drainage and Sanitation

Study of sanitary fittings with reference to use, materials and functions, traps and their uses, classification of traps as per use and shape, pipes and piping systems, specials, vent and anti-siphonage systems, jointing and installations, storm water and roof drainage systems and their installations, underground drainage systems with application of ventilation, self cleansing velocity, laying of drains to required gradients and testing of drains, disposal of sewage within the premises using septic tanks, effluent treatment plants, their function and layouts.

UNIT – III: Room Acoustics

Key terms & Concepts, Introduction, Acoustic principles, Sound power and pressure levels, Sound pressure level, absorption of sound, Reverberation time,

Transmission of sound. Sound pressure level in a plant room, out door sound pressure level, Sound pressure level in intermediate space, noise rating, Data requirement, output data.

UNIT – IV: Lighting and Ventilation

Indoor lighting- natural and artificial, systems of lighting such as direct, indirect, diffused, applications of lighting systems with reference to levels of illumination for various uses and lumen method calculations, light fittings/ luminaries-All types of energy efficient lamps, optic fiber, led etc. Ventilation - Introduction, Ventilation requirements, Natural and Mechanical systems, Removal of heat gains Psychrometric cycles, Ventilation rate measurement, Material for ventilation duct work.

UNIT– V: Electrification

Introduction to generation and distribution of electric power in urban areas, substations for small schemes in industrial units, electrical system installations in a building from the supply mains to individual outlet points, including meter board, distribution board and layout of points with load calculations, electrical wiring systems for small and large installations including different material specification electrical control and safety devices- switches, fuse, circuit breakers, earthing, lightning conductors etc.

UNIT – VI: Fire Protection, Plant and Service Areas

Key terms and concepts, introduction, Fire classification, Portable existing gushers, Fixed – Fire fighting installation, fire detectors and alarus, smoke ventilation. Key terms and conditions, Introduction, Mains and services, Plant room space requirements, service ducts, pipe, duct and cable supports, plant connections, Co-ordinated service drawings boiler room ventilation.

Text Books:

1. S.C.Rangwala, Water supply and sanitary engineering, Charotar publishing house.
2. A. Kamala & DL Kanth Rao, Environmental Engineering, Tata McGraw – Hill publishing company Limited

Reference Books

1. Technical teachers Training Institute (Madras), Environmental Engineering, Tata McGraw Hill publishing Company Limited.
2. M.David Egan, Concepts in Building Fire Safety.28
3. V.K.Jain, Fire Safety in Building.
4. E.G.Butcher, Smoke control in Fire-safety Design.
5. National Building Code 2005.

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Open Elective - III

MODERN OPTIMIZATION TECHNIQUES

IV Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To familiarize the students with the concepts of evolutionary optimization
- To develop an understanding of Genetic Algorithm
- To expose students to Particle Swarm Optimization
- To introduce the principles of Differential Evolution
- To gain knowledge on Ant Colony Optimization

Learning Outcomes:

Students will be able to

- analyze the pros and cons of different optimization techniques.
- describe the concepts of various techniques.
- develop suitable algorithms for the implementation of above techniques.
- apply these techniques to solve various engineering optimization problems .
- compare the performance of various techniques.
- select a suitable technique to optimize a given problem.

UNIT – I: Definition-Classification of optimization problems

Unconstrained and Constrained optimization-Optimality conditions, Evolution in nature-Fundamentals of Evolutionary algorithms- Evolutionary Strategy and Evolutionary Programming.

UNIT – II: Genetic Algorithm

Basic concepts- search space- working principle -encoding-fitness function - Genetic Operators-Selection: Roulette-wheel, Boltzmann, Tournament, Rank and Steadystate-Elitism- Crossover: single-pint, two-point, multi-point, uniform, matrix and cross over rate.

UNIT – III: Mutation

Mutation, mutation rate. Variations of GA: Adaptive GA and Real coded GA - Issues in GA implementation-Particle Swarm Optimization: Introduction-Fundamental principles of Particle Swarm Optimization-Velocity Updating-Advanced operators-Parameter selection.

UNIT – IV: Binary, discrete and combinatorial PSO

Implementation issues-Convergence issues, Multi-objective PSO (Dynamic neighbourhood PSO-Vector evaluated PSO)-Variations of PSO: weighted, repulsive, stretched, comprehensive learning, combined effect PSO and clonal PSO.

UNIT – V: Differential Evolution

Introduction-Fundamental principles of Differential Evolution- different strategies of differential evolution-function optimization formulation-mutation and crossover operators-estimation and selection-Discrete Differential Evolution.

UNIT – VI: Ant Colony Optimization

Introduction-Fundamental principles of Ant colony optimization-Ant foraging behaviour-initialization-transition strategy-pheromone update rule- applications.

Text Books:

1. Kalyanmoy Deb, "Multi objective optimization using Evolutionary Algorithms", John Wiley and Sons, 2008.
2. E. Goldberg, Genetic Algorithms in search, Optimization and machine learning, 1989
3. Particle Swarm Optimization, An overview by Riccardo Poli, James Kennedy, Tim Blackwell, Springer
4. Differential Evolution, A Practical Approach to Global Optimization, Authors: Price, Kenneth, Storn, Rainer M., Lampinen, Jouni A. , Springer
5. Ant Colony Optimization by Marco Dorigo, Thomas Stutzle, MIT Press.

Reference Books:

1. "Modern optimization techniques with applications in Electric Power Systems", Soliman Abdel Hady, Abdel Aal Hassan Mantawy, Springer,2012.
2. 'Introduction to Genetic Algorithms", M. Mitchell, Indian reprint, MIT press Cambridge, 2nd edition, 2002.
3. R.C. Eberhart, Y.Sai and J. Kennedy, Swarm Intelligence , The Morgan Kaufmann Series in Artificial Intelligence, 2001.
4. "Biomimicry for optimization, Control and Automation, K.M. Passino, Springer-Verlag, London, UK, 2005.
5. "New Optimization Techniques in Engineering, G. C. Onwubolu, & B. V. Babu, Springer- Verlag Publication, Germany, 2003.

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Open Elective - III

ELECTRICAL POWER UTILIZATION
(Other than EEE)
IV Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To familiarize the students with the mechanics of train movement.
- To gain knowledge on selection of appropriate heating method.
- To introduce the laws of illumination.
- To develop an understanding of refrigeration and air-conditioning.
- To expose students to the process of Electro Lysis.

Learning Outcomes:

Students will be able to

- analyze the appropriate type of traction system.
- select a suitable method of heating for a given application.
- design an illumination system.
- calculate the required tonnage capacity for a given air-conditioning system.
- select a suitable charging method.
- evaluate domestic wiring connection and debug any faults occured.

UNIT – I: Electrical Traction

Features of an Ideal Traction System, Systems of Electrical Traction, Traction Supply System, Mechanism of Train Movement, Speed- Time Curve, Traction Motors, Tractive Effort and Horse Power, Speed Control Schemes, Electric Braking, Recent Trends in Traction.

UNIT – II: Electric Heating

Classification, Heating Element, Losses in Oven and Efficiency, Resistance Furnace, Radiant Heating, Induction Heating, High Frequency Eddy Current Heating, Dielectric Heating, Arc Furnace, Heating of Furnace, Electric Welding, Methods and Equipments.

UNIT – III: Illumination

Radiant Energy, Terms and Definitions, Laws of Illumination, Polar Curves, Photometry, MSCP, Integrating Sphere, Luminous Efficacy, Electrical Lamps, Design of Interior and Exterior Lighting Systems, Illumination Levels for Various Purposes, Light Fittings, Factory Lighting, Flood Lighting, Street Lighting, Energy Conservation in Lighting.

UNIT – IV: Air Conditioning and Refrigeration

Control of Temperature, Protection of Motors, Simple Heat-Load and Motor Calculations, Various Types of Air Conditioning, Functioning of Complete Air Conditioning System, Type of Compressor Motor, Cool Storage, Estimation of Tonnage Capacity and Motor Power.

UNIT – V: Electro-Chemical Processes

Electrolysis – Electroplating – Electro deposition – Extraction of metals current, Efficiency - Batteries – types – Charging Methods.

UNIT – VI: Basics of Domestic Electrical Wiring

Types of Cables, Flexible Wires Sizes and Current Capacity, Use of Fuse, MCB and MCCB (Working and Construction), Idea about Megger, Earthling – Domestic and Industrial.

Text Books:

1. "Utilisation of Electric Energy" Garg and Girdhar, 1982, Khanna Publisher.
2. "Art and Science of Utilization of Electrical Energy", Pratab H., Second Edition, Dhanpat Rai and Sons, New Delhi.

Reference Books:

1. "Generation, Distribution and Utilization of Electrical Energy",Wadhwa C.L., 1993, Wiley Eastern Limited,
2. "Electric Energy Utilization and Conservation", S.C.Tripathy, 1993, Tata McGraw Hill.
3. "Utilization of Electric Power", R.K. Rajaput,Laxmi Publications, 1st Edition, 2007.
4. "Utilization of Electric Power", N.V.Suryanarayana, New Age International, 2005
5. "Generation, Distribution and Utilization of Electrical Energy, C.L.Wadhwa, New Age International, 4th Edition, 2011.
6. Refrigiration and Air-conditioning, M. Prasad, Wiley Eastern Ltd., 1995 .
7. "Utilization of Electrical Energy", Taylor E. Openshaw, 1968, Orient Longman.
8. "Utilization of Electric Power and Electric Traction", Gupta J. B., 2002, S. K. Kataria and Sons.

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Open Elective - III

ROBOTICS
(Other than ME)
IV Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To familiarize the students with anatomy, kinematics, sensors and dynamics of a programmable machine, robot.

Learning Outcomes:

Students will be able to

- distinguish between fixed automation and programmable automation.
- identify various components of robot.
- select appropriate type of actuator for a joint.
- illustrate robot applications in manufacturing.
- analyze kinematics of a robot.
- derive equations of motion of a manipulator for a particular application.
- write a programme to control a robot for execution of a work cycle.

UNIT – I: Introduction

Automation and Robotics, Components of Robot – Mechanical manipulator-control system and end effectors-Types of end effectors — Requirements and challenges of end effectors classification of robots by coordinate system and control system. Control resolution, accuracy, repeatability and work volume of robot.

