AUDISANKARA COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
Gudur, Nellore Dist - 524101, A.P (India)

ACADEMIC REGULATIONS

B.Tech (Regular) Four Year Degree Programme

(Applicable for the batches admitted from the academic year 2013-14 and B.Tech Lateral Entry Scheme from the academic year 2014-15)

1. INTRODUCTION:

Academic Programmes of the institute are governed by rules and regulations approved by the Academic Council, which is the highest Academic body of the Institute. These academic rules and regulations are applicable to the students admitted from the academic year 2013-14 onwards into four year B.Tech Programmes.

Audisankara College of Engineering & Technology shall follow Year-wise pattern for First year courses and Semester pattern for II, III and IV year courses of all B.Tech Programmes being offered. An academic year for semester pattern shall consist of two semesters (I & II Semesters) from the second year onwards of each B.Tech Programme.

2. DURATION OF THE PROGRAMME:

The duration of the UG Programme is for four academic years. A student is permitted to complete the B.Tech Programme in a stipulated time frame of Eight consecutive years from the joining Academic Year. Students joining the B.Tech Programme in the first semester of second year directly through Lateral Entry Scheme (LES) shall have to complete the Programme in a stipulated time frame of Six consecutive years from the joining Academic Year. Otherwise they shall forfeit their seat in B.Tech Programme and their admission shall stand cancelled.

3. MINIMUM INSTRUCTION DAYS:

The first year of four year B.Tech Programme shall have a minimum of 180 instruction days and from second year onwards each semester shall have 90 instruction days with atleast 100 contact hours per each theory subject for yearly pattern and 50 for semester pattern. However, contact hours are generally three for a practical subject per week.

4. PROGRAMMES OFFERED (UNDER GRADUATE LEVEL):

Currently Audisankara College of Engineering & Technology is offering,

B.Tech Under Graduate Programmes in the following Engineering disciplines:

- Civil Engineering (**CE**)
- Electrical and Electronics Engineering (**EEE**)
- Mechanical Engineering (**ME**)
- Electronics and Communication Engineering (**ECE**)
- Computer Science and Engineering (**CSE**)

5. ELIGIBILITY CRITERION FOR ADMISSION:

5.1 ADMISSION CATEGORY:

Admissions are made under two categories for B.Tech (Regular) Programmes.

The eligibility criterion for admission into 1st year B.Tech. (Regular) Programme shall be as mentioned below:
Admissions in each Programme in the Institution are classified into

- **CATEGORY-A : (EAMCET Convener Quota)**
- **CATEGORY-B : (NRI/Management)**
- Admissions are made as per the guidelines of A.P State Council of Higher Education (APSCHE), Government of Andhra Pradesh.

5.2 LATERAL ENTRY CATEGORY:

The candidates having passed the qualifying exam (B.Sc., Graduation & Diploma holders) shall be admitted into the II year I Semester directly, based on the rank secured by the candidate at Engineering Common Entrance Test (ECET (FDH)) in accordance with the instructions received from the Convener, ECET and APSCHE. The candidate shall also satisfy any other eligibility requirements stipulated by the JNTUA, Anantapur and / or the Government of Andhra Pradesh from time to time.

6. COURSE STRUCTURE:

Each Programme of study shall consist of:

- General Courses: Humanities and Social Sciences: (5 to 10%)
- Basic Sciences: (15 to 20%)
- Engineering Sciences: (15 to 20%)
- Professional Subjects - Core :(50 to 60%)
- Professional Subjects - Electives: (10 to 15%)
- Personality Development Courses: (1%)

7.0 CONTACT PERIODS AND CREDITS:

Depending upon the complexity and volume of the course, the number of contact periods per week will be assigned. The Course Credits are broadly fixed based on the following norms:

- Lectures – One Lecture period per week is assigned one credit.
- Tutorials - Two tutorial periods per week are assigned one credit.
- Practical – 3 periods per week are assigned two credits.
- Practical course/ Personality Development course/ Technical Seminars/ Comprehensive Viva-Voce shall have 2 credits each in semester.
- Project Work Phase-I shall have 2 credits.
- Project Work Phase-II shall have 10 credits.
- However, some courses are prescribed with fixed number of credits depending on the complexity of the subject and relative importance.

7.1 Theory / Tutorial classes:

Each course is prescribed with a fixed number of lecture periods per week. During each lecture period, the course instructor shall deal with the concepts of the course content with the required analysis and applications. For certain courses, tutorial periods are prescribed in order to give exercises to the students and to closely monitor their learning ability and achievement to strengthen the subject knowledge.

7.2 Laboratory / Workshop Courses:

A minimum prescribed number of experiments / jobs / programs in each of these courses have to be performed by the students, who shall complete these in all respects and get each experiment evaluated by teacher concerned and certified by the Head of the Department concerned at the end of the year/ semester.

7.3 Programme Credits:

Each discipline of the B.Tech (Regular) Programme is designed to have a total of 200 credits, and the student shall have to complete the courses and earn all the credits to get B.Tech degree awarded.

However, B.Tech (Lateral Entry Scheme) student shall have to acquire 154 credits for the degree to be awarded.

7.4 Scheme of Instruction for 1st, 2nd, 3rd and 4th Years

The scheme of instruction and syllabi of all B.Tech Programmes are given separately.

8. EXAMINATIONS AND SCHEME OF EVALUATION:

8.1 INTERNAL EXAMINATIONS:

8.1.1 Theory Courses:

Each course is evaluated for **30** marks (**a+b+c**).

a) **5 marks** in each theory course shall be given to those students who put in attendance of that subject in a graded manner as given in Table 1. This incentive is aimed to motivate the students to become regular and not to miss instruction classes.

Table 1: Attendance based marks system

S. No	Attendance Range	Marks Awarded
1	Attendance of 75% and above but less than 78%	2 Marks
2	Attendance of 78% and above but less than 80%	3 Marks
3	Attendance of 80% and above but less than 90%	4 Marks
4	Attendance of 90% and above	5 Marks

b) (i) **Yearly Pattern:** For I B.Tech (Yearly pattern) there shall be three midterm examinations each for **20 marks** and 90 minutes duration in each theory subject as per the academic calendar announced in advance giving a test performance weightage of 80% for the highest test score and 20% for the average of remaining two midterm examinations for a total of 20 marks. Internal marks are awarded by conducting three midterm examinations as mentioned below:

- Midterm-I is designed and conducted covering first unit of syllabus.
- Midterm-II is conducted covering unit –II and half of unit-III contents.
- Midterm-III is conducted covering second half of unit-III and unit-IV contents.

ii) **Semester Pattern:** Two midterm examinations each for **20 marks** with the duration of 90 minutes each will be conducted for every theory course in a semester. The midterm marks shall be awarded giving a weightage of 80% in the midterm examination in which the student scores more marks and 20% in the remaining midterm examination.

Internal Examination Pattern for 20 Marks:

- Each Internal Examination Question Paper comprises of three questions covering the two units.
- Answering all the three questions is compulsory.
- Question 1 contains six one mark questions covering three questions from each unit and student has to answer four questions (4 Marks).
- Question 2 is from one unit and question 3 from the other unit. Questions 2 & 3 will have internal choice (Either/or). Each question is allotted 8 Marks.

c) 5 marks are allocated for **Assignment tests.**

- There will be four Assignment tests per subject in year/semester pattern.
- One Assignment test is conducted from each unit.
- Five Assignment questions are given in advance from each unit out of which two questions given by the concerned teacher has to be answered during Assignment test.
- Average of Assignment tests marks is considered.

NOTE: A student who is absent for any Mid Term Examination/ Assignment Test, for any reason whatsoever, shall be deemed to have scored zero marks in that Mid Term Exam/ Assignment Test and no make-up test shall be conducted.

8.1.2 Drawing Subjects:

For subjects such as Engineering Drawing/ Building Drawing etc. the distribution of internal marks is as given below:

Table 2: Distribution of Internal Marks

Sl. No.	Criterion	Marks
1	Attendance	5
2	Day - to - Day Evaluation	10
3	Internal Examination	15

a) Engineering Drawing (Yearly pattern):

Three internal tests are conducted spanned at equal intervals. Test performance weightage of 80% for the highest test score and 20% for the average of remaining two midterm examinations for a total of 15 marks. Internal marks are awarded by conducting three midterm examinations as mentioned below:

- Midterm-I is designed and conducted covering first unit of syllabus.
- Midterm-II is conducted covering unit –II and half of unit-III contents.
- Midterm-III is conducted covering second half of unit-III and unit-IV contents.

b) Building Drawing etc., (Semester pattern):

Two internal tests are conducted spanned at equal intervals. Test performance weightage of 80% for the highest test score and 20% for the average of remaining midterm examination for a total of 15 marks. Internal marks are awarded by conducting two midterm examinations as mentioned below:

- Midterm-I is designed and conducted covering first unit of syllabus.
- Midterm-II is conducted covering the second unit of syllabus.

8.1.3 Laboratory Courses:

For Laboratory courses there shall be continuous evaluation during the year/semester for 30 internal marks. The break-up of internal marks to be awarded is as given below:

Table 3: Break-up of Internal Marks

Sl. No.	Criterion	Marks
1	Attendance	5
2	Conduct of experiments, Observation & Results in regular class work(Day-to-Day Performance)	15
3	Viva – voce and Internal Examination	10

In any semester a minimum of 90% of prescribed number of experiments/exercises specified in the syllabus for laboratory course shall be conducted. They shall complete these experiments/exercises in all respects and submit and get the record certified by the concerned internal lab teacher and the Head of the Department to become eligible to appear for the final end examination in the Laboratory Course.

8.1.4 Technical Seminar:

There shall be two Technical Seminars conducted in each discipline, Technical Seminar-I in the II B.Tech II semester and the Technical Seminar-II in the III B.Tech II semester. The distribution of internal marks for component of Technical seminar is given below:

Table 5: Distribution of Marks for component of Technical seminar

Sl. No.	Criterion	Marks
1	Seminar Report & Subject content	20
2	Seminar presentation & Viva – Voce Exam	30

A Technical Seminar shall have two components, one chosen by the student from the course work as an extension and approved by the faculty supervisor. The other component is suggested by the supervisor and can be a reproduction of the concept in any standard research paper or an extension of concept from earlier course work. A hard copy of the information on seminar topic in the form of a report is to be submitted for evaluation along with presentation. The presentation of the seminar topics shall be made before a committee consisting of Head of the department, seminar supervisor and a senior faculty member. Each Technical Seminar shall be evaluated for 100 marks. Technical Seminar component-I for 50 marks and component-II for 50 marks making total 100 marks. (**Distribution of marks for 50:** 10 marks for report, 10 marks for subject content, 20 marks for presentation and 10 marks for queries).

8.1.5 Comprehensive Viva-Voce:

There shall be a Comprehensive Viva-Voce in IV B.Tech II Semester. The comprehensive Viva-Voce shall be evaluated in the topics covering the core aspects of the concerned discipline in which the candidate is likely to get graduated. The marks can be awarded based on the performance in viva-voce examination conducted by a committee consisting of **i)** Head of the Department **ii)** Two Senior Faculty members of the department **iii)** External Examiner appointed by the Principal. The comprehensive Viva-Voce shall be conducted for 100 marks. Of the 100 marks, 25 marks are allocated to each member of the committee.

8.1.6 Project Work:

The Project work is spread over to two semesters having Project Work Phase-I and Project Work Phase-II. Project Work Phase-I is included in IV B.Tech I Semester and Project Work Phase-II in IV B.Tech II Semester as detailed below:

A student has to select topic of his Project Work based on his interest and available facilities, in the IV B.Tech I semester which he will continue through IV B.Tech II semester also.

Project Work Phase-I: IV Year I Semester

The object of Project Work Phase-I is to enable the student to take up investigative study in the broad field of his branch of Engineering, either fully theoretical/practical or involving both theoretical and practical work to be assigned by the department on an individual basis or three/four students in a group under the guidance of a supervisor/ guide. This is expected to provide a good initiation for the student(s) in R&D work.

The assignment normally includes:

- Survey and Study of published literature of on the assigned topic.
- Working out a preliminary approach to the problem relating to the assigned topic.
- Conducting preliminary analysis/ modeling/simulation/experiment/ design/ feasibility.
- Preparing a written report on the study conducted for presentation to the department.
- Final seminar presentation before Project Review Committee.

The supervisor/ guide will evaluate the execution of the project periodically.
Project Work Phase-I is allocated 100 marks with 2 credits. Out of 100, 25 marks are allocated for the supervisor/guide to be awarded based on periodical project reviews and submission of the report on the work done. 25 marks are allocated for the supervisor/guide and head of the department to be awarded based on seminar given by each student on the topic of the project. The other 50 marks shall be awarded on the basis of his presentation on the work done on his project by the Departmental committee comprising of Head of the Department, respective supervisor/ guide and two senior faculty of the department appointed by the Principal.
The candidate is declared to have passed in Project work Phase-I when he gets 40% marks given by the Departmental Committee and 50% marks overall.

Project Work Phase-II: IV Year II Semester:

The Project work Phase-II will be an extension of Phase-I project work. The object of Project work phase-II is to enable the student to extend further the investigative study taken up as the project in Phase-I under the guidance of the supervisor/ guide from the department.

The assignment normally includes:

- Preparing an action plan for conducting the investigation including the team work.
- In depth study of the topic assigned.
- Review and finalization of the approach to the problem relating to the assigned topic.
- Final development of product/process, testing, results, conclusions and further direction.
- Preparing a paper for conference presentation/ publication in journal if possible.
- Preparing a dissertation in the standard format for being evaluated by the department.
- Final presentation of the work done before the Project Review Committee (PRC).

Project Work Phase-II is allocated 50 internal marks. Out of 50, 25 marks are allocated for the supervisor/guide and head of the department to be evaluated based on two seminars given by each student on the topic of the project. The other 25 marks shall be evaluated on the basis of his presentation on the work done on his project by the Departmental Committee comprising of Head of the Department, respective supervisor/ guide and two senior faculty of the department appointed by the Principal.

8.1.7: Professional Ethics and Human Values / Qualitative and Quantitative Analysis:

The subject **Professional Ethics and Human Values** is included in the B.Tech Programme under mandatory and a theory course. It is treated equivalent to any other professional theory subject but only internal evaluation.

The other subject **Qualitative and Quantitative Analysis** is introduced in to the B.Tech Programme to equip with the necessary skill sets and to enhance the placement opportunities of students. It is also a theoretical subject equivalent to any other professional theory subject but only internal evaluation.

8.1.8: Mandatory Courses:

a) A Mandatory Course is one among the compulsory courses and does not carry any credits and is compulsory with examination (internal evaluation only). List of the mandatory courses will be notified at the beginning of the II B.Tech I Semester for all students and the student has to choose one mandatory course for self study mode/with class work at the beginning of the II B.Tech I Semester. All the students (regular & lateral entry students) shall complete one of the mandatory courses, with acceptable performance. The indicative list of the mandatory courses is given below.

1. Intellectual Property Rights – 13MA301
2. Sociology & Elements of Indian History for Engineers – 13MA302
3. Energy Studies – 13MA303
4. Rural Development – 13MA304
5. Law for Engineers – 13MA305
6. Clinical Psychology – 13MA306
7. Business Communication – 13MA307

b) Mandatory courses will be evaluated by conducting examination for duration of 90 minutes.

c) Students will have two chances every academic year to clear the mandatory course beginning from the II B.Tech I Semester. Further, the student has an option to change the mandatory course in case if he / she is unable to clear the mandatory course in the first two chances. However, provisional pass certificate of B.Tech degree will be issued only, when the student clears the mandatory course. Its result shall be declared with **"PASS"** or **"FAIL"** performance and included in the marks memorandum. Each student has to get **"PASS"** in the mandatory course prescribed to qualify for the award of degree.

8.1.9: Audit Courses:

a) A student can register for courses for audit only, when interested to supplement his /her knowledge and / or skills. These courses are optional and there will be no examination. The audit courses shall not be taken into account in determining the student's academic performance in any semester. They will be notified separately by the department. It is optional for students to register for these courses and seek their inclusion in marks memorandum (but not for earning credits). Courses in this category are technology oriented but not necessarily focused on the discipline under study.

8.2 YEAR / SEMESTER END EXAMINATIONS:

8.2.1 Theory Courses: 70 marks each:

The Year/ Semester end examination in each theory subject shall be conducted for 3 hours duration at the end of the year/semester for 70 marks. The question paper each theory subject for Year/Semester pattern shall be designed as per the following guidelines:

- Contains a total of nine questions.
  - A total of NINE questions.
  - Answer one Question from each Unit
  - The Eight questions are to be designed taking one question from each unit (Unit Wise Either or Type) of the four units.
  - In each question, one, two or more bits can be set, totaling 14 Marks with appropriate distribution of marks.
  - Question No.9 containing of 14 one mark questions. A minimum of three one – mark questions shall be set from each unit of the four units.

A student has to secure not less than a minimum of 35% of marks (25 marks) exclusively at the end year/semester examinations in each of the theory subjects in which the candidate had appeared. However, the candidate shall have to secure a minimum of 40% of marks (40 marks) in both external and internal components put together to become eligible for passing in the subject.

8.2.2 Engineering Drawing:

The syllabus of Engineering Drawing subject comprises of four units. The end examination in Engineering Drawing shall be conducted for 3 hours duration at the end of the year. The question paper shall be designed in the following pattern:

- Question paper contains a total of nine questions.
  - Answer one Question from each Unit
  - The Eight questions are to be designed taking one question from each unit (Unit Wise Either or Type) of the four units.
  - In each question, one, two or more bits can be set, totaling 14 Marks with appropriate distribution of marks.
  - Question No.9 containing of 7 two mark questions. A minimum of two two – marks questions shall be set from unit-I, II & III of the four units.

A student has to secure not less than a minimum of 35% of marks (25 marks) exclusively at the end year/semester examinations in each of the subjects in which the candidate had appeared. However, the candidate shall have to secure a minimum of 40% of marks (40 marks) in both external and internal components put together to become eligible for passing in the subject.

8.2.3 Lab Courses (Practical / Workshop): 70 marks

Out of 70 marks **50** marks are allocated for experiment (procedure for conducting the experiment carries 15 marks & readings, calculation and result-35) and **15** marks for viva-voce examination with **5** marks for the record.

Each Year/Semester External Lab Examination shall be evaluated by an Internal Examiner along with an External Examiner appointed by the Principal.
A candidate shall be declared to have passed in individual lab course if he secures a minimum of 50% aggregate marks (50 marks) (Internal & year/semester External Examination marks put together), subject to a minimum of 40% marks (28 marks) in the year/semester external examination.

8.2.4 Project Work Phase-II:

The semester end examination for project work done during IV B.Tech I semester and IV B.Tech II semester for 150 marks shall be conducted by a Project Review Committee (PRC). The committee comprises of an External Examiner appointed by the Principal, Head of the Department and Project Guide/Supervisor. The evaluation of project work shall be conducted at the end of the II Semester of IV B.Tech. The above committee evaluates the project work report with weightages of 50% of the marks (50 marks) awarded by external examiner, 20% of marks (20 marks) awarded by HOD & 30% of the marks (30 marks) by Project Guide/Supervisor respectively for a total of 100marks. Of the 50 marks for Presentation & Viva-Voce examination, HOD evaluates for 10 marks and external examiner for 40 marks. The evaluation of 150 marks is distributed as given below:

Table 11: Distribution of Project Work Marks

Sl. No.	Criterion	Marks
1	Report	100
2	Presentation & Viva – Voce	50

A candidate shall be declared to have passed in project work phase-II if he secures a minimum of 50% aggregate marks (100 marks) (Internal marks + External project marks), subject to a minimum of 40% marks (60 marks) in the project end examination.

9. <u>YEAR/SEMESTER – WISE DISTRIBUTION OF CREDITS:</u>

Table 12: Year/Semester –wise Credits distribution

YEAR/SEMESTER	No. of Credits for courses per year/semester Theory+ Lab/Drg/Proj/CVV/Semi	Total credits
I year	30+16	46
II year I semester	18+08	26
II year II semester	18+08	26
III year I semester	18+08	26
III year II semester	18+08	26
IV year I semester	18+08	26
IV year II semester	12+12	24
TOTAL CREDITS	200	200

(i) In first year the course of study consists of 6 theory subjects + Engineering Drawing + 4 laboratories and from second year onwards, each semester the course of study consists of 6 theory subjects + 3 laboratories. However, in the IV year II semester, there shall be only 4 theory subjects in addition to the project work and comprehensive viva – voice examination.

(ii) All the Technical Seminars, Professional Ethics & Human Values and Aptitude, Arithmetic Reasoning & Comprehension are credit based**.**

10. ATTENDANCE REGULATIONS AND CONDONATION:

i) A student shall be eligible to appear for end semester examinations, if he acquires a minimum of 75% attendance in aggregate of all the subjects.

(ii) Condonation of shortage of attendance in aggregate up to 10% on medical grounds (65% above and below 75%) in each semester may be granted on the recommendation of the College Academic Committee. However, granting condonation is purely at the discretion of Principal of the college.

(iii) A Student will not be promoted to the next semester unless he satisfies the attendance requirement of the present semester as applicable. They may seek re-admission for that semester as and when offered next.

(iv) Shortage of Attendance below 65% in aggregate shall in no case be condoned.

(v) Students whose shortage of attendance is not condoned in any semester are not eligible to take their end examinations of that particular semester and their registration for examination shall stand cancelled.

(vi) A stipulated fee shall be payable towards condonation of shortage of attendance if granted.

(vii) Attendance may also be condoned for those students who participate in prestigious sports and co and extracurricular activities provided their attendance is in the minimum prescribed range for the purpose and recommended by the concerned authority.

(viii) Attendance in Project Work Phase-II in IV B.Tech II Semester is not included in the calculation of final attendance. However, the student has to accquire 75% of attendance aggregate other than attendance of Project Work Phase-II in IV B.Tech II Semester.

11. MINIMUM ACADEMIC REQUIREMENTS:

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item no.10.

A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory/drawing subject if he secures not less than a minimum of 35% of marks exclusively at the end year/semester examinations in each of the subjects in which the candidate had appeared. However, the candidate shall have to secure a minimum of 40% marks in both external and internal components put together to become eligible for passing in the subject.

1. A candidate shall be declared to have passed in individual lab/project course if he secures a minimum of 50% aggregate marks (Internal & year/semester end examination marks put together), subject to a minimum of 40% marks in the year/semester end examination.
2. A student shall be promoted to next semester, if he satisfies the minimum attendance requirement.
3. A Student shall be promoted from II year to III year, if he fulfills the academic requirements of securing a minimum of 36 credits from:
   a) One regular and one supplementary examination of I Year.
   b) One regular examination of II Year I Semester.

4. A student shall be promoted from III year to IV year if he fulfills the academic requirements of securing a minimum of 62 credits from:
   a) Two regular and two supplementary examinations of I Year.
   b) Two regular and one supplementary examinations of II Year I Semester.
   c) One regular and one supplementary examinations of II Year II Semester.
   d) One regular examination of III Year I Semester.

   Irrespective of whether the candidate takes the end examination or not as per the normal course study. And in case of getting detained for want of credits by points 4&5, the student may make up the credits through supplementary exams of the above exams before the date of class work commencement of III B.Tech I Semester and IV I Semester respectively.
5. There shall be supplementary examinations along with the regular end examinations enabling the students to give a fair chance to clear the subject if failed.
6. However, advance supplementary examinations shall be conducted for all such students who had failed at the IV B.Tech II Semester subjects of their study.
7. A student shall register for all the subjects and earn all the 200 credits as indicated in the course structure within eight academic years (6 consecutive years for LES students) from the year of their admission shall forfeit their seat in B.Tech course and their admission shall stand cancelled.

12. AWARD OF CLASS:

After the student has satisfied the requirements, prescribed for the completion of the programme and is eligible for the award of B.Tech. Degree, he shall be placed in one of the following four classes:

Table 13: Award of Division

Class Awarded	% of marks to be secured
First Class with Distinction	70% and above
First Class	Below 70% but not less than 60%
Second Class	Below 60% but not less than 50%
Pass Class	Below 50% but not less than 40%

13. TRANSITORY REGULATIONS:

A student, who is detained or discontinued in the year/semester, on readmission shall be required to do all the courses in the curriculum prescribed for such batch of students in which the student joins subsequently.

13.1 A student who is following the JNTUA, Ananthapuramu curriculum, detained due to lack of credits/ attendance at the end of the first semester of second year, shall join the autonomous batch of I Semester of II B.Tech. Such students will study all the courses prescribed for that batch, in which the student joins. The first year marks shall not be converted in to course credits. However, the student has to clear all his first year backlog subjects if any by appearing in the supplementary examinations of JNTUA, Ananthapuramu when conducted and courses prescribed in Autonomous stream for the Award of Degree. The class will be awarded based on the academic performance of a student. Such candidates will be considered on par with lateral entry candidates of autonomous stream and will be governed by the regulations applicable to lateral entry candidate's category.

13.2. A student who is following the JNTUA, Ananthapuramu curriculum, detained due to lack of credits/ attendance at the end of the second semester of second B.Tech, and also at the subsequent semesters, shall join the autonomous batch at the appropriate semester. Such candidates shall be required to pass in all the courses in the Programme prescribed by concerned BOS for such batch of students, to be eligible for the award of degree. However, exemption will be given in all those courses of the semester(s) of the batch, which the candidate joins now, which he had passed earlier. The student has to clear all his backlog subjects by appearing in the supplementary examinations, conducted by JNTUA, Ananthapuramu and College (Autonomous Stream) for the Award of Degree. The class will be awarded based on the academic performance of a student in the JNTUA Pattern and academic regulations of JNTUA will be followed.

14. READMISSION CRITERIA:

A Candidate, who is detained in a year/semester due to lack of attendance/credits, has to obtain written permission from the Principal for readmission into the same semester after duly fulfilling all the required norms stipulated by the college in addition to paying the required fee.

15. SUPPLEMENTARY EXAMINATIONS:

Apart from the regular End Examinations the institute may also schedule and conduct supplementary examinations for all subjects for the benefit of students with backlogs. Such students writing supplementary examinations as supplementary candidates may have to write more than one examination per day.

16. CONDUCT AND DISCIPLINE:-

(a) Students shall conduct themselves within and outside the premises of the Institute in a descent and dignified manner befitting the students of Audisankara College of Engineering & Technology.

(b) As per the order of the Honorable Supreme Court of India, ragging in any form is considered a criminal offence and is totally banned. Any form of ragging will be severely dealt with.

(c) The following acts of omission and / or commission shall constitute gross violation of the code of conduct and are liable to invoke disciplinary measures with regard to ragging.

  (i) Lack of courtesy and decorum; indecent behavior anywhere within or outside the college campus.
  (ii) Damage of college property or distribution of alcoholic drinks or any kind of narcotics to fellow students / citizens.

(d) Possession, consumption or distribution of alcoholic drinks or any kind of narcotics or hallucinogenic drugs.

(e) Mutilation or unauthorized possession of library books.

(f) Noisy and unruly behavior, disturbing studies of fellow students.

(g) Hacking in computer systems (such as entering into other person's areas without prior permission, manipulation and / or damage of computer hardware and software or any other cyber crime etc.

(h) Usage of camera /cell phones in the campus.

(i) Plagiarism of any nature.

(j) Any other act of gross indiscipline as decided by the college academic council from time to time.

(k) Commensurate with the gravity of offense, the punishment may be reprimand, fine, expulsion from the institute/ hostel, debarring from examination, disallowing the use of certain facilities of the Institute, rustication for a specified period or even outright expulsion from the Institute, or even handing over the case to appropriate law enforcement authorities or the judiciary, as required by the circumstances.

(l) For an offence committed in (i) a hostel (ii) a department or in a class room and (iii) elsewhere, the chief Warden, the concern Head of the Department and the Principal respectively, shall have the authority to reprimand or impose fine.

(m) Cases of adoption of unfair means and/ or any malpractice in an examination shall be reported to the principal for taking appropriate corrective action.

(n) All cases of serious offence, possibly requiring punishment other than reprimand, shall be reported to the Academic council of the college.

(o) The Institute Level Standing Disciplinary Action Committee constituted by the academic council shall be the authority to investigate the details of the offence, and recommend disciplinary action based on the nature and extent of the offence committed.

(p) The Principal shall deal with any problem, which is not covered under these rules and regulations.

(q) **"Grievance and Redressal Committee" (General)** constituted by the Principal shall deal with all grievances pertaining to the academic / administrative / disciplinary matters.

(r) All the students must abide by the code and conduct rules prescribed by the college from time to time.

17.0 RULES FOR DISCIPLINARY ACTION FOR MALPRACTICE / IMPROPER CONDUCT IN EXAMINATIONS

	Nature of Malpractices/Improper conduct	**Punishment**
	If the candidate	
1. (a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only.
(b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2.	Is found copying in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate will be cancelled.
3.	Comes in alcohol drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year.
4.	Smuggles the Answer book or a part there of additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all end examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5.	Leaves the exam hall taking away answer script or intentionally tears of the script or	Expulsion from the examination hall and cancellation of performance in that subject and

	any part thereof inside or outside the examination hall.	all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all end examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
6.	Possesses any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate will also be debarred and forfeit the seat.
7.	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate will also be debarred and forfeit the seat. The performance of the original candidate who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate will also be debarred for two consecutive semesters from class work and all end 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 registered against him.
8.	Refuses to obey the orders of the Chief Superintendent/Asst. Superintendent/ any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall causing any injury to him or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case registered against them.

