P.S.R. ENGINEERING COLLEGE

(An Autonomous Institution & Affiliated to Anna University, Chennai)

SIVAKASI - 626140

B.E. – ELECTRICAL AND ELECTRONICS ENGINEERING

UG REGULATION-2012

CURRICULUM AND SYLLABI

[1st To 8th Semester]

THIS IS THE FINAL VERSION OF THE SYLLABUS AS RATIFIED AND APPROVED BY THE ACADEMIC COUNCIL OF THE COLLEGE IN THE MEETINGS HELD ON 7/7/2012, 1/6/2013 & 12/4/2014

DEAN(ACAD)

PROGRAMME EDUCATIONAL OBJECTIVES OF B.E –ELECTRICAL AND ELECTRONICS ENGINEERING:

- Graduates will be successful in professional career by acquiring the knowledge in the fundamentals of Electrical and Electronics Engineering principles and professional skills.
- Graduates will analyze real life problems and design the socially accepted and economically feasible Electrical and Electronics Engineering systems.
- Graduates will engage in lifelong learning and professional development by pursuing higher studies and participation in professional organizations.
- Graduates will exhibit good communication skills in their professional career, lead a team with good leadership traits and good interpersonal relationship with the members in other engineering teams.

PROGRAMME OUTCOMES OF B.E – ELECTRICAL AND ELECTRONICS ENGINEERING:

- Apply knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the emerging complex problems in eelectrical and electronics engineering.
- Identify, formulate, research literature and solve complex electrical and electronics engineering problems using first principles of mathematics and engineering sciences.
- Design solutions for complex electrical and electronics engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
- Conduct investigations of complex problems including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.
- Create, select and apply appropriate techniques, resources and modern engineering tools, including prediction and modeling, to complex electrical and electronics engineering activities, with an understanding of the limitations.
- Function effectively as an individual, and as a member or leader in diverse teams and in multidisciplinary tasks.
- Communicate effectively with the engineering community and with society at large
- Demonstrate understanding of the societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to engineering practice.
- Understand and commit to professional ethics and responsibilities and norms of engineering practice.
- Understand the impact of engineering solutions in a societal context and demonstrate knowledge of and need for sustainable development.
- Demonstrate a knowledge and understanding of management and business practices and their limitations.
- Recognize the need for, and have the ability to engage in independent and life-long learning.

REGULATIONS FOR UG PROGRAMME (B.E/B.Tech) CANDIDATE ADMITTED DURING THE ACADEMIC YEAR 2012 - 2013 AND ONWARDS [UG Regulation-2012]

I. CONDITIONS FOR ADMISSION

Candidates for admission to the first year of the four year B.E / B.Tech Degree course shall be required to have passed

i) The higher secondary examination (academic stream) conducted by the Government of Tamilnadu with Mathematics, Physics and Chemistry

(or)

ii) The higher secondary examination(Vocational stream offering the vocational groups of Engineering and Technology)conducted by the Government of tamilnadu

(or)

iii) The diploma examinations in engineering conducted by the state board of technical education and training, Tamilnadu

(or)

iv) An examination of any university or authority, accepted by the Anna University as equivalent thereto

(or)

v) Any other examinations as notified by the Government of Tamilnadu

LATERAL ENTRY ADMISSION (YEAR 2013 - 2014 AND ONWARDS)

Candidate who have passed the Diploma in Engineering / Technology conducted by the State Board of Technical Education and training are eligible for admission to the third semester under lateral entry scheme of the B.E / B.TECH degree programmes.

Any other conditions as notified by the Government of Tamilnadu

2. BRANCHES OF STUDY

Branches will be offered at the time of admission to the course. The following are the courses offered in this college.

1) B.E-Civil Engineering
2) B.E-Mechanical Engineering
3) B.E-Electrical and Electronics Engineering
4) B.E-Electronics and Communication Engineering
5) B.E-Computer Science and Engineering
6) B.TECH-Information Technology
7) B.TECH-Bio-Technology

3. STRUCTURE OF PROGRAMMES

3.1 Every programme shall have a curriculum with well-defined syllabi comprising theory and practical courses such as:

i) General core courses comprising Mathematics, Basic sciences, Engineering Sciences, Humanities and Engineering.
ii) Core courses of Engineering/ Technology.
iii) Elective courses for specialization in related fields.
iv) Workshop practice, computer practice, engineering graphics, laboratory work, industrial training, seminar presentation, project work, industrial visit, etc.,
v) NSS/RRC/ISTE/CISCO/IEEE/YRC/SPORTS activities for character development.

3.2 The subjects of study shall be both theory and practical and shall be in accordance with the prescribed syllabus.

3.3 Each semester curriculum shall normally have a blend of lecture courses not exceeding 6 and practical courses not exceeding 4.

3.4 A student who has passed all the subjects prescribed in the curriculum for the award of the degree shall not be permitted to-enroll to improve his/her marks in a subject or the aggregate marks.

3.5 The medium of instruction, examination and project report shall be in English, expect for courses on language other than English.

4. DURATION OF THE PROGRAMME

The duration of the programme for the degree of B.E/B.TECH programme shall be four academic years with semester pattern for HSC students and three years for lateral entry students. The number of working days will be 90 days (which includes the days for conducting unit tests.), 450 hours, or 540 periods of each 50 minutes duration for semester pattern. The number of working days is to be calculated excluding study holidays, Government holidays, and end-semester examination days. The head of the department shall ensure that every teacher imparts instruction as per the number of period specified in the syllabus and that the teacher teaches the full content of the specified syllabus for the course being taught.

5. SYSTEMS OF EXAMINATION

Performance in each course of study shall be evaluated based on i) Continuous internal assessment throughout the semester and ii) an end semester examination**.**

Theory

End semester examination will be conducted in all the theory subjects of study at the end of each semester for all the courses. The maximum marks of each subject shall be 100, out of which the continuous internal assessment will carry 25 marks, while the end semester examination will carry 75 marks.

To derive the internal mark the following guidelines are to be followed:

1) Test (3 Nos) {Each test is to be conducted for 60 marks}	: 60 marks
2) Assignment /Seminar/mini project	
a) Assignment 2 Nos (or)	
b) 1 Assignment +1 Seminar (or)	: 30 marks
c) Mini project	
d) Attendance*	: 10 marks
	----------
	100 marks

Total 100 marks should be reduced to 25 marks

*Attendance (10 marks)

Percentage of attendance	Marks
75	2
76-80	4
81-85	6
86-90	8
91 and above	10

Practical

The practical classes for all the practical/lab component courses will be assessed continuously and marks will be entered in the prescribed Performa. The progress of classes will be monitored by a committee formed by the concerned head of the departments/ professor in-charge of the course to ensure that the concerned staff conducts the laboratory experiments as specified in the syllabus. The maximum marks for the practical/lab component courses shall be 100, out of which the continues internal assessment will carry 25 marks, while the end semester practical examination will carry 75 marks. If any practical course contains Part A Part B components, the maximum marks for each part of the lab will be 50 marks, while the end semester practical examination will carry 37.5 marks. The internal and external examiners shall conduct the end semester practical examination and award marks. To derive the internal mark the following guidelines are to be followed.

i)	Continuous Assessment	: 50 marks
ii)	Test (minimum one)	: 40 marks
iii)	Attendance	: 10 marks

Total 100 marks should be reduced to 25 marks

*Attendance (10) marks

Percentage of attendance	Marks
75	2
76-80	4
81-85	6
86-90	8
91 and above	10

Project work and Viva-voce

For the project work and vivo-voce examination the maximum marks shall be 200 comprising 150 marks for internal assessment and 150 for the end semester examination. The award of the end semester marks for 150 shall be evaluated by both the internal and external examiners. Out of 150 the project report shall carry a maximum of 50 marks (same mark must be awarded to every student of the project group) while the viva-voce **examination shall carry 100 marks** (awarded to each student of the project group based on the individual performance in the viva-vice examination).

For internal mark:

Work assessed by Guide/Supervisor : 50 % weight
Work assessed by Committee : 50 % weight
(Committee consists of 3 members one among them is the Guide/Supervisor)

6. REQUIREMENTS FOR EXAMINATION AND ATTENDANCE

A candidate who has fulfilled by the following conditions shall be deemed to have satisfied the requirements for completions of a semester.

6.1 i. A candidate will be permitted to appear for the examination for any semester, only if he/she secures not less than 75% of attendance in the number of working days during that semester, if it shall be open to chairman of the academic council or any authority delegated with such powers (by the governing body) to grant condonation (based on the recommendation of the head of the department) to a candidate who has failed to secure 75% of the attendance for valid reasons and has secured not less than 66% of the attendance. Such exemptions can be allowed only TWO times during his/her entire course of study.

ii Candidate representing university in State/National/International /Inter University sports events, co and extra-curricular activities, paper or project presentation with prior permission form the head of the institution are given exemption up to 10% of the required attendance and such candidates shall be permitted to appear for the current semester examinations.

iii his/her conduct and progress have been certified to be satisfactory by the concerned head of the department.

iv Condonation can be allowed only two times during his/her entire course of study.

6.2 Candidates who do not complete the semester (as per clause 6.1) will not be permitted to write the end semester examination and are not permitted go to next semester. They are required to repeat the incomplete semester in the next academic year.

7. PROCEDURE FOR AWARDING MARKS FOR INTERNAL ASSESSMENT

i. Every teacher is required to maintain an 'ATTENDANCE AND ASSESSMENT RECORD' which consists of attendance marked in each lecture or practical or project work class, the test marks and the record of class work (Topic Covered) for each course. This should be submitted to the Head of the departments periodically (at least 3 times in a semester) for checking the syllabus coverage and the records of test marks and attendance. The Head of the department shall affix the signature and date after due verification at the end of the semester. This record should be verified by the Head of the Institution who will keep this document in safe custody (for five years).

ii. Theory Courses (25 Marks):

(a) Unit Tests [60% Weight]

Three tests each carrying sixty (60) marks shall be conducted by the department / Institution. The total marks obtained in all tests put together out of 180, shall be

reduced to 60 marks and rounded to nearest integer (this implies equal weight to all the three tests). However retest at the discretion of the head of the department may be conducted for the deserving candidates.

(b) Assignment / Seminar / Miniproject [30% weight]

i) **Assignment:**

Two assignments each carrying 15 marks and requiring work of average 5 to 6 hours of study and written work of average 5 to 6 hours shall be given to be carried out by each student in a separate assignment folder, duly indexed with headings, date of submission, Marks, remarks and signature of faculty with date etc.

ii) **Assignment and seminar**

A student has to carry out one assignment and one seminar carrying 15 marks each. An assignment normally requires work of average 5 to 6 hours of study and written work of average 5 to 6 hours which has to submitted in a separate assignment folder, duly indexed with headings, date of submission, Marks, remarks and signature of faculty with date etc.,

The student has to make one technical seminar on current topics related to the specialization. The students are expected to submit a report of his / her presentation. The seminar will be assessed by the course tutor with common parameters as described by the department.

iii) **Mini Project**

A student has to carry out mini project carrying 30 marks either in hardware or software with the approval of the head of the department.The student has to submit a report before the end of the semester. Mini project will be assessed based on the model presentation and report as decided by the department.

(c) Attendance [10% weight]

Attendance (10) marks

Percentage of attendance	**marks**
75	2
76-80	4
81-85	6
86-90	8
91 and above	10

The internal marks are valid for two more attempts in addition to the current attempt for the candidates admitted from the academic year 2012 to 2013 and onwards. if a candidates scores a minimum of 50% marks in the end semester examination, after three attempts(first attempt + two more attempts), he / she would be declared as passed in that examination.

iii. Practical Subjects [25 marks)

Every practical exercise / experiment shall be evaluated based on conduct of exercise / experiment and records maintained. There shall be at least one test. The criteria for determining the internal assessment marks are:

Experiment / Record / Average Practical classes' performance	: 50 % Weight
Practical Test	: 40%Weight
Attendance	: 10 % Weight

Total 100 marks should be reduced to 25 Marks.

iv. Project Work

There shall be three assessments during the semester by a review committee. The students shall make presentation on the progress made before the committee. The Head of the Institution shall constitute the review committee for each branch of study. The criteria for arriving the internal assessment marks for the project work evaluated for 50 marks are:

Work accessed by the Project Guide	:	50% weight
Assessment by a three (3)-member internal review committee (Guide will be one of the members of the committee)	:	50%weight

The internal marks are valid for two more attempts in addition to the current attempt for the candidates admitted from the academic year 2012-2013 and onwards. If a candidate scores a minimum of 50% marks only in the end semester examination, after three attempts (First attempt + two more attempts), he / she would be declared as a passed candidate in that examinations.

8. PROCEDURE FOR COMPLETING THE COURSE

(i) A candidate who has for some reason discontinued the course can join the course of study of any semester only at the time of its normal commencement in the institution for regular students upon satisfying all the following conditions.

(a) he/she should have completed the course of study of the previous semester.
(b) he/she should be eligible to register for the examination and satisfy rule 8(iii).
(c) he/she should have registered for all the examination of the previous semesters.

(ii) A candidate will be permitted to proceed from one semester to the next higher semester only if he/she has satisfied the regulation for eligibility to appear for the end semester examination in the concerned semester, subject to the condition that the candidate should register for all the arrear subjects of lower semesters along with the current (higher) semester subject.

(iii) A candidate should have completed B.E/B.Tech, degree course within a period of SEVEN (or 14 semesters) consecutive academic years (Six consecutive years or 12 semesters for lateral entry students) from the date of admission to the course, even if the candidate discontinues and rejoins subsequently, to be eligible for the award of the degree. The minimum and maximum period for completion of the U.G. Programmes (B.E/B.Tech) are given below.

B.E /B.Tech. (Full Time)	Minimum Number of Semester	Maximum Number of Semesters
HSC Candidates	8	14
Lateral Entry Candidates	6	12

9. REQUIREMENTS TO APPEAR FOR END SEMESTER EXAMINATION

A candidate shall normally be permitted to appear for the end semester examination of the current semester if he/she has satisfied the semester completion requirements (Subject to clause 6.1) and has registered for examination in all course of that semester. Registration is mandatory for current semester examination as well as appear examination failing which the candidate will not be permitted to move to the higher semester.

10. PASSING MINIMUM AND CLASSIFICATION OF SUCCESSFUL CANDIDATE

(i) For each subject the examination will be conducted for 100 marks. A candidate who secures not less than 50% of the total marks in the end semester examinations and internal assessment put together in both theory and practical courses, including project work, subject to securing a minimum of 50% in the end-semester examination, wherever applicable, shall be declared to have passed the examination in that subject. When the marked secured for 100 is converted to 75, minimum 37 marks must be secured for pass. If any programme, during any semester, conducts the laboratory in two parts, say part a A and Part B, a candidate should register and appear for both parts in the end semester practical examination. If a candidate for any reason is absent in any one part of the practical examination, despite his/her presence in the other part, he/she is declared as fail in both parts A and B (marked as absent in end semester examination) and should appear again for both part A and B in the next attempt. For a pass, a candidate should secure a minimum of 50% in each part and final mark secured is the sum of marks secured in Part A and B.

(ii) A candidate who successfully completes the course requirements and has passed all the prescribed examinations in all the eight semester within a maximum period of seven years reckoned from the commencement of the first semester to which the candidate was admitted is eligible to get the degree.

(iii)A candidate who qualifies for the degree by passing the examination in all subject of the entire course in first attempt within a period of four consecutive academic years from the date of admission to the course and secures a CGPA of not less than 8.5 for the entire course shall be declared to have passed the examination for the degree in FIRST CLASS WITH DISTINCTION. For this purpose, the withdrawal

from examination will not be construed as an appearance. Further, the authorized break of study will not be counted for the purpose of classification.

(iv) A candidate transferred from other institution, who qualifies for the degree by passing the examination in all subjects of the entire course in first attempt within a period of four consecutive academic years from the date of admission to the course and secures a CGPA of not less than 8.5 for the entire course shall be declared to have passed the examination for the degree in FIRST CLASS WITH DISTINCTION. For this purpose, the withdrawal from examination will not be construed as an appearance. Further, the authorized break of study will not be counted for the purpose of classification.

(v) A candidate who qualifies for the award of the degree having passed the examination in all the subject of the course in the semester first to eight within a maximum period of ten consecutive semester after his/her commencement of study in the first semester and secures a CGPA of not less than 6.5 for the entire course shall be declared to have to have passed the examination for the degree in FIRST CLASS. For this purpose, the authorized break of the study will not be counted for the purpose of classifications.

(vi) All other successful candidates shall be declared to have passed the examination for the degree in SECOND CLASS.

(vii) A candidate who is absent in semester examination in a course/ project work after having registered for the same shall be considered to have appeared in that examination for the purpose of classification.

11. ISSUE OF MARK SHEET

Individual mark sheet for each semester will be issued, through the head of the department concerned, after the publication of the result.

The mark sheet will contain credit, grade, grade point and result status for the course concerned.

12. MALPRACTICE

If a student indulges in malpractices in any of the end semester examination, he/she shall be liable for punitive action as prescribed by the Anna University, Chennai from time to time.

13. REVALUATION

(i) Copies of answer script for the theory course(s) can be obtained from the Office of the Controller of Examinations on payment of a prescribed fee specified for this purpose through proper application.

(ii) A candidate can apply for revaluation of his/her examination answer paper in a theory course, within a week from the declaration of results, on payment of a prescribed fee through proper application to the Office of the Controller of Examinations, as per the norms given by the Chairman Academic Council. Revaluation is not permitted for practical course and for project work.

(iii) Re totaling is permissible for all arrear and current theory subjects.

14. ELIGIBILITY FOR THE AWARD OF DEGREE

A candidate shall be declared eligible for the award of the B.E/B.Tech. degree provided the candidate has

(i) Successfully completed the course requirements and has passed all the prescribed examinations in all the 8 semesters within a maximum period of 7 years (6 semesters within a maximum period of 6 years for lateral entry candidates) from the commencement of first semester (third semester for lateral entry) to which the candidate was admitted.

(ii) The syndicate of the university must have approved the award of degree.

15. CLASS COMMITTEE

15.1 A class committee consists of teachers of the concerned class, student representatives and a chairperson who is not teaching the class. It is the like the "QUALITY CIRCLE" (more commonly used in industries) with the overall goal of improving he teaching-learning process. The functions of the class committee include.

* Solving problems experienced by students in the class room and in the laboratories.

* Clarifying the regulations of the degree programme and details of rules therein.

* Informing the student representatives the academic schedule including the dates of assessments and the syllabus coverage for each assessment.

* Informing the student representatives the details of regulations regarding weight used for each assessment. In the case of practical course (laboratory/drawing/project work/seminar etc.,) the breakup of marks for each experiment/exercise/module of work, should be clearly discussed in the class committee meeting and informed to the students.

* Analyzing the performance of the students of the class after each test and finding the ways and means of solving problems, if any.

* Identifying the weak students, if any, and requesting the teachers concerned to provided some additional or guidance of coaching to such weak students.

15.2 The class committee for a class under a particular branch is normally constituted by the head of the department. However, if the students of different branches are mixed in each class of the first semester (generally common to all branches), the class committee is to be constituted by the head of the institution.

15.3 The class committee shall be constituted on the first working day of any semester or earlier.

15.4 At least 6 student representatives (usually 3 boys and 3 girls) shall be included in the class committee.

15.5 The chairperson of the class committee any invite the faculty adviser(s) and the head of the department to the meeting of the class committee.

15.6 The head of the institution may participate in any class committee of the institution.

15.7 The chairperson is required to prepare the minutes of every meeting, submit the same to the head of the institution within two days of the meeting and arrange to circulate among the concerned students and teachers. If there are some points in the minutes requiring action by the authorities concerned. The same shall be brought to the notice of the authority by the head of the institutions.

15.8 The first meeting of the class committee shall be held within one week from the date of commencement of the semester, in order to inform the students about the nature and weight of assessments within the framework of the regulations. Two or three subsequent meetings may be held at suitable intervals, During these meetings the student members representing the entire class, shall meaningfully interact and express the opinions and suggestions of the class students to improve the effectiveness of the teaching-learning process.

16. FACULTY ADVISER

To help the students in planning their courses of study and for general advice on the academic programme, the Head of the Department of the student will attach a certain number of students to a teacher of the Department who shall function as Faculty Adviser for those students throughout their period of study. Such Faculty Adviser shall advise the students and monitor the courses taken by the students, check the attendance and progress of the students attached to him *I* her and counsel them periodically. If necessary, the faculty adviser may also discuss with or inform the parents about the progress of the students.

17. COURSE COMMITTEE FOR COMMON COURSES

Each common theory course offered to more than one discipline or group of students shall have a "Course Committee" comprising all the teachers teaching the common course with one of them nominated as Course Coordinator. The nomination of the Course Coordinator shall be made by the Head of the Department /Head the Institution depending upon whether all the teachers teaching the common course belong to a single department or to several departments. The "Course committee" shall meet as often as possible and ensure uniform evaluation of the tests and arrive at a common scheme of evaluation for the tests. Wherever it is feasible, the course committee may also prepare a common question paper for the test(s).

18. PROVISION FOR WITHDRAWAL FROM EXAMINATION

(i) A candidate may, for valid reasons, be granted permission to withdraw from appearing for the examination in any course or courses of only one semester examination during the entire duration of the degree programme. Also only one application for withdrawal is permitted for that semester examination in which withdrawal is sought. Withdrawal from appearing for the examination in any course or courses in the middle of the examination is not permitted.

(ii) Withdrawal application shall be valid only if the candidate is, otherwise, eligible to write the examination and if it is made prior to the commencement of the last examination in that semester and duly recommended by the Head of Department and approved by the Head of the Institution.

(iii) Withdrawal shall not be construed as an appearance for the eligibility of a candidate for first class with distinction.

(iv) Withdrawal is possible only if the candidate satisfies the attendance requirements [as per clause 6.1]

19. TEMPORARY BREAK OF STUDY FROM A PROGRAMME

(i) A candidate is not normally permitted to temporarily break the study. However if a candidate intends to temporarily discontinued the programme in the middle for valid reasons (such as accident or hospitalization due to prolonged ill health) and to rejoin the programme in a later than the last date for registering for the semester examinations of the semester in question, through the head of the department starting the reasons thereof.

(ii) The candidate permitted to rejoin the programme after the break shall be governed by the rules and regulations in force at the time of rejoining.

(iii) The duration specified for passing all the course for the purpose of classification vide clause 10(iii), 10(iv) and 10(v) shall be increased by the period of such break of study permitted.

(iv) The period for completion of the programme reckoned from, the commencement of the first/third semester to which the candidate was admitted shall not exceed the maximum period specified in clause 8(iii) irrespective of the period of break of study in order that he/she may be eligible for the award of the degree (vide clause 14).

(v) If any student is detained for want of requisite attendance, progress and good conduct, the period spent in that semester shall not be considered as permitted 'break of study' and clause 19(iii) is not applicable for this case.

20. RANK OF STUDENT

A candidate who qualifies for the degree by passing the examination in all subjects of the entire course in first attempt within a period of four (three for lateral entry) consecutive academic years from the date of admission to the course can be given his/her position in the class as rank. The rank is determined from III semester to VIII semester examination CGPA. Student transferred from other institution to P.S.R. Engineering College are not eligible for rank.

21. PROCUDURE FOR USING SCRIBER

If candidate is physically handicapped (in case of accidents/ill health) at the time of examination, he/she may be permitted to use a scriber to write the examination. In such case 30 minutes, extra time will be permitted. The scriber shall be a non-engineering student/graduate.

22. INDUSTRIAL VISIT

Every student is required to undergo one industrial visit, starting from the third semester of the progremme. Every teacher shall take the students are least for one industrial visit in a year.

23. PERSONALITY AND CHARACTER DEVELOPMENT

All students shall enroll, on admission, in any one of their personality and character development programmes (NSS/YRC/RRC/ISTE/IEEE/CISCO). The training shall include classes to hygiene and health awareness and training in first aid.

- NATIONAL SERVICE SCHEME (NSS) will have social service activities in and around the college/institution.
- YOUTH RED CROSS (YRC) will have activities related to social service in and around college/institution.
- RED RIBBON CLUB (RRC) will have activities to improve health awareness among the people in and around the college campus.
- INDIAN SOCIETY FOR TECHNICAL EDUCATION (ISTE) will have activities to improve students technical skill and career development.
- INSTITUTION OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE) will have activities to enhance professional students innovative skill.

- COMPUTER INFORMATION SYSTEM COMPANY (CISCO) will have activities to enhance professional student's innovative skill with help of enhanced human network.

While the training activities will normally be during weekends, the camp will normally be during vacation period.

24. DISCIPLINE

Every student is required to observe and decorous behavior both inside and outside the college and not to indulge in any activity, which will tend to bring down the prestige of the college. In the event an act indiscipline being reported, the principal shall constitute a disciplinary committee consisting of three heads of department of which on should be from the faculty of the student, to inquire into acts in discipline. The disciplinary action is subject to review by the university in case the student represents to the university. Any expulsion of the student from the college shall be with prior concurrence from director of technical education/university.

25. CREDIT SYSTEM

The letter grade and the grade point are awarded base on percentage of marks secure by a candidate in individual course as detailed below:

Range of Total Marks	Letter Grade	Grade Points (GP)
90 to 100	S	10
80 to 89	A	9
70 to 79	B	8
60 to 69	C	7
55 to 59	D	6
50 to 54	E	5
0 to 49	U	0
INCOMPLETE	I	0

"U" denotes failure in the course.
"I" denotes incomplete as per clause 6.1 and hence prevention from writing end semester examination
"W" denotes withdrawal from the course.

After result are declared, grade sheets will be issued to each student which will contain the following details:

- The list of subjects enrolled the semester and the grades scored.
- The grade point average (GPA) for the semester and
- The cumulative grade point average (CGPA) of all subject enrolled from first semester onwards.

GPA is the ratio of the sum of the products of the number of credits of course registered and the points corresponding to the grades scored in those course, taken for all the course, to the sum of the number of credits of all the course in the semester.

$$GPA = \frac{\text{Sum of } [C \times GP]}{\text{Sum of } C}$$

where C - Credit of a particular course
GP - Grade point obtained by the student in the respective course

CGPA will be calculated in a similar manner, considering all the course enrolled from first semester, "U", "T", and "W" grades will be excluded for calculating GPA and CGPA.

Each course is normally assigned certain number of credits with 1 credit per lecturer period per week, 1 credit per tutorial period per week, 1 credit for 2 periods of laboratory or practical or seminar or project work per week (2 credits for 3 or 4 periods of practical).

26. REVISION OF REGULATION AND CURRICULUM

The college may from time to time revise, amend of change the regulations, scheme of examinations and syllabus, if found necessary.

