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

ACADEMIC REGULATIONS

B.Tech (Regular) Four Year Degree Programme

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

1. INTRODUCTION:

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

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

2. DURATION OF THE PROGRAMME:

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

3. MINIMUM INSTRUCTION DAYS:

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

4. PROGRAMMES OFFERED (UNDER GRADUATE LEVEL):

Currently Audisankara College of Engineering & Technology is offering,

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

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

5. ELIGIBILITY CRITERION FOR ADMISSION:

5.1 ADMISSION CATEGORY:

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

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

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

5.2 LATERAL ENTRY CATEGORY:

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

6. COURSE STRUCTURE:

Each Programme of study shall consist of:

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

7.0 CONTACT PERIODS AND CREDITS:

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

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

7.1 Theory / Tutorial classes:

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

7.2 Laboratory / Workshop Courses:

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

7.3 Programme Credits:

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

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

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

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

8. EXAMINATIONS AND SCHEME OF EVALUATION:

8.1 INTERNAL EXAMINATIONS:

8.1.1 Theory Courses:

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

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

Table 1: Attendance based marks system

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

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

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

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

Internal Examination Pattern for 20 Marks:

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

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

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

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

8.1.2 Drawing Subjects:

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

Table 2: Distribution of Internal Marks

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

a) Engineering Drawing (Yearly pattern):

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

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

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

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

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

8.1.3 Laboratory Courses:

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

Table 3: Break-up of Internal Marks

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

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

8.1.4 Technical Seminar:

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

Table 5: Distribution of Marks for component of Technical seminar

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

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

8.1.5 Comprehensive Viva-Voce:

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

8.1.6 Project Work:

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

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

Project Work Phase-I: IV Year I Semester

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

The assignment normally includes:

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

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

Project Work Phase-II: IV Year II Semester:

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

The assignment normally includes:

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

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

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

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

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

8.1.8: Mandatory Courses:

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

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

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

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

8.1.9: Audit Courses:

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

8.2 YEAR / SEMESTER END EXAMINATIONS:

8.2.1 Theory Courses: 70 marks each:

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

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

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

8.2.2 Engineering Drawing:

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

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

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

8.2.3 Lab Courses (Practical / Workshop): 70 marks

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

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

8.2.4 Project Work Phase-II:

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

Table 11: Distribution of Project Work Marks

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

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

9. YEAR/SEMESTER – WISE DISTRIBUTION OF CREDITS:

Table 12: Year/Semester –wise Credits distribution

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

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

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

10. ATTENDANCE REGULATIONS AND CONDONATION:

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

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

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

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

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

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

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

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

11. MINIMUM ACADEMIC REQUIREMENTS:

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

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

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

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

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

12. AWARD OF CLASS:

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

Table 13: Award of Division

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

13. TRANSITORY REGULATIONS:

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

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

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

14. READMISSION CRITERIA:

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

15. SUPPLEMENTARY EXAMINATIONS:

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

16. CONDUCT AND DISCIPLINE:-

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

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

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

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

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

(e) Mutilation or unauthorized possession of library books.

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

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

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

(i) Plagiarism of any nature.

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

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

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

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

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

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

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

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

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

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

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

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

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

Malpractices identified by squad or special invigilators

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

18. AWARD OF RANK:

The rank shall be awarded based on the following:

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

19. GENERAL:

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

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

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

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

20. CHANGE OF BRANCH:

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

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

(LATERAL ENTRY SCHEME)

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

1. Award of B.Tech. Degree

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

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

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

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

3. Minimum Academic Requirements:

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

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

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

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

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

4. Course Pattern

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

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

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

5. Award of Class:

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

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

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

AUDISANKARA COLLEGE OF ENGINEERING & TECHNOLOGY
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Course Structure for B.Tech (Electronics and Communication Engineering) Regular Programme Applicable for students admitted from Academic Year 2013-14

B.Tech I Year – Electronics and Communication Engineering

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

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

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

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

Sl.No	Course Code	Subject	Scheme of instruction (Periods / week)			Scheme of Examination			No. of Credits
			Th	Tu	Lab	IM	EM	Total Marks	
1	13HS114	Engineering Mathematics-III	3	-	-	30	70	100	3
2	13HS120	Professional Ethics and Human Values	2	-	-	30	70	100	2
3	13EC301	Network Theory	3	1	-	30	70	100	3
4	13EC302	Electronic Devices and Circuits	3	1		30	70	100	3
5	13EC303	Probability Theory and Stochastic Process	3	-	-	30	70	100	3
6	13EC304	Signals and Systems	3	1		30	70	100	3
7	13EC305	Data Structures through C	3	-	-	30	70	100	3
8	13EC306	Data Structures Lab	-	-	3	30	70	100	2
9	13EC307	Electronic Devices and Circuits Lab	-	-	3	30	70	100	2
10	13EC308	Signals and Systems Lab	-	-	3	30	70	100	2
Contact Periods / Week			**20**	**3**	**9**	**300**	**700**	**1000**	
Total Periods / Week			**32**			**Total Credits**			**26**

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

Sl.No	Course Code	Subject	Scheme of instruction (Periods / week)			Scheme of Examination			No. of Credits
			Th	Tu	Lab	IM	EM	Total Marks	
1	13HS118	Managerial Economics and Financial Analysis	3	-	-	30	70	100	3
2	13EC401	Electrical Technology	3	-	-	30	70	100	3
3	13EC402	Electromagnetic Theory and Transmission Lines	3	1	-	30	70	100	3
4	13EC403	Switching Theory and Logic Design	3	-	-	30	70	100	3
5	13EC404	Analog Circuit Analysis	3	1	-	30	70	100	3
6	13EC405	Pulse and Digital Circuits	3	1	-	30	70	100	3
7	13EC406	Electrical Engineering Lab	-	-	3	30	70	100	2
8	13EC407	Analog Circuit Analysis Lab	-	-	3	30	70	100	2
9	13EC408	Circuit Simulation Lab	-	-	3	30	70	100	2
10	13EC409	Technical Seminar-I	-	1	-	100	-	100	2
Contact Periods / Week			**18**	**4**	**9**	**370**	**630**	**1000**	
Total Periods / Week			**31**			**Total Credits**			**26**

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

Sl.No	Course Code	Subject	Scheme of instruction (Periods / week)			Scheme of Examination			No. of Credits
			Th	Tu	Lab	IM	EM	Total Marks	
1	13HS121	Qualitative and Quantitative Analysis	2	-	-	30	70	100	2
2	13EC501	Analog Communications	3	1	-	30	70	100	3
3	13EC502	Linear Integrated Circuits and Applications	3	-	-	30	70	100	3
4	13EC503	Computer Architecture and Organization	3	-	-	30	70	100	3
5	13EC504	Digital IC System Design	3	1	-	30	70	100	3
6	13EC505	Linear Control Systems	3	-	-	30	70	100	3
7	13EC506	Antenna and Wave Propagation	3	1	-	30	70	100	3
8	13EC507	Analog Communications Lab	-	-	3	30	70	100	2
9	13EC508	Linear IC and PDC Lab	-	-	3	30	70	100	2
10	13EC509	Digital IC System Design Lab	-	-	3	30	70	100	2
Contact Periods / Week			**20**	**3**	**9**	**300**	**700**	**1000**	
Total Periods / Week			**32**			**Total Credits**			**26**

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

Sl.No	Course Code	Subject	Scheme of instruction (Periods / week)			Scheme of Examination			No. of Credits
			Th	Tu	Lab	IM	EM	Total Marks	
1	13EC601	Microprocessors and Microcontrollers	3	1	-	30	70	100	3
2	13EC602	Digital Communications	3	1	-	30	70	100	3
3	13EC603	Digital Signal Processing	3	-	-	30	70	100	3
4	13EC604	VLSI Design	3	1	-	30	70	100	3
5	13EC605	Computer Communication and Networking	3	-	-	30	70	100	3
6	13EC606	Electronic Measurements and Instrumentation	3	-	-	30	70	100	3
7	13EC607	Microprocessors and Microcontrollers Lab	-	-	3	30	70	100	2
8	13EC608	Electronic Measurements and Instrumentation Lab	-	-	3	30	70	100	2
9	13HS122	Soft Skills Lab	-	-	3	30	70	100	2
10	13EC609	Technical Seminar-II	-	1	-	100	-	100	2
Contact Periods / Week			**18**	**4**	**9**	**370**	**630**	**1000**	
Total Periods / Week			**31**			**Total Credits**			**26**

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

Sl.No	Course Code	Subject	Scheme of instruction (Periods / week)			Scheme of Examination			No. of Credits
			Th	Tu	Lab	IM	EM	Total Marks	
1	13EC701	Optical Communications	3	-	-	30	70	100	3
2	13EC702	Microwave Engineering	3	1	-	30	70	100	3
3	13EC703	DSP Processors and Architectures	3	1	-	30	70	100	3
4	13EC704	Embedded Systems Design	3	1	-	30	70	100	3
5	13EC705 13EC706 13EC707 13EC708	**Elective-I** 1. Operating Systems 2. Wireless Communications and Networks 3. ASIC Design 4. Spread Spectrum Communications	3	-	-	30	70	100	3
6	13EC709 13EC710 13EC711	**Open Elective** 1. Neural Networks and Fuzzy Logic 2. Supervisory Control and Data Acquisition (SCADA) 3.Digital Image Processing	3	-	-	30	70	100	3
7	13EC712	VLSI Circuit Design Lab	-	-	3	30	70	100	2
8	13EC713	Microwave Engineering and Digital Communication Lab	-	-	3	30	70	100	2
9	13EC714	DSP and Embedded processing Lab	-	-	3	30	70	100	2
10	13EC715	Project Work - Phase-I	-	-	2	100	-	100	2
Contact Periods / Week			**18**	**3**	**11**	**370**	**630**	**1000**	
Total Periods / Week			**32**			**Total Credits**			**26**

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

Sl.No	Course Code	Subject	Scheme of instruction (Periods / week)			Scheme of Examination			No. of Credits
			Th	Tu	Lab	IM	EM	Total Marks	
1	13EC801	Satellite Communication	3	1	-	30	70	100	3
2	13EC802	Radar Systems	3	1	-	30	70	100	3
3	13EC803 13EC804 13EC805 13EC806	**Elective-II** 1.Digital Design through Verilog 2.Microelectromechanical Systems (MEMS) 3.Telecommunication Switching Techniques 4. Data Communication	3	-	-	30	70	100	3
4	13EC807 13EC808 13EC809 13EC810	**Elective-III** 1.RFID Technology 2. Mobile and Cellular Communication 3.Biomedical Instrumentation and Processing 4. Speech Signal Processing	3	-	-	30	70	100	3
5	13EC811	Comprehensive Viva-Voce	-	-	-	-	100	100	2
6	13EC812	Project Work - Phase-II	-	-	-	50	150	200	10
Contact Periods / Week			**12**	**2**	**-**	**180**	**520**	**700**	
Total Periods / Week			**14**			**Total Credits**			**24**

AUDISANKARA COLLEGE OF ENGINEERING & TECHNOLOGY: GUDUR
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Detailed Syllabus

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

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

1. SYLLABUS :

Listening Skills:

Objectives

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

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

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

2. TEXTBOOKS PRESCRIBED:

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

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

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

UNIT –I:

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

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

UNIT –II:

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

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

UNIT –III:

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

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

UNIT –IV:

Exercises on:

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

Exercises on:

Letter Writing

Report Writing

Reference Books:

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

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I B.Tech (ECE)	L	T	P	[C]
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(13HS102) ENGINEERING PHYSICS

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

UNIT – I:

Optics, Fiber Optics and Lasers

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

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

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

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

UNIT – II:

Crystal Structures, X-Ray Diffraction and Semiconductors

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

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

UNIT–III:

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

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

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

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

UNIT – IV

Superconductivity & Nanotechnology

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

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

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

Text Books:

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

Reference Books:

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

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

Objectives:

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

UNIT – I:

Water Technology & Fuel Technology:

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

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

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

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

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

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

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

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

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

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

UNIT – II:

Electrochemistry and Science of corrosion:

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

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

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

Factors influencing corrosion,

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

UNIT – III:

Polymers and advanced Engineering Materials

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

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

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

Text Books:

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

Reference Books:

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

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

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

UNIT – I:

Differential & Integral Calculus

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

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

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

Curve Tracing – Cartesian, Polar, Parametric forms.

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

UNIT-II:

Ordinary Differential Equations:

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

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

UNIT III:

Laplace Transforms

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

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

UNIT IV:

Vector Calculus:

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

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

Text Books:

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

Reference Books:

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

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(13HS105) ENGINEERING MATHEMATICS-II

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

UNIT – I:

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

UNIT-II:

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

UNIT- III:

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

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

UNIT- IV :

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

Text Books:

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

Reference Books:

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

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(13HS106) ENVIRONMENTAL SCIENCE

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

UNIT-I:

Introduction to Environmental Science and Natural Resources:

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

UNIT-II:

Ecosystems and Biodiversity:

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

UNIT-III

Environmental Pollution :

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

UNIT-IV

Social issues and the Environment:

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

Field Work:

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

Text Books:

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

Reference Books:

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

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(13HS107) COMPUTER PROGRAMMING

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

UNIT – I:

Introduction to Computers and Programming:

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

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

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

UNIT – II:

Control Statements:

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

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

UNIT – III:

Arrays and Pointers:

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

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

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

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

UNIT – IV:

Structure and Union

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

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

Text Books:

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

Reference Books:

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

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(13HS109) ENGINEERING DRAWING

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

UNIT – I:

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

Conic Sections

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

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

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

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

UNIT – II:

Projections of Points, Straight Lines, Planes:

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

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

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

UNIT– III:

Projection of Solids, Sections and Development of Solids:

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

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

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

UNIT – IV:

ISOMETRIC AND ORTHOGRAPHIC PROJECTIONS

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

Orthographic Projections – Conversion of pictorial views into orthographic views

Text Books:

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

Reference Books:

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

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(13HS110) COMPUTER PROGRAMMING LAB

Objectives:

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

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

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

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

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

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

EXERCISE-5:
Programs on sorting and searching

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

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

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

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

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

EXERCISE-11:
Programs on command line arguments

EXERCISE-12:
Programs on self referencing

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

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

ENGINEERING WORKSHOP

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

1: Trades for Exercises:

(a) Carpentry Shop

1. Cross Lap Joint
2. Mortise and Tenon Joint

(b) Fitting Shop

1. Square Fitting
2. V Fitting

(c) Sheet Metal Shop

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

(d) House Wiring

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

(e) Foundry

1. Single Piece Pattern
2. Double Piece Pattern.

(f) Welding

1. Lap Joint
2. T - Joint

2: Trades for Demonstration

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

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

Reference Books:

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

I.T. WORKSHOP

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

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

CHAPTER – I: PC Hardware

Task – 1:

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

Task – 2:

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

Task – 3:

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

Task – 4:

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

Task – 5:

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

CHAPTER - II: Word Processor

Task – 1:

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

Task – 2:

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

CHAPTER –III: Spread Sheets

Task –1:

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

Task –2:

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

Task –3:

Create student marks list for 10 students using for the formulas

CHAPTER –IV: Presentation

Task –1:

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

Task –2:

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

CHAPTER – V: Internet & World Wide Web

Task –1:

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

Task –2:

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

Task –3:

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

Task – 4:

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

Text Books:

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

Reference Books:

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

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(13HS112) ENGINEERING PHYSICS AND ENGINEERING CHEMISTRY LAB

Objectives: Educate the theoretical concepts experimentally.

ENGINEERING PHYSICS LAB

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

ENGINEERING CHEMISTRY LAB

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

Reference Books:

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

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I B.Tech (ECE)	L	T	P	[C]
	0	0	3	[4]

(13HS113) ENGLISH LANGUAGE AND COMMUNICATION SKILLS LAB

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

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

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

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

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

Reference:

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

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II B.Tech I Semester (ECE)	L	T	P	[C]
	3	0	0	[3]

(13HS114) ENGINEERING MATHEMATICS-III

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

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

UNIT-II:
Functions of a Complex Variable: Continuity – Differentiability – Analyticity – Properties – Cauchy – Riemann Equations in Cartesian and polar co-ordinates. Harmonic and Conjugate Harmonic function – Milne – Thomson method – Elementary functions – Exponential, trigonometric, Hyperbolic functions and their properties – General power z^C(c is complex), principal value.
Conformal Mapping: Transformation by e^z, 1nz, z^2, sinz, cos z, Bilinear transformation – Translation, rotation, magnification and inversion – Fixed point – cross ratio – Determination of bilinear Transformation mapping three given points.

UNIT - III:
Complex Integration: Line Integral – Evaluation along a path and by Indefinite Integration – Cauchy's Integral theorem – Cauchy's integral formula – General Integral formula.
Complex power series: Radius of convergence – Expansion in Taylors Series – Maclaurin's Series and Laurent Series. Singular point – Isolated singular point – pole of order 'm' – Essential singularity.

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

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

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

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

(d) Integrals by indentation

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

Text Books:

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

Reference Books:

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

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	2	0	0	[2]

(13HS120) PROFESSIONAL ETHICS AND HUMAN VALUES

Objectives:

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

UNIT-I:

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

UNIT-II:

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

UNIT-III:

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

UNIT-IV:

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

Text Books:

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

Reference Books:

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

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	3	1	0	[3]

(13EC301) NETWORK THEORY

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

UNIT – I:

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

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

UNIT – II:

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

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

UNIT – III:

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

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

UNIT – IV:

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

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

Text Books:

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

Reference Books:

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

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	3	1	0	[3]

(13EC302) ELECTRONIC DEVICES AND CIRCUITS

Objectives: Students undergoing this course are expected to:

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

UNIT- I:

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

UNIT- II:

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

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

UNIT- III:

BJT, Transistor Biasing & Stabilization:

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

UNIT- IV:

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

Text Books:

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

Reference Books:

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

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II B.Tech I Semester (ECE)	L	T	P	[C]
	3	0	0	[3]

(13EC303) PROBABILITY THEORY AND STOCHASTIC PROCESS

Objectives: Students undergoing this course are expected to:

- Solve problems related to conditional and joint probability
- Solve problems based on density functions and cumulative density functions
- Solve problems on mean , variance and standard deviations of random signals
- transform random variables in one domain to other
- Solve problems on joint and conditional distribution functions
- Solve problems on Different density functions and cumulative distribution functions
- Plot and study power spectral density and system response

UNIT – I:

Probability & The random Variable:

Probability introduced through sets and Relative Frequency: Experiments and Sample Spaces Discrete and Continuous Sample Spaces, Events, Probability Definitions and Axioms, Mathematical Model of Experiments, Probability as a Relative Frequency, Joint Probability, Conditional Probability, Total Probability, Bayes' Theorem and Independent Events.