	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.	
9.	Is a 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 clauses 6 to 8.	In case of students of the college expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them.
10.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject.
11.	Is detected copying on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year examinations.
12.	Indulging in any malpractice which is not covered in the above clauses 1 to 11 if detected shall be reported to the College Authorities for further action to award suitable punishment.	Appropriate action will be taken as recommended by the College Authorities.

Malpractices identified by squad or special invigilators

1. Punishments to the candidates as per the above guidelines.

18. AWARD OF RANK:

The rank shall be awarded based on the following:

- Only such candidates, who pass the Final Semester end examination at the end of the II Semester of IV B.Tech (Final Semester) after admission as regular final year students along with the others in their batch and become eligible for the award of the Degree, shall be eligible for the award of rank. Candidates, who lose one year / one or more Semesters of study for any reason what so ever are not eligible for the award of rank.
- Ranks shall be awarded in each branch of study for the top five students appeared for the Regular Examinations.
- For the purpose of awarding rank in each branch, the aggregate of marks (Internal + External) of all courses (put together) in all the four years, secured at the first attempt only shall be considered.
- Award of prizes, scholarships, or any other Honors shall be based on the rank secured by a candidate, consistent with the guidelines of the Donor, wherever applicable.

19. GENERAL:

(a) Where the words “he” “him” “his” occur in the regulations, they include “she”, “her”.

(b) The academic regulation should be read as a whole for the purpose of any interpretation.

(c) In the case of any dues or ambiguity in the interpretation of the above rules, the decision of the Principal is final.

(d) The Institute may change or amend the academic regulations or syllabi at any time duly approved by Academic Council and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the Institute.

20. CHANGE OF BRANCH:

There shall be no sliding of branch after the completion of admission process.

AUDISANKARA COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
Gudur, Nellore Dist - 524101, A.P (India)

(LATERAL ENTRY SCHEME)

(Effective for the students getting admitted into II year through Lateral Entry Scheme from the Academic Year 2014-2015 onwards)

1. Award of B.Tech. Degree

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

i. Pursue a course of study for not less than three academic years and in not more than six academic years.

ii. Register for 154 credits from II Year to IV Year of Regular B.Tech. Program

2. Students, who fail to fulfill the requirement for the award of the degree in six consecutive academic year from the year of admission, shall forfeit their seat.

3. Minimum Academic Requirements:

The following academic requirements have to be satisfied in addition to the attendance requirements.

i. A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory, practical, design, drawing subject or project if he secures not less than 35% of marks in the end examination and a minimum of 40% of marks in the sum total of the internal evaluation and end examination taken together. For the seminar he should secure 40% in the internal evaluation.

ii. A student shall be promoted from third year to fourth year only if he fulfils the academic requirements of 39 credits from the following examinations.

   a. Two regular and one supplementary examinations of II year I semester.
   b. One regular and one supplementary examinations of II year II semester.
   c. One regular examination of III year I semester.

   Irrespective of whether the candidate takes the end examination or not as per the normal course of study and in case of getting detained for want of credits the student may make up the credits through supplementary exams of the above exams before the date of class work commencement of Fourth year I semester.

4. Course Pattern

i. The entire course of study is three academic years on semester pattern.

ii. A student eligible to appear for the end examination in a subject, but absent at it or has failed in the end examination may appear for the subject at the next supplementary examination offered.

iii. When a student is detained due to lack of credits / shortage of attendance he may be re-admitted when the semester is offered after fulfillment of academic regulations, whereas he continues to be in the academic regulations he was first admitted.

5. Award of Class:

After a student has satisfied the requirements prescribed for the completion of the program and are eligible for the award of B.Tech. Degree he shall be placed in one of the following four classes:

Class Awarded	% of marks to be secured
First Class with Distinction	70% and above
First Class	Below 70% but not less than 60%
Second Class	Below 60% but not less than 50%
Pass Class	Below 50% but not less than 40%

6. All other regulations as applicable for B.Tech. Four-year degree course (Regular) will hold good for B.Tech. (Lateral Entry Scheme) students.

AUDISANKARA COLLEGE OF ENGINEERING & TECHNOLOGY
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Gudur, Nellore Dist - 524101, A.P (India)

Course Structure for B.Tech (Electrical and Electronics Engineering) Regular Programme Applicable for students admitted from Academic Year 2013-14

B.Tech I Year – Electrical and Electronics Engineering

Sl.No	Course Code	Subject	Scheme of instruction (Periods per week)				Scheme of Examination			No. of Credits
			Th	Tu	Drg	Lab	IM	EM	Total Marks	
1	13HS101	Communicative English	2	-	-	-	30	70	100	3
2	13HS102	Engineering Physics	2	-	-	-	30	70	100	3
3	13HS103	Engineering Chemistry	2	-	-	-	30	70	100	3
4	13HS104	Engineering Mathematics-I	3	1	-	-	30	70	100	5
5	13HS105	Engineering Mathematics-II	3	1	-	-	30	70	100	5
6	13HS106	Environmental Science	2	-	-	-	30	70	100	3
7	13HS107	Computer Programming	3	1	-	-	30	70	100	4
8	13HS109	Engineering Drawing	2	-	4	-	30	70	100	4
9	13HS110	Computer Programming Lab	-	-	-	3	30	70	100	4
10	13HS111	Engineering Workshop and IT Workshop	-	-	-	3	30	70	100	4
11	13HS112	Engineering Physics and Engineering Chemistry Lab	-	-	-	3	30	70	100	4
12	13HS113	English Language and Communication Skills Lab	-	-	-	3	30	70	100	4
Contact Periods / Week			**19**	**3**	**4**	**12**	**360**	**840**	**1200**	
Total Periods / Week			**38**				**Total Credits**			**46**

Note: Th: Theory, Tu: Tutorial, Drg: Drawing, Lab: Laboratory, IM: Internal Marks, EM: External Marks

- The students attend the Engineering Workshop and IT Workshop in alternate Weeks. The end exam shall be conducted separately and average of the two exams will be recorded by the Autonomous exam section.
- The students attend the Engineering Physics Lab and Engineering Chemistry Lab in alternate Weeks. The end exam shall be conducted separately and average of the two exams will be recorded by the Autonomous exam section.

B.Tech II Year I Semester – Electrical and Electronics Engineering

Sl.No	Course Code	Subject	Scheme of instruction (Periods / week)			Scheme of Examination			No. of Credits
			Th	Tu	Lab	IM	EM	Total Marks	
1	13HS114	Engineering Mathematics-III	3	1	-	30	70	100	3
2	13HS120	Professional Ethics and Human Values	2	-	-	30	70	100	2
3	13EE301	Fluid Mechanics and Hydraulic Machinery	3	-	-	30	70	100	3
4	13EE302	Electronic Devices and Circuits	3	1	-	30	70	100	3
5	13EE303	Circuit Theory-I	3	1	-	30	70	100	3
6	13EE304	DC Machines	3	1	-	30	70	100	3
7	13EE305	Data Structures through C	3	-	-	30	70	100	3
8	13EE306	Fluid Mechanics and Hydraulic Machinery Lab	-	-	3	30	70	100	2
9	13EE307	Electronic Devices and Circuits Lab	-	-	3	30	70	100	2
10	13EE308	Electrical Workshop	-	-	3	30	70	100	2
Contact Periods / Week			**20**	**4**	**9**	**300**	**700**	**1000**	
Total Periods / Week			**33**			**Total Credits**			**26**

B.Tech II Year II Semester – Electrical and Electronics Engineering

Sl.No	Course Code	Subject	Scheme of instruction (Periods / week)			Scheme of Examination			No. of Credits
			Th	Tu	Lab	IM	EM	Total Marks	
1	13EE401	Electromagnetic Field Theory	3	1	-	30	70	100	3
2	13EE402	Transformers and Induction Motors	3	1	-	30	70	100	3
3	13EE403	Circuit Theory-II	3	1	-	30	70	100	3
4	13EE404	Generation of Electric Power	3	-	-	30	70	100	3
5	13EE405	Analog Electronic Circuits	3	-	-	30	70	100	3
6	13EE406	Digital Electronics	3	-	-	30	70	100	3
7	13EE407	Electrical Machines Lab-I	-	-	3	30	70	100	2
8	13EE408	Electrical Circuits and Simulation Lab	-	-	3	30	70	100	2
9	13EE409	Pulse and Digital Circuits Lab	-	-	3	30	70	100	2
10	13EE410	Technical Seminar-I	-	1	-	100	-	100	2
Contact Periods / Week			**18**	**4**	**9**	**370**	**630**	**1000**	
Total Periods / Week			**31**			**Total Credits**			**26**

B.Tech III Year I Semester – Electrical and Electronics Engineering

Sl.No	Course Code	Subject	Scheme of instruction (Periods / week)			Scheme of Examination			No. of Credits
			Th	Tu	Lab	IM	EM	Total Marks	
1	13HS118	Managerial Economics and Financial Analysis	3	-	-	30	70	100	3
2	13HS121	Qualitative and Quantitative Analysis	2	-	-	30	70	100	2
3	13EE501	Electrical Measurements and Instrumentation	3	1	-	30	70	100	3
4	13EE502	Power Electronics	3	-	-	30	70	100	3
5	13EE503	Synchronous & Special Machines	3	-	-	30	70	100	3
6	13EE504	Transmission of Electric Power	3	1	-	30	70	100	3
7	13EE505	Signals and Systems	3	1	-	30	70	100	3
8	13EE506	Electrical Measurements Lab	-	-	3	30	70	100	2
9	13EE507	Electrical Machines Lab-II	-	-	3	30	70	100	2
10	13HS122	Soft Skills Lab	-	-	3	30	70	100	2
Contact Periods / Week			**20**	**3**	**9**	**300**	**700**	**1000**	
Total Periods / Week			**32**			**Total Credits**			**26**

B.Tech III Year II Semester – Electrical and Electronics Engineering

Sl.No	Course Code	Subject	Scheme of instruction (Periods / week)			Scheme of Examination			No. of Credits
			Th	Tu	Lab	IM	EM	Total Marks	
1	13EE601	Microprocessors and Microcontrollers	3	-	-	30	70	100	3
2	13EE602	Power Semiconductor Drives	3	1	-	30	70	100	3
3	13EE603	Power System Operation and Control	3	1	-	30	70	100	3
4	13EE604	Power System Analysis	3	1	-	30	70	100	3
5	13EE605	Control Systems	3	-	-	30	70	100	3
6	13EE606	Linear and Digital IC Applications	3	-	-	30	70	100	3
7	13EE607	Power Electronics and Simulation Lab	-	-	3	30	70	100	2
8	13EE608	Control Systems and Simulation Lab	-	-	3	30	70	100	2
9	13EE609	Microprocessors and Microcontrollers Lab	-	-	3	30	70	100	2
10	13EE610	Technical Seminar-II	-	1	-	100	-	100	2
Contact Periods / Week			**18**	**4**	**9**	**370**	**630**	**1000**	
Total Periods / Week			**31**			**Total Credits**			**26**

B.Tech IV Year I Semester – Electrical and Electronics Engineering

Sl.No	Course Code	Subject	Scheme of instruction (Periods / week)			Scheme of Examination			No. of Credits
			Th	Tu	Lab	IM	EM	Total Marks	
1	13HS119	Management Science	3	-	-	30	70	100	3
2	13EE701	Electrical Distribution Systems	3	1	-	30	70	100	3
3	13EE702	Switch Gear and Protection	3	1	-	30	70	100	3
4	13EE703	Digital Signal Processing	3	-	-	30	70	100	3
5	13EE704 13EE705 13EE706 13EE707	**Elective-I** 1.Renewable Energy Sources 2.Power System Reliability 3.Embedded Systems 4.High Voltage Engineering	3	-	-	30	70	100	3
6	13EE708 13EE709 13EE710	**Open Elective** 1.Fuzzy logic and Neural Networks 2.Entreprenuership Development 3.Optimization Techniques	3	-	-	30	70	100	3
7	13EE711	Advanced Power Electronics and Drives Lab	-	-	3	30	70	100	2
8	13EE712	Digital Signal Processing Lab	-	-	3	30	70	100	2
9	13EE713	Power System Simulation Lab	-	-	3	30	70	100	2
10	13EE714	Project Work - Phase-I	-	-	2	100	-	100	2
Contact Periods / Week			**18**	**3**	**11**	**370**	**630**	**1000**	
Total Periods / Week			**32**			**Total Credits**			**26**

B.Tech IV Year II Semester – Electrical and Electronics Engineering

Sl.No	Course Code	Subject	Scheme of instruction (Periods / week)			Scheme of Examination			No. of Credits
			Th	Tu	Lab	IM	EM	Total Marks	
1	13EE801	Utilization of Electrical Energy	3	-	-	30	70	100	3
2	13EE802	HVDC and FACTS	3	-	-	30	70	100	3
3	13EE803 13EE804 13EE805 13EE806	**Elective-II** 1. PLCs and Applications 2.Modern Control Theory 3.Smart Grid Systems 4.Database Management Systems	3	1	-	30	70	100	3
4	13EE807 13EE808 13EE809 13EE810	**Elective-III** 1.Energy Auditing and Demand Side Management 2.VLSI Design 3.Computer Organization 4.Design of Electrical Systems	3	1	-	30	70	100	3
5	13EE811	Comprehensive Viva-Voce	-	-	-	-	100	100	2
6	13EE812	Project Work - Phase-II	-	-	-	50	150	200	10
Contact Periods / Week			**12**	**2**	**-**	**170**	**530**	**700**	
Total Periods / Week			**14**			**Total Credits**			**24**

AUDISANKARA COLLEGE OF ENGINEERING & TECHNOLOGY: GUDUR
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Detailed Syllabus

I B.Tech (EEE)	L	T	P	[C]
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(13HS101) COMMUNICATIVE ENGLISH

Objectives:
- To improve the language proficiency of the students in English with an emphasis on LSRW skills.
- To equip the students to study academic subjects with greater facility through theoretical and practical components of the syllabus.
- To develop study skills as well as communication skills in formal and informal situations.

1. SYLLABUS :

Listening Skills:

Objectives

1. To enable students to develop their listening skills so that they may appreciate its role in the LSRW skills approach to language and improve their pronunciation
2. To equip students with necessary training in listening so that they can comprehend the speech of people of different backgrounds and dialects.

Students should be given practice in listening and identifying the sounds of English language and to mark stress , right intonation in connected speech.

- Listening for general content
- Listening to fill up information
- Intensive listening
- Listening for specific information

2. TEXTBOOKS PRESCRIBED:

In order to improve the proficiency of the student in the acquisition of the four skills mentioned above, the following texts and course content are prescribed and divided into Four Units:

For Detailed study: **ENJOYING EVERYDAY ENGLISH**, Sangam Books (India) Pvt Ltd Hyderabad, 2009

For Non-detailed study: **INSPIRING LIVES**, Maruti Publications, Guntur, 2009

UNIT –I:

Heaven's Gate: Introduction of the Author and Lesson, Paragraphs and Description, Introduction of Leh,… Greeting and Leave Taking and Introducing, Naming Words, Homonyms, Homophones, Homographs, Synonyms and Antonyms.

Mokshagundam Visvesvaraya: Introduction of Visvesvaraya, Childhood, Education, Projects he Undertook, Social Reforming Activities….. Synonyms and Antonyms.

UNIT –II:

Cuddalore Experience: Introduction of the Author and Lesson, Paragraphs and Description, Description of Tsunami, Damage Caused, Immediate Rescue Operations Implemented….. Official Reports, Congratulating, Offering Sympathy and Condolences and Making Complaints, Tenses, Phrasal Verbs.

Mother Teresa: Introduction of Teresa, Childhood, Humanity Work, Honours and Awards…. One Word Substitutes.

UNIT –III:

Odds against us: Introduction of the Author and Lesson, Paragraphs and Description, Differences between Foreign Movies and Indian Movies, Three Factors that Guide a Director….. Information Transfer, Conjunctions and Prepositions, Technical Vocabulary.

Charlie Chaplin: Introduction of Chaplin, His Films, His married Life….. One Word Substitutes

UNIT –IV:

Exercises on:

Remedial Grammar covering Common errors in English, Use of Articles and Prepositions, Active/Passive Voice, Reported speech, Tenses, Degrees of Comparison, conditional Clauses (If/Weather/Unless), One Word Substitutions, Idiomatic Expressions, Synonyms & Antonyms, Words often confused, Question Tags.

Exercises on:

Letter Writing

Report Writing

Reference Books:

1. Meenakshi Raman and Sangita Sharma, Technical Communication , Principle and Practice, OUP, 2009
2. Essential Grammar in Use, (with CD) 3/e, Cambridge University Press, 2009
3. M.Ashraf Rizvi, Resumes and Interviews, Tata – McGraw Hill, 2009
4. Robert J. Dixson , Everyday Dialogues in English, Prentice-Hall of India Ltd., 2006.
5. Farhathullah, Communication Skills for Technical Students, T.M., Orient Blackswan, 2008

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(13HS102) ENGINEERING PHYSICS

Objectives: To Impart the awareness among the Engineering Students about the present day technologies in Physics to reach the heights of technical globe with latest technologies in Fiber Optics, Nanotechnology, Super Conductivity and Lasers.

UNIT – I:

Optics, Fiber Optics and Lasers

Interference: Introduction, Interference in thin film by reflection, Newton's rings.

Diffraction: Introduction, Fraunhoffer diffraction due to single slit, Diffraction Grating.

Fiber Optics: Construction of Optical Fiber, Principle of Optical Fiber, Acceptance angle and Acceptance cone, Numerical aperture, Types of Optical Fibers, Fiber optic communication system and its advantages, Attenuation in Optical Fibers, Applications of Optical Fibers.

Lasers: Introduction, Characteristics of Lasers, Spontaneous & Stimulated emission of radiation, Population Inversion, Pumping Methods, Components of Lasers, Ruby Laser, Helium Neon Laser, Semiconductor laser, Applications of Lasers.

UNIT – II:

Crystal Structures, X-Ray Diffraction and Semiconductors

Crystal Structures, X-Ray Diffraction: Introduction, Space Lattice, Basis, Unit Cell, Lattice Parameters, Bravais Lattices, Crystal systems, Expression for Lattice constant, Structure and Packing factor of SC, BCC & FCC crystals, Structure of NaCl and Diamond, Crystal Planes, Crystal directions and Miller Indices , Important features of Miller Indices, Expression for Interplanar spacing in rectangular coordinate systems, X-ray Diffraction by crystal planes, Bragg's law, Laue Method, Powder Method .

Semiconductors: Introduction, Intrinsic semiconductor and carrier concentration, Extrinsic semiconductor and carrier concentration, Law of mass action, Electrical conductivity in semiconductors, Drift and Diffusion, Einstein relation, Hall Effect, Direct and Indirect Band gap semiconductors, LED, Photodiodes.

UNIT–III:

Principles of Quantum Mechanics, Band Theory of Solids and Magnetic Properties:

Principles of Quantum Mechanics : Waves and particles, de-Broglie Hypothesis, Matter waves, Heisenberg Uncertainty principle, Applications of Heisenberg uncertainty principle, Schrodinger time independent wave equation, Physical significance of wave function, Particle in one dimensional potential box, Fermi Dirac Distribution function, Electron Scattering and Sources of electrical resistance.

Band Theory of Solids: Electron in a periodic potential, Kronig-Penny Model (qualitative treatment only), Origin of Energy Bands formation in Solids, Effective mass of electron, Classification of solids into Conductors, Semiconductors & Insulators based on Band theory.

Magnetic Properties: Magnetic susceptibility, Origin of Magnetic moment-Bohr magneton, Classification of magnetic materials, Domain theory of ferromagnetism, Hysteresis curve, Ferrites and its applications, Soft and hard magnetic materials.

UNIT – IV

Superconductivity & Nanotechnology

Superconductivity: Introduction, Properties of superconductors, Meissner Effect, Type – I and Type – II Superconductors, Flux Quantization, Penetration Depth. Josephson Effect, BCS theory, Applications of superconductors, High Temperature Superconductors.

Nanotechnology: Origin of Nanotechnology, Nanoscale, Surface area to volume ratio, Quantum Confinement effect, Properties of nanomaterials, Electrical properties, Optical properties, Magnetic Properties, Mechanical properties, Fabrication of nanomaterials by Ball Milling, Plasma Arcing, Chemical vapour deposition, Sol-Gel method, Electrode position methods and Applications of Nanomaterials.

CNT-Introduction, Types, Properties, Production, Applications of CNTS, Graphene and Graphene based FET.

Text Books:

1. V. Rajendran, K.Thyagarajan Engineering Physics , III Edition, 2012.Tata MacGraw Hill Publishers
2. P.K.Palanisamy , Engineering Physics, II Edition 2010 Scitech Publishers.

Reference Books:

1. S. ManiNaidu ,Engineering Physics, I Edition, 2012. Pearson Education
2. M. Arumugam , Engineering Physics II Edition, 1997 , Anuradha Publications.
3. A.J. Dekkar , Solid State Physics , Latest edition, 2012. McMillan Publishers
4. Gaur and Gupta Dhanapati , Engineering Physics, 7th Edition, 1992 Rai Publishers ,.
5. B S Murthy, P.Shankar, Baldev Raj B BRath, James Murday , I Edition, 2012.
Text book of Nanoscience and Nanotechnology:, University Press,
6. H.S. Philip Wong, Deji Akinwande , Carbon Nanotubes and Graphene Device Physics –, Cambridge University Press, 2011.

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I B.Tech (EEE)	L	T	P	[C]
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(13HS103) ENGINEERING CHEMISTRY

Objectives:

- The Chemistry course for undergraduate students is framed to strengthen the fundamentals of chemistry and then build an interface of theoretical concepts with their industrial/engineering applications.
- The extension of fundamentals of electrochemistry to energy storage devices such as commercial batteries and fuel cells is one such example.

UNIT – I:

Water Technology & Fuel Technology:

Water Technology: Sources of water, Hardness of water, units of hardness, Estimation of hardness by EDTA method, Analysis of water – Dissolved oxygen, Estimation of Chloride, Alkanity, Acidity.

Sterilization of water: Chlorination, Ozonisation, Addition of Bleaching powder.

Water for Industrial Purpose: Water for steam generation, Boiler troubles – priming and foaming, Boiler corrosion, sludges and scales, caustic embrittlement.

Water treatment: Internal treatment – colloidal, phosphate, calgon, carbonate and sodium aluminate conditioning. Softening methods of water – Ion exchange process. Determination of brakish water – Reverse Osmosis.

Fuel Technology: Definition, classification, characteristics of good fuel.

Solid fuels: Coal, classification, Metallurgical coke – characteristics and Manufacturing (Otto-Halfman's by product oven method)

Liquid fuels: Petroleum, origin, refining, and fractional distillation, synthetic petrol.

Gaseous fuels: Composition and preparation of producer gas, water gas, bio gas, coal gas, natural gas.

Calorific Value and its Units, flue gas analysis by Orsat's apparatus.

Lubricants: Functions, Classification and Properties – viscosity, viscosity index, flash and fire point, pour and cloud point, aniline point, mechanical strength, neutralization number.

UNIT – II:

Electrochemistry and Science of corrosion:

Electrochemistry : Conductance, Equivalent conductance, Molecular conductance, conduct metric titrations, Applications of conductivity measurement., numerical calculations, review of electro chemical cells-Galvanic cells.

Batteries: Ni-Cd cell, Lithium ion cells, fuel cells – Hydrogen Oxygen Fuel cell, Methanol fuel cell.

Science of corrosion: Definition and Types of corrosion – Dry corrosion and wet corrosion. Galvanic series, Galvanic corrosion and concentration cell corrosion.

Factors influencing corrosion,

Control of corrosion: Use of inhibitors, Sacrificial Anode, Impressed current, Electroplating and Electro less plating (Cu and Ni).

UNIT – III:

Polymers and advanced Engineering Materials

Polymers: Basic concepts, Types of polymerization – Addition, condensation, co-polymerization.

Plastics: Thermoplastics and Thermosetting plastics, preparation, properties and Engineering uses of Teflon, PVC, Bakelite, Nylon.

Natural Rubber (Elastomers): Processing, Compounding, Vulcanization of Natural Rubber.
Synthetic Rubber: Buna – S, Buna – N, Poly urethane, poly sulphide and silicone Rubber.
Advanced Engineering Materials:
Conducting Polymers: Synthesis and Applications of poly acetylene, poly aniline.
Liquid Crystals: Definition, properties, and classification and Engineering applications.
Inorganic Polymers: Basic Introduction, Silicones, Polyphospazins (-(R) 2 – P = N -) and applications.

UNIT – IV:
Building Materials and Photo Chemistry
Cement: Definition, Composition and Manufacture of Portland cement, Analysis, setting and hardening of cement.
Refractories: Definition, classification, criteria of good Refractory- Refractoriness, Refractoriness under load, Chemical inertness, Dimensional stability, Thermal spalling, porosity, Thermal expansion, Thermal conductivity, Abrasion Resistance, Electrical conductivity. Causes for failure of refractories.
Photo Chemistry:
Photochemical Reactions, Difference between Photochemical reactions and thermochemical reactions. Absorption of light: Beer-Lambert's law.
Photo-physical Processes: (a) Fluorescence. (b) Phosphorescence and (c) Chemi-luminiscence applications.

Text Books:

1. Prof. K.N.Jayaveera, Dr.G.V.Subba Reddy and Dr.C. Ramachandraiah, , Engineering Chemistry Fourth Edition, 2012 McGraw Hill Higher Education, New Delhi.
2. Jain & Jain, Text book of Engineering Chemistry , 15th Edition 2009, Dhanpat Rai Publishing Company, New Delhi.

Reference Books:

1. S.S Dhara, S.S.Umare, A Text book of Engineering Chemistry ,12th Edition, 2010. S. Chand Publications, New Delhi,
2. K.B.Chandra Sekhar, UN.Das and Sujatha Mishra Engineering Chemistry , 2nd Edition, 2012 SCITECH, Publications India Pvt Limited, Chennai
3. K. Sesha Maheswaramma and Mrudula Chugh , Engineering Chemistry, First Edition, 2013 PearsonEducation
4. C.V. Agarwal, Chemistry of Engineering Materials Varanasi,2008. Tara Publication.

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I B.Tech (EEE)	L	T	P	[C]
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(13HS104) ENGINEERING MATHEMATICS-I

Objectives: The Subject is aimed at developing the basic mathematical skills of engineering students that are imperative for effective understanding of engineering subjects. The topics introduced will serve as basic tools for specialized studies in many engineering fields.

UNIT – I:

Differential & Integral Calculus

Mean Value Theorems – Rolle's, Lagrange's, Cauchy's, Taylor's, and Maclaurin's theorem (without proofs) with simple related problems.

Functions of several variables - Jacobian, functional dependence, Taylor's and Maclaurin's series(without proof) with two variables , maxima & minima of function of two and three variables.- Lagrange's method of multipliers with three variables only

Radius of Curvature – Cartesian, Polar, Parametric forms and Radius of Curvature at Origin (Newton's Method).

Curve Tracing – Cartesian, Polar, Parametric forms.

Multiple Integrals - Evaluation of Double Integrals – Change of Order of Integration- Change of Variables- Evaluation of Triple Integrals.

UNIT-II:

Ordinary Differential Equations:

Differential Equations of First Order and First Degree: Exact Differential Equations, Integrating factors, Linear Differential Equations, Bernoulli's Differential Equations, Orthogonal Trajectories of curves, Newton's Law of cooling, Law of Natural Decay & Growth.

Linear Differential Equations of Second or Higher Order: Homogeneous, Non -Homogeneous, Differential Equations of second and higher order with constant coefficients with RHS terms of the type e^{ax}, Sin ax/cos ax, Polynomial in x, $e^{ax}V$ [V is sin ax or cos ax or polynomial in x], $x^m V$ [V is sin ax/ cos ax], method of Variation of parameters.

UNIT III:

Laplace Transforms

Laplace transforms of standard functions – Inverse Laplace - First shifting Theorem, Transforms of derivatives and integrals – Unit step function – Second shifting theorem – Dirac's delta function – Convolution theorem – Laplace transform of Periodic function.

Differentiation and integration of Laplace transforms – Application of Laplace transforms to ordinary differential equations of first and second order.

UNIT IV:

Vector Calculus:

Vector Differentiation: Scalar and Vector point functions, Gradient of scalar point function, Directional derivatives – Divergence of a vector point function – Curl of a vector point function and their related properties.

Vector integration: Line integral - Work done – Vector potential function – Area, Surface and volume integrals. Green's theorem, Stoke's Theorem, and Gauss's Divergence Theorem (without proof), Applications of Green's , Stoke's and Gauss's Theorems.