---------- End ----------

REGULATION – 2012
B.E. ELECTRICAL AND ELECTRONICS ENGINEERING
CURRICULUM & SYLLABI(I TO VIII SEMESTER)

S.No.	Sub. Code	Subject Name	Internal Marks	Final Exam Marks	Total Marks	Hrs & Credits			
						L	T	P	C
SEMESTER I									
Theory									
1	12F1Z1	Technical English-I	25	75	100	3	1	0	4
2	12F1Z2	Engineering Mathematics-I	25	75	100	3	1	0	4
3	12F1Z3	Engineering Physics-I	25	75	100	3	0	0	3
4	12F1Z4	Engineering Chemistry-I	25	75	100	3	0	0	3
5	12F1Z5	Fundamentals of Computing and Programming	25	75	100	3	0	0	3
6	12F1Z6	Engineering Graphics	25	75	100	3	1	0	4
Practical									
7	12F1Z7	Physics and Chemistry Laboratory - 1	25	75	100	0	0	3	2
8	12F1Z8	Computer Practice Laboratory -1	25	75	100	0	0	3	2
9	12F1Z9	Engineering Practices Laboratory	25	75	100	0	0	3	2
	Total				900	18	3	9	27

S.No.	Sub. Code	Subject Name	Internal Marks	Final Exam Marks	Total Marks	Hrs & Credits			
						L	T	P	C
SEMESTER II									
Theory									
1	12F2Z1	Technical English-II	25	75	100	3	1	0	4
2	12F2Z2	Engineering Mathematics-II	25	75	100	3	1	0	4
3	12F2Z3	Engineering Physics-II	25	75	100	3	0	0	3
4	12F2Z4	Engineering Chemistry-II	25	75	100	3	0	0	3
5	12F2Y5	Engineering Mechanics (For Non-Circuit branches)	25	75	100	3	0	0	3
6	12F2E5	Circuit Theory (For EEE branch only)	25	75	100	3	1	0	4
7	12F2X5	Electric Circuits and Electron Devices (For ECE,CSE,IT branches)	25	75	100	3	1	0	4
8	12F2X6	Basic Civil and Mechanical Engineering (For Circuit branches)	25	75	100	3	1	0	4
9	12F2Y6	Basic Electrical and Electronics Engineering(For Non-Circuit branches)	25	75	100	3	1	0	4
Practical									
10	12F2Z7	Physics and Chemistry Laboratory - II	25	75	100	0	0	3	2
11	12F2X7	Computer Aided Drafting and Modeling Laboratory (For Non Circuit Branches)	25	75	100	0	0	3	2
12	12F2E7	Electrical Circuit Laboratory (For EEE)	25	75	100	0	0	3	2
13	12F2Z8	Computer Practice Laboratory - II	25	75	100	0	0	3	2
14	12F2X8	Electric Circuits and Electron Devices Laboratory (ECE,CSE,IT)	25	75	100	0	0	3	2
	Total				900	18	4	9	28

S.No	Subject Code	Course Title	Internal Marks	Final Exam Marks	Total Marks	Hrs & Credits			
						L	T	P	C
SEMESTER III									
Theory									
1	12MA31	Transforms and Partial Differential Equations	25	75	100	3	1	0	4
2	12EE31	Electronic Devices	25	75	100	3	0	0	3
3	12EE32	Electromagnetic Theory	25	75	100	3	1	0	4
4	12EE33	Electrical Machines – I	25	75	100	3	1	0	4
5	12EE34	Measurements and Instrumentation	25	75	100	3	0	0	3
6	12EE35	Data Structures and Algorithms	25	75	100	3	0	0	3
Practical									
7	12EE36	Electrical Machines Laboratory – I	25	75	100	0	0	3	2
8	12EE37	Data Structures and Algorithms Laboratory	25	75	100	0	0	3	2
9	12EE38	Measurements and Instrumentation Laboratory	25	75	100	0	0	3	2
10	12HS31	Professional English I	25	75	100	0	0	1	1
Total					1000	18	3	10	28

S.No	Subject Code	Course Title	Internal Marks	Final Exam Marks	Total Marks	Hrs & Credits			
						L	T	P	C
SEMESTER IV									
Theory									
1	12MA42	Numerical Methods	25	75	100	3	1	0	4
2	12EE41	Electrical Machines – II	25	75	100	3	1	0	4
3	12EE42	Transmission and Distribution	25	75	100	3	1	0	4
4	12EE43	Electronic Circuits	25	75	100	3	0	0	3
5	12EE44	Object Oriented Programming	25	75	100	3	0	0	3
6	12GE31	Environmental Science and Engineering	25	75	100	3	0	0	3
Practical									
7	12EE45	Object Oriented Programming Laboratory	25	75	100	0	0	3	2
8	12EE46	Electronic Devices and Circuits Laboratory	25	75	100	0	0	3	2
9	12EE47	Electrical Machines Laboratory – II	25	75	100	0	0	3	2
10	12HS41	Professional English II	25	75	100	0	0	1	1
Total					1000	18	3	10	28

S.No	Subject Code	Course Title	Internal Marks	Final Exam Marks	Total Marks	Hrs & Credits			
						L	T	P	C
SEMESTER V									
Theory									
1.	12EE51	Power Electronics	25	75	100	3	0	0	3
2.	12EE52	Protection and Switchgear	25	75	100	3	0	0	3
3.	12EE59	Communication Engineering	25	75	100	3	0	0	3
4.	12EE53	Digital Electronics	25	75	100	3	1	0	4
5.	12EE54	Linear Integrated Circuits	25	75	100	3	0	0	3
6.	12EE55	Control Systems	25	75	100	3	1	0	4
Practical									
7	12EE56	Power Electronics Laboratory	25	75	100	0	0	3	2
8	12EE57	Integrated Circuits Laboratory	25	75	100	0	0	3	2
9	12EE58	Control Systems Laboratory	25	75	100	0	0	3	2
10	12HS51	English for Employment - I	25	75	100	0	0	2	1
Total					1000	18	3	11	27

S.No	Subject Code	Course Title	Internal Marks	Final Exam Marks	Total Marks	Hrs & Credits			
						L	T	P	C
SEMESTER VI									
Theory									
1	12EE61	Solid State Drives	25	75	100	3	0	0	3
2	12EE62	Power System Analysis	25	75	100	3	1	0	4
3	12EE63	High Voltage Engineering	25	75	100	3	0	0	3
4	12EE64	Digital Signal Processing	25	75	100	3	1	0	4
5	12EE65	Microprocessor and Microcontroller	25	75	100	3	0	0	3
6	12GE51	Professional Ethics in Engineering	25	75	100	3	0	0	3
Practical									
7	12EE66	Microprocessor and Microcontroller Laboratory	25	75	100	0	0	3	2
8	12EE67	Industrial Drives and Control Laboratory	25	75	100	0	0	3	2
9	12EE68	Digital Signal Processing Laboratory	25	75	100	0	0	3	2
10	12HS61	English for Employment - II	25	75	100	0	0	2	1
Total					1000	18	2	11	27

S.No	Subject Code	Course Title	Internal Marks	Final Exam Marks	Total Marks	Hrs & Credits			
						L	T	P	C
SEMESTER VII									
Theory									
1	12EE71	Power System Operation and Control	25	75	100	3	0	0	3
2	12EE72	Design of Electrical Machines	25	75	100	3	1	0	4
3	12EE73	Special Electrical Machines	25	75	100	3	0	0	3
4	12EE74	Electric Energy Generation, utilization and Conservation	25	75	100	3	0	0	3
5		Elective - I	25	75	100	3	0	0	3
6		Elective - II	25	75	100	3	0	0	3
Practical									
7	12EE76	Power System Simulation Laboratory	25	75	100	0	0	3	2
8	12GE71	Comprehension	25	75	100	0	0	3	2
		Total			800	18	1	6	23

S.No	Subject Code	Course Title	Internal Marks	Final Exam Marks	Total Marks	Hrs & Credits			
						L	T	P	C
SEMESTER VIII									
Theory									
1		Elective – III	25	75	100	3	0	0	3
2		Elective – IV	25	75	100	3	0	0	3
Practical									
3	12EE76	Project	25	75	100	0	0	12	6
					300	6	0	12	12

Credits (I &II Semesters) : 55
Credits (III &VIII Semesters): 145
Total Credits (I to VIII Semesters): 200

LIST OF ELECTIVES

S.No.	Sub. Code	Subject Name	Internal Marks	Final Exam Marks	Total Marks	Hrs & Credits			
						L	T	P	C
VII– SEMESTER ELECTIVES									
1	12MG52	Principles of Management	25	75	100	3	0	0	3
2	12MG61	Marketing Management	25	75	100	3	0	0	3
3	12MG71	Total Quality Management	25	75	100	3	0	0	3
4	12MG73	Human Resource Management	25	75	100	3	0	0	3
5	12MG74	Entrepreneurship Development	25	75	100	3	0	0	3
6	12EE7A	Soft Computing	25	75	100	3	0	0	3
7	12EE7B	VLSI Design	25	75	100	3	0	0	3
8	12EE7C	Embedded System Design	25	75	100	3	0	0	3
9	12EE7D	Operating Systems	25	75	100	3	0	0	3

10	12EE7E	Programmable Logic Controllers	25	75	100	3	0	0	3
11.	12EE7F	Computer Networks	25	75	100	3	0	0	3

S.No.	Sub. Code	Subject Name	Internal Marks	Final Exam Marks	Total Marks	Hrs & Credits			
						L	T	P	C
VIII – SEMESTER ELECTIVES									
1	12EE8A	Mechatronics	25	75	100	3	0	0	3
2	12EE8B	Robotics and Automation	25	75	100	3	0	0	3
3	12EE8C	Bio-medical Instrumentation	25	75	100	3	0	0	3
4	12EE8D	Fiber Optics and Laser Instruments	25	75	100	3	0	0	3
5	12EE8E	Modern Control System	25	75	100	3	0	0	3
6	12EE8F	Power Quality	25	75	100	3	0	0	3
7	12EE8G	High Voltage Transmission System	25	75	100	3	0	0	3
8	12EE8H	Flexible AC Transmission Systems	25	75	100	3	0	0	3
9	12EE8I	Renewable Energy Sources	25	75	100	3	0	0	3
10	12EE8J	Smart Grid	25	75	100	3	0	0	3

12F1Z1	TECHNICAL ENGLISH-I	L	T	P	C
		3	1	0	4

AIM

- To familiarize with the Basics of Language
- To know the mechanics of Writing for various Situations
- To communicate with error-free messages
- To understand all formats of the text
- To Get enough confidence on Business Communication

UNIT I FOCUS ON LANGUAGE 12

General Vocabulary- prefix, suffix –Denotative & connotative- Parts of Speech-Types of Sentences- Conditionals Connectors Concord -Tenses- -Active &Passive voice -Phrases & Clauses-Spelling& Punctuation-Cause & Effect-Correct use of words(parts of speech)-Question Tags-'wh'&'Yes/No'Type questions-Rearranging Jumbled Sentences-One-Word Substitution

UNIT II READING 12

Reading for gist/Identifying information/gap filling-Reading different types of text like advertisement, instruction, manuals, report - Reading passage with multiple choice questions/cloze type passage/sentence matching/completing passage-Reading for flow chart completion/matching information/matching headings, Reading for sentence completion

UNIT III WRITING 12

Writing Sentences for Brevity, Clarity and Simplicity-Writing Topic sentences/General Information/Description Paragraph-structuring an Essay-Writing effective conclusions-Writing a Process- Writing formal letter like Requisition letter, Placing an order, Quotation letter, Acknowledgement letter, Enquiry Letter, Complaint Letter, Permission Letter.

UNIT IV LISTENING 12

Listening for Learning-Word Stress and Pronunciation practices-Listening for Specific information-Note taking-Listening to announcements- Listening to News on the radio/TV

UNIT V SPEAKING 12

Introducing oneself–offering Suggestions and recommendations-Expressing opinions suggestions- (agreement/disagreement)-Role play- Purchase Manager& Customer, Customer care executive (voice) & Customer, Bank manager& Employee, Commenting on the basis of Discussion-Using Verbal & Non-verbal cues in speech-Using Familiar Expressions in different situations

TOTAL= 60 PERIODS

TEXT BOOK

1. Department of Humanities & Social Sciences, Anna University, '*English for Engineers and Technologists*' Combined Edition (Volumes 1 & 2), Chennai: Orient Longman Pvt. Ltd., 2006.

REFERENCES

1 CambridgeBECPreliminary2Student'sBookwithAnswers: Examinationpapersfrom UniversityofCambridgeESOL Examinations, Cambridge ESOL, PB, ISBN: 9780521544504

2 Meenakshi Raman and Sangeetha Sharma-"Technical Communication: English skills for Engineers"-Oxford University Press-2008,ISBN:0-19-569574-7

12F1Z2	ENGINEERING MATHEMATICS – I (COMMON TO ALL BRANCHES)	L	T	P	C
		3	1	0	4

UNIT I MATRICES 12

Characteristic equation - Eigen Values and Eigen vectors of a real matrix - Properties of Eigen values - Problem solving using Cayley-Hamilton - Similarity Transformation - Orthogonal Transformation of a Symmetric matrix to diagonal form - Quadratic form - Orthogonal reduction to canonical form

UNIT II THREE DIMENSIONAL GEOMETRY 12

Introduction – Sphere - Tangent plane - Plane section of a sphere–Lines - Skew lines – Coplanar lines -– Equation of cylinder - Right circular cylinder.

UNIT III DIFFERENTIAL CALCULUS 12

Curvature - Radius of curvature - Cartesian and Parametric Coordinates - Circle of Curvature - Involutes and Evolutes – Envelope - Evolutes as Envelope of its normal.

UNIT IV FUNCTIONS OF SEVERAL VARIABLES 12

Partial Derivatives - Euler's Theorem for homogeneous function - Total Derivative - differentiation of Implicit function – Jacobian - Taylor's Expansion - Maxima/Minima for function of two variables - Method of Lagrange's multipliers.

UNIT V MULTIPLE INTEGRALS 12

Double integration - Cartesian and Polar co-ordinates - Change of order of integration - Change of variable between Cartesian and polar co-ordinates - Triple integration - Area as a double integration - Volume as a triple integral.

TOTAL= 60 PERIODS

TEXT BOOK

1. B.S.Grewal,'Higher Engineering Mathematics', Thirty Sixth Edition,Khanna Publishers,Delhi,2005.
2. Kreyszig, E., Advanced Engineering Mathematics, 8th edition, John Wiley Sons, 2001
3. Dr.P.Kandasamy , Dr.K.Thilagavathy , Dr.K.Gunavathy , S. Chand & Company Ltd.
4. Ram nagar, New Delhi

REFERENCS

1. Greenberg, M.D. Advanced Engineering Mathematics, Second Edition, Pearson Education Inc. (First Indian reprint), 2002
2. Venkataraman.M.K.,"Engineering Mathematics",Volume I and II Revised enlarged Fourth Edition, The National ?Publishing Cpompany,Chennai,2004.
3. Veerarajan.T"Engineering Mathematics",Fourth Edition,Tata McGraw – hill publishing company Ltd,New Delhi,2005.

12F1Z3	ENGINEERING PHYSICS – I	L	T	P	C
		3	0	0	3

UNIT I ULTRASONICS 9

Introduction – Production – magnetostriction effect - magnetostriction generator- piezoelectric effect - piezoelectric generator- Detection of ultrasonic waves, properties – Cavitations - Velocity measurement – acoustic grating - Industrial applications – drilling, welding, soldering and cleaning – SONAR - Non Destructive Testing – pulse echo system through transmission and reflection modes - A,B and C –scan displays, Medical applications – Sonograms.

UNIT II LASERS 9

Introduction – Principle of Spontaneous emission and stimulated emission. Population inversion, pumping. Einsteins A and B coeffcients - derivation. Types of lasers – He-Ne, CO2 , Nd-YAG, Semiconductor lasers- Qualitative Industrial Applications - Lasers in welding, heat treatment, cutting – Medical applications - Holography and uses.

UNIT III FIBER OPTICS and APPLICATIONS 9

Principle and propagation of light in optical fibres – Numerical aperture and Acceptance angle - Types of optical fibres (material, refractive index, mode) – Double crucible technique of fibre drawing - Fibre optical communication system (Block diagram) - Light sources - Detectors - Fibre optic sensors – temperature and displacement - Endoscope.

UNIT IV QUANTUM PHYSICS 9

Black body radiation – Planck's theory (derivation)- Compton effect- Theory and experimental verification – Matter waves – Schrödinger's wave equation – Time independent and time dependent equations – Physical significance of wave function – Particle in a one dimensional box.

UNIT V CRYSTAL PHYSICS 9

Lattice – Unit cell – Bravais lattice – Lattice planes – Miller indices – d spacing in cubic lattice – Calculation of number of atoms per unit cell – Atomic radius – Coordination number – Packing factor for SC, BCC, FCC and HCP structures –Crystal defects – point, line and surface defects- Burger vector.

TOTAL= 45 PERIODS

TEXT BOOK

1. R. K. Gaur and S.C. Gupta, 'Engineering Physics' Dhanpat Rai Publications, New Delhi(2003).
2. M.N. Avadhanulu and PG Kshirsagar, 'A Text book of Engineering Physics',S.Chand and company, Ltd., New Delhi, 2005.
3. K.Rajagopal , " Engineering Physics " Prentice – Hall of India Pvt. Ltd. New Delhi , 2007.

REFERENCES

1. Serway and Jewett, 'Physics for Scientists and Engineers with Modern Physics',6th Edition, Thomson Brooks/Cole, Indian reprint (2007)
2. Rajendran, V and Marikani A, 'Engineering Physics' Tata McGraw Hill Publications Ltd, III Edition, New Delhi, (2004).
3. Palanisamy, P.K., 'Engineering Physics' Scitech publications, Chennai, (2007).
4. Jayakumar. S, 'Engineering Physics', R.K. Publishers, Coimbatore, (2003).
5. Chitra Shadrach and Sivakumar Vadivelu, 'Engineering Physics', Pearson Education, New Delhi, (2007).

12F1Z4	ENGINEERING CHEMISTRY – I	L	T	P	C
		3	0	0	3

AIM

To impart a sound knowledge on the principles of chemistry involving the different Application oriented topics required for all engineering branches.

OBJECTIVES

- The student should be conversant with the principles water characterization and treatment of potable and industrial purposes.
- Principles of polymer chemistry and engineering applications of polymers
- Industrial applications of surface chemistry
- Conventional and non-conventional energy sources and energy storage
- Devices and Chemistry of engineering materials

UNIT I WATER TECHNOLOGY 9

Characteristics – alkalinity – types of alkalinity and determination – hardness –types and estimation by EDTA method (problems); Domestic water treatment –disinfection methods (Chlorination, ozonation. UV treatment) – Boiler feed water– requirements – disadvantages of using hard water in boilers – internal conditioning (phosphate, calgon and carbonate conditioning methods) – external conditioning – demineralization process – desalination and reverse osmosis.

UNIT II POLYMERS AND COMPOSITES 9

Polymers-definition – polymerization – types – addition and condensation Polymerization – free radical polymerization mechanism – Plastics, classification–Preparation, properties and uses of PVC, Teflon, polycarbonate, polyurethane, Nylon-6, 6, PET- Rubber - vulcanization of rubber, synthetic rubbers – buty1Rubber, SBR, Composites – definition, types polymer matrix composites – FRP only.

UNIT III SURFACE CHEMISTRY 9

Adsorption – types – adsorption of gases on solids – adsorption isotherms –Frendlich and Langmuir isotherms – adsorption of solutes from solution – role of adsorbents in catalysis, ion-exchange adsorption and pollution abatement.

UNIT IV NON-CONVENTIONAL ENERGY SOURCES AND STORAGE DEVICES 9

Nuclear energy – fission and fusion reactions and light water nuclear reactor for Power generation (block diagram only) – breeder reactor – solar energy Conversion – Solar cells – wind energy – fuel cells – hydrogen – oxygen fuel cell – Batteries – Alkaline batteries – lead–acid, nickel–cadmium and lithium batteries.

UNIT V ENGINEERING MATERIALS 9

Refractories – classification – acidic, basic and neutral refractories – properties (refractoriness, refractoriness under load, dimensional stability, porosity, thermal spalling) – manufacture of alumina, magnesite and zirconia bricks, Abrasives – natural and synthetic abrasives – quartz, corundum, emery, garnet, diamond, silicon carbide and boron carbide. Lubricants – mechanism of lubrication, liquid lubricants, - properties – viscosity index, flash and fire points, cloud and pour points, oilyness) – solid lubricants – graphite and molybdenum sulphide. Nanomaterials – introduction to nanochemistry – carbon nanotubes and their

Applications

TOTAL= 45 PERIODS

TEXT BOOK

1. P.C.Jain and Monica Jain, "Engineering Chemistry" Dhanpat Rai Pub, Co., New Delhi (2002).
2. Dr.A.Ravikrishnan, "Engineering Chemistry" Sri Krishna Publications, Chennai. (2002)
3. S.S. Dara "A text book of engineering chemistry" S.Chand and Co.Ltd., New Delhi (2006).

REFERENCES

1. B.K.Sharma "Engineering chemistry" Krishna Prakasan Media (P) Ltd., Meerut (2001).
2. B. Sivasankar "Engineering Chemistry" Tate McGraw-Hill Pub.Co.Ltd, New Delhi (2008).

12F1Z5	FUNDAMENTALS OF COMPUTING AND PROGRAMMING	L	T	P	C
		3	0	0	3

AIM

To provide an awareness to Computing and Programming

OBJECTIVES

- To enable the student to learn the major components of a computer system
- To know the correct and efficient ways of solving problems
- To learn to program in C

UNIT I INTRODUCTION TO COMPUTERS 9

Introduction – Characteristics of Computers – Evolution of Computers - Computer Generations – Classification of Computers – Basic Computer organization – Number Systems- Computer Software –Types of Software – Software Development Steps – Internet Evolution – Basic Internet Terminology- Internet Services.

UNIT II PROBLEM SOLVING 9

Problem Solving Using Computers- Planning the Computer Program – Purpose – Algorithm – Flow Charts – Pseudo code.

UNIT III INTRODUCTION TO C 9

Overview of C – Constants, Variables and Data Types – Operators and Expressions – Managing Input and Output operators – Decision Making - Branching and Looping.

UNIT IV ARRAYS AND FUNCTIONS 9

Arrays- Handling of Character Strings – User-defined Functions – Definitions – Declarations - Call by reference – Call by value.

UNIT V STRUCTURES AND POINTERS 9

Structures and Unions – Pointers – Arrays – The Preprocessor – Developing a C Program : Some Guidelines

TOTAL= 45 PERIODS

TEXT BOOK

1. Ashok.N.Kamthane," Computer Programming", Pearson Education (India) (2008).
2. Behrouz A.Forouzan and Richard.F.Gilberg, "A Structured Programming Approach Using C", II Edition, Brooks-Cole Thomson Learning Publications, (2007).

REFERENCES

1. Pradip Dey,Manas Ghoush, "Programming in C", Oxford University Press.(2007).
2. Byron Gottfried, "Programming with C", 2nd Edition, (Indian Adapted Edition), TMH publications, (2006). (Unit II, III, IV, and V).
3. Stephen G.Kochan, "Programming in C", Third Edition, Pearson Education India, (2005).
4. Brian W.Kernighan and Dennis M.Ritchie, "The C Programming Language", Pearson Education Inc., (2005).
5. E.Balagurusamy, "Computing fundamentals and C Programming", Tata McGRaw-Hill Publishing Company Limited, (2008).
6. S.Thamarai Selvi and R.Murugan, "C for All", Anuradha Publishers, (2008).

12F1Z6 ENGINEERING GRAPHICS

L	T	P	C
3	1	0	4

AIM

To develop Graphic skills of the students.

OBJECTIVES

- To develop in students graphic skill for communication of concepts, ideas and design of engineering products and expose them to existing national standards related to technical drawings.

UNIT I PLANE CURVES AND FREE HAND SKETCHING 15

Conics – Construction of ellipse, Parabola and hyperbola by eccentricity method –Construction of cycloid – construction of involutes of squad and circle – Drawing of tangents and normal to the above curves.

UNIT II PROJECTION OF POINTS, LINES AND PLANE SURFACES 15

Projection of points and straight lines located in the first quadrant – Determination of true lengths and true inclinations – Projection of polygonal surface and circular lamina inclined to both reference planes.

UNIT III PROJECTION OF SOLIDS 15

Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one reference plane by change of position method.

UNIT IV SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES 15

Sectioning of above solids in simple vertical position by cutting planes inclined to one reference plane and perpendicular to the other – Obtaining true shape of section.

Development of lateral surfaces of simple and truncated solids – Prisms, pyramids, cylinders and cones – Development of lateral surfaces of solids with cylindrical cutouts, perpendicular to the axis.

UNIT V ISOMETRIC AND PERSPECTIVE PROJECTIONS 15

Principles of isometric projection – isometric scale – isometric projections of simple solids, truncated prisms, pyramids, cylinders and cones.

Perspective projection of prisms, pyramids and cylinders by visual ray method.

TOTAL= 75 PERIODS

TEXT BOOK

1. N.D. Bhatt, "Engineering Drawing" Charotar Publishing House, 46 Th Edition, (2003).

REFERENCES

1. K. V. Natrajan, "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai (2006).
2. M.S. Kumar, "Engineering Graphics", D.D. Publications, (2007).
3. K. Venugopal and V. Prabhu Raja, "Engineering Graphics", New Age International (P) Limited (2008).
4. M.B. Shah and B.C. Rana, "Engineering Drawing", Pearson Education (2005).
5. K. R. Gopalakrishnana, "Engineering Drawing" (Vol.IandII), Subhas Publications (1998).
6. Dhananjay A.Jolhe, "Engineering Drawing with an introduction to AutoCAD" Tata McGraw Hill.
7. Publishing Company Limited (2008).Basant Agarwal and Agarwal C.M., "Engineering Drawing", Tata McGraw Hill Publishing Company Limited, New Delhi, (2008).

12F1Z7	PHYSICS LABORATORY – I	L	T	P	C
		0	0	3	2

LIST OF EXPERIMENTS

1. Particle size determination using Diode Laser
   (b) Determination of wavelength of the Laser source.
   (c) Determination of acceptance angle and Numerical aperture of an optical fiber.
2. Determination of thickness of a thin wire – Air wedge method
3. Determination of velocity of sound and compressibility of liquid – Ultrasonic interferometer.
4. Spectrometer- Dispersive power of a prism.
5. Determination of thermal conductivity of a bad conductor – Lee's Disc method.
6. Determination of Young's modulus of the material – non uniform bending.

12F1Z7	CHEMISTRY LABORATORY – I	L	T	P	C
		0	0	3	2

LIST OF EXPERIMENTS

1. Estimation of hardness of Water by EDTA
2. Estimation of Copper in brass by EDTA
3. Estimation of ferrous iron by Potentiometric titrations
4. Estimation of hydrochloric acid by P^H metry.
5. Determination of DO in water (Winkler's method)

REFERENCES

1. Text book of Quantitative Inorganic Analysis,A.I.Vogel, ELBS, London.
2. A.Ravikrishnan,"Practical Engineering Chemistry", Sri Krishna Publications, Chennai(2002)

12F1Z8	COMPUTER PRACTICE LABORATORY-I	L	T	P	C
		0	0	3	2

LIST OF EXERCISES

1) **Word Processing**

a) Create a word Document using Table creation, Table Formatting and Scientific notations
b) Create Mail Merge
c) Drawing Flowchart for the following
i) To find the largest of three numbers A,B, and C
ii) To find the sum of first 50 Natural numbers
iii) Factorial of given number using Recursion

2) **Spreadsheet**

a) Create Spreadsheet using the following features:
Tables, Charts, Formula, Formula Editor
Sorting, Import/Export Features.

3) **Power-point**

a) Create a Power point Presentation about your college.
"C" Programs

Aim:

To practice C programs for the following concepts:

4) Simple C Programs using Data types, Expression Evaluation
5) Program using Conditional and Looping Statements
6) Program using Arrays
7) Program using functions
8) Program using Switch…case Statement
9) Program using Strings
10) Program using Structures
11) Program using Unions
12) Program using Pointers

12F1Z9 ENGINEERING PRACTICES LABORATORY L T P C

0 0 3 2

OBJECTIVES

- To provide exposure to the students with hands on experience on various basic engineering practices in Civil, Mechanical, Electrical and Electronics Engineering.

GROUP A CIVIL AND MECHANICAL

I .CIVIL ENGINEERING PRACTICE 9

Buildings:

(a) Study of plumbing and carpentry components of residential and industrial buildings. Safety aspects.

Plumbing Works:

(a) Study of pipeline joints, its location and functions: valves, taps, couplings, unions, reducers, elbows in household fittings.
(b) Study of pipe connections requirements for pumps and turbines.
(c) Preparation of plumbing line sketches for water supply and sewage works.
(d) Hands-on-exercise:
Basic pipe connections – Mixed pipe material connection – Pipe Connections with different joining components.
(e) Demonstration of plumbing requirements of high-rise buildings.

Carpentry using Power Tools only:

(a) Study of the joints in roofs, doors, windows and furniture.
(b) Hands-on-exercise: Wood work, joints by sawing, planing and cutting.

II . MECHANICAL ENGINEERING PRACTICE 13

Welding:

(a) Preparation of arc welding of butt joints, lap joints and tee joints.
(b) Gas welding practice

Basic Machining:

(a) Simple Turning and Taper turning
(b) Drilling Practice

Sheet Metal Work:

(a) Forming and Bending:
(b) Model making – Trays, funnels, etc.
(c) Different type of joints.

Machine assembly practice:

(a) Study of centrifugal pump
(b) Study of air conditioner

Demonstration on:

(a) Smithy operations, upsetting, swaging, setting down and bending. Example – Exercise – Production of hexagonal headed bolt.

(b) Foundry operations like mould preparation for gear and step cone pulley.
(c) Fitting – Exercises – Preparation of square fitting and vee – fitting models.

GROUP B ELECTRICAL and ELECTRONICS

III ELECTRICAL ENGINEERING PRACTICE 10

1. Residential house wiring using switches, fuse, indicator, lamp and energymeter.
2. Fluorescent lamp wiring.
3. Stair case wiring
4. Measurement of electrical quantities – voltage, current, power and power factor in RLC circuit.
5. Measurement of energy using single phase energy meter.
6. Measurement of resistance to earth of electrical equipment.

IV ELECTRONICS ENGINEERING PRACTICE 13

1. Study of Electronic components and equipments – Resistor, colour coding measurement of AC signal parameter (peak-peak, rms period, frequency) using CRO.
2. Study of logic gates AND, OR, EOR and NOT.
3. Generation of Clock Signal.
4. Soldering practice – Components Devices and Circuits – Using general purpose PCB.
5. Measurement of ripple factor of HWR and FWR.

TOTAL= 45PERIODS

REFERENCES

- K.Jeyachandran, S.Natarajan and S, Balasubramanian, "A Primer on Engineering Practices Laboratory", Anuradha Publications, (2007).
- T.Jeyapoovan, M.Saravanapandian and S.Pranitha, "Engineering Practices Lab Manual", Vikas Publishing House Pvt.Ltd, (2006)
- H.S. Bawa, "Workshop Practice", Tata McGraw – Hill Publishing Company Limited, (2007).
- A.Rajendra Prasad and P.M.M.S. Sarma, "Workshop Practice", Sree Sai Publication, (2002).
- P.Kannaiah and K.L.Narayana, "Manual on Workshop Practice", Scitech Publications, (1999).

12F2Z1 TECHNICAL ENGLISH-II

L	T	P	C
3	1	0	4

AIM

- To Build Vocabularies for an effective communication
- To know the mechanics of Writing for various Situations
- To obtain excellence in Oral Communication
- To Know the basics of Presentation Techniques
- To improve listening skill with all types of audio script

UNIT I READING 12

Intensive reading and predicting content, Reading and interpretation, Reading comprehension exercises with questions on overall content – Discussions analyzing stylistic features (creative and factual description) – Reading comprehension exercises with texts including graphic communication– Exercises in interpreting non-verbal communication-Reading comprehension exercises with critical questions, multiple choice, Reading comprehension exercises with analytical questions on content – Evaluation of content questions.

UNIT II WRITING 12

Writing a Report-Writing a Proposal-Writing a Feasibility Report-Writing Situational Report- Memo-Writing Agenda -Writing Minutes -Writing Manuals-Writing Thesis statements-Writing Recommendation, Checklist, Instruction-Writing Statement of Purpose-Writing Letter of Recommendation-Writing Statement of the Problem-Transcoding Flow Chart, Pie Chart, Bar Diagram, Line Graph

UNIT III LISTENING 12

Listening to gather Information- Listening to stories- Listening to a conversations/Interviews Listening to a News Report- Listening to a famous speeches, ceremonial speech, awareness programme and technical presentation- Intensive Listening to find exact information-Listening for gist-Listening to identify expressions used in Discussions-Listening to identify tonal Variations in Speeche

UNIT IV SPEAKING 12

Talking about General Contents, localities, home town, ambition in life, Future plan-Introducing others-Describing/Introducing function of a product/ machine, talking about pros and cons of the product-Communication for the Mass-Welcome Address, Special Address, Presidential Address, Vote of thanks -Speaking with good Pronunciation-Famous quotes, speeches- Public Speech-Speaking on the General Topic-Appropriate Communication-Answering to the Question, adding valuable points to the discussion, giving an appropriate reply, appropriate vocabulary according to the audience-Giving a specific information about Statistics used in Bar diagram, Pie Chart -Role-Play-Hr and applicant, Purchase Manager and Customer, Industrialist- Reporter, Employer- Employee, Managing Director-HR

UNIT V FOCUS ON LANGUAGE 12

Synonym-Antonym- Homonym-Tenses-Phrasal Verbs- Acronym- Abbreviations-Foreign words-Confusing Words-Analogy- Numerical Expressions- Purpose Statement- Error Corrections-Direct andIndirect Speech

TOTAL= 60PERIODS

TEXT BOOK

1. Department of Humanities and Social Sciences, Anna University, '*English for Engineers and Technologists*' Combined Edition (Volumes 1 and 2), Chennai: Orient Longman Pvt. Ltd., 2006.