UNIT – II: Robot actuators and Feed back components

Actuators: Pneumatic, Hydraulic actuators, electric & stepper motors.
Feedback components: position sensors – potentiometers, resolvers, encoders – Velocitysensors.

UNIT – III: Robot Application in Manufacturing

Material Transfer - Material handling, loading and unloading- Processing - spot and continuous arc welding & spray painting - Assembly and Inspection.
Future applications of robots.

UNIT – IV: Motion Analysis

Homogeneous transformations as applicable to rotation and translation – problems.

Manipulator Kinematics: Specifications of matrices, D-H notation joint coordinates and world coordinates Forward and inverse kinematics – problems.

UNIT – V:

Differential transformation and manipulators, Jacobians – problems.Dynamics: Lagrange – Euler and
Newton – Euler formations – Problems.

UNIT – VI:

Trajectory planning and avoidance of obstacles, path planning, Slew motion, joint integrated motion – straight line motion – Robot programming, languages and software packages.

Text Books:

1. Industrial Robotics / Groover M P /Pearson Edu.
2. Robotics and Control / Mittal R K & Nagrath I J / TMH.

Reference Books:

1. Robotics / Fu K S/ McGraw Hill.
2. An Introduction to Robot Technology, / P. Coiffet and M. Chaironze / Kogam Page Ltd. 1983 London.
3. Robotic Engineering / Richard D. Klafter, Prentice Hall.
4. Robot Analysis and Intelligence / Asada and Slow time / Wiley Inter-Science.
5. Introduction to Robotics / John J Craig / Pearson Edu.
6. Robot Dynamics & Control – Mark W. Spong and M. Vidyasagar / John Wiley & Sons (ASIA) Pte Ltd.

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Open Elective - III

ASSISTIVE TECHNOLOGIES

IV Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- Understand the laws that govern the use of assistive technology in higher education.
- Evaluate appropriate pieces of technology according to a student's specific disability and academic needs.

Learning Outcomes:

Students will be able to

- identify the legislative policies connected with assistive
- discuss Universal design principles in the context of general education environments and curriculum materials.
- explore the process for finding the right technology and the right applications, and determine how to pay for it.
- explore and discuss how to establish a technology team with an assistive technology representative, perform a school wide assessment of all student needs and develop a school and/or classroom tech plan.

UNIT – I: Introduction to Assistive Technology (AT) Devices and Services

Assistive Technology Defined. Historical Overview of Assistive Technology. Multidisciplinary Nature of at Service Provision.

UNIT – II: Adaptations Framework for Considering Assistive Technology

Introduction to the Adaptations Framework, Setting-Specific Demands, Person-Specific Characteristics, Adaptations, Evaluation of Effectiveness of Adaptations**.**

UNIT – III: Assistive Technology Assessments

Overview of Assessment Issues, Overview of General Assessments , Assistive Technology Assessments, Assessment Components.

UNIT – IV: Enhance Speech Communication

Nature of Spoken Language, Introduction to Augmentative and Alternative Communication Systems, Selection Techniques for Aided Communication Systems, Overview of Nonelectronic Systems and Electronic Devices.

UNIT – V: Mobility & Access to Information

Introduction to Mobility Adaptations, Basic Design Considerations, Seating and Positioning Issues. Introduction to Information Access, Computer Access, Telecommunication, Listening and Print Access.

UNIT – VI: Enhance Independent Living

Introduction to Independent Living, Devices for Daily Life, Switches and Scanning. Environmental Control Units, Access to Management Devices.

Text Books:

1. Diane P edrotty Bryant, Brian R. Bryant, Allyn and Bacon "Assistive Technology for People with Disabilities", 2nd edition ***Psycho-Educational Services***
2. Amy G.Dell, Deborah A.Newton, Jerry G.Petroff, "Assistive Technology in the class room Enhancing the school experiences of students with disabilities", Pearson Publications

Reference Books:

1. Marion A.Hersh, Michael A.Johnson , " Assistive Technology for the Hearing-impaired, Deaf and Deafblind", Springer Publications
2. Meeko Mitsuko K.Oishi, Ian M.Mitchell, H.F. Machiel vanderloss, "Design and use of Assistive Technology, Springer Publications.
3. Eckehard Fozzy Moritz, "Assistive Technologies for the Interaction of the Elderly", Springer Publications.

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Open Elective - III

INTRODUCTION TO EMBEDDED SYSTEMS

(Other than ECE, CSE & IT)

IV Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To gain knowledge on basic quantitative principles of embedded system design and performance measurements.
- To study about different embedded firmware and RTOS concepts

Learning Outcomes:

Students will be able to

- know the design concepts of different embedded systems.
- know the embedded system components and firmware.
- learn about the techniques of the task communication and RTOS concepts
- design principles of RTOS Based Embedded System Design

UNIT – I: Introduction to Embedded Systems

Definition of Embedded System, Embedded Systems Vs General Computing Systems, History of Embedded Systems, Classification, Major Application Areas, Purpose of Embedded Systems, Characteristics and Quality Attributes of Embedded Systems.

UNIT – II: Typical Embedded System

Core of the Embedded System: General Purpose and Domain Specific Processors, ASICs, PLDs, Commercial Off-The-Shelf Components (COTS), Memory selection for Embedded Systems, Processor selection for embedded system.

UNIT – III: Embedded System Components and Firmware

Reset Circuit, Brown-out Protection Circuit, Oscillator Unit, Real Time Clock, Watchdog Timer, Embedded Firmware design approaches and Development languages.

UNIT – IV: Embedded communication interface

Communication Interface: Onboard and External Communication Interfaces, Serial/ Parallel Communication – Serial communication protocols -RS232 standard – RS485 –Serial Peripheral Interface (SPI) – Inter Integrated Circuits (I2C).

UNIT – V: RTOS Based Embedded System Design

Operating System Basics, Types of Operating Systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling.

UNIT – VI: Task Communication

Task Synchronization, Task communication/Synchronization Issues, Task Synchronization Techniques, Device Drivers, How to Choose an RTOS.

Text Books:

1. Shibu K.V, "Introduction to Embedded Systems ",Mc Graw Hill. (I to VI Units)
2. Raj Kamal,"Embedded Systems", TMH. (IV Unit)

Reference Books:

1. Frank Vahid, Tony Givargis,"Embedded System Design", John Wiley.
2. Lyla, "Embedded Systems", Pearson, 2013
3. David E. Simon, "An Embedded Software Primer", Pearson Education.

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Open Elective - III

SOCIAL NETWORKS

IV Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To provide basic concepts of Social networks and make them learn the psychological foundations of Social networks.
- To Know about Network Influence and diffusion

Learning Outcomes:

Students will be able to

- describe Social network concepts.
- categorize segmentation and Characteristics.
- analyze psychological foundation of Social networks.
- evaluation of various organizations of networks.
- define Network Influence and diffusion.
- design social network systems in different areas.

UNIT – I:

Basic social network concepts-Distributions- Multiplexity-Roles and positions-Embedded of the informal within instituted or named networks.

UNIT – II:

Network segmentation-Named and Unnamed Network segments-segmenting groups on the basis of cohesion-structural similarity and structural equivalence.

UNIT – III:

Psychological foundations of social networks-safety-effectiveness-Status-Limits on individual networks

UNIT – IV:

Organizations and networks Information-Driven organizations-Bridging the gaps: Network size, diversion and social cohesion

UNIT – V:

Networks, Influence and diffusion – influence and decision making-epidemiology and network diffusion.

UNIT – VI:

Network as social capital –Individual level social capital-social capital as an attribute of social systems.

Text Books:

1. Understanding Social Networks: Theories, Concepts, and Findings By Charles Kadushin.

Reference Books:

1. Social Networks and the Semantic Web By Peter Mika.
1. **Social Network Analysis: Methods and Applications** By Stanley Wasserman, Katherine Faust

Open Elective - III

MOBILE APPLICATION DEVELOPMENT

(Other than CSE & IT)

IV Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course objectives:

- To prepare students with skills and knowledge of Mobile application development using J2ME Technology.
- Understand the Android OS architecture and able to develop the applications for mobile devices

Learning Outcomes:

Students will be able to

- configure a J2ME environment for development.
- plan and design of J2ME applications.
- access and work with database under the J2ME.
- reproduce the installation of the Android Eclipse SKD.
- implement the user interface for android applications.
- use best design practices for mobile development, designing applications for performance and responsiveness and also implement communication between the mobile devices.

UNIT – I: J2ME Overview

Inside J2ME, How J2ME Is Organized, J2ME and Wireless Devices, What J2ME Isn't, Other Java Platforms for Small Computing Devices.

J2ME Architecture and Development Environment : J2ME Architecture ,Small Computing Device Requirements, Run-Time Environment, MIDlet Programming .Java Language for J2ME ,J2ME Software Development Kits ,Hello World J2ME Style Multiple MIDlets in a MIDlet Suite ,J2ME Wireless Toolkit.

UNIT – II:

Commands, Items, and Event Processing: J2ME User Interfaces ,Display Class ,The Palm OS Emulator ,Command Class ,Item Class ,Exception Handling .High-Level Display: Screens :Screen Class , Alert Class, Form Class ,Item Class ,List Class, Text Box Class, Ticker Class.

Canvas: The Canvas, User Interactions Graphics, Clipping Regions, Animation

UNIT – III:

Record Management System : Record Storage ,Writing and Reading Records, Writing and Reading Mixed Data Types ,Record Enumeration ,Sorting Records, Searching Records ,Record Listener .

J2ME Database Concepts: Data, Databases, Database Schema, Overview of the JDBC Process, Database Connection.

UNIT – IV:

Installation and configuration of android, starting an android application project: components, debugging with eclipse. Application design: the screen layout and Main.xml file, components ids, controls, creating and configuring android Emulator, communication with emulator.

UNIT – V:

controls and user interface: radio buttons, radio group ,the spinner, data picker, buttons, array adapter .

view class: combining graphics with a touch listener ,canvas, bitmap, paint ,motion event.