Text Books:

1. T.K.V. Iyengar , Engineering Mathematics Volume-I , 12th Edition(2013) , S.Chand publication
2. E. Rukmangadachari & E. Keshava Reddy, Engineering Mathematics, Volume – I , 1st Edition (2010). Pearson Publisher

Reference Books:

1. Erwin Kreyszig , Advanced Engineering Mathematics, 10thEdition(2012), Wiley India.
2. B.S.Grewal ,Higher Engineering Mathematics, 42 Edition(2012), Khanna publishers .
3. Debashish Dutta ,Text Book of Engineering Mathematics, New Age International Publishers.
4. B.V.Ramana ,Higher Engineering Mathematics, Mc Graw Hill publishers(2008)

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(13HS105) ENGINEERING MATHEMATICS-II

Objectives: The course is aimed at developing the basic mathematical skills of engineering students that are imperative for effective understanding of engineering subjects. The topics introduced will serve as basic tools for specialized studies in many engineering fields.

UNIT – I:

Matrix Algebra: Rank of a matrix – Normal form, Echelon form – Inverse of a matrix using elementary operations –Consistency of system of Linear equations (Homogenous and Non-homogeneous) Hermitian & Skew Hermitian- unitary matrices and their properties. Eigen Values and Eigen Vectors (Real and Complex Matrices) Cayley- Hamilton theorem and its applications. Diagonalization of a matrix – Reduction of a quadratic form to canonical form by orthogonal transformation.

UNIT-II:

Numerical Analysis: Numerical solutions of algebraic and transcendental equations by Regula – Falsi method, Newton – Raphson method, Bisection, and Iteration methods. Forward, backward differences, Newton's forward and backward interpolation formulae, Lagrange interpolation, Numerical differentiation formula for derivative using Newton's forward and backward differences. Numerical Integration with Trapezoidal rule, Simpson's 1/3 rule and Simpson's 3/8 rule. Taylor series method, Euler's method, Modified Euler's method, Runge-Kutta method of 2^{nd} & 4^{th} orders, for solving first order ordinary differential equations.

UNIT- III:

Fourier Series: Expansion of a function in Fourier series for a given range – Half range sine and cosine expansions. Complex form of Fourier series – Fourier transformation – sine and cosine transformations – simple illustrations.

Z-Transforms: Inverse Z-transforms-Damping Rule and shifting Rule, initial and final value theorems – Convolution theorem- Difference equations – Solution of difference equations using z – transforms

UNIT- IV :

Partial Differential Equations: Formation of Partial Differential Equations by elimination of arbitrary constants and arbitrary functions - Method of Separation of variables - Solutions of one dimensional wave equation, Heat Equation, and two dimensional Laplace's equation under initial and boundary conditions.

Text Books:

1. T.K.V. Iyengar ,Mathematical Methods , 8th Edition(2013) ,S. Chand publication.
2. E. Rukmangadachari & E. Keshava Reddy, Engineering Mathematics, Volume - II, Pearson Publisher-1st Edition (2010)

Reference Books:

1. B.S.Grewal ,Higher Engineering Mathematics, 42 Edition(2012),Khanna publishers. 2.
2. B.V.Ramana , Higher Engineering Mathematics, Mc Graw Hill publishers(2008).
3. Debashish Dutta,Text Book of Engineering Mathematics,New Age international Publishers.
4. Erwin Kreyszig,Advanced Engineering Mathematics, 10th Edition(2013),Wiley India.

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(13HS106) ENVIRONMENTAL SCIENCE

Objectives: The student should be conversant with the evolution and the importance of environmental studies, various natural resources and the current threats to their sustainability, significance and protection of bio diversity and various forms of environmental degradation causes, effects and control measures of various pollutants and international conventions and protocols for the protection of environment.

UNIT-I:

Introduction to Environmental Science and Natural Resources:

Environment: Definition, scope, importance – need for public awareness. Renewable and non-Renewable resources. Natural resources and associated problems. Forest resources: Use –over exploitation- deforestation - case studies. Mining, dams - effects on forests and tribal people. Water resources: Use – over utilization of surface and ground water. Floods, drought, conflicts over water. Mineral resources: Use – exploitation - environmental effects of extracting and using mineral resources - case studies. Food resources: World food problems - changes caused by agriculture and overgrazing - effects of modern agriculture- fertilizer-pesticide problems. Water logging, salinity. Energy resources: Growing energy needs - renewable and non renewable energy sources. Use of alternate Energy sources, Impact of Energy use on Environment.

UNIT-II:

Ecosystems and Biodiversity:

Concept of an ecosystem: Structure and function of an ecosystem – producers, consumers, decomposers. Energy flow in the ecosystem. Ecological succession – food chains - food webs and ecological pyramids. Types of ecosystem: Introduction - characteristic features - forest ecosystem - grassland ecosystem - desert ecosystem - aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries). Biodiversity: Introduction– definition, genetic - species –ecosystem diversity. Value of biodiversity: Consumptive use - productive use – social values – ethical values - aesthetic values. Biodiversity level: Global - national - local levels- India as a mega diversity nation- Hotspots of biodiversity. Threats to biodiversity: Habitat loss - poaching of wildlife – man wildlife conflicts – endangered and endemic species of India. Conservation of biodiversity: *In-situ* and e*x-situ* conservation of biodiversity**.**

UNIT-III

Environmental Pollution :

Pollution: Definition Cause, effects and control measures of –air pollution - water pollution - soil pollution - marine pollution - noise pollution - thermal pollution - nuclear hazards. Solid waste management: Causes - effects - control measures of Rural/Urban/Industrial waste management [with case study of any one type, e.g., power, fertilizer, tannin, leather, chemical, sugar]. Role of an individual in prevention of pollution. Population growth and Environment, Environment and human health. Effects of human activities (Urbanization, Transportation, Industrialization, Green revolution) on the Quality of Environment.

UNIT-IV

Social issues and the Environment:

From Unsustainable to Sustainable development – Urban problems related to energy – Water conservation, rain water harvesting and watershed management – Resettlement and rehabilitation of people; its problems and concerns. Case studies – Environmental ethics: Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies – Wasteland reclamation. – Consumerism and waste products. Environment Protection Act. – Air (Prevention and Control of Pollution) Act.- Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation – Public awareness.

Field Work:

Visit to a local area to document environment assets River/ forest grassland/ hill/mountain – Visit to a local polluted site-Urban/Rural / Industrial/ Agricultural Study of common plants, insects, birds – river, hill slopes, etc

Text Books:

1. Text book of Environmental Studies for Undergraduate Courses by Erach. Bharucha for University Grants Commission, Universities Press.
2. Environmental Studies by R. Rajagopalan, Oxford University Press.
3. Environmental Studies by Benny Joseph, Mc. Graw Hill Publications.

Reference Books:

1. Text book of Environmental Sciences and Technology by M.Anji Reddy, BS Publication.
2. Comprehensive Environmental studies by J.P. Sharma, Laxmi publications.
3. Environmental sciences and engineering – J. Glynn Henry and Gary W. Heinke – Printice hall of India Private limited.
4. Introduction to Environmental engineering and science by Gilbert M. Masters and Wendell P. Ela – Printce hall of India Private limited.
5. Environmental Studies by Anindita Basak – Pearson education.

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(13HS107) COMPUTER PROGRAMMING

Objectives: The primary objective is to develop the under – graduate students of Engineering a level of competence in IT required for independent and effective skills for academics and industry needs.

UNIT – I:

Introduction to Computers and Programming:

Introduction computers- What is a computer?, block diagram of computer, Computer characteristics, hardware, software, types of programming languages.

Introduction to computer problem solving: introduction, the problem solving aspects , top-down design, implementation of algorithms, program verification, Flow charts.

Introduction to C Language - C Language Elements, General form of a C Program, Variable declarations, Data types, Executable statements, Expressions, Precedence and Associativity, Expression Evaluation, Operators and Expressions, Type Conversions, Data Input and Output, Preparing and running a complete C program.

UNIT – II:

Control Statements:

Decision Statements: If, if-else, nested if and switch Statements, Loop Control Statements - while, for, do-while Statements, Nested Loops, Other Related Statements - break, continue, goto.

Functions: Function prototype, definition and accessing, passing arguments to a function, Library Functions, Scope of a function, Storage Classes - Auto, Register, Static, Extern, Scope rules, Type qualifiers, Recursion - Recursive functions, C Preprocessor, header files.

UNIT – III:

Arrays and Pointers:

Arrays: Declaring and Referencing arrays, Array subscripts, Using for Loops for Sequential access, Using array elements as function arguments, operations on Multidimensional Arrays.

Sorting and Searching: Bubble Sort, Selection Sort, Quick sort, Merge Sort, Linear and Binary Search Methods

Pointers: Introduction, Features of Pointers, Pointer Declaration, Arithmetic Operations with Pointers, Pointers and Arrays, Pointers and Two-Dimensional Arrays, Array of Pointers, Pointers to Pointers, Void Pointers, Memory Allocation Functions, Pointer to Functions, Command- Line Arguments.

Strings: String Basics, String Handling Functions, String Comparison, Searching and sorting of strings.

UNIT – IV:

Structure and Union

Structure and Union: Introduction, Features of structure, Declaration and Initialization of Structure, Structure within Structure, Array of Structures, Pointer to Structure, self referential Structures, Structures and Functions, type def and Enumerated data types, Unions, Bit fields

Files: Introduction, Streams and file types, Steps for file operations, File I/O structures, Read and Write, register variables and bitwise operations, File Status functions (error handling).

Text Books:

1. Byron S Gottfried, Jitender Kumar Chabra, Programming with C, , Third Edition, McGraHill Pvt. Ltd.
2. Jeri R Hanly, Elliot B. Koffman, Ashok Kamthane, A. Ananda Rao, Programming in C and data structures, Pearson Education

Reference Books:

1. R. G. Dromey, How to Solve it by Computer, Person Education,2008.
2. B.A.Forouzan and R.F. Gilberg, C Programming & Data Structures, Third Edition, Cengage Learning,2000.
3. Stephen G. Kochan,Programming in C –III Edition, Pearson Educataion,2004.
4. J.A. Jones & K. Harrow ,C Programming with problem solving, Dreamtech Press
5. Harry H. Cheng,C for engineers and scientists an interpretive approach, , McGraHill International Pvt. Ltd
6. E.Balagurusamy, C Programming & Data Structures, TMH,2009.

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(13HS109) ENGINEERING DRAWING

Objectives: Increase ability to communicate with people, Learn to take data and transform it into graphic drawings and Learn basic engineering drawing formats

UNIT – I:

Introduction to Engineering Drawing: Introduction to Drawing Instruments and their uses, Lettering, Types of Dimensioning, Division of a Line, Construction of Polygons, Inscribing of polygons, Describing of polygons.

Conic Sections

Ellipse: Eccentricity method, Oblong method, Parallelogram method, Arc's of Circles method and Concentric Circles method.

Parabola: Eccentricity method, Rectangle method, Tangent method, Parallelogram method.

Hyperbola: Eccentricity method, Rectangular hyperbola, Asymptotes method, Two branches of Hyperbola (Arc's of Circles method),Abscissa- Ordinate- method.

Cycloids: General Cycloid, Epi-Cycloid, Hypo-Cycloid.

UNIT – II:

Projections of Points, Straight Lines, Planes:

Points: Introduction to Orthographic Projections, Describing of quadrants , First and Third angle projection – Position of points in 4 quadrants.

Straight Lines: Lines parallel to both the principal planes, perpendicular to one plane and parallel to another plane, lines inclined to one plane, lines inclined to both the planes, finding true lengths, true inclinations.

Planes: Projection of regular plane surfaces, planes parallel to one plane, planes inclined to one plane and inclined to both the planes.

UNIT– III:

Projection of Solids, Sections and Development of Solids:

Solids: Positions of regular solids(prism, cylinder, pyramid and cone) – Projection of Solids – Axis perpendicular to one plane and parallel to another plane, inclined to one plane and inclined to both the planes, Axis parallel to both the Principal planes.

Section of Solids: Section Planes and Sectional views of Right Regular Solids–Prism, Cylinder, Pyramid and Cone. True shapes of the sections.

Development of Solids: Development of Surfaces of Right Regular Solids – Prisms, Cylinder, Pyramid, Cone and their Sectional parts.

UNIT – IV:

ISOMETRIC AND ORTHOGRAPHIC PROJECTIONS

Isometric Projections: Principles of Isometric Projection – Isometric Scale – Isometric Views– Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non- isometric lines.

Orthographic Projections – Conversion of pictorial views into orthographic views

Text Books:

1. N.D. Bhat, Engineering Drawing, Charotar Publishers, 52nd Revised and Enlarged : 2013
2. K.L. Narayana, P. Khanniah, Engineering Drawing, Publisher, Scitech

Reference Books:

1. Venugopal, K., A Textbook of Engineering Graphics , New age Publishers,2009
2. Venkata Reddy, Engineering Drawing, B.S.Publishers ,2009
3. Basant Agrawal, C M Agrawal ,Engineering Drawing ,2013
3. V.Ramesh Babu, Engineering Drawing .2009
4. Shah and Rana, 2/e, Engineering Drawing, Pearson education.2013

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(13HS110) COMPUTER PROGRAMMING LAB

Objectives:

- To make the student learn a programming language.
- To teach the student to write programs in C to solve the problems.
- To introduce the student to simple linear data structures such as lists, stacks, queues.

Recommended Systems/Software Requirements:
Intel based desktop PC with ANSI C Compiler and Supporting Editors

EXERCISE-1:
a) Write a C program to evaluate area of triangle (sqrt(s(s-a)(s-b)(s-c).
b) Write a C program to swap 2 numbers without using temporary variable.
c) Write a C program to print Sum of n natural numbers.
d) Programs on Expressions

EXERCISE-2:
a) Write a C program to calculate the following Sum:
Sum=1-x2/2! +x4/4!-x6/6!+x8/8!-x10/10!
b) Write a C program to find the roots of a quadratic equation.
c) Write a C program to print prime Numbers up to n numbers

EXERCISE-3:
a) Write a C program to find factorial of a number using while, do-while, for loops
b) Write a C program to determine if the given Number is a palindrome or not
c) Write a C program to determine if the given Number is a Armstrong or not

EXERCISE-4:
a) Write a program on matrices
i) Addition ii) Subtraction iii) Multiplication iv) Transpose
v) Sum of diagonal elements vi) Summing row wise and column wise

EXERCISE-5:
Programs on sorting and searching

EXERCISE-6:
a) Write a program to implement call by value and call by reference
b) Write a C program to print Fibonacci series using recursion and iteratively
c) Write a C program to find factorial of a number using recursion and iteratively

EXERCISE-7:
a) Write a C program to sort 5 city names in alphabetical order
b) Write a C program to determine if the given string is a palindrome or not.
c) Write a C program to implement string handling functions

EXERCISE-8:
a) Write a C program to print address of variable
b) Write a C program print the element of array using pointers

EXERCISE-9:
a) write a c program to find the total salary of employee and salary of employee details
b) write a C program to pass structure as an arguments to function and calculate total marks of 5 subjects

EXERCISE-10:
a) Write a C program to write and read data to and from files
b) Write a C program which copies one file to another.
c) Write a C program to reverse the first n characters in a file.

EXERCISE-11:
Programs on command line arguments

EXERCISE-12:
Programs on self referencing

Reference Books:
1. M.Cooper, The Spirit of C, an introduction to modern programming, Jaico Publishing House.
2. K.R. Venugopal and S.R. Prasad, Mastering C, TMH Publications,2006.
3. V. Rajaraman, Computer Basics and C Programming, PHI Publications.

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(13HS111) ENGINEERING WORKSHOP AND I.T. WORKSHOP

ENGINEERING WORKSHOP

Objectives: The Engineering Workshop for engineers is a training lab course. It imparts the required knowledge about producing the Products particular joining methods, manufacturing methods among the students through which they will get an idea about shop floor level, a manufacturing section in industry.

1: Trades for Exercises:

(a) Carpentry Shop

1. Cross Lap Joint
2. Mortise and Tenon Joint

(b) Fitting Shop

1. Square Fitting
2. V Fitting

(c) Sheet Metal Shop

1.3-Sided Tray (Trapezoidal Tray)
2. Cylinder (Circular Tin)

(d) House Wiring

1. Wiring for two lamps (bulbs) with independent switch controls with or without looping
2. Wiring for stair case lamp.

(e) Foundry

1. Single Piece Pattern
2. Double Piece Pattern.

(f) Welding

1. Lap Joint
2. T - Joint

2: Trades for Demonstration

i. Machine Shop (Lathe Machine, Grinding Machine and Drilling Machine)
ii. Metal Cutting
iii. Plumbing

In addition to the above, hand tools, hand machines, models of jobs, materials with names such as different woods, wood faults, plastics, steels, meters, gauges, equipment, first-aid and shop safety shall be demonstrated through charts, layouts, figures, circuits, CD or DVD.

Reference Books:

1. Engineering Work shop practice, V. Ramesh Babu, VRB Publishers Private Limited, 2009
2. Work shop Manual, P.Kannaiah and K.L.Narayana, SciTech Publishers, 2009
3. Workshop Practice Manual, K. Venkata Reddy, BS Publications,

I.T. WORKSHOP

Objectives: The IT Workshop for engineers is a training lab course. The modules include training on PC Hardware, Internet & World Wide Web and Productivity tools including Word, Excel, Power Point and Publisher.

PC Hardware introduces the students to a personal computer and its basic peripherals, the process of assembling a personal computer, installation of system software like MS Windows, Linux and the required device drivers. In addition hardware and software level troubleshooting process, tips and tricks would be covered. The students should work on a working PC (PIV or higher)to disassemble and assemble back to working condition and install Windows and Linux on the same PC. Students are suggested to work similar tasks in the Laptop scenario wherever possible.

CHAPTER – I: PC Hardware

Task – 1:

Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor

Task – 2:

Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also students need to go through the video which shows the process of assembling a PC. A video shall be given as part of the course content

Task – 3:

Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva

Task – 4:

Hardware Troubleshooting: Students have to be given a PC which does not boot due to improper assembly or defective peripherals. They should identify the problem and fix it to get the computer back to working condition. The work done should be verified by the instructor and followed up with a Viva

Task – 5:

Software Troubleshooting: Students have to be given a malfunctioning CPU due to system software problems. They should identify the problem and fix it to get the computer back to working condition. The work done should be verified by the instructor and followed up with a Viva.

CHAPTER - II: Word Processor

Task – 1:

Introduction to Ms Word, importance of Word as Word Processor, overview of toolbars, saving, accessing files, using help and resources.

Task – 2:

To create project certificate. Features to be covered:-Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both LaTeX and Word.

CHAPTER –III: Spread Sheets

Task –1:

The mentor needs to tell the importance of MS office 2007/ equivalent (FOSS) tool Excel as a Spreadsheet tool, give the details of the four tasks and features that would be covered in each. Using Excel – Accessing, overview of toolbars, saving excel files, Using help and resources.

Task –2:

Features to be covered:- Gridlines, Format Cells, Summation, auto fill, Formatting Text

Task –3:

Create student marks list for 10 students using for the formulas

CHAPTER –IV: Presentation

Task –1:

Students will be working on basic power point utilities and tools which help them create basic power point presentation. Topic covered during this Exercise includes :- PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in both LaTeX and Powerpoint. Students will be given model power point presentation which needs to be replicated (exactly how it's asked).

Task –2:

Second Exercise helps students in making their presentations interactive. Topic covered during this Exercise includes : Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts

CHAPTER – V: Internet & World Wide Web

Task –1:

Orientation & Connectivity Boot Camp: Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate, to the instructor, how to access the websites and email. If there is no internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.

Task –2:

Web Browsers, Surfing the Web: Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers.

Task –3:

Search Engines & Netiquette: Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated by the student to the satisfaction of instructors.

Task – 4:

Cyber Hygiene: Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to first install an antivirus software, configure their personal firewall and windows update on their computer.

Text Books:

1. ITL Education Solutions limited, Introduction to Information Technology, Pearson Education,2005.
2. Peter Norton, Introduction to Computers, 6/e Mc Graw Hill

Reference Books:

1. Leslie Lamport, LaTeX Companion –PHI/Pearson.
2. Scott Muller QUE, Upgrading and Repairing, PC's 18th e, Pearson Education,2007.
3. Vikas Gupta, Comdex Information Technology course tool kit, WILEY Dreamtech
4. David Anfinson and Ken Quamme. IT Essentials PC Hardware and Software Companion Guide, Third Edition by– CISCO Press, Pearson Education,2008.

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(13HS112) ENGINEERING PHYSICS AND ENGINEERING CHEMISTRY LAB

Objectives: Educate the theoretical concepts experimentally.

ENGINEERING PHYSICS LAB

1. Dispersive power of the prism – Spectrometer.
2. Determination of wavelength of given source- Spectrometer-Normal Incidence Method.
3. Determination of wavelength of a laser source - Diffraction Grating.
4. Determination of particle size by using a laser source.
5. Newton's Rings.
6. Magnetic field along the axis of a current carrying coil – Stewart and Gee's method.
7. Numerical aperture of an optical fiber.
8. B – H Curve.
9. Energy gap of a material of p-n junction
10. Determination of rigidity modulus of a wire material – Torsional pendulum
11. Melde's experiment – Transverse & Longitudinal modes.
12. Hall Effect

ENGINEERING CHEMISTRY LAB

1. Preparation of Standard Potassium Dichromate and Estimation of Ferrous Iron.
2. Preparation of Standard Potassium Dichromate and Estimation of Copper, by Iodometry.
3. Preparation of Standard EDTA solution and Estimation of Hardness of Water.
4. Determination of Alkanity of water.
5. Preparation of Standard EDTA and Estimation of Copper
6. Determination of strength of the given Strong acid and weak acid against standard strong base solution by Conductometric titration
7. Determination of viscosity of the oils through Redwood viscometer (i) and (ii)
8. Flash point and Fire point apparatus.
9. Estimation of dissolved oxygen through Winklers method.
10. Preparation of phenol-formaldehyde resin (Bakelite)
11. Determination of Chlorine in Bleching powder and Iodine in Iodised salt.
12. Estimation of Chloride ion using potassium chromate indicator by mhor's method.

Reference Books:

1. J. Mendham et al ,Vogel's Text book of Quantitative Chemical Analysis, Sixth Edition, 2012, Pearson Education,.
2. K.B.Chandra Sekhar, G.V. Subba Reddy and K.N.Jayaveera, Chemistry Practical – Lab Manual ,SM Publications, 3rd Edition, 2012Hyderabad.
3. Vogel's Book of Quantitative Inorganic Analysis, ELBS Edition.

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I B.Tech (EEE)

L	T	P	[C]
0	0	3	[4]

(13HS113) ENGLISH LANGUAGE AND COMMUNICATION SKILLS LAB

Objectives: To equip students with effective speaking and listening skills in English, help them develop the soft skills and people skills which will make them to excel in their jobs and enhance to students' performs at placement interviews

UNIT – I:
Activity– 1: Introduction to the Sounds of English- Vowels, Diphthongs & Consonants.
Activity– 2: Situational Dialogues (Giving Directions etc.)

UNIT – II:
Activity– 3: Speaking on the mobiles and telephone conversation
Activity– 4: Role Play
Activity– 5: 'Just A Minute' Sessions (JAM).

UNIT – III:
Activity– 6: Describing Objects / Situations / People in spoken and written formats.
Activity– 7: Information Transfer

UNIT – IV:
Activity– 8: Debate & Group Discussion.
Activity– 9: Reading Comprehension

Reference:

1. Daniel Jones, English Pronouncing Dictionary, Current Edition with CD.
2. R. K. Bansal and J. B. Harrison, Spoken English, Orient Longman 2006 Edn.
3. Krishna Mohan & NP Singh, Speaking English Effectively, (Macmillan)
4. J. Sethi, Kamlesh Sadanand & D.V. Jindal, A Practical Course in English Pronunciation, (with two Audio cassettes), Prentice-Hall of India Pvt. Ltd., New Delhi.
5. Dr Shalini Verma , Body Language- Your Success Mantra , S.Chand & Co, 2008
6. English Dictionary for Advanced Learners, (with CD) International edn. Macmillan 2009

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	3	1	0	[3]

(13HS114) ENGINEERING MATHEMATICS-III

Objectives: The Subject is aimed at developing the basic mathematical skills of engineering students that are imperative for effective understanding of engineering subjects. The topics introduced will serve as basic tools for specialized studies in many engineering fields.

UNIT – I:

Special Functions: Gamma and Beta functions – their properties – Evaluation of Improper integrals. Bessel functions – properties – Recurrence relations – orthogonal. Legendre polynomials – Properties – Rodrigue's formula – Recurrence Relations – Orthogonality

UNIT-II:

Functions of a Complex Variable: Continuity – Differentiability – Analyticity – Properties – Cauchy – Riemann Equations in Cartesian and polar co-ordinates. Harmonic and Conjugate Harmonic function – Milne – Thomson method – Elementary functions – Exponential, trigonometric, Hyperbolic functions and their properties – General power z^C(c is complex), principal value.

Conformal Mapping: Transformation by e^z, 1nz, z^2, sinz, cos z, Bilinear transformation – Translation, rotation, magnification and inversion – Fixed point – cross ratio – Determination of bilinear Transformation mapping three given points.

UNIT - III:

Complex Integration: Line Integral – Evaluation along a path and by Indefinite Integration – Cauchy's Integral theorem – Cauchy's integral formula – General Integral formula.

Complex power series: Radius of convergence – Expansion in Taylors Series – Maclaurin's Series and Laurent Series. Singular point – Isolated singular point – pole of order 'm' – Essential singularity.

UNIT – IV

The Calculus of Residue – Evaluation of residue by formula and by Laurent series – Residue theorem – Evaluation of integrals of the type.

(a) Improper real integral $\int_{-\alpha}^{\alpha} f(x)dx$.

(b) $\int_{0}^{2\pi} f(\cos\theta, \sin\theta)d\theta$.

(c) $\int_{-\alpha}^{\alpha} e^{imx} f(x)dx$.

(d) Integrals by indentation

Argument Principle – Rouche's theorem – determination of number of zeros of complex polynomials – maximum modulus principle – Fundamental theorem of Algebra, Liouville's Theorem.

Text Books:

1. T.K.V. Iyengar, B. Krishna Gandhi and Others ,A Text Book of Engineering Mathematics, Vol – III, , S. Chand & Company.
2. E. Rukmangadachari and E. Keshava Reddy ,A Text Book of Engineering Mathematics-III, , Pearson Education.

Reference Books:

1. B.S.Grewal ,Higher Engineering Mathematics, 42 Edition(2012), Khanna publishers .
2. C. Sankaraiah ,A Text Book of Engineering Mathematics, , V.G.S. Book Links.
3. B.V.Ramana ,Higher Engineering Mathematics, Mc Graw Hill publishers(2008)
4. Chruchile and Brown -Complex variables
5. Schaum series -Complex variables

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(13HS120) PROFESSIONAL ETHICS AND HUMAN VALUES

Objectives:

- To create an awareness on Engineering Ethics and Human Values
- To instill Moral and Social Values and Loyalty
- To appreciate the rights of others.

UNIT-I:

Human Values: Morals, Values and Ethics – Integrity – Work Ethic – Service Learning – Civic Virtue – Respect for Others – Living Peacefully – caring – Sharing – Honesty – Courage – Valuing Time – Co-operation – Commitment – Empathy – Self-Confidence – Character – Spirituality

UNIT-II:

Engineering Ethics: Senses of 'Engineering Ethics' - variety of moral issued - types of inquiry - moral dilemmas - moral autonomy - Kohlberg's theory - Gilligan's theory - consensus and controversy – Models of Professional Roles - theories about right action - Self-interest - customs and religion - uses of ethical theories.

UNIT-III:

Engineering as Social Experimentation: Engineering as experimentation - engineers as responsible experimenters - codes of ethics - a balanced outlook on law - the challenger case study

UNIT-IV:

Safety, Responsibilities and Rights: Safety and risk - assessment of safety and risk - risk benefit analysis and reducing risk - the Three Mile Island and Chernobyl case studies.
Collegiality and loyalty - respect for authority - collective bargaining - confidentiality - conflicts of interest - occupational crime - professional rights - employee rights - Intellectual Property Rights (IPR) - discrimination.

Text Books:

1. Mike Martin and Roland Schinzinger, “Ethics in Engineering”, McGraw-Hill, New York 1996.
2. Govindarajan M, Natarajan S, Senthil Kumar V. S, “Engineering Ethics”, Prentice Hall of India, New Delhi, 2004.

Reference Books:

1. Charles D. Fleddermann, “Engineering Ethics”, Pearson Education / Prentice Hall, New Jersey, 2004 (Indian Reprint)
2. Charles E Harris, Michael S. Protchard and Michael J Rabins, “Engineering Ethics – Concepts and Cases”, Wadsworth Thompson Learning, United States, 2000 (Indian Reprint now available)
3. John R Boatright, “Ethics and the Conduct of Business”, Pearson Education, New Delhi, 2003.
4. Edmund G Seebauer and Robert L Barry, “Fundamentals of Ethics for Scientists and Engineers”, Oxford University Press, Oxford, 2001.