REFERENCES

1. Sharan J.Genrson and Steven M.Gerson – "Technical Writing – Process and Product" – Pearson Education – 2000.
2. Raymond V.Lesikar, John D. Pettit and Mary E.Flatley – Lesikass BasicCommunication Tata McGraw Will 8th Edition – 1999.
3. Stevel. E. Pauley, Daniel G.Riordan – Technical Report Writing Today – AITBS

Publishing and Distributors, India 5th edition – 2000.
4. Robert L.Shurter, Effective letters in business Third Ed. 1983.
5. Norman Whitby, Business Benchmark – Pre-Intermediate to Intermediate, Students Book, Cambridge University Press, 2006.
6. Cambridge BEC Preliminary 1 : Practice Tests from the University of Cambridge Local Examinations Syndicate, University of Cambridge Local Examinations Syndicate, PB, ISBN: 9780521753012
7. Cambridge BEC Preliminary 2 Student's Book with Answers : Examination papers from University of Cambridge ESOL Examinations, Cambridge ESOL, PB, ISBN: 9780521544504

12F2Z2 ENGINEERING MATHEMATICS – II L T P C
(COMMON TO ALL BRANCHES) 3 1 0 4

UNIT I LAPLACE TRANSFORM 12

Laplace transform – Conditions for existence – Transform of elementary functions –Basic properties – Transform of derivatives and integrals – Transform of unit step function and impulse functions – Transform of periodic functions. Definition of Inverse Laplace transform as contour integral – Convolution theorem (excluding proof) – Initial and Final value theorems – Solution of linear ODE of second order with constant coefficients using Laplace transformation techniques

UNIT II VECTOR CALCULUS 12

Gradient , Divergence and Curl – Directional derivative – Irrotational and solenoidal vector fields – Vector integration – Green's theorem in a plane, Gauss divergence theorem and stokes' theorem (excluding proofs) – Simple applications involving cubes and rectangular parallelepipeds.

UNIT III ANALYTIC FUNCTIONS 12

Functions of a complex variable – Analytic functions – Necessary conditions, Cauchy– Riemann equation and Sufficient conditions (excluding proofs) – Harmonic and orthogonal properties of analytic function – Harmonic conjugate – Construction of analytic functions – Conformal mapping : w= z+c, cz, 1/z, and bilinear transformation.

UNIT IV COMPLEX INTEGRATION 12

Statement and application of cauchy's theorem and Cauchy's integral formula, Taylor and Laurent expansion, Singularities, Classification, Residues, Cauchy's residue theorem, Contour integration, Unit circle and semi-circular contours (excluding poles on real axis)

UNIT V ORDINARY DIFFERENTIAL EQUATIONS 12

Higher order linear differential equations with constant coefficients – Method of variation of parameters – Cauchy's and Legendre's linear equations – Simultaneous
first order linear equations with constant coefficients.

TOTAL= 60 PERIODS

TEXT BOOK

1) B.S.Grewal,'Higher Engineering Mathematics', Thirty Sixth Edition,Khanna Publishers, Delhi,2005.
2) Kreyszig, E., Advanced Engineering Mathematics, 8th edition, John Wiley Sons, 2001

REFERENCES

1) Greenberg, M.D. Advanced Engineering Mathematics, Second Edition, Pearson Education Inc. (First Indian reprint), 2002
2) Venkataraman.M.K.,"Engineering Mathematics",Volume I and II Revised enlarged Fourth Edition The National ?Publishing Cpompany,Chennai,2004.
3) Veerarajan.T"Engineering Mathematics",Fourth Edition,Tata McGraw – hill publishing company Ltd,New Delhi,2005.

12F2Z3 ENGINEERING PHYSICS – II

L	T	P	C
3	0	0	3

UNIT I CONDUCTING MATERIALS 9

Conductors – classical free electron theory of metals – Electrical and thermal conductivity – Wiedemann – Franz law – Lorentz number – Draw backs of classical theory – Quantum theory – Fermi distribution function – Effect of temperature on Fermi Function – Density of energy states – carrier concentration in metals.

UNIT II SEMICONDUCTING MATERIALS 9

Intrinsic semiconductor – carrier concentration derivation – Fermi level – Variation of Fermi level with temperature – electrical conductivity – band gap determination – extrinsic semiconductors – carrier concentration derivation in n-type and p-type semiconductor – variation of Fermi level with temperature and impurity concentration – compound semiconductors – Hall effect –Determination of Hall coefficient – Applications.

UNIT III MAGNETIC AND SUPERCONDUCTING MATERIALS 9

Origin of magnetic moment – Bohr magneton – Dia and para magnetism – Ferro magnetism – Domain theory – Hysteresis – soft and hard magnetic materials – anti – ferromagnetic materials – Ferrites – applications – magnetic recording and readout – storage of magnetic data – tapes, floppy and magnetic disc drives.

Superconductivity : properties - Types of super conductors – BCS theory of superconductivity(Qualitative) - High Tc superconductors – Applications of superconductors – SQUID, cryotron, magnetic levitation.

UNIT IV DIELECTRIC MATERIALS 9

Electrical susceptibility – dielectric constant – electronic, ionic, orientational and space charge polarization – frequency and temperature dependence of polarisation – internal field – Claussius – Mosotti relation (derivation) – dielectric loss – dielectric breakdown – uses of dielectric materials (capacitor and transformer) – ferroelectricity and applications.

UNIT V MODERN ENGINEERING MATERIALS 9

Metallic glasses: preparation, properties and applications.

Shape memory alloys (SMA): Characteristics, properties of NiTi alloy, application, advantages and disadvantages of SMA.

Nanomaterials: synthesis –plasma arcing – chemical vapour deposition – sol-gels – electrodeposition – ball milling - properties of nanoparticles and applications.

Carbon nanotubes: fabrication – arc method – pulsed laser deposition – chemical vapour deposition - structure – properties and applications.

TOTAL= 45 PERIODS

TEXT BOOK

1. Charles Kittel ' Introduction to Solid State Physics', John Wiley and sons, 7 edition, Singapore (2007)
2. Charles P. Poole and Frank J.Ownen, 'Introduction to Nanotechnology', Wiley India(2007) (for Unit V)
3. K.Rajagopal , "Engineering Physics" Prentice Hall of India Pvt.Ltd. New Delhi , 2007

REFERENCES

1. Rajendran, V, and Marikani A, 'Materials science'Tata McGraw Hill publications, (2004) Newdelhi.
2. Jayakumar, S. 'Materials science', R.K. Publishers, Coimbatore, (2008).
3. Palanisamy P.K, 'Materials science', Scitech publications(India) Pvt. LTd., Chennai, Second Edition(2007)
4. M. Arumugam, 'Materials Science' Anuradha publications, Kumbakonam, (2006).

12F2Z4 ENGINEERING CHEMISTRY – II L T P C
3 0 0 3

AIM

To impart a sound knowledge on the principles of chemistry involving the different application oriented topics required for all engineering branches.

OBJECTIVES

- The student should be conversant with the principles electrochemistry, electrochemical cells, emf and applications of emf measurements.
- Principles of corrosion control
- Chemistry of Fuels and combustion
- Industrial importance of Phase rule and alloys
- Analytical techniques and their importance.

UNIT I ELECTROCHEMISTRY 9

Electrochemical cells – reversible and irreversible cells – EMF – measurement of emf – Single electrode potential – Nernst equation (problem) – reference electrodes –Standard Hydrogen electrode -Calomel electrode – Ion selective electrode – glass electrode and measurement of pH – electrochemical series – significance – potentiometer titrations (redox - Fe^{2+} vs dichromate and precipitation – Ag^{+} vs CI^{-} titrations) and conduct metric titrations (acid-base – HCI vs, NaOH) titrations

UNIT II CORROSION AND CORROSION CONTROL 9

Chemical corrosion – Pilling – Bedworth rule – electrochemical corrosion – different types – galvanic corrosion – differential aeration corrosion – factors influencing corrosion – corrosion control – sacrificial anode and impressed cathodic current methods – corrosion inhibitors – protective coatings – paints – constituents and functions – metallic coatings – electroplating (Au) and electroless (Ni) plating.

UNIT III FUELS AND COMBUSTION 9

Calorific value – classification – Coal – proximate and ultimate analysis metallurgical coke – manufacture by Otto-Hoffmann method – Petroleum processing and fractions – cracking – catalytic cracking and methods-knocking – octane number and cetane number – synthetic petrol – Fischer Tropsch and Bergius processes – Gaseous fuels- water gas, producer gas, CNG and LPG, Flue gas analysis – Orsat apparatus – theoretical air for combustion.

UNIT IV PHASE RULE AND ALLOYS 9

Statement and explanation of terms involved – one component system – water system – condensed phase rule – construction of phase diagram by thermal analysis – simple eutectic systems (lead-silver system only) – alloys – importance, ferrous alloys – nichrome and stainless steel – heat treatment of steel, non-ferrous alloys – brass and bronze.

UNIT V ANALYTICAL TECHNIQUES 9

Beer-Lambert's law (problem) – UV-visible spectroscopy and IR spectroscopy – principles – instrumentation (problem) (block diagram only) – estimation of iron by colorimetry – flame photometry – principle – instrumentation (block diagram only) – estimation of sodium by flame photometry – atomic absorption spectroscopy – principles – instrumentation (block diagram only) – estimation of nickel by atomic absorption spectroscopy.

TOTAL= 45 PERIODS

TEXT BOOK

1) P.C.Jain and Monica Jain, "Engineering Chemistry" Dhanpat Rai Pub, Co.,New Delhi (2002).
2) Dr.A.Ravikrishnan, "Engineering Chemistry" Sri Krishna Publications, Chennai. (2002)
3) S.S.Dara "A text book of Engineering Chemistry" S.Chand and Co.Ltd., New Delhi (2006).

REFERENCES

1) B.Sivasankar "Engineering Chemistry" Tata McGraw-Hill Pub.Co.Ltd, New Delhi (2008).
2) B.K.Sharma "Engineering Chemistry" Krishna Prakasan Media (P) Ltd., Meerut (2001).

12F2Y5 ENGINEERING MECHANICS L T P C
3 1 0 4

OBJECTIVES

At the end of this course the student should be able to understand the vectorial and scalar representation of forces and moments, static equilibrium of particles and rigid bodies both in two dimensions and also in three dimensions. Further, he should understand the principle of work and energy. He should be able to comprehend the effect of friction on equilibrium. He should be able to understand the laws of motion, the kinematics of motion and the interrelationship. He should also be able to write the dynamic equilibrium equation. All these should be achieved both conceptually and through solved examples.

UNIT I BASICS & STATICS OF PARTICLES 12

Introduction – Units and Dimensions – Laws of Mechanics – Lame's theorem, Parallelogram and triangular Law of forces – Vectors – Vectorial representation of forces and moments – Vector operations: additions, subtraction, dot product, cross product – Coplanar Forces – Resolution and Composition of forces – Equilibrium of a particle – Forces in space – Equilibrium of a particle in space – Equivalent systems of forces – Principle of transmissibility – Single equivalent force.

UNIT II EQUILIBRIUM OF RIGID BODIES 12

Free body diagram – Types of supports and their reactions – requirements of stable equilibrium – Moments and Couples – Moment of a force about a point and about an axis – Vectorial representation of moments and couples – Scalar components of a moment – Varignon's theorem – Equilibrium of Rigid bodies in two dimensions – Equilibrium of Rigid bodies in

three dimensions – Examples

UNIT III PROPERTIES OF SURFACES AND SOLIDS 12

Determination of Areas and Volumes – First moment of area and the Centroid of sections – Rectangle, circle, triangle from integration – T section, I section, - Angle section, Hollow section by using standard formula – second and product moments of plane area – Rectangle, triangle, circle from integration – T section, I section, Angle section, Hollow section by using standard formula – Parallel axis theorem and perpendicular axis theorem – Polar moment of inertia – Principal moments of inertia of plane areas – Principal axes of inertia.

Mass moment of inertia – Derivation of mass moment of inertia for rectangular section, prism, sphere from first principle – Relation to area moments of inertia. (**for Internal test / Assignment.**)

UNIT IV DYNAMICS OF PARTICLES 12

Displacements, Velocity and acceleration, their relationship – Relative motion – Curvilinear motion – Newton's law – Work Energy Equation of particles – Impulse and Momentum.

UNIT V FRICTION AND ELEMENTS OF RIGID BODY DYNAMICS 12

Frictional force – Laws of Coloumb friction – simple contact friction – Rolling resistance – Belt friction. Translation and Rotation of Rigid Bodies – Velocity and acceleration – General Plane motion.

TOTAL= 60 PERIODS

TEXT BOOK

1. Beer, F.P and Johnson Jr. E.R. "Vector Mechanics for Engineers", Vol. 1 Statics and Vol. 2 Dynamics, McGraw-Hill International Edition, (1997).

REFERENCES

1. Rajasekaran, S, Sankarasubramanian, G., "Fundamentals of Engineering Mechanics", Vikas Publishing House Pvt. Ltd., (2000).
2. Hibbeller, R.C., "Engineering Mechanics", Vol. 1 Statics, Vol. 2 Dynamics, Pearson Education Asia Pvt. Ltd., (2000).
3. Palanichamy, M.S., Nagam, S., "Engineering Mechanics – Statics & Dynamics", Tata McGraw-Hill, (2001).
4. Irving H. Shames, "Engineering Mechanics – Statics and Dynamics", IV Edition – Pearson Education Asia Pvt. Ltd., (2003).
5. Ashok Gupta, "Interactive Engineering Mechanics – Statics – A Virtual Tutor (CDROM)", Pearson Education Asia Pvt., Ltd., (2002).

12F2X5 ELECTRIC CIRCUITS AND ELECTRON DEVICES L T P C

(For ECE, CSE and IT Branches) **3 1 0 4**

UNIT I CIRCUIT ANALYSIS TECHNIQUES 12

Kirchoff's current and voltage laws – series and parallel connection of independent sources – R, L and C – Network Theorems – Thevenin, Superposition, Norton, Maximum power transfer and duality – Star-delta conversion.

UNIT II TRANSIENT RESONANCE IN RLC CIRCUITS 12

Basic RL, RC and RLC circuits and their responses to pulse and sinusoidal inputs – frequency response – Parallel and series resonances – Q factor – single tuned and double tuned circuits.

UNIT III SEMICONDUCTOR DIODES 12

Review of intrinsic & extrinsic semiconductors – Theory of PN junction diode – Energy band structure – current equation – space charge and diffusion capacitances – effect of temperature and breakdown mechanism – Zener diode and its characteristics.

UNIT IV TRANSISTORS 12

Principle of operation of PNP and NPN transistors – study of CE, CB and CC configurations and comparison of their characteristics – Breakdown in transistors – operation and comparison of N-Channel and P-Channel JFET – drain current equation – MOSFET – Enhancement and depletion types – structure and operation – comparison of BJT with MOSFET – thermal effect on MOSFET.

UNIT V SPECIAL SEMICONDUCTOR DEVICES (Qualitative Treatment only) 12

Tunnel diodes – PIN diode, varactor diode – SCR characteristics and two transistor equivalent model – UJT – Diac and Triac – Laser, CCD, Photodiode, Phototransistor, Photoconductive and Photovoltaic cells – LED, LCD.

TOTAL= 60 PERIODS

TEXT BOOK

1. Joseph A. Edminister, Mahmood, Nahri, "Electric Circuits" – Shaum series,Tata McGraw Hill, (2001)
2. S. Salivahanan, N. Suresh kumar and A. Vallavanraj, "Electronic Devices and Circuits",Tata McGraw Hill, 2nd Edition, (2008).
3. David A. Bell, "Electronic Devices and Circuits", Oxford University Press, 5th Edition,(2008).

REFERENCES

1. Robert T. Paynter, "Introducing Electronics Devices and Circuits", Pearson Education, 7th Education, (2006).
2. William H. Hayt, J.V. Jack, E. Kemmebly and steven M. Durbin, "Engineering Circuit Analysis",Tata McGraw Hill, 6th Edition, 2002.
3. J. Millman & Halkins, Satyebranta Jit, "Electronic Devices & Circuits",Tata McGraw Hill, 2nd Edition, 2008.

12F2X6 BASIC CIVIL & MECHANICAL ENGINEERING L T P C

(For circuit branches) **3 1 0 4**

A – CIVIL ENGINEERING

UNIT I SURVEYING AND CIVIL ENGINEERING MATERIALS 15

Surveying: Objects – types – classification – principles – measurements of distances – angles – leveling – determination of areas – illustrative examples.

Civil Engineering Materials: Bricks : Properties & uses – Manufacturing, stones:Types, Cement: Manufacturing –Properties-Types of use, concrete: Manufacturing, Sand – steel sections.

UNIT II BUILDING COMPONENTS AND STRUCTURES 15

Components of Building with typical cross section sketch
Foundations: Types, Bearing capacity – Requirement of good foundations.
Superstructure: Brick masonry – stone masonry – beams – columns – lintels – roofing – flooring – plastering – Mechanics – Internal and external forces – stress – strain – elasticity – illustrative examples - Types of Bridges and Dams .

TOTAL: 30 PERIODS

B – MECHANICAL ENGINEERING

UNIT III POWER PLANT ENGINEERING 10

Introduction, Classification of Power Plants – Working principle of steam, Gas, Diesel, Hydro-electric and Nuclear Power plants – Merits and Demerits – Pumps and turbines – working principle of Reciprocating pumps (single acting and double acting) – Centrifugal Pump.

UNIT IV I C ENGINES 10

Internal combustion engines as automobile power plant – Working principle of Petrol and Diesel Engines – Four stroke and two stroke cycles – Comparison of four stroke and two stroke engines – Boiler as a power plant.

UNIT V REFRIGERATION AND AIR CONDITIONING SYSTEM 10

Terminology of Refrigeration and Air Conditioning. Principle of vapour compression and absorption system – Layout of typical domestic refrigerator – Window and Split type room Air conditioner.

TOTAL= 30 PERIODS

REFERENCES

1. Shanmugam G and Palanichamy M S, "Basic Civil and Mechanical Engineering", TMH Publishing Co., New Delhi, (1996).
2. Ramamrutham. S, "Basic Civil Engineering", Dhanpat Rai Publishing Co. (P) Ltd. (1999).
3. Seetharaman S. "Basic Civil Engineering", Anuradha Agencies, (2005).
4. Venugopal K and Prahu Raja V, "Basic Mechanical Engineering", Anuradha Publishers, Kumbakonam, (2000). Shantha Kumar S R J., "Basic Mechanical Engineering", Hi-tech Publications, Mayiladuthurai, (2000).

12F2Y6	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING (Common to branches under Civil, Mechanical and Technology faculty)	L	T	P	C
		3	1	0	4

UNIT I ELECTRICAL CIRCUITS and MEASUREMENTS 12

Ohm's Law – Kirchhoff's Laws – Steady State Solution of DC Circuits – Introduction to AC Circuits – Waveforms and RMS Value – Power and Power factor – Single Phase and Three Phase Balanced Circuits. Operating Principles of Moving Coil and Moving Iron Instruments (Ammeters and Voltmeters), Dynamometer type Wattmeters and Energy meters.

UNIT II ELECTRICAL MACHINES 12

Construction, Principle of Operation, Basic Equations and Applications of DC Generators, DC Motors, Single Phase Transformer, single phase induction Motor.

UNIT III SEMICONDUCTOR DEVICES AND APPLICATIONS 12

Characteristics of PN Junction Diode – Zener Effect – Zener Diode and its Characteristics – Half wave and Full wave Rectifiers – Voltage Regulation. Bipolar Junction Transistor – CB, CE, CC Configurations and Characteristics – Elementary Treatment of Small Signal Amplifier.

UNIT IV DIGITAL ELECTRONICS 12

Binary Number System – Logic Gates – Boolean Algebra – Half and Full Adders – Flip-Flops – Registers and Counters – A/D and D/A Conversion (single concepts)

UNIT V FUNDAMENTALS OF COMMUNICATION ENGINEERING 12

Types of Signals: Analog and Digital Signals – Modulation and Demodulation: Principles of Amplitude and Frequency Modulations. Communication Systems: Radio, TV, Fax, Microwave, Satellite and Optical Fibre (Block Diagram Approach only).

TOTAL= 60 PERIODS

TEXT BOOK

1. N. Mittle "Basic Electrical Engineering", Tata McGraw Hill Edition, New Delhi, 1990.
2. R.S. Sedha, "Applied Electronics" S. Chand and Co., 2006.

REFERENCES

1. Muthusubramanian R, Salivahanan S and Muraleedharan K A, "Basic Electrical, Electronics and Computer Engineering", Tata McGraw Hill, Second Edition, (2006).
2. Nagsarkar T K and Sukhija M S, "Basics of Electrical Engineering", Oxford press (2005).
3. Mehta V K, "Principles of Electronics", S. Chand and Company Ltd, (1994).
4. Mahmood Nahvi and Joseph A. Edminister, "Electric Circuits", Schaum' Outline Series, McGraw Hill, (2002).
5. Premkumar N, "Basic Electrical Engineering", Anuradha Publishers, (2003).

12F2Z7	PHYSICS LABORATORY-II	L	T	P	C
		0	0	3	2

LIST OF EXPERIMENTS

1. Determination of Young's modulus of the material – uniform bending.
2. Determination of viscosity of liquid – Poiseuille's method.
3. Determination of wavelength of mercury spectrum- Spectrometer Grating.
4. Torsional pendulum – Determination of rigidity modulus.
5. Determination of Band Gap of a semiconductor material.
6. Determination of specific resistance of a given coil of wire – Carey Foster Bridge**.**

A minimum of FIVE experiments shall be offered.

12F2Z7	CHEMISTRY LABORATORY – II	L	T	P	C
		0	0	3	2

LIST OF EXPERIMENTS

1. Estimation of chloride ion in water sample by Argentometric method.
2. Conductometric titration of strong acid vs strong base.
3. Conductometric precipitation titration.
4. Conductometric titration of mixture of acids.
5. Estimation of alkalinity of water sample.

REFERENCES

1. Text book of Quantitative Inorganic Analysis,A.I.Vogel, ELBS, London.
2. A.Ravikrishnan,"Practical Engineering Chemistry", Sri Krishna Publications, Chennai(2002)

12F2X7	COMPUTER AIDED DRAFTING AND MODELING LABORATORY	L	T	P	C
		0	0	3	2

LIST OF EXPERIMENTS

1. Study of capabilities of software for Drafting and Modeling – Coordinate systems (absolute, relative, polar, etc.) – Creation of simple figures like polygon and general multi-line figures.
2. Drawing of a Title Block with necessary text and projection symbol.
3. Drawing of curves like parabola, spiral, involute using Bspline or cubic spline.
4. Drawing of front view and top view of simple solids like prism, pyramid, cylinder,cone, etc, and dimensioning.
5. Drawing front view, top view and side view of objects from the given pictorial views (eg. V-block, Base of a mixie, Simple stool, Objects with hole and curves).
6. Drawing of a plan of residential building (Two bed rooms, kitchen, hall, etc.)
7. Drawing of a simple steel truss.
8. Drawing sectional views of prism, pyramid, cylinder, cone, etc,
9. Drawing isometric projection of simple objects.
10. Creation of 3D models of simple objects and obtaining 2D multi-view drawings from 3D model.

Note: Plotting of drawings must be made for each exercise and attached to the records written by students.

List of Equipments for a batch of 30 students:

1. Pentium IV computer or better hardware, with suitable graphics facility -30 Nos.
2. Licensed software for Drafting and Modeling. – 30 Licenses
3. Laser Printer or Plotter to print / plot drawings – 2 Nos.

TOTAL: 45 PERIODS

12F2E7	ELECTRICAL CIRCUIT LABORATORY (For EEE only)	L	T	P	C
		0	0	3	2

LIST OF EXPERIMENTS

1. Verification of ohm's laws and Kirchhoff's laws.
2. Verification of Thevemin's and Norton's Theorem
3. Verification of Superposition Theorem
4. Verification of Maximum Power Transfer Theorem.
5. Verification of Reciprocity Theorem
6. Measurement of self inductance of a coil
7. Verification of mesh and nodal analysis.
8. Transient response of RL and RC circuits for DC input.
9. Frequency response of series and parallel resonance circuits.
10. Frequency response of single tuned coupled circuits.

12F2Z8	COMPUTER PRACTICE LABORATORY-II	L	T	P	C
		0	0	3	2

LIST OF EXCERCISES

1. Study of Unix OS
2. Basic Commands in Unix

Shell Programs

3. Simple Shell Programs
4. Script using for Loop
5. Script using if loop
6. Script using combination of for and if loop
7. Script using while and until loop
8. Script using combination of while and if loop
9. Script using Switch case
10. String Manipulation
11. File manipulation

C-Programs

1. Function with no arguments and no return type
2. Function with no arguments and return type
3. Function with arguments and no return type
4. Function with arguments and return type
5. Call by value
6. Call by reference
7. Recursion function
8. Pointers
9. Random access functions in files
10. File handling

SYLLABUS

1. UNIX COMMANDS

Study of UNIX OS - Basic Shell Commands - Unix Editor.

2. SHELL PROGRAMMING

Simple Shell program - Conditional Statements - Testing and Loops.

3. C PROGRAMMING ON UNIX

Dynamic Storage Allocation-Pointers-Functions-File Handling.

12F2X8	CIRCUITS AND DEVICES LABORATORY	L	T	P	C
		0	0	3	2

LIST OF EXCERCISES

1. Verification of KVL and KCL
2. Verification of Thevenin and Norton Theorems.
3. Verification of superposition Theorem.
4. Verification of Maximum power transfer and reciprocity theorems.
5. Frequency response of series and parallel resonance circuits.
6. Characteristics of PN and Zener diode
7. Characteristics of CE configuration
8. Characteristics of CB configuration
9. Characteristics of UJT and SCR
10. Characteristics of JFET and MOSFET
11. Characteristics of Diac and Triac.
12. Characteristics of Photodiode and Phototransistor.

12MA31 TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS L T P C
(Common to all B.E. / B.Tech Degree Programmes) 3 1 0 4

AIM

To facilitate the understanding of the principles and to cultivate the art of formulating physical problems in the language of mathematics.

OBJECTIVES

- To develop the skills of the students in the areas of Transforms and Partial DifferentialEquations.
- To know the necessary for their effective studies in a large number of engineering subjects like Signals & Systems, Digital signal Processing ,Communication systems, and Electromagnetic theory.
- To serve as a prerequisite for post graduate and specialized studies and research.

UNIT I FOURIER SERIES 12

Dirichlet's Conditions – General Fourier Series –Odd and even functions- Half range Sine and Cosine series – Complex form of Fourier Series - Parseval's Identity – Harmonic Analysis.

UNIT II FOURIER TRANSFORMS 12

Fourier integral theorem (without proof) – Fourier transform pair – Sine and Cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity.

UNIT III PARTIAL DIFFERENTIAL EQUATIONS 12

Formation of partial differential equations – Lagrange's linear equation – Solutions of standard types of first order partial differential equations - Linear partial differential equations of second and higher order with constant coefficients.

UNIT IV APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS 12

Solutions of one dimensional wave equation – One dimensional equation of heat conduction – Steady state solution of two-dimensional equation of heat conduction (Insulated edges excluded) – Fourier series solutions in cartesian coordinates.

UNIT V TRANSFORMS AND DIFFERENCE EQUATIONS 12

Z-transforms - Elementary properties – Inverse Z-transform – Convolution theorem -Formation of difference equations – Solution of difference equations using Z-transform.

TOTAL: 60 PERIODS

TEXT BOOKS

1. Grewal, B.S, "Higher Engineering Mathematics", 40th Edition, Khanna publishers, Delhi, (2007)

REFERENCE BOOKS

1. Bali.N.P and Manish Goyal, "A Textbook of Engineering Mathematic", 7th Edition, Laxmi Publications(P) Ltd. (2007)
2. Ramana.B.V., "Higher Engineering Mathematics", Tata Mc-GrawHill Publishing Company Ltd, New Delhi (2007).
3. Glyn James, "Advanced Modern Engineering Mathematics", 3rd Edition, Pearson Education(2007).
4. Erwin Kreyszig, "Advanced Engineering Mathematics", 8th edition, Wiley India (2007).

12F2E5 CIRCUIT THEORY (For EEE Branch Only) **L T P C 3 1 0 4**

UNIT I BASIC CIRCUITS ANALYSIS 12

Ohm's Law – Kirchhoff's laws – DC and AC Circuits – Resistors in series and parallel circuits – Mesh current and node voltage method of analysis for D.C and A.C. circuits.

UNIT II NETWORK REDUCTION AND NETWORK THEOREMS FOR DC AND AC CIRCUITS 12

Network reduction: voltage and current division, source transformation – star delta conversion. Thevenin's and Norton's Theorem – Superposition Theorem – Maximum power transfer theorem – Reciprocity Theorem.

UNIT III RESONANCE AND COUPLED CIRCUITS 12

Series and parallel resonance – their frequency response – Quality factor and Bandwidth - Self and mutual inductance – Coefficient of coupling – Tuned circuits – Single tuned circuits.