UNIT – VI:

working with images :display images ,using images stored on android devices ,image view, working with text files ,working with data tables, using sqlite ,using xml for data exchange, cursor, content values, XML PUL Parser, XML Resource parser.

Client -server applications: socket, server socket, HTTP URL connection, URL.

Text Books:

1. J2ME: The Complete Reference by James Keogh ,McGraw-Hill/Osborne.
2. Android Application development for java programmers by James C Sheusi, Cengage Learning

Reference Books

1. **Core J2ME Technology by John W. Muchow, Prentice Hall PTR; 1st edition.**
2. **Enterprise J2ME : developing mobile java applications –Michael juntao yuan,pearson Education ,2004.**
3. **Beginning java ME platform, Ray Richpater, Après, 2009.**
4. **Android apps for absolute Beginners by Wallace Jackson, Apress.**
5. **Begining android 4 application development, Wei-meng Lee, wiley** Programming android, Ziguord Mednieks, Laired Dornin, G.Blake Meike & Masumi Nakameera, Orelly

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Open Elective - III

REAL - TIME SYSTEMS

IV Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To familiarize with the concepts of Real – Time systems.

Learning Outcomes:

Students will be able to

- understand the use of multi tasking techniques in real time systems.
- evaluate the performance of soft and hard real time systems.
- analyze multi task scheduling algorithms for periodic, aperiodic and sporadic tasks.
- design real time operating systems.

UNIT – I:

Real-Time systems, typical real-time applications, hard versus soft real-time systems, a reference model of real-time systems.

UNIT – II:

Commonly used approaches to hard real-time scheduling, clock-driven scheduling,

UNIT – III:

Priority-driven scheduling of periodic tasks, scheduling aperiodic and sporadic jobs in priority- driven systems.

UNIT – IV:

Resources and resource access control, multiprocessor scheduling and resource access control.

UNIT – V:

Scheduling flexible computations and tasks with temporal distance constraints.

UNIT – VI:

Real-Time Communications, Operating Systems.

Text Books:

1. Jane Liu, Real-Time Systems, Prentice Hall, 2000.
2. Philip.A.Laplante, Real Time System Design and Analysis, 3rd Edition, PHI, 2001.

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Open Elective - III

NETWORK MANAGEMENT SYSTEMS

IV Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To understand key elements of Network Management.
- To understand the various Network management tools.

Learning Outcomes:

Students will be able to

- analyze the key elements of Network Management.
- distinguish different types of SNMPs.
- apply the remote monitoring mechanism for an application.

UNIT – I: Data communications

Analogy of Telephone Network Management, Communications protocols and Standards, Challenges of Information Technology Managers

UNIT – II: Network Management

Goals, Organization, and Functions, Network and System Management, Network Management System Platform, Current Status and future of Network Management.

UNIT – III: SNMPV1 Network Management

Organization and Information and Information Models.

Managed network: Case Histories and Examples, The History of SNMP Management, The SNMP Model, The Organization Model, System Overview, The Information Model.

UNIT – IV: SNMPv1 Network Management

Communication and Functional Models, The SNMP Communication Model, Functional model

UNIT – V: SNMP Management

SNMPv2: Major Changes in SNMPv2, SNMPv2 System Architecture, SNMPv2 Structure of Management Information, the SNMPv2 Management Information Base, SNMPv2 Protocol, Compatibility with SNMPv1

UNIT – VI: SNMP Management

RMON: What is Remote Monitoring? , RMON SMI and MIB, RMON1, RMON2, ATM Remote Monitoring

Network Management Tools and Systems: Network Management Tools, Network Statistics Measurement Systems.

Text Book:

1. Network Management, Principles and Practice, Mani Subrahmanian, Pearson Education.

Reference Books:

1. Network management, Morris, Pearson Education.
2. Principles of Network System Administration, Mark Burges, Wiley Dreamtech.
. Distributed Network Management, Paul, John Wiley.

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Open Elective - III

FUNDAMENTALS OF E-COMMERCE

(Other than CSE & IT)

IV Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To introduce the basic concepts of E-Commerce.
- To gain the knowledge on various Mercantile Process models.
- To identify the fundamental concepts in E-Payment systems like smart card, credit card..etc
- To expose to electronic data interchange (EDI) problems.

Learning Outcomes:

Students will be able to

- outline the fundamentals in E-Commerce.
- describe various Mercantile Process models.
- discuss about various E-Payment systems.
- identify electronic data interchange (EDI) problems.
- describe various Advertising techniques on internet

UNIT – I: Electronic Commerce-Frame work

Electronic Commerce-Frame work, anatomy of E-Commerce applications, E-Commerce Consumer applications, E-Commerce organization applications.

UNIT – II: Consumer Oriented Electronic commerce

Consumer Oriented Electronic commerce - Mercantile Process models.

UNIT – III: Electronic payment systems

Electronic payment systems - Digital Token-Based, Smart Cards, Credit Cards, Risks in Electronic Payment systems.

UNIT – IV: Inter Organizational Commerce

Inter Organizational Commerce - EDI, EDI Implementation, Value added networks.

UNIT – V: Intra Organizational Commerce

Work Flow, Automation Customization and internal Commerce, Supply chain Management.

UNIT – VI: Advertising and Marketing

Information based marketing, Advertising on Internet, on-line marketing process, market research

Text Book:

1. Kalakota, Whinston *Frontiers of electronic commerce*, Pearson.

Reference Books:

1. Hendry Chan, Raymond Lee, Tharam Dillon, Ellizabeth Chang *E-Commerce fundamentals and applications*, John Wiley.
2. S.Jaiswal – Galgotia *E-Commerce.*
3. Kenneth C.Taudon, Carol Guyerico Traver *E-Commerce – Business, Technology, Society.*

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Open Elective - III

STATISTICAL METHODS USING R SOFTWARE

IV Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To understand statistical concepts.
- To know R software.

Learning Outcomes:

Students will be able to

- examine the relationship between the variables and forecast.
- apply suitable range of statistical tests.
- use R for statistical programming, Computation, Graphics, and modeling.
- expand their knowledge of R on their own.

UNIT – I: Correlation-Regression

Simple correlation for ungrouped data , rank correlation and simple regression.

UNIT – II: Testing of Hypothesis

Introduction - population-sample-large sample and small sample. Testing of hypothesis - hypothesis - null hypothesis - alternative hypothesis - level of significance - degrees of freedom - one tailed and two tailed tests - procedure of testing of hypothesis.

UNIT – III: One Sample Significance Tests

One sample tests: Large sample - Test for single mean, single proportion, Small sample tests: t-test for single mean.

UNIT – IV: Two Sample Significance Tests

Two sample tests : Large sample - test for two means, two proportions, Small sample: t-test for two means, F-test.

UNIT – V: Introduction to R software

An introductory R session- R as a calculator- Getting help and loading packages- Data entry and exporting data.

Correlation and Regression using R: Calculating correlation coefficient- calculating rank correlation-finding regression lines- interpretations

UNIT – VI: One Sample and Two Sample Tests using R

Large sample: Calculating Z value for single and two means - interpretation - Calculating Z value for single proportion and two proportions-interpretations

Small sample: Calculating t for single mean and two means- interpretations Calculating F value -interpretations

Text Books:

1. S.C.Gupta and V.K.kapoor-Fundamentals of Mathematical Statistics-S.chand & co.
2. Probability and Statistics, Dr. T. K. V. Iyengar, Dr. B. Krishna Gandhi, S. Ranganatham and Dr. M.V. S. S. N. Prasad, S. Chand & Company Ltd.
3. Peter Dalgaard. Introductory Statistics with R (Paperback) 1st Edition Springer-Verlag New York, Inc. ISBN 0-387-95475-9
4. W. N. Venables and B. D. Ripley. 2002. Modern Applied Statistics with S. 4th Edition. Springer. ISBN 0-387-95457-0

Reference Books:

1. An Introduction to R. Online manual at the R website at http://cran.r-project.org/manuals.html
2. Andreas Krause, Melvin Olson. 2005. The Basics of S-PLUS. 4th edition. Springer-Verlag, New York. ISBN 0-387-26109-5.

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MICROPROCESSORS AND MICROCONTROLLERS LAB

IV Year – I Semester

Practical	: 3	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To introduce ALP concepts using 8086 and 8051.

Learning Outcomes:

Students will be able to

- interface different I/O devices with processor and controller.
- generate different wave forms using Processor and controller

List of experiments:

Part - A: (8086 Non Interfacing Assembly language programs)

1. Arithmetic operations (Addition, Subtraction, Multiplication, Division)
2. Logical operations (AND, OR, XOR ,NOR, NAND)
3. Shift and Rotate operations
4. String operations (Length, Transfer, Compare)

Part - B: (8086 Interfacing Assembly language programs)

1. Digital input digital output/Logic controller
2. Digital to Analog converter (Generation of Square wave, triangular and ramp)
3. Stepper Motor Controller

Part - C: (8051 Interfacing Assembly language programs)

1. Reading and Writing on parallel ports.
2. Serial communication implementation.
3. Traffic control implementation.
4. Analog to Digital converter (External ADC and temperature sensors controller)
5. Seven segment display control

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ELECTRICAL SYSTEMS SIMULATION LAB

IV Year – I Semester

Practical	: 3	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To enable the students gain sufficient knowledge on the programming and simulation of Electrical circuits, Electrical Machines, Control Systems, Power Electronics and Power Systems.
- To expose students to the response of RLC circuits to different inputs and also at resonance.
- To develop an understanding of the response of second order systems to inputs like pulse, step and sinusoidal signals and the stability of the given systems by plotting Root Locus, Bode plots and Nyquist plots using simulation.
- To gain the knowledge of the response of various power electronic converters using Simulation.
- To understand load flow studies, short circuit studies and stability analysis of power systems by using simulation.

Learning Outcomes:

Students will be able to

- acquire skills of using PSPICE/MULTISIM software for Electrical circuit studies.
- acquire skills of using computer packages like MATLAB coding and SIMULINK in modeling, design and simulation of Electrical Machines, Control Systems, Power Electronics and power systems studies.
- prepare laboratory reports that clearly communicate experimental information in a logical and scientific manner.
- analyze the response for the given input and also verify various network theorems for the given circuit.
- design a PID controller to improve the stability of the given system.
- understand the transient behavior of the given circuit / system..