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3	0	0	[3]

(13EE301) FLUID MECHANICS AND HYDRAULIC MACHINERY

Objectives: This course gives an introduction to the fundamentals of fluid flow and its behavior so as to equip the students to learn related subjects and its application in the day to day life in a very effective manner

UNIT- I:

Introduction: Dimensions and units – physical properties of fluids, specific gravity, viscosity, surface tension and capillarity, vapor pressure and their influences on fluid motion. Newtonian and non Newtonian fluids. Fluid Pressure at a Point; Pascal's law, Hydrostatic law, Atmospheric, Absolute and gauge pressure; Hydrostatic paradox, Pressure measurement manometers; Simple, differential and Micro Manometers

Kinematics of Fluid Motion: Methods of describing fluid motion; Classification of flow; Steady, unsteady, uniform and non-uniform flows; Laminar and turbulent flows; Three, two and one dimensional flows; Irrotational and rotational flows; Streamline; Pathline; Streakline; Equation for acceleration; Convective accelaration; Local acceleration; Continuity equation; Velocity potential and stream function.

UNIT – II:

Dynamics of Fluid Flow: Forces acting on a Fluid in Motion; Euler's equation of motion; Bernoulli's equation ; Energy correction factor; Momentum principle; Force exerted on a pipe bend. Discharge through Venturi Meter; Discharge through Orifice Meter; Discharge through flow nozzle; Measurement of velocity by Pitot tube,pitot-static tube.

Closed Conduct Flow: Energy losses in pipelines; Darcy – Weisbach equation; Minor losses in pipelines; Hydraulic Grade Line and Total Energy Line; Concept of equivalent length; Hydraulic power transmission through a pipe; Siphon; Pipes in series, parallel & branched pipes.

UNIT – III:

Basics of Turbo Machinery: Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes, jet striking centrally and at tip, velocity triangles at inlet and outlet, expressions for work done and efficiency-Angular momentum principle, Torque and head transferred in roto dynamic machines.

Hydraulic Turbines-I: Introduction, head and efficiencies of hydraulic turbines, Classification of turbines; pelton wheel: parts, Velocity triangles, work done and efficiency, working proportions, design of pelton wheel. Radial flow reaction turbines: velocity triangles and work done for inward radial flow turbine, degree of reaction, discharge, speed ratio, flow ratio.

UNIT – IV:

Hydraulic Turbines-II: Francis turbine: main components and working, work done and efficiencies, design proportions; design of francis turbine runner. Kaplan turbine: main components and working, working proportions. Draft tube: theory and efficiency; specific speed, unit quantities, characteristic curves of hydraulic turbines. Cavitation: causes, effects.

Centrifugal Pumps: Introduction, component parts and working of a centrifugal pump, work done by the impeller; heads, losses and efficiencies; minimum starting speed; Priming ;specific speed; limitation of suction lift, net positive suction head(NPSH);Performance and characteristic curves; Cavitation effects ;Multistage centrifugal pumps; troubles and remedies.

Text Books:

1. Hydraulics & Fluid Mechanics by P. N. Modi & S. N. Seth; Standard Book house, New Delhi
2. Fluid Mechanics & Hydraulic Machines by Dr. R. K. Bansal; Laxmi Publications, New Delhi.

Reference Books:

1. Hydraulic Machines by Jagdish Lal, Metropolitan.
2. A. K. Jain; Fluid Mechanics, Khanna Publishers, Delhi
3. Rajput, Fluid mechanics and fluid machines, S.Chand &Co.
4. D.S. Kumar Kataria, Fluid Mechanics & Fluid Power Engineering ,Publishers: D.S. Kumar Kataria&Sons.
5. K R Arora, Fluid Mechanics, Hydraulics and Hydraulic Machines ,Standard Publishers
6. Kumar K.L., Engineering Fluid Mechanics , Eurasia Publishing House (P) Ltd., New Delhi

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(13EE302) ELECTRONIC DEVICES AND CIRCUITS

Objectives: Students undergoing this course are expected to:

- Know the formation and properties of semiconductor materials & Understand the operation of diode
- Understand various types of rectifiers and Understand the importance of regulators
- Explain the operation of transistor and Know the need for biasing of transistor
- Explain the operation of transistor as amplifier.

UNIT- I:

Semiconductor Physics &P-N Junction Diode: Semiconductor Materials ,Intrinsic & Extrinsic Materials ,Doping Concentrations ,Continuity equation, Drift &diffusion velocity ,Hall effect, P-N junction Manufacturing types, diode equation, V-I characteristics ,Temperature dependence, Static & Dynamic resistance, Diode equivalent Circuit, Break down mechanism, Zener diode and its characteristic. Study of Photo Diode, Varactor diode, and Schottky diode

UNIT- II:

Rectifiers and Filters: P-N junction as rectifier ,Half wave ,Full wave (center tap, Bridge)rectifiers, Average current, RMS current, Rectifiers efficiency, Ripple factor ,Form Factor, Percentage of regulation, Peak inverse voltage, Problems on rectifiers.

Filters: Capacitor, Inductor Filters-section filter, π-Section filter, Problems on filters, Zener diode as voltage regulator

UNIT- III:

BJT, Transistor Biasing & Stabilization:

Transistor construction, Operation and Configurations, V-I Characteristics, Relation between Transistor Parameters(α,β,γ),Comparison between BJT Configurations ,Analysis of Q-points and Load Lines(AC,DC), Need for Biasing, Types of Biasing Techniques and their stabilization factors (I_{CEO},V_{BE}, β &S) , Thermal runaway ,Problems on Biasing , BJT as Switch and Amplifier

UNIT- IV:

Field Effect Transistor: Introduction to FET, Types of FETs, Construction, Operations and Characteristics of JFET and MOSFET, FET Configurations, Comparison of JFET &MOSFET, Comparision between BJT and FET. Biasing of JFET and MOSFET, Problems on biasing. Principal of operation and Characteristics of UJT.

Text Books:

1. Jacob Millman, Christos C Halkias & Satyabratajit, Electronic Devices and Circuits, 2nd ed., TMH,2008.
2. Robert L Boylested and Louis Nashelsky, Electronic Devices and Circuit Theory, 9th ed., Pearson India, 2007.

Reference Books:

1. NN Bhargava, DC Kulshrestha and SC Gupta , Basic Electronics and Linear Circuits, 1st ed., TMH, 2003.
2. Millman and Grabel , Microelectronics, 2nd ed., Tata McGraw Hill**,** 1988.

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(13EE303) CIRCUIT THEORY-I

Objectives: Circuit Theory is the foundation for all the subjects of Electrical Engineering discipline. The emphasis of this course is laid on the basic concepts & analysis of DC circuits, Single phase AC circuits, network theorems, magnetically coupled circuits and graph theory.

UNIT – I:

Introduction to Electrical Circuits: Circuit Concept – R-L-C parameters – Voltage and Current sources – Independent and dependent sources- Source transformation – Voltage – Current relationship for passive elements (for different input signals-square, ramp, saw tooth, triangular).

Magnetic Circuits: Magnetic Circuits – Faraday's laws of electromagnetic induction – concept of self and mutual inductance – dot convention – coefficient of coupling – Analysis of series and parallel magnetic circuits.

UNIT – II:

Network Analysis: Kirchhoff's laws – network reduction techniques – series, parallel, series-parallel. Star-to-delta and delta-to-star transformation. Nodal Analysis, mesh analysis, super node and super mesh for D.C excitations.

Single Phase A.C Circuits: R.M.S and Average values and form factor for different periodic wave forms-sinusoidal, square, ramp, saw tooth etc., Phase and phase difference- Complex and Polar forms of representation - J-notation –Steady-state analysis of R, L and C (in series, parallel and series-parallel combinations) with sinusoidal excitation. Concepts of Reactance, Impedance, Susceptance, Admittance, power factor, Apparent, Real & Reactive power, Complex power. Phasor diagrams and analysis.

UNIT – III:

Network theorems I: Superposition, Thevenin's, Norton's and Reciprocity theorems. Analysis with D.C. & sinusoidal excitations.

Network theorems II: compensation, maximum power transfer, Tellegen's , millman's theorems. Analysis with D.C. & sinusoidal excitations.

UNIT – IV:

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

Network topology: Definition & Concepts: Graph – Tree, Basic cutset and Basic Tieset matrices for planar networks – Loop and Nodal methods of analysis of Networks with dependent and independent voltage and current sources - Duality & Dual networks.

Text Books:

1. W.H.Hayt, J.E.Kimmerly, and S.M.Durbin "Engineering circuit analysis" McGraw Hill Education private limited, 6th Edition, 2002.
2. M.E Van Valkenburg, "Network Analysis" Prentice Hall of India, 3rd Edition, 2000.

Reference Books:

1. C. K. Alexander and M. N. O. Sadiku, "Fundamentals of Electric Circuits" Tata McGraw-Hill, 2nd edition, 2004.
2. Mahmood Nahvi, Joseph Edminister, "Electric Circuits" Schuam Series, 5th edition, 2011.
3. Chakrabati A, "Circuit Theory (Analysis and Synthesis)" Dhanpath Rai & Sons, 6th edition, 2004.
4. Mahmood Nahvi and Joselph Edminister, "Electric Circuits" Schaum's Outline series TMH, 2004.
5. Ravish R Singh, "Electrical Networks" Tata McGraw-Hill Publication, 6th edition, 2010.
6. A. Sudhakar and Shyammohan S Palli, "Circuits & Networks" Tata McGraw-Hill, 4th edition, 2010.

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(13EE304) D C MACHINES

Objectives: Electrical Machines is a subject where a student will deal with various types of electrical machines which find extensive applications in industry, power stations, domestic, commercial etc fields. As electrical machines are largely energy converting equipment, the objective of this subject is to provide the understanding of the basic principles involved in the electro-mechanical energy conversion principles and operation. The student acquires thorough knowledge of details of construction, operation and applications of DC machines. Students also learn practical aspects of DC machines and be able to analyze the performance under different conditions. Appropriate tests conducted will make the students understand better.

UNIT – I:

Electromechanical Energy Conversion Principles: Principle of Energy Conversion-Single excited magnetic systems- Expression for electrical energy input, energy stored in magnetic field, mechanical work done and the mechanical force developed-numerical problems. Doubly excited magnetic systems - Expression for magnetic torque.

DC Generators-Construction and Operation: DC Generators – working principle- Faraday's laws-constructional features, action of Commutator, armature windings-lap and wave windings, Use of laminated armature, EMF Equation- Numerical problems.

UNIT-II:

Armature Reaction in DC Generators: Armature reaction – Cross magnetizing and de-magnetizing AT/Pole, compensating winding, dummy coils, Commutation-reactance voltage-methods of improving commutation.

Classification of DC Generators: Methods of Excitation – Separate Excitation, Self excitation, conditions for building-up of EMF- critical field resistance and critical speed-problems, causes for failure to self excitation and remedial measures.

UNIT-III:

Operating Characteristics of DC Generators: Operating characteristics of separately excited, self excited generators-Shunt, Series and Compound-problems, parallel operation of DC Shunt generators-load sharing, applications.

DC Motors: DC motors-Principle of operation-importance of back emf, torque equation-Armature & Shaft torques-expressions, operating characteristics and applications of shunt, series and compound motors-Armature reaction and commutation.

UNIT-IV:

Starting and Speed Control of DC Motors: DC motor starters -function of a starter- construction-starting resistance-no load coil- over load release. Operation of 2- point, 3-point and 4- point starters. Speed equation of a dc motor- speed control methods for dc motors-Armature voltage and field flux control, Ward-Leonard system -Problems.

Losses, Efficiency and Testing of DC Machines: Losses-constant and variable types and their effect-calculation of efficiency, condition for maximum efficiency, methods of testing- Swinburne's test, Brake test, Hopkinson's test, Field test, Retardation test and separation of losses.

Text Books:

1. Dr.P.S.Bhimbra, "Electric Machinery", Khanna Publishers, 7th edition, 2006.
2. J.B.Gupta, "Theory and performance of Electrical Machines", Khanna Publishers, 14th edition, 2010.

Reference Books:

1. Charles I. Hubert."Electric Machines: Theory, Operating Applications, and Controls", Pearson publication, 2nd edition, June 2002.
2. A.E.Fitzerald, C.kingsley and S.Umans,"Electrical Machinery", Tata Mc Graw-Hill companies, New Delhi, 6th edition, 2008.
3. Samarjit Singh, "Electrical Machines", Pearson education, 2012.
4. R.K.Rajput,"A Text book of Electrical Machines", Lakshmi Publications, 2005.

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	3	0	0	[3]

(13EE305) DATA STRUCTURES THROUGH C

Objectives: The objective of this course is to teach students various data structures and to explain them algorithms for performing various operations on these data structures.
The course aims are:

- Demonstrate familiarity with major algorithms and data structures.
- Analyze performance of algorithms.
- Choose the appropriate data structure and algorithm design method for a specified application.
- Determine which algorithm or data structure to use in different scenarios.
- Be familiar with writing recursive methods.

UN IT-I:
Algorithms: Definition, Properties, Performance Analysis- Space Complexity, Time Complexity, Asymptotic Notations and their Significance.
Introduction to Data structures: Elementary Data Organization, Data Structures - types, Data Structure Operations.
Arrays: Introduction, Linear Arrays, Representation of Linear Arrays in Memory, Traversing Linear Arrays, Inserting and Deleting. Multi Dimensional Arrays- two dimensional Arrays, Representation Of Two Dimensional Arrays in Memory, Pointer Arrays.

UNIT-II:
Stacks: Introduction, Stacks, Array Representation of Stacks, Evaluation of a postfix expression, Transforming Infix expression into Postfix expression, Recursion.
Queues: Introduction, Array Representation of Queues, implementation of Queue. Circular Queue – Representation and implementation, Priority Queue, Double Ended queue.

UNIT-III:
Linked Lists: Introduction, Representation of Linked List in Memory, Traversing a Linked List, Searching a Linked List, Insertion into a Linked List, and Deletion from Linked List. Header Linked Lists. Doubly Linked List, Circular Linked List. Linked Representation of Stacks, Linked Representation of Queues.
Trees: Definition, terminology. Binary Trees: Definition, properties, Complete Binary tree, Full Binary tree, Representation of Binary tree – Array based representation, Linked Representation. Common binary tree operations, binary tree traversals- Preorder, Inorder, Postorder.

UNIT-IV:
Binary Search Trees – Definitions, Searching and Insertion into Binary Search Tree, Deleting from Binary Search Tree.
Searching: Linear search, Fibonacci Search, Binary search and their time complexities, Hashing.
Sorting: definition, Internal Sorting- Bubble sort, selection sort, insertion sort, quick sort, merge sort, heap sort, radix sort and time complexities of each Technique.

Text Books:

1. Seymour lipschutz 'Theory and Problems of Data Structures' - schaum's outline sries. TMH

Reference Books:

1. Y. Langsam, M.J.Augenstein, A.M.Tenenbaum, 'Data structures using C ', Pearson Education, Second Edition, 2002.
2. E.Balaguruswamy,' C and Data Structures' TMH Publication, 2003
3. M. A. Weiss, "Data Structures and Algorithm Analysis in C", 2nd ed, Pearson Education Asia.
4. G A V Pai – Data Structures and Algorithms: Concepts, Techniques and Applications, 2nd Edn, Tata McGraw-Hill, 2008
5. J. Tremblay, P. soresan, 'An Introduction to data Structures with applications', TMH Publication, 2nd Edition, 1984.

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L	T	P	[C]
0	0	3	[2]

(13EE306) FLUID MECHANICS AND HYDRAULIC MACHINERY LAB

Objective: The object of the course to make the students understand the fluid flow concepts and get familiarity with flow measuring devices, turbines and pumps.

List of Experiments:

1. Venturimeter : Determination of Coefficient of discharge.
2. Orificemeter : Determination of Coefficient of discharge.
3. Determination of friction factor of Pipes.
4. Determination of loss of head in pipes due to bends, sudden contractions and sudden expansion.
5. Verification of Bernoulli's equation.
6. Impact of jet on vanes.
7. Performance test on Pelton wheel turbine.
8. Performance test on Francis turbine.
9. Performance test on kaplan turbine.
10. Performance test on single stage centrifugal pump.
11. Performance test on multi stage centrifugal pump.
12. Performance test on reciprocating pump.

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	0	0	3	[2]

(13EE307) ELECTRONIC DEVICES AND CIRCUITS LAB

Objectives: This lab course is intended to

- Know the usage of electronic equipment
- Know the testing of components
- Understand the PN diode operation in forward and reverse bias
- Know the characteristics of Half and Full wave rectifier with and without filters
- Know how to connect transistor in CB,CE configurations

For Laboratory examination – Minimum of 10 experiments

- Identification and Testing of Components
- Study & Demonstration of Sourcing Instruments
- Study & Demonstration of Measuring Instruments

1. PN Junction diode characteristics A. Forward bias B. Reverse bias.
2. Zener diode characteristics
3. Transistor CB characteristics (Input and Output)
4. Transistor CE characteristics (Input and Output)
5. Half wave rectifier, Half wave rectifier with capacitor filter.
6. Full wave center tapped rectifier with and without capacitor filter.
7. FET characteristics
8. Design of self bias for CE configuration
9. Design of Zener regulator.
10. Design of series voltage regulator.
11. Design of shunt voltage regulator.
12. UJT characteristics

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	0	0	3	[2]

(13EE308) ELECTRICAL WORKSHOP

Objectives: To provide students an opportunity to study, understand and operationalise various circuits with lamps, motors, and generators. etc. commonly used in industry. This course also provides the students hands on experience in using of various electronic components and assembling &testing of various electronic circuits.

LIST OF EXPERIMENTS:

1. Study and operationalisation of circuits with different types of lamps.
2. Study and operationalisation of fractional horse power motors with starters.
3. Design and fabrication of choke coil.
4. Study of various types of electrical installation earthing procedures.
5. Design of small Transformers.
6. Design of Industrial Hall Lightings.
7. To study repairing of home appliances such as heater, iron and fans.
8. Electronic component testing.
9. Design and fabrication of rectifiers with filters.
10. UPS wiring and testing.
11. Assembly and testing of hybrid UPS system with solar panel.
12. Fabrication of PCB.
13. Characterization of electrical cables.
14. Wiring and testing of control panel.

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II B.Tech II Semester (EEE)	L	T	P	[C]
	3	1	0	[3]

(13EE401) ELECTROMAGNETIC FIELD THEORY

Objectives: The course 'electromagnetic field theory' is designed for the undergraduate students to make them understand the complex phenomena of electric fields and magnetic fields before moving on to more advanced subjects of their interest e.g. antennas and arrays, microwave engineering, radar systems, fiber and integrated optics, quantum electronics, power systems and electrical machines.

UNIT – I:

Electrostatics: Scalars and vectors, Vector Algebra, Dot product, cross product, Introduction to Cartesian, cylindrical and Spherical coordinate system, Stoke's theorem, Divergence theorem. Electrostatic Fields – Coulomb's Law – Electric Field Intensity (EFI) – EFI due to different charge distributions – Work done in moving a point charge in an electrostatic field – Electric Potential – Properties of potential function – Potential gradient – Guass' law – Application of Guass' Law – Maxwell's first law, div (D)=ρv,

Conductors and Dipole: Laplace's and Poison's equations – Solution of Laplace's equation in one variable. 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.

UNIT – II:

Dielectric & Capacitance: Electric field inside a dielectric material, polarization. Dielectric – Conductor and Dielectric – Dielectric boundary conditions. Capacitance, Capacitance of parallel plate, 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

Magneto Statics: Static magnetic fields – Biot-Savart's law – Oesterd's experiment - Magnetic field intensity (MFI) – MFI due to different current distributions – Relation between magnetic flux, magnetic flux density and MFI – Maxwell's second Equation, div(B)=0.

UNIT – III:

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 straight current carrying filament – Point form of Ampere's circuital law – Maxwell's third equation, Curl (H)=Jc, Field due to a circular loop, rectangular and square loops.

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 – IV:

Magnetic Potential: Scalar Magnetic potential and its limitations – vector magnetic potential and its properties – vector magnetic potential due to simple configurations – vector Poisson's equations. Self and Mutual inductance – Neumann's formula – 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. Introduction to permanent magnets, their characteristics and applications.

Time varying fields: Time varying fields-Faraday's laws of electro magnetic induction-its integral and point forms, maxwell's fourth equation, curl(E)= $\frac{-\partial B}{\partial t}$, statically and dynamiclly induced EMFs, displacement current, Modification of Maxwell's equations for time varying fields, poynting theorem and poynting vector.

Text Books:

1. William H. Hayt & John. A. Buck "Engineering Electromagnetics" Mc. Graw-Hill Companies, 7th Editon.2006.
2. Mathew N O Sadiku "Electro magnetic Fields" Oxford Publications, 7th edition, 2006.

Reference Books:

1. D J Griffiths "Introduction to Electro Dynamics" Prentice-Hall of India Pvt.Ltd, 2nd edition, 1999.
2. J P Tewari "Electromagnetics" Khanna publishers, 4th edition, 2009
3. J. D Kraus "Electromagnetics" Mc Graw-Hill Inc. 4th edition 1992
4. S. Kamakshaiah "Electromagnetic fields" Right Publishers, 2007
5. David K. Chang, " Field and Wave Electromagnetics ", Addison Wesley, Second edition, New Delhi,2001.
6. C. A. Balanis, J. Wiley and Sons "Advanced Engineering Electromagnetics" 2nd Edition, 1989.
7. J. D. Jackson, J. Wiley and Sons "Classical Electrodynamics" 2nd Edition, 1975.
8. Jin Au Kong, J. Wiley and Sons "Electromagnetic Wave Thoery" 2nd Edition, 1990.

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II B.Tech II Semester (EEE)

L	T	P	[C]
3	1	0	[3]

(13EE402) TRANSFORMERS AND INDUCTION MOTORS

Objectives: This course enables the students to:

- Understand the operating principles of transformers and poly phase induction motors –their construction and testing.
- Acquire analytical ability to analyze different types of induction motors with their performance characteristics and speed Control techniques using relevant mathematical models.
- Evaluate the various performance characteristics of induction machines for industrial applications.
- Understand the starting, braking and stalling phenomena of three phase induction motors.

UNIT – I:

Single-Phase Transformers –Single phase transformers – Principle of operation, constructional details (shell and core types), ideal transformer, Minimization of Hysteresis & Eddy current losses, EMF equation, operation on no-load and load, phasor diagrams, numerical problems.

Single-Phase Transformers – Performance analysis: Equivalent circuit, Losses and efficiency, per unit system, Regulation, All-day efficiency, Effect of variations of frequency & supply voltage on Iron losses- numerical problems.

UNIT – II:

Testing of Single-Phase Transformers & Autotransformers: Open circuit and short circuit tests, Sumpner's test, Predetermination of efficiency and regulation, separation of losses, parallel operation with equal and unequal voltage ratios-autotransformers-equivalent circuit- comparison with two-winding transformers- numerical problems.

Polyphase Transformers: Polyphase connections-Y/Y,Y/Δ,Δ/Y, Δ/Δ and Open Delta, Vector grouping, third harmonics in phase voltages, three-winding transformers, tertiary windings- determination of Z_p, Z_s and Z_t transients in switching, off-load and on-load tap changing transformers, Scott connection, numerical problems.

UNIT – III:

Three-Phase Induction Motors: Construction –stator, Cage and wound rotor, production of rotating magnetic field, principle of operation, rotor EMF and rotor frequency, rotor reactance, rotor current and power factor at standstill and during operation-numerical problems.

Characteristics of Induction Motors: Power flow diagram- Motor input, stator losses, rotor input, rotor copper loss and mechanical power developed, torque equation-deduction from torque equation, expressions for maximum torque and starting torque, torque- slip characteristics, crawling and cogging - double-cage and deep-bar rotors, equivalent circuit – phasor diagram-numerical problems.

UNIT – IV:

Circle Diagram of Induction Motors: No-load and blocked-rotor tests, Circle diagram-predetermination of performance. Methods of starting, types of starters-direct online starting, stator reactor starting, autotransformer starting, star-delta starting, rotor resistance starter. Starting current and starting torque calculations-numerical problems.

Speed Control of Induction Motors: Speed control – change of frequency, change of poles-methods of consequent poles–cascade connections, rotor resistance method, injection of an emf into rotor circuit, induction generator, applications and numerical problems.

Text Books:

1. Dr.P.S.Bhimbra, "Electric Machinery", Khanna Publishers, 7th edition, 2006.
2. J.B.Gupta, "Theory and performance of Electrical Machines", Khanna Publishers, 14th edition, 2010.

Reference Books:

1. Charles I. Hubert."Electric Machines: Theory, Operating Applications, and Controls", Pearson publication, 2nd edition, June 2002.
2. A.E.Fitzerald, C.kingsley and S.Umans,"Electrical Machinery", Tata Mc Graw-Hill companies, New Delhi, 6th edition, 2008.
3. Samarjit Singh, "Electrical Machines", Pearson education, 2012.
5. R.K.Rajput,"A Text book of Electrical Machines", Lakshmi Publications, 2005.

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(13EE403) CIRCUIT THEORY-II

Objectives: This course enables the students to Comprehend three phase systems with balanced and unbalanced loads and power measurements. Synthesize the transmission line parameters using two-port networks. Evaluate AC and DC transients for complex electrical systems. To Perform the comprehensive analysis of different systems in both time and frequency domain. To understand the system response in continuous time domain. Understanding the application of Fourier series, Fourier transform and Laplace transform in the analysis of electrical circuits.

UNIT – I:

Three Phase balanced Circuits: Three phase balanced circuits: Phase sequence – Star and delta connection – Relation between line and phase voltages and currents in balanced systems – Analysis of 3 phase circuits – Measurement of active and reactive power.

Three Phase Unbalanced Circuits: Analysis of Unbalanced 3 phase circuits- loop method-Application of Milliman's Theorem – Star delta Transformation Technique – Two Wattmeter method of Measurement of 3 phase power.

UNIT – II:

DC Transient Analysis: Transient response of R-L, R-C, R-L-C circuits (Series combinations only) for d.c. excitation – Initial conditions - Solution using differential equation approach and Laplace transform methods of solutions. Response of R-L & R-C networks to pulse excitation.

AC Transient Analysis: Transient response of R-L, R-C, R-L-C circuits (Series combinations only) for d.c. and sinusoidal excitations – Initial conditions - Solution using differential equation approach and Laplace transforms.

UNIT – III:

Two port Networks-I: Z, Y, ABCD and hybrid parameters and their relations-reciprocity and symmetry conditions.

Two port Networks-II: Concept of transformed network – 2-port network parameters using transformed variables – Cascaded networks

UNIT – IV

Fourier analysis of AC Circuits: Fourier theorem-Trigonometric form and exponential form of Fourier series-Conditions of symmetry-line spectra and phase angle spectra-Analysis of electrical circuits to Non sinusoidal periodic wave forms.

Fourier Transforms: Fourier integrals and Fourier transforms-Properties of Fourier transforms and applications to electrical circuits.

Text Books:

1. W.H.Hayt, J.E.Kimmerly, and S.M.Durbin "Engineering circuit analysis" McGraw Hill Education private limited, 6th Edition, 2002.
2. M.E Van Valkenburg, "Network Analysis" Prentice Hall of India, 3rd Edition, 2000.

Reference Books:

1. C. K. Alexander and M. N. O. Sadiku, "Fundamentals of Electric Circuits" Tata McGraw-Hill, 2nd edition, 2004.
2. Mahmood Nahvi, Joseph Edminister "Electric Circuits", Schuam Series, 5th edition, 2011.
3. Chakrabati A, "Circuit Theory (Analysis and Synthesis)" Dhanpath Rai & Sons, 6th edition, 2004.
4. Mahmood Nahvi and Joselph Edminister, "Electric Circuits" Schaum's Outline series TMH, 2004.
5. Ravish R Singh, "Electrical Networks" Tata McGraw-Hill Publication, 6th edition, 2010.
6. A. Sudhakar and Shyammohan S Palli, "Circuits & Networks" Tata McGraw-Hill, 4th edition, 2010.

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(13EE404) GENERATION OF ELECTRIC POWER

Objectives: To impart knowledge about the generation of electric power to meet the ever increasing demand by both conventional & Non-conventional power plants.

UNIT-I:

Thermal Power Plants: Schematic layout of thermal power station (TPS), description of TPS components: economizers, boilers, super heaters, turbines, condensers, electro static precipitator (ESP), chimneys and cooling towers.

Nuclear Power Plants: Principle and operation of nuclear reactors, different Reactor components, radiation hazards and safety precautions, Types of nuclear reactors-PWR, BWR and FBR .

UNIT – II:

Hydro-Electric Power Plants: Introduction of Hydro-electric plant & its layout. Advantages and disadvantages of Hydro-electric plants, selection of site for Hydro-electric plant, essential parts & features of Hydro-electric power plant, classification of Hydro-electric power plants depending on load & head.

Basic Renewable Energy Plants: Principles of bio conversion, types and characteristics of bio gas digesters. Principle & method of harnessing geothermal and ocean energy. Economic Aspects.

UNIT – III:

Solar and Wind Energy Generation:

Solar Energy Generation: Role and potential of solar energy options, Principles of Solar radiation. Types of Solar Energy collectors, Different methods of solar energy storage, solar applications, Economic Aspects.

Wind energy Generation: Role and potential of wind energy option, types of wind mills-performance characteristics, Applications, Betz Criteria, economic aspects.