UNIT IV TRANSIENT RESPONSE FOR DC AND AC CIRCUITS 12

Transient response of RL, RC and RLC Circuits using Laplace transform for DC input and A.C. with sinusoidal input.

UNIT V ANALYSING THREE PHASE CIRCUITS 12

Three phase balanced / unbalanced voltage sources – analysis of three phase 3-wire and 4-wire circuits with star and delta connected loads, balanced and un balanced – phasor diagram of voltages and currents – power and power factor measurements in three phase circuits.

TOTAL= 60 PERIODS

TEXT BOOK

1. William H. Hayt Jr, Jack E. Kemmerly and Steven M. Durbin, "Engineering Circuits Analysis",Tata McGraw Hill publishers, 6th edition, New Delhi, 2002.
2. Sudhakar A and Shyam Mohan SP, "Circuits and Network Analysis and Synthesis",Tata McGraw Hill, (2007).

REFERENCS

1. Paranjothi SR, "Electric Circuits Analysis," New Age International Ltd., New Delhi, (1996).
2. Joseph A. Edminister, Mahmood Nahri, "Electric circuits", Schaum's series, Tata McGraw- Hill, New Delhi (2001).
3. Chakrabati A, "Circuits Theory (Analysis and synthesis), Dhanpath Rai and Sons, Nev Delhi, (1999).
4. Charles K. Alexander, Mathew N.O. Sadik, "Fundamentals of Electric Circuits", Seco Edition, McGraw Hill, (2003).

12EE31 ELECTRONIC DEVICES L T P C
3 0 0 3

AIM

To study the characteristics and applications of electronic devices.

OBJECTIVES

To acquaint the students with construction, theory and characteristics of the following electronic devices:

- p-n junction diode.
- Bipolar transistor.
- Field Effect transistor.
- LED, LCD and other photo electronic devices.
- Power control/regulator devices.

UNIT I SEMICONDUCTOR DIODE 9

Theory of p-n junction – p-n junction as diode – p-n diode currents – Volt-amp characteristics – Diode resistance –Equivalent Circuits – Temperature effect of p-n junction – Transition and diffusion capacitance of p-n diode – Diode switching times – Zener Diodes.

UNIT II BI-POLAR JUNCTION TRANSISTOR 9

Junction transistor – Transistor construction – Detailed study of currents in transistor – Input and output characteristics of CE, CB and CC configurations – Transistor hybrid model for CE configuration – Analytical expressions for transistor characteristics – Transistor switching times – Voltage rating – Power transistors.

UNIT III FETs 9

Field Effect Transistors – Construction and Characteristics Transfer characteristics –MOSFETs and their characteristics–FET as a variable resistor – Unijunction transistor.

UNIT IV OPTO ELECTRONIC DEVICES 9

Photo emissivity and photo electric theory – Theory, construction and characteristics: light emitting diodes, liquid crystal cell, Charge coupled device, seven segment display, photo conductive cell, photodiode, solar cell, photo transistor, opto-couplers and laser diode, Light activated SCR**.**

UNIT V SPECIAL SEMICONDUCTOR DEVICES 9

Theory, characteristics and application: SCR, DIAC,TRIAC, GTO,PUT, tunnel diode, –Schottkey, varactor, power diodes. thermistors, piezo-electric devices, charge coupled devices, LDR and Metal Oxide Varistor.

TOTAL = 45 PERIODS

TEXT BOOKS

1. Robert L. Boylestad, Louis Nashelsky “Electronic Devices and Circuit Theory”, 10th Edition, Pearson Education, 2009.
2. S.Salivahanan, N.Sureshkumar, “Electronic Devices and Circuits”, 3rd Edition, Tata McGraw Hill, 2012.

REFERENCE BOOKS

1. R.S.Sedha, “A Text book of Applied Electronics”, 2nd Edition, S.Chand & Company Ltd., 2008.
2. Albert Paul Malvino, “Electronic Priciples”, Tata McGraw Hill, 2002.
3. David A. Bell, “Electronic Devices and Circuits”, 4th Edition, Prentice Hall India, 1999.
4. Millman and Halkias, “Electron devices and circuits”, Tata McGraw Hill 2003.

5. Donald L. Schilling and Charles Belove, "Electronic Circuits: Discrete and Integrated" McGraw-Hill, 2000.
6. Floyd, "Electronic Devices", 7th Edition, Pearson Education, 2008.

12EE32 ELECTROMAGNETIC THEORY L T P C
3 1 0 4

AIM

To expose the students to the fundamentals of electromagnetic fields and their applications in Electrical Engineering

OBJECTIVES

To impart knowledge on

- Concepts of electrostatics, electrical potential, energy density and their applications.
- Concepts of magneto statics, magnetic flux density, scalar and vector potential and its Applications.
- Faraday's laws, induced emf and their applications.
- Concepts of electromagnetic waves and Poynting vector.
- Field modeling and computation with relevant software.

UNIT I INTRODUCTION TO VECTOR ANALYSIS 12

Sources and effects of electromagnetic fields – Vector fields – Different co-ordinate systems- vector calculus – Gradient, Divergence and Curl - Divergence theorem –Stoke's theorem.

UNIT II ELECTROSTATICS 12

Coulomb's Law – Electric field intensity – Field due to point and continuous charges –Gauss's law and application – Electric potential – Electric field and equipotential plots –Electric field in free space, conductors, dielectric -Dielectric polarization – Dielectric strength - Electric field in multiple dielectrics – Boundary conditions, Poisson's and Laplace's equations – Capacitance- Energy density.

UNIT III MAGNETOSTATICS 12

Lorentz Law of force, magnetic field intensity – Biot–savart Law - Ampere's Law –Magnetic field due to straight conductors, circular loop, infinite sheet of current –Magnetic flux density (B) – B in free space, conductor, magnetic materials –Magnetization – Magnetic field in multiple media – Boundary conditions – Scalar and vector potential – Magnetic force – Torque – Inductance – Energy density – Magnetic circuits.

UNIT IV ELECTRODYNAMIC FIELDS 12

Faraday's laws, induced emf – Transformer and motional EMF – Forces and Energy in quasi-stationary Electromagnetic Fields - Maxwell's equations (differential and integral forms) – Displacement current – Relation between field theory and circuit theory.

UNIT V ELECTROMAGNETIC WAVES 12

Generation – Electro Magnetic Wave equations – Wave parameters; velocity, intrinsic impedance, propagation constant – Waves in free space, lossy and lossless dielectrics, conductors-skin depth, Poynting vector – Plane wave reflection and refraction –Transmission lines – Line equations – Input impedances – Standing wave ratio and power.

TOTAL = 60 PERIODS

TEXT BOOKS

1. Mathew N. O. Sadiku, 'Elements of Electromagnetics', Oxford University Press, 1st Edition, 2010.
2. Ashutosh Pramanik, 'Electromagnetism – Theory and Applications', Prentice-Hall of India Private Limited, New Delhi, 2006.

REFERENCE BOOKS

1. Joseph. A. Edminister, 'Theory and Problems of Electromagnetics', 2nd Edition, Schaum Series,

Tata McGraw Hill, 1993.
2. William.H.Hayt, 'Engineering Electromagnetics', Tata McGraw Hill edition, 2001.
3. Kraus and Fleish, 'Electromagnetics with Applications', McGraw Hill International Editions, 5th Edition, 1999.
4. K.A. Gangadhar, P.M. Ramanathan, "Field Theory, Including Antennas and Wave Propagation:For Electrical, Electronics and Communication Engineering", Khanna Publishers, 2002.

12EE33 **ELECTRICAL MACHINES – I** **L T P C**
3 1 0 4

AIM

To expose the students to the basic principles of electro-mechanical energy conversion in Electrical Apparatus and the operation of Transformers and DC Machines.

OBJECTIVES

- To familiarize the constructional details, the principle of operation, prediction of performance, the methods of testing the transformers and three phase transformer connections.
- To introduce the principles of electromechanical energy conversion in singly and multiply excited systems.
- To study the working principles of electrical machines using the concepts of electro-mechanical energy conversion principles and derive expressions for generated voltage and torque developed in all Electrical Machines.
- To study the working principles of DC machines as Generator and Motor, types, determination of their no-load/load characteristics, starting and methods of speed control of motors.
- To estimate the various losses taking place in D.C. machines and to study the different testing methods to arrive at their performance.

UNIT I BASIC CONCEPTS OF ROTATING MACHINES 12

Principles of electromechanical energy conversion –Magnetic circuits – Inductance – Statically and Dynamically induced EMF - Torque – Hysteresis- Core losses - AC operation of magnetic circuits - Energy in magnetic systems – field energy, co-energy and mechanical force- Single and multiple excited systems –mmf of distributed A.C. windings – Rotating magnetic field – Generated voltage &Torque in round rotor machine.

UNIT II DC GENERATORS 12

Constructional details – emf equation – Methods of excitation – Self and separately excited generators – Characteristics of series, shunt and compound generators – Armature reaction and commutation – Parallel operation of DC shunt and compound generators. Applications of DC generators.

UNIT III DC MOTORS 12

Principle of operation – Back emf and torque equation – Characteristics of series, shunt and compound motors – Starting of DC motors – Types of starters – Speed control of DC series and shunt motors. Applications of DC motors.

UNIT IV TRANSFORMERS 12

Constructional details of core and shell type transformers – Types of windings – Principle of operation – emf equation – Transformation ratio – Transformer on no-load –Parameters referred to HV / LV windings – Equivalent circuit – Transformer on load –Regulation, Parallel operation of single phase transformers – Auto transformer – Three phase transformers – Vector group.

UNIT V TESTING OF DC MACHINES AND TRANSFORMERS 12

Losses and efficiency in DC machines and transformers – Condition for maximum efficiency –

Testing of DC machines – Brake test, Swinburne's test, Retardation test and Hopkinson's test – Testing of transformers – Polarity test, load test, open circuit and short circuit tests –All day efficiency.

TOTAL = 60 PERIODS

TEXT BOOKS

1. D.P. Kothari and I.J. Nagrath, 'Electric Machines', Tata McGraw Hill Publishing Company Ltd, 2002.
2. P.S. Bimbhra, 'Electrical Machinery', Khanna Publishers, 2003.

REFERENCE BOOKS

1. A.E. Fitzgerald, Charles Kingsley, Stephen. D. Umans, 'Electric Machinery', Tata McGraw Hill publishing Company Ltd, 2003.
2. J.B. Gupta, 'Theory and Performance of Electrical Machines', S.K. Kataria and Sons, 2002.
3. K. Murugesh Kumar, 'Electric Machines I', 1st Edition, Vikas publishing house Pvt. Ltd, 2010.
4. Stephen Chapman, "Electric Machinery Fundamentals", 4th Edition, McGraw Hill Companies Inc. 2012.

12EE34 MEASUREMENTS AND INSTRUMENTATION

L	T	P	C
3	0	0	3

AIM

To provide adequate knowledge in electrical instruments and measurements techniques.

OBJECTIVES

To make the student have a clear knowledge of the basic laws governing the operation of the instruments, relevant circuits and their working.

- To introduce general instrument system, error, calibration etc.
- Emphasis is laid on analog and digital techniques used to measure voltage, current, energy and power etc.
- To have an adequate knowledge of comparison methods of measurement.
- Elaborate discussion about storage & display devices.
- To Expose to various transducers and data acquisition system.

UNIT I INTRODUCTION 9

Functional elements of an instrument – Static and dynamic characteristics – Errors in measurement – Statistical evaluation of measurement data – Standards and calibration.

UNIT II ELECTRICAL AND ELECTRONIC INSTRUMENTS 9

Principle and types of analog and digital voltmeters, ammeters, multi-meters – Single and three phase watt meters and energy meters – Magnetic measurements – Determination of B-H curve and measurements of iron loss – Instrument transformers – Instruments for measurement of frequency and phase-Megger.

UNIT III COMPARISON METHODS OF MEASUREMENTS 9

D.C & A.C potentiometers, D.C & A.C bridges, transformer ratio bridges, self-balancing bridges, Interference and screening – Multiple earth and earth loops - Electrostatic and electromagnetic interference – Grounding techniques.

UNIT IV STORAGE AND DISPLAY DEVICES 9

Magnetic disk and tape – Recorders, digital plotters and printers, CRT display, digital CRO, LED, LCD and dot matrix display – Data Loggers.

UNIT V TRANSDUCERS AND DATA ACQUISITION SYSTEMS 9

Classification of transducers – Selection of transducers – Resistive, capacitive and inductive transducers – Piezoelectric, optical and digital transducers – Elements of data acquisition system – A/D, D/A converters – Smart sensors.

TOTAL = 45 PERIODS

TEXT BOOKS

1. E.O. Doebelin, 'Measurement Systems – Application and Design', Tata McGraw Hill publishing company, 2003.
2. A.K. Sawhney, 'A Course in Electrical & Electronic Measurements &Instrumentation', Dhanpat Rai and Co, 2004.

REFERENCE BOOKS

1. A.J. Bouwens, 'Digital Instrumentation', Tata McGraw Hill, 1997.
2. D.V.S. Moorthy, 'Transducers and Instrumentation', Prentice Hall of India Pvt. Ltd, 2007.
3. H.S. Kalsi, 'Electronic Instrumentation', Tata McGraw Hill, 2nd Edition 2004.
4. Martin Reissland, 'Electrical Measurements', New Age International (P) Ltd., Delhi, 2001.
5. J. B. Gupta, 'A Course in Electronic and Electrical Measurements', S. K. Kataria and Sons, Delhi, 2003.

12EE35 DATA STRUCTURES AND ALGORITHMS

L	T	P	C
3	0	0	3

AIM

To master the design and applications of linear, tree, and graph structures. To understand various algorithm design and analysis techniques.

OBJECTIVES

- To introduce the concept of arrays, structures, pointers and recursion.
- To study stack, queue and linked list concepts.
- To study trees, representation of trees, tree traversal and basic operations on trees.
- To study some of the sorting and searching techniques.
- To study the concept of graphs, traversal techniques and minimum spanning tree.

UNIT I LINEAR STRUCTURES 9

Abstract Data Types (ADT) – List ADT – array-based implementation – linked list implementation – cursor-based linked lists – doubly-linked lists – applications of lists –Stack ADT – Queue ADT – circular queue implementation – Applications of stacks and queues.

UNIT II TREE STRUCTURES 9

Need for non-linear structures – Tree ADT – tree traversals – left child right sibling data structures for general trees – Binary Tree ADT – expression trees – applications of trees– binary search tree ADT.

UNIT III BALANCED SEARCH TREES AND INDEXING 9

AVL trees – Binary Heaps – B-Tree – Hashing – Separate chaining – open addressing –Linear probing.

UNIT IV GRAPHS 9

Definitions – Topological sort – breadth-first traversal - shortest-path algorithms –minimum spanning tree – Prim's and Kruskal's algorithms – Depth-first traversal –biconnectivity – Euler circuits – applications of graphs.

UNIT V ALGORITHM DESIGN AND ANALYSIS 9

Greedy algorithms – Divide and conquer – Dynamic programming – backtracking –branch and bound – Randomized algorithms – algorithm analysis – asymptotic notations recurrences – NP-complete problems.

TOTAL = 45 PERIODS

TEXT BOOKS

1. M. A. Weiss, "Data Structures and Algorithm Analysis in C", Pearson Education, Asia, 2002.
2. ISRD Group, "Data Structures using C", Tata McGraw-Hill Publishing Company Ltd., 2006.

REFERENCE BOOKS

1. A. V. Aho, J. E. Hopcroft, and J. D. Ullman, "Data Structures and Algorithms", Pearson Education, 1983.
2. R. F. Gilberg, B. A. Forouzan, "Data Structures: A Pseudo code approach with C",Second Edition, Thomson India Edition, 2005.
3. Sara Baase and A. Van Gelder, "Computer Algorithms", 3rd Edition, Pearson Education, 2000.
4. T. H. Cormen, C. E. Leiserson, R. L. Rivest, and C. Stein, "Introduction to algorithms", 2nd Edition, Prentice Hall of India Ltd, 2001.

12EE36 ELECTRICAL MACHINES LABORATORY – I

L	T	P	C
0	0	3	2

AIM

To expose the students to the operation of D.C. machines and transformers and give them experimental skill.

LIST OF EXPERIMENTS

1. Open circuit and load characteristics of separately excited and self excited DC generators.
2. Load characteristics of DC compound generator with differential and cumulative connection.
3. Load characteristics of DC shunt and compound motor.
4. Load characteristics of DC series motor.
5. Swinburne's test and speed control of DC shunt motor.
6. Hopkinson's test on DC motor – generator set.
7. Load test on single-phase transformer and three phase transformer connections.
8. Open circuit and short circuit tests on single phase transformer.
9. Sumpner's test on transformers.
10. Separation of no-load losses in single phase transformer.
11. Testing of Transformer oil and insulation.

TOTAL = 45 PERIODS

12EE37 MEASUREMENTS AND INSTRUMENTATION LABORATORY

L	T	P	C
0	0	3	2

AIM

The aim of this lab is to fortify the students with an adequate work experience in the measurement of different quantities and also the expertise in handling the instruments involved.

LIST OF EXPERIMENTS

1. Study of LVDT and Strain Gauge.
2. AC bridges – Maxwell's Bridge and Schering's Bridge.
3. DC bridges – Wheatstone Bridge and Kelvin's Double Bridge.
4. Instrumentation amplifiers.
5. A/D and D/A converters.
6. Study of transients.
7. Calibration of single-phase energy meter.
8. Calibration of current transformer and potential transformer.

9. Measurement of three phase power and power factor.
10. Measurement of iron loss.
11. Measurement of harmonics in rectifier circuits.

TOTAL = 45 PERIODS

12EE38	DATA STRUCTURES AND ALGORITHMS LABORATORY	L	T	P	C
		0	0	3	2

AIM

To develop skills in design and implementation of data structures and their applications.

LIST OF EXPERIMENTS

1. Implement singly and doubly linked lists.
2. Represent a polynomial as a linked list and write functions for polynomial addition.
3. Implement stack and use it to convert infix to postfix expression.
4. Implement array-based circular queue and use it to simulate a producer consumer problem.
5. Implement an expression tree. Produce its pre-order, in-order, and post-order traversals.
6. Implement binary search tree.
7. Implement insertion in AVL trees.
8. Implement priority queue using heaps.
9. Implement hashing techniques.
10. Perform topological sort on a directed graph to decide if it is acyclic.
11. Implement Dijkstra's algorithm using priority queues.
12. Implement Prim's and Kruskal's algorithms.
13. Implement a backtracking algorithm for Knapsack problem.
14. Implement a branch and bound algorithm for traveling salesperson problem.
15. Implement any randomized algorithm.

TOTAL = 45 PERIODS

12HS31	PROFESSIONAL ENGLISH-I	L	T	P	C
		0	0	1	1

AIM

To create an Environment to improve learner's communication skill using Professional English module

OBJECTIVES

- To impart basics of Language & Grammar relating to Business Communication
- To imbibe the spirit of accurate and appropriate Basic communication
- To introduce the professional Communication module
- To improve learners ability to understand Technical communication

A. Language & Grammar **2**

1. Use of Verb,Article,Adjectives,Adverbs,Preposition,Conjunction,Comparative Superlative,
2. Noun –Antecedent & Precedent
3. Spelling &Punctuation
4. Concord
5. Use of Active & Passive voice
6. Use of Conditional Sentence & Reported speech

B. Reading **4**

1 Reading technical reports for Gist

2 Reading Technical Article, Graphs, Charts, Adverts, Notices & Proposals for Structure and detail

C. Writing **3**

1 Writing E-mails for giving Instruction/ Summarizing/Persuading/Giving assurance/asking a comment
2 Writing an Introduction to Report/Proposal/Technical Description
3 Writing Instructions & Recommendations for User manuals/Equipments/devices/New Inventions

D. Listening **3**

1 Listening to Technical News for Gist
2 Listening to Technical Interviews for gathering information
3 Listening to a Presentation for inferring meaning

E. Speaking **6**

1 Self-Introduction
2 Have your say- Recent gadgets/Technical Innovations/ Scientific Inventions

TOTAL = 18 PERIODS

TEXT BOOKS

1. Technical Writing: Process and Product, Gerson, Pearson Education India, 2007 ISBN: 8131709280, 9788131709283
2. Business Benchmark Pre-Intermediate to Intermediate: Student's Book BEC Preliminary Edition, Norman Whitby, PB + 2 Audio CDs, ISBN: 9780521759397

Examination Guideline

Internal and External Examinations should be considered only from The BUSINESS ENGLISH oriented Articles/Extracts/Clips/Illustrations/Audio scripts.

12MA42	**NUMERICAL METHODS**	**L**	**T**	**P**	**C**
		3	**1**	**0**	**4**

AIM

With the present development of the computer technology, it is necessary to develop efficient algorithms for solving problems in science, engineering and technology. This course gives a complete procedure for solving different kinds of problems occur in engineering numerically.

OBJECTIVES

At the end of the course, the students would be acquainted with the basic concepts in numerical methods and their uses are summarized as follows:

- The roots of nonlinear (algebraic or transcendental) equations, solutions of large system of linear equations and eigen value problem of a matrix can be obtained numerically where analytical methods fail to give solution.
- When huge amounts of experimental data are involved, the methods discussed on interpolation will be useful in constructing approximate polynomial to represent the data and to find the intermediate values.
- The numerical differentiation and integration find application when the function in the analytical form is too complicated or the huge amounts of data are given such as series of measurements, observations or some other empirical information.
- Since many physical laws are couched in terms of rate of change of one/two or more independent variables, most of the engineering problems are characterized in the form of either nonlinear ordinary differential equations or partial differential equations. The methods introduced in the solution of ordinary differential equations and partial differential equations will be useful in attempting any engineering problem.

UNIT I SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS 12

Solution of equation - Fixed point iteration: x=g(x) method – Newton's method –Solution of linear system by Gaussian elimination and Gauss-Jordon methods – Iterative methods - Gauss-Seidel methods - Inverse of a matrix by Gauss Jordon method –Eigen value of a matrix by power method and by Jacobi method for symmetric matrix.

UNIT II INTERPOLATION AND APPROXIMATION 12

Lagrangian Polynomials – Divided differences – Interpolating with a cubic spline –Newton's forward and backward difference formulas.

UNIT III NUMERICAL DIFFERENTIATION AND INTEGRATION 12

Differentiation using interpolation formulae –Numerical integration by trapezoidal and Simpson's 1/3 and 3/8 rules – Romberg's method – Two and Three point Gaussian quadrature formulas – Double integrals using trapezoidal and Simpsons's rules.

UNIT IV INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS 12

Single step methods: Taylor series method – Euler methods for First order Runge –Kutta method for solving first and second order equations – Multistep methods: Milne's and Adam's predictor and corrector methods.

UNIT V BOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS 12

Finite difference solution of second order ordinary differential equation – Finite difference solution of one dimensional heat equation by explicit and implicit methods – One dimensional wave equation and two dimensional Laplace and Poisson equations.

TOTAL = 60 PERIODS

TEXT BOOKS

1. Veerarajan,T And Ramachandran.T, 'Numerical Mehods With Programming in 'C', 2nd Edition Tata Mcgraw Hill Pub.Co.Ltd, First Reprint 2007.
2. Sankar Rao K, 'Numerical Methods for Scientists and Engineers', 3rd Edition, Prentice Hall of India Private, New Delhi, 2007.

REFERENCE BOOKS

1. P. Kandasamy, K. Thilagavathy and K. Gunavathy, 'Numerical Methods', S.Chand and Co. Ltd., New Delhi, 2003.
2. Gerald C.F. and Wheate, P.O. 'Applied Numerical Analysis', 7th Edition, PHI, 2009.

12EE41 ELECTRICAL MACHINES - II L T P C
3 1 0 4

AIM

To expose the students to the concepts of synchronous and asynchronous machines and analyze their performance.

OBJECTIVES

To impart knowledge on

- Construction and performance of salient and non – salient type synchronous generators.
- Principle of operation and performance of synchronous motor.
- Construction, principle of operation and performance of induction machines.
- Starting and speed control of three-phase induction motors.
- Construction, principle of operation and performance of single phase induction motors and

special machines.

UNIT I SYNCHRONOUS GENERATOR 12

Constructional details – Types of rotors – emf equation – Synchronous reactance– Armature reaction – Voltage regulation – EMF, MMF, ZPF and A.S.A methods– Synchronizing and parallel operation – Synchronizing torque - Change of excitation and mechanical input – Two reaction theory – Determination of direct and quadrature axis synchronous reactance using slip test – Operating characteristics - Capability curves.

UNIT II SYNCHRONOUS MOTOR 12

Principle of operation – Torque equation – Operation on infinite bus bars – V curves– Power input and power developed equations – Starting methods –Current loci for constant power input, constant excitation and constant power developed.

UNIT III THREE PHASE INDUCTION MOTOR 12

Constructional details – Types of rotors – Principle of operation – Slip –Equivalent circuit – Slip-torque characteristics - Condition for maximum torque –Losses and efficiency – Load test - No load and blocked rotor tests – Circle diagram – Separation of no load losses – Double cage rotors – Induction generator – Synchronous induction motor.

UNIT IV STARTING AND SPEED CONTROL OF THREE PHASE INDUCTION MOTOR 12

Need for starting – Types of starters – Rotor resistance, Auto-transformer and Star-delta starters – Speed control – Change of voltage, torque, number of poles and slip – Cascaded connection – Slip power recovery scheme.

UNIT V SINGLE PHASE INDUCTION MOTORS AND SPECIAL MACHINES 12

Constructional details of single phase induction motor – Double revolving field theory and operation – Equivalent circuit – No load and blocked rotor test –Performance analysis – Starting methods of single-phase induction motors -Shaded pole induction motor - Linear reluctance motor - Repulsion motor -Hysteresis motor - AC series motor.

TOTAL = 60 PERIODS

TEXT BOOKS

1. D.P. Kothari and I.J. Nagrath, 'Electric Machines', Tata McGraw Hill Publishing Company Ltd, 2002.
2. P.S. Bhimbhra, 'Electrical Machinery', Khanna Publishers, 2003.

REFERENCE BOOKS

1. A.E. Fitzgerald, Charles Kingsley, Stephen D.Umans, 'Electric Machinery', Tata McGraw Hill publishing Company Ltd, 2003.
2. J.B. Gupta, 'Theory and Performance of Electrical Machines', S.K.Kataria and Sons, 2002.
3. K. Murugesh Kumar, 'Electric Machines - II', 1st Edition, Vikas Publishing House Pvt. Ltd, 2010.
4. Stephen Chapman, "Electric Machinery Fundamentals", 4th Edition, McGraw Hill Companies Inc. 2012.

12EE42 TRANSMISSION AND DISTRIBUTION L T P C
3 1 0 4

AIM

To understand the importance and the functioning of transmission and distribution of the electric power in an electrical utility (or) a power system.

OBJECTIVES

- To develop expressions for the computation of transmission line parameters.
- To obtain the equivalent circuits for the transmission lines based on distance and operating voltage for determining voltage regulation and efficiency. Also to improve the voltage profile of the transmission system.
- To analyse the voltage distribution in insulator strings and cables and methods to improve the same.
- To understand the operation of the different distribution schemes.

UNIT I INTRODUCTION 12

Structure of electric power system - different operating voltages of generation, transmission and distribution – advantage of higher operating voltage for AC transmission. An introduction to EHV AC transmission, HVDC transmission and FACTs. Mechanical design of transmission line between towers – sag and tension calculations using approximate equations taking into account the effect of ice and wind.

UNIT II TRANSMISSION LINE PARAMETERS 12

Parameters of resistance, inductance and capacitance calculations - single and three-phase transmission lines - single and double circuits - solid, stranded and bundled conductors - symmetrical and unsymmetrical spacing – transposition of lines -concepts of GMR and GMD - skin and proximity effects - interference with neighbouring communication circuits. Corona discharge characteristics – critical voltage and loss. (Simple diagrams of typical towers and conductors for 400, 220 and 110 kV operations)

UNIT III MODELLING AND PERFORMANCE OF TRANSMISSION LINES 12

Transmission line classification - short line, medium line and long line – equivalent circuits – Ferranti effect - surge impedance, attenuation constant and phase constant- voltage regulation and transmission efficiency - real and reactive power flow in lines – power circle diagrams – shunt and series compensation. An introduction to power angle diagram - surge-impedance loading, load ability limits based on thermal loading; angle and voltage stability considerations.

UNIT IV INSULATORS AND CABLES 12

Classification of insulators for transmission and distribution purpose – voltage distribution in insulator string and grading - improvement of string efficiency. Underground cables - constructional features of LT and HT cables – insulation resistance, capacitance, dielectric stress and grading – tan δ and power loss -thermal characteristics.

UNIT V SUBSTATION, GROUNDING SYSTEM AND DISTRIBUTION SYSTEM 12

Classification, functions and major components of substations. Bus-bar arrangements - substation bus schemes - single bus, double bus with double breaker, double bus with single breaker, main and transfer bus, ring bus, breaker-and-a-half with two main buses, double bus-bar with bypass isolators. Importance of earthing in a substation. Qualitative treatment to neutral grounding and earthing practices in substations. Feeders, distributors and service mains. DC distributor – 2-wire and 3-wire, radial and ring main distribution. AC distribution – single phase and three phase 4-wire distribution.

TOTAL = 60 PERIODS

TEXT BOOKS

1. B.R.Gupta, 'Power System Analysis and Design', S. Chand, New Delhi, 2003.
2. S.N. Singh, 'Electric Power Generation, Transmission and Distribution', Prentice Hall of India Pvt. Ltd., New Delhi, 2002.

REFERENCE BOOKS

1. Luces M. Fualkenberry, Walter Coffer, 'Electrical Power Distribution and Transmission', Pearson Education, 1996.
2. Hadi Saadat, 'Power System Analysis,' Tata McGraw Hill Publishing Company', 2003.
3. Central Electricity Authority (CEA), 'Guidelines for Transmission System Planning',New

Delhi.
4. 'Tamil Nadu Electricity Board Handbook', 2007.
5. S.L.Uppal and S.Rao 'Electrical Power Systems', Khanna Publishers, 2009.