List of Experiments:

Any 8 of the following experiments are to be conducted:

1. Steady state and Transient analysis of RLC circuits.
2. Series and parallel RLC Resonance circuits.
3. Verification of Thevenin's, Norton's and maximum power transfer theorems.
4. Response of second order systems to an input.
   (i) Pulse signal (ii) Step signal and (iii) Sinusoidal signal.
5. Design of PID controller for a second order control system.
6. Plot Root locus, Bode plots, and Nyquist plots for the transfer functions of systems and analyze the stability of the given system.
7. State model representation of transfer functions and evaluating the controllability and observability of the system.
8. Single phase voltage source inverter.
9. Single-phase full converter using R,L & E loads.
10. Single phase AC voltage controller using R,L & E loads.
11. Load Flow studies by Gauss – seidel/Newton Raphson/Fast decoupled methods.
12. Short circuit studies for symmetrical and unsymmetrical (LL, LG, LLG) faults.

In addition to the above eight simulation experiments, at least any two of the simulation experiments from the following list are required to be conducted:

1. Modeling and simulation of single phase transformer.
2. Modeling and simulation of three phase induction machine
3. Dynamic stability analysis of Power Systems
4. Switching transients in a single phase line
5. Circuit breaker operation of three phase balanced load.

Text Book:

1. "Simulation Tools for Electrical Engineers", N. Yadaiah and G. Tulasi Ram Das, Pearson Education.

Reference Books:

1. MATLAB user's manual- Mathworks, USA.
2. MATLAB - control system tool box - Mathworks, USA.
3. SIMULINK user's manual- Mathworks, USA.
4. "PSPICE for circuits and electronics using PSPICE", M.H.Rashid, PHI Publications.

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POWER SYSTEMS LAB

IV Year – I Semester

Practical	: 3	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To enable the students gain sufficient knowledge on protective relays over voltage and over current and impedance relay etc.
- To ability to conduct testing and experimental procedures on over voltage and current relays .
- To analyze the operation of transmission line under different loading Conditions.
- To expose students to analyze the concepts ferranti effect and surge impedance loading.

Learning Outcomes:

Students will be able to

- prepare laboratory reports that clearly communicate experimental information in a logical and scientific manner..
- determine the Sub-Transient Reactance of a Salient Pole Machine.
- analyze the characteristics of the over voltage and over current relay.
- analyze the importance of transmission line parameters.
- understand the Ferranti effect and surge impedance loading.
- analyze the characteristics of reverse power relay

List of Experiments:

The following experiments are required to be conducted as compulsory.

1. Characteristics of IDMT over Current Relay.
2. Characteristics of Static Negative Sequence Relay.
3. Characteristics of Over Voltage Relay. (Microprocessor Type).
4. Characteristics of Reverse Power Relay.
5. Simulation of 220KV Transmission line model.
   i) Ferranti Effect ii) Transmission line parameter
   iii) Surge Impedance loadings
6. Transformer Oil Testing and testing of Buchholtz relay.
7. Determination of Sub-Transient Reactance of a Salient Pole Machine.
8. Characteristics of impedance relay.

In addition to the above eight experiments, at least any two of the experiments from the following list are required to be conducted:

1. Determination of Sequence Impedances of a salient pole Synchronous Machine.
2. Characteristics of Under frequency relay.
3. Characteristics of Defferential relay.
4. Characteristics of Induction Motor Protection relays.

Elective - IV

ELECTRICAL COSTING & ESTIMATION

IV Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To Formalize Student with IE rules.
- To impact knowledge on electrical wiring & estimating its cost.

Learning Outcomes:

Students will be able to

- state IE rules, NEC related to Electrical Installation and testing.
- state and describe the basic terms, general rules, circuit design procedure.
- estimate cost of Residential adn Industrial Electrical Installations.
- prepare detail estimate and costing of Residential Electrical Installations.
- prepare detail estimate and costing of Factory Electrical Installations.

UNIT – I: Drawing and IE Rules & Service Connection

Gener al requirement of Electrical Installation IE rules related to Electrical Installation & Testing Concept of service connection types of service connection & their features Methods of Installation of service connection estimates of under ground & overhead service connections.

UNIT – II: Estimation of Lighting and Power Loads

Different lamp circuits - for godown wiring - lamp circuit incorporating energy meter, cut out and distribution box.General rules guidelines for wiring of Residential Installation and positioning of equipments. Principles of circuit design in lighting and power circuits. Procedures for designing the circuits and deciding the number of circuits. Method of drawing single line diagram.Selection of type of wiring and rating of wires & cables.Load calculations and selection of size of conductor.Selection of rating of main switch, distributions board,protective switchgear ELCB and MCB and wiring accessories. Earthling of Residential Installation.Sequence to be followed for preparing Estimate Preparation of detailed estimates and costing of Residential Installation.

UNIT – III: Estimation of OH Lines and Earthling

Distribution lines of 11 kV and 400 v OH lines - estimation only quantity of materials required for lines of length 1 km - of number of poles - Cross arms clamps - insulators - conductor length and size for a given power transmission Distribution transformer erection- Estimation of quantity of materials required for structures, isolators - HG fuse operating mechanism, isolators, lightening arrestors for pole mounted substation and plinth mounted substation Quantity estimation for materials required in electrical Earthing both for pipe earthling and plate Earthing

suitable to the given equipment or transformer substationElectrification of commercial Installation

UNIT – IV: Estimation of Power Loads

Irrigation pump installation - Estimation and coasting upto 10 HP service main - type- calculation of size and quantity of wire and other components required - Labour cost for erection - Type of starter and control panel - accessories quantity and estimation Estimate for the installation of submersible pump.

UNIT – V: Electrification of factory UNIT Installation

Concept of Industrial load. Concept of Motor wiring circuit and single line diagram.Important guidelines about power wiring and Motor wiring Design consideration of Electrical Installation in small Industry/Factory/workshop Motor current calculations.Selection and rating of wire, cable size & conduct Deciding fuse rating, starter, distribution boards main switch etc Deciding the cable route, determination of length of wire, cable, conduit, earth wire, and earthling Sequence to be followed to prepare estimate Preparations of detailed estimate and costing of small factory UNIT/ workshop

UNIT – VI: Departmental Tests and REC and Electrical Act 2003

Electrical installation testing - departmental procedure for testing before giving service connection - departmental procedure for obtaining service connection - desirable insulation resistance for domestic and power circuits - Tests for measuring insulation resistance - procedure for conducting insulation resistance test and continuity tests, earth continuity test. Design of rural electrification scheme - Load survey-determination of capacity of transformer - estimation of quantity of materials required for the erection of distribution lines and 11 kV feeder from a nearby 11 kV feeder - determining the economic feasibility of the scheme as per the procedure laid out in NEC, - Extracts from Indian Electricity rules 1956 and code of practice by NEC regarding - domestic power, agricultural industrial wiring installations, erection of 11 kV, 400 v distribution lines - pole mounted transformer.

Text Book:

1. Electrical Wiring Estimating & costing by Dr. S.L.Uppal and G.C. Garge, Oscar Publication, New Delhi.
2. Electrical Installation estimating costing by J.B. Gupta, S.K. Katariya and sons.

Reference Books:

1. Electrial wiring estimating & costing by J.B.Gupta.
2. Electrical Drawing by Balbir Singh.
3. Electrical wiring by Arora.
4. Maintenance and Operation of Electrical Equipment by BVS Rao Vol…I. Testing, Commissioning Operation & Maintenance of Electrical equipment by S.Rao.
5. Electrical Estimating and costing Tata Mc Graw Hill Publication,New Delhi.
6. N. Alagappan S. Ekambaram.

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Elective - IV

MODELING AND ANALYSIS OF ELECTRICAL MACHINES

IV Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To introduce the concepts of Kron's primitive machine.
- To familiarize with modeling of Electrical Machine**s.**

Learning Outcomes:

Students will be able to

- analyze the steady state and transient behavior of d.c machine.
- apply transformation techniques for modeling of an electrical machine.
- develop a mathematical model to an electrical machine for specific application.
- develop a small signal model for the dynamic analysis of a.c machine.

UNIT – I:

Principles of Electromagnetic Energy Conversion, General expression of stored magnetic energy, co-energy and force/torque, example using single and doubly excited system

UNIT – II:

Static and rotating reference frames – transformation of variables – reference frames –transformation between reference frames – transformation of a balanced set – balanced steady state phasor and voltage equations – variables observed from several frames of reference.

UNIT – III:

Voltage and toque equations – dynamic characteristics of permanent magnet and shunt DC motors – state equations - solution of dynamic characteristic by Laplace transformation.

UNIT – IV:

Voltage and toque equations – transformation for rotor circuits – voltage and toque equations in reference frame variables – analysis of steady state operation – free acceleration characteristics – dynamic performance for load and torque variations – dynamic performance for three phase fault – computer simulation in arbitrary reference frame.

UNIT – V:

Voltage and Torque Equation – voltage Equation in arbitrary reference frame and rotor reference frame – Park equations - rotor angle and angle between rotor – steady state analysis – dynamic performances for torque variations- dynamic performance for three phase fault – transient stability limit – critical clearing time – computer simulation

UNIT – VI:

Special Machines - Permanent magnet synchronous machine: Surface permanent magnet (square and sinusoidal back emf type) and interior permanent magnet machines. Construction and operating principle, dynamic modeling and self controlled operation; Analysis of Switch Reluctance Motors.

Text Books:

1. 'Electric Motor & Drives: Modeling, Analysis and Control', R. Krishnan, Prentice Hall of India, 2nd Edition, 2002.
2. "Analysis of Electric Machinery and Drive Systems", Paul C.Krause, OlegWasyzczuk, Scott S, Sudhoff, IEEE Press, Second Edition.

Reference Books:

1. 'Brushless Permanent Magnet and Reluctance Motor Drives', Miller, T.J.E., Clarendon Press, 1st Edition, 1989.
2. "Eletomechanical Energy Conversion", Samuel Seely, Tata McGraw Hill Publishing Company.
3. "Electric Machinery", A.E, Fitzgerald, Charles Kingsley, Jr, and Stephan D, Umanx, Tata McGraw Hill, 5th Edition, 1992.