Definition of a Random Variable, Conditions for a Function to be a Random Variable, Discrete, Continuous and Mixed Random Variable, Distribution and Density functions and their Properties-Binomial, Poisson, Uniform, Gaussian, Exponential, Rayleigh and Conditional Distribution, Methods of defining Conditioning Event, Conditional Density, Properties.

UNIT – II:

Operation on One Random Variable & Multiple Random variables:

Introduction, Expected Value of a Random Variable, Function of a Random Variable, Moments about the Origin, Central Moments, Variance and Skew, Chebychev's Inequality, Characteristic Function, Moment Generating Function, Transformations of a Random Variable: Monotonic Transformations for a Continuous Random Variable, Nonmonotonic Transformations of Continuous Random Variable, Transformation of a Discrete Random Variable.

Vector Random Variables, Joint Distribution Function, Properties of Joint Distribution, Marginal Distribution Functions, Conditional Distribution and Density– Point Conditioning, Conditional Distribution and Density–Interval conditioning, Statistical Independence, Sum of Two Random Variables, Sum of Several Random Variables, Central Limit Theorem (Proof not expected), Unequal and Equal Distributions.

UNIT –III:

Operations on Multiple Random Variables & Stochastic Process:

Expected Value of a Function of Random Variables: Joint Moments about the Origin, Joint Central Moments, Joint Characteristic Functions, Jointly Gaussian Random Variables: Two Random Variables case, N Random Variable case, Properties, Transformations of Multiple Random Variables, Linear Transformations of Gaussian Random Variables.

Concept of Stochastic Process, Classification of Processes, Deterministic and Nondeterministic Processes, Distribution and Density Functions, concept of Stationary and Statistical Independence, First-Order Stationary Processes, Second- Order and Wide- Sense Stationarity, Nth- Order and Strict-Sense Stationarity.

UNIT –IV:

Temporal Characteristics & Special Characteristics:

Time Averages and Ergodicity, Mean-Ergodic Processes, Correlation-Ergodic Processes, Autocorrelation Function and its Properties, Cross- Correlation Function and its Properties, Covariance and its Properties, Linear system Response of Mean and Mean- Squared value, Autocorrelation Function, Cross-Correlation Functions, Gaussian Random processes and Poisson Random Process.

Power Spectrum: Properties, Relationship between Power Spectrum and Autocorrelation Function, Cross- Power Density Spectrum, Properties. Relationship between Cross- Power Spectrum and Cross-Correlation Function, Spectral Characteristics of System Response: Power Density Spectrum of Response, Cross- Power Spectral Density of Input and Output of a Linear System.

Text Books:

1. Peyton Z. Peebles, Probability, Random Variables and Random Signal Principles, TMH, 4th Edition,2002.
2. Athanasios Papoulis and S.Unnikrishna Pillai, Probability, Random Variables and Stochastic Processes,TMH, 2nd Edition 2002.
3. H.Taub. Donald. L.Schilling, Goutam Saha, Principles of Communication systems , TMH, 3rd edition 2008.
4. Pradip Kumar Ghosh, Theory of Probability and Stochastic Processes , University Press, 1st edition,2010.

Reference Books:

1. Mallikarjuna Reddy, Probability Theory and Stochastic processes, cengage Learning. 1st edition 2010.
2. *John W Woods, Henry Stark, Probability and Random processes with application to signal processin, Pearson Education, 3rd Edition, 2011.*
3. George R. Cooper, Clare D.Mc Gillem, Probability methods of Signal and System Analysis, Oxford. 3rd Edition,1999,
4. S.P.Eugene Xavier , Statistical Theory of Communication, , New Age Publications, 1st edition 2003.

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	3	1	0	[3]

(13EC304) SIGNALS AND SYSTEMS

Objectives: Students undergoing this course are expected to:

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

UNIT – I:

Introduction to Signals, Fourier Series:

Analogy between vectors and signals, orthogonal signal space, Signal approximation using orthogonal functions, Mean square error, closed or complete set of orthogonal functions, Orthogonality in complex functions. Representation of function by a set of mutually orthogonal functions. Classification of signals, elementary signals, basic operations on signals, classification of systems, basic system properties

Fourier series representation of Continuous-time periodic signals, Convergence of the Fourier Series, Properties of Continuous time Fourier Series, the complex Fourier spectrum

UNIT – II:

Fourier Representation of Aperiodic Signals: The Continuous-time Fourier Transform, Fourier transforms of standard signals, Fourier transform for periodic signals, Properties of the continuous time Fourier transform.

Linear time invariant systems: impulse response, input-output relation for a linear system, transfer function of an LTI system, filter characteristics of a linear system, distortionless transmission through a system, signal and system bandwidth, ideal filter characteristics, causality and Paley-Wiener criterion for physical realization

UNIT – III:

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

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

UNIT – IV

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

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

Text Books:

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

Reference Books:

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

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	3	0	0	[3]

(13EC305) DATA STRUCTURES THROUGH C

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

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

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

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

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

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

Text Books:

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

Reference Books:

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

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	0	0	3	[3]

(13EC306) DATA STRUCTURES LAB

Objectives:

- To develop skills to design and analyze simple linear and non linear data structures
- To Strengthen the ability to identify and apply the suitable data structure for the given real world problem
- To Gain knowledge in practical applications of data structures

Recommended Systems/Software Requirements:

- Intel based desktop PC with minimum of 166 MHZ or faster processor with at least 64 MB RAM and 100 MB free disk space
- C compiler is Recommended

1. Write C program to implement the Stack using an Array.
2. Write a C program that uses Stack operations to perform the following:
   i) Converting infix expression into postfix expression
   ii) Evaluating the postfix expression
3. Write C program to implement the Queue using an Array.
4. Write a C Program to perform the following operations on Singly linked list
   i) creation ii) insertion iii) deletion iv) search v) display
5. Write C program to implement the Stack using Singly Linked List.
6. Write C program to implement the Queue using Singly Linked List.
7. Write a C Program to perform the following operations on doubly linked list
   i) creation ii) insertion iii) deletion iv) search v) display
8. Write C programs to implement the deque (double ended queue) using a doubly linked list.
9. Write a C program to create binary tree and traverse the binary tree in
   i) Pre order ii) In order iii) Post order
   (Write both recursive and non recursive functions)
10. Write C programs to implement the following search methods
    i) Linear Search ii) Binary search
11. Write C programs for implementing the following sorting methods:
    i) Bubble sort ii) Selection Sort
12. Write C Programs for implementing the following sorting methods
    i) Insertion ii) Quick sort
13. Write C programs for implementing the following sorting methods
    i) Heap Sort ii) merge sort

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	0	0	3	[3]

(13EC307) ELECTRONIC DEVICES AND CIRCUITS LAB

Objectives: This lab course is intended to

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

For Laboratory examination – Minimum of 10 experiments

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

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

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II B.Tech I Semester (ECE)	L	T	P	[C]
	0	0	3	[3]

(13EC308) SIGNALS AND SYSTEMS LAB

Objectives: Students undergoing this course are expected to:

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

(For Laboratory examination – Minimum of 10 experiments) using MATLAB

1. Write a program to generate the discrete sequences (i) unit step (ii) unit impulse (iii) ramp (iv) periodic sinusoidal sequences. Plot all the sequences.
2. Find the Fourier transform of a square pulse .Plot its amplitude and phase spectrum.
3. Write a program to convolve two discrete time sequences. Plot all the sequences. Verify the result by analytical calculation.
2. Write a program to find the trigonometric Fourier series coefficients of a rectangular periodic signal. Reconstruct the signal by combining the Fourier series coefficients with appropriate weightings.
3. Write a program to find the trigonometric and exponential fourier series coefficients of a periodic rectangular signal. Plot the discrete spectrum of the signal.
4. Generate a discrete time sequence by sampling a continuous time signal. Show that with sampling rates less than Nyquist rate, aliasing occurs while reconstructing the signal.
5. The signal x (t) is defined as below. The signal is sampled at a sampling rate of 1000 samples per second. Find the power content and power spectral density for any signal.
6. Write a program to find the magnitude and phase response of first order low pass and high pass filter. Plot the responses in logarithmic scale.
7. Write a program to find the response of a low pass filter and high pass filter, when a speech signal is passed through these filters.
8. Write a program to find the autocorrelation and cross correlation of sequences.
9. Generate a uniformly distributed length 1000 random sequence in the range (0,1). Plot the histogram and the probability function for the sequence. Compute the mean and variance of the random signal.
10. Generate a Gaussian distributed length 1000 random sequence. Compute the mean and variance of the random signal by a suitable method.
11. Write a program to generate a random sinusoidal signal and plot four possible realizations of the random signal.
12. Generate a discrete time sequence of N=1000 i.i.d uniformly distributed random numbers in the interval (-0.5,-0.5) and compute the autocorrelation of the sequence.
13. Obtain and plot the power spectrum of the output process when a white random process is passed through a filter with specific impulse response.

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

(13HS118) MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

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

UNIT- I:
Introduction to Managerial Economics: Definition, Nature and Scope of Managerial Economics– Demand Analysis: Determinants, Law of Demand and its exceptions.
Elasticity of Demand: Types, Measurement and Significance of Elasticity of Demand. Demand Forecasting, methods, (survey methods, statistical methods, expert opinion method, test marketing, controlled experiments, judgmental approach to demand forecasting)

UNIT- II:
Theory of Production: Production Function – Isoquants and Isocosts, MRTS, Least Cost Combination of Inputs, Cobb-Douglas Production function, Laws of Returns, Internal and External Economies of Scale.
Cost Analysis: Cost concepts, Opportunity cost, Fixed vs. Variable costs, Explicit costs Vs. Implicit costs, Out of pocket costs vs. Imputed costs.
Break-Even Analysis : (BEA)-Determination of Break-Even Point (simple problems)
Market: Types of competition, Price-Output Determination in case of Perfect Competition and Monopoly, Monopolistic competition.
Methods of Pricing: Cost, competition, strategy based pricing

UNIT -III:
Business Types: Business, features, Sole Proprietorships, Partnerships, Joint Stock Companies, Public Enterprises and their types.
Capital and Capital Budgeting: Capital and its significance, Types and sources of raising finance. Nature and scope of Capital Budgeting, Features, Methods: Payback Method, Accounting Rate of Return Method (ARR) and Net Present Value Method (simple problems)

UNIT- IV:
Financial Accounting: Double-Entry Book Keeping, Journal, Ledger, Trial Balance- Final Accounts. (Simple Problems)
Financial Analysis through Ratios: Computation, Analysis and Interpretation of Liquidity Ratios (Current Ratio and quick ratio), Capital structure Ratios (Debt- Equity ratio, Interest Coverage ratio), Activity Ratios (Inventory turnover ratio and Debtor Turnover ratio), and Profitability ratios (Gross Profit Ratio, Net Profit ratio, Operating Ratio, P/E Ratio and EPS), (Simple Problems).

Text Books:
1. Aryasri: **"Managerial Economics and Financial Analysis",** TMH,2nd edition, 2005.
2. SA Siddiqui and AS Siddiqui **"Managerial Economics and Financial Analysis"**, New age international publishers.
3. Varshney & Maheswari: **"Managerial Economics"**, Sultan Chand, 2003.

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

Reference Books:

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

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II B.Tech II Semester (ECE)	L	T	P	[C]
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(13EC401) ELECTRICAL TECHNOLOGY

Objectives: To equip the students with fundamental knowledge of electrical engineering by covering the important concepts of basic electrical circuits (DC & AC), electrical machines viz transformers generators and motors. To analyze the transient behavior of first & second order electric circuits, design & analyze the two port network parameters, filters and attenuators. To know the design & working principles of D.C generators, D.C motors, and Transformers.

UNIT-I:

Transient Analysis (First and second order circuits): Transient Response of RL, RC series and RLC Circuits for DC excitations, initial conditions, solutions Using Differential Equations approach and Laplace Transform Method.

Two Port Networks: Impedance parameters, Admittance parameters, Hybrid parameters, Transmission (ABCD) parameters, Conversion of one parameter to another, conditions for Reciprocity and Symmetry, Interconnection of two port networks in series, parallel and cascade configurations. Illustrative problems

UNIT-II:

Filters: Classification of Filters, filter Networks, Classification of pass Band and stop Band, Constant-k Low pass filter ,High pass filter, Band pass filter and Band Elimination filter. Illustrative problems.

Symmetrical Attenuators: Symmetrical Attenuators- T-type Attenuator, π-type Attenuator, Bridged T-type Attenuator, Lattice Attenuator

UNIT-III:

DC Machines

DC Generators: Principle of operation of DC Machines ,EMF equation, Types of generators, Magnetization and Load characteristics of DC Generators.

DC Motors: Types of DC Motors, Characteristics of DC Motors, Losses and Efficiency, Swinburne`s Test,Speed control of DC shunt motor, Flux and Armature Voltage Control Methods.

UNIT-IV:

Transformers and Their Performance: Principle of Operation of Single Phase transformer ,Types, Constructional Features ,Phasor Diagram on No Load and Load, Equivalent Circuit, Losses and Efficiency of Transformer and Regulation, OC and SC Tests, Predetermination of Efficiency and Regulation(Simple Problems)

Induction Motors:Types & Constructional details,Rotating Magnetic Field,Principle of operation, Frequency of rotor currents,Slip - Torque Characteristics.

Text Books:

1. W.H.Hayt, J.E.Kimmerly, and S.M.Durbin "Engineering circuit analysis" McGraw Hill Company , 6th Edition, 2008.
2. A.Sudhakar, Shyammohan S.pilli "Network Analysis" TMH, 3rd Edition, 2009.
3. M.S.Naidu and S.Kamakshaiah "Basic Electrical Engineering" TMH,3rd Edition, 2009.

Reference Books:

1. John.D.Ryder "Networks, Lines and Fields" PHI , 2rd Edition, 2008,.
2. C.L Wadhwa "Network Analysis and Synthesis" New Age International Publishers. 3rd Edition, 2007.
3. N.C.Jagan and C.Lakshmi Narayana "Network Analysis" BSP, 3rd edition, 2006.
4. C. K. Alexander and M. N. O. Sadiku, "Fundamentals of Electric Circuits" Tata McGraw-Hill, 2nd edition, 2008.

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(13EC402) ELECTROMAGNETIC THEORY AND TRANSMISSION LINES

Objectives: The main objectives of the course are to:

- Acquire the prerequisites of the electro-magnetic fields and their interaction with materials
- Understand the applications of Coulomb's law and Gauss law to different charge distributions
- Know the physical interpretation of Maxwell' equations and applications for various fields like Antennas, Waveguides
- Understand behavior of E.M. waves incident on the interface between two different media
- Acquire knowledge of Poynting Theorem and its application of Power flow
- Understand the significance of Transmission lines and their different parameters.

UNIT- I:

Electrostatics-I: Coulomb's Law, Electric Field Intensity - Fields due to Different Charge Distributions, Electric Flux Density, Gauss Law and Applications, Electric Potential, Relations Between E and V, Maxwell's Two Equations for Electrostatic Fields, Energy Density, Illustrative Problems.

Electrostatics-II: Convection and Conduction Currents, Dielectric Constant, Isotropic and Homogeneous Dielectrics, Continuity Equation, Relaxation Time, Poisson's and Laplace's Equations, Capacitance - Parallel Plate, Coaxial, Spherical Capacitors, Illustrative Problems.

UNIT- II:

Magnetostatics: Biot - Savart Law, Ampere's Circuital Law and Applications, Magnetic Flux Density, Maxwell's Two Equations for Magnetostatic Fields, Magnetic Scalar and Vector Potentials, Forces due to Magnetic Fields, Ampere's Force Law, Inductances and Magnetic Energy, Illustrative problems.

Maxwells Equations (Time Varying Fields): Faraday's Law and Transformer EMF, Inconsistency of Ampere's Law and Displacement Current Density, Maxwell's Equations in Different Final Forms and Word Statements. Conditions at a Boundary Surface: Dielectric- Dielectric and Dielectric - Conductor Interfaces, Illustrative Problems.

UNIT- III:

EM Wave Characteristics-I: Wave Equations for Conducting and Perfect Dielectric Media, Uniform Plane Waves – Definition, All Relations between E & H, Sinusoidal Variations, Wave Propagation in Lossless and Conducting Media, Conductors & Dielectrics – Characterization, Wave Propagation in Good Conductors and Good Dielectrics, Polarization, Illustrative Problems.

EM Wave Characteristics-II: Reflection and Refraction of Plane Waves - Normal and Oblique Incidences, for both Perfect Conductor and Perfect Dielectrics, Brewster Angle, Critical Angle and Total Internal Reflection, Surface Impedance, Poynting Vector and Poynting Theorem – Applications, Power Loss in a Plane Conductor, Illustrative Problems.

UNIT IV

Transmission Lines-I: Types, Parameters, Transmission Line Equations, Primary & Secondary Constants, Expressions for Characteristic Impedance, Propagation Constant, Phase and Group

Velocities, Infinite Line Concepts, Lossless / Low Loss Characterization, Distortion - Condition for Distortion less and Minimum Attenuation, Loading – Types of Loading, Illustrative Problems.
Transmission Lines-II: Input Impedance Relations, SC and OC Lines, Reflection Coefficient, VSWR, UHF Significance of Z_{min} and $Z_{max,}$ Smith Chart - Configuration and Applications, Single and Double Stub Matching, Illustrative problems.

Text books:

1. Mathew N.O. Sadiku , Elements of Electromagnetics, Oxford Univ.Press, 4th edition 2007.
2. William H. Hayt Jr. and John A. Buck, Engineering Electromagnetic s, TMH, 7th edition 2009.
3. John D. Ryder , Networks, Lines and Fields, PHI, 2nd edition, 2000.
4. "Electromagnetics", Schaum's Outline Series, 3rd edition,2011.

Reference Books:

1. E.C. Jordan and K.G. Balmain, Electromagnetic Waves and Radiating Systems , PHI, 2nd edition 2002.
2. K.D. Prasad , Antenna & Wave Propagation, Tech India Publishers, 1st edition, 2001.