12EE43 ELECTRONIC CIRCUITS

L	T	P	C
3	0	0	3

AIM

To introduce the concept of realizing circuits using active and passive devices for signal generation and amplification.

OBJECTIVES

- To expose the students to study the different biasing and configurations of the amplifier circuits.
- To study the characteristics of tuned amplifier.
- To expose the students to various amplifiers oscillator circuits with feedback concepts.
- To learn the wave shaping process and circuits.
- To learn and analyse the process of AC to DC conversion.

UNIT I SMALL-SIGNAL AND LARGE SIGNAL AMPLIFIERS 9

Fixed and self biasing of BJT & FET – Small signal analysis of CE, CC & Common source amplifiers – Cascade and Darlington connections, Classification of Power amplifiers - Class A direct coupled and transformer coupled amplifier – Class B amplifier - Push pull connection - Complementary symmetry configuration -Expression for maximum power conversion efficiency with class A and class B operation - Non linear and cross over distortion - Distortion calculation – Class D amplifier.

UNIT II DIFFERENTIAL AND TUNED AMPLIFIERS 9

Differential amplifiers – Common mode and differential mode analysis - DC and AC analysis - Characteristics of tuned amplifiers – Single & double tuned amplifier.

UNIT III FEEDBACK AMPLIFIER AND OSCILLATORS 9

Characteristics of negative feedback amplifiers – Voltage / current, series/shunt feedback – Effect of feedback on input impedance, output impedance, gain stability, bandwidth and distortion of amplifier Theory of sinusoidal oscillators – Phase shift and Wien bridge oscillators – Colpitts, Hartley and crystal oscillators. Q of tank circuit and ambient temperature on frequency stability - Crystal oscillator.

UNIT IV PULSE CIRCUITS 9

RC wave shaping circuits – Diode - Clipper & Clamper circuits. – Astable, mono stable and bistable multivibrators – Schmitt triggers – UJT based saw tooth oscillators.

UNIT V RECTIFIERS AND POWER SUPPLY CIRCUITS 9

Single phase half wave and full wave rectifier analysis, three phase bridge rectifier using diodes-Ripple factor, rectification efficiency and transformer utilization factor - Rectifier with inductive load.- Inductor filter – Capacitor filter - Series voltage regulator – Switched mode power supply. Principles of regulated power supply - Series and shunt type voltage regulator - Protection of regulator against short circuit.

TOTAL = 45 PERIODS

TEXT BOOKS

1. Robert Boylestad and Louis Nashelsky, Electronic Devices and Circuits, 5th Edition, Prentice-Hall of India Private Ltd , New Delhi, 1996.
2. Millman and Halkias, "Electronic devices and circuits", Tata McGraw Hill publishing company ltd., 1996.

REFERENCE BOOKS

1. R.S.Sedha, "A text book of Applied Electronics", S.Chand & Company Ltd., 2004.
2. Albert Paul Malvino, "Electronic Principles", 5th Edition, Tata McGraw Hill publishing Co.Ltd., 1997.
3. Allen Mottershead, "Electronic Devices and Circuits - an Introduction", Prentice Hall of India Pvt. Ltd., 1997.
4. David A. Bell, "Electric Circuits and Electronic Devices", Oxford University Press, 3rd Impression, 2012.
5. G.K. Mithal, "Electronic devices and circuits", Khanna publishers, 1997.

12EE44 OBJECT ORIENTED PROGRAMMING L T P C
3 0 0 3

AIM

To present the concept of object oriented programming and discuss briefly the important elements of object oriented analysis and design of systems.

OBJECTIVES

- To study the object oriented programming principles, tokens, expressions, control structures and functions.
- To introduce the classes, objects, constructors and Destructors.
- To introduce the operator overloading, inheritance and polymorphism concepts in C++.

UNIT I INTRODUCTION 9

Object oriented programming concepts – objects-classes- methods and messages abstraction and encapsulation-inheritance- abstract classes- polymorphism. Introduction to C++- objects-classes-Special functions in C++ -Inline, Static, friend functions

UNIT II CLASSES, CONSTRUCTORS, FRIEND CLASS&OPERATOR OVERLOADING 9

constructors and destructors - type conversions- friend class- Operator overloading- fundamentals - restrictions - overloading stream - insertion and stream extraction operators - overloading unary & binary operators - converting between types - overloading ++ and --.

UNIT III . INHERITANCE 9

Inheritance - introduction - protected members – casting base _class pointers to derived _class pointers - overloading base class members in a derived class - public, protocols and private inheritance - direct base classes and indirect base classes - using constructors and destructors in derived classes - implicit derived class object to base class object conversion. Introduction - type fields and switch statements - virtual functions - abstract base classes and concrete classes - polymorphism - dynamic binding - virtual destructors.

UNIT IV TEMPLATES & EXCEPTION HANDLING 9

Templates - function templates - class templates - overloading template functions – class template and non type parameters -templates with multiple parameters. Exception handling - when exception handling, basic of C++ exception, catching an exception, re throwing an exception, exception specifications.

UNIT V STREAMS AND FILES 9

C++ Stream I/O: Streams - stream input - stream output - unformatted i/o –stream manipulators - stream format states - stream error - states. Files: file operations, file pointers, error handling during file operations.

TOTAL = 45 PERIODS

TEXT BOOKS

1. B. Trivedi, "Programming with ANSI C++", Oxford University Press, 2007.

REFERENCE BOOKS

1. ISRD Group, "Introduction to Object-oriented Programming and C++", Tata McGraw-Hill Publishing Company Ltd., 2007.
2. S. B. Lippman, Josee Lajoie, Barbara E. Moo, "C++ Premier", 4th Edition, Pearson Education, 2005.
3. D. S. Malik, "C++ Programming: From Problem Analysis to Program Design", 3rd Edition, Thomson Course Technology, 2007.

12GE31	ENVIRONMENTAL SCIENCE AND ENGINEERING (Common to all B.E. / B.Tech Degree Programmes)	L	T	P	C
		3	0	0	3

AIM

The aim of this course is to create awareness in every engineering graduate about the important of environment, the effect of technology on the environment and ecological balance and make him/her sensitive to the environment problems in every Professional endeavor that he/she participates.

OBJECTIVES

At the end of this course the student is expected to understand,

- What constitutes the environment, what are precious resources in the environment, how to conserve these resources,
- The role of a human being in maintaining a clean environment and useful environment for the future generations and how to maintain ecological balance and preserve bio-diversity.
- The role of government and non-government organization in environment managements.

UNIT I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY 14

Definition, scope and importance of environment – need for public awareness - concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers – energy flow in the ecosystem – ecological succession – food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to biodiversity definition: genetic, species and ecosystem diversity – biogeographically classification of India – value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, national and local levels – India as a mega-diversity nation – hot-spots 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 ex- situ conservation of biodiversity.

Field study of common plants, insects, birds

Field study of simple ecosystems – pond, river, hill slopes, etc.

UNIT II ENVIRONMENTAL POLLUTION 8

Definition – causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards – soil waste management: causes, effects and control measures of municipal solid wastes – role of an individual in prevention of pollution – pollution case studies – disaster management: floods, earthquake, cyclone and landslides.

Field study of local polluted site – Urban / Rural / Industrial / Agricultural.

UNIT III NATURAL RESOURCES 10

Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. case studies – Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles.

Field study of local area to document environmental assets – river / forest / grassland / hill / mountain.

UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT 7

From unsustainable to sustainable development – urban problems related to energy – water conservation, rain water harvesting, watershed management – resettlement and rehabilitation of people; its problems and concerns, case studies – role of non- governmental organization-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 – enforcement machinery involved in environmental legislation- central and state pollution control boards- Public awareness.

UNIT V HUMAN POPULATION AND THE ENVIRONMENT 6

Population growth, variation among nations – population explosion – family welfare programme – environment and human health – human rights – value education – HIV / AIDS – women and child welfare – role of information technology in environment and human health – Case studies.

TOTAL = 45 PERIODS

TEXT BOOKS

1. Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, (2006).
2. P.Meenakshi, " Elements of Environmental science and Engineering", Prientice Hall of India, 2nd Edition.
3. Anubha Kaushik and C.P.Kaushik, 'Environmental Science and Engineering', 3rd Edition New age International Publishers, New Delhi 2008.

REFERENCE BOOKS

1. R.K. Trivedi, 'Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards', Vol. I and II, Enviro Media.
2. Gilbert M.Masters, 'Introduction to Environmental Engineering and Science', 2nd edition, Pearson Education (2004).
3. Cunningham, W.P. Cooper, T.H. Gorhani, 'Environmental Encyclopedia', Jaico Publ., House, Mumbai, 2001.
4. Dharmendra S. Sengar, 'Environmental law', Prentice hall of India PVT LTD,New Delhi, 2007.
5. Rajagopalan, R, 'Environmental Studies-From Crisis to Cure', Oxford University Press (2005).

12EE45 OBJECT ORIENTED PROGRAMMING LABORATORY

L	T	P	C
0	0	3	2

AIM

To develop object-oriented programming skills using C++.

LIST OF EXPERIMENTS

1. Simple C++ programs.
2. Programs using Functions.
3. Function Overloading.
4. Operator Overloading.
5. Simple & Multiple Inheritance.
6. Multilevel & Hybrid Inheritance.
7. Virtual Functions.
8. Polymorphism.
9. Templates.
10. Exception Handling.
11. File Handling.

TOTAL : 45 PERIODS

12EE46 ELECTRONIC DEVICES AND CIRCUITS LABORATORY

L	T	P	C
0	0	3	2

AIM

To study the characteristics and to determine the device parameters of various solid-state devices.

LIST OF EXPERIMENTS

1) Characteristics of Semiconductor diode and Zener diode.
2) Characteristics of Transistor under common emitter, common collector, and common base configuration.
3) Characteristics of FET.
4) Characteristics of UJT and UJT Relaxation Oscillator.
5) Characteristics of SCR, DIAC and TRIAC.
6) Photo diode, phototransistor Characteristics and study of light activated relay circuit.
7) Static Characteristics of Thermistors, RTD, Thermocouple and LDR.
8) Single phase half wave and full wave rectifiers with inductive and capacitive filters.
9) Differential amplifier using FET.
10) Clipper and Clamper circuits.
11) Realization of Passive filters.
12) CE amplifier.
13) Study of Oscillator Circuits.

TOTAL : 45 PERIODS

12EE47 ELECTRICAL MACHINES II LABORATORY

L	T	P	C
0	0	3	2

AIM

To expose the students to the operation of synchronous machines and induction motors and give them experimental skill.

LIST OF EXPERIMENTS

1. Regulation of three phase alternator by EMF and MMF methods.
2. Regulation of three phase alternator by ZPF and ASA methods.
3. Regulation of three phase salient pole alternator by slip test.
4. Measurements of negative sequence and zero sequence impedance of alternators.
5. V and Inverted V curves of Three Phase Synchronous Motor.
6. Load test on three-phase induction motor.

7. Circle Diagram and equivalent circuit of three phase induction motor.
8. Separation of No-load losses of three-phase induction motor.
9. Load test on single-phase induction motor.
10. No load and blocked rotor test on single-phase induction motor.
11. Load test on three phase alternator.

TOTAL : 45 PERIODS

12HS41	**PROFESSIONAL ENGLISH-II**	**L**	**T**	**P**	**C**
	(Common to All B.E./B.Tech Degree programmes)	**0**	**0**	**1**	**1**

AIM

To Create an Environment to experiment Professional English communication module with Intermediate resources

OBJECTIVES

- To be competent in Presentation skill
- To develop students' accuracy in Written Communication
- To improve learners ability to understand Technical Presentations and Conversations
- To give the exposure with Internal and External workplace Communication

A. Reading **4**

1. Reading Technical Articles, Reports, Proposals for gathering information
2. Reading Technical Journals, User manuals, annual reports for matching information

B. Writing **6**

1. Writing E-mail to inform/respond/Insist/Convince/comment
2. Writing Technical Report (Format, Types, Abstract)
3. Writing Project Introduction/Website/Product
4. Writing User Manuals/Guidelines
5. Writing Product Reviews
6. Writing Useful Expressions for Persuading, Summarizing, gathering information

C. Listening **2**

1. Listening to Telephonic conversation for filling the gaps
2. Listening to Group discussion to gather information
3. Listening to Interviews for writing short answers
4. Listening to Technical Presentation for evaluation

D. Speaking **6**

1. Mini-Presentation on Technical Themes:
   a) Cloud computing b) 4g c) Mission to Mars
   d) Water Resource e) Sixth Sense Technology
2. Group Discussion on Social and Technical issues

TOTAL = 18 PERIODS

TEXT BOOKS

1. Technical Communication: Principles and Practice, 2/e, MEENAKSHI RAMAN; SANGEETA SHARMA ISBN: 0198065299, 9780198065296
2. Business Benchmark Pre-Intermediate to Intermediate: Student's Book BEC Preliminary Edition, Norman Whitby, PB + 2 Audio CDs, ISBN: 9780521759397

Examination Guideline

Internal and External Examinations should be considered only from The BUSINESS ENGLISH oriented Articles/Extracts/Clips/Illustrations/Audio scripts.

12EE51 **POWER ELECTRONICS** **L T P C**
3 0 0 3

AIM

To introduce the application of electronic devices for conversion, control and conditioning of electric power

OBJECTIVES

i. To get an overview of different types of power semi-conductor devices and their switching characteristics.
ii. To understand the operation, characteristics and performance parameters of controlled rectifiers.
iii. To study the operation, switching techniques and basic topologies of DC-DC switching regulators.
iv. To learn the different modulation techniques of pulse width modulated inverters and to understand the harmonic reduction methods.
v. To know the practical application for power electronics converters in conditioning the power supply

UNIT I POWER SEMI-CONDUCTOR DEVICES 9

Structure, operation and characteristics of SCR, TRIAC, power transistor, MOSFET and IGBT. Driver and snubber circuits for MOSFET - switching characteristics and switching losses.

UNIT II UNCONTROLLED AND CONTROLLED CONVERTERS 9

2-pulse, 3-pulse and 6-pulse uncontrolled and controlled converters – Inverter operation of fully controlled converter - Effect of source inductance - Distortion and displacement factor – Ripple factor – Harmonic analysis - Single phase AC voltage controllers – Cyclo converters.

UNIT III DC TO DC CONVERTERS 9

Step-down and step-up choppers - Time ratio control and current limit control - Switching mode regulators: Buck, boost, buck-boost and cuk converter - Resonant switching based SMPS.

UNIT IV INVERTERS 9

Single phase and three phase (both 120^0 mode and 180^0 mode) inverters - PWM techniques: Sinusoidal PWM, modified sinusoidal PWM and multiple PWM - Voltage and harmonic control - Series resonant inverter - Current source inverters.

UNIT V APPLICATIONS (QUALITATIVE TREATMENT ONLY) 9

Uninterrupted power supply topologies - Flexible AC transmission systems - Shunt and series static VAR compensator - Unified power flow controller- HVDC Transmission-AC and DC drives.

TOTAL: 45PERIODS

TEXT BOOKS

1. Muhammad H. Rashid, 'Power Electronics: Circuits, Devices and Applications', Pearson Education, 3rd Edition, 2004.
2. Ned Mohan, Tore.M.Undeland, William.P.Robbins, 'Power Electronics: Converters, Applications and Design', John Wiley and sons, 3rd Edition, 2003.
3. P.S.Bimbra, "Power Electronics", Khanna Publishers, Eleventh Edition, 2003.

REFERENCES

1. Cyril.W.Lander, 'Power Electronics', McGraw Hill International, Third edition, 1993.
2. Bimal K. Bose, 'Modern Power Electronics and AC Drives', Pearson Education, 2003.
3. Jaganathan, 'Introduction to Power Electronics', Prentice Hall of India, 2004.
4. M.D. Singh, K.B. Khanchandani, 'Power Electronics', 2nd Edition, Tata McGraw Hill, 2008.

12EE52 **PROTECTION AND SWITCHGEAR** **L T P C**
3 0 0 3

AIM

To expose the students to the various faults in power system and learn the various methods of protection scheme.

OBJECTIVES

i. .Discussion on various earthing practices usage of symmetrical components to estimate fault current and fault MVA.
ii. Study of relays & Study of protection scheme, solid state relays.
iii. To understand instrument transformer and accuracy.
iv. To understand the method of circuit breaking various arc theories Arcing phenomena – capacitive and inductive breaking.
v. Types of circuit breakers.

UNIT I INTRODUCTION 9

Principles and need for protective schemes – nature and causes of faults – types of faults – fault current calculation using symmetrical components – Power system earthing - Zones of protection and essential qualities of protection – Protection scheme – Phasor Measurement Unit

UNIT II OPERATING PRINCIPLES AND RELAY CONSTRUCTIONS 9

Electromagnetic relays – Over current, directional, distance and differential, under frequency relays – static relays.

UNIT III APPARATUS PROTECTION 9

Apparatus protection transformer, generator, motor, protection of bus bars, transmission lines – CTs and PTs and their applications in protection schemes.

UNIT IV THEORY OF CIRCUIT INTERRUPTION 9

Physics of arc phenomena and arc interruption. Restriking voltage & Recovery voltage, rate of rise of recovery voltage, resistance switching, current chopping, interruption of capacitive current – DC circuit breaking.

UNIT V CIRCUIT BREAKERS 9

Types of Circuit Breakers – Air blast, Air break, oil SF_6 and Vacuum circuit breakers – comparative merits of different circuit breakers – Testing of circuit breakers

TOTAL: 45 PERIODS

TEXT BOOKS

1. Badri Ram, Vishwakarma, 'Power System Protection and Switchgear', Tata McGraw hill, 2001.
2. Y.G. Paithankar and S.R. Bhide, 'Fundamentals of Power System Protection', Prentice Hall of India Pvt. Ltd., New Delhi – 110001, 2003.

REFERENCES

1. Sunil S. Rao, 'Switchgear and Protection', Khanna publishers, New Delhi, 1986 .
2. C.L. Wadhwa, 'Electrical Power Systems', Newage International (P) Ltd., 2000.
3. M.L. Soni, P.V. Gupta, V.S. Bhatnagar, A. Chakrabarti, 'A Text Book on Power System Engineering', Dhanpat Rai & Co., 1998.
4. B. Ravindranath, and N. Chander, 'Power System Protection & Switchgear', Wiley Eastern Ltd., 1977.

12EE59 **COMMUNICATION ENGINEERING** **L T P C**
3 0 0 3

AIM

To introduce the concepts of communication systems engineering using wire and wireless medium.

OBJECTIVES

i. To introduce different methods of analog communication and their significance.
ii. To introduce Digital Communication methods for high bit rate transmission.
iii. To introduce the concepts of source and line coding techniques for enhancing rating of transmission of minimizing the errors in transmission.
iv. To introduce MAC used in communication systems for enhancing the number of users.
v. To introduce various media for digital communication

UNIT I ANALOG COMMUNICATION 9

Principles of amplitude modulation, AM Voltage & power distribution, Balanced Modulator, AM transmitters: High level and Low level transmitter, Diode Detector, AM receiver: TRF & Super heterodyne receiver.

Angle modulation - FM and PM waveforms, phase deviation and modulation index, frequency deviation and percent modulation, Bandwidth requirements for Angle modulated waves, FET reactance modulator, FM transmitters: PLL & Armstrong Method, Balanced slope detector, FM receiver.

UNIT II DIGITAL COMMUNICATION 9

Introduction, Shannon limit for information capacity, ASK, FSK bit rate and baud, FSK transmitter & receiver ,BPSK transmitter & receiver , QPSK transmitter & receiver ,QAM transmitter & receiver ,DPSK transmitter & receiver , carrier recovery – squaring loop, Costas loop.

UNIT III DIGITAL TRANSMISSION 9

Introduction, Pulse modulation, PCM – PCM sampling, Sampling rate, Signal to Quantization Noise Rate, DM transmitter and receiver , ADM transmitter and receiver, DPCM transmitter and receiver ,pulse transmission – Intersymbol interference, eye patterns.

UNIT IV SPREAD SPECTRUM AND MULTIPLE ACCESS TECHNIQUES 9

Introduction, Pseudo-noise sequence, DS spread spectrum with coherent binary PSK, processing gain, FH spread spectrum, multiple access techniques –TDMA-FDMA-CDMA-SDMA.

UNIT V SATELLITE AND OPTICALCOMMUNICATION 9

Satellite System Link Model -Kepler's Law, Orbit Types .Optical Communication Systems-Elements of Optical Fiber Transmission link, Types, Losses, Sources and Detectors.

TOTAL: 45PERIODS

TEXT BOOKS

1. Wayne Tomasi, "Advanced Electronic Communication Systems", 5th Edition, Pearson Education, 2007.

REFERENCES

1. H.Taub,D L Schilling ,G Saha ,"Principles of Communication", 3rd Edition, 2007.
2. Simon Haykin, "Communication Systems", 4th Edition, John Wiley & Sons. 2001.
3. Dennis Roddy, Satellite Communications, McGraw-Hill Publication, 4th Edition 2006.
4. Gerd Keiser, 'Optical Fiber Communication', McGraw Hill, 3rd Edition. 2000.
5. Rappaport. T.S., "Wireless communications", Pearson Education, 2003.

12EE53 **DIGITAL ELECTRONICS** **L T P C**
3 0 0 4

AIM

To learn the basic methods for the design of digital circuits and provide the fundamental concepts used in the design of digital systems.

OBJECTIVES

i. To impart to you a formalism of logic enabling you to analyse logical processes.
ii. To enable you to implement simple logical operations using combinational logic circuits.
iii. To enable you to understand common forms of number representation in digital electronic circuits and to be able to convert between different representations.
iv. To enable you to understand the logical operation of simple arithmetic and other MSI circuits (Medium Scale Integrated Circuits)
v. To impart to you the concepts of sequential and asynchronous sequential circuits.

UNIT I DIGITAL INTEGRATED CIRCUITS 12

Introduction – Special Characteristics – Bipolar Transistor Characteristics – RTL and DTL circuits – Transistor-Transistor Logic (TTL) Emitter Coupled Logic (ECL) – Metal Oxide Semiconductor (MOS) – Complementary MOS (CMOS) – CMOS Transmission Gate circuits

UNIT II COMBINATIONAL CIRCUITS – I 12

Design procedure – Adders-Subtractors – Serial adder/ Subtractor - Parallel adder/ Subtractor- Parallel Order/ Subtractor-Carry look ahead adder- BCD adder- Magnitude Comparator.

UNIT III COMBINATIONAL CIRCUITS – II 12

Multiplexer/ Demultiplexer- encoder / decoder – parity checker – code converters. Implementation of combinational logic using MUX, ROM, PAL and PLA- HDL for combinational Circuits.

UNIT IV SEQUENTIAL CIRCUIT 12

Classification of sequential circuits – Moore and Mealy -Design of Synchronous counters: state diagram- State table –State minimization –State assignment- ASM-Excitation table and maps-Circuit implementation - Universal shift register – Shift counters – Ring counters.

UNIT V ASYNCHRONOUS SEQUENTIAL CIRCUITS 12

Design of fundamental mode and pulse mode circuits – primitive state / flow table – Minimization of primitive state table –state assignment – Excitation table – Excitation map- cycles – Races –Hazards: Static –Dynamic –Essential –Hazards elimination.

TOTAL: 60 PERIODS

TEXT BOOKS

1. M. Morris Mano, “Digital Design”, 3rd Edition, Prentice Hall of India Pvt. Ltd., New Delhi, 2003/Pearson Education (Singapore) Pvt. Ltd., New Delhi, 2003.
2. John .M Yarbrough, “Digital Logic Applications and Design”, Thomson- Vikas publishing house, New Delhi, 2002.

REFERENCES

1. S. Salivahanan and S. Arivazhagan, “Digital Circuits and Design”, 2nd Edition, Vikas Publishing House Pvt. Ltd, New Delhi, 2004
2. Charles H.Roth. “Fundamentals of Logic Design”, Thomson Publication Company, 2003.
3. Donald P.Leach and Albert Paul Malvino, “Digital Principles and Applications”, 5th Edition, Tata McGraw Hill Publishing Company Limited, New Delhi, 2003.
4. R.P.Jain, “Modern Digital Electronics”, 3rd Edition, Tata McGraw–Hill publishing company limited, New Delhi, 2003.
5. Thomas L. Floyd, “Digital Fundamentals”, Pearson Education, Inc., New Delhi, 2003.
6. Donald D.Givone, “Digital Principles and Design”, Tata McGraw-Hill Publishing company limited, New Delhi, 2003.

12EE54 **LINEAR INTEGRATED CIRCUITS** **L T P C**
3 0 0 3

AIM

To introduce the concepts for realising functional building blocks in ICs, fabrications & application of ICs.

OBJECTIVES

i. To study the IC fabrication procedure.
ii. To study characteristics; realise circuits; design for signal analysis using Op-amp ICs.
iii. To study the applications of Op-amp.
iv. To study internal functional blocks and the applications of special ICs like Timers, PLL circuits, regulator Circuits, ADCs.

UNIT I IC FABRICATION 9

IC classification, fundamental of monolithic IC technology, epitaxial growth, masking and etching, diffusion of impurities. Realisation of monolithic ICs and packaging

UNIT II CHARACTERISTICS OF OPAMP 9

Ideal OP-AMP characteristics, DC characteristics, AC characteristics, offset voltage and current: voltage series feedback and shunt feedback amplifiers, differential amplifier; frequency response of OP-AMP; Basic applications of op-amp – summer, differentiator and integrator, precision rectifier.

UNIT III APPLICATIONS OF OPAMP 9

Instrumentation amplifier, first and second order active filters, V/I & I/V converters, comparators, multivibrators, waveform generators, clippers, clampers, peak detector, S/H circuit, D/A converter (R-2R ladder and weighted resistor types), A/D converter - Dual slope, successive approximation and flash types.

UNIT IV SPECIAL ICs 9

555 Timer circuit – Functional block, characteristics & applications; 566-voltage controlled oscillator circuit; 565-phase lock loop circuit functioning and applications, Analog multiplier ICs.

UNIT V APPLICATION ICs 9

IC voltage regulators - LM317, 723 regulators, switching regulator, MA 7840, LM 380 power amplifier, ICL 8038 function generator IC, isolation amplifiers, opto coupler, opto electronic ICs.

TOTAL: 45 PERIODS

TEXT BOOKS

1.Ramakant A. Gayakwad, 'Op-amps and Linear Integrated Circuits', 4th Edition, PHI Learning, 2009.
2.D. Roy Choudhury and Shail B.Jain, 'Linear Integrated Circuits', 4th Edition, New Age, 2010.

REFERENCES

1.Jacob Millman and Christos C.Halkias, 'Integrated Electronics - Analog and Digital circuits system', Tata McGraw Hill, 2003.
2. Robert F.Coughlin and Fredrick F.Driscoll, 'Op-amp and Linear ICs', 4th Edition, Pearson Education, 2002.
3. David A.Bell, 'Op-amp & Linear ICs', Prentice Hall of India, 2nd Edition, 1997.
4. S.Salivahanan and V.S Kanchana Bhaskaran , "Linear Integrated Circuits" , Second edition , Tata McGraw Hill, 2008

12EE55 **CONTROL SYSTEMS** **L T P C**
3 0 0 4

AIM

To provide sound knowledge in the basic concepts of linear control theory and design of control system.

OBJECTIVES

i. To understand the methods of representation of systems and getting their transfer function models.
ii. To provide adequate knowledge in the time response of systems and steady state error analysis.
iii. To give basic knowledge is obtaining the open loop and closed–loop frequency responses of systems.
iv. To understand the concept of stability of control system and methods of stability analysis.
v. To study the three ways of designing compensation for a control system.

UNIT I SYSTEMS AND THEIR REPRESENTATION 12

Basic elements in control systems – Open and closed loop systems – Electrical analogy of mechanical and thermal systems – Transfer function – Synchros – AC and DC servomotors – Block diagram reduction techniques – Signal flow graphs.

UNIT II TIME DOMAIN ANALYSIS 12

Time response – Time domain specifications – Types of test input – I and II order system response – Error coefficients – Generalized error series – Steady state error – P, PI, PID modes of feedback control.

UNIT III FREQUENCY DOMAIN ANALYSIS 12

Frequency response – Bode plot – Polar plot – Constant M and N circles – Nichols chart – Determination of closed loop response from open loop response – Correlation between frequency domain and time domain specifications

UNIT IV STABILITY ANALYSIS 12

Characteristics equation – Location of roots in S plane for stability – Routh Hurwitz criterion – Root locus construction – Effect of pole, zero addition – Gain margin and phase margin – Nyquist stability criterion.

UNIT V COMPENSATOR DESIGN 12

Performance criteria – Lag, lead and lag-lead networks – Compensator design using bode plots.

TOTAL: 60 PERIODS

TEXT BOOKS

1.K. Ogata, 'Modern Control Engineering', 5th Edition, Prentice Hall, 2010.
2.I.J. Nagrath & M. Gopal, 'Control Systems Engineering', 4th Edition, New Age International Publishers, 2005.

REFERENCES

1. B.C. Kuo, 'Automatic Control Systems', 7th Edition, Prentice Hall of India Ltd., 1995.
2. M. Gopal, 'Control Systems, Principles & Design', 4th Edition, Tata McGraw Hill, New Delhi, 2012.
3. M.N. Bandyopadhyay, 'Control Engineering Theory and Practice', 1st Edition, Prentice Hall of India, 2009.
4. S. Seshadhri, B. Subathra, 'Control Systems', 1st Edition, Tata McGraw Hill, 2012

12EE56 **POWER ELECTRONICS LABORATORY** **L T P C**
0 0 3 2

LIST OF EXPERIMENTS

1. Characteristics of SCR.
2. Characteristics of TRIAC and DIAC.
3. Characteristics of MOSFET and IGBT.
4. Transient characteristics of SCR and MOSFET.
5. AC to DC fully controlled converter (single phase and three phase).
6. AC to DC half-controlled converter (single phase and three phase).
7. Step down and step up MOSFET based choppers.
8. IGBT based single-phase PWM inverter.
9. IGBT based three-phase PWM inverter.
10. Resonant dc-to-dc converter.
11. AC voltage controller.