UNIT – IV:

Economic Aspects of Power Generation: Load curve, load duration, integrated load duration curves; Demand, diversity capacity, Plant use factors Numerical Problems, classification of costs: fixed, semi fixed and Running costs.

Tariff Methods: Desirable characteristics of a Tariff method - Tariff methods: flat rate, block rate, two part, three part and power factor tariff methods and Numerical problems.

Text Books:

1. M.L.Soni,P.V Gupta,U.S Bhatnagar and A.Chakraborti "A text book on Power System Engineering" Dhanpat Rai & Co.Pvt.Ltd.1999.
2. V.K Mehta and Rohit Mehta "Principles of Power Systems" S.Chand & company LTD, New Delhi 2004.

Reference Books:

1. S.N.Singh "Electrical Power Generation, Transmission and Distribution",PHI, 2003.
2. GD Rai "Non Conventional Energy Sources "Khanna Publishers, 4th edition 2000.
3. M.V Deshpande "Elements of power station design and practice, wheeler publishing 2005.

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(13EE405) ANALOG ELECTRONIC CIRCUITS

Objectives: Students undergoing this course are expected to:

- Analyse Single stage amplifier at low and High frequencies using BJT and FETs.
- Analyse Multi stage amplifiers at low and High frequencies using BJT and FETs.
- Recognize the importance of feedback in amplifiers.
- Understand the principle, operation and design of oscillators.
- Comprehend the use of Power amplifiers and Tuned amplifiers in real time applications.
- Differentiator and Integrator circuits, clippers(limiters)
- Clampers (dc-reinserted), comparators(discriminators)

UNIT-I:

Single Stage Amplifiers Design and Analysis: Review of CE, CB, CC& CS amplifiers-Classification of Amplifiers, Distortion in amplifiers-Approximate analysis, CE, CB, CC amplifiers comparison.

BJT & FET Frequency Response: Logarithms-Decibels-General frequency consideration-Low frequency analysis-Low frequency response of BJT amplifiers-Low frequency response of FET amplifier-Miller effect capacitance-High frequency response of BJT amplifier-Square wave testing

UNIT-II:

Feedback Amplifiers: Concept of feedback, Classification of feedback amplifiers, General characteristics of negative feedback amplifiers, Effect of Feedback on Amplifier characteristics-Voltage series-Voltage shunt, Current series and Current shunt Feedback configurations-Simple problems.

Oscillators: Conditions for oscillations. RC and LC type Oscillators, Crystal oscillators, Frequency and amplitude stability of oscillators, Generalized analysis of LC oscillators, Quartz, Hartley, and Colpitts Oscillators, RC-phase shift and Wien-bridge oscillators.

UNIT –III:

Large Signal Amplifiers: Class -A Power Amplifier, Maximum Value of Efficiency of Class-A Amplifier, Transformer coupled amplifier- Push Pull Amplifier-Complimentary Symmetry Circuits (Transformer Less Class B Power Amplifier)-Phase Inverters, Transistor Power Dissipation, Thermal Runway, Heat sinks.

Linear Waveshaping: High pass, low pass RC circuits, their response for sinusoidal, step, pulse, square and ramp inputs.

Clippers and Clampers : Diode clippers, Transistor clippers, clipping at two independent levels, Transfer characteristics of clippers, Emitter coupled clipper, Comparators, applications of voltage comparators, clamping operation, clamping circuits using diode with different inputs, Clamping circuit theorem, practical clamping circuits, effect of diode characteristics on clamping voltage, Transfer characteristics of clampers.

UNIT-IV:

Switching Characteristics of Devices: Diode as a switch, piecewise linear diode characteristics, Transistor as a switch, Breakdown voltage consideration of transistor, saturation parameters of Transistor and their variation with temperature, Design of transistor switch, transistor-switching times.

Multivibrators:
Analysis and Design of Bistable, Monostable, Astable Multivibrators and Schmitt trigger using transistors.

Text books:

1. Robert L.Boylestad, Louis Nasheisky, Electronic Devices and Circuit Theory, 9th ed., Pearson Education ,2007.
2. S. Salivahanan, N. Suresh Kumar and A. VallavaraJ, Electronic Devices and Circuits, 2nd ed., TMH, 2008.
3. David A. Bell, Solid State Pulse Circuits, 4th ed., PHI, 2002.

Reference Books:

1. Robert r. Paynter, Introductory Electronic Devices and Circuits, ,7th ed., PEI, 2009
2. Anil K. Maini, Varsha Agrawal, Electronic Devices and Circuits, 1st ed., WILEY, 2009.
3. Jacob Milliman, Harbert Taub and Mothlkl S Prakash rao, Pulse,Digital & Switching Waveforms , 2nd ed., TMH, 2008.

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(13EE406) DIGITAL ELECTRONICS

Objectives: Students undergoing this course are expected to:

- Understand the different number system, its conversions and binary arithmetic.
- Know the fundamentals of Boolean algebra and theorems, Karnaugh maps including the minimization of logic functions to SOP or POS form.
- understand the logic design of programmable devices, including PLDs
- understand RAMS, and ROMS including its sequencing and control

UNIT- I:

Digital Codes and Boolean Algebraic Switching Functions:

Types of number systems – complement representation of Negative numbers, Implementation of simple arithmetic operations and conversions using Binary, BCD, OCTAL and Hexa-Decimal Numbers. Error Detecting & Error Correcting codes- Hamming codes. Fundamental postulates of Boolean Algebra, Basic theorems and properties, Switching Functions, Canonical and Standard forms, Algebraic simplification Digital Logic Gates, Universal Gates.

UNIT- II:

Minimization of Switching Functions and Combinational Logic Design:

Map Method:- Prime Implicants, Don't care combinations, Minimal SOP and POS forms, Tabular Method, Prime- Implicant chart, Simplification Rules. Design using conventional Logic Gates, Encoder, Decoder, Multiplexer, De-Multiplexer, Introduction to Modular design using IC chips, MUX Realization of switching functions Parity bit generator, Code- converters, Hazards and hazard free realizations.

UNIT- III:

Programmable Logic Devices and Sequential Circuits:

Basic PLD's:-ROM, PROM, PAL, PLA. Realization of Switching functions using PLD's. Capabilities and limitations of Threshold gate. Classification of sequential circuits: (Synchronous, Asynchronous, Pulse mode, Level mode with examples) Basic Flip-Flops, Triggering and Excitation Tables. Steps in Synchronous Sequential Circuit Design. Design of modulo -N Ring & Shift counters, Serial Binary Adder, Sequence Detector and Memory (Register level: Serial and Parallel).

UNIT- IV:

State Machines: FSMs AND ASMs

Finite State Machine – capabilities and Limitations, Mealy and Moore models, Examples of Mealy and Moore models, Partition Techniques and Merger chart Methods Concept of Minimal cover table. **Algorithmic State Machines:-**Salient features of the ASM chart, Simple examples, System design using data path and control subsystems, control Implementations, Examples of Weighing machine and Binary multiplier.

Text Books:

1. Zvi Kohavi, Switching & Finite Automata Theory, 2nd ed., TMH, 1979.
2. Morris Mano, Digital Design, 3rd ed., PHI, 2008.
3. A.Anand Kumar, Switching Theory and Logic Design, 1st ed., PHI, 2011.

Reference Books:

1. Fletcher, An Engineering Approach to Digital Design,1st ed., PHI, 2001
2. Charles H. Roth, Fundamentals of logic design, 5th ed., Thomson Publicaitons,2006.

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(13EE407) ELECTRICAL MACHINES LAB-I

Objectives: The main objective of this lab is to develop the practical knowledge on DC machines for the students which are studied in the previous semester theoretically.

List of Experiments:

1. Study of DC machine parts (identification of armature, field windings, brushes, Commutator etc,.)
2. Finding armature Resistance R_a and armature inductance.
3. Magnetization characteristics of DC shunt generator. Determination of critical field resistance and critical speed.
4. Load test on DC shunt generator. Determination of characteristics.
5. Load test on DC series generator. Determination of characteristics.
6. Load test on DC compound generator. Determination of characteristics.
7. Swinburne's test and speed control of DC shunt motor. Predetermination of efficiencies.
8. Speed control methods of DC Shunt Motor.
9. Brake test on DC shunt motor. Determination of performance curves.
10. Brake test on DC compound motor. Determination of performance curves.
11. Separation of Losses in a DC Shunt Motor.
12. Fields Test on DC series machines. Determination of efficiency.
13. Hopkinson's tests on DC shunt machines. Predetermination of efficiency.
14. Retardation test on DC shunt motor. Determination of losses at rated speed.

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(13EE408) ELECTRICAL CIRCUITS AND SIMULATION LAB

Objectives:

List of Experiments:

1. Verification of Thevenin's and Norton's theorem
2. Verification of superposition theorem and maximum power transfer theorem
3. Verification of Compensation theorem
4. Verification of Reciprocity and Millmann's theorem
5. Locus diagrams of RL and RC series circuits
6. Series and parallel resonance
7. Determination of self, mutual inductance and coefficient of coupling
8. Verification of Z and Y Parameters
9. Verification of Transmission and Hybrid parameters
10. Measurement of active power for star and delta connected balanced loads
11. Measurement of Reactive power for star and delta connected balanced loads
12. Measurement of three phase power by two Watt meter method for Unbalanced loads

PSPICE SIMULATION:

13. Simulation of DC circuits
14. DC transient response
15. Mesh analysis
16. Nodal analysis

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(13EE409) PULSE AND DIGITAL CIRCUITS LAB

Objectives: The students completing this course are expected to demonstrate basic knowledge of Pulse and Digital Circuits Lab by understanding:

- Differentiator and Integrator circuits, clippers(limiters)
- clampers (dc-reinserted), comparators(discriminators)
- Switching characteristics of diodes and transistors
- Bistable multi(flip-flop), Schmitt trigger circuit
- Time Base generators(Miller, Bootstrap Voltage time base generator and Current time base generator)

Minimum twelve experiments to be conducted:

1) Linear wave shaping.
2) Non linear wave shaping-clippers.
3) Non linear wave shaping-clampers.
4) Transistor as a switch.
5) Study of logic gates.
6) Study of flip-flops.
7) Sampling gates.
8) Astable Multivibrator.
9) Monostable Multivibrator.
10) Bistable Multivibrator.
11) Schmitt trigger.
12) UJT Relaxation oscillator.
13) Colpitts oscillator.
14) RC- Phase shift oscillator.

Additional Experiments:

15) Bootstrap sweep circuit.
16) Constant current sweep generator using BJT.

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(13EE410) TECHNICAL SEMINAR-I

Objectives: To get involved with the latest advancements and developments to enhance communication and presentation skills, exchange of ideas, greater connectivity to develop a research bent of mind.

A Technical Seminar shall have two components, one chosen by the student from the course work as an extension and approved by the faculty supervisor. The other component is suggested by the supervisor and can be a reproduction of the concept in any standard research paper or an extension of concept from earlier course work. A hard copy of the information on seminar topic in the form of a report is to be submitted for evaluation along with presentation. The presentation of the seminar topics shall be made before a committee consisting of Head of the department, seminar supervisor and a senior faculty member. Each Technical Seminar shall be evaluated for 100 marks. Technical Seminar component-I for 50 marks and component-II for 50 marks making total 100 marks. (**Distribution of marks for 50:** 10 marks for report, 10 marks for subject content, 20 marks for presentation and 10 marks for queries).

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III B.Tech I Semester (EEE)

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(13HS118) MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Objectives: To explain the basic principles of managerial economics, accounting and current business Environment underlying business decision making

UNIT- I:

Introduction to Managerial Economics: Definition, Nature and Scope of Managerial Economics– Demand Analysis: Determinants, Law of Demand and its exceptions.

Elasticity of Demand: Types, Measurement and Significance of Elasticity of Demand. Demand Forecasting, methods, (survey methods, statistical methods, expert opinion method, test marketing, controlled experiments, judgmental approach to demand forecasting)

UNIT- II:

Theory of Production: Production Function – Isoquants and Isocosts, MRTS, Least Cost Combination of Inputs, Cobb-Douglas Production function, Laws of Returns, Internal and External Economies of Scale.

Cost Analysis: Cost concepts, Opportunity cost, Fixed vs. Variable costs, Explicit costs Vs. Implicit costs, Out of pocket costs vs. Imputed costs.

Break-Even Analysis : (BEA)-Determination of Break-Even Point (simple problems)

Market: Types of competition, Price-Output Determination in case of Perfect Competition and Monopoly, Monopolistic competition.

Methods of Pricing: Cost, competition, strategy based pricing

UNIT -III:

Business Types: Business, features, Sole Proprietorships, Partnerships, Joint Stock Companies, Public Enterprises and their types.

Capital and Capital Budgeting: Capital and its significance, Types and sources of raising finance. Nature and scope of Capital Budgeting, Features, Methods: Payback Method, Accounting Rate of Return Method (ARR) and Net Present Value Method (simple problems)

UNIT- IV:

Financial Accounting: Double-Entry Book Keeping, Journal, Ledger, Trial Balance- Final Accounts. (Simple Problems)

Financial Analysis through Ratios: Computation, Analysis and Interpretation of Liquidity Ratios (Current Ratio and quick ratio), Capital structure Ratios (Debt- Equity ratio, Interest Coverage ratio), Activity Ratios (Inventory turnover ratio and Debtor Turnover ratio), and Profitability ratios (Gross Profit Ratio, Net Profit ratio, Operating Ratio, P/E Ratio and EPS), (Simple Problems).

Text Books:

1. Aryasri: “Managerial Economics and Financial Analysis”, TMH,2nd edition, 2005.

2. SA Siddiqui and AS Siddiqui “Managerial Economics and Financial Analysis”, New age international publishers.

3. Varshney & Maheswari: “Managerial Economics”, Sultan Chand, 2003.

Codes/Tables: Present Value Tables need to be permitted into the examination Hall.

Reference Books:

1. Raghunatha Reddy & Narasimhachary: "Managerial Economics& Financial Analysis", Scitech, 2009
2. V. Rajasekaran & R. Lalitha," Financial Accounting", Pearson Education, New Delhi, 2010.
3. Suma Damodaran, "Managerial Economics", Oxford University Press.
4. Domnick Salvatore: "Managerial Economics In a Global Economy", Thomson, 4th Edition.
5. Subash Sharma & M.P. Vittal, "Financial Accounting for management", Text & Cases, Machmillan 2008
6. S.N.Maheswari & S.K. Maheswari," Financial Accounting", Vikas,2008
7. Truet and Truet: "Managerial Economics:Analysis", Problems and Cases, Wiley,2009
8. Dwivedi:"Managerial Economics", Vikas, 6th Edition, 2009

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L	T	P	[C]
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(13HS121) QUALITATIVE AND QUANTITATIVE ANALYSIS

Objectives: To determine and measure the one's ability thorough advanced training, some specific set of skills (intellectual, motor and so on), the subject assumes that professional potential and special abilities developed.

UNIT – I:

Simple Arithmetic -Number - H.C.F. & L.C.M. of Numbers – Decimal Fractions – Simplification – Square Root and Cube Root – Average – Problems on Numbers – Problems on Ages – Percentage – Profit & Loss – Ratio & Proportion-Partnership – Chain Rule – Time & Work – Pipes & Cisterns – Time & Distance – Problems on Trains – Boats & Streams – Allegation or Mixture – Simple Interest – Compound Interest – Area Volume & Surface Areas – Volume & Surface Areas – Calendar – Clocks – Races & Games of Skill – Number Series – Tabulation – Pi –Chart – Bar Diagram – Line Graphs.

UNIT– II:

Reasoning (Verbal and Non-Verbal) -Series Completion – Analogy – Coding–Decoding – Classification – Blood Relations – Puzzle test – Sequential output tracing - Direction Sense test – Logical Venn diagrams – Alphabet test – Alpha-Numeric Sequence puzzle – Number, Ranking and time sequence test – Mathematical operations – Logical sequence of words – Arithmetical reasoning – Insert the missing character – Data sufficiency – Eligibility test – Assertion and reason – Situation reaction test – Verification of Truth of the Statement - –Cubes and dice.

UNIT – III:

Logical deductions, Non verbal reasoning

Logic – Statement-Arguments – Statement-Assumptions – Statement-Course of action – Statement-Conclusions – Deriving conclusion from passages – Theme deduction – Cause and effect reasoning

UNIT – IV:

Reading Comprehension- Purpose of reading, reading rates, improving comprehension skills, techniques for good comprehension, skimming, scanning, determining the meaning of words, different styles of worked out problems.

Text Books:

1. RS Agarwal , A textbook on Quantitative Aptitude.
2. RS Agarwal, A textbook on verbal and nonverbal reasoning .
3. Meenakshi Raman and Sangeeth Sarma, Technical Communication.

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(13EE501) ELECTRICAL MEASUREMENTS AND INSTRUMENTATION

Objectives:

To enable the students to have a clear knowledge of the basic laws governing the operation of electrical & electronic measuring instruments, relevant circuits and their working. This course provides complete idea about measurement of electrical quantities like Voltage, Current, Power, Energy and comparison of methods of measurement of Resistance, Inductance and Capacitance. Apart from measurements of electric quantities this course also provides a comprehensive idea of Transducers and Cathode Ray Oscilloscopes.

UNIT-I

Measuring Instruments: Classification – deflecting, control 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 shunt and series resistance - Types of P.F. Meters – 1-ph and 3-ph meters: dynamometer & moving iron type,

Instrument Transformers: Construction and principle of operation CT and PT – Ratio and phase angle errors.

UNIT –II

Measurement of Power / Energy: Single phase dynamometer wattmeter, LPF and UPF, three element dynamometer wattmeter, expression for deflecting and control torques. Single phase induction type energy meter – driving and braking torques – errors and compensations- Three phase energy meter.

Potentiometers: Principle and operation of D.C. Crompton‘s potentiometer- standardization – Measurement of unknown resistance, current, voltage. A.C. Potentiometers: polar and coordinate types- standardization - applications.

UNIT – III

A.C &D.C Bridges: Method of measuring low, medium and high resistance – sensitivity of Wheatstone‘s bridge – measurement of low resistance: Kelvin‘s double bridge - measurement of high resistance: loss of charge method - Measurement of low & high inductance - Maxwell‘s, Hays and Anderson‘s bridge - Measurement of capacitance and loss angle – Desauty, Schering and Wien‘s bridge.

Magnetic measurements: Determination of B-H loop, method of reversals, characterization of magnetic materials and measurement of flux.

UNIT – IV:

Digital Meters: Digital Voltmeter-Successive approximation, ramp and integrating type-Digital frequency meter-Digital multimeter-Digital Tachometer**:**

Oscilloscope: Cathode Ray Oscilloscope- Cathode Ray tube-Time base generator- – application of CRO –Measurement of Phase , frequency, current & voltage- Lissajous pattern**.**
Transducers: Definition of transducers, Classification of transducers- Principle operation of LVDT transducers- Strain gauge and its principle of operation.

Text Books:

1. A.K.Sawhney "Electrical & Electronic Measurement & Instruments" Dhanpat Rai & Co. Publications. 1994
2. R.K.Rajput "Electrical & Electronic Measurement & Instrumentation", S. Chand & Co 2nd Edition. 2008

Reference Books:

1. D O Doeblin "Measurements Systems, Applications and Design", Mc Graw Hill Edition.
2. Buckingham and Price "Electrical Measurements ", Prentice Hall of India.
3. Reissland, M.U "Electrical Measurements: Fundamentals, Concepts, Applications", New Age International (P) Limited, publishers.
4. H. S. Kalsi "Electronic Instrumentation", Tata Graw Hill, 3rd Edition.
5. E.W. Golding and F.C. Widdis "Electrical Measurements and measuring Instruments", Reem Publications 5th Edition.
6. D.V.S Murthy "Transducers and Instrumentation", Prentice Hall of India.

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III B.Tech I Semester (EEE)	L	T	P	[C]
	3	0	0	[3]

(13EE502) POWER ELECTRONICS

Objectives:
To get an overview of different types of power semiconductor devices and their switching characteristics. To understand the various configurations, operation, characteristics, control techques and performance of phase controlled rectifiers, AC voltage controllers, DC-DC switching regulators and inverters. Harmonic reduction methods.

UNIT – I

Power Semiconductor Devices: Study of switching devices - SCR, TRIAC ,BJT,MOSFET,IGBT and GTO – Static and dynamic characteristics – Turn on and Turn off methods.

Devices and circuits for triggering and commutation: R, RC and UJT Triggering circuits for SCR, line and forced commutation circuits – Series and parallel operation of SCR – Design of Snubber circuit – specifications and ratings of SCR's, BJT and IGBT - Problems.

UNIT –II

Single Phase Controlled Converters: Phase control technique: half & full controlled converters – midpoint & bridge connections - Two pulse converter with Resistive, R-L and R-L-E loads - Derivation of average load voltage and current & RMS Value – Active and Reactive power inputs to the converters with and without Freewheeling Diode - Effect of source inductance – Dual converter - problems.

Three Phase Controlled Converters: Three pulse and six pulse converters - midpoint & bridge connections – average load voltages with R and RL loads - Effect of Source inductance–Dual converter - Waveforms –Problems.

UNIT – III

AC Voltage Controllers: Single phase AC Regulators with R and RL loads, modes of operation of TRAIC, AC voltage Regulators Control strategies – Derivation of RMS load voltage, current and power factor, wave forms – problems.

Cycloconverters: Single phase midpoint cycloconverters with Resistive and inductive load (Principle of operation only) – Bridge configuration of single phase cycloconverter (Principle of operation only) – Waveforms.

UNIT – IV

Choppers: Choppers classification and their control strategy – Step down choppers - Derivation of load voltage and currents with R, RL and RLE loads- Step up Chopper – load voltage expression. load commutated chopper-DC Jones chopper, problems.

Inverters: Basic series and parallel inverter - Single phase and three phase bridge inverters - voltage source inverters- Current source inverter – Pulse Width Modulation techniques – Introduction to multi level inverters concept - problems.

Text Books:

1. M. D. Singh & K. B. Kanchandhani “Power Electronics”, Tata Mc Graw Hill Publishing Company, 2013.
3. P.S.Bhimbra “Power Electronics”, Khanna Publishers, 3rdEdition, 2003.
4. P.C.Sen “Power Electronics”, Tata Mc Graw Hill Publishing. 1987

Reference Books:

1. Vedam Subramanyam “Power Electronics”, New Age International (P) Limited, 3rd Edition.
2. M. H. Rashid “Power Electronics: Circuits, Devices and Applications”, Prentice Hall of India, 2nd Edition, 2004.
3.G. K. Dubey, S. R. Doradla, A. Joshi and R. M. K. Sinha “Thyristorised Power Controllers”, New Age International (P) Limited Publishers.
4. L. Umanand “Power Electronics - Essentials & Applications”, John Wiley India Pvt. Ltd.
5. Ashfaq Ahmed “Power Electronics for Technology” Pearson Education, Indian reprint, 2003.
6. Philip T. Krein, “Elements of Power Electronics” Oxford University Press, 2004 Edition.
7. Ned Mohan Tore. M. Undel and, William. P. Robbins, ‘Power Electronics: Converters, Applications and Design”, John Wiley and sons, third edition, 2003.

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(13EE503) SYNCHRONOUS AND SPECIAL MACHINES

Objectives:

This subject is an extension of previous electrical machines courses. It deals with analysis of Synchronous generator/motors which are the prime source of electrical power generation and its utilities. Also deals with different types of single phase motors which are having significant applications in house hold appliances and control systems.

UNIT – I

Constructional Details of Synchronous Machines: Constructional Features of round rotor and salient pole machines -– Armature and field windings – Integral slot and fractional slot windings; Distributed and concentrated windings – distribution, pitch and winding factors. Principle of operation- E.M.F Equation - introduction to static excitation systems.

Synchronous generator Characteristics: Harmonics in generated E.M.F. – suppression of harmonics – armature reaction - leakage reactance – synchronous reactance and impedance – experimental determination - phasor diagram – load characteristics.

UNIT – II

Regulation of Synchronous Generator: Regulation by synchronous impedance method, M.M.F. method, Z.P.F. method and A.S.A. methods – salient pole alternators – two reaction analysis – experimental determination of X_d and X_q (Slip test) Phasor diagrams – Regulation of salient pole alternators.

Parallel Operation of Synchronous Generators: Synchronizing alternators with infinite bus bars – synchronizing power torque – parallel operation and load sharing - Effect of change of excitation and mechanical power input. Analysis of short circuit current wave form – determination of sub-transient, transient and steady state reactances.

UNIT – III

Synchronous Motors: Principle of Operation - phasor diagram – Variation of current and power factor with excitation – V and Inverted V Curves - Power developed – Synchronous Condenser.

Power Circles: Excitation and power circles – hunting and its suppression – Methods of starting – synchronous induction motor.

UNIT – IV

Single Phase Motors: Single phase induction motor – Constructional features – Double revolving field theory – Elementary idea of cross-field theory – split phase motors -capacitor start-capacitor start and run– shaded pole motor-

Special Motors: Principle and operation - A.C. Series motor/Universal motor - BLDC motors - stepper motors - Applications.

Text Books:

1. I.J.Nagrath & D.P.Kothari “Electric Machines”, Tata Mc Graw- Hill Publishers, 4th Edition, 2010.
2. P.S. Bimbhra “Electrical Machines”, Khanna Publishers. 2003

Reference Books:

1. S.Kamakashiah “Electromechanics-III (Synchronous and single phase machines)” , Overseas publishers Pvt Ltd.
2. A.E. Fitzgerald, C.Kingsley and S.Umans “Electric Machinery”, Mc Graw-Hill Companies, 5th edition, 1990.
3. Langsdorf “Theory of Alternating Current Machinery”, Tata Mc Graw-Hill, 2nd edition.
4. M.G.Say “The Performance and Design of A.C.Machines”, Pitman & Sons.
5. M. S. Sarma and M. K. Pathak “Electric Machines”, CENGAGE Learning.
6. Takashi Kenjō, Shigenobu Nagamori, “Permanent-magnet and brushless DC motors”, Oxford University Press, 1985 reprint.

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(13EE504) TRANSMISSION OF ELECTRIC POWER

Objectives:
It deals with basic theory of transmission lines, their modeling and performance analysis. This course also emphasizes on various effects of high voltage transmission, mechanical design of transmission lines, cables and insulators.

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 - 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, single and double circuit lines, Problems.
Performance of Short and Medium Transmission Lines: Classification of Transmission Lines - Short, medium and long line and their models - representations - Nominal-T, Nominal-Pie and A, B, C, D Constants, Problems. Mathematical Solutions to estimate regulation and efficiency of all types of lines - Problems.

UNIT-II
Performance of Long Transmission Lines: Long Transmission Line-Rigorous Solution, evaluation of A, B, C, D Constants, Interpretation of the Long Line Equations – Representation of Long lines – Equivalent T and π – surge Impedance and surge Impedance loading - wavelength and Velocity of propagation –Ferranti effect, Charging current.
Power System Transients: 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 (Problems). Bewley's Lattice Diagrams (for all the cases mentioned with examples).

UNIT-III
Corona: Description of the phenomenon, factors affecting corona, critical voltages and power loss, Radio Interference.
Overhead Line Insulators: Types of Insulators, String efficiency and Methods for improvement, Problems - voltage distribution, calculation of string efficiency, Capacitance grading and Static Shielding.

UNIT – IV
Sag and Tension Calculations: with equal and unequal heights of towers, Effect of Wind and Ice on weight of Conductor, Problems -Stringing chart & sag template and their applications.

Underground Cables: Types of Cables, Construction, Types of Insulating materials, Calculations of Insulation resistance and stress in insulation, Problems. Capacitance of Single and 3-Core belted cables, Problems. Grading of Cables - Capacitance grading, Problems. Description of Inter-sheath grading.

Text Books:

1. M.L.Soni, P.V.Gupta, U.S.Bhatnagar, A.Chakrabarthy "A Text Book on Power System Engineering", Dhanpat Rai & Co Pvt.Ltd. 2009
2. C.L.Wadhwa, "Electrical power systems", New Age International (P) Limited, Publishers, sixth edition, 2013.

Reference Books:

1. I.J.Nagarath and D.P.Kothari "Modern Power System Analysis", Tata McGraw Hill, 2nd Edition.
2. B.R.Gupta "Power System Analysis and Design", S. Chand & Co, 6th Revised Edition, 2010.
3. John J Grainger, William D Stevenson, "Power system Analysis"TMC Companies, 4th edition
4. Turan Gonen "Electric Power Transmission System Engineering: Analysis and Design", 2nd Edition, CRC Press.
5. S. A. Nasar "Electric Power Systems", Schaum's Outline Series, Revised 1st Edition, TMH.
6. R. K. Rajput, "Power System Engineering"Laxmi Publications, 1st Edition.