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(13EC403) SWITCHING THEORY AND LOGIC DESIGN

Objectives: Students undergoing this course are expected to:

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

UNIT- I:

Digital Codes and Boolean Algebraic Switching Functions:

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

UNIT- II:

Minimization of Switching Functions and Combinational Logic Design:

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

UNIT- III:

Programmable Logic Devices and Sequential Circuits:

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

UNIT- IV:

State Machines: FSMs AND ASMs

Finite State Machine – capabilities and Limitations, Mealy and Moore models, Examples of Mealy and Moore models, Partition Techniques and Merger chart Methods Concept of Minimal cover table.

Algorithmic State Machines:-Salient features of the ASM chart, Simple examples, System design using data path and control subsystems, control Implementations, Examples of Weighing machine and Binary multiplier.

Text Books:

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

Reference Books:

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

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(13EC404) ANALOG CIRCUIT ANALYSIS

Objectives: Students undergoing this course are expected to:

- Analyse Single stage amplifier at low and High frequencies using BJT and FETs.
- Analyse Multi stage amplifiers at low and High frequencies using BJT and FETs.
- Analyze single stage and multi stage amplifiers and to enable the students to realize the impact of cascading or coupling during the system level integration.
- Recognize the importance of feedback in amplifiers.
- Know how the negative feedback provides better stability with less distortion.
- Understand the principle, operation and design of oscillators.
- Comprehend the use of Power amplifiers and Tuned amplifiers in real time applications.

UNIT – I:

Small Signal Amplifiers:

Common emitter amplifier with emitter resistance, Emitter follower, FET small signal model, Low frequency common source and common drain amplifiers, FET as Voltage Variable Resistor, Cascading Transistor Amplifiers, High input Resistance Transistor Circuits – Darlington pair, Cascode amplifier, Frequency response and analysis of RC Coupling, Direct coupling and Transformer coupling, Difference amplifier, Two Stage RC Coupled JFET amplifiers (in Common Source (CS) configuration). Transistor at High Frequencies, Hybrid- π Common Emitter transistor model, Hybrid- π conductances, Hybrid π capacitances, Validity of hybrid π model, Variation of Hybrid Parameters, CE short circuit gain, Current gain with resistive load, Single stage CE transistor amplifier response, Gain Bandwidth product, Emitter follower at High frequencies.

UNIT – II:

Large Signal Amplifiers:

Classification of amplifiers, Class A large signal amplifiers, second harmonic distortion, higher order harmonic distortion, transformer-coupled class A audio power amplifier – efficiency of Class A amplifiers. Class B amplifier – efficiency – push pull amplifier - distortion in amplifiers - complementary-symmetry (Class B) push-pull amplifier, Class C, Class D amplifier – Class S amplifier – MOSFET power amplifier, Thermal stability and heat sink.

UNIT – III:

Feedback Amplifiers:

Block diagram, Loop gain, Gain with feedback, Effects of negative feedback – Sensitivity and desensitivity of gain, Cut-off frequencies, distortion, noise, input impedance and output impedance with feedback, Four types of negative feedback connections – voltage series feedback, voltage shunt feedback, current series feedback and current shunt feedback, Method of identifying feedback topology and feedback factor, Nyquist criterion for stability of feedback amplifiers.

UNIT – IV:

Oscillators:

Classification, Barkhausen Criterion - Mechanism for start of oscillation and stabilization of amplitude, General form of an Oscillator, Analysis of LC oscillators -Hartley, Colpitts, Clapp, Armstrong, Tuned collector oscillators, RC oscillators -phase shift – Wienbridge.

Tuned Amplifiers and Voltage Regulators:
Introduction, Q-Factor, Small Signal Tuned Amplifier – Capacitance single tuned amplifier, Double Tuned Amplifiers, Effect of Cascading Single tuned amplifiers on Band width, Effect of Cascading Double tuned amplifiers on Band width, Staggered tuned amplifiers, Stability of tuned amplifiers, Voltage regulation – Line Regulation, Load Regulation, Types of Regulators, Series voltage regulator , shunt regulators, Overload Voltage protection.

Text Books:
1. Jacob Millman, Christos C Halkias & Satyabratajit , Electronic Devices and Circuits, TMH, 2nd edition 2007**.**
2. Robert L Boylested and Louis Nashelsky, Electronic Devices and Circuit Theory, Pearson India, 10th Edition,2009.
3. David A Bell , Electronic Devices and Circuits, Oxford, 5th edition, 2008.

Reference Books:
1. NN Bhargava, DC Kulshrestha and SC Gupta, Basic Electronics and Linear Circuits, TMH, 2nd edition, 2009.
2. Jacob Millman and Arvin Grabel, Microelectronics, Tata McGraw Hill, 2nd edition, 2007.

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(13EC405) PULSE AND DIGITAL CIRCUITS

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

- Differentiator and Integrator circuits, clippers(limiters)
- clampers (dc-reinserted), comparators(discriminators)
- Switching characteristics of diodes and transistors
- Astable multi(square wave generator)
- Monostable multi(one shot)
- Bistable multi(flip-flop), Schmitt trigger circuit
- Time Base generators(Miller, Bootstrap Voltage time base generator and Current time base generator)
- Synchronization and Frequency division(Synchronization using Astable, Monostable relaxation circuits)
- Sampling Gates (Unidirectional, Bidirectional sampling gates without pedestal and Applications of sampling gates) and Realization of Logic gates using Diodes and Transistors.

UNIT-I:

Introduction to elementary signals and representations, RC circuits, types

Linear Wave Shaping:

The Highpass RC Circuit, The Highpass RC Circuit: Exponential & Ramp Inputs, The Highpass RC Circuit as a Diffentiator, Low pass RC Circuit, The Low pass RC Circuit (Exponential & Ramp Inputs), The Low Pass RC Circuit as a Integrator, Attenuators.

Non-Linear Wave Shaping:

Clipping Circuits, Diode Clippers, Clipping at Two Independent Levels, The Clamping Operation, Clamping Circuits Taking Source and Diode Resistances into Account, A Clamping Circuit Theorem and Practical Clamping Circuits.

UNIT-II:

Multivibrators:

Bistable Multivibrator**:** The Stable States of a Bistable Multivibrator, A Fixed Bias Transistor Bistable Multivibrator, Self Bias Transistor Bistable Multivibrator, Commutating Capacitors, Methods of Improving Resolution, Unsymmetrical Triggering of the Bistable Multivibrator. Triggering Unsymmerically through a Unilateral Device, Symmetrical Triggering and Schmitt Trigger.

Monostable And Astable Multivibrators**:** The Monostable Multivibrators, Gate Width of a Collector Coupled Monostable Multivibrator, Waveforms of The Collector Coupled Monostable Multivibrators, The Astable Collector Coupled Multivibrator**.**

UNIT-III:

Time Base Generators:

Voltage Time Base Generators: General Features of a Time Base Signal, Methods of Generating a Time Base Waveform, Exponential Sweep Circuit, Negative Resistance Switches, Sweep Circuit Using a Transistor Switch, A Transistor Constant Current Sweep, Miller and Boot

Strap Time Base Generators-General Considerations, The Transistor Miller Time Base Generator, The Transistor Boot Strap Time Base Generator.

Current Time Base Generators: A Simple Current Sweep, Linearity Correction through Adjustment of Driving Waveform, A Transistor Current Time Base Generator. Blocking Oscillators: A Triggered Transistor Blocking Oscillator (Base Timing), A Triggered Transistor Blocking Oscillator (Emitter Timing).

UNIT-IV:

Sampling Gates: basic operating principle, types & applications of S.G, synchronization and frequency division applications.

Logic Gates and Applications: OR, AND, NOT, NAND, NOR, EX-OR and EX-NOR gates, RTL, DTL,TTL and CMOS logic families

Text books:

1. J.Millman, H.Taub, Pulse, Digital and Switching Wave forms, TMH publishers,1st edition, 2001.
2. A.Anand Kumar, Pulse and Digital Circuits, PHI Publishers 2nd edition, 2008.
3. David A.Bell , Solid State Pulse Circuits, PHI, 4th edition, 2006.

Reference books:

1. L. strauss, Wave Generation and shaping , McGraw-Hill,1970.
2. Jacob Millman,Christos C.Halkis, Integrated Electronics, TMH, 2nd edition, 2009.
3. "Pulse circuits", Michale
4. Ronald J.Tocci, Fundamentals of pulse and digital circuits, 3 rd edition 2008
5. John f. Wakerly, Digital design principles and practices, Pearson publishers,3rd edition 2011.

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(13EC406) ELECTRICAL ENGINEERING LAB

Objectives:

List of Experiments:

PART-A

1. Verification of KVL and KCL
2. Verification of Thevenin`s Equivalent circuit and Norton`s Equivalent circuit by direct Test
3. Verification of Superposition and Reciprocity theorems
4. Verification of Tellegen`s and millmann's theorems
5. Verification of Maximum power transfer theorem. Verification on DC, Verification on AC With Resistive loads
6. Verification of Compensation theorem.
7. Two Port Network parameters- Z and Y parameters
8. Two Port Network parameters- ABCD and h-parameters

PART –B

1. Swinburne`s Test on DC Shunt machine (Predetermination of efficiency of a given DC shunt machine working as motor and generator)
2. Brake Test on DC Shunt Motor. Determination of performance characteristics.
3. Magnetization characteristics of DC Shunt Generator. Determination of critical Resistance
4. OC and SC Test on single phase Transformer (Predetermination of efficiency and regulation at given power factors and determination of Equivalent circuit.
5. Load Test on single phase Transformer.
6. Speed control of DC shunt motor.
7. Load Test on DC Shunt generator. Determination of characteristics.
8. Load Test on DC Series generator. Determination of characteristics

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(13EC407) ANALOG CIRCUIT ANALYSIS LAB

Objectives: This course is intended to

- Conduct experiment on Common Emitter and Common Source amplifiers.
- Accomplish the frequency response of two stage RC coupled amplifier.
- Construct negative feedback in amplifiers.
- Construct sinusoidal oscillators.
- Construct power amplifiers.

List of Experiments (Twelve experiments to be done):

Testing in the Hardware Laboratory:

1. Common Emitter amplifier,
2. Common Base Amplifier
3. Common Source Amplifier
4. Common Drain Amplifier
5. Two Stage RC Coupled Amplifier
6. Current shunt Feedback Amplifier
7. Voltage Feedback Amplifier
8. Wien Bridge Oscillator using Transistors
9. RC Phase Shift Oscillator using Transistors
10. Hartley and Colpitts Oscillator using Transistors
11. Class A Power Amplifier (Transformer less)
12. Class B Complementary Symmetry Amplifier

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(13EC408) CIRCUIT SIMULATION LAB

Objectives: This course is intended to simulate and

- Conduct experiment on Common Emitter and Common Source amplifiers.
- Accomplish the frequency response of two stage RC coupled amplifier.
- Construct negative feedback in amplifiers.
- Construct sinusoidal oscillators.
- Construct power amplifiers.

List of Experiments (Twelve experiments to be done):

I) Design and Simulation in Simulation Laboratory using Multisim or Pspice or Equivalent Simulation Software.

1. Common Emitter amplifier.
2. Common Base Amplifier.
3. Common Source Amplifier.
4. Common Drain Amplifier.
5. Two Stage RC Coupled Amplifiers.
6. Current shunt Feedback Amplifier.
7. Voltage Feedback Amplifier.
8. Wien Bridge Oscillator using Transistors.
9. RC Phase Shift Oscillator using Transistors.
10. Hartley and Colpitts Oscillator using Transistors.
11. Class A Power Amplifier (Transformer less).
12. Class B Complementary Symmetry Amplifier

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(13EC409) TECHNICAL SEMINAR-I

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

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

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(13HS121) QUALITATIVE AND QUANTITATIVE ANALYSIS

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

UNIT – I:

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

UNIT– II:

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

UNIT – III:

Logical deductions, Non verbal reasoning

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

UNIT – IV:

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

Text Books:

1. RS Agarwal , A textbook on Quantitative Aptitude.
2. RS Agarwal, A textbook on verbal and nonverbal reasoning .

Meenakshi Raman and Sangeeth Sarma, Technical Communication.

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(13EC501) ANALOG COMMUNICATONS

Objectives:

- The course presents the various types of Analog Modulation schemes for transmission of Analog Information.
- Understand basic concepts of designing components like Modulators and demodulators used in design of Analog communication systems.
- The student will understand the design of Transmitter and Receiver sections in Communication system and effect of Noise in Receivers.

UNIT-I

Introduction- Communication Systems & Linear Continuous Wave (Cw) Modulation: Communication Process, Elements of communication Systems - information, Messages and Signals, Communication channel, Modulation -, Modulation Methods, Modulation Benefits and Applications Fundamental Limitations of communication Systems.

Double Side Band Amplitude Modulation: AM Signals and Spectra, DSB Signals and Spectra, Tone Modulation, Modulators and Transmitters – Product Modulators, Square Law Modulators, Balanced Modulators and Switching Modulators. Suppressed Side Band (SSB) Amplitude Modulation - Single Side Band Signals and Spectra, Single Side Band Generation, Vestigial Side Band Signals and Spectra, Frequency Conversion and Demodulation –Frequency Conversion, Synchronous Detection, Envelope Detection, And Illustrative Problems.

UNIT-II

Angle Continuous Wave (CW) Modulation: Phase and Frequency Modulation – PM and FM Signals, Narrow Band PM and FM, Tone Modulation, Multi Tone and Periodic Modulation, Transmission Bandwidth and Distortion – Transmission Estimates, Linear Distortion, Non-Linear Distortion and Limiters. Generation and Detection of PM and FM – Direct FM and VCOs, Phase Modulators and Indirect FM, Frequency Detection, Interference – Interfering Sinusoids, Pre-Emphasis and De-Emphasis Filtering, FM Capture Effect, Illustrative Problems.

UNIT-III

Analog Communication Systems and Pulse Modulation Techniques: Receivers for CW Modulation – Super Heterodyne receivers, direct conversion receiver, special purpose receivers, Receiver Specifications, Receiver Measurements, Multiplexing Systems, synchronous detection and frequency synthesizers using Phase Locked Loop (PLL), Linearized PLL FM detection, Illustrative Problems. Pulse amplitude modulation – Flat top sampling and Pulse amplitude modulation (PAM), Pulse-Time Modulation – Pulse Duration and Pulse Position modulations, PPM spectral analysis, Illustrative Problems.

UNIT-IV

Noise: Thermal Noise & Available Power, White noise and filtered noise, Noise equivalent bandwidth, base band signal Transmission with noise- Additive Noise & S/N, Analog Signal Transmission, Noise in Analog Modulation Systems- Band Pass Noise System Models, Quadrature Components, envelope phase, Correlation Functions, Linear CW Modulation with Noise – Synchronous Detection, Envelope Detection, and Threshold Effect, Angle CW with Noise, Post detection Noise, Destination S/N, FM Threshold Effect, Analog Pulse modulation with Noise, Illustrative Problems.

Text Books:

1. Simon Haykin, "Communication Systems", Wiley-India Edition, 3rd Edition, 2010.
2. A. Bruce Carlson, & Paul B. Crilly, "Communication Systems – An Introduction to Signals & Noise in
3.Electrical Communication", McGraw-Hill International Edition, 5th Edition, 2010.
4. Sham Shanmugam, "Digital and Analog Communication Systems", Wiley-India edition, 2006.

Reference Books:

1. B.P. Lathi, & Zhi Ding, "Modern Digital & Analog Communication Systems", Oxford University Press International, 4th edition, 2010.
2. Herbert Taub & Donald L Schilling, "Principles of Communication Systems", Tata McGraw-Hill, 3rd Edition, 2009.
3. R.E. Ziemer & W.H. Tranter, "Principles of Communication-Systems Modulation & Noise", Jaico Publishing House, 2001.
4. George Kennedy and Bernard Davis, "Electronics & Communication System", TMH, 2004.

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	3	0	0	[3]

(13EC502) LINEAR INTEGRATED CIRCUITS AND APPLICATIONS

Objectives:

- To introduce the basic building blocks of linear integrated circuits.
- To teach the linear and non-linear applications of operational amplifiers.
- To introduce the theory and applications of analog multipliers and PLL.
- To teach the theory of ADC and DAC
- To introduce a few special function integrated circuits.

UNIT-I

Integrated Circuits: Differential amplifier –DC and AC analysis of Dual input balanced output configuration, Properties of other differential amplifier configuration (dual input unbalanced output, single ended input-balanced/unbalanced output), DC coupling and cascade differential amplifier stages, Level Translator.

Characteristics of OP-Amps, integrated circuits-types, classification, package types and temperature ranges, power supplies, OP-Amp Block diagram, ideal and practical OP-Amp specifications, DC and AC characteristics, 741 OP-Amp and its features, FET input OP-Amps, OP-Amp parameters and measurement, input and output offset voltages and currents, slew rate, CMRR, PSRR, drift, Frequency compensation technique.

UNIT-II

Linear Applications of OP-AMPS: Inverting and non-inverting amplifier, integrator and differentiator, difference amplifier, instrumentation amplifier, AC amplifier, V-I, I-V converters, Buffers.

Non Linear Applications of OP-AMPS: Non-linear function generation, comparators, Multivibrators, Triangular and square wave generators, Log and antilog amplifiers, precision rectifiers.

UNIT-III

Analog Filters: Introduction, Butterworth filters-first order, second order LPF, HPF filters. Band pass, Band reject and all pass filters.

Timers and Phase Locked Loops: Introduction to 555 Timer, functional diagram, Monostable and Astable operations and applications, Schmitt Trigger, PLL-Introduction, Block schematic, principles and description of individual blocks,565 PLL ,applications of PLL-Frequency multiplication, frequency translation, AM, FM and FSK demodulators.

UNIT-IV

D/A AND A/D Converters: Introduction, Basic DAC techniques, weighted resistor DAC, R-2R Ladder DAC, Inverted R-2R DAC and IC 1408 DAC, different types of ADCs-parallel comparator type ADC, counter type ADC, successive approximation ADC and Dual slope ADC.DAC and ADC specifications, specifications AD 574 (12 bit ADC).

Analog Multipliers and Modulators: Four quadrant multiplier, Balanced modulator, IC 1496, applications of analog switches and multiplexers, sample and hold amplifiers, Voltage regulator (IC based).

Text Books:

1. Op-Amps & Linear ICs, Ramakanth A. Gayakwad, 4th edition, PHI, 2000.
2. Operational Amplifiers & Linear Integrated Circuits–R.F.Coughlin & Fredrick Driscoll, 6th edition, PHI, 2000.