TOTAL: 45 PERIODS

12EE57 **LINEAR AND DIGITAL ELECTRONICS LABORATORY** **L T P C**
0 0 3 2

LIST OF EXPERIMENTS

1. Study of Basic Digital IC's.
   (Verification of truth table for AND, OR, XOR, NOT, NOR, NAND, JK FF, RS FF, D FF)
2. Implementation of Boolean Functions, Adder/ Subtraction circuits.
3. a) Code converters, Parity generator and parity checking, Excess 3, 2s Complement, Binary to grey code using suitable IC's.
   b) Encoders and Decoders: Decimal and Implementation of 4-bit shift registers in SISO, SIPO, PISO, PIPO modes using suitable IC's.
4. Counters: Design and implementation of 4-bit modulo counters as synchronous and Asynchronous types using FF IC's and specific counter IC.
5. Shift Registers:
   Design and implementation of 4-bit shift registers in SISO, SIPO, PISO, PIPO Modes using situable IC's.
6. Multiplex/ De-multiplex :
   Study of 4:1; 8:1 multiplexer and Study of 1:4; 1:8 demultiplexer.
7. Timer IC application.
   Study of NE/SE 555 timer in Astable, Monostable operation.
8. Applications of Op-Amp:
   Slew rate verifications, inverting and non-inverting amplifier,
   Adder, comparator, Integrator and Differentiator.
9. Study of Analog to Digital Converter and Digital to Analog Converter:
   Verification of A/D conversion using dedicated IC's.
10. Study of VCO and PLL ICs
    i. Voltage to frequency characteristics of NE/ SE 566 IC.
    ii. Frequency multiplication using NE/SE 565 PLL IC.
11. Schmitt Trigger and precision rectifier.

TOTAL: 45 PERIODS

12EE58 **CONTROL SYSTEMS LABORATORY** **L T P C**
0 0 3 2

LIST OF EXPERIMENTS

1. Determination of transfer function of DC Servomotor.
2. Determination of transfer function of AC Servomotor.
3. Analog simulation of Type - 0 and Type – 1 systems.
4. Determination of transfer function of DC Generator.
5. Determination of transfer function of DC Motor.
6. Stability analysis of linear systems.
7. DC and AC position control systems.
8. Stepper motor control system.
9. Digital simulation of first order systems.
10. Digital simulation of second order systems.
11. Study of PID Controller.
12. Closed loop control of temperature.

TOTAL: 45 PERIODS

12EE61 **SOLID STATE DRIVES** **L T P C**
3 0 0 3

AIM

To study and understand the operation of electric drives controlled from a power electronic converter and to introduce the design concepts of controllers.

OBJECTIVES

i. To understand the stable steady-state operation and transient dynamics of a motor-load system.
ii. To study and analyze the operation of the converter / chopper fed dc drive and to solve simple problems.
iii. To study and understand the operation of both classical and modern induction motor drives.
iv. To understand the differences between synchronous motor drive and induction motor drive and to learn the basics of permanent magnet synchronous motor drives.
v. To analyze and design the current and speed controllers for a closed loop solid- state DC motor drive and simulation using a software package.

UNIT I DRIVE CHARACTERISTICS 9

Equations governing motor load dynamics - steady state stability - Multi quadrant dynamics in the speed torque plane - Typical load torque characteristics -Selection of Motor power rating – Thermal model of motor for heating and cooling - Types of duty cycle - Acceleration, deceleration, starting and stopping.

UNIT II CONVERTER / CHOPPER FED DC MOTOR DRIVE 9

Steady state analysis of the single and three phase fully controlled converter fed separately excited D.C motor drive: Continuous and discontinuous conduction mode - Chopper fed D.C drive: Time ratio control and current limit control - Operation of four quadrant converter/chopper fed drive – Closed loop control.

UNIT III INDUCTION MOTOR DRIVES 9

Stator side control: Stator voltage control - Adjustable frequency drives: v/f control, constant slip-speed control and constant air-gap flux control – Basics of voltage/current fed inverters - Block diagram of closed loop drive.

Rotor side control: Rotor resistance control and slip power recovery scheme - Static control of rotor resistance using DC chopper - Block diagram of closed loop drive – Vector control.

UNIT IV SYNCHRONOUS MOTOR DRIVES 9

Open loop volts/hertz control and self-control of synchronous motor: Marginal angle control and power factor control - Permanent magnet synchronous motor Block diagram of closed loop control.

UNIT V DESIGN OF CONTROLLERS FOR DRIVES 9

Transfer function for dc motor, load and converter – Closed loop control with current and speed feedback - Armature voltage control and field weakening mode control - Design of controllers: Current controller and speed controller - Converter selection and characteristics.

TOTAL: 45 PERIODS

TEXT BOOKS

1.Gopal K.Dubey, "Fundamentals of Electrical Drives", 2nd Edition, Narosa Publishing House, 2012.
2.Bimal K.Bose. "Modern Power Electronics and AC Drives", PHI Learning, 2005.

REFERENCES

1.S.K.Pillai, "A First course on Electrical Drives", 3rd Edition, New Age International, 2012.
2.Murphy J.M.D and Turnbull, "Power Electronic Control of AC Motors", Pergamon Press, Oxford 1988.
3.Gopal K.Dubey, "Power semiconductor controlled drives", Prentice Hall Inc., New Jersey, 1989.
4.R.Krishnan, "Electric Motor & Drives: Modeling, Analysis and Control", 1st Edition, PHI, 2009.

12EE62 POWER SYSTEM ANALYSIS L T P C 3 1 0 4

AIM

To understand the necessity and to become familiar with the modelling of power system and components. And to apply different methods to analyse power system for the purpose of system planning and operation.

OBJECTIVES

i. To model the power system under steady state operating condition. To apply efficient numerical methods to solve the power flow problem.
ii. To model and analyse the power systems under abnormal (or) fault conditions.
iii. To model and analyse the transient behaviour of power system when it is subjected to a fault.

UNIT I INTRODUCTION 12

Modern power system (or) electric energy system - Analysis for system planning and operational studies – basic components of a power system. Generator models - transformer model – transmission system model - load representation. Single line diagram – per phase and per unit representation – change of base. Simple building algorithms for the formation of Y-Bus matrix and Z-Bus matrix.

UNIT II POWER FLOW ANALYSIS 12

Importance of power flow analysis in planning and operation of power systems. Statement of power flow problem - classification of buses into P-Q buses, P-V (voltage-controlled) buses and slack bus. Development of Power flow model in complex variables form and polar variables form. Power Flow methods - Gauss-Seidel method, Newton-Raphson (N-R) method and Fast Decoupled Power Flow (FDPF) method - algorithm and flowchart; Comparison of the three methods.

UNIT III FAULT ANALYSIS – BALANCED FAULTS 12

Importance short circuit (or) for fault analysis - basic assumptions in fault analysis of power systems. Symmetrical (or) balanced three phase faults – problem formulation – fault analysis using Z-bus matrix – algorithm and flow chart. Computations of short circuit capacity,post fault voltage and currents.

UNIT IV FAULT ANALYSIS – UNBALANCED FAULTS 12

Introduction to symmetrical components – sequence impedances – sequence networks – representation of single line to ground, line to line and double line to ground fault conditions - Unbalanced fault analysis - problem formulation – analysis using Z-bus impedance matrix – algorithm and flow chart.

UNIT V STABILITY ANALYSIS 12

Importance of stability analysis in power system planning and operation - classification of

power system stability - angle and voltage stability – simple treatment of angle stability into small-signal and large-signal (transient) stability.
Single Machine Infinite Bus (SMIB) system: Development of swing equation - equal area criterion - determination of critical clearing angle and time by using modified Euler method and Runge-Kutta second order method - Algorithm and flow chart.

TOTAL: 60 PERIODS

TEXT BOOKS

1. Hadi Saadat, 'Power System Analysis', 2nd Edition (revised), Tata McGraw Hill Publishing Company, 2009.
2. John J. Grainger and W.D. Stevenson Jr., 'Power System Analysis', 1st Edition, McGraw Hill International Book Company, 2003.
3. D.P. Kothari , I.J. Nagarath, 'Power System Engineering', 2nd Edition, Tata McGraw-Hill Publishing Company Ltd., 2007.

REFERENCES

1. P. Kundur, 'Power System Stability and Control", 1st Edition, Tata McGraw Hill Publications, 2006.
2. Olle I. Elgerd, 'Electric Energy Systems Theory – An Introduction', Tata McGraw Hill Publishing Company Limited, Second Edition, 2003.
3. I.J. Nagrath and D.P. Kothari, 'Modern Power System Analysis', 4th Edition, Tata McGraw-Hill Publishing Company, 2011.
4. K.Nagasarkar and M.S. Sukhija, 'Power System Analysis', 1st Edition, Oxford University Press, 2007.
5.C.L.Wadhwa, 'Electrical Power Systems', New Age International, 2009

12EE63 **HIGH VOLTAGE ENGINEERING** **L T P C**
3 0 0 3

AIM

To expose the students to various types of over voltage transients in power system and its effect on power system.

OBJECTIVES

i. To understand the various types of over voltages in power system and protection methods.
ii. Generation of over voltages in laboratories.
iii. Measurement of over voltages.
iv. Nature of breakdown mechanism in solid, liquid and gaseous dielectrics.
v. Testing of power apparatus and insulation coordination.

UNIT I OVER VOLTAGES IN ELECTRICAL POWER SYSTEMS 6

Causes of over voltages and its effects on power system – Lightning, switching surges and temporary over voltages – protection against over voltages – Bewley's lattice diagram.

UNIT II ELECTRICAL BREAKDOWN IN GASES, SOLIDS AND LIQUIDS 10

Gaseous breakdown in uniform and non-uniform fields – Corona discharges – Vacuum breakdown – Conduction and breakdown in pure and commercial liquids – Breakdown mechanisms in solid and composite dielectrics.

UNIT III GENERATION OF HIGH VOLTAGES AND HIGH CURRENTS 10

Generation of High DC, AC, impulse voltages and currents. Tripping and control of impulse generators.

UNIT IV MEASUREMENT OF HIGH VOLTAGES AND HIGH CURRENTS 10

Measurement of High voltages and High currents – Digital techniques in high voltage measurement.

UNIT V HIGH VOLTAGE TESTING & INSULATION COORDINATION 9

High voltage testing of electrical power apparatus – Power frequency, impulse voltage and DC testing – International and Indian standards – Insulation Coordination.

TOTAL: 45 PERIODS

TEXT BOOKS

1. M. S. Naidu and V. Kamaraju, 'High Voltage Engineering', 4th Edition, Tata McGraw Hill, 2010.

REFERENCES

1. W. S. Zaengl, E. Kuffel, J.Kuffel, 'High Voltage Engineering Fundamentals', 2nd Edition, CBS Publishers, 2005.
2. E. Kuffel and M. Abdullah, 'High Voltage Engineering', Pergamon Press, Oxford, 1970.
3. L. L. Alston, 'High Voltage Technology', 1st Edition, Oxford University Press, 2011.
4. C.L.Wadhwa, 'High Voltage Engineering', New Age International, 2007.

12EE64 **DIGITAL SIGNAL PROCESSING** **L T P C 3 1 0 4**

AIM

To introduce the concept of analyzing discrete time signals & systems in the time and frequency domain.

OBJECTIVES

i. To classify signals and systems & their mathematical representation.
ii. To analyse the discrete time systems.
iii. To study various transformation techniques & their computation.
iv. To study about filters and their design for digital implementation.
v. To study about a programmable digital signal processor & quantization effects.

UNIT I INTRODUCTION 12

Classification of systems: Continuous, discrete, linear, causal, stable, dynamic, recursive, time variance; classification of signals: continuous and discrete, energy and power; mathematical representation of signals; spectral density; sampling techniques, quantization, quantization error, Nyquist rate, aliasing effect. Digital signal representation.

UNIT II DISCRETE TIME SYSTEM ANALYSIS 12

Z-transform and its properties, inverse z-transforms; difference equation – Solution by z-transform, application to discrete systems - Stability analysis, frequency response – Convolution – Fourier transform of discrete sequence – Discrete Fourier series.

UNIT III DISCRETE FOURIER TRANSFORM & COMPUTATION 12

DFT properties, magnitude and phase representation - Computation of DFT using FFT algorithm – DIT & DIF - FFT using radix 2 – Butterfly structure.

UNIT IV DESIGN OF DIGITAL FILTERS 12

FIR & IIR filter realization – Parallel & cascade forms. FIR design: Windowing Techniques – Need and choice of windows – Linear phase characteristics. IIR design: Analog filter design - Butterworth and Chebyshev approximations; digital design using impulse invariant and bilinear transformation - Warping, prewarping - Frequency transformation.

UNIT V DIGITAL SIGNAL PROCESSOR 12

Introduction to TMS320C5X – Architecture – Features – Addressing Formats – Functional modes.

TOTAL: 60 PERIODS

TEXT BOOKS

1. J.G. Proakis and D.G. Manolakis, 'Digital Signal Processing Principles, Algorithms and Applications', 4th Edition, Pearson Education, New Delhi, 2012.
2. S.K. Mitra, 'Digital Signal Processing – A Computer Based Approach', 4th Edition, Tata McGraw Hill, New Delhi, 2011.
3. A. Nagoorkani, 'Digital Signal Processing', 2nd Edition, Tata McGraw Hill, 2012.

REFERENCES

1 Alan V. Oppenheim, Ronald W. Schafer and John R. Buck, 'Discrete – Time Signal Processing', Pearson Education, New Delhi, 2003.
2. B. Venkataramani, M. Bhaskar, 'Digital Signal Processors, Architecture, Programming and Applications', Tata McGraw Hill, New Delhi, 2003.
3. S. Salivahanan, A. Vallavaraj, C. Gnanapriya, 'Digital Signal Processing', Tata McGraw Hill, New Delhi, 2003.
4. Texas TMS 320C54X user manual (website)

12EE65	MICROPROCESSORS AND MICROCONTROLLER	L	T	P	C
		3	0	0	3

AIM

To introduce Microprocessor Intel 8085 and 8086 and the Micro Controller 8051.

OBJECTIVES

i. i. To study the Architecture of 8085 & 8086, 8051.
ii. To study the addressing modes & instruction set of 8085 & 8051.
iii. To introduce the need & use of Interrupt structure 8085 & 8051.
iv. To develop skill in simple program writing for 8051 & 8085 and applications.
v. To introduce commonly used peripheral / interfacing ICs

UNIT I 8085 PROCESSOR 9

Hardware Architecture pintouts - Signals – Memory interfacing – I/O ports and data transfer concepts – Timing Diagram – Interrupt structure. Introduction to 8086 processor -Architecture and modes of operation only.

UNIT II PROGRAMMING OF 8085 PROCESSOR 9

Instruction format and addressing modes – Assembly language format – Data transfer, data manipulation & control instructions – Programming: Loop structure with counting & Indexing - Look up table - Subroutine instructions - stack.

UNIT III PERIPHERAL INTERFACING 9

Study of Architecture and programming of ICs: 8255 PPI, 8259 PIC, 8251 USART, 8279 Key board display controller and 8253 Timer/ Counter – Interfacing with 8085 - A/D and D/A converter interfacing.

UNIT IV 8051 MICRO CONTROLLER 9

Functional block diagram - Instruction format and addressing modes – Timing Diagram Interrupt structure – Timer –I/O ports – Serial communication.

UNIT V MICRO CONTROLLER PROGRAMMING & APPLICATIONS 9

Data Transfer, Manipulation, Control & I/O instructions – Simple programming exercises key board and display interface – Closed loop control of servo motor- stepper motor control - Washing Machine Control. Concept of Embedded C program – Applications.

TOTAL: 45 PERIODS

TEXT BOOKS

1. R.S. Gaonkar, 'Microprocessor Architecture Programming and Application', 5th Edition, CBS Publishers, 2011.
2. N.Senthilkumar, M. Saravanan, S. Jeevanantham, 'Microprocessor and Microcontrollers', 1st Edition, Oxford University Press, 2010.
3. Muhammad Ali Mazidi, Janice Gilli Mazidi and R.D.Kinely, 'The 8051 Micro Controller and Embedded Systems', 2nd Edition, Pearson Education, 2011.
4. Douglas V Hall " Microprocessor and Interfacing " ,Reviced second edition, Tata McGraw hill,2006

5. Muhammed Ali Mazidi , Janice Gillispie Mazidi, Rolin D. Mckinlaty, "8051 Microcontroller and Embedded Systems using assembly and C" , second edition , Pearson Edution , 2007.

REFERENCES

1. Krishna Kant, "Microprocessor and Microcontrollers", Eastern Company Edition, Prentice Hall of India, New Delhi , 2010.
2. Walter A Tribal & Avtar Singh, 'The 8088 & 8086 Microprocessors', 4th Edition, Pearson Education, 2007.

4.C.L.Wadhwa, 'High Voltage Engineering', New Age International, 2007.

12GE61 **PROFESSIONAL ETHICS IN ENGINEERING** **L T P C**
3 0 0 3

AIM

To sensitize the engineering students on blending both technical and ethical responsibilities.

UNIT I ENGINEERING ETHICS 9

Senses of Engineering Ethics– Variety of moral issues–Types of inquiry–Moral dilemmas– Moral Autonomy–Kohlberg's theory–Gilligan's theory–Consensus and Controversy–Professions and Professionalism–Professional Ideals and Virtues–Uses of Ethical Theories.

UNIT II ENGINEERING AS SOCIAL EXPERIMENTATION 9

Engineering as Experimentation–Engineers as responsible Experimenters–Research Ethics Codes of Ethics–Industrial Standards- A Balanced Outlook on Law–The Challenger Case Study.

UNIT III ENGINEER'S RESPONSIBILITY FOR SAFETY 9

Safety and Risk–Assessment of Safety and Risk–Risk Benefit Analysis– Reducing Risk–The Government Regulator's Approach to Risk- Chernobyl Case Studies and Bhopal.

UNIT IV RESPONSIBILITIES AND RIGHTS 9

Collegiality and Loyalty–Respect for Authority–Collective Bargaining–Confidentiality–Conflicts of Interest–Occupational Crime–Professional Rights–Employee Rights– Intellectual Property Rights (IPR) – Discrimination.

UNIT V GLOBAL ISSUES 9

Multinational Corporations– Business Ethics-Environmental Ethics –Computer Ethics-Role in Technological Development– Weapons Development–Engineers as Managers–Consulting Engineers–Engineers as Expert Witnesses and Advisors–Honesty–Moral Leadership–Sample Code of Conduct.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Mike Martin and Roland Schinzinger, "Ethics in Engineering", McGraw Hill, 2005.
2. Charles E Harris, Michael S Pritchard and Michael J Rabins, "Engineering Ethics–concepts and Cases", Thompson Learning, 2000.

REFERENCES

1. 1. Charles D Fleddermann, "Engineering Ethics", Prentice Hall, New Mexico, 1999.
2. John R Boatright, "Ethics and the Conduct of Business", Pearson Education, 2003.
3. Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientist and Engineers", Oxford University Press, 2001.
4. PS Bajaj and Raj Agrawal, "Business Ethics–An Indian Perspective", Biztantra, 2004.
5. David Ermann and MicheleS Shauf, "Computers, Ethics and Society", Oxford University Press, 2003.

12EE66 MICROPROCESSOR AND MICRO CONTROLLER LABORATORY

L	T	P	C
0	0	3	2

LIST OF EXPERIMENTS

8-bit Microprocessor

1. Simple arithmetic operations: Multi precision addition / subtraction / multiplication / division.
2. Programming with control instructions: Increment / Decrement, Ascending / Descending order, Maximum / Minimum of numbers, Rotate instructions Hex / ASCII / BCD code conversions.
3. Interface Experiments:
   a. A/D Interfacing.
   b. D/A Interfacing.
   c. Traffic light controller.
4. Interface Experiments: Simple experiments using 8251, 8279, 8254.

8-bit Microcontroller

5. Demonstration of basic instructions with 8051 Micro controller execution, including: Conditional jumps, looping, Calling subroutines.Stack parameter testing
6. Parallel port programming with 8051 using port 1 facility:Stepper motor and D / A converter.
7. Programming exercise on RAM Direct Addressing, Bit Addressing
8. Programming Practice using simulation Tools and C Complier
   a. Initialize Timer
   b. Enable Interrupts
9. Study of micro controller with FLASH memory.
10. Programming Practice on Assembler and Simulator tools in 8085.
11. Microcontroller based ADC interfacing.

12EE67 INDUSTRIAL DRIVES AND CONTROL LABORATORY

L	T	P	C
0	0	3	2

LIST OF EXPERIMENTS

1. Speed Control of DC Motor Drive using MOSFET and IGBT Chopper.
2. Speed Control of DC Motor Drive using single phase Converter.
3. Speed Control of DC Motor Drive using three phase Converter.
4. Speed Control of PWM inverter fed single-phase AC drive.
5. Speed Control of PWM inverter fed 3-phase AC drive.
6. Simulation of VSI fed 3-phase Induction motor drives.
7. Simulation of Open loop and Closed loop converter fed DC motor drive.
8. Simulation of Open loop and Closed loop chopper fed DC motor drive.
9. Simulation of Four quadrant operation of three-phase induction motor.
10. Simulation of VSI fed three-phase synchronous motor drive.

12EE68 DIGITAL SIGNAL PROCESSING LABORATORY

L	T	P	C
0	0	3	2

LIST OF EXPERIMENTS

USING TMS320C5X & ADSP

1. Study of various addressing modes of DSP using simple programming examples.
2. Sampling of input signal and display.
3. Implementation of FIR filter.
4. Calculation of FFT.
5. Audio signal processing.

USING MATLAB

1. Generation of signals.
2. Linear and circular convolution of two sequences.

3. Sampling and effect of aliasing.
4. Design of FIR filters.
5. Design of IIR filters.
6. Calculation of FFT of a signal.

12HS61 **ENGLISH FOR EMPLOYMENT - II** **L T P C**
0 0 3 2

LIST OF EXPERIMENTS

UNIT I READING

1.1 Reading for Gist
1.2 Reading for Structure and detail
1.3 Understanding General Points
1.4 Reading-Vocabulary and Texture
1.5 Structure and Discourse features
1.6 Understanding sentence structure

UNIT II WRITING

2.1 Describing figure from graphic input
2.2 Deriving conclusion from illustrations
2.3 Writing a Report-Describing/Summarizing
2.4 Explaining a context
2.5 Writing Apologies
2.6 Complaint letter
2.7 Writing for giving assurance

UNIT-III LISTENING

3.1 Listening for Specific Information
3.2 Listening to Identify topic
3.3 Listening to a context
3.4 Listening to opinions expressed in a debate
3.5 Listening for Gist
3.6 Listening for making Inferences

UNIT-IV SPEAKING

4.1 Introducing yourself
4.2 Have your say
4.3 'Mini-Presentation' on the given topic
4.4 Group Discussion
4.5 Expressing personal opinion about the Social Issues.

12EE71 **POWER SYSTEM OPERATION AND CONTROL** **L T P C**
3 1 0 4

AIM

To understand the day to day operation of power system and the control actions to be implemented on the system to meet the minute-to-minute variation of system load demand.

OBJECTIVES

i. To have an overview of power system operation and control.
ii. To model power-frequency dynamics and to design power-frequency controller.
iii. To model reactive power-voltage interaction and the control actions to be implemented for maintaining the voltage profile against varying system load.

UNIT I INTRODUCTION **12**

System load – variation - load characteristics - load curves and load-duration curve (daily, weekly and annual) - load factor - diversity factor. Importance of load forecasting and simple techniques of forecasting. An overview of power system operation and control and the role of computers in the

implementation. (Qualitative treatment with block diagram).

UNIT II REAL POWER - FREQUENCY CONTROL 12

Basics of speed governing mechanism and modeling - speed-load characteristics – load sharing between two synchronous machines in parallel. Control area concept LFC control of a single area system. Static and dynamic analysis of uncontrolled and controlled cases. Integration of economic dispatch control with LFC. Two-area system – modeling - static analysis of uncontrolled case - tie line with frequency bias control of two-area system - state variable model.

UNIT III REACTIVE POWER–VOLTAGE CONTROL 12

Basics of reactive power control. Excitation systems – modeling. Static and dynamic analysis - stability compensation - generation and absorption of reactive power. Relation between voltage, power and reactive power at a node - method of voltage control - tap-changing transformer. System level control using generator voltage magnitude setting, tap setting of OLTC transformer and MVAR injection of switched capacitors to maintain acceptable voltage profile and to minimize transmission loss.

UNIT IV UNIT COMMITMENT AND ECONOMIC DISPATCH 12

Statement of economic dispatch problem – cost of generation – incremental cost curve co-ordination equations without loss and with loss, solution by direct method and λ-iteration method. (No derivation of loss coefficients). Statement of Unit Commitment problem – constraints; spinning reserve, thermal unit constraints, hydro constraints, fuel constraints and other constraints. Solution methods - Priority-list methods - forward dynamic programming approach. Numerical problems only in priority-list method using full-load average production cost.

UNIT V COMPUTER CONTROL OF POWER SYSTEMS 12

Need of computer control of power systems. Concept of energy control centre (or) load dispatch centre and the functions - system monitoring - data acquisition and control. System hardware configuration – SCADA and EMS functions. Network topology - state estimation - security analysis and control. Various operating states (Normal, alert, emergency, in-extremis and restorative). State transition diagram showing various state transitions and control strategies.

TOTAL: 60 PERIODS

TEXT BOOKS

1. Allen. J. Wood and Bruce F. Wollenberg, 'Power Generation, Operation and Control', 2nd Edition, John Wiley & Sons, Inc., 2009
2. Chakrabarti & Halder, "Power System Analysis: Operation and Control", 3rd Edition, Hall of India, 2010.

REFERENCES

1. D.P. Kothari and I.J. Nagrath, 'Modern Power System Analysis', Fourth Edition, Tata McGraw Hill Publishing Company Limited, New Delhi, 2011.
2. Hadi Saadat, "Power System Analysis", 3rd Edition 2007.
3. P. Kundur, 'Power System Stability and Control' MC Craw Hill Publisher, USA, 1994.
4. Olle I. Elgerd, 'Electric Energy Systems theory - An Introduction' Tata McGraw Hill Publishing Company Ltd. New Delhi, 2nd Edition 2003.
5. T.J.E. Miller, 'Reactive Power Control in Electric power systems', John Wiley and sons, 1982.

12EE72 DESIGN OF ELECTRICAL MACHINES

L	T	P	C
3	1	0	4

AIM

To expose the students to the concept of design of various types of electrical machines.

OBJECTIVES

To provide sound knowledge about constructional details and design of various electrical machines.

i. To study mmf calculation and thermal rating of various types of electrical machines.
ii. To design armature and field systems for D.C. machines.

iii. To design core, yoke, windings and cooling systems of transformers.
iv. To design stator and rotor of induction machines.
v. To design stator and rotor of synchronous machines and study their thermal behavior.

UNIT I INTRODUCTION 12

Major considerations in Electrical Machine Design - Electrical Engineering Materials – Space factor – Choice of Specific Electrical and Magnetic loadings - Thermal considerations - Heat flow in two dimensions – Temperature rise - Rating of machines – Standard specifications.

UNIT II DC MACHINES 12

Output Equations – Main Dimensions - Magnetic circuit calculations – Carter's Coefficient – Net length of Iron –Real & Apparent flux densities – Selection of number of poles – Design of Armature – Design of commutator and brushes – performance prediction using design values.

UNIT III TRANSFORMERS 12

Output Equations – Main Dimensions - KVA output for single and three phase transformers – Window space factor – Overall dimensions – Operating characteristics – Regulation – No load current – Temperature rise in Transformers – Design of Tank - Methods of cooling of Transformers

UNIT IV INDUCTION MOTORS 12

Output equation of induction motor – Main dimensions – Length of air gap- Rules for selecting rotor slots of squirrel cage machines – Design of rotor bars & slots – Design of end rings – Design of wound rotor -– Magnetic leakage calculations – Leakage reactance of polyphase machines- Magnetizing current - Short circuit current – Circle diagram - Operating characteristics.

UNIT V SYNCHRONOUS MACHINES 12

Output equations – choice of loadings – Design of salient pole machines – Short circuit ratio – shape of pole face – Armature design – Armature parameters – Estimation of air gap length – Design of rotor –Design of damper winding – Determination of full load field mmf – Design of field winding – Design of turbo alternators – Rotor design. Introduction to computer aided design of electrical machine.

TOTAL: 60 PERIODS

TEXT BOOKS

1. Sawhney, A.K., 'A Course in Electrical Machine Design', Dhanpat Rai & Sons, New Delhi, 1984.
2. Sen, S.K., 'Principles of Electrical Machine Designs with Computer Programmes', Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi, 1987.

REFERENCES

1. A.Shanmugasundaram, G.Gangadharan, R.Palani 'Electrical Machine Design Data Book', New Age Intenational Pvt. Ltd., Reprint 2007.
2. Balbir Singh, 'Electrical Machine Design', Vikas Publishing House, 1982.

12EE73 SPECIAL ELECTRICAL MACHINES

L	T	P	C
3	0	0	3

AIM

To expose the students to the construction, principle of operation and performance of special electrical machines as an extension to the study of basic electrical machines..

OBJECTIVES

To impart knowledge on

i. Construction, principle of operation and performance of synchronous reluctance motors.
ii. Construction, principle of operation, control and performance of stepping motors.
iii. Construction, principle of operation, control and performance of switched reluctance motors.
iv. Construction, principle of operation, control and performance of permanent magnet brushless D.C. motors.
v. Construction, principle of operation and performance of permanent magnet synchronous motors.