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(13EE505) SIGNALS AND SYSTEMS

Objectives: Students undergoing this course are expected to:

- Differentiate between continuous and discrete time signals
- Know Fourier representation of signals
- Emphasize on Fourier spectrum of signal
- Know the Ideal characteristics of filters
- Know the Significance of Sampling
- Concept of region of convergence(ROC)

UNIT – I

Introduction to Signals, Fourier Series:Analogy between vectors and signals, orthogonal signal space, Signal approximation using orthogonal functions, Mean square error, closed or complete set of orthogonal functions, Orthogonality in complex functions. Representation of function by a set of mutually orthogonal functions. Classification of signals, elementary signals, basic operations on signals, classification of systems, basic system properties Fourier series representation of Continuous-time periodic signals, Convergence of the Fourier Series, Properties of Continuous time Fourier Series, the complex Fourier spectrum

UNIT – II

Fourier Representation of Aperiodic Signals: The Continuous-time Fourier Transform, Fourier transforms of standard signals, Fourier transform for periodic signals, Properties of the continuous time Fourier transform. Linear time invariant systems: impulse response, input-output relation for a linear system, transfer function of an LTI system, filter characteristics of a linear system, distortionless transmission through a system, signal and system bandwidth, ideal filter characteristics, causality and Paley-Wiener criterion for physical realization

UNIT – III

Sampling theorem for band-limited signals, types of sampling, effect of undersampling- Aliasing.

Correlation: Convolution and Correlation, graphical analysis of convolution, autocorrelation and cross correlation, energy density spectrum, parseval's theorem, power density spectrum, relation between autocorrelation and spectral density function, relation between convolution and correlation.

UNIT – IV

Laplace transforms: Review of Laplace transforms, Properties of L.T's, Inverse Laplace transform, Concept of region of convergence (ROC) for Laplace transforms, constraints on ROC for various classes of signals, Relation between L.T's, and F.T. of a signal.

Z–Transforms: Introduction, The Z-transform, The region of convergence for the Z-transform, The Inverse Z-transform: Properties of Z-transform, Analysis and characterization of LTI systems using Ztransforms

Text Books:

1. B.P. Lathi, Signals, Systems & Communications, BS Publications, 1 edition 2008.
2. A.V. Oppenheim, A.S. Willsky and S.H. Nawab , Signals and Systems, PHI, 2nd Edition, 2009.
3. Simon Haykin and Van Veen ,Signals & Systems, Wiley, 2nd Edition, 2007.

Reference Books:

1. Michel J. Robert , Fundamentals of Signals and Systems, MGH International Edition,2008.
2. M.J.Roberts , Signals and Systems Analysis using Transform method and MATLAB ,TMH, 1st edition, 2007.

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(13EE506) ELECTRICAL MEASUREMENTS LAB

Objectives:

To know the procedure for measuring resistance, inductance & capacitance of different ranges. Measurement of active and reactive power, frequency and parameters of a choke coil. Calibration of energy meter, watt meter and potential meters.

List of Experiments:

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. Kelvin's double Bridge – Measurement of resistance – Determination of Tolerance.
5. Measurement of % ratio error and phase angle of given C.T. by comparison.
6. Measurement of capacitance using Schering Bridge & Anderson Bridge.
7. Measurement of 3 phase reactive power with single-phase wattmeter.
8. Measurement of parameters of a choke coil using 3 voltmeter and 3 ammeter methods.
9. Optical bench – Determination of polar curve measurement of MHCP of filament lamps
10. Calibration LPF wattmeter – by Phantom testing
11. Measurement of 3 phase power with Two watt meter method (Balanced & Unbalanced).
12. Dielectric oil testing using H.T. testing Kit
13. LVDT and capacitance pickup – characteristics and Calibration
14. Resistance strain gauge – strain measurements and Calibration
15. Transformer turns ratio measurement using AC Bridge.
16. A.C. Potentiometer – Calibration of AC Voltmeter, Parameters of Choke.
17. Measurement of inductance by Maxwell's bridge and measurement of capacitance by Wien's bridge.
18. B-H loop characterization of a given magnetic material.

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(13EE507) ELECTRICAL MACHINES LAB-II

Objective:

In this lab students understand the performance of single phase transformer, parallel operation of transformer, performance of induction motor, regulation of alternator and equivalent circuit of single phase induction motor.

List of Experiments:

1. O.C. & S.C. Tests on Single phase Transformer.
2. Sumpner's test on a pair of single phase transformers.
3. Scott connection of transformers.
4. No-load & Blocked rotor tests on three phase Induction motor.
5. Regulation of a three –phase alternator by synchronous impedance & m.m.f. methods.
6. V and Inverted V curves of a 3 phase synchronous motor.
7. Equivalent Circuit of a single phase induction motor.
8. Determination of X_d and X_q of a salient pole synchronous machine.
9. Parallel operation of Single phase Transformers.
10. Separation of core losses of a single phase transformer.
11. Brake test on three phase Induction Motor.
12. Regulation of three-phase alternator by Z.P.F. and A.S.A methods.
13. Load test on 3-phase transformer.
14. Measurement of Harmonics in 3 phase transformer
15. Measurement of sequence impedance of a three-phase alternator.
16. Study of induction generator operation.

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(13HS122) SOFT SKILLS LAB

Objectives: Keeping in mind the previous exposure of the student to English, this lab focuses on improving the student's efficiency in English at all levels. The lab intends to train students to use language effectively, to participate in group discussions, to help them face interviews, and sharpen public speaking skills and enhance the confidence of the student by exposing him/ her to various situations and contexts which he/ she would face in his/ her career.

Activity– 1: Reading Comprehension
Activity– 2: Listening Comprehension
Activity– 3: Technical Report Writing
Activity– 4: Resume Writing
Activity– 5: Group Discussion
Activity– 6: Situation Dialogues
Activity– 7: Interview Skills
Activity– 8: Technical Presentation

Reference Books:

1. Dr.Alex, "Soft Skills" – Know yourself & Know the world.
2. Huckin and Olsen, Technical Writing and professional communication, Tata Mc Graw-Hill 2009.
3. Scott Morgan and Barrett Whitener, Speaking about Science, A Manual for Creating Clear Presentations ,Cambridge University press, 2006
4. Meenakshi Raman & Sangeeta Sharma, Technical Communication, Oxford University Press 2009.
5. M. Ashraf Rizvi, Resume's and Interviews, Tata Mc Graw-Hill, 2008
6. KK Ramachandran and KK Karthick, Form Campus To corporate, Macmillan Publishers, India Ltd, 2010
7. Dr A Ramakrishna Rao, Dr G Natanam & Prof SA Sankaranarayanan, English Language Communication: A Reader cum Lab Manual, Anuradha Publications, Chennai 2008.
8. K R Lakshminarayan and T. Muruguvel , Managing Soft Skills, Sci-Tech Publication, 2010
9. John X Wang, Business Communication, CRC Press, Special Indian Edition, 2008.

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(13EE601) MICROPROCESSORS AND MICROCONTROLLERS

Objective: To learn the basic microprocessor architecture and to gain knowledge on interfacing components with processors and micro controllers

UNIT-I

Introduction: Architecture of 8086 microprocessor, special functions of general purpose registers.8086 flag register and function of 8086 flags, addressing modes of 8086,instruction set of 8086.assembler directives, simple programs, procedures and macros.

Assembly Language Programming: Assembly language programs involving logical, branch and call instructions, sorting, evaluation of arithmetic expressions, string manipulation.

UNIT-II

Details of 8086 & Interfacing: Pin diagram of 8086-Minimum mode and maximum mode of operation, Timing diagram, memory interfacing to 8086(static RAM and EPROM), Need for DMA, DMA data transfer method, Interfacing with 8237/8257.

Programmable Interfacing Devices: 8255 PPI-various modes of operation and interfacing to 8086.interfacing keyboard, displays, 8279 stepper motor and actuators. Interrupt structure of 8086, Vector interrupt table. Interrupt service routines.

UNIT-III

Serial Data Transfer Schemes: Asynchronous and synchronous data transfer schemes.8251 USART architecture and interfacing, TTL to RS232C and RS232C to TTL conversion, Sample program of serial data transfers.

Programmable Interrupt Controllers: 8259 PIC architecture and interfacing, cascading of interrupt controller and its importance, Programming with 8259, Programmable interval timer 8253, Modes of 8253, Programming examples with 8253.

UNIT-IV

8051 Microcontroller and its Programming: Architecture of micro controller-8051 Microcontroller-internal and external memories-counters and timers-synchronous serial-cum asynchronous serial communication-interrupts. Addressing modes of 8051, Instructor set of 8051, Assembly Language Programming examples using 8051.

Text Books:

1.A.K. Ray and K.M.Bhurchandi, Advanced microprocessor and peripherals, 2nd edition, TMH, 2000.
2.Deshmukh, Microcontrollers, Tata Mc-Graw Hill Edition, 2004.
3.Raj kamal, Microcontrollers Architecture, programming, interfacing and system Design, Pearson Education, 2005.

Reference Books:

1. Douglas V.Hall, Microprocessors Interfacing, 2nd edition, 2007.
2. Walter A. Triebel, Avtar Singh, The 8088 and 8086 Microprocessors, PHI, 4th Edition, 2003.
3. Liu and GA Gibson, Micro computer system 8066/8088 family Architecture, programming and Design, PHI, 2nd Ed.
4. Subrata Ghoshal, 8051 Microcontroller-Internals, Instructions, Programming and Interfacing, Pearson, 2010

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(13EE602) POWER SEMICONDUCTOR DRIVES

Objective:

This course is an application of Power Electronics to DC and AC drives. Control of DC motor drives with single phase, three phase converters and choppers are given in detail. The control of AC motor drives with variable frequency converters and variable voltage are also presented.

UNIT – I

Introduction to Electric Drives: Electric drive- definition- advantages of electric drives-dynamics-control of electric drives-closed loop control.

Converter Fed DC Drives: Single and three Phase (semi and fully controlled) converter fed DC separately excited and series motors- continuous current operation, output voltage and current waveforms, Speed – Torque expressions & characteristics, Problems.

UNIT-II

Four Quadrant Operation of DC Drives: Introduction to Four quadrant operation, Motoring and Braking operations, Electric Braking: Plugging, Dynamic and Regenerative Braking operations. Four quadrant operation of DC motors by dual converters, closed loop operation of DC motor.

Control of DC Motors by Choppers: Single quadrant, Two –quadrant and four quadrant chopper fed DC separately excited and series motors: Continuous current operation, Output voltage and current wave forms, Speed torque expressions, speed torque characteristics, Problems on Chopper fed DC Motors, Closed Loop operation of chopper fed drives.

UNIT – III

Voltage Control of Induction Motors: Variable voltage characteristics of induction motors, Control of Induction Motor by AC Voltage Controllers, speed torque characteristics.

Frequency Control of Induction Motors: Variable frequency characteristics, Variable frequency control of induction motor by Voltage source and current source inverter and cycloconverters, PWM control , Comparison of VSI and CSI operations , Speed torque characteristics, Problems. Closed loop operation of induction motor drives

UNIT-IV

Rotor Side Control of Induction Motor: static rotor resistance control, Slip power recovery, Static Scherbius drive, Static Kramer Drive , their performance and speed torque characteristics , advantages , applications , problems.

Control of Synchronous Motors: Separate control & self control of synchronous motors, Operation of self controlled synchronous motors by VSI, CSI and cycloconverters. Load commutated CSI fed Synchronous Motor, Operation, Waveforms, speed torque characteristics, Applications, Advantages and Problems, Closed Loop control of synchronous motor drives.

Text Books:

1. G K Dubey “Fundamentals of Electric Drives”, Narosa Publications. 2002

2. MD Singh and K B Kanchandhani “Power Electronics”, Tata McGraw-Hill Publishing Company, 1998.

Reference Books:

1. M.H.Rashid “Power Electronic Circuits, Devices and applications”, PHI.

2. B.K.Bose “Modern Power Electronics and AC Drives”, PHI.

3. P.S.Bhimbra, “Power Electronics”.

4. Vedam Subramanyam “Thyristor Control of Electric drives” , Tata McGraw Hill Publications.

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(13EE603) POWER SYSTEM OPERATION AND CONTROL

Objectives:
This subject deals with Economic operation of Power Systems, Hydrothermal scheduling and modeling of turbines, generators and automatic controllers. It emphasizes on single area and two area load frequency control and reactive power control.

UNIT – I
Economic Operation of Power Systems-I: 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.
Economic Operation of Power Systems-II: Optimum generation allocation including the effect of transmission line losses – Loss Coefficients, General transmission line loss formula.

UNIT – II
Hydrothermal Scheduling: Optimal scheduling of Hydrothermal System: Hydroelectric power plant models, Scheduling problems-Short term hydrothermal scheduling problem.
Modelling of Turbine: First order Turbine model, Block Diagram representation of Steam Turbines and Approximate Linear Models.
Modelling of Governor: Mathematical Modelling of Speed Governing System – Derivation of small signal transfer function – Block Diagram.

UNIT – III
Load Frequency Control –I: Necessity of keeping frequency constant. Definitions of Control area – Single area control – Block diagram representation of an isolated power system – Steady state analysis – Dynamic response – Uncontrolled case. Load frequency control of 2- tie-line bias control.
Load Frequency Control –II: Proportional plus Integral control of single area and its block diagram representation, steady state response – Load Frequency Control and Economic dispatch control.

UNIT – IV
Reactive Power Control: Overview of Reactive Power control – Reactive Power compensation in transmission systems – advantages and disadvantages of different types of compensating equipment for transmission systems; load compensation – Specifications of load compensator, Uncompensated and compensated transmission lines: shunt and Series Compensation.

Text Books:

1. A. Chakravarthi and S. Halder "Power System Analysis Operation and Control", 3rd Edition, PHI. 2006
2. I.J.Nagrath & D.P.Kothari "Modern Power System Analysis" Tata M Graw – Hill Publishing Company Ltd, 2nd edition. 2003

Reference Books:

1. J.Duncan Glover and M.S.Sarma "Power System Analysis and Design", THOMPSON, 3rd Edition.
2. S. A. Nasar, Schaum's Outline Series "Electric Power Systems", Revised 1st Edition, TMH.
3. O I Elgerd "Electric Energy Systems", Mc Graw-hill Edition.
4. S. N. Singh "Electric Power Generation, Transmission and Distribution", 2nd Edition, PHI.
5. Abhijit Chakrabarti, D. P. Kothari, A. K. Mukhopadhyay and Abhinandan De "An Introduction to: Reactive Power Control and Voltage Stability in Power Transmission Systems", Eastern Economy Edition, 2010.
6. C.L.Wadhwa, "Electrical power systems", New Age International (P) Limited, Publishers, sixth edition, 2013.

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(13EE604) POWER SYSTEM ANALYSIS

Objectives:

This course introduces formation of Y bus and Z bus of a Power System, power flow studies by various methods. It also deals with short circuit analysis and analysis of power system for steady state and transient stability.

UNIT -I

Power System Network Matrices-I: Representation of Power system elements, Essential characteristics of a good Algorithm, Steps involved in solving a problem using Digital computer - Graph Theory: Definitions, Bus Incidence Matrix, Y-bus formation by Direct and Singular Transformation Methods, Problems.

Power System Network Matrices-II: Formation of Z-Bus-Partial network, Algorithm for the Modification of Z-Bus Matrix for addition element for the following cases: Addition of element from a new bus to reference, Addition of element from a new bus to an old bus, Addition of element between an old bus to reference and Addition of element between two old busses (Derivations and Problems). - Modification of Z-Bus for the changes in network (Problems).

UNIT –II

Power Flow Studies-I: Necessity of Power Flow Studies – Data for Power Flow Studies –Derivation of Static load flow equations – Load flow solutions using Gauss Seidel Method: Acceleration Factor, Load flow solution with and without P-V buses, Algorithm and Flowchart. Load flow Solution for Simple Power Systems (Max. 3-Buses): Determination of Bus Voltages, Injected Active and Reactive Powers (Sample One Iteration only) and finding Line Flows/Losses for the given Bus Voltages.

Power Flow Studies-II: Newton Raphson Method in Rectangular and Polar Co-Ordinates Form: Load Flow Solution with or without PV Busses- Derivation of Jacobian Elements, Algorithm and Flowchart. Decoupled and Fast Decoupled Methods- Comparison of Different Methods – DC load Flow.

UNIT – III

Short Circuit Analysis-I: Per-Unit System of Representation. Per-Unit equivalent reactance network of a three phase Power System, Problems. Symmetrical fault Analysis: Short Circuit Current and MVA calculations, Fault levels, Application of Series Reactors, Problems.

Short Circuit Analysis-II: Symmetrical Component Theory: Symmetrical Component Transformation, Positive, Negative and Zero sequence components: Voltages, Currents and Impedances. Sequence Networks: Positive, Negative and Zero sequence Networks, Problems. Unsymmetrical Fault Analysis: LG, LL, LLG faults with and without fault impedance, Problems.

UNIT –IV

Power System Steady Stability: Elementary concepts of Steady State, Dynamic and Transient Stabilities. Description of: Steady State Stability Power Limit, Transfer Reactance, Synchronizing Power Coefficient, Power Angle Curve and Determination of Steady State Stability and Methods to improve steady state stability.

Transient State Stability Analysis: Derivation of Swing Equation, Determination of Transient Stability by Equal Area Criterion, Application of Equal Area Criterion, Critical Clearing Angle Calculation. Solution of Swing equation by 4th order Range –Kutta Method (up to 2 iterations) - Methods to improve Stability - Application of Auto Reclosing and Fast Operating Circuit Breakers.

Text Books:

1. Stagg El – Abiad & Stags "Computer Methods in Power Systems", Mc Graw-hill Edition. 1987
2. C.L.Wadhwa, Electrical Power Systems', Wiley Eastern Ltd., 6th Edition. 2013

Reference Books:

1. I.J.Nagrath & D.P.Kothari "Modern Power system Analysis", Tata McGraw-Hill Publishing Company, 2nd edition.
2. Grainger and Stevenson "Power System Analysis", Tata McGraw-Hill.
3. M A Pai, "Computer Techniques in Power System Analysis", Second Edition, TMH.
4. B.R.Gupta, S. Chand & Co "Power System Analysis and Design", 6th Revised Edition, 2010.
5. K. Uma Rao "Computer Techniques and Models in Power Systems" I. K. International.

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(13EE605) CONTROL SYSTEMS

Objectives:

To provide sound knowledge in the basic concepts of linear control theory and design of control system. To understand the methods of representation of systems and to derive their transfer functions. To provide adequate knowledge in the time response of systems and steady state error analysis, obtain the open loop and closed loop frequency responses of systems, stability of systems and methods of stability analysis and various methods of designing compensation circuits for a control system.

UNIT – I

Introduction: Introduction to linear 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 - Translational and Rotational mechanical systems.

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

UNIT-II

Time Response Analysis: Standard test signals - Time response of first 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 systems.

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 – III

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 in Frequency Domain: Stability Analysis from Bode Plots. Polar Plots-Nyquist Plots-Stability Analysis.

UNIT – IV

Compensation Techniques: Compensation techniques – Lag, Lead, Lead-Lag Controllers design in frequency Domain, PID Controllers.

State Space Analysis: 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. I. J. Nagrath and M. Gopal. "Control Systems Engineering", New Age International Limited, Publishers, 2nd edition. 2008
2. B. C. Kuo "Automatic Control Systems", John wiley and son's. 8th edition 2003

Reference Books:

1. Katsuhiko Ogata "Modern Control Engineering", Prentice Hall of India Pvt. Ltd., 3rd edition, 1998.
2. A. Anand Kumar, "Control Systems" Eastern Economy Edition -PHI learning Private Ltd. 2007
3. N.K.Sinha "Control Systems" , New Age International (P) Limited Publishers, 3rd Edition, 1998.
4. Nise "Control Systems Engg", John wiley 3rd Edition.

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(13EE606) LINEAR AND DIGITAL IC APPLICATIONS

Objective: To enable the students to understand the fundamentals of Linear & Digital integrated circuits, analog to digital converters (ADC), and digital to analog converters (DAC) and designing electronic circuits using integrated circuits.

UNIT- I

Integrated Circuits: Classification, chip size and circuit complexity, basic information of Opamp, ideal and practical Op-amp, internal circuits, Op-amp characteristics, DC and AC characteristics, 741 op-amp and its features, modes of operation-inverting, non-inverting, differential.

OP-AMP Applications: Basic application of Op-amp, instrumentation amplifier, ac amplifier, V to I and I to V converters, sample & hold circuits, multipliers and dividers, Differentiators and Integrators, Comparators, Schmitt trigger, Multivibrators, introduction to voltage regulators, features of 723.

UNIT- II

Active Filters and Oscillators: Introduction, 1st order LPF, HPF filters. Band pass, Band reject and all pass filters. Oscillator types and principle of operation – RC, Wien and quadrature type, waveform generators – triangular, saw tooth, square wave and VCO.

Timers & Phase Locked Loops: Introduction to 555 timer, functional diagram, monostable and astable operations and applications, Schmitt Trigger. PLL - introduction, block schematic, principles and description of individual blocks of 565.

UNIT- III

D-A and A- D Converters: Introduction, basic DAC techniques, weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, and IC 1408 DAC, Different types of ADCs - parallel comparator type ADC, counter type ADC, successive approximation ADC and dual slope ADC, DAC and ADC specifications.

Classification of Integrated circuits, comparison of various logic families, standard TTL NAND Gate-Analysis& characteristics, TTL open collector O/Ps, Tristate TTL, MOS & CMOS open drain and tristate outputs, CMOS transmission gate, IC interfacing- TTL driving CMOS & CMOS driving TTL.

UNIT- IV

Design using TTL-74XX & CMOS 40XX series, code converters, decoders, Demultiplexers, decoders & drives for LED & LCD display. Encoder, priority Encoder, multiplexers & their applications, priority generators/checker circuits. Digital arithmetic circuits-parallel binary adder/subtractor circuits using 2's, Complement system. Digital comparator circuits.

Sequential Circuits: Flip-flops & their conversions. Design of synchronous counters, Decade counter, shift registers & applications, familiarities with commonly available 74XX & CMOS 40XX series of IC counters.

Memories: ROM architecture, types & applications, RAM architecture, Static & Dynamic RAMs, synchronous DRAMs.

Text Books:

1. D. Roy Chowdhury, Linear Integrated Circuits –New Age International (p) Ltd, 2nd Ed., 2003.
2. Ramakanth A. Gayakwad, Op-Amps & Linear ICs PHI, 1987.

Reference Books:

1. R.F. Coughlin & Fredrick F. Driscoll, Operational Amplifiers & Linear Integrated Circuits, PHI, 1977.
2. Denton J. Daibey, Operational Amplifiers & Linear Integrated Circuits: Theory & Applications, TMH.
3. Sergio Franco, Design with Operational Amplifiers & Analog Integrated Circuits, McGraw Hill, 3rd Ed., 2002.
4. Floyd and Jain, Digital Fundamentals, Pearson Education, 8th Edition, 2005.

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(13EE607) POWER ELECTRONICS AND SIMULATION LAB

Objectives:

To study the characteristics of switching devices and its applications and to gain a fair knowledge on the programming and simulation of power electronics converters.

List of Experiments:

1. Study of Characteristics of SCR, MOSFET & IGBT
2. Gate firing circuits for SCR's
3. Single Phase AC Voltage Controller with R and RL Loads
4. Single Phase fully controlled bridge converter with R and RL loads
5. DC Jones chopper with R and RL Loads
6. Single Phase Parallel, inverter with R and RL loads
7. Single Phase Cycloconverter with R and RL loads
8. Single Phase Half controlled converter with R and RL load
9. Three Phase half controlled bridge converter with R-load
10. Single Phase dual converter with RL loads
11. Single Phase series inverter with R and RL loads
12. PSPICE simulation of single-phase full converter using RLE loads
13. PSPICE simulation of single-phase AC voltage controller using RLE loads.
14. PSPICE simulation of Buck chopper.
15. PSPICE simulation of single phase Inverter with PWM control.

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(13EE608) CONTROL SYSTEMS AND SIMULATION LAB

Objectives:

To help the students understand and practice the modeling, simulation, and implementation of a physical dynamical system by a linear time invariant ordinary differential equation. To highlight the electrical modeling of a second order system and analyze the under-damped, over-damped and critically damped cases.

List of Experiments:

1. Time response of Second order system
2. Characteristics of Synchros
3. Programmable logic controller – Study and verification of truth tables of logic gates, simple
4. Boolean expressions and application of speed control of motor.
5. Effect of feedback on DC servo motor
6. Transfer function of DC motor
7. Effect of P, PD, PI, PID Controller on a second order systems
8. Lag and lead compensation – Magnitude and phase plot
9. Transfer function of DC generator
10. Temperature controller using PID
11. Characteristics of magnetic amplifiers
12. Characteristics of AC servo motor
13. Linear system analysis (Time domain analysis, Error analysis) using MATLAB.
14. Stability analysis (Bode, Root Locus, Nyquist) of Linear Time Invariant system using MATLAB
15. State space model for classical transfer function using MATLAB – Verification.
16. Effect of adding poles and zeroes to a system- MATLAB Verification.
17. Design a lead/lag or lead-lag compensator - MATLAB Verification.

Reference Books:

1. M.H.Rashid “Simulation of Electrical and electronics Circuits using PSPICE”, M/s PHI Publications.
2. PSPICE A/D user’s manual – Microsim, USA.
3. PSPICE reference guide – Microsim, USA.
4. MATLAB and its Tool Books user’s manual and – Mathworks, USA.
5. Anand Natrajan and Ramesh babu, “Control systems engineering”.

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(13EE609) MICROPROCESSORS AND MICROCONTROLLERS LAB

Minimum twelve experiments should be conducted.

1. Introduction to MASM/TASM.
2. Arithmetic operation – Multi byte Addition and Subtraction, Multiplication and Division – Signed and unsigned Arithmetic operation. ASCII – arithmetic operation- Multi byte Addition and Subtraction, Multiplication and Division.
3. Logic operations – Shift and rotate – Converting packed BCD to unpacked BCD, BCD to ASCII conversion.
4. By using string operation and Instruction prefix: Move Block, Reverse string, Sorting, Inserting, Deleting, Length of the string, String comparison.
5. DOS/BIOS programming: Reading keyboard (Buffered with and without echo) – Display characters, Strings.
6. a) Generating the Fibonacci series.
   b) Ascending order of N-8bit numbers.
   c) Descending order of N-8bit numbers.
7. Verification of the given string is whether palindrome or not.
8. Interfacing stepper motor with 8086 microprocessor
   a) Clockwise 5 rotations
   b) Anti clockwise 5 rotations
9. Interfacing DAC with 8086 microprocessor
   a) Generating triangular waveform
   b) Generating sawtooth waveform
   c) Generating square waveform
10. Reading and Writing on a parallel port.
11. Timer in different modes.
12. Serial communication implementation.
13. 8259 – Interrupt Controller: Generate an interrupt using 8259 timer.
14. 8279 – Keyboard Display: Write a small program to display a string of characters.

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(13EE610) TECHNICAL SEMINAR-II

Objectives: To get involved with the latest advancements and developments to enhance communication and presentation skills, exchange of ideas, greater connectivity to develop a research bent of mind.

A Technical Seminar shall have two components, one chosen by the student from the course work as an extension and approved by the faculty supervisor. The other component is suggested by the supervisor and can be a reproduction of the concept in any standard research paper or an extension of concept from earlier course work. A hard copy of the information on seminar topic in the form of a report is to be submitted for evaluation along with presentation. The presentation of the seminar topics shall be made before a committee consisting of Head of the department, seminar supervisor and a senior faculty member. Each Technical Seminar shall be evaluated for 100 marks. Technical Seminar component-I for 50 marks and component-II for 50 marks making total 100 marks. (**Distribution of marks for 50:** 10 marks for report, 10 marks for subject content, 20 marks for presentation and 10 marks for queries).

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(13HS119) MANAGEMENT SCIENCE

Objectives: To explain various concepts of management as well as industry practices.

UNIT – I

Introduction to management and organization: Nature of management, functions of management. Taylor's scientific management, Fayol's principles of management, Maslow's theory, Douglas theory X & Theory Y, Hefzberg theory, systems approaches to management, leadership styles, social responsibilities of management, Departmentation & Decentralization, types of organization Structures

UNIT-II

Operations & Materials Management: Plant layout, types of plant layout-Methods of production (Job, batch, & Mass production), work study, statistical quality control, R-chart, C-chart, P-chart & X-chart (simple problems). Inventory control, Economic Order Quantity (EOQ), ABC analysis, supply chain management.

UNIT - III

Marketing Management & Human resource: Fuctions of marketing, marketing mix, marketing strategies, distribution channels. Manpower planning, recruitment, selection, T&D, placement, wage & salary administration, promotion, transfer, performance appraisal, welfare administration.

UNIT – IV

Project management: Network Analysis, PERT,CPM, identifying critical path, project cost analysis, project crashing (simple problems)

Strategic Management: Mission, goals, objectives, policy, programmes, corporate planning process, environmental scanning, SWOT analysis, steps in strategy formulation & implementation.

Text Books:

1. Management Science – A.R.Aryasri, TMH.

Reference Books:

1. Management Science – Siddiqui & Siddqui, TMH
2. Prasad LM, Principles and Practices of Management, Sultan Chand & Sons, New Delhi
3. Marketing Management – Phillip Kotler, 11/e, pearson, 2007
4. Personnel and Human Resource management – P.Subbarao – Himalaya Publication.
5. Production and operation management – Aswathappa.K, Himalaya Publication House, Mumbai.
6. Strategic management, P.Subba Rao, Himalaya Publishers, 2009
7. Management science – V.S.Manjunath, Person.