Reference Books:

1. Operational Amplifiers & Linear ICs by David A. Bell, 2nd edition, Oxford University Press, 2010.
2.Linear Integrated Circuits – D. Roy Chowdhary, New Age International (p) Ltd, 2nd Edition, 2003.
3. Design with Operational Amplifiers & Analog Integrated Circuits - Sergio Franco, McGraw Hill, 1988.
4. Operational Amplifiers – C.G. Clayton, Butterworth & Company Publ. Ltd./ Elsevier, 1971.

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(13EC503) COMPUTER ARCHITECTURE AND ORGANIZATION

Objectives:

- Students would have the basic knowledge necessary to understand the hardware operation of digital computers and learn architecture, organization and design of a computer.
- The objective of the course is to familiarize students with the basic Knowledge necessary to understand the hardware operation of Digital computers.
- The course present the organization and architecture of CPU,input-output, memory.
- This course present advanced Architectures.

UNIT-I

Basic Structure of Computers: Computer Types, Functional Units, Basic Operational Concepts, Bus Structures, Software, Performance, Multiprocessors and Multi Computers. Data Representation-Fixed Point Representation, Floating – Point Representation. Error Detection Codes.

Register Transfer and Microoperations: Register Transfer Language. Register Transfer, Bus and Memory Transfers, Arithmetic, Logic, Shift Microoperations, Arithmetic logic shift Unit, Instruction Codes, Computer Registers, Computer Instructions, Instruction Cycle. Memory: Reference Instructions- Input – Output and Interrupt, STACK Organization. Instruction Formats, Addressing Modes, DATA Transfer and Manipulation, Program Control, Reduced Instruction Set Computer.

UNIT-II

Control Unit: Control Memory, Address Sequencing, Microprogram Example, Design of Control Unit Hard Wired Control, Microprogrammed Control.

Computer Arithmetic: Data Representation-Fixed point, Floating Point Representation, Addition and Subtraction, Multiplication Algorithms, Division Algorithms, Floating – Point Arithmetic Operations, Decimal Arithmetic Unit Decimal Arithmetic Operations.

UNIT-III

The Memory System: Basic concepts, semiconductor RAM memories, Read-only memories, Cache memories, performance considerations, Virtual memories, secondary storage, Introduction to RAID.

Input-Output Organization: Peripheral Devices, Input-Output Interface, Modes of Transfer, Priority Interrupt, Direct memory Access, Input –Output Processor (IOP), Serial communication, Introduction to standard serial communication protocols like RS232, USB, IEEE1394.

UNIT-IV

Advanced Architectures Pipeline and Vector Processing: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline, Vector Processing, Array Processors.

Multi Processors: Characteristics of Multiprocessors, Interconnection Structures, Interprocessor Arbitration, InterProcessor Communication and Synchronization, Shared Memory Multiprocessors, Distributed Multicomputing.

Text Books:

1. Computer Organization – Carl Hamacher, Zvonks Vranesic, SafeaZaky, 5th Edition,2002, McGraw Hill.
2. Computer Systems Architecture – M.Moris Mano, 3rd Edition, Pearson/PHI, 2008.
3. Computer Architecture-Behrooz Parhami, Oxford University Press, USA, 2005

Reference Books:

1. Computer Organization and Architecture – William Stallings 6th Edition, Pearson/PHI.
2. Structured Computer Organization – Andrew S. Tanenbaum, 4th Edition PHI/Pearson.
3. Fundamentals or Computer Organization and Design, - Sivaraama Dandamudi Springer Int. Edition.
4. Computer Architecture a quantitative approach, John L. Hennessy and David A. Patterson, 4th Edition, Elsevier.
5. Computer Architecture: Fundamentals and principles of Computer Design, Joseph D. Dumas II, BS Publication

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(13EC504) DIGITAL IC SYSTEM DESIGN

Objectives:

- To study basic semiconductor principles and digital IC technology, static and dynamic characteristics of popular MOS and bipolar logic families with emphasis on CMOS and TTL technologies.
- To study the VHDL programming concepts and design of different combinational and sequential circuits using VHDL.
- To study the design of common logic circuits, such as combinational circuits, regenerative circuits, and various types of memories.

UNIT- I

Introduction to Logic Families: Bipolar logic, Transistor logic, TTL families, CMOS logic, CMOS steady state electrical behavior, CMOS dynamic electrical behavior, CMOS logic families.

Bipolar Logic and Interfacing: CMOS/TTL interfacing, low voltage CMOS logic and interfacing, Emitter coupled logic, Comparison of logic families, Familiarity with standard 74XX and CMOS 40XX series-ICs – Specifications.

UNIT-II

The VHDL Hardware Description Language: Design flow, program structure, types and constants, functions and procedures, libraries and packages.

The VHDL Design Elements: Structural design elements, data flow design elements, behavioral design elements, time dimension and simulation synthesis.

UNIT-III

Combinational Logic Design: Decoders, encoders, three state devices, multiplexers and demultiplexers, Code Converters, EX-OR gates and parity circuits, comparators, adders & subtractors, ALUs, Combinational multipliers. VHDL modes for the above ICs.

Design Examples (Using VHDL): Design examples (using VHDL) - Barrel shifter, comparators, floating-point encoder, dual parity encoder.

UNIT-IV

Sequential Logic Design: Latches and flip-flops, PLDs, counters, shift register, and their VHDL models, synchronous design methodology, impediments to synchronous design.

Memories: ROMs: Internal structure, 2D-decoding commercial types, timing and applications.

Static RAM: Internal structure, SRAM timing, standard SRAMS, synchronous SRAMS.

Dynamic RAM: Internal structure, timing, synchronous DRAMs. Familiarity with Component Data Sheets – Cypress CY6116, CY7C1006, Specifications.

Text Books:

1. John F.Wakerly, Digital Design Principles & Practices, PHI/ Pearson Education Asia, 3rd Ed., 2005.
2. J. Bhasker, A VHDL Primer, Pearson Education/ PHI, 3rd Edition.

Reference Books:

1. Charles H. Roth Jr, Digital System Design Using VHDL, PWS Publications, 2nd edition, 2008.
2. Stephen Borwn and Zvonko Vramesic, Fundamentals of Digital Logic with VHDL Design, McGraw Hill, 2nd Edition, 2005.

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(13EC505) LINEAR CONTROL SYSTEMS

Objectives:

- In this course it is aimed to introduce to the students the principles and applications of control systems in everyday life.
- The basic concepts of block diagram reduction, time domain analysis solutions to time invariant systems and also deals with the different aspects of stability analysis of systems in frequency domain and time domain.

UNIT-I

Introduction: Open Loop and closed loop control systems and their differences- Examples of control systems- Classification of control systems-Types of feedback- Feed-Back and its Effects. Transfer Function- Impulse Response and transfer function of linear systems-Block diagram algebra –Signal flow graph - Reduction using Mason's gain formula.

Mathematical Modeling of Physical Systems: Transfer function of electrical systems-Mechanical systems-Electromechanical systems- Impulse Response and transfer functions - Transfer Function of DC Servo motor - AC Servo motor- Synchro transmitter and Receiver.

UNIT-II

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

Stability Analysis in S-Domain*:* The concept of stability – Routh's stability criterion – qualitative stability and conditional stability – limitations of Routh's stability. The root locus concept - construction of root loci-effects of adding poles and zeros to G(s) H(s) on the root loci.

UNIT-III

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

Stability Analysis in Frequency Domain*:* Polar Plots-Nyquist Plots-Stability Analysis.

UNIT-IV

Design of Compensators*:* Compensation techniques – Lag- Lead, Lead-Lag Controllers design in frequency Domain- P, PD, PI, and PID Controllers.

State Space Analysis of Continuous Systems*:* Concepts of state, state variables and state model, derivation of state models from block diagrams, Diagonalization- Solving the Time invariant state Equations- State Transition Matrix and its Properties.

Text Books:

1. Automatic Control Systems 8th edition– by B. C. Kuo 2003– John Wiley and son's.

2. Control Systems Engineering – by I. J. Nagrath and M. Gopal, New Age International (P) Limited, Publishers, 5th edition, 2007.

Reference Books:

1. Control Systems –by A. Anand Kumar. PHI, 2007.

2. Automatic Control Systems –by S.N. Verma & B.S. Manke. Khanna PUBLISHERS.

3. Control Systems-by U.A. Bakshi & Mrs. V.U. Bakshi 2003. Technical Publications.

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(13EC506) ANTENNA AND WAVE PROPOGATION

Objectives:

- To expose the students to the basics of antennas and various types of antenna arrays
- and their radiation patterns.
- To analyze the concepts of antenna radiation and fundamental parameters.
- To understand the application of different antenna types and their characteristics.
- To study antenna array and Array factor.

UNIT -I

Antenna Basics: Introduction, Basic antenna parameters- patterns, Beam Area, Radiation Intensity, Beam Efficiency, Directivity-Gain-Resolution, Antenna Apertures, Effective height, Illustrative problems. Fields from oscillating dipole, Field Zones, Shape-Impedance considerations, Antenna temperature, front–to-back ratio, antenna theorems, radiation- basic Maxwell's equations, retarded potential-Helmholtz Theorem.

Thin Linear Wire Antennas: Radiation from Small Electric Dipole, Quarter wave Monopole and Half wave Dipole – Current Distributions, Field Components, Radiated power, Radiation Resistance, Beam width, Directivity, Effective Area and Effective Height. Natural current distributions, far fields and patterns of Thin Linear Center-fed Antennas of different lengths, Illustrative problems. Loop Antennas: Introduction, Small Loop, Comparison of far fields of small loop and short dipole, Radiation Resistances and Directives of small and large loops (Qualitative Treatment).

UNIT-II

Antenna Arrays: Point sources- Definition, Patterns, arrays of 2 Isotropic sources- Different cases. Principle of Pattern Multiplication, Uniform Linear Arrays – Broadside Arrays, Endfire Arrays, EFA with Increased Directivity, Derivation of their characteristics and comparison, BSAa with Non-uniform Amplitude Distributions- General considerations and Bionomial Arrays, Illustrative problems.

VHF, UHF and Microwave Antennas - I: Arrays with Parasitic Elements, Yagi - Uda Arrays, Folded Dipoles & their characteristics. Helical Antennas-Helical Geometry, Helix modes, Practical Design considerations for Monofilar Helical Antenna in Axial and Normal Modes. Horn Antennas- Types, Fermat's Principle, Optimum Horns, Design Considerations of Pyramidal Horns, Illustrative Problems.

UNIT-III

Micro Strip Antennas: Introduction, features, advantages and limitations, Rectangular patch antennas- Geometry and parameters, characteristics of Micro strip antennas, Impact of different parameters on characteristics, reflector antennas- Introduction, Flar sheet and corner reflectors, paraboloidal reflectors- geometry, pattern characteristics, Feed Methods, Reflector Types- Related Features, Illustrative Problems.

Lens Antennas: Introduction, Geometry of Non-metallic Dielectric Lenses, Zoning , Tolerances, Applications.Antenna Measurements: Introduction, Concepts- Reciprocity, Near and Far Fields, Coordination system, sources of errors, Patterns to be Measured, Pattern Measurement Arrangement, Directivity Measurement , Gain Measurements (by comparison, Absolute and 3-Antenna Methods).

UNIT-IV

Wave Propagation: Introduction, Definitions, Characterizations and general classifications, different modes of wave propagation, Ray/ Mode concepts. Ground wave propagation (Qualitative treatment)- Introduction, Plane earth reflections, Space and surface waves, wave tilt, curved earth reflections. Space wave propagation- Introduction, field strength variation with distance and height, effect of earth's curvature, absorption. Super refraction, M-curves and duct propagation, scattering phenomena, tropospheric propagation, fading and path loss calculations.

Sky Wave Propagation: Introduction, structure of Ionosphere, refraction and reflection of sky waves by Ionosphere, Ray path, Critical frequency, MUF, LUF, OF, Virtual height and Skip distance, Relation between MUF and Skip distance, Multi-HOP propagation, Energy loss in Ionosphere, Summary of Wave Characteristics in different frequency ranges.

Text Books:

1. Antennas and wave propagation – John D. Kraus, Ronald J. Marhefka and Ahmad S.Khan, TMH, New Delhi, 4th Ed., (special Indian Edition), 2010
2. Electromagnetic Waves and Radiating Systems – E.C. Jordan and K.G. Balmain, PHI, 2nd ed., 2000.

Reference Books:

1. Antenna Theory - C.A. Balanis, John Wiley & Sons, 2nd ed., 2001.
2. Antennas and Wave Propagation – K.D. Prasad, Satya Prakashan, Tech India Publications, New Delhi, 2001.
3.Transmission and Propagation – E.V.D. Glazier and H.R.L. Lamont, The Services Text Book of Radio, vol. 5, Standard Publishers Distributors, Delhi.
4. Electronic and Radio Engineering – F.E. Terman, McGraw-Hill, 4th edition, 1955.
5. Antennas – John D. Kraus, McGraw-Hill (International Edition), 2nd ed., 1988.

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(13EC507) ANALOG COMMINUCATIONS LAB

Minimum 12 experiments should be conducted :

1. Amplitude modulation and demodulation.
2. Frequency modulation and demodulation.
3. Characteristics of mixer.
4. Pre-emphasis & de-emphasis.
5. Pulse Amplitude Modulation and demodulation.
6. Pulse Width Modulation and demodulation.
7. Pulse Position Modulation and demodulation.
8. Radio Receiver measurements – Sensitivity, Selectivity, & Fidelity.
9. Spectral analysis of AM and FM signals using spectrum analyzer.
10. Spectral analysis of AM and FM signals using labVIEW.
11. Phase locked loop.
12. Synchronous detector.
13. SSB system.
14. Frequency modulation and demodulation using labVIEW.

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(13EC508) LINEAR IC AND PDC LAB

Objectives:

- This course is intended to obtain the desired wave shapes using linear wave shaping circuits like High pass and low pass RC circuits for different types of input signals.
- Get the desired waveform using nonlinear wave shaping circuits like clippers and clampers.
- To Know the operation of various multivibrators and to observe the respective switching waveforms

Minimum 12 experiments to be conducted:

PART-I (Transistor based/Discrete Components)

1. Linear wave shaping.
2. Non Linear wave shaping – Clippers.
3. Non Linear wave shaping – Clampers.
4. Transistor as a switch.
5. Realization of Logic Gates
6. Astable& Monostable Multivibrator.
7. Bistable Multivibrator & Schmitt Trigger.

PART-II (IC based)

1. IC 741 op amp applications-Adder, Integrator circuits.
2. Active filters-LPF, HPF.
3. UJT Relaxation Oscillator.
4. Function generator using 741 op-amp.
5. IC 555 timer-Monostable, astable operation circuits.
6. Schmitt Trigger circuits-using 741 & IC 555.
7. Voltage regulator using IC723/78XX.

8.4-Bit DAC using 741 op-amp.

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(13EC509)DIGITAL IC SYSTEM DESIGN LAB

Objective:

Simulate the internal structure of the following Digital IC's using VHDL / VERILOG and verify the operations of the Digital IC's (Hardware) in the Laboratory.

Minimum 6 experiments from each part to be conducted:

Part –I

Hardware laboratory using digital IC's

1. Logic Gates- 74XX (NAND/NOR/EXOR/EXNOR).
2. Half Adder, Half Subtractor, Full Adder, Full Subtractor & Ripple Carry Adder.
3. 3-8 Decoder -74X138 & 8-3 Encoder- 74X148.
4. 8 X 1 Multiplexer -74X151 and 2x4 Demultiplexer-74X155.
5. 4 bit Comparator-74X85.
6. D Flip-Flop 74X74.
7. JK Flip-Flop 74X109.
8. Decade counter-74X90.
9. Universal shift register -74X194.

Part-II

Software Simulation using VHDL/Verilog

1. Logic Gates- 74XX.
2. Half Adder, Half Subtractor, Full Adder, Full Subtractor & Ripple Carry Adder.
3. 3-8 Decoder -74X138 & 8-3 Encoder- 74X148.
4. 8 X 1 Multiplexer -74X151 and 2x4 Demultiplexer-74X155.
5. 4 bit Comparator-74X85.
6. D Flip-Flop 74X74.
7. JK Flip-Flop 74X109.
8. Decade counter-74X90.
9. Universal shift register -74X194.

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(13EC601) MICROPROCESSORS AND MICROCONTROLLERS

Objective:

- To learn the basic microprocessor architecture and to gain knowledge on interfacing components with processors and micro controllers
- To learn the fundamentals architectures of 8255, 8259, 8086 programming in assembly language, Software Design Kit (SDK), System integration with 8086.
- To learn different Communication protocols like RS232, SPI, and I^2C.

UNIT-I

Introduction: Introduction to 8085, Architecture of 8086 microprocessor, special functions of general purpose registers.8086 flag register and function of 8086 flags, addressing modes of 8086,instruction set of 8086.assembler directives, simple programs, procedures and macros.

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

UNIT-II

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

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

UNIT-III

Serial Data Transfer Schemes: Asynchronous and synchronous data transfer schemes.8251 USART architecture and interfacing.TTL to RS232C and RS232C to TTL conversion. Sample program of serial data transfer. Introduction to high-speed serial communications standards, USB.

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

UNIT-IV

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

Advanced Microcontrollers: ARM Microcontrollers: ARM Core Architecture, Versions of ARM, Important Features. Programming examples of ARM using IDE.

Text Books:

1. Advanced microprocessor and peripherals-A.K. Ray and K.M.Bhurchandi, 2nd edition, TMH, 2000.
2. Microcontrollers-Deshmukh, Tata Mc-Graw Hill Edition, 2004.
3. Microcontrollers Architecture, programming, interfacing and system Design-Raj kamal, Pearson Education, 2005.
4. Microprocessor Architecture, Programming, and Applications With the 8085- Ramesh S. Gaonkar-Prentice Hall PTR, 2002.

Reference Books:

1. Microprocessors Interfacing-Douglas V.Hall, 2nd edition, 2007.
2. The 8088 and 8086 Microprocessors- Walter A. Triebel, Avtar Singh, PHI, 4th Edition, 2003.
3. Micro computer system 8066/8088 family Architecture, programming and Design-By Liu and GA Gibson, PHI, 2nd Ed.
4.8051 Microcontroller-Internals, Instructions, Programming and Interfacing by SubrataGhoshal, Pearson, 2010.