UNIT I SYNCHRONOUS RELUCTANCE MOTORS 9

Constructional features – Types – Axial and Radial flux motors – Operating principles – Variable

Reluctance and Hybrid Motors – SYNREL Motors – Voltage and Torque Equations - Phasor diagram - Characteristics

UNIT II STEPPING MOTORS 9

Constructional features – Principle of operation – Variable reluctance motor – Hybrid motor – Single and multi stack configurations – Torque equations – Modes of excitations – Characteristics – Drive circuits – Microprocessor control of stepping motors – Closed loop control.

UNIT III SWITCHED RELUCTANCE MOTORS 9

Constructional features – Rotary and Linear SRMs - Principle of operation – Torque production – Steady state performance prediction- Analytical method -Power Converters and their controllers – Methods of Rotor position sensing – Sensorless operation – Closed loop control of SRM - Characteristics.

UNIT IV PERMANENT MAGNET BRUSHLESS D.C. MOTORS 9

Permanent Magnet materials – Magnetic Characteristics – Permeance coefficient -Principle of operation – Types – Magnetic circuit analysis – EMF and torque equations –Commutation – Power controllers – Motor characteristics and control.

UNIT V PERMANENT MAGNET SYNCHRONOUS MOTORS 9

Principle of operation – Ideal PMSM – EMF and Torque equations – Armature reaction MMF – Synchronous Reactance – Sine wave motor with practical windings - Phasor diagram – Torque/speed characteristics - Power controllers - Converter Volt-ampere requirements.

TOTAL: 45 PERIODS

TEXT BOOKS

1. T.J.E. Miller, 'Brushless Permanent Magnet and Reluctance Motor Drives', Clarendon Press, Oxford, 1989.
2. T. Kenjo, 'Stepping Motors and Their Microprocessor Controls', Clarendon Press London, 1984.

REFERENCES

1. R.Krishnan, 'Switched Reluctance Motor Drives – Modeling, Simulation, Analysis, Design and Application', CRC Press, New York, 2001.
2. P.P. Aearnley, 'Stepping Motors – A Guide to Motor Theory and Practice', Peter Perengrinus London, 1982.
3. T. Kenjo and S. Nagamori, 'Permanent Magnet and Brushless DC Motors', Clarendon Press, London, 1988.
4. J. Gnanavadivel, J. Karthikeyan, S. Albert Alexander, 'Special Electrical Machines', Anuradha Publications, 2007.

12EE74 ELECTRIC ENERGY GENERATION, UTILISATION AND CONSERVATION

L	T	P	C
3	0	0	3

AIM

To expose students to the main aspects of generation, utilization and conservation

OBJECTIVES

To impart knowledge on

i. To impart knowledge on Generation of electrical power by conventional and non–conventional methods.
ii. Electrical energy conservation, energy auditing and power quality.
iii. Principle and design of illumination systems and methods of heating and welding.
iv. Electric traction systems and their performance.
v. Industrial applications of electric drives.

UNIT I POWER GENERATION 9

Review of conventional methods – thermal, hydro and nuclear based power generation. Nonconventional methods of power generation – fuel cells - tidal waves – wind – geothermal – solar - bio-mass - municipal waste. Cogeneration. Effect of distributed generation on power system operation.

UNIT II ECONOMIC ASPECTS OF GENERATION 9

Economic aspects of power generation – load and load duration curves – number and size of units – cost of electrical energy – tariff. Economics of power factor improvement – power capacitors – power

quality. Importance of electrical energy conservation – methods – energy efficient equipments. Introduction to energy auditing.

UNIT III ILLUMINATION 9

Importance of lighting – properties of good lighting scheme – laws of illumination – photometry - types of lamps – lighting calculations – basic design of illumination schemes for residential, commercial, street lighting, and sports ground - energy efficiency lamps.

UNIT IV INDUSTRIAL HEATING AND WELDING 9

Role electric heating for industrial applications – resistance heating – induction heating – dielectric heating - electric arc furnaces. Brief introduction to electric welding – welding generator, welding transformer and the characteristics.

UNIT V ELECTRIC TRACTION 9

Merits of electric traction – requirements of electric traction system – supply systems – mechanics of train movement – traction motors and control – braking – recent trends in electric traction.

TOTAL: 45 PERIODS

TEXT BOOKS

1. C.L. Wadhwa, 'Generation, Distribution and Utilization of Electrical Energy', New Age International Pvt. Ltd, Revised 3rd Edition 2012.
2. B.R. Gupta, 'Generation of Electrical Energy', Eurasia Publishing House (P) Ltd, New Delhi, 2003..

REFERENCES

1. H. Partab, 'Art and Science of Utilisation of Electrical Energy', Dhanpat Rai and Co, New Delhi, 2004.
2. E. Openshaw Taylor, 'Utilization of Electrical Energy in SI Units', Orient Longman Pvt. Ltd, 2003.
3. J.B. Gupta, 'Utilization of Electric Power and Electric Traction', S.K. Kataria and Sons, 2002.
4. Ram Kumar Garg, 'Electric Power Utilization', Khanna Publishers, 1995.

12EE75 POWER SYSTEM SIMULATION LABORATORY L T P C 0 0 3 2

LIST OF EXPERIMENTS

1. Computation of Parameters and Modelling of Transmission Lines.
2. Formation of Bus Admittance and Impedance Matrices and Solution of Networks.
3. Load Flow Analysis - I : Solution of Load Flow And Related Problems Using Gauss-Seidel Method.
4. Load Flow Analysis - II: Solution of Load Flow and Related Problems Using Newton-Raphson and Fast-Decoupled Methods.
5. Fault Analysis.
6. Transient and Small Signal Stability Analysis: Single-Machine Infinite Bus System.
7. Transient Stability Analysis of Multimachine Power Systems.
8. Electromagnetic Transients in Power Systems.
9. Load – Frequency Dynamics of Single- Area and Two-Area Power Systems.
10. Economic Dispatch in Power Systems.

.

12EE76 COMPREHENSION L T P C 0 0 3 2

AIM:

To encourage the students to comprehend the knowledge acquired from the first Semester to Sixth Semester of B.E Degree Course through periodic exercise.

LIST OF ELECTIVES

ELECTIVE I

12MG52 **PRINCIPLES OF MANAGEMENT** **L T P C**
3 0 0 3

AIM

Knowledge on the principles of management is essential for all kinds of people in all kinds of organizations. After studying this course, students will be able to have a clear understanding of the managerial functions like planning, organizing, staffing, leading and controlling. Students will also gain some basic knowledge on international aspect of management.

OBJECTIVES

Knowledge on the principles of management is essential for all kinds of people in all kinds of organizations. After studying this course, students will be able to have a clear understanding of the managerial functions like planning, organizing, staffing, leading and controlling. Students will also gain some basic knowledge on international aspect of management..

UNIT I MANAGEMENT THEORY AND SCIENCE 9

Definition of Management – Science, Theories of Management – Managing : Science or Art? – Management & Society: Social Responsibility – Ethics ad Value Systems.

UNIT II PLANNING 9

Definition – The Nature and Purpose of Planning – Types of planning –Steps Planning – The Planning process – Objectives - Strategies, Policies and Planning Premises- Forecasting – Decision-making.

UNIT III ORGANIZING 9

Definition – The nature and Purpose of organization – Organization levels and the span of Management – Departmentation – Line/Staff Authority– Centralization – Decentralization– Effective organization & Organizational culture – Staffing – Managerial Job – An overview of staffing function (selection process, techniques and instruments) – Performance appraisal and career strategy – Management Development process and training – Managing change – Organizational development.

UNIT IV LEADING 9

Human factors in Managing – Behavioral models – Creativity and innovation – Motivational theories – Special motivational techniques – Job enrichment – Leadership Behaviors & styles – Situationa or contingency approaches to leadership - Communication – Communication process – Barriers and breakdowns in communication – Towards Effective communication.

UNIT V CONTROLLING 9

The system and process of Controlling – Control Technique – Information Technology– Productivity & Operation Management – Overall Preventing Control – International Management – Toward a unified, Global Management Theory.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Koontz, “Essentials of Management”, Tata McGraw Hill, 2001.
2. Stephen P.Robbins and David A.Decenzo, “Fundamentals of Management, Pearson Education”, 3rd Edition, 2001

REFERENCES

1. J.S.Chandan, “Managemen Concepts and Strategies”, Vikas Publishing House, 2002.
2. Tim Hannagan, “Management Concepts and Practices”, Macmillan India Ltd., 1997.
3. Hellriegel, Jackson and Slocum, “Management: A competency – Based Approach” South Western, 9th Edition, 2002.
4. Stewart Black and Lyman W.Porter, “Management –Meeting New Challenges”, Prentice Hall, 2000.
5. Bateman Snell, “Management Competing in the new era”, McGraw-Hill, 2002.

12MG61 **MARKETING MANAGEMENT** **L T P C**
3 0 0 3

AIM

The aim of this course is to facilitate understanding of the conceptual framework of marketing and its applications in decision making under various environmental constraints.

OBJECTIVES

The objective of this course is to facilitate understanding of the conceptual framework of marketing and its applications in decision making under various environmental constraints.

UNIT I INTRODUCTION **9**

Concept, nature, scope and importance of marketing; Marketing concept and its evolution; Marketing mix; Strategic marketing planning – an overview. Market Analysis and Selection: Marketing environment – macro and micro components and their impact on marketing decisions; Market segmentation and positioning; Buyer behavior; consumer versus organizational buyers; Consumer decision making process.

UNIT II PRODUCT DECISIONS **9**

Concept of a product; Classification of products; Major product decisions; Product line and product mix; Branding; Packaging and labeling; Product life cycle – strategic implications; New product development and consumer adoption process. Pricing Decisions: Factors affecting price determination; Pricing policies and strategies; Discounts and rebates.

UNIT III DISTRIBUTION CHANNELS AND PHYSICAL DISTRIBUTION DECISIONS **9**

Nature, functions, and types of Distribution channels; Distribution channel intermediaries; Channel management decisions; Retailing and wholesaling. Promotion Decisions Communication Process; Promotion mix – advertising, personal selling, sales promotion, publicity and public relations; Determining advertising budget; Copy designing and testing; Media selection; Advertising effectiveness; Sales promotion – tools and techniques.

UNIT IV MARKETING RESEARCH **9**

Meaning and scope of marketing research; Marketing research proce**ss.** Marketing Organization and Control: Organizing and controlling marketing operations.

UNIT V ISSUES AND DEVELOPMENTS IN MARKETING **9**

Social, ethical and legal aspects of marketing; Marketing of services; International marketing; Green marketing; Cyber marketing; Relationship marketing and other developments of marketing..

TOTAL: 45 PERIODS

TEXT BOOKS

1. Philip Kotlar, Marketing Management, Prentice Hall, New Delhi, 2009.
2. Stanton, Etzel, Walker, Fundamentals of Marketing, Tata-McGraw Hill, New Delhi, 1994.

REFERENCES

1. Saxena, Rajan, Marketing Management, 4th Edition,Tata-McGraw Hill, 2009.
2. McCarthy, E.J., Basic Marketing: A managerial approach, Irwin, 1981.

12MG71 **TOTAL QUALITY MANAGEMENT** **L T P C**
3 0 0 3

AIM

To provide comprehensive knowledge about the principles, practices, tools and techniques of Total quality management.

OBJECTIVES

To understand the concepts, principles, techniques and implementation of TQM

UNIT I INTRODUCTION **9**

Introduction-Need for quality-Evolution of quality - Dimensions of manufacturing and service quality-Basic concepts of TQM-Definition of TQM–TQM Framework- Contributions of Deming, Juran and

Crosby–Barriers to TQM.

UNIT II TQM PRINCIPLES 9

Leadership – Strategic quality planning, Quality statements - Customer focus – Customer orientation,Customer satisfaction, Customer complaints, Customer retention.
Employee involvement – Motivation, Empowerment, Team and Teamwork, Recognition and Reward, Performance appraisal –Continuous process improvement–PDSA cycle, 5s, Kaizen-Supplier partnership–Partnering, Supplier selection, Supplier Rating.

UNIT III TQM TOOLS & TECHNIQUES I 9

The seven traditional tools of quality–New management tools–Six-sigma: Concepts, methodology, applications to manufacturing, service sector including IT–Benchmarking–Reason to benchmark, Benchmarking process–FMEA–Stages, Types.

UNIT IV TQM TOOLS & TECHNIQUES II 9

Quality circles– Quality Function Deployment (QFD) – Taguchi quality loss function – TPM–Concepts, improvement needs– Cost of Quality–Performance measures.

UNIT V QUALITY SYSTEMS 9

Need for ISO9000-ISO9000-2000 Quality System–Elements, Documentation, Quality auditing- QS 9000 – ISO 14000 – Concepts, Requirements and Benefits – Case studies of TQM implementation in manufacturing and service sectors including IT.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Dale H. Besterfiled et al., "Total Quality Management", Pearson Education Asia, 3rd Edition, 2006.

REFERENCES

1. James R. Evans and William M. Lindsay, "The Management and Control of Quality", 6th Edition, South-Western (Thomson Learning), 2005.
2. Oakland, J.S., "TQM–Text with Cases", 3rd Edition, Butterworth–Heinemann Ltd., Oxford, 2003.
3. Suganthi,L and Anand Samuel, "Total Quality Management", Prentice Hall (India) Pvt. Ltd., 2006.
4. Janakiraman, B. and Gopal, R.K, "Total Quality Management – Text and Cases", Prentice Hall (India) Pvt. Ltd., 2006.

12MG73 HUMAN RESOURCE MANAGEMENT

L	T	P	C
3	0	0	3

AIM

To design and to provide high quality education in theoretical and practical knowledge and skills in various aspects of human resources management for those who wish to pursue or further advance their careers in business.

OBJECTIVES

- Knowledge on the human resource management is essential for all kinds of people in business concerns in order to advance their careers.
- After learning this course, students will be able to have a clear understanding of concepts and perceptives in human resource management.

UNIT I PERCEPTIVE IN HUMAN RESOURCE MANAGEMENT 5

Evolution of human resource management – The importance of the human factor – Objectives of human resource management – Inclusive growth and affirmative action -Role of human resource manager – Human resource policies – Computer applications in human resource management – Human resource accounting and audit..

UNIT II THE CONCEPT OF BEST FIT EMPLOYEE 8

Importance of Human Resource Planning – Forecasting human resource requirement – Internal and External sources. Selection process screening – Tests - Validation – Interview – Medical examination – Recruitment introduction – Importance – Practices – Socialization benefits.

UNIT III TRAINING AND EXECUTIVE DEVELOPMENT 10

Types of training methods purpose benefits resistance. Executive development programmes – Common practices - Benefits – Self development – Knowledge management.

UNIT IV SUSTAINING EMPLOYEE INTEREST 12

Compensation plan – Reward – Motivation – Theories of motivation – Career management – Development of mentor – Protégé relationships.

UNIT V PERFORMANCE EVALUATION AND CONTROL PROCESS 10

Need for ISO9000-ISO9000-2000 Quality System–Elements, Documentation, Quality auditing- QS 9000 – ISO 14000 – Concepts, Requirements and Benefits – Case studies of TQM implementation in manufacturing and service sectors including IT.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Decenzo and Robbins, Human Resource Management, Wiley, 8th Edition, 2007.
2. Dessler Human Resource Management, Pearson Education Limited, 2007.

REFERENCES

1. Mamoria C.B. and Mamoria S. Personnel Management, Himalaya Publishing Company, 2007
2. Bernadin , Human Resource Management ,Tata McGraw Hill ,6th Edition 2006.
3. Eugence Mckenna and Nic Beach, Human Resource Management, Pearson Education Limited, 2007.
4. Wayne Cascio, Managing Human Resource, McGraw Hill, 2007.
5. Ivancevich, Human Resource Management, McGraw Hill 2002.

12MG74 ENTREPRENEURSHIP DEVELOPMENT L T P C 3 0 0 3

AIM

Study of this subject provides an understanding of the scope of an entrepreneur, key areas of development, financial assistance by the institutions, methods of taxation and tax benefits, etc.

OBJECTIVES

i. Knowledge on entrepreneurship development provides essentials for all kinds of people to identify business opportunities.
ii. After learning this course, students will be able to have a clear understanding of Entrepreneurship and factors affecting growth and business environment.

UNIT I ENTREPRENEURSHIP 9

Entrepreneur – Types of Entrepreneurs – Difference between Entrepreneur and Intrapreneur – Entrepreneurship in Economic Growth, Factors Affecting Entrepreneurical Growth, Business environment.

UNIT II MOTIVATION 9

Major Motives Influencing an Entrepreneur – Achievement Motivation Training, self Rating, Business Game, Thematic Apperception Test – Stress management, Entrepreneurship Development Programs – Need, Objectives.

UNIT III BUSINESS PLAN PREPARATION 9

Small Enterprises – Definition, Classification – Characteristics, Ownership Structures – Project Formulation – Steps involved in setting up a Business – identifying, selecting a Good Business opportunity, Market Survey and Research, Techno Economic Feasibility Assessment – Preparation of Preliminary Project Reports – Project Appraisal – Sources of Information – Classification of Needs and Agencies.

UNIT IV FINANCING AND ACCOUNTING 9

Need – Sources of Finance, Term Loans, Capital Structure, Financial Institution, management of working Capital, Costing, Break Even Analysis, Network Analysis Techniques of PERT/CPM – Taxation – Income Tax, Excise Duty – Sales Tax.

UNIT V SUPPORT TO ENTREPRENEURS 9

Sickness in small Business – Concept, Magnitude, causes and consequences, Corrective Measures – Government Policy for Small Scale Enterprises – Growth Strategies in small industry – Expansion, Diversification, Joint Venture, Merger and Sub Contracting, Effective management of business units.

TOTAL: 45 PERIODS

TEXT BOOKS

1. S.S.Khanka "Entrepreneurial Development", S.Chand & Co. Ltd. Ram Nagar New Delhi, 1999.
2. Kuratko & Hodgetts, "Enterprenuership – Theory, process and practices", Thomson learning, 6th edition.

REFERENCES

1. Hisrich R D and Peters M P, "Entrepreneurship" 5th Edition, Tata McGraw-Hill, 2002.
2. Mathew J Manimala," Entrepreneurship theory at cross roads: paradigms and praxis" Dream Tech, 2nd Edition, 2006.
3. Rabindra N. Kanungo "Entrepreneurship and innovation", Sage Publications, New Delhi, 1998.
4. EDII "Faulty and External Experts – A Hand Book for New Entrepreneurs Publishers: Entrepreneurship Development" Institute of India, Ahmadabad, 1986.

ELECTIVE II

12EE7A **SOFT COMPUTING** **L T P C**
3 0 0 3

AIM

To cater the knowledge of Neural Networks, Fuzzy Logic Control, Genetic Algorithm and Evolutionary Programming and their applications for controlling real time systems.

OBJECTIVES

1. To expose the concepts of feedforward neural networks.
2. To provide adequate knowledge about feedback neural networks.
3. To teach about the concept of fuzziness involved in various systems.
4. To provide adequate knowledge about fuzzy set theory.
5. To expose the ideas of GA and EP in optimization and control.

UNIT I ANN - INTRODUCTION 9

Introduction – Biological neuron – Artificial neuron – Neuron modeling – Learning rules – Single layer – Multi layer feed forward network – Back propagation – Learning factors.

UNIT II ANN - ARCHITECTURE AND APPLICATIONS 9

Feedback networks – Discrete time Hopfield networks – Transient response of continuous time networks – Process modeling using ANN- Neuro controller for inverted pendulum.

UNIT III FUZZY SYSTEMS 9

Classical sets – Fuzzy sets – Fuzzy relations – Fuzzification - Membership functions – Defuzzification – Methods of defuzzification – Fuzzy rules.

UNIT IV FUZZY LOGIC CONTROL 9

Membership function – Knowledge base – Decision-making logic – Optimisation of membership function using neural networks – Adaptive fuzzy system- FLC for inverted pendulum- Home heating system- Introduction to Neuro-fuzzy systems.

UNIT V GENETIC ALGORITHMS 9

Genetic Algorithms: Operators, search algorithm, penalty, Case Studies: Power System Problems (Optimal Power Flow & Economic Dispatch), Controller Tuning.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Laurence Fausett, 'Fundamentals of Neural Networks', Pearson Education, 2004.
2. Timothy J. Ross, 'Fuzzy Logic with Engineering Applications', McGraw Hill, 1997.
3. David Goldberg, "Genetic Algorithms in Search, Optimization and Machine Learning', Pearson Education, 2007.

REFERENCES

1. J.S.R.Jang, C.T.Sun and E.Mizutani, ' Neuro- Fuzzy and Soft Computing' Pearson Education, New Delhi, 2004.

2. Jacek M. Zurada, 'Introduction to Artificial Neural Systems', Jaico Publishing home, 2002.
3. John Yen and Reza Langari, 'Fuzzy Logic – Intelligence, Control and Information', Pearson Education, NewDelhi, 2003.
4. Robert J.Schalkoff, ' Artifical Neural Networks', McGraw Hill, 1997.
5. S.N.Sivanandam, S.N.Deepa, "Principles of Soft computing", 2nd Edition, Wiley India, 2011.

12EE7B **VLSI DESIGN**

L	T	P	C
3	0	0	3

AIM

To understand the basic concepts of VLSI and CMOS design

OBJECTIVES

1. To introduce MOS theory / Manufacturing Technology.
2. To study inverter / counter logic / stick / machine diagram / sequential circuits.
3. To study address / memory / arithmetic circuits.
4. To introduce FPGA architecture / principles / system design.
5. To get familiarised with VHDL programming behavioral / structural/concurrent

UNIT I BASIC MOS TRANSISTOR 9

Enhancement mode & Depletion mode – Fabrication (NMOS, PMOS, CMOS, BiCMOS) Technology – NMOS transistor current equation – second order effects – MOS Transistor Model.

UNIT II NMOS & CMOS INVERTER AND GATES 9

NMOS & CMOS inverter – Determination of pull up / pull down ratios – stick diagram – lambda based rules – super buffers – BiCMOS & steering logic.

UNIT III SUB SYSTEM DESIGN & LAYOUT 9

Structured design of combinational circuits – Dynamic CMOS & clocking – Tally circuits – (NAND- NAND, NOR-NOR and AOI logic) – EXOR structure – Multiplexer structures – Barrel shifter.

UNIT IV DESIGN OF COMBINATIONAL ELEMENTS & REGULAR ARRAYLOGIC 9

NMOS PLA – Programmable Logic Devices - Finite State Machine PLA – Introduction to FPGA, CPLD.

UNIT V VERILOG PROGRAMMING 9

RTL Design – Destructured level Design -combinational logic – Types – Operators – Packages – Sequential circuit – Sub programs. (Examples: address, counters, flip-flops, FSM, Multiplexers / Demultiplexers).

TOTAL: 45 PERIODS

TEXT BOOKS

1. D.A.Pucknell, K.Eshraghian, 'Basic VLSI Design', 3rd Edition, Prentice Hall of India, New Delhi, 2003.
2. Eugene D.Fabricius, 'Introduction to VLSI Design', Tata McGraw Hill, 1990.
3. K. Lal Kishore,V.S.V. Prabhaka , Vlsi Design, I K International Publishing House Pvt. Ltd, 2009.

REFERENCES

1. N.H.Weste, 'Principles of CMOS VLSI Design', Pearson Education, India, 2002.
2. Charles H.Roth, 'Fundamentals of Logic Design', Jaico Publishing House, 1992.
3. Zainalatsedin Navabi, 'VHDL Analysis and Modeling of Digital Systems', 2nd Edition, Tata McGraw Hill, 1998.
4. Douglas Perry, 'VHDL Programming By Example', Tata McGraw Hill, 3rd Edition, 2007.
5. Parag K.Lala, 'Digitl System Design using PLD', BS Publications, 2003.

12EE7C **EMBEDDED SYSTEMS** **L T P C**
3 0 0 3

AIM

To study embedded computers, their features and design with an example.

OBJECTIVES

i. To introduce students to the embedded systems, its hardware and software.
ii. To introduce devices and buses used for embedded networking.
iii. To explain programming concepts and embedded programming in C and C++.
iv. To explain real time operating systems, inter-task communication and an exemplary case of MUCOS – IIRTOS.

UNIT I EMBEDDED DESIGN PROCESS 9

Embedded Computers, Characteristics of Embedded Computing Applications, Challenges in Embedded Computing system design, Embedded system design process- Requirements, Specification, Architectural Design, Designing Hardware and Software Components, System Integration, Formalism for System Design- Structural Description, Behavioural Description, Design Example: Model Train Controller, ARM processor- processor and memory organization.

UNIT II EMBEDDED PROCESSOR AND COMPUTING PLATFORM 9

Data operations, Flow of Control, SHARC processor- Memory organization, Data operations, Flow of Control, parallelism with instructions, CPU Bus configuration, ARM Bus, SHARC Bus, Memory devices, Input/output devices, Component interfacing, designing with microprocessor development and debugging, Design Example : Alarm Clock, Hybrid Architecture.

UNIT III NETWORKS 9

Distributed Embedded Architecture- Hardware and Software Architectures, Networks for embedded systems- I2C, CAN Bus, SHARC link ports, Ethernet, Myrinet, Internet, Network-Based design- Communication Analysis, system performance Analysis, Hardware platform design, Allocation and scheduling, Design Example: Elevator Controller.

UNIT IV REAL-TIME CHARACTERISTICS 9

Clock driven Approach, weighted round robin Approach, Priority driven Approach, Dynamic Versus Static systems, effective release times and deadlines, Optimality of the Earliest deadline first (EDF) algorithm, challenges in validating timing constraints in priority driven systems, Off-line Versus On-line scheduling.

UNIT V SYSTEM DESIGN TECHNIQUES 9

Design Methodologies, Requirement Analysis, Specification, System Analysis and Architecture Design, Quality Assurance, Design Example: Telephone PBX, Ink jet printer, Personal Digital Assistants, Set-top Boxes.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Wayne Wolf, “Computers as Components: Principles of Embedded Computing System Design”, Morgan Kaufman Publishers, 2008.
2. Jane W.S. Liu, “Real-Time systems”, Pearson Education Asia, 2000.

REFERENCES

1. C. M. Krishna and K. G. Shin, “Real-Time Systems” , McGraw-Hill, 1997.
2. Frank Vahid and Tony Givargis, “Embedded System Design: A Unified Hardware/Software Introduction”, John Wiley & Sons.

12EE7D **OPERATING SYSTEMS** **L T P C**
3 0 0 3

AIM

To learn the various aspects of operating systems such as process management, memory management, file systems, and I/O management.

OBJECTIVES

1. To have an overview of different types of operating systems.
2. To know the components of an operating system.
3. To have a thorough knowledge of process management.
4. To have a thorough knowledge of storage management.
5. To know the concepts of I/O and file systems.

UNIT I PROCESSES AND THREADS 9

Introduction to operating systems – review of computer organization – operating system structures – system calls – system programs – system structure – virtual machines. Processes: Process concept– Process scheduling – Operations on processes – Cooperating processes – Interprocess communication – Communication in client- server systems. Case study: IPC in Linux. Threads: Multi- threading models – Threading issues. Case Study: threads library.

UNIT II PROCESS SCHEDULING AND SYNCHRONIZATION 9

CPU Scheduling: Scheduling criteria – Scheduling algorithms – Multiple-processor scheduling – Real time scheduling – Algorithm Evaluation. Case study: Process scheduling in Linux. Process Synchronization: The critical-section problem – Synchronization hardware – Semaphores – Classic problems of synchronization – critical regions – Monitors. Deadlock: System model – Deadlock characterization – Methods for handling deadlocks – Deadlock prevention – Deadlock avoidance – Deadlock detection – Recovery from deadlock

UNIT III STORAGE MANAGEMENT 9

Memory Management: Background – Swapping – Contiguous memory allocation – Paging – Segmentation – Segmentation with paging. Virtual Memory: Background – Demand paging – Process creation – Page replacement – Allocation of frames – Thrashing. Case Study: Memory management in Linux.

UNIT IV FILE SYSTEMS 9

File-System Interface: File concept – Access methods – Directory structure –File-system mounting – Protection. File-System Implementation: Directory implementation – Allocation methods – Free-space management – efficiency and performance – recovery – log-structured file systems. Case studies: File system in Linux – file system in Windows XP.

UNIT V I/O SYSTEMS 9

I/O Systems – I/O Hardware – Application I/O interface – kernel I/O subsystem – streams – performance. Mass-Storage Structure: Disk scheduling – Disk management – Swap -space management – RAID – disk attachment – stable storage – tertiary storage. Case study: I/O in Linux.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Silberschatz, Galvin, and Gagne, "Operating System Concepts", 6th Edition, Wiley India Pvt. Ltd, 2003.
2. D. M. Dhamdhere, "Operating Systems: A concepts based approach", 2nd Edition, Tata McGraw-Hill Publishing Company Ltd., 2006.

REFERENCES

1. Andrew S. Tanenbaum, "Modern Operating Systems",2nd Edition, Pearson Education/ PHI, 2001.
2. Harvey M. Deital, "Operating Systems", 3rd Edition, Pearson Education, 2000.

12EE7E **PROGRAMMABLE LOGIC CONTROLLER** **L T P C**
3 0 0 3

AIM

To illustrate the concept of programmable logic controllers.

OBJECTIVES

1. To give an introductory knowledge about PLC and the programming languages.
2. To give adequate knowledge about of application of PLC.
3. To give basic knowledge in the architecture and local control unit of distributed control system.

UNIT I INTRODUCTION TO PROGRAMMABLE LOGIC CONTROLLER 9

Study the history of development - examples of early applications - review of common computer mathematical functions - digital logic gates.

UNIT II MAIN ELEMENTS OF THE PLC SYSTEM 9

CPU - memory maps - single bit I/O modules - Power Supplies.

UNIT III PLC PROGRAMMING 9

Equipment – formats - ladder diagrams – scanning – Programming On/Off Inputs to produce On-Off Outputs - Basic PLC Programming.