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Elective - IV

HIGH VOLTAGE ENGINEERING

IV Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To understand breakdown mechanisms occur in solids gases and liquid dielectrics.
- To understand various generation methods employed for High DC, AC and impulse voltages.
- To distinguish various methods employed for measurement High DC, AC and impulse voltages.

Learning Outcomes:

Students will be able to

- analyse the behavior of dielectric material under Different circumstances.
- demonstrate an understanding of high voltage engineering techniques.
- conduct analysis of industrial equipment.
- identify the most suitable equipment for performing specific testing on high-voltage applications.
- perform basic AC, DC, impulse voltage and partial discharge tests on high voltage equipment and insulation systems in the laboratory environment.

UNIT – I: Break Down In Gaseous And Liquid Dielectrics

Gases as insulating media, collision process, Ionization process, Townsend's criteria of breakdown in gases, Paschen's law. Liquid as Insulator, pure and commercial liquids, breakdown in pure and commercial liquids. Intrinsic breakdown, electromechanical breakdown, thermal breakdown, breakdown of solid dielectrics in practice, Breakdown in composite dielectrics, solid dielectrics used in practice.

UNIT – II: Generation Of High Voltages And Currents

Generation of High Direct Current Voltages, Generation of High alternating voltages, Generation of Impulse Voltages, Generation of Impulse currents, Tripping and control of impulse generators.

UNIT – III: Measurement Of High Voltages And Currents

Measurement of High Direct Current voltages, Measurement of High Voltages alternating and impulse, Measurement of High Currents-direct, alternating and Impulse, Oscilloscope for impulse voltage and current measurements.

UNIT – IV: Non-Distructive Testing Of Material And Electrical Apparatus
Measurement of D.C Resistivity, Measurement of Dielectric Constant and loss factor, Partial discharge measurements.

UNIT – V: High Voltage Testing Of Electrical Apparatus
Testing of Insulators and bushings, Testing of Isolators and circuit breakers, testing of cables, Testing of Transformers, Testing of Surge Arresters, Radio Interference measurements

UNIT – VI: Industrial Application to High Voltage Engineering
Electrostatic precipitator, electrostatic separator, electrostatic copying, electrostatic coating and pulsed power

Text Books:

1. High Voltage Engineering by M.S.Naidu and V. Kamaraju – TMH Publications, 3rd Edition.
2. High Voltage Engineering: Fundamentals by E.Kuffel, W.S.Zaengl, J.Kuffel by Elsevier, 2nd Edition.

Reference Books:

1. High Voltage Engineering by C.L.Wadhwa, New Age Internationals (P) Limited, 1997.
2. High Voltage Insulation Engineering by Ravindra Arora, Wolfgang Mosch, New Age International (P) Limited, 1995.

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Elective - IV

DIGITAL SIGNAL PROCESSING

IV Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To introduce the concepts of frequency domain representation of discrete time signals.
- To familiarize the students with the designing of digital filters and their realization.

Learning Outcomes:

Students will be able to

- apply Convolution and Correlation techniques on discrete time signals.
- determine the frequency domain representation of discrete time signals.
- apply FFT algorithms in different signal processing applications.
- design and Realize digital filters.

UNIT – I: Discrete Time Signals and Systems

Introduction to Digital Signal Processing, Discrete time signals, Classification, Elementary discrete time signals, Basic operations on Sequences, Discrete time Systems, Classification, Linear Time Invariant Discrete time Systems, Properties of discrete time LTI Systems.

UNIT – II: Convolution and Correlation

Convolution sum, Cross Correlation and auto correlation of discrete time signals and their properties.

Discrete Fourier Series: Fourier Series for discrete time periodic signals, Properties, Power Density Spectrum, Fourier Transform for discrete time aperiodic signals, Properties, Convergence, Energy Density Spectrum, Relationship of Fourier transform to Z transform, Frequency Response.

UNIT – III: Discrete Fourier Transform

Frequency Sampling- Discrete Fourier Transform (DFT), DFT as a Linear Transformation, Properties of DFT, Linear Convolution of sequences using DFT, Relationship between DFT and Z transform

UNIT – IV: Fast Fourier Transforms (FFT)

Fast Fourier Transform-Radix-2 decimation in time and decimation in frequency FFT algorithms, IDFT using FFT algorithms, FFT for composite N

UNIT – V: Design of IIR Filters

Analog filter approximation-Butterworth and Chebyshev (Type-I) filters, Design of IIR filters form analog filters- Approximation of derivatives, Impulse Invariant technique, Bilinear transformation, Matched Z transform.

UNIT – VI: Design of FIR Filters

Linear Phase FIR filters-Frequency Response, Fourier Series Method of designing FIR filter, Design of FIR filters using Windows (Rectangular, Bartlett, Raised Cosine, Hamming, Hanning and Blackman), Frequency Sampling Method of designing FIR filters (Type I)

Realization of Digital Filters: Realization of IIR Filters**-** Direct form I, II, Transposed form, Parallel form, Realization of FIR Filters**-** Transversal Structure, Cascade Realization, Linear Phase Realization

Text Books:

1. Digital Signal Processing, Principles, Algorithms, and Applications: John G. proakis, Dimitris G.Manolakis, Pearson Education / PHI, 2013.
2. Discrete Time Signal Processing – A.V.Oppenheim and R.W. Schaffer, PHI

Reference Books:

1. Digital Signal Processing: Andreas Antoniou, TATA McGraw Hill , 2006.
2. Digital Signal Processing: Ashok Ambardar, Satya Prasad, Cenage Learning
3. Digital Signal Processing: MH Hayes, Schaum's Outlines, TATA Mc-Graw Hill, 2007.

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Elective - V

DIGITAL CONTROL SYSTEMS

IV Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To familiarize the students with the application of z-transform and inverse z-transform for signals sampling and reconstruction.
- To introduce the basic concepts for designing and implementation of digital compensators in frequency domain.

Learning Outcomes:

Students will be able to

- apply the knowledge of z-transform, and inverse z-transforms for analyzing the signals.
- demonstrate the knowledge and understanding of the fundamental principles to convert the analog signal to discrete signal.
- apply the concepts of controllability and observability to provide valid conclusions on the performance of digital control systems.
- describe and determine the stability of discrete time system by using different techniques.
- demonstrate the knowledge and understanding of the fundamental principles to design the digital compensator for discrete time systems.
- design an appropriate digital feedback controller, to meet specified performance requirements and implement digital observer to estimate unmeasured states of practical plants.

UNIT – I: Introduction To Signals

Introduction to continuous and discrete time signals, shifting and scaling operator, periodic and non-periodic signals, linear time invariant and causal systems. Z-transform and theorems, finding inverse z- transform and method for solving difference equation.

UNIT – II: Sampling and Reconstruction

Introduction, sampling theorem, examples of Digital control systems – Digital to Analog conversion and Analog to Digital conversion, sample and hold operations.

UNIT – III: State Space Analysis

State Space Representation of discrete time systems, State transition matrix, Methods for Computation of State Transition Matrix, Discretization of continuous time state – space equations. Concepts of Controllability and Observability, Tests for controllability and Observability. Duality between Controllability and Observability.

UNIT – IV: Stability Analysis

Mapping between the S-Plane and the Z-Plane – Primary strips and Complementary Strips – Constant frequency loci, Constant damping ratio loci, Stability Analysis of closed loop systems in the Z-Plane. Jury stability test – Stability Analysis by use of the Bilinear Transformation and Rout Stability criteria, principles of Discretization.

UNIT – V: Design of Discrete Time Control System by Conventional Methods

Transient and steady – State response Analysis of digital systems – Design based on the frequency response method – Bilinear Transformation and Design procedure in the w-plane, Lead, Lag and Lead-Lag compensators and digital PID controllers.

UNIT – VI :State Feedback Controllers and Observers

Design of state feedback controller through pole placement – Necessary and sufficient conditions, Ackerman's formula. State Observers – Full order and reduced order observers.

Text Books:

1. Discrete-Time Control systems - K. Ogata, Pearson Education/PHI, 2nd Edition.
2. Digital Control Systems - Kuo, Oxford University Press, 2nd Edition, 2003.
3. Digital control engineering – M.Gopal, new age international

Reference Books:

1. Digital Control and State Variable Methods - M.Gopal, TMH, 4th edition.
2. Digital control of dynamic systems – Gene F. Frankin, J.David powell, Michael workman, pearson education, 3rd edition 2000.

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Elective - V

AI TECHNIQUES

IV Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To familiarize students with the basic concepts of Artificial Intelligence(AI).
- To familiarize students with the architecture, principle of operation of Artificial Neural Networks, Fuzzy Logic and Genetic Algorithms.

Learning Outcomes:

Students will be able to

- describe and develop various applications of artificial intelligence.
- describe the neural network learning methods.
- develop coding of ANN for a given problem.
- analyse fuzzy logic sets and system components to develop fuzzy logic controllers.
- develop genetic algorithm coding and apply for optimization problems.
- select a suitable AI technique for a particular application.

UNIT – I: Introduction to Soft Computing Techniques

Introduction to various Soft computing / Artificial intelligent techniques and their origin. Introduction to Neural Networks: Humans and Computers, Organization of the Brain, Biological Neuron, Biological and Artificial Neuron ModelsEssentials of Neural Networks: Neural network Architectures-knowledge representation learning process-learning tasks and their rules

UNIT – II: Single Layer Feed Forward Neural Networks(SLFFN)

Perceptron Models: Discrete, Continuous and Multi-Category, Training Algorithms: Discrete and Continuous Perceptron Networks, Perceptron Convergence theorem, Limitations of the Perceptron Model, Applications.Multi Layer Feed Forward Neural Networks(MLFFN)Generalized delta rule, delta rule for Multi Layer Feed Forward Neural Networks, Concept of Back Propagation, Back Propagation algorithm, Advantages and Disadvantages of Back Propagation

UNIT – III: ANN Memories and Applications

ANN Paradigms, Hebbian Learning, Bidirectinal Associative Memory (BAM) architecture, BAM training and Hope field networks.Neural Network Applicationss: load forecasting, fault identification, process control and identification.