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(13EC602) DIGITAL COMMUNICATIONS

Objectives:

- Understand basic components of digital communication systems.
- Understand transmission and detection of digital signals
- Analyze the error performance of digital modulation techniques.
- Design digital communication systems under given power, spectral and error performance constrains.
- Become familiar with the fundamentals of channel coding.
- The student will know the constituents of a digital communications system.
- The student will be able to analyze various methods of baseband and bandpass digital transmission and detection methods.
- The student will know how to analyze and allocate performance objectives to components of a digital communications system.
- The student will understand basic channel coding techniques

UNIT-I

Digitization Techniques for Analog Messages: Introduction - Importance of Digitization Techniques for Analog Messages, Pulse Code Modulation (PCM) - Generation and Reconstruction, Quantization Noise, Non-Uniform Quantization and Companding, PCM with Noise, Decoding Noise, Error Threshold, PCM versus Analog Modulation.

Delta modulation, Adaptive Delta Modulation, Differential PCM systems (DPCM), Digital Multiplexing-Multiplexers and Hierarchies.

UNIT-II

Base Band Digital Transmission: Digital Signals and Systems – Digital PAM Signals, Transmission Limitations, Power Spectra of Digital PAM, Noise and Errors – Binary Error Probabilities, Matched Filtering, Correlation Detection.

Band Limited Digital PAM Systems – Nyquist Pulse Shaping, Optimum Terminal Filters, Correlative Coding.

UNIT-III

Band Pass Digital Transmission: Digital CW Modulation – Spectral Analysis of Digital Band Pass Signals, Signal Space, Gram-Schmidt Procedure, Coherent Binary Systems – Optimum Binary Detection, Coherent ASK (OOK (on-off keying), BPSK and FSK, Timing and Synchronization, Interference, Non-Coherent Binary Systems, Non-Coherent FSK, Differentially Coherent PSK. Quadrature Carrier and M–ary Systems- Quadrature Carrier Systems, M–ary PSK Systems, M–ary QAM Systems, M–ary FSK Systems, and Comparison of Digital Modulation Systems, digital communication standards.

UNIT- IV

Information Theory and Coding: Information Measure and Encoding - Information Measure, Entropy and Information Rate, Coding for a Discrete Memory Less Channel, Information transmission on a discrete channels - mutual information, Binary Symmetric Channel, Discrete Channel Capacity, Coding for the Binary Symmetric Channels. Error Detection & Correction - Repetition & Parity Check Codes, Interleaving, Code Vectors and Hamming Distance, Forward Error Correction (FEC) Systems, Automatic Retransmission Query (ARQ) Systems, Linear Block Codes – Matrix Representation of Block Codes, Convolution Codes – Convolutional Encoding, Decoding Methods.

Text Books:

1. A. Bruce Carlson, & Paul B. Crilly, "Communication Systems – An Introduction to Signals & Noise in Electrical Communication", McGraw-Hill International Edition, 5th Edition, 2010.

2. Sam Shanmugam, "Digital and Analog Communication Systems", John Wiley, 2005.

Reference Books:

1. Bernard Sklar, "Digital Communications", Prentice-Hall PTR, 2nd edition, 2001.

2. Simon Haykin, "Communication Systems", Wiley-India edition, 3rd edition, 2010.

3.B.P. Lathi, & Zhi Ding, "Modern Digital & Analog Communication Systems", Oxford University Press, International 4th edition, 2010.

4. Herbert Taub & Donald L Schilling, "Principles of Communication Systems", Tata McGraw-Hill, 3rd Edition, 2009.

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(13EC603) DIGITAL SIGNAL PROCESSING

Objectives:

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

UNIT-I

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

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

UNIT-II

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

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

UNIT-III

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

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

UNIT-IV

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

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

Text Books:

1. Digital signal processing, principles, Algorithms and applications: John G. Proakis, Dimitris G. Manolakis, Pearson Education/PHI, 4th ed., 2007.

2.Digital signal processing , A computer base approach- Sanjit K Mitra, Tata Mcgraw Hill, 3rd edition, 2009.

3. Discrete Time Signal Processing-A.V. Oppenheim and R.W. Schaffer, 2nd ed., PHI.

Reference Books:

1. Digital signal processing: Andreas Antoniou, TATA McGraw Hill, 2006.

2. A Text book on Digital Signal processing – R S Kaler, M Kulkarni,, Umesh Gupta, I K International Publisthing House Pvt. Ltd.

3. Digital signal processing: M H Hayes, Schaum's outlines, TATA Mc-Graw Hill, 2007.

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(13EC604) VLSI DESIGN

Objectives:

The course includes the fundamentals of

- Fabrications steps of MOS and BiCMOS technologies.
- Basic NMOS, CMOS & BiCMOS circuits.
- NMOS & CMOS process technology.
- Technology Scaling
- Designing VLSI subsystems.
- The concepts of modeling a digital system using Hardware Description Language.
- Chip design using programmable devices.

UNIT-I

Introduction: Introduction to IC technology-MOS, PMOS, NMOS, CMOS and BI-CMOS technologies-oxidation, lithiography, diffusion, Ion implantation, metallisation , Encapsulation, probe testing, Integrated Resistors And Capacitors, Current Mirror Circuits..

Basic Electrical Properties: Basic electrical properties of MOS and BI-CMOS circuits: I_{ds}-V_{ds} relationships, MOS transistor threshold voltage, g_m, g_{ds}, figure of merit; pass transistor, NMOS inverter, various pull-ups, CMOS inverter analysis and design, BI-CMOS inverters.

UNIT-II

VLSI Circuit Design Processes: VLSI design flow, MOS layers, stick diagrams, design rules and lay out,2 m CMOS design rules for wires, contacts and transistors layout diagrams for NMOS and CMOS inverters and gates, scaling of MOS circuits, limitations of scaling.

GATE Level Design: Logic gates and other complex gates, switch logic, alternate gate circuits, basic circuit concepts, sheet resistance RS and its concept to MOS, area capacitance units, calculations-(Micro)-delays, driving large capacitive loads, wiring capacitances, fan-in and fan-out, choice of layers.

UNIT III

Sub System Design: Sub system design, shifters, adders, ALUs, multipliers, parity generators, comparators, zero/one detectors, counters, high density memory elements.

Semiconductor Integrated Circuit Design: PLAs, FPGAs, CPLDs, standard cells, programmable array logic, design approach.

UNIT-IV

VHDL Synthesis: VHDL synthesis, circuit design flow, circuit synthesis, simulation, layout, design capture tools, design verification tools, test principles.

CMOS Testing: CMOS testing need for testing, test principles, design strategies for test, chip level test techniques, system-level test techniques, layout design for improved testability

Text Books:

1. Kamran Eshraghian, Eshraghian Dougles and A.Pucknell, Essentials of VLSI circuits and systems, PHI 2005 Edition.
2. Weste and Eshraghian, Principles of CMOS VLSI design, Pearson Education, 1999.

Reference Books:

1. John P.Uyemura, Introduction to VLSI circuits and systems, John Wiley, 2003.
2. John M. Rabaey, Digital Integrated circuits, PHI, EEE, 1997.
3. Wayne wolf, Modern VLSI design, Pearson Education, 3rd Edition, 1997.

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III B.Tech II Semester (ECE)	L	T	P	[C]
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(13EC605) COMPUTER COMMUNICATION AND NETWORKING

Objectives:

- This course includes fundamentals of networks and overview of data communications before entering into depths of networks.
- This course includes different network models: OSI, TCP/IP models, UDP, IEEE 802 wireless standards and various network protocols.
- This course helps to understand all the basics of networks and applications of network technology.

UNIT – I

Introduction to computer communication: Uses of Computer Networks, Network Hardware, The OSI Reference Model, The TCP/IP Reference Model, Example Networks, Data communications fundamentals.

The Physical Layer: Guided Transmission Media, Wireless Transmission.

UNIT - II

The Data Link Layer: Data Link Layer Design Issues, Error Detection And Correction, Elementary Data Link Protocols, Sliding Window Protocols**,** Example Data Link Protocols.

Medium Access Control Sub Layer: The Channel Allocation Problem, Multiple Access Protocols, Ethernet, Wireless LANS, Data Link Layer Switching.

UNIT – III

The Network Layer: Network Layer Design Issues, Routing Algorithms, Congestion Control Algorithms, Internetworking, The Network Layer in the Internet.

UNIT – IV

The Transport Layer: The Transport Service, Elements of Transport Protocols, the Internet Transport Protocols; UDP, the Internet Transport Protocols; TCP.

The Application Layer: The Domain Name System, Electronic Mail, the World Wide Web.

Application Layer: Basics of Domain Name System, Basics of SNMP, Basics of Electronic Mail & The World WEB, Basics of Multi Media.

Text Books:

1. Computer Networks, Andrew S Tanenbaum , ,4th Edition, Pearson Education/PHI.
2. Computer Networks, Bhushan Trivedi.

Reference Books:

1. Data Communications and Networking, Behrouz A. Forouzan. 4th Edition, TMH.
2. An Engineering Approach to Computer Networks, S.Keshav, 2nd Edition, Pearson Education.
3. Understanding communications and Networks, W.A.Shay 3rd Edition, Thomson.

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III B.Tech II Semester (ECE)

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(13EC606) ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

Objective:

- To learn basic measurement concepts and Concepts of electronic measurements.
- To learn the Importance of signal generators and signal analyzers in measurements.
- To learn relevance of digital instruments in measurements and need for data acquisition systems.
- To learn measurement techniques in optical domains.

UNIT-I

Performance characteristics of Instruments: Static characteristics, Accuracy, Precision, Resolution, Sensitivity, static and dynamic calibration, Errors in Measurement, and their statistical analysis, dynamic characteristics-speed of Response, fidelity, Lag and dynamic error. DC voltmeters-multirange, range extension/solid state and differential voltmeters, AC voltmeters –multirange, range extension. Thermocouple type RF ammeter, ohm meters, series type, shunt type, multimeter for voltage, current and resistance measurements.

Signal Generator: Fixed and variable, AF oscillators, function generators, pulse, random noise, sweep, and arbitrary waveform generators, their standards, specifications and principles of working (Block diagram approach).

UNIT-II

Wave analyzers, Harmonic distortion analyzers, FFT analyzers, and Logic analyzers.Oscilloscopes: Standard specifications of CRO, CRT features, vertical and horizontal amplifiers, horizontal and vertical deflection systems, sweep trigger pulse, delay line, sync selector circuits, probes for CRO – active, passive, and attenuator type, triggered sweep CRO, and Delayed sweep, dual trace/beam CRO, Measurement of amplitude, frequency and phase (Lissajous method).

UNIT-III

Principles of sampling oscilloscope, storage oscilloscope, and digital storage oscilloscope, Digital frequency counter, time and period measurement, Digital Multimeter (A to D converter used in DMM and its principle).

Review of DC Bridges: Wheatstone bridge, Wein Bridge, errors and precautions in using bridges, AC bridges: Measurement of inductance-Maxwell's bridge, Anderson Bridge. Measurement of capacitance- Schearing Bridge. Kelvin Bridge, Q-meter, EMI and EMC, Interference and noise reduction techniques.

UNIT-IV

Sensors and Transducers: Active and passive transducers: Measurement of displacement (Resistance, capacitance, inductance; LVDT) Force (strain gauges) Pressure (piezoelectric transducers) Temperature (resistance thermometers, thermocouples, and thermistors), Velocity, Acceleration, Vibration, pH measurement Signal Conditioning Circuits.

Data Acquisition System, Analogue and digital data recording techniques, strip chart and XY recording methods, Over view of PC Based instrumentation. Bus standards for measuring instruments (GPIB, RS232, USB), Virtual Instrumentation using labVIEW.

Text Books:

1. Electronic instrumentation, second edition - H.S.Kalsi, Tata McGraw Hill, 2004.
2. Modern Electronic Instrumentation and Measurement Techniques – A.D. Helfrick and W.D. Cooper, PHI, 5th Edition, 2002.
3. Electronic Instrumentation & Measurements - David A. Bell, PHI, 2nd Edition, 2003.

Reference Books:

1. Measurement Systems Application and Design-Ernest O Doebelin and Dhanesh N Manik TMH, 5th Edition, 2009.
2. Electronic Measurement and Instrumentation**,** Oliver and Cage, TMH.
3. Electronic Test Instruments, Analog and Digital Measurements - Robert A.Witte, Pearson Education, 2nd Ed., 2004.
4. Electronic Measurements & Instrumentations by K. Lal Kishore, Pearson Education - 2005.

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(13EC607) MICROPROCESSORS AND MICROCONTROLLERS LAB

Any 6 experiments from each part should be conducted

PART-I

I. Microprocessor 8086/MASAM or TASAM

1. Arithmetic operation – Multi byte Addition and Subtraction, Multiplication and Division – Signed and unsigned Arithmetic operation. ASCII – arithmetic operation- Multi byte Addition and Subtraction, Multiplication and Division
2. Logic operations – Shift and rotate – Converting packed BCD to unpacked BCD, BCD to ASCII conversion.
3. By using string operation and Instruction prefix: Move Block, Reverse string, Sorting, Inserting, Deleting, Length of the string, String comparison.
4. a) Generating the Fibonacci series.
   b) Ascending order of N-8bit numbers.
   c) Descending order of N-8bit numbers.
5. Interfacing stepper motor with 8086 microprocessor
   a) Clockwise 5 rotations
   b) Anti clockwise 5 rotations
6. Interfacing DAC with 8086 microprocessor
   a) Generating triangular waveform
   b) Generating saw tooth waveform
   c) Generating square waveform
7. Verification of the given string is whether palindrome or not.

PART-II

Microcontroller 8051:

1. Reading and Writing on a parallel port.
2. Timer in different modes.
3. Serial communication implementation.
4. 8259 – Interrupt Controller: Generate an interrupt using 8259 timer.
5. 8279 – Keyboard Display: Write a small program to display a string of characters.
6. 8255 – PPI: Write ALP to generate sinusoidal wave using PPI.
7. 8251 – USART: Write a program in ALP to establish Communication between two processors.

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(13EC608) ELECTRONIC MEASUREMENTS AND INSTRUMENTATION LAB

Any 7 experiments from each part should be conducted

PART –I

1. Speed measurement using:
   (a) Photoelectric pickup method
   (b) Magnetic Pickup method
2. Angular displacement measurement using capacitive pickup method.
3. (a) Load measurement using Load cell
   (b) Displace measurement using LVDT (linear)
4. Displacement measurement using capacitive transducer.
5. Displacement measurement using resistive transducer.
6. Displacement measurement using LDR.
7. Measurement of strain using strain gauge.
8. a) Temperature measurement using thermocouple.
   b) Temperature measurement using Thermistor.
   c) Resistance temperature detector (R.T.D.)
9. Illumination characteristic of given phototransistor.

PART – II (Study Experiments)

1. Calibration and Study of DMM.
2. Data Acquisition System.
3. Programmable Logic Controller.
4. Process Control Simulation.
5. GP-IB Control of DSO and DMM.
6. Study of Universal counter.
7. Arbitrary waveform generator.
8. LCR Q meter.
9. Storage Oscilloscope.

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(13HS122) SOFT SKILLS LAB

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

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

Reference Books:

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

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(13EC609) TECHNICAL SEMINAR-II

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

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

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(13EC701) OPTICAL COMMUNICATIONS

Objectives:

- To learn the basic elements of optical fiber transmission link, fiber modes configurations and Structures.
- To understand the different kind of losses, signal distortion in optical wave guides and other signal degradation factors
- To learn the various optical source materials, LED structures, quantum efficiency, laser diodes.
- To learn the fiber optical receivers such as PIN, APD diodes, noise performance in photo detector, receiver operation and configuration.

UNIT-I

Introduction and Optical fiber waveguides: Historical Development, The General System, Advantages of Optical Fiber Communications, Ray Theory transmission, Electromagnetic mode theory for Optical Propagation, Cylindrical Fiber.

Single mode fibers, Fiber Materials: Fiber Fabrication, Mechanical Properties of Fibers, Fiber Optic Cables.

UNIT-II

Attenuation, Material Absorption Losses in Silica Glass Fibers, Linear Scattering Losses, Fiber Bend Loss, Dispersion, Chromatic dispersion, Intermodal dispersion, Overall fiber dispersion, Polarization. Fiber alignment and joint loss, Fiber Splices, Fiber Connectors, Fiber Couplers, Optical Isolators and Circulators.

UNIT-III

Light Emitting Diodes (LEDs): LED Structures, Light Source Materials, Quantum efficiency and LED Power, Modulation of LED. LASER Diodes- Laser Diode Modes and Threshold Conditions, Laser Diode Rate Equations, External Quantum Efficiencies, Resonant Frequencies.

Power launching and Coupling: Source to Fiber Power Launching, Lensing schemes for Coupling Improvement, fiber-to-fiber Joints, LED coupling tot single mode fibers, Fiber Splicing, Optical fiber connectors. Photo Detectors – Physical principles of photo diodes, photo detector noise, detector response time, avalanche multiplication noise, structures for InGaAs APDs, temperature effect on avalanche gain, comparisons of photo detectors.

UNIT-IV

Digital Links: Point to point links, power penalties, error control.

Analog links: Over-view of analog links, carrier to noise ratio, multichannel transmission techniques, RF over fiber, radio over fiber links.

WDM Concepts and components: Over-view, Passive optical couplers, Isolators & circulators, Fiber grating filters, dielectric thin film filters, Phased array based devices, Diffraction gratings, Active optical components, tunable light sources.

Text Books:

1.Optical fiber communications- Gerd keiser, McGraw Hill International Edition, 4th Edition, 2010.
2. Optical fiber communications-John M. Senior, PHI, 3rd Edition, 2010.

Reference Books:

1. Principles and Applications of Optical Communications, Max Ming-Kang Liu, TMH, 2010.
2. Text book on optical fiber communication and its applications-S.C.Gupta, PHI, 2005.
3. Fundamentals of Optical Fiber communications, Satish Kumar, PHI, 2009.

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(13EC702) MICROWAVE ENGINEERING

Objective:

- To introduce the students, to the basics of microwave devices, microwave components, microwave measurements and modeling of RF circuits used in communication systems**.**

UNIT-I

Microwave Transmission Lines - I: Introduction, Microwave spectrum and bands, applications of Microwaves. Rectangular Waveguides-Solution of Wave Equation in Rectangular Coordinates, TE/TM mode analysis, Expressions for fields, Characteristic equation and cutoff frequencies, filter characteristics, dominant and degenerate modes, sketches of TE and TM mode fields in the cross-section. Mode characteristics - Phase and Group velocities, wavelengths and impedance relations, Illustrative Problems.