UNIT IV PROGRAM USING REGISTER FUNCTIONS 9

Input - output registers - timer - counter functions - understand PLC arithmetic functions - square root - comparisons creation of ladder diagrams for process-control.

UNIT V APPLICATIONS 9

Skip - Master Control Relay Functions - Interlocks Data Move Systems - Real time control using PLC - PID function in PLC – Soft PLC's, Lab Exercises.

TOTAL: 45 PERIODS

TEXT BOOKS

1. John W. Webb and Ronald A Reis, Programmable Logic Controllers – Principles and Applications, Prentice Hall, New Jersey, 2nd edition, 1998.

REFERENCES

1. Frank D. Petruzella, Programmable Logic Controllers, McGraw Hill, Newyork, 4th edition, 2011.
2. Curtis D. Johnson, Process Control Instrumentation Technology, Prentice Hall, New Delhi, 7th edition, 2002.
3. Stenerson J., Fundamentals of Programmable Logic Controllers, Sensors and Communications, Prentice Hall, 1998.
4. Michel G. and Duncan, F., Programmable Logic Controllers: Architecture and Application, John Wiley & Sons Pvt ltd., 1990.
5. Carrow, R.A., Soft Logic: A Guide to Using a PC as a Programmable Logic Controller, Tata McGraw Hill, New Delhi, 1997.

12EE7E **COMPUTER NETWORKS** **L T P C**
3 0 0 3

AIM

To introduce the concept of computer networking to electrical engineering students.

OBJECTIVES

i. To understand the concept of OSI Layer / network architecture.
ii. To understand the concept of Internetworking protocols and Routing algorithms.
iii.To understand the concept of Data communication and security algorithms in networks.

UNIT I INTRODUCTION **9**

Introduction to networks – network architecture – network performance – Direct link networks – encoding – framing – error detection – transmission – Ethernet – Rings – FDDI - Wireless networks – Switched networks – bridges.

UNIT II NETWORK LAYER **9**

Internetworking – IP - ARP – Reverse Address Resolution Protocol – Dynamic Host Configuration Protocol – Internet Control Message Protocol – Routing – Routing algorithms – Addressing – Subnetting – CIDR – Inter domain routing – IPv6.

UNIT III TRANSPORT LAYER **9**

Transport Layer – User Datagram Protocol (UDP) – Transmission Control Protocol – Congestion control – Flow control – Queuing Disciplines – Congestion Avoidance Mechanisms.

UNIT IV APPLICATION LAYER AND NETWORK SECURITY **9**

Data Compression – introduction to JPEG, MPEG, and MP3 – cryptography – symmetric-key – public-key – authentication – key distribution – key agreement – PGP – SSH – Transport layer security – IP Security – wireless security – Firewalls.

UNIT V APPLICATIONS **9**

Domain Name System (DNS) – E-mail – World Wide Web (HTTP) – Simple Network Management Protocol – File Transfer Protocol (FTP) – Web Services - Multimedia Applications – Overlay networks.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Larry L. Peterson and Bruce S. Davie, “Computer Networks: A Systems Approach”, 4th Edition, Elsevier Publishers Inc., 2007.

REFERENCES

1. James F. Kuross and Keith W. Ross, “Computer Networking: A Top-Down Approach Featuring the Internet”, Third Edition, Addision wesley, 2004.
2. Andrew S. Tanenbaum, “Computer Networks”, 4th Edition, PHI, 2003.
3. William Stallings, “Data and Computer Communication”, 6th Edition, Pearson Education, 2000.
4. Nader F. Mir, “Computer and communication networks”, Pearson Education, 2007.

12EE8A **MECHATRONICS** **L T P C**
3 0 0 3

AIM

To understand the principles, techniques and components of mechatronics system and its design.

OBJECTIVES

i. This syllabus is formed to create knowledge in mechatronic systems and impart the source of concepts and techniques, which have recently been applied in practical situation.
ii. It gives a framework of knowledge that allows engineers and technicians to develop an interdisciplinary understanding and integrated approach to engineering.

UNIT I INTRODUCTION 5

Introduction to Mechatronics- Systems- Concepts of Mechatronics approach-Need for Mechatronics- Emerging area of Mechatronics- Classification of Mechatronics.

UNIT II SENSORS AND TRANSDUCERS 12

Introduction – Performance Terminology- Potentiometers-LVDT-Capacitance sensors- Strain gauges- Eddy current sensor-Hall effect sensor- Temperature sensors- Light sensors- Selection of sensors- Signal processing.

UNIT III MOTION CONTROL AND MEASUREMENT SYSTEM 12

Control system- Open Loop and Feedback Control-Measurement system-Drives and actuators-Control devices- Servo systems- Motion converters.

UNIT IV PROGRAMMABLE LOGIC CONTROLLERS 8

Introduction- Basic structure- Input and output processing- Programming- Mnemonics- Timers, counters and internal relays- Data handling-Selection of PLC.

UNIT V DESIGN AND MECHATRONICS 8

Design process-stages of design process-Traditional and Mechatronics design concepts- Case studies of Mechatronics systems- Pick and place Robot- Autonomous mobile robot-Wireless surveillance balloon- Engine Management system- Automatic car park barrier.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Bolton, “Mechatronics”, Pearson education, 2nd Edition, fifth Indian Reprint, 2003.
2. Smaili A and Mrad.F, "Mechatronics integrated technologies for intelligent machines", Oxford university press, 2008.
3. R. K. Rajput, “A Textbook of Mechatronics”, S.Chand and Company Ltd., reprint 2013.

REFERENCES

1. Godfrey C. Onwubolu, "Mechatronics Principles and Applications", Elsevier, 2006.
2. Devadas Shetty and Richard A.Kolk, “Mechatronics systems design”, PWS Publishing Company 2007.
3. Nitaigour Premchand Mahalik, “Mechatronics Principles, Concepts and Applicatlions” Tata McGraw-Hill Publishing company Limited, 2003.
4. Michael B.Histand and Davis G.Alciatore,” Introduction to Mechatronics and Measurement systems”, McGraw Hill International edition, 1999.
5. Bradley D.A, Dawson.D, Buru N.C and Loader A.J, “Mechatronics” Chapman an Hall, 1993.
6. Lawrence J.Kamm, “Understanding Electro-Mechanical Engineering – An Introduction to Mechatronics”, Prentice Hall of India Pvt Ltd, 2000.
7. Dan Necsulescu, “Mechatronics”, Pearson education, 2002.
8. Newton C.Braga, “Mechatronics Sourcebook”, Thomson Delmar Learning, Eswar Press, 2003.

12EE8B **ROBOTICS AND AUTOMATION** **L T P C**
3 0 0 3

AIM

To provide comprehensive knowledge of robotics in the design, analysis and control point of view.

OBJECTIVES

1. To study the various parts of robots and fields of robotics.
2. To study the various kinematics and inverse kinematics of robots.
3. To study the Euler, Lagrangian formulation of Robot dynamics.
4. To study the trajectory planning for robot.
5. To study the control of robots for some specific applications

UNIT I BASIC CONCEPTS 9

Definition and origin of robotics – different types of robotics – various generations of robots – degrees of freedom – Asimov's laws of robotics – dynamic stabilization of robots.

UNIT II POWER SOURCES AND SENSORS 9

Hydraulic, pneumatic and electric drives – determination of HP of motor and gearing ratio – Variable speed arrangements – path determination – micro machines in robotics – Machine vision – ranging – laser – acoustic – magnetic, fiber optic and tactile sensors.

UNIT III MANIPULATORS, ACTUATORS AND GRIPPERS 9

Construction of manipulators – manipulator dynamics and force control – electronic and Pneumatic manipulator control circuits – end effectors – U various types of grippers – design considerations.

UNIT IV KINEMATICS AND PATH PLANNING 9

Solution of inverse kinematics problem – multiple solution jacobian work envelop – hill Climbing techniques – robot programming languages.

UNIT V CASE STUDIES 9

Mutiple robots – machine interface – robots in manufacturing and non- manufacturing applications – robot cell design – selection of robot

TOTAL: 45 PERIODS

TEXT BOOKS

1. Mikell P. Weiss G.M., Nagel R.N. and Odraj N.G., Industrial Robotics, McGraw-Hill, Singapore, 1996.
2. Ghosh, Control in Robotics and Automation: Sensor Based Integration, Allied Publishers, Chennai, 1998.

REFERENCES

1. Deb.S.R., 'Robotics technology and flexible Automation', John Wiley, USA 1992.
2. Asfahl C.R., 'Robots and manufacturing Automation', John Wiley, USA 1992.
3. Klafter R.D., Chimielewski T.A., Negin M., 'Robotic Engineering – An integrated approach', Prentice Hall of India, New Delhi, 1994.
4. Mc Kerrow P.J. 'Introduction to Robotics', Addison Wesley, USA, 1991.
5. Issac, 'Asimov I Robot', Ballantine Books, New York, 1986.

12EE8C **BIOMEDICAL INSTRUMENTATION** **L T P C**
3 0 0 3

AIM

To make the student to acquire an adequate knowledge about the physiological systems of the human body and relate them to the parameters that have clinical importance

OBJECTIVES

1. To provide an acquaintance of the physiology of the heart, lung, blood circulation and circulation respiration. Transducers for biomedical applications.
2. To introduce the student to the various sensing and measurement devices of electrical origin. To provide awareness of electrical safety of medical equipments.
3. To provide the latest ideas on devices of non-electrical devices.
4. To bring out the important and modern methods of imaging techniques.
5. To provide latest knowledge of medical assistance / techniques and therapeutic equipments.

UNIT I PHYSIOLOGY AND TRANSDUCERS 9

Cell and its structure – Resting and Action Potential – Nervous system: Functional organization of the nervous system – Structure of nervous system, neurons - synapse –transmitters and neural communication – Cardiovascular system – respiratory system – Basic components of a biomedical system - Transducers – selection criteria – Piezo electric, ultrasonic transducers - Temperature measurements - Fibre optic temperature sensors.

UNIT II ELECTRO – PHYSIOLOGICAL MEASUREMENTS 9

Electrodes –Limb electrodes –floating electrodes – pregelled disposable electrodes - Micro, needle and surface electrodes – Amplifiers: Preamplifiers, differential amplifiers, chopper amplifiers – Isolation amplifier.ECG – EEG – EMG – ERG – Lead systems and recording methods – Typical waveforms. Electrical safety in medical environment: shock hazards – leakage current-Instruments for checking safety parameters of biomedical equipments.

UNIT III NON-ELECTRICAL PARAMETER MEASUREMENTS 9

Measurement of blood pressure – Cardiac output – Heart rate – Heart sound –Pulmonary function measurements – spirometer – Photo Plethysmography, Body Plethysmography – Blood Gas analysers : pH of blood –measurement of blood pCO_2, pO_2, finger-tip oxymeter - ESR, GSR measurements .

UNIT IV MEDICAL IMAGING 9

Radio graphic and fluoroscopic techniques – Computer tomography – MRI – Ultrasonography – Endoscopy – Thermography – Different types of biotelemetry systems and patient monitoring – Introduction to Biometric systems.

UNIT V ASSISTING AND THERAPEUTIC EQUIPMENTS 9

Pacemakers – Defibrillators – Ventilators – Nerve and muscle stimulators – Diathermy – Heart – Lung machine – Audio meters – Dialyzers – Lithotripsy.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Leslie Cromwell, Fred J.Weibell, Erich A.Pfeiffer, 'Bio-Medical Instrumentation and Measurements', 2nd Edition, Pearson Education, 2002.
2. R.S.Khandpur, 'Hand Book of Bio-Medical instrumentation', Tata McGraw Hill Publishing Co. Ltd., 2003.

REFERENCES

1. M.Arumugam, 'Bio-Medical Instrumentation', Anuradha Agencies, 2003.
2. L.A. Geddes and L.E.Baker, 'Principles of Applied Bio-Medical Instrumentation', John Wiley &Sons, 1975.
3. J.Webster, 'Medical Instrumentation', John Wiley Sons,1995.
4. C.Rajarao and S.K. Guha, 'Principles of Medical Electronics and Bio-medical Instrumentation', Universities press (India) Ltd, Orient Longman ltd, 2000.

12EE8D FIBRE OPTICS AND LASER INSTRUMENTS

L	T	P	C
3	0	0	3

AIM

To contribute to the knowledge of fibre optics and laser instrumentation and its industrial and medical application.

OBJECTIVES

1. To expose the students to the basic concepts of optical fibres and their properties.
2. To provide adequate knowledge about the Industrial applications of optical fibres.
3. To expose the students to the laser fundamentals.
4. To provide adequate knowledge about industrial application of lasers.
5. To provide adequate knowledge about holography and medical applications of lasers.

UNIT I OPTICAL FIBRES AND THEIR PROPERTIES 9

Principles of light propagation through a fibre - Different types of fibres and their properties, fibre characteristics – Absorption losses – Scattering losses – Dispersion – Connectors and splicers – Fibre termination – Optical sources – Optical detectors.

UNIT II INDUSTRIAL APPLICATION OF OPTICAL FIBRES 9

Fibre optic sensors – Fibre optic instrumentation system – Different types of modulators – Interferometric method of measurement of length – Moire fringes – Measurement of pressure, temperature, current, voltage, liquid level and strain.

UNIT III LASER FUNDAMENTALS 9

Fundamental characteristics of lasers – Three level and four level lasers – Properties of laser – Laser modes – Resonator configuration – Q-switching and mode locking – Cavity damping – Types of lasers – Gas lasers, solid lasers, liquid lasers, semiconductor lasers.

UNIT IV INDUSTRIAL APPLICATION OF LASERS 9

Laser for measurement of distance, length, velocity acceleration, current, voltage and Atmospheric effect – Material processing – Laser heating, welding, melting and trimming of material – Removal and vaporization.

UNIT V HOLOGRAM AND MEDICAL APPLICATIONS 9

Holography – Basic principle - Methods – Holographic interferometry and application, Holography for non-destructive testing – Holographic components – Medical applications of lasers, laser and tissue interactive – Laser instruments for surgery, removal of tumors of vocal cards, brain surgery, plastic surgery, gynecology and oncology.

TOTAL: 45 PERIODS

TEXT BOOKS

1. J.M. Senior, 'Optical Fibre Communication – Principles and Practice', Prentice Hall of India, 1985.
2. J. Wilson and J.F.B. Hawkes, 'Introduction to Opto Electronics', Prentice Hall of India, 2001.

REFERENCES

1. G. Keiser, 'Optical Fibre Communication', McGraw Hill, 1995.
2. M. Arumugam, 'Optical Fibre Communication and Sensors', Anuradha Agencies, 2002.
3. John F. Read, 'Industrial Applications of Lasers', Academic Press, 1978.
4. Monte Ross, 'Laser Applications', McGraw Hill, 1968.

12EE8E	MODERN CONTROL SYSTEM	L	T	P	C
		3	0	0	3

AIM

To introduce characteristics of nonlinear systems, mathematical model of various nonlinear elements, analysis techniques and stability.

OBJECTIVES

1. To understand the characteristics of non-linear systems.
2. To perform the graphical analysis of non-linear systems through phase-plane method.
3. To study and analyse non-linear characteristics through Describing function method.
4. To understand the concept of stability analysis of systems and various stability criterions.

UNIT I NONLINEAR SYSTEM INTRODUCTION 10

Introduction, Characteristics of Non linear systems, Jump resonance, Sub-harmonic oscillations, Limit cycles, Frequency entertainment quenching, Non-linearities - inherent and intentional.

UNIT II PHASE PLANE ANALYSIS 10

Phase plane analysis, Singular points, sketching of phase portraits, Limit cycles, and nonlinear conservative system with nonlinear damping. Effect of non-linearities on the step response of the position control and Relay systems.

UNIT III DESCRIBING FUNCTION ANALYSIS 10

Describing function techniques - Describing functions of nonlinear characteristics, Expression for the functions, Accuracy of describing function methods, Describing functions for multiple non linearities, Evaluation of the gain function for analytically and graphically defined characteristics.

UNIT IV STABILITY ANALYSIS 10

Experimental determination of gain functions, Condition for stability, stability of oscillations, Stability of systems with multiple non-linearities, closed loop frequency response, Transient response, and Dual input describing functions.

UNIT V STABILITY CRITERIONS 10

Lyapunov's and Popov's stability criteria, Linearization and stability in the small and large sense, Second method of Lyapunov, Variable gradient methods, Lure's problem, Popov's stability Theorem

TOTAL: 50 PERIODS

TEXT BOOKS

1. M. Gopal, "Modern Control System Theory", New Age International, 2nd edition 2009.
2. Bay.J.S., Linear State Space Systems, McGraw-Hill, 1999.
3. I.J.Nagrath and M.Gopal - Control System Engineering, John Wiley Publishing Ltd., 1993

REFERENCES

1. M. Chidambaram, "Computer Control of Process", Alpha Science International, Ltd., 2002.
2. Chi-Tsong Chen, "Linear System Theory and Design", 3rd edition, Oxford University Press, 1999.
3. K. Ogatta, "Modern Control Engineering", Pearson Education Asia, Low Priced Edition,1997.
4. Glad.T.,Ljung.L., Control Theory – Multivariable and Non-linear methods, Taylor and Francis, London and NY.
5. G. J. Thaler, "Automatic Control Systems", Jaico publishers, 1993.

12EE8F **POWER QUALITY** **L T P C**
3 0 0 3

AIM

To study the various issues affecting power quality, their production, monitoring and suppression.

OBJECTIVES

1. To study the production of voltages sags, overvoltages and harmonics and methods of control.
2. To study various methods of power quality monitoring.

UNIT I INTRODUCTION TO POWER QUALITY 9

Terms and definitions: Overloading- under voltage- overvoltage. Concepts of transients-short duration variations such as interruption-long duration variation such as sustained interruption. Sags and swells-voltage sag-voltage swell-voltage imbalance-voltage fluctuation- power frequency variations. International standards of power quality. Computer Business Equipment Manufacturers Associations CBEMA) curve.

UNIT II VOLTAGE SAGS AND INTERRUPTIONS 9

Sources of sags and interruptions-estimating voltage sag performance. Thevenin's equivalent source-analysis and calculation of various faulted condition. Voltage sags due to induction motor starting. Estimation of the sag severity-mitigation of voltage sags, active series compensators. Static transfer

switches and fast transfer switches.

UNIT III OVERVOLTAGES 9

Sources of over voltages-Capacitor switching–lightning- ferro resonance. Mitigation of voltage swells-surge arresters-low pass filters- power conditioners. Lightning protection–shielding-line arresters-protection of transformers and cables. An introduction to computer analysis tools for transients, PSCAD and EMTP.

UNIT IV HARMONICS 9

Harmonic sources from commercial and industrial loads, locating harmonic sources. Power system response characteristics-Harmonics Vs transients. Effect of harmonics-harmonic distortion- voltage and current distortion-harmonic indices- inter harmonics–resonance. Harmonic distortion evaluation-devices for controlling harmonic distortion-passive and active filters. IEEE and IEC standards

UNIT V POWER QUALITY MONITORING 9

Monitoring considerations-monitoring and diagnostic techniques for various power quality problems-modeling of power quality (harmonics and voltage sag) problems by mathematical simulation tools-power line disturbance analyzer –quality measurement equipment -harmonic / spectrum analyzer – flicker meters -disturbance analyzer. Applications of expert systems for power quality monitoring.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Roger C. Dugan, Mark F. McGranagham, Surya Santoso, H. Wayne Beaty, ‘Electrical Power Systems Quality’ McGrawHill,2003.

REFERENCES

1. G.T.Heydt, 'Electric Power Quality', 2nd Edition, Starsina Circle Publications, 1994.
2. M.H.JBollen,‘ Understanding Power Quality Problems: Voltage Sags and Interruptions’, New York: IEEE Press, 1999.
3. J.Arrillaga, N.R.Watson, S.Chen, 'Power System Quality Assessment', NewYork Wiley, 1999. PSCAD User manual.

12EE8G **HIGH VOLTAGE TRANSMISSION SYSTEM** **L T P C**
3 0 0 3

AIM

To impart knowledge about HVDC systems and EHV-AC system.

OBJECTIVES

1. To understand the concept, planning of DC power transmission and comparison with AC power transmission.
2. To analyze HVDC converters.
3. To study about circuit breaker and surges.
4. To understand the concept of compensation in AC transmission systems.

UNIT I INTRODUCTION TO HVDC SYSTEMS AND EHV-AC SYSTEM 9

Introduction - Historical development - Comparison between AC and DC transmission - kinds of DC links.

UNIT II ANALYSIS OF CONVERTERS 9

Three phase fully controlled thyristor bridge converters - Equivalent circuits - Characteristics of Converters- Gate control - Basic means of control characteristics - Constant current control - Constant extinction angle control - Harmonic analysis - Filters.

UNIT III TRANSMISSION LINE PARAMETERS 9

Basis of protection of HVDC systems - DC reactors - voltage and current oscillations - Clearing line faults and re-energizing the line - Over voltage protection. Introduction of HVAC transmission - Transmission voltages - average values of line parameters – Power handling capacity and line loss - Costs of transmission lines and equipments - Mechanical considerations in line performance.

UNIT IV CIRCUIT BREAKER AND SURGES 9

Origin of over voltages and their types - Short circuit current and circuit breaker - Recovery voltage – Ferro resonance over voltages - Calculation of switching surges - Single phase equivalents – Generalized equations for single phase and three phase representation.

UNIT V FLEXIBLE AC TRANSMISSION 9

Problem at power frequency - Generalized constants - No load voltage conditions and charging current -Power circle diagram and its use - Voltage control using synchronous condenser - Shunt and series compensation - Sub synchronous resonance in series capacitor compensated lines - Flexible AC transmission.

TOTAL: 45 PERIODS

TEXT BOOKS

1. E.W.Kimbark, Direct Current Transmission, Vol. I, Wiley Interscience, New York, 1971.
2. K.R.Padiyar, HVDC Power Transmission System Technology and System Interactions, Wiley Eastern Ltd., 1991.
3. Das Begamudre, “Extra High voltage AC Transmission”, Rakosh Wiley eastern Ltd., New Delhi, 1986.

REFERENCES

1. Colin Adamson, and N.G.Hingorani, High Voltage Direct Current Power Transmission, Garraway Limited, England, 1960.
2. B.J.Kory (ed), High Voltage Direct Current converters and Systems, Macdonald & co., London, 1965.
3. B.M. Weedy, Electric Power Systems, John Wiley & Sons, London, 1979.

		L	T	P	C
12EE8H	FLEXIBLE AC TRANSMISSION SYSTEMS	3	0	0	3

AIM

To enhance the transmission capability of transmission system by shunt and series compensation using static controllers.

OBJECTIVES

1. To understand the concept of flexible AC transmission and the associated problems.
2. To review the static devices for series and shunt control.
3. To study the operation of controllers for enhancing the transmission capability.

UNIT I INTRODUCTION 9

The concept of flexible AC transmission-reactive power control in electrical power transmission lines-uncompensated transmission line–series and shunt compensation. Overview of FACTS devices-Static Var Compensator (SVC)–Thyristor Switched Series capacitor(TCSC)–Unified Power Flow controller (UPFC) – Integrated Power Flow Controller (IPFC).

UNIT II STATIC VAR COMPENSATOR (SVC) AND APPLICATIONS 9

Voltage control by SVC–advantages of slope in dynamic characteristics–influence of SVC on system voltage. Applications-enhancement of transient stability–steady state power transfer –enhancement of power system damping–prevention of voltage instability.

UNIT III THYRISTOR CONTROLLED SERIES CAPACITOR (TCSC) AND APPLICATIONS 9

Operation of the TCSC-different modes of operation–modeling of TCSC–variable reactance model–modeling for stability studies. Applications- improvement of the system stability limit– enhancement of system damping –voltage collapse prevention.

UNIT IV EMERGING FACTS CONTROLLERS 9

Static Synchronous Compensator (STATCOM) –operating principle–V-I characteristics Unified Power Flow Controller (UPFC) –Principle of operation- modes of operation – applications – modeling of UPFC for power flow studies.

UNIT V CO-ORDINATION OF FACTS CONTROLLERS 9

FACTs Controller interactions–SVC–SVC interaction- co-ordination of multiple controllers using linear control techniques–Quantitative treatment of control coordination.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Mohan Mathur, R. Rajiv. K.Varma, "Thyristor–Based Facts Controllers for Electrical Transmission Systems", IEEE press and John Wiley & Sons, Inc.

REFERENCES

1. A.T.John," Flexible AC Transmission System", Institution of Electrical and Electronic Engineers (IEEE),1999.
2. Narain G.Hingorani,Laszio. Gyugyl,"Understanding FACTS Concepts and Technology of Flexible AC Transmission System", Standard Publishers, Delhi 2001.

		L	T	P	C
12EE8I	RENEWABLE ENERGY SOURCES	3	0	0	3

AIM

To instruct the importance of renewable energy and its utilization for the thermal and electrical energy needs and also the environmental aspects of these resources.

OBJECTIVES

1. Understand and analyze the pattern of renewable energy resources Suggest methodologies / technologies for its utilization.
2. Economics of the utilization and environmental merits.

UNIT I SOLAR ENERGY 9

Introduction - Historical development - Comparison between AC and DC transmission - kinds of DC links.

UNIT II WIND ENERGY 9

Three phase fully controlled thyristor bridge converters - Equivalent circuits - Characteristics of Converters- Gate control - Basic means of control characteristics - Constant current control - Constant extinction angle control - Harmonic analysis - Filters.

UNIT III BIO - ENERGY 9

Basis of protection of HVDC systems - DC reactors - voltage and current oscillations - Clearing line faults and re-energizing the line - Over voltage protection. Introduction of HVAC transmission - Transmission voltages - average values of line parameters – Power handling capacity and line loss - Costs of transmission lines and equipments - Mechanical considerations in line performance.

UNIT IV OTEC, TIDAL, GEOTHERMAL AND HYDEL ENERGY. 9

Tidal energy – Wave energy – Data, Technology options – Open and closed OTEC Cycles – Small Hydro, turbines – Geothermal energy sources, power plant and environmental issues.

UNIT V OTHER ENERGY SOURCES 9

Hydrogen, generation, storage, transport and utilization, Applications: power generation, transport – Fuel cells – technologies, types – economics and the power generation.

TOTAL: 45 PERIODS

TEXT BOOKS

1. G.D. Rai, Non Conventional Energy Sources, Khanna Publishers, New Delhi, 1999.
2. S.P. Sukhatme, Solar Energy, Tata McGraw Hill Publishing Company Ltd., New Delhi, 1997.

REFERENCES

1. Godfrey Boyle, Renewable Energy, Power for a Sustainable Future, Oxford University Press, U.K., 1996.
2. Twidell, J.W. & Weir, A., Renewable Energy Sources, EFN Spon Ltd., UK, 1986.
3. G.N. Tiwari, solar Energy – Fundamentals Design, Modelling and applications, Narosa Publishing House, New Delhi, 2002.
4. L.L. Freris, Wind Energy Conversion systems, Prentice Hall, UK, 1990.

12EE8J SMART GRID

L	T	P	C
3	0	0	3

AIM

To understand the importance of Smart Grid technologies in electric power systems through smart instruments.

OBJECTIVES

1. To study about Smart Grid technologies, different smart meters and advanced metering infrastructure.
2. To familiarize the power quality management issues in Smart Grid.
3. To familiarize the high performance computing for Smart Grid applications

UNIT I INTRODUCTION TO SMART GRID 9

Evolution of Electric Grid, Concept, Definitions and Need for Smart Grid, Smart grid drivers, functions, opportunities, challenges and benefits, Difference between conventional & Smart Grid,

Concept of Resilient & Self Healing Grid, Present development & International policies in Smart Grid, Diverse perspectives from experts and global Smart Grid initiatives.

UNIT II SMART GRID TECHNOLOGIES 9

Technology Drivers, Smart energy resources, Smart substations, Substation Automation, Feeder Automation ,Transmission systems: EMS, FACTS and HVDC, Wide area monitoring, Protection and control, Distribution systems: DMS, Volt/VAr control, Fault Detection, Isolation and service restoration, Outage management, High-Efficiency Distribution Transformers, Phase Shifting Transformers, Plug in Hybrid Electric Vehicles (PHEV).

UNIT III SMART METERS AND ADVANCED METERING INFRASTRUCTURE 9

Introduction to Smart Meters, Advanced Metering infrastructure (AMI) drivers and benefits, AMI protocols, standards and initiatives, AMI needs in the smart grid, Phasor Measurement Unit(PMU), Intelligent Electronic Devices(IED) & their application for monitoring & protection.

UNIT IV POWER QUALITY MANAGEMENT IN SMART GRID 9

Power Quality & EMC in Smart Grid, Power Quality issues of Grid connected Renewable Energy Sources, Power Quality Conditioners for Smart Grid, Web based Power Quality monitoring, Power Quality Audit.

UNIT V HIGH PERFORMANCE COMPUTING FOR SMART GRID APPLICATIONS 9

Local Area Network (LAN), House Area Network (HAN), Wide Area Network (WAN), Broadband over Power line (BPL), IP based Protocols, Basics of Web Service and CLOUD Computing to make Smart Grids smarter, Cyber Security for Smart Grid.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Stuart Borlase “Smart Grid :Infrastructure, Technology and Solutions”, 1st Edition, CRC Press 2013.
2. Janaka Ekanayake, Nick Jenkins, KithsiriLiyanage, Jianzhong Wu, Akihiko Yokoyama, “Smart Grid: Technology and Applications”, 1st Edition, Wiley, 2012.

REFERENCES

1. Vehbi C. Güngör, DilanSahin, TaskinKocak, Salih Ergüt, Concettina Buccella, Carlo Cecati, and Gerhard P. Hancke, Smart Grid Technologies: Communication Technologies and Standards IEEE Transactions On Industrial Informatics, Vol. 7, No. 4, November 2011.

2. Xi Fang, Satyajayant Misra, Guoliang Xue, and Dejun Yang “Smart Grid – The New and Improved Power Grid: A Survey”, IEEE Transaction on Communication Surveys and Tutorials, Vol.14, Issue 4, 2012.