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(13EE701) ELECTRICAL DISTRIBUTION SYSTEMS

Objectives:

This course is introduced to the students to get familiar with the classification of Distribution systems, design considerations of distribution feeders, location of substations, improving power factor and voltage stability.

UNIT – I

General Concepts: Introduction to distribution systems, Load modelling 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.

General Aspects of D.C Distribution System: Classification of Distribution Systems - Comparison of DC V_S AC and Under-Ground vs Over - Head Distribution Systems- Requirements and Design features of Distribution Systems-Voltage Drop Calculations (Problems) in D.C Distributors for the following cases: Radial D.C Distributor fed one end and at the both the ends (equal/unequal Voltages) and Ring Main Distributor.

UNIT- II

A.C. Distribution Systems: Design Considerations of Distribution Feeders: Radial and loop types of primary feeders, voltage levels, feeder loading; basic design practice of the secondary distribution system. Voltage Drop Calculations (Problems) in A.C. Distributors for the following cases: Power Factors referred to receiving end voltage and with respect to respective load voltages.

Substations: Location of Substations: Rating of distribution substation, service area within primary feeders. Benefits derived through optimal location of substations. Classification of substations: Air insulated substations - Indoor &Outdoor substations: Substations layout showing the location of all the substation equipment. Bus bar arrangements in the Sub-Stations: Simple arrangements like single bus bar, sectionalized single bus bar, main and transfer bus bar Double breaker – One and half breaker system with relevant diagrams.

UNIT – III

Power Factor and Voltage Control: Causes of low P.f -Methods of Improving P.f -Phase advancing and generation of reactive KVAR using static Capacitors-Most economical P.f. for constant KW load and constant KVA type loads, Problems. Dependency of Voltage on Reactive Power flow - Methods of Voltage Control: Shunt Capacitors, Series Capacitors, Synchronous Capacitors, Tap changing and Booster Transformers.

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 – IV

Compensation for Power Factor Improvement: Capacitive compensation for power-factor control - effect of shunt capacitors (Fixed and switched), Power factor correction- Economic justification - Procedure to determine the best capacitor location.

Protection and Coordination of Distribution Systems: Objectives of distribution system protection, types of common faults and procedure for fault calculations. Protective Devices: Principle of operation of Fuses, Circuit Reclosures, line sectionalizes, and circuit breakers Coordination of Protective Devices: General coordination procedure.

Text Books:

1. Turan Gonen "Electric Power Distribution system, Engineering", Mc Graw-hill Book Company. 2007
2. A.S. Pabla "Electric Power Distribution", Tata Mc Graw-hill Publishing Company, 4th edition, 1997.

Reference Books:

1. Dr. M. K. Khedkar and Dr. G. M. Dhole "Electric Power Distribution Automation", University Science Press.
2. V. Kamaraju "Electrical Power Distribution Systems", Right Publishers.
3. Kamalesh Das "Electrical Power Systems for Industrial Plants", JAICO Publishing House.
4. G. Ramamurthy "Hand Book of Electric Power Distribution", 2nd Edition, Universities Press.

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(13EE702) SWITCH GEAR AND PROTECTION

Objectives:

This course introduces all varieties of Circuit Breakers and Relays for protection of Generators, Transformers and feeder bus bars from over voltages and other hazards. It emphasis on Neutral grounding for overall protection.

UNIT – I

Circuit Breakers-I: Circuit Breakers: Elementary principles of arc interruption, Restriking Voltage and Recovery voltages, Restriking Phenomenon, Average and Max. RRRV, Problems, Current Chopping and Resistance Switching, CB ratings and Specifications, Types and Problems, Auto reclosures.

Circuit Breakers-II: Description and Operation of following types of circuit breakers: Minimum Oil Circuit breakers, Air Blast Circuit Breakers, Vacuum and SF6 circuit breakers.

UNIT – II:

Protective Relays: Basic Requirements of Relays, Primary and Backup protection, Construction details of Attracted armature, balanced beam, induction type and differential relays, Universal Torque equation, characteristics of over current, Direction and distance relays.

Static and Microprocessor Based Relays: Static Relays, Advantages and Disadvantages, Definite time, Inverse and IDMT static relays, Comparators, Amplitude and Phase comparators. Microprocessor based relays, Advantages and Disadvantages, Block diagram for over current (Definite, Inverse and IDMT) and Distance Relays and their Flow Charts.

UNIT: III

Generator Protection: Protection of generators against Stator faults, Rotor faults, and Abnormal Conditions. Restricted Earth fault and Inter-turn fault Protection. Problems on % Winding Unprotected.

Transformer Protection: Protection of transformers: Percentage Differential Protection, Problem on Design of CT s Ratio, Buchholtz relay Protection.

UNIT –IV

Protection of Feeders, Transmission Lines: Protection of Radial & Ring main Feeders using over current Relays. Protection of Transmission line, 3 Zone protection using Distance Relays, Carrier current protection, Protection of Bus bars.

Protection against Over Voltages: Generation of Over Voltages in Power Systems-Protection against Lightning Over Voltages - Valve type and Zinc-Oxide Lighting Arresters - Insulation Coordination –BIL.

Text Books:

1. Sunil S Rao “Switchgear and Protection”, Khanna Publishers. 1992
2. Badari Ram, D.N Viswakarma “Power System Protection and Switchgear”, TMH Publications. 2011

Reference Books:

1. Y. G. Paithankar and S. R. Bhide” Fundamentals of Power System Protection”, 2nd Edition, PHI.
2. Bhuvanesh Oza “Power system protection and switch gear”, TMH, 2010.
3. C.L.Wadhwa “Electrical Power Systems” by, New Age international (P) Limited, Publishers, 3rd edition
4. C.Christopoulos and A. Wright “Electrical power System Protection”, 2nd Edition, Springer international Edition.
5. V.K.Mehta & Rohit Mehta “Principles of power systems”, S.Chand & company ltd, 4th edition.

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(13EE703) DIGITAL SIGNAL PROCESSING

Objectives:

- To study DFT and its computation
- To study the design techniques for digital IIR and FIR filters
- To study the finite word length effects in digital signal processing.

UNIT-I

Introduction: Introduction to digital signal processing: Discrete time signals and sequences, linear shift invariant systems, stability and causality, linear constant coefficient difference equations. Frequency domain representation of discrete time signals and systems.

Discrete Fourier Series: Properties of discrete Fourier series, DFS representation of periodic sequences, discrete Fourier transforms: properties of DFT, linear convolution of sequences using DFT, computation of DFT. Relation between Z-Transform and DFS.

UNIT-II

Fast Fourier Transforms: Fast Fourier transforms (FFT)-Radix2 decimation in time and decimation in frequency FFT algorithms, inverse FFT and FFT for composite N.

Realization of Digital Filters: Review of Z-transforms, applications of Z-Transforms, solution of difference equations of digital filters, block diagram representation of linear constant-coefficient difference equations, basic structures of IIR systems, transposed forms, basic structures of FIR systems, system function.

UNIT-III

IIR Digital Filters: Analog filter approximations-Butterworth and chebyshev, design of IIR digital filters from analog filters, design examples: analog-digital transformations, Illustrative Problems.

FIR Digital Filters: Characteristics of FIR digital filters, frequency response. Design of FIR digital filters using window techniques, frequency sampling technique, comparison of IIR and FIR filters, Illustrative Problems.

UNIT-IV

Multirate Digital Signal Processing Fundamentals: Basic sample rate alteration devices, Multirate Structures for sampling rate Converters, Multistage design of decimator and Interpolator, Polyphase Decomposition, Nyquist filters.

Applications Of Digital Signal Processing: Spectral analysis of nonstationary Signals, Musical Sound processing, signal Compression, Transmultiplexers, Discrete Multitone Transmission of digital data.

Text Books:

1. Digital signal processing, principles, Algorithms and applications: John G. Proakis, Dimitris G. Manolakis, Pearson Education/PHI, 4th ed., 2007.
2. Digital signal processing , A computer base approach- Sanjit K Mitra, Tata Mcgraw Hill, 3rd edition, 2009.
3. Discrete Time Signal Processing-A.V. Oppenheim and R.W. Schaffer, 2nd ed., PHI.

Reference Books:

1. Digital signal processing: Andreas Antoniou, TATA McGraw Hill, 2006.
2. A Text book on Digital Signal processing – R S Kaler, M Kulkarni,, Umesh Gupta, I K International Publisthing House Pvt. Ltd.
3. Digital signal processing: M H Hayes, Schaum's outlines, TATA Mc-Graw Hill, 2007.

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(13EE704) RENEWABLE ENERGY SOURCES
(Elective-I)

Objectives:

This course is introduced to get familiar with solar energy, its radiation, collection, storage and application. It also introduces the Wind energy, Biomass energy, geothermal energy and ocean energy as alternative energy sources.

UNIT – I

Solar Energy: Role and potential of new and renewable sources, the solar constant, solar radiation at the earth's surface, solar energy collectors, classification of flat plate and concentrating collectors, advantages and disadvantages of concentrating collectors over flat plate collectors, solar energy storage systems, Solar Applications- solar heating/cooling technique, solar distillation and drying, solar electric power generation-solar photo voltaic.

UNIT-II

Wind Energy: Sources and potentials, basic principles of wind energy conversion, basic components of a WECS, classification of WECS systems, advantages and disadvantages of WECS, types of wind machines, and applications of wind energy.

UNIT-III

Energy from Bio-Mass & Geothermal Energy: Biomass conversion technologies, factors affecting bio digestion, types of Bio-gas plants, materials used for bio gas generation, selection of site for a bio gas plant, starting a bio gas plant, filling a digester for starting, fuel properties of bio gas and utilization of bio gas, Resources, types of wells, methods of harnessing the energy, potential in India.

UNIT-IV

Energy from Oceans: OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Potential and conversion techniques, mini-hydel power plants, and their economics.

Direct Energy Conversion: Need for DEC, Carnot cycle, limitations, principles of DEC.

Text Books:

1. G.D. Rai "Non-Conventional Energy Sources", Khanna Publishers, 2009.
2. Tiwari and Ghosal "Renewable energy resources", Narosa. 2005.

Reference Books:

1. John Twidell & Tony Wier "Renewable Energy Resources", CRC Press (Taylor & Francis)
2. Ramesh & Kumar "Renewable Energy Technologies", Narosa.
3. K Mittal "Non Conventional Energy Systems", Wheeler
4. D.P.Kothari, K.C.Singhal "Renewable energy sources and emerging technologies", PHI.

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(13EE705) POWER SYSTEM RELIABILITY
(Elective-I)

Objectives:

Power System Reliability course is one of the important courses of the Electrical discipline. In this course reliability analysis of generating system, effects on transmission lines and reliability analysis of distribution system for radial and parallel configurations will be studied.

UNIT-I

Generating System Reliability Analysis: Generation system model – Capacity outage probability tables – Recursive relation for capacitive model building – Sequential addition method – Unit removal – Evaluation of loss of load and energy indices-Frequency and Duration methods – Evaluation of equivalent transitional rates of identical and non- identical units – Evaluation of cumulative probability and cumulative frequency of non identical generating units – Examples.

UNIT-II

Bulk Power System Reliability Evaluation: Basic configuration – Conditional probability approach – System and load point reliability indices – Weather effects on transmission lines – Weighted average rate and Markov model – Common mode failures.

UNIT-III

Distribution System Reliability Analysis – I (Radial Configuration): Basic Techniques – Radial networks – Evaluation of Basic reliability indices, performance indices - Load point and system reliability indices – Customer oriented, loss and energy oriented indices – Examples.

UNIT-IV

Distribution System Reliability Analysis - II (Parallel Configuration): Basic techniques – Inclusion of bus bar failures, scheduled maintenance – Temporary and transient failures – Weather effects – Common mode failures – Evaluation of various indices – Examples.

Text Books:

1. Roy Billiton and Ronald N. Allan, “Reliability Evaluation of Power Systems”, Plenum Press, New York and London, 2nd Edition, 1996.
2. J. Endrenyi, “Reliability Modeling in Electric Power Systems”, John Wiley & Sons, 1st Edition, 1978.

Reference Books:

1. Roy Billiton Ronald N.Allan “Relibility Evaluation of Power Systems”.
2. J.Endrenyi “Realibility Modelling in Electric Power Systems”.
3. Allen J.wood, Robert J.Ringlee, Roy Billinton “Power-System Reliability Calculations”.

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(13EE706) EMBEDDED SYSTEMS
(Elective-I)

Objectives: To become familiar with the logic components that comprises an embedded system And to design a complete microprocessor-based hardware/software system

UNIT – I

Introduction to Embedded Systems, design challenges, processor technology, IC technology, design technology, tradeoffs, single purpose processor, RT level combinational logic, sequential logic (RT level) custom single purpose processor design, optimizing custom single purpose processors. General purpose processors: basic architecture, pipelining, programmers view, development environment, ASIPS, microcontrollers and digital signal processors

UNIT – II

State Machine and Concurrent Process Models: models vs. languages, FSMD, using state machines, PSMM, concurrent process model, concurrent processes, communication and synchronization among processes, data flow model and real-time systems. Need for communication interfaces, RS232/UART, RS422/RS485, USB, Infrared, IEEE 802.11, and Bluetooth.

UNIT - III

Basic Embedded System and RTOS Concepts: Architecture of kernel, tasks and task scheduler, interrupt service routines, semaphores, mutex. Mail boxes, message queues, event registers, pipes and signals.

UNIT – IV

Advanced Embedded System and RTOS Concepts: Timers, memory management, priority inversion problem, embedded OS and real time OS, RT Linux, and Handheld OS. HW / SW co- design.

Text Books:

1. Frank Vahid, Tony D Givargis, Embedded system design – A unified HW/ SW Introduction, John Wiley& sons 2002.
2. KVKK Prasad, Embedded and real time systems, Dreemtech Press, 2005.

Reference Books:

1. Raj Kamal, Embedded system architecture, programming and design, TM edition.
2. Mohammad Ali Mazidi, Janice G., The 8051 microcontroller and embedded systems, Pearson edition.
3. Jonathan W Valvano, Embedded Microcomputer Systems, Brooks/cole, Thompson Learning
4. David E. Simon, An Embedded Software Primer, Pearson edition.

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(13EE707) HIGH VOLTAGE ENGINEERING
(Elective-I)

Objectives:

This subject deals with the detailed analysis of Breakdown occur in gaseous, liquids and solid dielectrics. Information about generation and measurement of High voltage and current. To understand thoroughly various high voltage testing techniques of power apparatus and Insulation coordination in power systems. In addition the High voltage testing methods are also discussed.

UNIT- I

Introduction to H V Technology, Over Voltage Phenomenon and Insulation Co-Ordination

Introduction: Electric Field Stresses, Gas / Vacuum as Insulator, Liquid Dielectrics, Solids and Composites, Estimation and Control of Electric Stress, methods for electric field computation, Surge voltages, their distribution and control.

Natural Causes for Over Voltages – Lightning phenomenon, Overvoltage due to switching surges, system faults and other abnormal conditions, Principles of Insulation Coordination on High voltage and Extra High Voltage power systems.

UNIT -II

Break Down in Gaseous, Liquid and Solid 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.

Solid Dielectric: Intrinsic breakdown, electromechanical breakdown, thermal breakdown, breakdown of solid dielectrics in practice, Breakdown in composite dielectrics, solid dielectrics used in practice.

UNIT- III

Generation and Measurement 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.

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

Testing of Non-Destructive of Material and High Voltage Electrical Apparatus: Measurement of D.C Resistivity, Measurement of Dielectric Constant and loss factor, discharge measurements. Testing of Insulators and bushings, testing of Isolators and circuit breakers, testing of cables, testing of Transformers, testing of Surge Arresters, Radio Interference measurements.

Text Books:

1. M.S.Naidu and V. Kamaraju "High Voltage Engineering", TMH Publications, 3rd Edition. 2009
2. Rakosh Das Begamudre, "Extra High Voltage AC Transmission Engineering", Wiley Eastem ltd., New Delhi – 1987.

Reference Books:

1. C.L.Wadhwa "High Voltage Engineering", New Age Internationals (P) Limited, 1997.
2. Ravindra Arora, Wolfgang Mosch "High Voltage Insulation Engineering", New Age International (P) Limited, 1995.
3. Turan Gonen, "Electric Power Transmission System Engineering", John Wiley, 1988.
4. EHV Transmission line reference book – Edision Electric Institute (GEC) 1986.
5. E.Kuffel, W.S.Zaengl, J.Kuffel "High Voltage Engineering: Fundamentals", Elsevier, 2nd Edition.
6. Mazon Abdul – Salam, Hussein Anis, Ahdab EI- Morshedy, Roshdy Radwan, "High Voltage Engg. Theory & Practice", 2nd Edition Special Indian Edition by BSP books Pvt.Ltd.

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IV B.Tech I Semester (EEE)	L	T	P	[C]
	3	0	0	[3]

(13EE708) FUZZY LOGIC AND NEURAL NETWORKS
(Open Elective)

Objectives:

This course introduces the basics of Neural Networks and essentials of Artificial Neural Networks with Single Layer and Multilayer Feed Forward Networks. Also deals with Associate Memories and introduces Fuzzy sets and Fuzzy Logic system components along with Genetic Algorithms. The Application of Soft Computing Techniques to Electrical Engineering is also presented.

UNIT – I

Artificial Neural Networks and Its Essentials: Introduction, Biological Neuron, Artificial Neuron, Basic concepts of Neural Networks, Basic Models of ANN Connections, McCulloch-Pitts Model, Characteristics of ANN, Applications of ANN. Artificial Neuron Model. Operations of Artificial Neuron, Types of Neuron Activation Function, ANN Architectures, Classification Taxonomy of ANN – Connectivity, Neural Dynamics (Activation and Synaptic), Learning Strategy (Supervised, Unsupervised, Reinforcement), Learning Rules, Types of Application.

UNIT–II

Supervised Learning and Associative Memory Networks: Perceptron Network, Perceptron Learning Rule, Architecture, Perceptron Training Algorithm, ADALINE, MADALINE, Back Propagation Network, BP Learning Rule, Input Layer Computation, Hidden Layer Computation, Output Layer Computation, Radial Basis Function. Training Algorithms for Pattern Association, Auto Associative Memory Network, Hetero Associative Memory Network, BAM, Hopfield Networks.

UNIT -III

Fuzzy Logic: Introduction to classical sets - properties, Operations and relations; Fuzzy sets, Membership, Uncertainty, Operations, properties, fuzzy relations, cardinalities, membership functions. Fuzzification, Membership value assignment, development of rule base and decision making system, Defuzzification to crisp sets, Defuzzification methods.

UNIT- IV

Genetic Algorithms and Applications to Electrical Systems: Introduction, Basic Operators and Terminologies in GA, Traditional Vs Genetic Algorithm, Encoding, Fitness Function, Reproduction, Crossover, Mutation Operator.

ANN based Short term Load Forecasting, Load flow Studies, Fuzzy logic based Unit Commitment and Genetic Algorithm based Economic Dispatch.

Text Books:

1. S. N. Sivanandam and S. N. Deepa “Principles of – Soft Computing”, Wiley India Edition.2011
2. Rajasekharan and Pai “Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications”, PHI Publications. 2003

Reference Books:

1. Satish Kumar “Neural networks”, TMH, 2004.
2. J. S. R. Jang, C. T. Sun and E. Mizutani “Neuro Fuzzy and Soft Computing” , Pearson Education.
3. Simon Hakins “Neural Networks”, Pearson Education.
4. T. J. Ross “Fuzzy Logic with Engineering Applications”, 2nd Edition, Wiley India Edition.
5. D. E. Goldberg, Addison “Genetic Algorithms”, Wisley, 1999.

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IV B.Tech I Semester (EEE)	L	T	P	[C]
	3	0	0	[3]

(13EE709) ENTREPRENUERSHIP DEVELOPMENT
(Open Elective)

Objective: The objective of the course is to make students understand the nature of entrepreneurship, and its importance to business.

UNIT -I:

Entrepreneurship: Concept of Entrepreneurship-characteristics-types of Entrepreneurs-theories of entrepreneurship- importance of Entrepreneurship, distinction between an Entrepreneur and a Manager, role of entrepreneurship in economic development-Evaluation of Entrepreneurship-successful entrepreneurs.

UNIT -II:

Forms of Entrepreneurship and Aspects of Promotion: Small Business and Importance in Indian Economy, Types of Ownership, Sole Trading, Partnership, Important features of various types of business, Corporate Entrepreneurship, Intrapreneurship – Role of Government in the promotion of Entrepreneur, State Enterprises in India. Idea generation- Opportunities, SWOT Analysis – Patents and Trade marks, Intellectual property rights.

UNIT -III:

Women and Rural Entrepreneurship: Concept of Women Entrepreneurship- Functions- Growth of Women Entrepreneurship – Problems of Women Entrepreneurship- Women ED Programs - development of Women Entrepreneurship In India - Recent trends. Need of Rural Entrepreneur in industrialization- problems of Rural Entrepreneurship- developing of Rural Entrepreneurship- NGO's and Rural Entrepreneur. MSME: Characteristics, Role, Problems, Government Policies to support Rural Enterprises. Need, objectives and phases of EDPs.

UNIT - IV:

Finance to Enterprise: Need for finance planning- Sources of Finance. Capital structure- Venture Capital- seed money- Institutional Finance to Entrepreneur- Institutional support to MSME. Role of MSME in Economic Development.

Text Books:

1. Vasanth Desai **"The Dynamics of Entrepreneurial Development and Management"** Himalaya,2009.
2. Bholanath Dutta, " **Entrepreneurship Management" – Text and Cases**, Excel Books, 2009

Reference Books:

1. S.S. Khanka, **"Entrepreneurial Development",** S. Chand and Company Limited New Delhi, 2009.
2. H. Nandan , "**Fundamentals of Entrepreneurship"** PHI, First/e, New Delhi, 2009.
3. Robert D Hisrich, Michael P Peters, Dean A Shepherd, **"Entrepreneurship"**, TMH,6th edition,2009.
4. Holt, **"Entrepreneurship" – New venture Creation**, PHI, 2009.

Roy, **"Entrepreneurship"** , Oxford 2009.

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	3	0	0	[3]

(13EE710) OPTIMIZATION TECHNIQUES
(Open Elective)

Objectives:
This course is an introduction to optimization techniques and linear programming, constrained and unconstrained nonlinear programming and dynamic programming.

UNIT – I
Introduction and Classical Optimization Techniques: Statement of an Optimization problem – design vector – design constraints – constraint surface – objective function – objective function surfaces – classification of Optimization problems. Single variable Optimization – multi variable Optimization without constraints – necessary and sufficient conditions for minimum/maximum – multivariable Optimization with equality constraints. Solution by method of Lagrange multipliers – multivariable Optimization with inequality constraints – Kuhn – Tucker conditions.

UNIT – II
Linear Programming: Standard form of a linear programming problem – geometry of linear programming problems – definitions and theorems – solution of a system of linear simultaneous equations – pivotal reduction of a general system of equations – motivation to the simplex method – simplex algorithm. Finding initial basic feasible solution by north – west corner rule, least cost method and Vogel's approximation method – testing for optimality of balanced transportation problems.

UNIT – III
Unconstrained Nonlinear Programming: One – dimensional minimization methods: Classification, Fibonacci method and Quadratic interpolation method. Univariate method, Powell's method and steepest descent method.

UNIT-IV
Constrained Nonlinear Programming: Characteristics of a constrained problem, Classification, Basic approach of Penalty Function method; Basic approaches of Interior and Exterior penalty function methods. Introduction to convex Programming Problem. Dynamic programming multistage decision processes – types – concept of sub optimization and the principle of optimality – computational procedure in dynamic programming – examples illustrating the calculus method of solution - examples illustrating the tabular method of solution.

Text Books:

1. S. S.Rao “Engineering optimization: Theory and practice”, New Age International (P) Limited, 3rd edition, 1998.
2. H.S. Kasene & K.D.Kumar “Introductory Operations Research”, Springer (India), Pvt .Ltd. 2004

Reference Books:

1. K.V. Mital and C. Mohan “Optimization Methods in Operations Research and systems Analysis “, New Age International (P) Limited, Publishers, 3rd edition, 1996.
2. Dr. S.D.Sharma “Operations Research”, Kedarnath Ramnath and company, 11th edition, Reprint 1997.
3. H.A. Taha “Operations Research: An Introduction”, PHI Pvt.Ltd. 6th edition.
4. G. Hadley “Linear Programming”, Narosa Publishing House, 2002.

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	0	0	3	[2]

(13EE711) ADVANCED POWER ELECTRONICS AND DRIVES LAB

List of Experiments:

1. Simulation of sine PWM & space vector PWM.
2. Simulation of three phase AC Voltage controller using RL load.
3. Simulation of 3-phase induction motor drive using V/f control.
4. Simulation of Vector control of 3-phase induction motor.
5. Simulation of Direct Torque Control of 3-phase induction motor.
6. Simulation of Brushless DC Motor drive.
7. Simulation of STATCOM & DSTATCOM.
8. Simulation of Active Power Filter, DVR.
9. Simulation of UPQC.
10. Cyclo converter based AC Induction motor control equipment.
11. Speed Measurement and closed loop control using PMDC motor.
12.3-Phase input IGBT, 4 quadrant chopper drive for DC motor with closed Loop control equipment.
13. Speed control of a permanent magnet synchronous motor using Matlab Simulink.

Reference Books:

1. Dr. Shailendra Jain, “Modeling & simulation using matlab & simulink”, Wiley India Pvt. Limited.
2. G.K.Dubey “Power semiconductor controlled drives”, Prentice Hall PTR.
3. Narain G. Hingorani, Laszlo Gyugyi “Understanding FACTS: Concepts and Technology of Flexible AC Transmission Systems”, Wiley, 2000 - Technology & Engineering.

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	0	0	3	[2]

(13EE712) DIGITAL SIGNAL PROCESSING LAB

Seven experiments should be performed using MATLAB and Code Compose Studio (CCS)

1. To study the architecture of DSP chips – TMS 320C 5X/6X Instructions.
2. To verify linear convolution.
3. To verify the circular convolution.
4. To design FIR filter (LP/HP) using windowing technique
    a) Using rectangular window
    b) Using triangular window
    c) Using Kaiser window
5. To Implement IIR filter (LP/HP) on DSP Processors
6. N-point FFT algorithm.
7. MATLAB program to generate sum of sinusoidal signals.
8. MATLAB program to find frequency response of analog LP/HP filters.
9. To compute power density spectrum of a sequence.
10. To find the FFT of given 1-D signal and plot.

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	0	0	3	[2]

(13EE713) POWER SYSTEM SIMULATION LAB

List of Experiments:

1. Formation of admittance matrices (Y bus) by using MATLAB.
2. Formation of bus impedance matrices (Z bus) using MATLAB.
3. Develop MATLAB program for Gauss-Seidel load flow analysis.
4. Develop MATLAB program for Newton-Raphson load flow analysis.
5. Develop MATLAB program for short circuit analysis.
6. Develop MATLAB program for fast decoupled load flow analysis.
7. Economic load dispatch in power systems
8. Computation of parameters and modeling of transmission lines.
9. Load – frequency control of single area power systems (with and without controller).
10. Load – frequency control of two area power systems (with and without controller).
11. Develop PSPICE Program for Generation System Reliability Analysis.
12. Develop PSPICE Program for Distribution System Reliability Analysis

Reference Books:

1. Dr. Shailendra Jain “Modeling & simulation using matlab & simulink”, Wiley India Pvt. Limited.
2. D. P. Kothari, I.J. Nagrath “Modern power system analysis”, Tata McGraw-Hill.
3. Roy Billinton “Power system reliability evaluation”, Taylor & Francis.

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	0	0	2	[2]

(13EE714) PROJECT WORK – PHASE-I

The object of Project Work Phase-I is to enable the student to take up investigative study in the broad field of his branch of Engineering, either fully theoretical/practical or involving both theoretical and practical work to be assigned by the department on an individual basis or three/four students in a group under the guidance of a supervisor/ guide. This is expected to provide a good initiation for the student(s) in R&D work.

The assignment normally includes:

- Survey and Study of published literature of on the assigned topic.
- Working out a preliminary approach to the problem relating to the assigned topic.
- Conducting preliminary analysis/ modeling/simulation/experiment/ design/ feasibility.
- Preparing a written report on the study conducted for presentation to the department.
- Final seminar presentation before Project Review Committee.

The supervisor/ guide will evaluate the execution of the project periodically.
Project Work Phase-I is allocated 100 marks with 2 credits. Out of 100, 25 marks are allocated for the supervisor/guide to be awarded based on periodical project reviews and submission of the report on the work done. 25 marks are allocated for the supervisor/guide and head of the department to be awarded based on seminar given by each student on the topic of the project. The other 50 marks shall be awarded on the basis of his presentation on the work done on his project by the Departmental committee comprising of Head of the Department, respective supervisor/ guide and two senior faculty of the department appointed by the Principal.
The candidate is declared to have passed in Project work Phase-I when he gets 40% marks given by the Departmental Committee and 50% marks overall.