UNIT – IV: Classical and Fuzzy Sets

Introduction to classical sets - properties, Operations and relations; Fuzzy sets, Membership, operations, properties, fuzzy relations, cardinalities, membership functions.

UNIT – V: Fuzzy Logic System Components and Applications

Fuzzification, Membership value assignment, development of rule base and decision making ystem,Defuzzification to crisp sets, Defuzzification methods.Fuzzy Logic Applications: Speed control of Drives, Process Control -P,PI,PD,PID Controllers.

UNIT – VI: Genetic Algorithms

Introduction-encoding-fitness function-reproduction operatorsGenetic Modelling-genetic operators-cross over and mutation-generational cycle-coveragence of genetic algorithm.

Text Books:

1. Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications by Rajasekharan and Rai – PHI Publication.
2. Introduction to Artificial Neural Systems - Jacek M. Zuarda, Jaico Publishing House, 1997.

Reference Books:

1. Neural Networks-James Freeman and Davis Skapura, Pearson Education, 2002.
2. Neural Networks-Simon Hakins, Pearson Education.
3. Neural Engineering by C.Eliasmith and CH.Anderson, PHI.
4. Neural Networks and Fuzzy logic System by Bart kosko, PHI Publications

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Elective - V

EHV AC/DC TRANSMISSION SYSTEMS

IV Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To understand the transmission line trends and analyze the Electrostatic field effect on AC lines.
- To understand the importance of HVDC transmission, analysis of HVDC converters, Faults and protections, Harmonics and Filters

Learning Outcomes:

Students will be able to

- discuss the mechanical aspects of transmission lines, standard transmission voltages & ground parameters.
- define the concept of bundle conductors and to calculate the electrostatic fields of AC lines.
- know Power Frequency Voltage control and over voltages in EHV lines.
- explore the concept of corona, audio noise in EHV AC lines.
- ability to calculate power conversion between Ac to DC and DC to AC.
- ability to discuss Harmonics in HVDC converters.

UNIT – I:

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 – Line Parameters for Modes of Propagation.

UNIT – II:

Electrostatic field and voltage gradients – calculations of electrostatic field of AC lines – effect of high electrostatic field on biological organisms and human beings - surface voltage gradients and maximum gradients of actual transmission lines – voltage gradients on sub conductor.

UNIT – III:

Electrostatic induction in unenergized lines – measurement of field and voltage gradients for three phase single and double circuit lines – unenergized lines. Power Frequency Voltage control and over-voltages in EHV lines: No load voltage – charging currents at power frequency-voltage control – shunt and series compensation – static VAR compensation.

UNIT – IV:

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. Measurements of audio noise radio interference due to Corona - properties of radio noise – frequency spectrum of RI fields – Measurements of RI and RIV.

UNIT – V:

Economics & Terminal equipment of HVDC transmission systems: Types of HVDC Links- Apparatus required for HVDC Systems- Comparison of AC&DC Transmission, Power handling capacity, Application of DC Transmission System. Choice of Converter configuration, 6-pulse, and 12-pulse converters.

UNIT – VI:

Equivalent circuit for converter, control characteristics, constants current control, Constant extinction angle control, Ignition angle control, reactive power requirements of HVDC converters, Converter faults & protection, Harmonics in HVDC Systems, Harmonic elimination, AC and DC filters.

Text Books:

1. EHVAC Transmission Engineering by R. D. Begamudre, New Age International (P) Ltd.
2. HVDC and Transmission by J. Arrillaga, published by Institution of Electrical Engineering 1988.
3. Direct Current Transmission – by E. W. Kim bark, John Wiley & Sons.

Reference Books:

1. HVDC Power transmission Systems: Technology and system Interactions – by K. R. Padiyar, New Age International (P) Limited, and Publishers.
2. EHVAC and HVDC Transmission Engineering and Distribution Engineering – S. Rao, Khanna Publishers.
3. Power Transmission by Direct Current – by E. Uhlmann, B. S. Publications.

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Elective - V

POWER PLANT INSTRUMENTATION

IV Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To provide an overview of different methods of power generation with a particular stress on thermal power generation.
- To impart knowledge about the different types of controls and control loops.
- To familiarize the methods of monitoring different parameters like speed, vibration of turbines and their control.

Learning Outcomes:

Students will be able to

- describe the constructional details, working principles of various generating stations.
- analyze the working of different types of controls and control loops.
- choose various measurements involved in power generation plants.
- understand the knowledge about the different types of devices used for analysis.

UNIT – I: Overview Of Power Generation

Brief survey of methods of power generation – hydro, thermal, nuclear, solar and wind power – importance of instrumentation in power generation – thermal power plants – building blocks – details of boiler processes UP&I diagram of boiler – cogeneration.

UNIT – II: Measurements In Power Plants

Electrical measurements – current, voltage, power, frequency, power – factor etc. – non electrical parameters – flow of feed water, fuel, air and steam with correction factor for temperature – steam pressure and steam temperature – drum level measurement – radiation detector – smoke density measurement – dust monitor.

UNIT – III: Analyzers In Power Plants

Flue gas oxygen analyser – analysis of impurities in feed water and steam – dissolved oxygen analyser – chromatography – PH meter – fuel analyser – pollution monitoring instruments.

UNIT – IV: Control Loops In Boiler

Combustion control – air/fuel ratio control – furnace draft control – drum level control – main stem and reheat steam temperature control – super heater control – attemperator –deaerator control – distributed control system in power plants – interlocks in boiler operation.

UNIT – V: Turbine – Monitoring And Control

Speed, vibration, shell temperature monitoring and control – steam pressure control – lubricant oil temperature control – cooling system

UNIT – VI: Analysis in Power Plant

Thermal conductive type, paramagnetic type-Oxygen analyzer, hydrogen purity meter-chromatography – PH meter,fuel analyzer, pollution monitoring and control

Text Books:

1. Sam G. Dukelow, 'The control of Boilers', Instrument Society of America, 1991.
2. Modern Power Station Practice, Vol.6, Instrumentation, Controls and Testing, Pergamon Press, Oxford, 1971.
3. E.L Wakil, M.M./Power Plant technology/Mc Graw Hill 1984.
4. J.Balasubramaniam & R.K Jain/Modern Power Plant Engineering/Khanna

Reference Books:

1. Elonka,S.M.and Kohal A.L.Standard Boiler Operations, McGraw-Hill, New Delhi,1994.
2. R.K.Jain, Mechanical and industrial Measurements, Khanna Publishers, New Delhi, 1995.

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Self Study Course

GLOBAL POSITIONING SYSTEMS

IV Year – II Semester

Lecture	: -	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To understand the concept and usage of GPS for various applications.

Learning Outcomes:

Students will be able to

- explain the GPS components.
- choose a specific GPS receiver and GPS survey method.
- interpret the navigational message and signals received by the GPS satellite
- identify location of features and map the geospatial features.

UNIT – I: Overview and Observables of GPS

Basic concept. Space segment- constellation, satellites, operational capabilities, denial of accuracy and access. Control segment- master control station, monitor stations, ground control stations. User segment- user categories, receiver types, information services.

Observables:

Data acquisition- code pseudoranges, phase psecudoranges, Doppler data, biases and noise. Data combinations- linear phase combinations, code, psecudorange smoothing. Atmospheric effects- phase and group velocity ,ionospheric refraction, toposoheric refraction, atmospheric monitoring.

UNIT – II: Surveying with GPS

Introduction- terminology definitions, observation techniques, field equipment. Planning a GPS survey- General remarks, Pre survey planning, field reconnaisence, monumentation, organizational design. Surveying Procedure- preobservation, observation, postobservation, ties to control monuments. In Situ data Processing- data transfer, data processing, trouble shooting and quality control, datum transformations, computation of plane coordinates. Survey report.

UNIT – III: Methods of Processing GPS Data

Data processing- data handling, cycle slip detection and repair. Ambiguity resolutions- general aspects, basic approaches, search techniques, ambiguity validation. Adjustment, filtering and smoothening- least squares adjustments, kalmal filtering, smoothening. Network adjustment- single base line solution,

multipoint solution, single base line versus multi point solution, least squares adjustment of base lines. Dilutin of precision. Accuracy measures- introduction, chi-square distribution, specifications.

UNIT – IV: Applications and Future of GPS

General Uses of GPS- global uses, regional uses, local uses. Attitude determination- theoretical and practical considerations. Air borne GPS for photo control. Interoperability of GPS- GPS and inertial navigation systems, GPS and GLONASS, GPS and other sensors.

Future of GPS:

New application aspects. GPS modernization- future GPS satellites, augmented signal structure. GPS augmentation- ground based and satellite based augmentation. GNSS - GNSS development, GNSS/Loran-C integration.

Text Books:

1. B. Hofmann- Wellnhoff, H.Lichtenegger and J. Collins: GPS theory and practice, fifth edition, Springer Wien, Newyork.
2. Bradford W. Parkinson, James Spilker, Global Positioning System: Theory and Applications, Vol. I, 1996.

Reference Books:

1. Gunter Seeber, Satellite Geodesy Foundations, Methods and Applications, Walter de Gruyter Pub., 2003.
2. Hofmann W.B, Lichtenegger, H, Collins, J Global Positioning System – Theory and Practice, Springer-VerlagWein, 2001.

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Self Study Course

INTERIOR DESIGN

IV Year – II Semester

Lecture	: -	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To understand concepts, principles, procedures and components of communication; interpret reasons of communication failure and source respective remedies.
- To classify communication and select appropriate media; draft business letters and reports pertinent to interior designing profession.
- To work in groups and teams; demonstrate leadership quality; make use of group skills to achieve goals.

Learning Outcomes:

Students will able to

- implement the key features that can enhance architectural view.
- understand the need of designing construction projects.
- identify the paints and materials for specific interior design.