Microwave Transmission Lines - II: Rectangular Waveguides – Power Transmission and Power Losses, Impossibility of TEM Modes, Micro strip lines-introduction, Z_0 relations, effective dielectric constant, losses, Q-factor, Cavity resonators-introduction, Rectangular and cylindrical cavities, dominant modes and resonant frequencies, Q-factor and coupling coefficients, Illustrative Problems.

UNIT-II

Waveguide Components and Applications- **I**: Coupling mechanisms- probe, loop, aperture types. Wave guide discontinuities - waveguide Windows, tuning screws and posts, matched loads. Waveguide attenuators - resistive card, rotary vane Attenuators; waveguide phase shifters-dielectric, rotary vane phase shifters. Wave guide multiport junctions-E plane and H plane Tees, Magic Tee, Directional couplers-2 hole, Bothe hole types, Illustrative Problems.

Wave Guide Components and Applications-Ii: Ferrites-composition and characteristics, Faraday rotation; Ferrite components-Gyrator, Isolator, Circulator. Scattering Matrix-Significance, Formulation and properties. S Matrix calculations for 2-port junction, E plane and H plane Tees, Magic Tee, Directional coupler, circulator and Isolator, Illustrative Problems.

UNIT-III

Microwave Tubes-I: Limitations and losses of conventional tubes at microwave frequencies. Microwave tubes-O type and M type classifications. O type tubes: 2 cavity klystrons-structure, Reentrant cavities, velocity modulation process and Applegate diagram, bunching process and small signal theory-Expressions for O/P power and efficiency. Reflex Klystrons-structure, Velocity Modulation, Applegate diagram, mathematical theory of bunching, power output, efficiency , oscillating modes and O/P characteristics, Effect of Repeller Voltage on Power O/P, Illustrative Problems.

HELIX TWTS: Significance, types and characteristics of slow wave structures; structure of TWT and amplification process (qualitative treatment), suppression of oscillations, gain considerations.
M -TYPE Tubes: Introduction, cross field effects, Magnetrons-different types, cylindrical travelling wave magnetron-Hull cutoff and Hartree conditions, modes of resonance and PI-mode operation, separation of PI-mode, O/P characteristics, Illustrative Problems.

UNIT-IV

Microwave Solid State Devices: Introduction, classification, applications, Transfer Electronic Devices, Gunn diode - principles, RWH theory, characteristics, basic modes of operation - Gunn oscillation modes. LSA Mode, Varactor Diode, Parametric Amplifier, Introduction to Avalanche Transit time devices (brief treatment only).
Microwave Measurements: Description of Microwave bench-different blocks and their features, errors and precautions; Microwave power measurement-Bolometers, Measurement of attenuation, frequency standing wave measurements –measurement of low and high VSWR, cavity-Q, impedance measurements.

Text Books:

1. Microwave devices and circuits-Samuel Y. Liao, Pearson, 3rd Edition, 2003.
2. Microwave principles-Herbert J.Reich, J.G.Skalnik, P.F.Ordung and H.L.Krauss, CBS publishers and distributors, New Delhi, 2004.

Reference Books:

1. Foundations for microwave engineering-R.E.Collin, IEEE press, John Wiley, 2nd edition, 2002.
2. Microwave circuits and passive devices-M.L.Sisodia and G.S.Raghuvanshi,Wiley Eastern Ltd., New age International publishers Ltd., 1995.
3. Microwave engineering passive circuits-Peter A.Rizzi, PHI, 1999.
4. Electronic and Radio Engineering-F.E.Terman, McGraw-Hill, 4th Edition, 1995.
5. Microwave Engineering – A. Das, TMH, 2nd ed., 2009.

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(13EC703) DSP PROCESSORS AND ARCHITECTURES

Objectives:

- The purpose of this course is to introduce the concepts of DSP Processor and its architectures.
- To program DSP Processor for various applications.

UNIT I

Introduction to Programmable DSPs: Multiplier & Multiplier accumulator, Modified bus structures & memory access schemes in P – DSPs, Multiple access memory, Multi ported memory, VLIW architecture, Pipelining, Special addressing modes in P–DSPs, On chip peripherals.

Computational Accuracy in DSP Implementations: Number formats for signals and coefficients in DSP systems, Dynamic Range and Precision, Sources of error in DSP implementations, A/D Conversion errors, DSP Computational errors, D/A Conversion Errors, Compensating filter.

UNIT II

Architectures for Programmable DSP Devices: Basic Architectural features, DSP Computational Building Blocks, Bus Architecture and Memory, Data Addressing Capabilities, Address Generation Unit, Programmability and Program Execution, Speed Issues, Features for External interfacing.

Programmable Digital Signal Processors: Commercial Digital signal-processing Devices, Data Addressing modes of TMS320C54XX DSPs, Memory space of TMS320C54XX Processors, Program Control, TMS320C54XX instructions and Programming, On-Chip Peripherals, Interrupts of TMS320C54XX processors, Pipeline Operation of TMS320C54XX Processors, Architecture of TMS 320C67XX Processor.

UNIT III

Implementations of Basic DSP Algorithms: The Q-notation, FIR Filters, IIR Filters, Interpolation Filters, Decimation Filters, PID Controller, Adaptive Filters, 2-D Signal Processing.

Implementation of FFT Algorithms: An FFT Algorithm for DFT Computation, A Butterfly Computation, Overflow and scaling, Bit-Reversed index generation, An 8-Point FFT implementation on the TMS320C54XX, Computation of the signal spectrum.

UNIT IV

Interfacing Memory And I/O Peripherals to Programmable DSP Devices: Memory space organization, External bus interfacing signals, Memory interface, Parallel I/O interface, Programmed I/O, Interrupts and I/O, Direct memory access (DMA). A Multichannel buffered serial port (McBSP), McBSP Programming, a CODEC interface circuit, CODEC programming, A CODEC-DSP interface example.

Recent Trends in DSP System Design: An over-view of the application nodes on DSP systems, An over-view of open multimedia applications platform (OMAP), An Introduction to FPGA, Design flow for an FPGA based system design, Cad tools for FPGA based system design, soft core processors, FPGA based DSP system design, New algorithms for Implementation of filters in VLSI, Distributed arithmetic algorithm, Case studies, Comparison of the performances of the systems designed using FPGAs and digital signals processors.

Text Books:

1. Digital Signal Processing – Avtar Singh and S. Srinivasan, Thomson Publications, 2004.
2. Digital Signal Processors, Architecture, Programming and Applications – B. Venkata Ramani and M. Bhaskar, TMH, 2004.

Reference Books:

1. Digital Signal Processing – Jonathan Stein, John Wiley, 2005.
2. DSP Processor Fundamentals, Architectures & Features – Lapsley et al. S. Chand & Co, 2000.

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(13EC704) EMBEDDED SYSTEMS DESIGN

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

UNIT – I

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

UNIT – II

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

UNIT - III

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

UNIT – IV

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

Text Books:

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

Reference Books:

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

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(13EC705) OPERATING SYSTEMS
(Elective-I)

Objectives:

- To understand the services provided by and the design of an operating system.
- To understand the structure and organization of the file system.
- To understand what a process is and how processes are synchronized and scheduled.
- To understand different approaches to memory management.
- Students should be able to use system calls for managing processes, memory and the file system.
- Students should understand the data structures and algorithms used to implement an OS.

UNIT – I:

Operating System Overview: Introduction, Operating Systems functions, Distributed systems, Special purpose systems, Operating systems Structures and System calls, Operating System generation.

Process Management: Process Concepts, Process Scheduling Criteria, algorithms and their evaluation, Inter process communication, Threads, Multi threaded models.

Process Synchronization: Critical section problem, Peterson's Solution, Synchronization Hardware, Semaphores, Classic problems of Synchronization, Monitors, Synchronization examples.

UNIT- II:

Dead Lock: System model, Deadlock Characterization, Deadlock Prevention, Detection and Avoidance, Recovery from deadlock.

Memory Management: Swapping, Contiguous memory allocation, Paging, Structure of the Page Table, Segmentation, Virtual memory, Demand paging, Page – Replacement algorithms, Allocation of frames, Thrashing.

UNIT- III:

Storage System Interfaces: Concept of a File, Access methods, Directory Structure, File System mounting, File sharing and protection, Allocation methods, Free space management.

Overview of Mass storage structures: Disk structure, Disk attachment, Disk scheduling, Swap – space management.

I/O Systems, Hardware, Application I/O interface, Kernel I/O sub systems, Transforming I/O requests Hardware operations, STREAMS, Performance.

UNIT- IV:

Protection: Protection, Goals of Protection, Principles of Protection, Domain of Protection Access Matrix, Implementation of Access Matrix, Access Control, Revocation of Access Rights, Capability – Based Systems, Language – Based Protection.

Security : The Security Problem, Program Threats, System and Network Threats cryptography as a Security Tool, User Authentication, Implementing Security Defenses, Fire walling to Protect Systems and Networks, Computer Security Classifications.

Text Books:

1. Abraham Silberchatz, Peter B. Galvin, Greg Gange, Operating System Concepts, Eighth edition, John Wiley.

Reference Books:

1. Stallings, Operating Systems: Internals and Design Principles,Sixth Edition–2009, Pearson Education.
2. Andrew S Tanenbaum, Modern Operating Systems,Second Edition, PHI.
3. B.L.Stuart, Cengage learning, Principles of Operating Systems, India Edition.
4. A.S.Godbole, Operating Systems, Second Edition, TMH.
5. R.Elmasri, A,G.Carrick and D.Levine, Operating Systems, Mc Graw Hill.
   Sibsankar Haldar, Alex A, Aravind, Operating Systems, Pearson Education India.

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(13EC706) WIRLELESS COMMUNICATIONS AND NETWORKS
(Elective-I)

Objectives: To understand

- Basic wireless communication , wireless networking
- Wireless data services and wireless access protocol
- Mobile Data Networks, Wireless ATM & HIPER LAN

UNIT-I

Multiple Access Techniques for Wireless Communication: Introduction, FDMA, TDMA, Spread Spectrum, Multiple Access, SDMA, Packet radio, Packet radio protocols, CSMA protocols, Reservation protocols.

Introduction to Wireless Networking: Introduction, Difference between wireless and fixed telephone networks, Development of wireless networks, Traffic routing in wireless networks.

UNIT-II

Wireless Data Services: CDPD, ARDIS, RMD, Common channel signaling, ISDN, BISDN and ATM, SS7, SS7 user part, signaling traffic in SS7.

Mobile IP and Wireless Access Protocol: Mobile IP Operation of mobile IP, Co-located address, Registration, Tunneling, WAP Architecture, overview, WML scripts, WAP service, WAP session protocol, wireless transaction, Wireless datagram protocol.

UNIT-III

Wireless LAN Technology: Infrared LANs, Spread spectrum LANs, Narrow bank microwave LANs, IEEE 802 protocol Architecture, IEEE802 architecture and services, 802.11 medium access control, 802.11 physical layer.

Blue Tooth: Overview, Radio specification, Base band specification, Links manager specification, Logical link control and adaptation protocol. Introduction to WLL Technology.

UNIT-IV

Mobile Data Networks: Introduction, Data oriented CDPD Network, GPRS and higher data rates, Short messaging service in GSM, Mobile application protocol.

Wireless ATM & Hiper LAN: Introduction, Wireless ATM, HIPERLAN, Adhoc Networking and WPAN.

Text Books:

1. Wireless Communications, Principles, Practice – Theodore S. Rappaport, PHI, 2nd Ed., 2002.
2. Wireless Communication and Networking – William Stallings, PHI, 2003.

Reference Books:

1. Wireless Digital Communications – Kamilo Feher, PHI, 1999.

2. Principles of Wireless Networks – Kaveh Pah Laven and P. Krishna Murthy, Pearson Education, 2002.

3. Wireless Communications – Andreaws F. Molisch, Wiley India, 2006.

4. Introduction to Wireless and Mobile Systems – Dharma Prakash Agarwal, Qing-An Zeng, Thomson 2nd Edition, 2006.

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

(13EC707) ASIC DESIGN
(Elective-I)

Objectives:

- To prepare the student to be an entry-level industrial standard cell ASIC or FPGA designer.
- To give the student an understanding of issues and tools related to ASIC/FPGA design and implementation, including timing, performance and power optimization, verification and manufacturing test.

UNIT-I

Introduction to ASICS, CMOS LOGIC and ASIC Library Design: Types of ASICs - Design flow - CMOS transistors CMOS Design rules - Combinational Logic Cell – Sequential logic cell - Data path logic cell - Transistors as Resistors - Transistor Parasitic Capacitance- Logical effort –Library cell design - Library architecture .

UNIT-II

Programmable ASICS, Programmable ASIC Logic Cells and Programmable ASIC I/O Cells: Anti fuse - static RAM - EPROM and EEPROM technology - PREP benchmarks - Actel ACT - Xilinx LCA –Altera FLEX - Altera MAX DC & AC inputs and outputs - Clock & Power inputs - Xilinx I/O blocks.

UNIT -III

Programmable ASIC Interconnect, Programmable ASIC Design Software and Low Level Design Entry: Actel ACT -Xilinx LCA - Xilinx EPLD - Altera MAX 5000 and 7000 - Altera MAX 9000 - Altera FLEX –Design systems - Logic Synthesis - Half gate ASIC -Schematic entry - Low level design language - PLA tools -EDIF- CFI design representation.

UNIT-IV

Logic Synthesis, Simulation And Testing: Verilog and logic synthesis -VHDL and logic synthesis - types of simulation -boundary scan test - fault simulation - automatic test pattern generation.

ASIC Construction, Floor Planning, Placement And Routing: System partition - FPGA partitioning - partitioning methods - floor planning - placement - physical design flow –global routing - detailed routing - special routing - circuit extraction - DRC.

Text Books:

1. Smith M.J.S ., "Application Specific Integrated Circuits, Addison -Wesley Longman Inc., 1997.
2. Farzad Nekoogar and Faranak Nekoogar, From ASICs to SOCs: A Practical Approach, Prentice Hall PTR, 2003.
3. Wayne Wolf, FPGA-Based System Design, Prentice Hall PTR, 2004.

Reference Books:

1. Rajsuman R., System-on-a-Chip Design and Test. Santa Clara, CA: Artech House Publishers, 2000.
2. Nekoogar F.. Timing Verification of Application-Specific Integrated Circuits (ASICs). Prentice Hall PTR, 1999

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(13EC708) SPREAD SPECTRUM COMMUNICATIONS
(Elective-I)

Objectives:

Students able to learn direct sequence and frequency hopping methods, synchronization, resistance to jamming to jamming, low probability of detection, spreading codes and their generation, system performance, Rake receivers, Code Division Multiple Access, cellular CDMA applications, wireless LAN applications, as well as commercial and military applications.

UNIT-I

Fundamentals of Spread Spectrum: General concepts, Direct sequence (DS), Pseudo Noise (PN), Frequency Hopping, Time Hopping, Comparison of Modulation methods, Hybrid Spread spectrum systems, Chirp spread spectrum, Baseband modulation techniques.

Analysis of Direct Sequence Spread Spectrum Systems: Properties of PN sequences, Classes of periodic sequences, Properties of m sequences, Partial Co–relation, PN signal from PN sequences, Partial co – relation of PN signals, The PN Signal, De-spreading the PN signal, Interference rejection, Output signal to noise ratio, Antijam characteristics, Interception, Energy bandwidth efficiency.

UNIT-II

Analysis of Avoidance – Type Spread Spectrum Systems: The frequency hopped signal, Interference rejection in a frequency hopping receiver, the time hopped signal.

Generation of Spread Spectrum Signals: Shift register sequence generators, Discrete frequency synthesizers, SAW device PN generators, Charge coupled devices, Digital tapped delay lines.

UNIT-III

Detection of Spread Spectrum Signals - Tracking: Coherent direct sequence receivers, other method of carrier tracking, Delay lock loop analysis, Tau – Dither loop, Coherent carrier tracking, Non coherent frequency hop receiver.

Detection of Spread Spectrum Signals - Acquisition: Acquisition of spread spectrum signals, Acquisition cell by cell searching, Reduction of acquisition time, Acquisition with matched filters, Matched filters for PN sequences, Matched filters for frequency hopped signals, Matched filters with acquisition - aiding waveform.

UNIT-IV

Application of Spread Spectrum to Communications: General capabilities of spread spectrum, Multiple access considerations, Energy and bandwidth efficiency in multiple access, Selective calling and Identification, Antijam considerations, Error correction coding, Intercept consideration (AI), Miscellaneous considerations, Examples of spread spectrum systems.

Code Division Multiple Access Digital Cellular Systems: Introduction, Cellular radio concept, CDMA Digital cellular systems, Specific examples of CDMA digital cellular systems.

Text Books:

1. George. R. Cooper and Clare D. McGillem, “Modren Communications and Spread Spectrum”, McGraw hill Book Company.

2. Roger L. Peterson, Rodger E. Ziemer & David E. Borth, “Introduction to Spread Spectrum Communications”, Prentice Hall 1995.

Reference Books:

1.Dr. Kamilo Feher, “Wireless Digital Communications – Modulation & Spread Spectrum Applications”, PHI, 1999.

2. Upena Dalal, “Wireless Communication”, Oxford Higher Educatiion, 2009.

3. Andrea Goldsmith “Wireles Communications”, Cambridge University Press, 2005.

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(13EC709) NEURAL NETWORKS AND FUZZY LOGIC
(Open Elective)

Objectives:

- To learn the various architectures of building an ANN and its applications
- Advanced methods of representing information in ANN like self organizing networks , associative and competitive learning
- Fundamentals of Fuzzy sets and Fuzzy Relations

UNIT- I

Introduction to neural networks: Introduction, Humans and Computers, Organization of the Brain, Biological Neuron, Biological and Artificial Neuron Models, Hodgkin-Huxley Neuron Model, Integrate-and-Fire Neuron Model, Spiking Neuron Model, Characteristics of ANN, McCulloch-Pitts Model, Historical Developments, Potential Applications of ANN.

Essentials of Artificial Neural Networks: Artificial Neuron Model, Operations of Artificial Neuron, Types of Neuron Activation Function, ANN Architectures, Classification Taxonomy of ANN – Connectivity, Neural Dynamics (Activation and Synaptic), Learning Strategy (Supervised, Unsupervised, Reinforcement), Learning Rules, Types of Application

UNIT-II

Single Layer Feed Forward Neural Networks: Introduction, Perceptron Models: Discrete, Continuous and Multi-Category, Training Algorithms: Discrete and Continuous Perceptron Networks, Perceptron Convergence theorem, Limitations of the Perceptron Model, Applications.