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	3	0	0	[3]

(13EE801) UTILIZATION OF ELECTRICAL ENERGY

Objectives:

This subject gives a comprehensive idea in utilization of electrical power such as drives, electric heating, electric welding of different metals and laws of illumination, types of lamps, electric traction, electrolysis,

UNIT – I

Illumination: Definition – Laws of illumination – Polar curves – Calculation of MHCP and MSCP. Lamps: Incandescent lamp, Sodium Vapour lamp, Fluorescent lamp. Requirement of good lighting scheme – Types, Design and Calculation of illumination, Street lighting and Factory lighting – Problems.

UNIT – II

Electric Heating, Electric Welding& Electrolytic Process: Advantages, Methods of Electric heating – Resistance, arc, Induction and dielectric heating. Types – Resistance, Electric arc, gas welding. Ultrasonic, Welding electrodes of various metals, Defects in welding. Electrolysis - Faradays laws, Application of Electrolysis, Power supply for Electrolysis.

UNIT – III

Selection of Motor Ratings & Braking: Advantages, Types of D. C and A. C Motors and their Characteristics –Electric Braking. Speed Control of D. C and A. C Motors –Thermal rating of electric motor-Temperature Rise and Load Equalization – Selection of Motors for particular Drive- Methods of Electric Braking – Plugging, Rheostatic and Regenerative types.

UNIT – IV

Electric Traction: Introduction – Systems of Electric Traction. Comparison between A. C and D. C Traction – Special features of Traction Motors - Mechanics of train movement. Speed-time curves of different services –trapezoidal and quadrilateral, speed-time curves – Problems, Calculations of tractive effort, Power, specific energy consumption -effect of varying acceleration and braking retardation, Adhesive weight and coefficient of adhesion.

Text Books:

1. E. Openshaw Taylor and V. V.L. Rao “Utilization of Electric Energy”, Universities Press. 1971
2. R. K. Rajput “Utilization of Electrical Power”, Laxmi Publications. 2006

Reference Books:

1. N.V.Suryanarayana, “Utilization of Electrical Power including Electric drives and Electric traction”, New Age International (P) Limited, Publishers, 1996.
2. Partab “Art & Science of Utilization of electrical Energy”, Dhanpat Rai & Co.

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	3	0	0	[3]

(13EE802) HVDC AND FACTS

Objectives:

This course is introduced to the students to get familiar with the FACTS (Flexible AC Transmission System) and HVDC (High Voltage Direct Current) which are controllable devices whose functions are to enhance the security, capacity and flexibility of power transmission systems. Application of these components in power systems implies an improvement of Transient stability, Voltage stability, Damping of power oscillations, optimal power flow.

UNIT-I

Introduction: DC power transmission- Introduction – types of DC links- Comparison of AC and DC transmission – Application of DC transmission – Description of DC transmission system - Planning for HVDC transmission- typical layout of a HVDC converter station.

Analysis of HVDC Converters and HVDC System Control: Pulse number, choice of converter configuration – Converter bridge characteristics – characteristics of a twelve pulse converter-detailed analysis of converters. General principles of DC link control – Converter control characteristics – System control hierarchy - Firing angle control – Current and extinction angle control.

UNIT-II

Hormonics, Filters, Reactive Power Control: Introduction, generation of Harmonics, AC and DC Filters, Reactive power requirements at steady state, sources of Reactive power static VAR systems.

HVDC Cables: Introduction to DC cables – Basic physical phenomenon arising in DC insulation.

UNIT – III

FACTS Concepts: Flow of power in AC parallel paths and Meshed systems, Basic types of FACTS controllers, Brief description and Definitions of FACTS controllers.

Static VAR Compensator (SVC) and Applications: Voltage control by SVC – Advantages of slope in dynamic characteristics – Influence of SVC on system voltage – Design of SVC voltage regulator.

UNIT –IV

Thyristor Controlled Series Capacitor (TCSC) and Applications: Operation of the TCSC – Different modes of operation – Modelling of TCSC – Variable reactance model.

Voltage Source Converter based FACTS Controllers: Static Synchronous Compensator (STATCOM) – Principle of operation – V-I Characteristics.

Text Books:

1. Padiyar, K. R., “HVDC power transmission system”, Wiley Eastern Limited, New Delhi 1990. First edition.
2. Edward Wilson Kimbark, “Direct Current Transmission”, Vol. I, Wiley interscience, New York, London, Sydney, 1971.
3. N.G. Hingorani & L. Gyugyi, “Understanding FACTS: Concepts and technology of flexible AC transmission systems” IEEE Press, 2000.

Reference Books:

1. K R Padiyar, “FACTS controllers in power transmission and distribution,” New Age International Publishers, New Delhi 2007.
2. T.J.E Miller, “Reactive Power Control in Electric Systems”, John Wiley & Sons, 1986.
3. K R Padiyar, “HVDC Power transmission systems, Technology and System Interactions,” New Age International publishers, New Delhi, 1999.
4. Ned Mohan et.al, “Power Electronics-converters, application and applications” John Wiley and Sons, New York, 2001.
5. Arrillaga, J., “High Voltage Direct Current Transmission”, Peter Pregrinus, London, 1983.

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	3	1	0	[3]

(13EE803) PLCs AND APPLICATIONS
(Elective-II)

Objectives:

This course introduces a prior knowledge about the basics of PLCs, Digital logic gates, data handling functions, and controlling of robots with PLCs.

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. PLC Programming: Input instructions, outputs, operational procedures, programming examples using contacts and coils. Drill press operation.

UNIT-II

Digital logic gates, programming in the Boolean algebra system, conversion examples. Ladder Diagrams for process control: Ladder diagrams & sequence listings, ladder diagram construction and flowchart for spray process system.

PLC Registers: Characteristics of Registers, module addressing, holding registers, Input Registers, Output Registers.

UNIT-III

PLC Functions: Timer functions & Industrial applications, counter function & industrial applications, Arithmetic functions, Number comparison functions, number conversion functions.

UNIT-IV

Data Handling functions: SKIP, Master control Relay, Jump, Move, FIFO, FAL, ONS, CLR & Sweep functions and their applications. Bit Pattern and changing a bit shift register, sequence functions and applications, controlling of two-axis & three axis Robots with PLC, Matrix functions.

Text Books:

1. W. Bolton "Programmable Logic Controllers", Elsevier, 5th Edition, 2010.
2. John W. Webb & Ronald A. Reiss "Programmable Logic Controllers- Principles and Applications", 5th Edition, PHI. 2003

Reference Books:

1. JR. Hackworth &F.D Hackworth Jr."Programmable Logic Controllers- Programming Method and Applications" Pearson, 2004.
2. Frank D. Petruzella "Programmable Logic Controllers "Tata McGraw-Hill, 3rd edition.
3. W. Bolton "Programmable Logic Controllers", Elsevier Newness, 4th edition, 2006.

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(13EE804) MODERN CONTROL THEORY
(Elective-II)

Objectives:

This subject deals with state space, describing function, phase plane and Stability analysis including controllability and observability. It also Deals with modern control and optimal control systems.

UNIT – I

State Variable Description: Concept of State – State Equations for Linear Continuous time Models – Non uniqueness of state model – State diagrams for continuous time State models – Solution of state equations, State Equations for Dynamic systems – State transmission matrix.

Controllability and Observability: Tests for controllability and observability for continuous time systems – Time invariant case, Principle of Duality, Controllability and observability of state models in Jordan canonical form and other canonical forms.

UNIT – II

State Feedback Controllers and Observers: Effect of state feedback on controllability and observability, Design of State Feedback Control through Pole placement. Full order observer and Reduced order observer.

Non Linear Systems: Introduction to nonlinear systems, Types of nonlinearities, Properties of Non Linear Systems – Describing function – describing function analysis of nonlinear systems- Stability analysis of Non – Linear systems through describing functions.

UNIT-III

Describing Function Analysis: Derivation of describing functions for Dead zone, Saturation, backlash, relay with dead zone and Hysteresis – Jump Resonance.

Phase-Plane Analysis: Introduction to phase-plane analysis, Method of Isoclines for Constructing Trajectories, Singular points, Phase-plane analysis of nonlinear control systems.

UNIT –IV

Stability Analysis: Stability in the sense of Lyapunov. Lyapunov's stability and Lyapunov's instability theorems. Direct method of Lyapunov for the Linear and Nonlinear continuous time autonomous systems.

Calculus of Variations: Minimization of functional of single function, constrained minimization. Minimum principle. Control variable inequality constraints. Control and state variable inequality constraints.

Text Books:

1. M. Gopal “Modern Control System Theory”, New Age International Publishers, 2nd Edition, 1996.
2. Stainslaw H. Zak “Systems and Control”, Oxford Press, 2003.

Reference Books:

1. K. Ogata “Modern Control Engineering”, Prentice Hall of India, 3rd edition, 1998.
2. I.J. Nagarath and M.Gopal “Control Systems Engineering”, New Age International (P) Ltd.
3. M. Gopal” Digital Control and State Variable Methods”, Tata Mc Graw-Hill Companies, 1997.

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(13EE805) SMART GRID SYSTEMS
(Elective-II)

Objectives: This course is helpful for the students to learn how to collect, transmit and store data to manage supply and demand by using grid and a network of computers

UNIT-I

Introduction to Smart Grid: Evolution of Electric Grid, Concept of Smart Grid, Definitions, Need of Smart Grid, Functions of Smart Grid, Opportunities & Barriers of Smart Grid, Difference between conventional & smart grid, Concept of Resilient & Self Healing Grid, Present development & International policies in Smart Grid. Case study of Smart Grid.

UNIT -II

Smart Grid Technologies: Introduction to Smart Meters, Real Time Prizing, Smart Appliances, Automatic Meter Reading(AMR), Outage Management System(OMS), Plug in Hybrid Electric Vehicles(PHEV), Vehicle to Grid, Smart Sensors, Home & Building Automation, Phase Shifting Transformers.

UNIT–III

DC Distribution and Smart Grid: AC vs DC sources-Benefits of and drives of DC power delivery systems-Powering equipment and appliances with DC-Data centers and information technology loads-Future neighborhood- Potential future work and research.

Intelligrid Architecture for the Smart grid: Introduction- Launching Intelligrid-Intelligrid today- Smart grid vision based on the Intelligrid architecture-Barriers and enabling technologies.

UNIT–IV

Efficient Electric End – Use Technology Alternatives: Existing technologies – lighting - Space conditioning - Indoor air quality - Domestic water heating- hyper efficient appliances - Ductless residential heat pumps and air conditioners – Variable refrigerant flow air conditioning-Heat pump water heating - Hyper efficient residential appliances -Data center energy efficiency- LED street and area lighting - Industrial motors and drives -Equipment retrofit and replacement - Process heating - Cogeneration, Thermal energy storage -Industrial energy management programs - Manufacturing process-Electro-technologies, Residential, Commercial and industrial sectors.

Text Books:

1. Clark W. Gellings, “The Smart Grid: Enabling Energy Efficiency and Demand Response”, CRC Press, 2009.
2. Janaka Ekanayake, Nick Jenkins, Kithsiri Liyanage, Jianzhong Wu, Akihiko Yokoyama, “Smart Grid: Technology and Applications”, Wiley. 2012

Reference Books:

1. James Momoh, “Smart Grid: Fundamentals of Design and Analysis”- Wiley, IEEE Press, 2012.
2. Ali Keyhani, Mohammad N. Marwali, Min Dai “Integration of Green and Renewable Energy in Electric Power Systems”, Wiley.
3. Andres Carvallo, John Cooper, “The Advanced Smart Grid: Edge Power Driving Sustainability: 1”, Artech House Publishers July 2011
4. James Northcote, Green, Robert G. Wilson “Control and Automation of Electric Power Distribution Systems (Power Engineering)”, CRC Press
5. Mladen Kezunovic, Mark G. Adamiak, Alexander P. Apostolov, Jeffrey George Gilbert “Substation Automation (Power Electronics and Power Systems)”, Springer
6. R. C. Dugan, Mark F. McGranghan, Surya Santoso, H. Wayne Beaty, “Electrical Power System Quality”, 2nd Edition, McGraw Hill Publication

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(13EE806) DATABASE MANAGEMENT SYSTEMS
(Elective-II)

Objectives: The following are the major objectives of this course:

- To expose the student to the basic concepts involved in designing and building a database management system,
- Learn how to use the Structured Query Language (SQL)
- Understand the relational model and relational database management system
- To provide detailed knowledge of Transaction, concurrency and recovery strategies of DBMS.
- To know how normalization is important for DBMS and different normalization Techniques.

UNIT- I

Databases and Database Users: Introduction, Characteristics of the Database Approach, Actors on the Scene, Workers behind the Scene, advantages of Using the DBMS Approach

Database System Concepts and Architecture: Data Models, Schemas, and Instances, Three-Schema Architecture and Data Independence, Database Languages and Interfaces, The Database System Environment, Centralized and Client/Server Architectures for DBMSs, Classification of Database Management Systems

Data Modeling Using the Entity-Relationship (ER) Model: Entity Types, Entity Sets, Attributes, and Keys, Relationship Types, Relationship Sets, Roles, and Structural Constraints. Weak Entity Types, Refining the ER Design for the COMPANY Database, Notations for ER Diagrams, Relationship Types of Degree Higher than Two

UNIT-II

The Relational Data Model: Relational Model Concepts, Relational Model Constraints, Relational Database Schemas, Update Operations, Transactions, and Dealing with Constraint Violations [145-165]. Relational Database Design by ER-to-Relational Mapping.

Structured Query Language (SQL): Introduction, SQL data definition and data types, DDL, DML, DCL and TCL Commands- Integrity Rules-Enforcing Integrity constraints. Basic Queries in SQL: SELECT, FROM, WHERE CLAUSES, pattern matching, Arithmetic operators, ordering of query results. More complex SQL queries: comparison using NULL, Nested Queries, correlated Nested Queries, joining tables, Aggregate functions, GROUP BY AND HAVING Clauses, SQL functions, views, Triggers

UNIT-III

Normalization for Relational Databases: Informal Design Guidelines for Relation Schemas, Functional Dependencies, Normal Forms Based on Primary Keys, General Definitions of Second and Third Normal Forms, Boyce-Codd Normal Form, Multivalued Dependency and Fourth Normal Form, Join Dependencies and Fifth Normal Form

Disk Storage: Introduction, Secondary Storage Devices, Buffering of Blocks. Basic File Structures: Placing File Records on Disk, Operations on Files, Files of Unordered Records (Heap Files) , Files of Ordered Records (Sorted Files), Hashing Techniques, Other Primary File Organizations, RAID Technology

UNIT-IV

Transaction Processing: Introduction, Transaction and System Concepts, Properties of Transactions, Characterizing Schedules based on recoverability, Characterizing Schedules based on serializability [T1:P611-P636].

Concurrency Control Techniques: Two-Phase Locking Techniques for Concurrency Control, Concurrency Control Based on Timestamp Ordering, Validation (Optimistic) Concurrency Control Techniques, Multiple Granularity Locking [T1:P643-P664].

Database Recovery Techniques: Recovery Concepts, Recovery Based on Deferred Update, Recovery Based on Immediate Update, Shadow Paging, and the ARIES Recovery Algorithm

Text Books:

1. Ramez Elmasri, Shamkant B.Navathe , Fundamentals of Database Systems 5th edition pearson.

Reference Books:

1. Silberchartz, Korth, Sudarshan, Database System Concepts, V Edition, McGraw Hill.
2. Ivan Bayross , SQL,PL/SQL 3rd Ed, BPB Publication.
3. Raghurama Krishnan, Johannes Gehrke , Database Management Systems III Ed, TATA McGrawHill.
4. C.J.Date, Introduction to Database Systems, Pearson Education.
5. The X team,S.Shah and V.shah, Oracle for Professionals, SPD.
6. Shah, Database systems Using Oracle:A simplified guide to SQL and PL/SQL, PHI.
7. M.L.Gillenson , Fundamentals of Database Management Systems,Wiley Student Edition.

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	3	1	0	[3]

(13EE807) ENERGY AUDITING AND DEMAND SIDE MANAGEMENT
(Elective-III)

Objectives:
This subject deals with the energy auditing, conservation, management techniques, measurements in energy audits. Information about how to improve the power factor & efficiency of electrical equipments. It also deals with DSM programme to improve financial performance and customer relations.

UNIT-I

Introduction and Basic Principles of Energy Audit: Introduction - Energy situation – world and India, energy consumption, conservation **Energy audit**- definitions, concept, types of audit, energy index, cost index ,pie charts, Sankey diagrams, load profiles, Energy conservation schemes, Measurements in energy audits, presentation of energy audit results.

UNIT-II:

Energy Efficient Motors and Power Factor Improvement: 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.
Power factor – methods of improvement, location of capacitors, Pf with non linear loads, effect of harmonics on power factor, power factor motor controllers.

UNIT-III

Lighting , Energy Instruments and Economic Aspects: Good lighting system design and practice, lighting control ,lighting energy audit - Energy Instruments- wattmeter, data loggers, thermocouples, pyrometers, lux meters, tongue testers, application of PLC's.
Economics Analysis-Depreciation Methods, life cycle costing analysis, time value of money, rate of return, present worth method - problems.

UNIT-IV

Demand Side Management: Introduction to DSM, concept of DSM, benefits of DSM, different techniques of DSM, Load management, load priority technique, peak clipping, peak shifting, valley filling, strategic conservation, energy efficient equipment. Management and Organization of Energy Conservation awareness Programs.

Text Books:

1. Energy management by W.R. Murphy AND G. Mckay Butter worth, Heinemann publications. 1982
2. Demand Side Management, Jyothi Prakash, TMH Publishers. 1977

Reference Books:

1. Energy efficient electric motors by John .C. Andreas, Marcel Dekker Inc Ltd-2nd edition, 1995.
2. Energy management by Paul o' Callaghan, Mc-graw Hill Book company-1st edition, 1998.
3. Energy management hand book by W.C.Turner, John wiley and sons.
4. Energy management and good lighting practice: fuel efficiency- booklet12-EEO.
5. Hand book on energy auditing - TERI (Tata Energy Research Institute).
6.Industrial Energy Management Systems, Arry C. White, Philip S.Schmidt, David R. Brown, emisphere Publishing Corporation, New York.

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(13EE808) VLSI DESIGN
(Elective-III)

Objective: To enable the students to understand, Basic NMOS, CMOS & BiCMOS circuits, NMOS & CMOS process technology, Technology Scaling, Designing VLSI subsystems, the concepts of modeling a digital system using Hardware Description Language, Chip design using programmable devices.

UNIT-I

Introduction: Introduction to IC technology-MOS, PMOS, NMOS, CMOS and BI-CMOS technologies-oxidation, lithography, diffusion, Ion implantation, metallization , Encapsulation, probe testing, integrated resistors and capacitors.

Basic Electrical Properties: Basic electrical properties of MOS and BI-CMOS circuits: I_{ds}-V_{ds} relationships, MOS transistor threshold voltage, g_m, g_{ds}, figure of merit; pass transistor, NMOS inverter, various pull-ups, CMOS inverter analysis and design, BI-CMOS inverters.

UNIT-II

VLSI Circuit Design Processes: VLSI design flow, MOS layers, stick diagrams, design rules and lay out,2 m CMOS design rules for wires, contacts and transistors layout diagrams for NMOS and CMOS inverters and gates, scaling of MOS circuits, limitations of scaling.

GATE Level Design: Logic gates and other complex gates, switch logic, alternate gate circuits, basic circuit concepts, sheet resistance RS and its concept to MOS, area capacitance units, calculations-(Micro)-delays, driving large capacitive loads, wiring capacitances, fan-in and fan-out, choice of layers.

UNIT-III

Sub System Design: Sub system design, shifters, adders, ALUs, multipliers, parity generators, comparators, zero/one detectors, counters, high density memory elements.

Semiconductor Integrated Circuit Design: PLAs, FPGAs, CPLDs, standard cells, programmable array logic, design approach.

UNIT -IV

VHDL Synthesis: VHDL synthesis, circuit design flow, circuit synthesis, simulation, layout, design capture tools, design verification tools, test principles.

CMOS Testing: CMOS testing need for testing, test principles, design strategies for test, chip level test techniques, system-level test techniques, layout design for improved testability.

Text Books:

1. Kamran Eshraghian, Eshraghian Dougles and A.Pucknell, Essentials of VLSI circuits and systems, PHI 2005 Edition.
2. Weste and Eshraghian, Principles of CMOS VLSI design, Pearson Education, 1999.

Reference Books:

1. John P.Uyemura, Introduction to VLSI circuits and systems, John Wiley, 2003.
2. John M. Rabaey, Digital Integrated circuits, PHI, EEE, 1997.
3. Wayne wolf, Modern VLSI design, Pearson Education, 3rd Edition, 1997.

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(13EE809) COMPUTER ORGANIZATION
(Elective-III)

Objectives:

- Students will learn the fundamentals of computer organization. It is relevant to classical & modern problems of computer design.
- Students will be able to identify where, when and how enhancements of computer Performance can be accomplished.
- Students will see how to use concepts of computer in real life setting using various PC performance improvements.
- Understand the mining of ALU, control unit, CPU and its function also in real life.

UNIT- I:

Basic Structure of Computers: Computer Types, Functional unit, Basic operational concepts, Bus structures.

Register Transfer Language and Micro operations: Register Transfer language, Register Transfer, Bus and memory transfers-Three state bus buffer, Memory transfer,

Arithmetic Micro operations- binary adder, binary adder-subtractor, binary incrementer, arithmetic circuit.

Logic micro operations- List of logic micro operations, Hardware implementation, some applications

Shift micro operations- Hardware implementation**.** Arithmetic logic shift unit

UNIT- II:

Basic Computer Organization and Design: Instruction codes- Stored program organization, indirect address.

Computer Registers- Common bus system.

Computer Instructions- Instruction set completeness.

Timing and Control, **Instruction cycle-** Fetch and decode, determine the type of instruction, register-reference instructions, Memory Reference Instructions.

Input – Output and Interrupt- Input-output configuration, Input-output instructions, program interrupt, Interrupt cycle, Addressing modes

Micro Programmed Control: Control memory, Address sequencing- Conditional branching, Mapping of Instruction, subroutines.

Micro Program Example- Computer configuration, Microinstruction Format, Symbolic Microinstructions, The fetch routine, Symbolic Micro program, binary Micro program.

Design of Control Unit- Micro program Sequencer.

UNIT- III:

Input-Output Organization: Peripheral Devices- ASCII Alphanumeric Characters.

Input-Output Interface-I/O Bus and Interface Modules, I/O versus Memory bus, Isolated verses Memory Mapped I/O, Example of I/O Interface.

Asynchronous data transfer- Strobe control, Handshaking, Asynchronous serial transfer, Asynchronous communication interface, First in-First-out buffer**,**

Modes of Transfer- Example of programmed I/O, Interrupt-Initiated I/O, software considerations, **Priority Interrupt-** Daisy chaining priority, Parallel priority Interrupt, Priority Encoder, Interrupt cycle, software routines, Initial and final operations.

Direct memory Access-DMA controller, DMA transfer

Input –Output Processor (IOP) – CPU-IOP communication, IBM 370 I/O channel, Intel 8089 IOP

UNIT- IV:

Memory Organization: Memory Hierarchy, Main memory- RAM and ROM chips, Memory Address map. **Auxiliary memory –** Magnetic Disks, Magnetic Tapes.

Cache Memory – Associative mapping, Direct mapping, Set associative mapping.

Virtual memory- Address space and memory space, address mapping using pages, associative memory page table, page replacement

Pipeline and Vector Processing: Parallel Processing, Pipelining- General Considerations, Arithmetic Pipeline, Instruction Pipeline**-** Data dependency, Handling of Branch Instructions.

Vector processing- Vector operations, matrix multiplication, memory interleaving, superscalar processors, supercomputers

Text Books:

1. Moris Mano, Computer System Architecture-,IIIrd Edition,Pearson/PHI.
2. C. Hamacher, V. Zvonko, S. Zaky, “Computer Organization” 5thedition, McGraw Hill, 2002, ISBN 007-120411-3.

Reference Books:

1. William Stallings, Computer Organization and Architecture- Sixth Edition,Pearson/PHI.
2. Andrew S.Tanenbaum , Structured Computer Organization-4th edition, PHI/Pearson.
3. Sivaraama Dandamudi,Springer , Fundamentals of Computer organization and design- Int. Edition.
4. John L.Hennessy and David A.Patterson, Computer Architecture a Quantitative approach, Fourth Edition, Elsevier.
5. Joseph D.Dumas , Computer Architecture: Fundamentals and principles of computer design II, BS Publication.

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(13EE810) DESIGN OF ELECTRICAL SYSTEMS
(Elective-III)

Objectives:

This course presents a comprehensive coverage of Electrical Systems Designing aspects of domestic and industrial installations, power factor and power quality improvement, resonance problems and economic aspects of system design.

UNIT-I

Design Aspects and Electrical Installations in Domestic Buildings: Role of Statutes In Electrical System Design, Classification of Building Services, Design Aspects of Lighting, Design Aspects of Ventilation, Design Aspects of Climate Control, Design Aspects of Vertical Transportation, Design Aspects of Minor Building Services. Classification, Estimation of Load Requirements, Selection of Type Of Wiring, Special Features Applicable For High-Rise Apartment Buildings, Pre-Commissioning Tests.

UNIT-II

Electrical Installations: Classification of Industrial Installation, General Characteristics, Selection of Distribution Architecture, Selection of Transformers And Sub Stations Short Circuit Studies, Fault Current Calculations, Earthing Design, Selection of Switch Gears: Electrical Protection, Protection of Circuit Elements, Persons & Life Stack, Equipment, Electrical Isolation, Switch Gear Control, Switching Devices, Uses, Selective Co -ordination, Circuit Breakers and their Selection.

UNIT-III

Power Factor Improvement and Earthing: Nature of Reactive Energy, Power Factor, Methods to Improve Power Factor, Economics of Power Factor Improvement, Location of Capacitors, Installation Precautions, Optimal Compensation, PF Correction of Induction Motors, Protection And Control, Voltage Transients, Switching Considerations. Introduction to Earthing, Types of System Earthing, Reasons For Grounding/ Earthing, TN System, TT System, IT System, Protective Measures And Protective Devices In IT System, Main Characteristics of Earthing Systems, Selection Criteria For Earthing, Design Considerations of Earthing, Measurement of Earth Resistance, Earth Leakage Protection, Neutral Earthing For Generators And Transformers.

UNIT-IV

Power Quality, Resonance Problems And Energy Economics In System Design: Power Quality Issues, Harmonics, Sources of Harmonics, Disturbances Caused By Harmonics, Methods To Reduce The Impact of Harmonics, Design The Detuned Capacitor Bank, IEEE Standard 519-1992 And Limits. Introduction to Energy Economics, Time Value of Money, Single Payment Compound Amount Model (SPCA), Uniform Series Compound Amount Model (USCA), Uniform Series Present Worth Model (USPW), Depreciation, Tax Considerations, after Tax Analysis.

Text Books:

1. M. K. Giridharan “Electrical Systems Design”, I. K. International Publishing House Pvt. Ltd.2011.
2. Er. V. K. Jain and Er. Amitabh Bajaj “Design of Electrical Installations”, University Science Press. 1993.

Reference Books:

1. Theodore R. Bosela “Electrical Systems Design”, Prentice Hall PTR, 2002.
2. V.K. Jain, Amitab Bajaj “A Text Book of Design of Electrical Installations”, Lakshmi publications. New Delhi.
3. Hemant Joshi “Residential, Commercial and Industrial Electrical Systems: Equipment and Industrial Electrical systems”, Tata McGraw-Hill.

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(13EE811) COMPREHENSIVE VIVA-VOCE

The comprehensive Viva-Voce shall be evaluated in the topics covering the core aspects of the concerned discipline in which the candidate is likely to get graduated. The marks can be awarded based on the performance in viva-voce examination conducted by a committee consisting of **i)** Head of the Department **ii)** Two Senior Faculty members of the department **iii)** External Examiner appointed by the Principal. The comprehensive Viva-Voce shall be conducted for 100 marks. Of the 100 marks, 25 marks are allocated to each member of the committee.

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(13EE812) PROJECT WORK - PHASE-II

The Project work Phase-II will be an extension of Phase-I project work. The object of Project work phase-II is to enable the student to extend further the investigative study taken up as the project in Phase-I under the guidance of the supervisor/ guide from the department.

The assignment normally includes:

- Preparing an action plan for conducting the investigation including the team work.
- In depth study of the topic assigned.
- Review and finalization of the approach to the problem relating to the assigned topic.
- Final development of product/process, testing, results, conclusions and further direction.
- Preparing a paper for conference presentation/ publication in journal if possible.
- Preparing a dissertation in the standard format for being evaluated by the department.
- Final presentation of the work done before the Project Review Committee (PRC).

Project Work Phase-II is allocated 50 internal marks. Out of 50, 25 marks are allocated for the supervisor/guide and head of the department to be evaluated based on two seminars given by each student on the topic of the project. The other 25 marks shall be evaluated on the basis of his presentation on the work done on his project by the Departmental Committee comprising of Head of the Department, respective supervisor/ guide and two senior faculty of the department appointed by the Principal.