UNIT – I: Interior Design and Decoration, Decoration and Tools

Importance of design - Optimization, Economics, Time, Maintainability, Multiplicity, Role of Interior Designer-Interest of user with respect to economy, comfort, safety, security, etc, Limitations on design due to existing constraints

Aesthetical tools

a. Principles of Design - Balance, Emphasis, Rhythm, Harmony, Scale and Proportion

b. Elements of design - Point, Line, Shape, Form, colour and colour theory, Texture and Pattern

c. Aesthetical design consideration - Physical such as touch, smell, hearing, Social such as interactive, status symbols, Psychological such as derivable pleasure from use, emotional comfort, Ideological such as environmental, patriotic, socialistic conditions .

Functional tools

a. Ergonomics- Its study - Postures, Anthropometrics, Biomechanics.

b. Zoning, Grids, Modulation of space within and without, enveloping space within the room and furniture.

UNIT – II: Design Notions

Concepts - Manifestation of realization through contemplative germination, Period & Styles - Historical & Cultural approach with stress on ability to identify Occidental

Periods and Oriental styles and with special focus on Contemporary Indian period and styles.

a. Occidental - Classical, Medieval, 19th Century AD, Contemporary
b. Oriental - Japanese, Chinese, Thai, and Indian Themes - The common thread that binds the entire design in a story line on Beach and Mela.

UNIT – III: Planning Process

Understanding process of design (Need-Design brief-Information collection-Developing Alternatives-Analysis-Solution) Planning Process of Interior Design

a. Design Brief - simple and clear description about what is to be designed.
b. Relevant Data collection such as location & condition of site, Client profile & requirements, Materials, etc.
c. Data Analysis - analyzing and forming alternative schemes based on personal interpretations of design brief and relevant data using design tools and design concepts.
d. Selection- finalizing the best scheme through personal justifications.
e. Presentation- representing the final scheme in graphical manner.

UNIT – IV: Materials, Paints, Varinishes and Coatings for Interior Design

Cement, Lime, Sand and Gypsum: Types & Properties of Cement, Lime, Fine and Course Aggregates Types & Applications of Concretes, Mortars and Plasters Properties & Applications of Gypsum & its products.

Paints, varnishes and coatings:

Constituents (Pigment, Thinner, etc.), Classification (Water, Oil, acrylic based), Types (lime wash, distempers, acrylic emulsion, metallic, textured, etc.), Textural quality (Matt, Gloss, Satin, Lustre, etc) and Properties Process of painting (preparation of surface, primer coat, etc.) & application of paint with brush, roller, spray, etc. including applications of paints on different surfaces. Constituents, Types & uses of Varnishes, Polishes & Coatings.

Text Books:

1. Joseph De Chaira Jullius Panero Martin Zelnik Time Saver Standard for Interior Design & Space Planning Mcgraw Hill New York.
2. John Pile Interior Design Harry N. Adry Publishers.

Reference Books:

1. Jullius Panero Martin Zelnik Human Dimensions and Interior Spaces Whitney Library New York.
2. Phillis Sleen Allen Beginning of Interior Environment New York.
3. Shirish Bapat Basic Design of Anthropometry Bela books Publishers.
4. Shirish Bapat Living Area (Interior Space) Bela books Publishers.

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Self Study Course

ELECTRICAL SAFETY MANAGEMENT

IV Year – II Semester

Lecture	: -	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To provide a comprehensive exposure to electrical hazards, safety procedures.
- To familiarize the students with various grounding techniques.

Learning Outcomes:

Students will be able to

- describe electrical hazards and safety equipment.
- analyze and apply various grounding and bonding techniques.
- select appropriate safety method for low, medium and high voltage equipment.
- participate in a safety team.

UNIT – I:

Primary and secondary hazards- arc, blast, shocks-causes and effects-safety equipment- flash and thermal protection, head and eye protection-rubber insulating equipment, hot sticks, insulated tools, barriers and signs, safety tags, locking devices- electrician's safety kit.

UNIT – II:

The six step safety methods- pre job briefings- hot -work decision tree-safe switching of power system, safety equipment, procedure for low, medium and high voltage systems- the one minute safety audit.

UNIT – III:

General requirements for grounding and bonding- definitions- grounding of electrical equipment- bonding of electrically conducting materials and other equipment-connection of grounding and bonding equipment- system grounding- purpose of system grounding- grounding of low voltage and high voltage systems.

UNIT – IV:

Company safety team- safety policy- safety meetings- safety audit- accident prevention- first aid- rescue techniques-accident investigation- national electrical safety code- standard for electrical safety in work place- occupational safety and health administration standards.

Text Book:

1. *Dennis Neitzel*, Al Winfield,'Electrical Safety Handbook', McGraw-Hill Education, 4th Edition,2012.

Reference Books:

1. John Cadick, 'Electrical Safety Handbook', McGraw-Hill School Education Group, 1994.
2. Maxwell Adams.J, "Electrical safety- a guide to the causes and prevention of electric hazards",The Institution of Electric Engineers, 1994.
3. Ray A. Jones, Jane G. Jones, 'Electrical safety in the workplace', Jones & Bartlett Learning, 2000.

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Self Study Course

GREEN ENGINEERING

IV Year – II Semester

Lecture	: -	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To impart knowledge, how engineering fundamentals can be applied to achieve sustainability and minimize environmental impacts in all engineering disciplines across life cycles.

Learning Outcomes:

Students will be able to

- To Create sustainable products, facilities, processes and infrastructure.
- To Design ecofriendly products.

UNIT – I: Introduction

Humanity and Technology, the Concept of Sustainability, Industrial Ecology and Sustainable Engineering Concepts.The Relevance of Biological Ecology to Industrial Ecology, Metabolic Analysis, Technology and Risk, the Social Dimensions of Industrial Ecology.

UNIT – II: Implementation

Sustainable Engineering, Technological Product Development, Design for Environment and Sustainability: Customer Products, Design for Environment and Sustainability: Buildings and Infrastructure.

UNIT – III: Life Cycle Assessment

An Introduction to Life Cycle Assessment, The LCA Impact and Interpretation Stages, Streamlining the LCA Process.

UNIT – IV: Analysis of Technological Systems

Systems Analysis, Industrial Ecosystems, Material Flow Analysis, Energy and Industrial Ecology, Water and Industrial Ecology, Urban Industrial Ecology, Modelling in Industrial Ecology.

Text Books:

1. T E Graedel, Braden R Allenby “Industrial ecology and sustainable engineering” Prentice Hall, ©2010.
2. David T. Allen, David R Shonnard “Sustainable Engineering Concepts, Design and Case Studies” Prentice Hall, 2011.

References Books:

1. Anastas, Paul T, Zimmerman, Julie B, “Innovations in Green Chemistry and Green Engineering”, Springer, First Edition, 2013.
2. Daniel A. Vallero, Chris Brasier, “Sustainable Design: The Science of Sustainability and Green Engineering”, Wiley, First Edition, 2008.

Self Study Course

MANAGING INNOVATION & ENTREPRENEURSHIP

IV Year – II Semester

Lecture	: -	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- Understand process of innovation and its exploitation.

Learning Outcomes:

Students will be able to

- explore opportunities to implement innovative ideas.
- assess the level of risk involved in realizing the innovative ideas as entrepreneur.

UNIT – I:

Innovation and entrepreneurship. A model for innovation and entrepreneurship, the challenge of innovation strategy.

UNIT – II:

The challenge of social entrepreneurship, the potential of" bottom of the pyramid", challenges in managing social entrepreneurship.

UNIT – III:

Developing new products, services and ventures. The global business plan.

UNIT – IV:

International Opportunities for Innovation and Entrepreneurship. The Future Impact on Innovation on Consumers, Business and Government

Text books:

1. John Bessant, Joe Tidd, "Innovation and Entrepreneurship", John Wiley and sons Ltd, second edition, 2011.
2. Robert D Hisrich Claudine Kearney "Managing Innovation and Entrepreneurship" SAGE publications, 2014.

Reference Books:

1. Joe Tidd , John Bessant, "Managing Innovation: Integrating technological, market and organizational change" Wiley, Fifth edition, 2013.
2. Joe Tidd , John Bessant, "Strategic Innovation Management", Wiley, First edition, 2014.
3. Richard Owen , John Bessant , Maggy Heintz , "Responsible Innovation: Managing the Responsible Emergence of Science and Innovation in Society", Wiley, First edition,2013.

Self Study Course

INTERNET OF THINGS

IV Year – II Semester

Lecture	: -	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To familiarize with IOT levels and Protocols.
- To provide an insight on specific IoT domain.

Learning Outcomes:

Students will be able to

- integrate Internet services and physical objects.
- analyze prototypes of Internet-connected products using appropriate tools.
- apply adequate patterns for user-interaction with connected-objects

UNIT – I: Introduction to Internet of Things

Introduction, History , Objects and things, The identifier, Enabling technology , The internet.

UNIT – II: **RFID**

Introduction and principles , Components- Active, Passive, Semi-active, and Semi-passive; Future of RFID, RFID application scenarios-case study

UNIT – III: **Wireless Sensor Network**

Overview , History, The node, Connecting Nodes, Networking Nodes. Securing communication- standards.

UNIT – IV: Internet of Things Protocols

An Introduction to M2M area network physical layers , Applications, Introduction to Legacy M2M protocols for sensor networks, Examples (Mod Bus, Zig Bee). Introduction to next generation Internet of Things Protocols-IP based protocols.

Text Books

1. Hakima Chaouchi, “The Internet of Things: Connecting Objects”, John Wiley and sons, ISTE, Briton. (I to III Units).
2. Olivier Hersent, David Boswarthick, Omar Elloumi, “The Internet of Things: Key Applications and Protocols”, johnwiley and sons. (IV unit).

Reference Books:

1. Sergei Evdokimov, Benjamin Fabian, Oliver Gunther, Lenka Ivantysynova, Holger Ziekow, “RFID and the Internet of Things: Technology, Applications, and Security challenges”, Now Publishers Inc, 2011.
2. Lu Yan, Yan Zhang, Laurence T. Yang, Huansheng Ning,”The Internet of Things: From RFID to the Next-Generation Pervasive Networked systems”, Auerbach Publications,CRC Press.

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Self Study Course

CONSUMER ELECTRONICS

IV Year – II Semester

Lecture	: -	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To understand working principles of various electronic gadgets and consumer products.
- To study the various technical specifications and facilities of the consumer products.