Multilayer Feed forward Neural Networks: Credit Assignment Problem, Generalized Delta Rule, Derivation of Backpropagation (BP) Training, Summary of Backpropagation Algorithm, Kolmogorov Theorem, Learning Difficulties and Improvements.

UNIT-III

Associative Memories: Paradigms of Associative Memory, Pattern Mathematics, Hebbian Learning, General Concepts of Associative Memory (Associative Matrix, Association Rules, Hamming Distance, The Linear Associator, Matrix Memories, Content Addressable Memory), Bidirectional Associative Memory (BAM) Architecture, BAM Training Algorithms: Storage and Recall Algorithm, BAM Energy Function, Proof of BAM Stability Theorem Architecture of Hopfield Network: Discrete and Continuous versions, Storage and Recall Algorithm, Stability Analysis, Capacity of the Hopfield Network Summary and Discussion of Instance/Memory Based Learning Algorithms, Applications.

Classical & Fuzzy Sets: Introduction to classical sets - properties, Operations and relations; Fuzzy sets, Membership, Uncertainty, Operations, properties, fuzzy relations, cardinalities, membership functions.

UNIT-IV

Fuzzy Logic System Components: Fuzzification, Membership value assignment, development of rule base and decision making system, Defuzzification to crisp sets, Defuzzification methods.

Applications: Neural network applications: Process identification, control, fault diagnosis and load forecasting. Fuzzy logic applications: Fuzzy logic control and Fuzzy classification.

Text Books:

1. Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications by Rajasekharan and Rai – PHI Publication.
2. Introduction to Neural Networks using MATLAB - S.N.Sivanandam, S.Sumathi, S.N.Deepa, TMH, 2006.

Reference Books:

1. Neural Networks – James A Freeman and Davis Skapura, Pearson, 2002.
2. Neural Networks – Simon Hakins, Pearson Education
3. Neural Engineering by C.Eliasmith and CH.Anderson, PHI
4. Neural Networks and Fuzzy Logic System by Bart Kosko, PHI Publications.

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(13EC710) SUPERVISORY CONTROL AND DATA ACQUISITION (SCADA)
(Open Elective)

Objective: To enable the students to understand the Elements of SCADA, Realtime systems, Communications in SCADA, Remote Terminal Units and Types of sensors & actuators used for industrial automation.

UNIT-I

Introduction, Definition of SCADA, Applicable Processes, Elements of SCADA system, A Limited Two-way systems, Development from Telemetry, History of **SCADA** : Dependence on Communications and Computers

Real Time Systems: introduction to Real Time, Communications Access and Master-Slave, Determining Scan Interval, Compute, Remote Control-limitation of SCADA: Murphy's Law and Remote Control, Safety Instrumented Systems, Regulatory Requirements,

UNIT-II

Communications: Communication makes SCADA possible, Data is Binary : Analog to Digital Conversion, Long distance communication is serial, Communication system components, Protocols, Modems, Synchronous Vs Asynchronous, Telephone Cable Vs Radio. Radio: Simplex Vs Duplex, Turn-on Time, Frequencies: Availability, Path study and seasonal variations, Solar Variations, Reliability and Maintenance, Satellite communications, Cell phones

UNIT-III

Remote Terminal Units(RTU) : RTU, Communications Interface, Protocol Detailed, Discrete control, Analog control, Pulse control, Serial Control, Monitor Discrete Signals, Monitor Analog signals, Monitor Pulse count signals, Monitor pulse count signals, Monitor Serial signals, Non RTU functions, Master Terminal Units : Communication Interface, Configuring a Picture of Process, Some simple Applications, Data Storage.

UNIT-IV

Sensors, Actuators, and Wiring: A Forgotten cost, Special Considerations, Standardization, Maintenance, Applications: Real time Revisited, Accounting and Grade of Data, Scanning and Communication, Some Automatic Control, Advisory Applications

Text Books:

1. Stuart A. Boyer -Scada: Supervisory Control and Data Acquisition, 3rd edition, ISA-2004
2. Jon Stenerson, Industrial Automation and Process Control, Prentice Hall, 2003.
3. David W. Pessen, Industrial Automation: Circuit Design and Components, Wiley.

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(13EC711) DIGITAL IMAGE PROCESSING
(Open Elective)

Objective: The objectives of this course are for students to learn the fundamental theories and techniques of digital image processing.

UNIT-I

Digital Image Fundamentals: Image Sensing and Acquisition, Image Sampling & quantization, some basic Relationships between pixels. Mathematical tools used in digital image processing – array Vs matrix operations, linear Vs non linear operations, arithmetic operations, set and logical operations, spatial operations, vector and matrix operations, Probabilistic methods.
Image Transforms: 2D-DFT and properties, Walsh Transform, Hadamard Transform, Discrete cosine Transform, Haar-Transform, Slant Transform, KL transform, comparison of different image transforms.

UNIT-II

Image Enhancement in The Spatial Domain: Basic Intensity transformations functions, histogram Processing, fundamentals of Spatial Filtering, Smoothing Spatial filters, Sharpening spatial filters, Combining spatial enhancement methods.
Image Enhancement in Frequency Domain: Basics of filtering in frequency domain, additional characteristics of the frequency domain, correspondence between filtering in the spatial and frequency domains. Image smoothing using frequency domain filters, image sharpening using frequency domain filters – Gaussian High pass filters, Laplacian in the frequency domain, Homomorphic filtering.

UNIT-III

Image Degradation / Restoration: Noise models, Restoration in the presence of Noise only-spatial filtering, - mean, order- statistic and adaptive filters, Estimating the Degradation function, Inverse filtering, Weiner filtering, Constrained Least squares filtering.
Image Segmentation: Point, line and edge Detection, Thresholding, Region based segmentation, the use of motion in segmentation.

UNIT-IV

Image Compression: Need for Image compression, Classification of Redundancy in Images, Image compression models, Classification of image compression schemes, Run length coding, arithmetic coding, Block truncation coding, Dictionary based compression, transform based compression, Image compression standards, Scalar quantization, vector quantization.
Color Image Processing: Color models, pseudo color image processing, color transformations, Smoothing and sharpening, image segmentation based on color.

Text Books:

1. Digital Image Processing-R. C .Gonzalez & R.E. Woods, Addison Wesley/Pearson education, 3rd Edition, 2010.
2. Digital Image processing– S jayaraman, S Esakkirajan, T Veerakumar, Tata McGraw Hill.

Reference Books:

1. Digital Image processing using MATLAB-Rafael C. Gonzalez, Richard E woods and Steven L.Eddins, Tata McGraw Hill, 2010.
2. Fundamentals of Digital Image processing-A .K. Jain, PHI.

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(13EC712) VLSI CIRCUIT DESIGN LAB

Designing and analysis (DC, AC, Transient) of Circuit models through CADENCE or MICROWIND

PART-I

1. Modeling and analysis of PMOS transistor.
2. Modeling and analysis of NMOS transistor.
3. Designing and Extracting, the layout of CMOS inverter.
4. Designing and Extracting, the layout of logic gates.

PART-II

Design and Implementation using HDL program and FPGA

1. Implementations of given Boolean function through HDL language, and verifying the functionality with FPGA.
2. Ripple Carry Adder
3. Carry look ahead
4. 8- bit comparator
5. Flip-Flops
6. Shift Register
7. Barrel shift register
8. ALU

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(13EC713) MICROWAVE ENGINEERING DIGITAL COMMUNICATION LAB

Minimum 6 from each section should be conducted.

PART-I

1. Reflex Klystron Characteristics.
2. Gunn Diode Characteristics.
3. Attenuation Measurement.
4. Directional Coupler Characteristics.
5. VSWR Measurement.
6. Impedance Measurement.
7. Waveguide parameters measurement.
8. Scattering parameters of Directional Coupler.
9. Scattering parameters of Magic Tee.

PART-II

1. Sampling Theorem – verification.
2. Time division multiplexing.
3. Pulse Code Modulation.
4. Delta modulation.
5. Frequency shift keying - Modulation and Demodulation.
6. Phase shift keying - Modulation and Demodulation.
7. Differential phase shift keying - Modulation and Demodulation.
8. QPSK - Modulation and Demodulation.

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(13EC714) DSP AND EMBEDDED PROCESSING LAB

Five experiments should be conducted from each part

PART-I

1. Write a matlab program for low pass and high pass butterworth filter of 6th order, 0.1 Hz 3dB cutoff frequency and sample interval of 50 Hz.
2. Write a matlab program for low pass and high pass chebyshev filter of 8th order, 0.1 Hz 3dB cutoff frequency and sample interval of 50 Hz.
3. Study the architecture of DSP kit TI6713.
4. (a) write a matlab program to evaluate linear convolution of a sequence
   (b) Implement the same and observe the result on DSP kit.
5. (a) write a matlab program to evaluate circular convolution of a sequence
   (b) Implement the same and observe the result on DSP kit.
6. (a) write a matlab program to evaluate PSD of a digital function
   (b) Implement the same and observe the result on DSP kit.

PART-II

1. Write a keil assembly level program to perform addition of two numbers and run it using keil debugger.
2. Write a keil assembly level program to toggle the bits of a port and run it using keil debugger.
3. Study the architecture of 8051 RTOS kit.
   (a)Write a program for toggling the LED's of RTOS 8051 kit.
   (b)Write a program for LCD interfacing and display of data using the RTOS 8051 kit.
4. Study the architecture of PIC development board.
   (a) Write a program to interface seven segment display using PIC board.
   (b) Write a program to dump data over the serial interface of PIC kit.
5. Study the architecture of ARM development board.

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(13EC715) PROJECT WORK – PHASE-I

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

The assignment normally includes:

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

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

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	3	1	0	[3]

(13EC801) SATELLITE COMMUNICATION

Objectives:

This course is to make the students understand the basic concept in the field of satellite communication. This subject gives the students an opportunity to know how to place a satellite in an orbit. The students are taught about the earth and space subsystems. The satellite services like broadcasting are dealt thoroughly. This will help the student to understand and appreciate the subject.

UNIT-I

Introduction: Origin of satellite communications, Historical background, basic concepts of satellite communications, frequency allocations for satellite services, applications, future trends of satellite communications.

Orbital Mechanics and Launchers: Orbital Mechanics look angle determination, orbital perturbations, orbit determination, launches and launch vehicles, orbital effects in communication systems performance.

UNIT-II

Satellite Subsystems: Attitude and orbital control system, Telemetry, Tracking, command and monitoring, power systems, communication subsystems, satellite antenna equipment reliability and space qualification.

Satellite link design: Basic transmission theory, system noise temperature and G/T ratio, design of down links, uplink design, design of satellite links for specified C/N, system design example.

UNIT-III

Multiple Access: Frequency division multiple access (FDMA) Intermodulation, calculation of C/N, Time Division multiple access (TDMA) frame structure, examples. Satellite switched TDMA onboard processing, DAMA, code division multiple access (CDMA), spread spectrum transmission and Reception.

Earth Station Technology: Introduction, transmitters, receivers, Antennas, tracking systems, terrestrial interface, primary power test methods.

UNIT-IV

Low Earth Orbit And Geo-Stationary Satellite Systems: Orbit consideration, coverage and frequency considerations, delay and throughput considerations, system considerations, operational NGSO constellation designs.

Satellite Navigation and the Global Positioning System: Radio and satellite navigation, GPS position location principles, GPS receivers and codes, satellite signal acquisition, GPS navigation message, GPS signal levels, GPS receiver operation, GPS C/A code accuracy, differential GPS.

Text Books:

1. Satellite Communications-Timothi Pratt, Charles Bostian And Jeremy Allnutt, WSE, Wiley Publications, 2nd Edition, 2003.
2. Satellite Communications Engineering-Wilbur L.Prichard, Robert A. Nelson & Henry G.Suyderhoud, 2nd Edition, Pearson Publications, 2003.

Reference Books:

1. Satellite communications: Design principles-M. Richharia, BS publications, 2nd Edition, 2003.
2. Satellite communications-D.C.Agarwal, Khanna publications, 5th Ed.
3. Fundamentals of Satellite communications-K.N.Raja rao, PHI, 2004.
4. Satellite communications-Dennis Roddy, McGraw Hill, 2nd Edition, 1996.

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	3	1	0	[3]

(13EC802) RADAR SYSTEMS

Objectives:

This course helps the Students to gain knowledge on

- Fundamentals of Radar, Different types of Radar and their working
- Radar signal Detection techniques, Radar Navigation Techniques
- MTI And Pulse Doppler Radar

UNIT-I

Basics of Radar: Introduction, Maximum Unambiguous Range, Simple form of Radar Equation, Radar Block Diagram and Operation, Radar Frequencies and Applications, Prediction of Range Performance, Minimum Detectable Signal, Receiver Noise, Modified Radar Range Equation, Illustrative Problems.

Radar Equation: SNR, Envelope Detector, False Alarm Time and Probability, Integration of Radar Pulses, Radar Cross Section of Targets (simple targets - sphere, cone-sphere), Transmitter Power, PRF and Range Ambiguities, System Losses (qualitative treatment), Illustrative Problems.

UNIT -II

CW and Frequency Modulated Radar: Doppler Effect, CW Radar – Block Diagram, Isolation between Transmitter and Receiver, Non-zero IF Receiver, Receiver Bandwidth Requirements, Applications of CW radar, Illustrative Problems.FM-CW Radar, Range and Doppler Measurement, Block Diagram and Characteristics (Approaching/ Receding Targets), FM-CW altimeter, Multiple Frequency CW Radar.

UNIT-III

MTI and Pulse Doppler Radar: Introduction, Principle, MTI Radar with - Power Amplifier Transmitter and Power Oscillator Transmitter, Delay Line Cancellers – Filter Characteristics, Blind Speeds, Double Cancellation, And Staggered PRFs. Range Gated Doppler Filters, MTI Radar Parameters, Limitations to MTI Performance, MTI versus Pulse Doppler radar.

Tracking Radar: Tracking with Radar, Sequential Lobing, Conical Scan, Monopulse Tracking Radar – Amplitude Comparison Monopulse (one- and two- coordinates), Phase Comparison Monopulse, Tracking in Range, Acquisition and Scanning Patterns, Comparison of Trackers.

UNIT-IV

Detection Of Radar Signals In Noise: Introduction, Matched Filter Receiver – Response Characteristics and Derivation, Correlation Function and Cross-correlation Receiver, Efficiency of Non-matched Filters, Matched Filter with Non-white Noise.

Radar Receivers: Noise Figure and Noise Temperature, Displays – types. Duplexers – Branch type and Balanced type, Circulators as Duplexers. Introduction to Phased Array Antennas – Basic Concepts, Radiation Pattern, Beam Steering and Beam Width changes, Series versus Parallel Feeds, Applications, Advantages and Limitations.

Text Books:

1. Introduction to Radar Systems – Merrill I. Skolnik, TMH Special Indian Edition, 2nd Edition, 2007.

Reference Books:

1. Introduction to Radar Systems – Merrill I. Skolnik, 3rd Edition, Tata McGraw-Hill, 2001.
2. Radar Principals, Technology, Applications – Byron Edde, Pearson Education, 2004.
3. Radar Principles – Peebles, Jr., P.Z.Wiley, NweYork, 1998.

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(13EC803) DIGITAL DESIGN THROUGH VERILOG
(Elective-II)

Objectives:

This course helps the students to learn.

- The concepts of modeling a digital system using Hardware Description Language.
- The RTL Progrgramming for both combinational and sequential circuits.
- About PLDs, CPLD, FPGA, and SOGs architectures and working principles .

UNIT-I

Introduction To Verilog: Verilog as HDL, Levels of design description, concurrency, simulation and synthesis, functional verification, system tasks, programming language interface(PLI), module, simulation and synthesis tools, test benches.

Language Constructs And Conventions: Introduction, keywords, identifiers, whitespace characters, comments, numbers, strings, logic values, strengths, data types, scalars and vectors, parameters, memory, operators, system tasks, exercises.

Gate Level Modelling: Introduction, AND gate primitive, module structure, other gate primitives, illustrative examples, tristate gates, array of instances of primitives, additional examples, design of Flip flops with gate primitives, delays, strengths and contention resolution, net types, design of basic circuits, exercises.

UNIT-II

Behavioral Modelling: Introduction, operations and assignments, functional Bifurcation, initial construct, always construct, examples, assignments with delays, wait construct, multiple always blocks, designs at behavioral level, blocking and non-blocking assignments, the case statement, simulation flow, if and if else constructs, assign-De assign construct, repeat construct, FOR loop, the disable construct, While loop, Forever loop, parallel blocks, force-release construct, event.

Modelling at Dataflow Level: Introduction, continuous assignment structures, delays and continuous assignments, assignment to vectors, operators.

Switch Level Modelling: Introduction, basic transistor switches, CMOS switch, Bidirectional gates, time delays with switch primitives, instantiations with strengths and delays, strength contention with trireg nets, exercises.

UNIT-III

System Tasks, Functions and Compiler Directives: Introduction, parameters, path delays, module parameters, system tasks and functions, file –based tasks and Functions, Compiler Directives, Hierarchical Access, General Observations, exercises.

Functions, Tasks, and User-Defined Primitives: Introduction, Function, Tasks, User- Defined Primitives (UDP), FSM Design (Moore and Mealy Machines).

UNIT-IV

Digital Design with SM Charts: State Machine Charts, Derivation of SM Charts, Realization of SM Charts, Implementation of the Dice Game, Alternative realizations for SM Charts using Microprogramming, Linked State Machines.

Designing With Programmable Gate Arrays and Complex Programmable Logic Devices: Xilinx 3000 Series FPGAs, Designing with FPGAs, Using a One-Hot State Assignment, Altera Complex Programmable Logic Devices (CPLDs), Altera FLEX 10K Series CPLDs.

Verilog Models: Static RAM Memory, A simplified 486 Bus Model, Interfacing Memory to a Microprocessor Bus, UART Design, Design of Microcontroller CPU.

Text Books:

1. Design through Verilog HDL – T.R. Padmanabhan and B. Bala Tripura Sundari, WSE, IEEE Press, 2004.
2. A Verilog Primier – J. Bhasker, BSP, 2003.