Learning Outcomes:

Students will be able to

- how to work with latest electronic gadgets.
- understand audio and video processing.
- keen learn with home appliances.
- should able to differentiate old and latest developments in electronic world

UNIT – I: Audio Systems

PA system – Microphone, Amplifier, Loudspeakers, Radio receivers – AM/FM, Audio recording and reproduction – Cassettes, CD and MP3.

UNIT – II: Video Systems

Video system VCR/VCD/DVD players, MP4 players, Set Top box, CATV and Dish TV, LCD, Plasma & LED TV, Projectors – DLP, Home Theatres, Remote Controls.

UNIT – III: Landline and Mobile Telephony

Basic landline equipment – CLI, Cordless Intercom/ EPABX system, Mobile phones – GPRS & Bluetooth GPS Navigation system.

UNIT – IV: Electronic Gadgets

Scanners – Barcode / Flat bed, Printers, Xerox, Multifunction units (Print, Scan, fax, and copy) Digital clock, Digital camera, Handicam, Home security system, CCTV.

Text Books:

1. S. P. Bali ,"Consumer Electronics", Pearson Education ,2008.
2. R. G. Gupta "Audio and Video systems: Principles, Maintenance and Troubleshooting", Tata McGraw Hill (2004).

Reference Books:

1. Ronald K.Jurgen, "Digital Consumer Electronics Handbook", McGraw Hill Professional Publishing, 1997.
2. R.R Gulati, "Colour Television-principles and practice", Wiley Eastern Limited, New Delhi.
3. B.R. Gupta, Vandana singhal,"Consumer Electronics", S.K. Kataria and sons, 2006.

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Self Study Course

e-WASTE MANAGEMENT

IV Year – II Semester

Lecture	: -	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To familiarize the concepts of e-Waste management.
- To gain knowledge in recycling technologies for e-Waste.

Learning Outcomes:

Students will be able to

- analyze the recycling techniques of e-Waste management.
- analyze various toxic releases and health complications due to e-Waste.
- apply various reuse techniques for e-Waste.
- acquire knowledge for handling and management of e-Waste.
- apply waste disposal strategy for e-Waste.

UNIT – I: Introduction to e-Waste Management in India

Global e-waste growth, Dark shadows of digitization on Indian horizon, e-waste generation, migration, Present practice and systems, disposal methods, Present processing practices, Initiatives to manage e-waste, Strengths and weaknesses of the current system.

UNIT – II: WEEE (waste electrical and electronic equipment) - toxicity and health

Hazardous substances in waste electrical and electronic equipment-toxicity and release, Occupational and environmental health perspectives of e-waste recycling.

UNIT – III: Options and Scenarios for e-Waste Management

Actions to be considered to achieve goals of e-waste management, Collection/ take back system, Closing the Plastic loop: Turning the supply chain into a supply cycle by mining plastics from end-of-life electronics and other durable goods.

UNIT – IV: Recycling technologies for e-waste

Recycling of e-scrap in a global environment-opportunities and challenges, Technologies for recovery of resources from e-waste.

Reuse: A Bridge from Unsustainable e-waste to sustainable e-resources.

Text Books:

1. Rakesh Johri, E-waste: Implications, regulations, and management in India and current global best practices .
2. Klaus Hieronymi, Ramzy Kahhat, Eric Williams, E-Waste Management: from Waste to Resource

Reference Books:

1. Satish Sinha, Priti Mahesh,Waste Electrical and Electronic Equipment The EU and India.
2. By Ronald E. Hester, Roy M. Harrison , Electronic Waste Management .

Self Study Course

MANAGEMENT INFORMATION SYSTEMS

IV Year – II Semester

Lecture	: -	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To understand the scope of information systems and strategies.
- To know the types of information systems and their functionalities in an enterprise.
- To know the applications of information systems in various business areas
- To analyze and develop the system.

Learning Outcomes:

Students will be able to

- define the basic concepts, strategies and challenges of MIS.
- describe the nature of the information system in the business process.
- analyze the applications of information system in various functional business areas.
- compare various information system design and analysis.

UNIT – I: Introduction to Information Systems

International Information Systems Meaning, Scope of Information Systems, Concepts of system and organization, strategic uses, Evolution of MIS, Challenges and New opportunities. Growth of international information systems; Managing global information Systems.

UNIT – II: Information System in the Enterprise

Major types of Systems in the organization; Systems from a functional perspective; Enterprise e application–Enterprise systems, Business Process Reengineering and Information Technology.

UNIT – III: Application of Information Systems to Functional Business Areas

Significance of Information systems; Application of Operational Information System to Business;

UNIT – IV: Systems Analysis and Design

Systems analysis; Structured systems analysis and design; Alternative application development and evaluation, IT Act 2000

Text Books:

1. Kenneth C Laudon & Jane P Laudon, Management Information Systems, 8th Edition, PHI–2003.
2. Robert Schultheis & Mary Sumner, Management Information Systems–The Managers View 20th reprint, TMH –2010.

Reference Books:

1. V.M.Prasad, Management Information Systems, 9th Edition, PearsonEducation–2005.
2. Robert G Murdick, Joel E Ross & James R Claggett , Information Systems for Modern Management, 3rd Edition, PHI - 2007.

Self Study Course

INFORMATION & COMMUNICATION TECHNOLOGY

IV Year – II Semester

Lecture	: -	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To explore the use of internet to access remote information, communicate and collaborate with others.
- To familiarize with social, economic, security and ethical issues associated with the use of ICT.

Learning Outcomes:

Students will be able to

- understand the basic concepts of networking.
- explore internet for learning.
- understand social, economic and security issues associated with the use of ICT.
- apply the concepts of ICT for their professional growth.

UNIT – I: Computer Networks & Internet

Concept, Types & Functions of Computer Networks, Internet and its Applications, Web Browsers & Search Engines, Legal & Ethical Issues.

UNIT – II: E-Learning & Web Based Learning

E-Learning, Web Based Learning, Virtual Classroom- concept, elements, advantages and limitations, EDUSAT

UNIT – III: Effects of using ICT

Software Copyright, Hacking, Viruses & its Management, Employment Patterns, IT in the home, Information from the Internet, Health and Safety**.**

UNIT – IV: ICT for Professional Development

ICT for Personal & Professional Development: Tools & Opportunities.
Open Education Resources: Concept & Significance.

Text Books:

1. Roger Crawford, Heinemann IGCSE ICT, Pearson Education Limited

Reference Books:

1. Agarwal J.P. (2013): Modern Educational Technology. Black Prints, Delhi.
2. Barton,R.(2004).Teaching Secondary Science with ICT. McGraw Hill International
3. Bhaskar Rao (2013): Samachara Prasara Sankethika vidya Shastramu, Masterminds, Guntur.
4. Cambridge, D.(2010).E-Portfolios for Lifelong Learning and Assessment. John Wiley and Sons

Self Study Course

ORGANIZATIONAL BEHAVIOUR

IV Year – II Semester

Lecture	: -	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To provide a basic knowledge of main ideas and key theories relating to organizational behavior.
- To understand basic concepts, theories and techniques in the field of human behaviour at the individual, group and organizational levels in the changing global scenario.
- To increase managerial effectiveness through understanding of self and others.
- To develop an interest in, an appreciation of, and a positive attitude toward the many aspects of the subject matter of management.

Learning Outcomes:

Students will be able to

- eemonstrate clear understanding of a number of established theorists, theories and studies relating to Organizational Behavior.
- explain and evaluate the key assumptions on which behaviour in organizations is currently managed and assess the effect of these ideas on employee attitudes and actions.
- apply problem solving and critical thinking abilities to analyze the kinds of choices available for developing alternative Organizational Behaviour approaches in the workplace.
- form an appreciation of the complexities and uncertainties of Organizational Behaviour by examining your own role in the light of experience of real-time problem settings.

UNIT – I: Introduction

Nature, scope & Importance – linkages with other social sciences – Individual Roles and Organizational Goals - Perspectives of Human Behavior, Approach to Organizational behavior - models of organizational behavior (Autocratic, Custodial, Supportive, Collegial & SOBC).

UNIT – II: Perceptual Management

Nature, importance - Process – selection, organization and interpretation – Influencing factors **-**Motivation – Concepts - Needs and Motives and theories (Maslow & Herzberg) Leadership and Motivating people - Leadership Theories. Attitudes and Values: formation - types – changes and behavior modification techniques.

UNIT – III: Personality Development

Nature - Stages, Factors, Determinants of Personality, Theories of personality - Johari Window - Transactional Analysis, Learning Processes - theories, Creativity and Creative Thinking. Leadership – nature – skills. Decision Making Process**:** Behavioral Dimensions, Groups and their formation - Group Dynamics, Informal Organizations, Group versus Individual Interaction.

UNIT – IV: Inter- Personal Communication

Listening, Feedback, Collaborative Processes in Work Groups, Team Building, Team Decision Making, Conflict Resolution in Groups and Problem Solving Techniques.

Taxonomy, Elements of Structure, Determinants of Structure, Functional Aspects of Structure, Role Impingement, Stress in Organization. Principles Underlying the Design of Organizations, Organizational Culture, Power and Authority. Organizational Development**:** Goals, processes, change – resistance to change – Nature of OD - interventions, OD techniques and OD applications.

Text Books:

1. Steven L McShane, Mary Ann Von Glinow, Radha R Sharma:"Organizational Behavior", Tata McGraw Hill Education, New Delhi, 2008.
2. K.Aswathappa: "Organizational Behavior-Text, Cases and Games", Himalaya Publishing House, New Delhi,

Reference Books:

1. Jerald Greenberg and Robert A Baron: "***Behavior in Organizations***", PHI Learning Private Limited, New Delhi, 2009.
2. Pareek Udai: "***Understanding Organizational Behavior***", Oxford University Press, New Delhi, 2007.
3. Jai B.P.Sinha: "***Culture and Organizational Behavior***", Sage Publication India Private Limted, New Delhi, 2008.
4. Sharma VS, Veluri: "***Organizational Behavior***", JAICO Publishing House, New Delhi, 2009.
5. Slocum,n Helireigel: "***Fundamentals of Organizational Behavior***", Cengage Learning India, New Delhi, 2009.

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