Reference Books:

1. Fundamentals of Logic Design with Verilog – Stephen. Brown and Zvonko Vranesic, TMH, 2005.
2. Advanced Digital Design with Verilog HDL – Michael D. Ciletti, PHI, 2005.

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(13EC804) MICROELECTROMECHANICAL SYSTEMS (MEMS)
(Elective-II)

Objectives:

- The course present the history, origin, fabrication processes and applications of Micro-Electro Mechanical Systems (MEMS)
- The objective of the course is to familiarize students with the basic Knowledge necessary to understand the concept of Micro-Electro Mechanical Systems (MEMS) implementation.

UNIT- I

Introduction: History of Micro-Electro Mechanical Systems (MEMS), market for MEMS, Introduction and origin of MEMS, driving force for MEMS development, fabrication process, MEMS fabrication technologies: Conventional IC fabrication processes, bulk micro machining, surface micro machining, LIGA process, anodic and fusion bonding, packaging techniques for MEMS.

UNIT-II

MEMS Sensor and Actuators: Sensors, Classification and terminology of sensors, evolution of semiconductor sensors, sensor Characterization basic concept of acoustic, mechanical, magnetic, radiation, thermal sensors and integrated sensors. Actuation in MEMS devices, electrostatic actuation, parallel plate capacitor-cantilever beam based movement, comb-drive structures.

UNIT- III

RF MEMS: Introduction to RF MEMS technologies: Need for RF MEMS components in communications, space and defense applications, Materials and fabrication technologies, Actuation methods in MEMS, Special considerations in RF MEMS design. MEM switch; Cantilever based MEM switch, Membrane based switch design microwave material and mechanical considerations.

UNIT-IV

MEMS Applications: Examples of RF MEMS components and case studies: Micro-switches, Planar, on-chipcomponents, Transmission lines and other components, Micromachined and reconfigurable antennas, Micromachined phase shifters.

NEMS: Introduction to Nanotechnology.

Text Books:

1. N Maluf , “An Introduction to Microelectromechanical Systems Engineering”, 2nd ed., Artech House,2004.
2. M. Madou, “Fundamentals of Micro Fabrication”, 2nd ed., CRC Press, 2002.
3. V.K. Varadan, K.J. Vinoy and K.A. Jose, “RF MEMS and their Applications”, John Wiley, 2002.

Reference Books:

1. J.W. Gardner , V.K. Varadan , O.O. Awadelkarim, “Microsensors, MEMS & SmartDevices”, John Wiley, 2001.
2. H.J. De Los Santos, “Introduction to Microelectromechanical (MEM) Microwave Systems”, Artech house, 1999.

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(13EC805) TELECOMMUNICATION SWITCHINH TECHNIQUES
(Elective-II)

Objectives:

- To know about the basics of telephone system and data
- Exposure to traffic and queuing systems theory
- To learn about the switching networks and control of switching systems.

UNIT-I

Telecommunication Switching Systems: Introduction, Elements of switching systems, switching network configuration, principles of cross bar switching. Electronic space division switching, Time division switching, Combination switching.

UNIT-II

Telephone Networks: Subscriber loop systems, switching hierarchy and routing, transmission plan, numbering plan, charging plans.

Signaling Techniques: In channel signaling, common channel signaling. Network traffic load and parameters, grade of service and blocking probability.

UNIT-III

Data Communication Networks: Introduction, network architecture, layered network architecture, protocols, data communications hardware, data communication circuits. Public switched data networks, connection oriented & connection less service, Circuit Switching, packet switching and virtual circuit switching concepts, OSI reference model, LAN, WAN, MAN & Internet. Repeaters, Bridges, Routers and gate ways.

UNIT-IV

Integrated Services Digital Network (ISDN) : Introduction, motivation, ISDN architecture, ISDN interfaces, functional grouping, reference points, protocol architecture, signaling, numbering, addressing, BISDN.

DSL Technology: ADSL, Cable Modem, Traditional Cable Networks, HFC Networks, Sharing, CM & CMTS and DOCSIS. SONET: Devices, Frame, Frame Transmission, Synchronous Transport Signals, STS I, Virtual Tributaries and Higher rate of service.

Text Books:

1. Tele communication switching system and networks - Thyagarajan Viswanath, PHI, 2000.
2. Advanced electronic communications systems - Wayne Tomasi, PHI, 2004.

Reference Books:

1. Digital telephony - J. Bellamy, John Wiley, 2nd edition, 2001.
2. Data Communications & Networks - Achyut. S.Godbole, TMH, 2004.
3. Principles of Communication Systems – H. Taub & D. Schilling , TMH, 2nd Edition, 2003.
4. Data Communication & Networking - B.A. Forouzan, TMH, 3rd Edition, 2004.
5. Telecommunication switching, Traffic and Networks - J E Flood, Pearson Education, 2002.

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(13EC806) DATA COMMUNICATION
(Elective-II)

Objectives:

The objectives of this course to introduce :

- The evolution of computer networks and the concepts data communication.
- The general principles of network design and compare the different network.
- The digital and analogue representations and channels;
- The mechanism and techniques of encoding.
- The general principles of circuit and packet switching.
- The wireless Local Area Networks.
- In-depth knowledge of data link layer fundamental such as error detection, correction and flow control techniques; multiple access control techniques.

UNIT-I

Introduction To Data Communications And Networking: Standards Organizations for Data Communications, Layered Network Architecture, Open Systems Interconnection, Data Communications Circuits, Serial and parallel Data Transmission, Data communications Circuit Arrangements.

Signals, Noise, Modulation, And Demodulation: Signal Analysis, Electrical Noise and Signal-to-Noise Ratio, Analog Modulation Systems, Information Capacity, Bits, Bit Rate, Baud, and *M*-ary Encoding, Digital Modulation.

Metallic Cable Transmission Media: Metallic Transmission Lines, Transverse Electromagnetic Waves, Characteristics of Electromagnetic Waves, Transmission Line Classifications, Metallic Transmission Line Types, Metallic Transmission Line Equivalent Circuit, Wave Propagation on Metallic Transmission Lines, Metallic Transmission Line Losses.

Optical Fiber Transmission Media: Advantages of Optical Fiber Cables, Disadvantages of Optical Fiber Cables, Electromagnetic spectrum, Optical Fiber Communications System Block Diagram, Optical Fiber construction, The Physics of Light, Velocity of Propagation, Propagation of Light Through an Optical fiber Cable, Optical Fiber Modes and Classifications, Optical Fiber Comparison, Losses in Optical Fiber Cables, Light sources, Light Detectors, Lasers.

UNIT-II

Digital Transmission: Pulse Modulation, Pulse code Modulation, Dynamic Range, Signal Voltage –to-Quantization Noise Voltage Ration, Linear Versus Nonlinear PCM Codes, Companding, PCM Line Speed, Delta Modulation PCM and Differential PCM.

Multiplexing and T Carriers: Time- Division Multiplexing, T1 Digital Carrier System, North American Digital Multiplexing Hierarchy, Digital Line Encoding, T Carrier systems, European Time- Division Multiplexing, Statistical Time – Division Multiplexing, Frame Synchronization, Frequency- Division Multiplexing, Wavelength- Division Multiplexing, Synchronous Optical Network.

Wirless Communications Systems: Electromagnetic Polarization, Rays and Wavefronts, Electromagnetic Radiation, Spherical Wavefront and the Inverse Square Law, wave Attenuation and Absorption, Optical Properties of Radio Waves, Terrestrial Propagation of Electromagnetic Waves, Skip Distance, Free-Space Path Loss, Microwave Communications Systems, Satellite Communications Systems.

UNIT-III

Telephone Instruments and Signals: The Subscriber Loop, Standard Telephone Set, Basic Telephone Call Procedures, Call Progress Tones and Signals, Cordless Telephones, Caller ID, Electronic Telephones, Paging systems.

The Telephone Circuit: The Local Subscriber Loop, Telephone Message- Channel Noise and Noise Weighting, Units of Powers Measurement, Transmission Parameters and Private-Line Circuits, Voice-Frequency Circuit Arrangements, Crosstalk.

Cellular Telephone Systems: Concepts – Frequency reuse- Cell splitting – Network components – Call Processing - First- Generation Analog Cellular Telephone, Personal Communications system, Second-Generation Cellular Telephone Systems, N-AMPS, Digital Cellular Telephone, Global system for Mobile Communications.

UNIT-IV

Data Communications Codes, Error Control, and Data Formats: Data Communications Character Codes, Bar Codes, Error Control, Error Detection, Error Correction, Character Synchronization.

Data Communications Equipment: Digital Service Unit and Channel Service Unit, Voice- Band Data Communication Modems, Bell Systems- Compatible Voice- Band Modems, Voice- Band Modern Block Diagram, Voice- Band Modem Classifications, Asynchronous Voice-Band Modems, Synchronous Voice-Band Modems, Modem Synchronization, ITU-T Voice- Band Modem Specifications, 56K Modems, Modem Control: The AT Command Set, Cable Modems, Probability of Error and Bit Error Rate.

Data –Link Protocols: Data –Link Protocol functions, Character –and Bit- Oriented Protocols, Data Transmission Modes, Asynchronous Data – Link Protocols, Synchronous Data – Link Protocols, Synchronous Data – Link Control, High – Level Data – Link Control.

Text Books:

1. Introduction to Data Communications and Networking, Wayne Tomasi, Pearson Education.
2. Simon Haykin, “Communication Systems”, Wiley-India Edition, 3rd Edition, 2010.
3. Sham Shanmugam, “Digital and Analog Communication Systems”, Wiley-India edition, 2006.

Reference Books:

1. Data Communications and Networking, Behrouz A Forouzan, 4th Edition, TMH.
2. Computer Communications and Networking Technologies, Gallow, 2nd edition, Thomson.
3. Computer Networking and Internet, Fred Halsll, Lingana Gouda Kulkarni, 5th Edition, Pearson Education.

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(13EC807) RFID TECHNOLOGY
(Elective-III)

UNIT-I

Understanding RFID Technology: Introduction, RFID Technology, The Elements of an RFID system, Coupling, Range, and Penetration, RFID Applications, VeriChip and Mark of the Beast.

History of the EPC: Introduction, The Distributed Intelligent Systems Center, Meanwhile, at Procter & Gamble, "Low-Cost" RFID Protocols, "Low-cost" Manufacturing, The Software and the Network, Privacy, Harnessing the Juggernaut, The Six Auto-ID Labs, The Evolution of the Industry, The Creation of EPC global.

UNIT-II

RFID and Global Privacy Policy: Introduction, Definitions of Privacy, Definitions of Personal Information, History of Current Privacy Paradigm, Mapping the RFID Discovery process, Functions and Responsibilities for chips, Readers, and Owners, Privacy as a Fundamental Human Right, Constitutional Rights.

UNIT-III

RFID, Privacy and Regulation: Introduction, Understanding RFID's Privacy Threats. RFID and the United States Regulatory Landscape: Introduction, Current State of RFID Policy, Individuals, Business, Government, Miscellaneous, Integrity and Security of the System, Government Access, Health Impact, Labor Impact

UNIT-IV

Applications: RFID Payments at ExxonMobil, Exxon Mobil Corporation, Transforming the Battlefield with RFID, Logistics and the Military, RFID in the Pharmacy, CVS and Auto-ID, Project Jump Start, RFID in the Store.

Text Books:

1.Simson Garfinkel and Beth Rosenberg, "RFID Applications, Security, and privacy", Pearson Education, 2005.

2. Steven Shepard, "Radio Frequency Identification", First edition, McGraw-Hill Professional, 2004.

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(13EC808) MOBILE AND CELLULAR COMMUNICATION
(Elective-III)

Objective:

The main objective of this course is to learn the fundamental concepts of mobile cellular communications, frequency reuse, call processing; propagation loss; multipath fading and methods of reducing fades; error correction requirements and techniques; modulation methods; FDMA, TDMA, and CDMA techniques; microcell issues; mobile satellite systems.

UNIT-I

Cellular Mobile Radio Systems: Introduction to Cellular Mobile system, performance criteria, uniqueness of mobile radio environment, operation of cellular systems, Hexagonal shaped cells, Analog and Digital Cellular systems.

Elements Of Cellular Radio System Design: General description of the problem, concept of frequency channels, Co-channel Interference Reduction Factor, desired C/I from a normal case in a Omni directional Antenna system, Cell splitting, consideration of the components of cellular system.

UNIT-II

Interference: Introduction to Co-channel interference, real time co-channel interference, Co-channel measurement, design of Antenna system, Antenna parameters and their effects, diversity receiver, non-co-channel interference-different types.

Cell Coverage for Signal and Traffic: Signal reflections in flat and hilly terrain, effect of human made structures, phase difference between direct and reflected paths, constant standard deviation, straight line path loss slope, general formula for mobile propagation over water and flat open area, near and long distance propagation antenna height gain, form of a point to point model.

UNIT-III

Cell Site and Mobile Antennas: Sum and difference patterns and their synthesis, Omni directional antennas, directional antennas for interference reduction, space diversity antennas, umbrella pattern antennas, minimum separation of cell site antennas, high gain antennas.

Frequency Management and Channel Assignment: Numbering and grouping, setup access and paging channels channel assignments to cell sites and mobile units, channel sharing and borrowing, sectorization, overlaid cells, non fixed channel assignment.

UNIT –IV

Handoff: Handoff, dropped calls and cell splitting, types of handoff, handoff invitation, delaying handoff, forced handoff, mobile assigned handoff. Intersystem handoff, cell splitting, micro cells, vehicle locating methods, dropped call rates and their evaluation.

Digital Cellular Networks: GSM architecture, GSM channels, multiplex access scheme, TDMA, CDMA.

Text Books:

1. Mobile cellular telecommunications-W .C. Y. Lee, Tata Mc-Graw Hill, 2nd Edition, 2006.
2. Wireless communications-Theodore. S. Rapport, Pearson Education, 2nd Edn., 2002.

Reference Books:

1. Principles of Mobile communications-Gordon L. Stuber, Springer International 2nd Edition, 2007.
2. Wireless and Mobile Communications-Lee Mc Graw Hills, 3rd Edition, 2006.
3. Wireless communications and Networking-Jon W.Mark and Weihua Zhqung, PHI, 2005.
4. Wireless communication Technology-R.Blake, Thompson Asia Pvt.Ltd., 2004.

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(13EC809) BIOMEDICAL INSTRUMENTATION AND PROCESSING
(Elective-III)

Objectives:

The main objective of this course is to introduce student to basic biomedical engineering technology. As a result student can understand, design and evaluate systems and devices that can measure, test and/or acquire biological information from the human body.

UNIT-I

Components of Medical Instrumentation System, Bio – amplifier, Static and dynamic characteristics of medical instruments, Biosignals and characteristics, Problems encountered with measurements from human beings.Organisation of cell, Derivation of Nernst equation for membrane Resting Potential Generation and Propagation of Action Potential, Conduction through nerve to neuro-muscular junction.

UNIT-II

Bio Electrodes – Biopotential Electrodes-External electrodes, Internal Electrodes, Biochemical Electrodes.Mechanical function, Electrical Conduction system of the heart, Cardiac cycle, Relation between electrical and mechanical activities of the heart.

UNIT-III

Cardiac Instrumentation Blood pressure and Blood flow measurement, Specification of ECG machine, Einthoven triangle, Standard 12-lead configurations, Interpretation of ECG waveform with respect to electro mechanical activity of the heart, Therapeutic equipment, Pacemaker, Defibrillator, Shortwave diathermy, Hemodialysis machine, Neuro-Muscular Instrumentation Specification of EEG and EMG machines, Electrode placement for EEG and EMG recording, Interpretation of EEG and EMG.

UNIT-IV

Respiratory Instrumentation Mechanism of respiration, Spirometry, Pnemuotachograph Ventilators. Patient electrical safety, types of hazards, natural protective mechanism, leakage current, patient isolation, hazards in operation rooms, grounding conditions in hospital environment.

Text Books:

1. Biomedical Instrumentation and Measurements – Leslie Cromwell and F.J. Weibell, E.A. Pfeiffer, PHI, 2nd Ed, 1980.
2. Medical Instrumentation, Application and Design – John G. Webster, John Wiley, 3rd Ed., 1998.

Reference Books:

1. Principles of Applied Biomedical Instrumentation – L.A. Geoddes and L.E. Baker, John Wiley, 1975.
2. Hand-book of Biomedical Instrumentation – R.S. Khandpur, TMH, 2nd Ed., 2003.
3. Biomedical Telemetry – Mackay, Stuart R., John Wiley, 2nd edition, 1968.

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(13EC810) SPEECH SIGNAL PROCESSING
(Elective-III)

Objective:

The objective of the course is to develop an understanding of how speech signals are processed in three general areas: Analysis, Synthesis, and Recognition.

UNIT-I

Production and Classification of Speech Sounds: Anatomy and Physiology of Speech Production, Categorization of Speech Sounds. Acoustics of Speech Production: Physics of Sound, Uniform tube model, A Discrete-Time model based on Tube Concatenation.

Time-Domain Models for Speech Processing: Short-Time energy, average zero crossing rate, Pitch period estimation using autocorrelation.

UNIT-II

Short Time Fourier Transform Analysis and Synthesis: Short Time Analysis, Signal estimation from STFT, Frequency Domain Pitch Estimation, A Correlation based Pitch Estimator, Pitch estimation based on a Comb Filter.

Digital Representations of The Speech Waveform: Instantaneous quantization, Delta Modulation, DPCM.

UNIT-III

Homomorphic Signal Processing: Homomorphic Systems for Convolution, Complex Cepstrum of Speech-like Sequences, Spectral root Homomorphic Filtering, Short-Time Homomorphic Analysis, Short-time Speech Analysis and Analysis/Synthesis Structures.

UNIT-IV

Speech Coding: Linear Prediction, Error minimization, Autocorrelation method, Levinson Recursion, Lattice filter formulation of the inverse filter. Vector Quantization, Distortion Measure, Sub-band coding

Speaker Recognition: Spectral features for Speaker Recognition, Mel- Cepstrum, Speaker Recognition Algorithms, Minimum – distance classifier.

Text Books:

1. Thomas F Quatieri, Discrete-Time Speech Signal Processing Principles and Practice, Pearson Education, 2002.

2. L R Rabiner and R W Schafer, Digital Processing of Speech Signals Pearson Education, 2002.

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(13EC811) COMPREHENSIVE VIVA-VOCE

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

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(13EC812) PROJECT WORK - PHASE-II

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

The assignment normally includes:

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

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