RAJEEV GANDHI MEMORIAL COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

NANDYAL-518501, KURNOOL DIST., A.P., INDIA

DEPARTMENT OF
ELECTRONICS & COMMUNICATION ENGINEERING

(ESTD-1995)

B.Tech SYLLABUS
2015

Applicable for students admitted into B.Tech (Regular) from 2015-16 & B.Tech (Lateral Entry Scheme) from 2016-17
REGULATIONS, Course Structure & Detailed Syllabus

Rajeev Gandhi Memorial College of Engineering and Technology

Autonomous institution

Department of Electronics and Communication Engineering

(Affiliated to J.N.T.U.A, Anantapuramu)

ACADEMIC REGULATIONS, COURSE STRUCTURE AND DETAILED SYLLABI

B.Tech. (Regular) from 2015-16 and B.Tech. (Lateral Entry Scheme) from 2016-17

For pursuing four year Bachelor Degree Program (under graduate) of study in Engineering (B.Tech.), Two year Master (post graduate) Degree of study in Engineering (M.Tech.), Two year Master (post graduate) degree of study in Business Administration (MBA), Three-year Master (post graduate) Degree of study in Computer Applications (MCA) offered by Rajeev Gandhi Memorial College of Engineering and Technology, Nandyal -518501 under Autonomous status and herein referred to as RGMCET (Autonomous):

All the rules specified herein approved by the Academic Council will be in force and applicable to students admitted from the Academic Year 2015-16 onwards. Any reference to "Institute" or "College" in these rules and regulations shall stand for Rajeev Gandhi Memorial College of Engineering and Technology (Autonomous).

All the rules and regulations, specified hereafter shall be read as a whole for the purpose of interpretation. As and when a doubt arises, the interpretation of the Chairman, Academic Council is final. As per the requirements of statutory bodies, the Principal, Rajeev Gandhi Memorial College of Engineering and Technology shall be the Chairman, Academic Council.

The candidate seeking admission into the first year of study of four year B.Tech degree Program should have:

i) Passed either Intermediate Public Examination (IPE) conducted by the Board of Intermediate Education, Andhra Pradesh with Mathematics, Physics and Chemistry as optional subjects (or any equivalent examination certified by Board of Intermediate Examinations) or a Diploma in Engineering in the relevant branch conducted by the Board of Technical Education, Andhra Pradesh (or any equivalent examination certified by State Board of Technical Education) for admission.

ii) Secured a rank in the EAMCET examination conducted by AP State Council for Higher Education (APSCHE) for allotment of a seat by the Convener, EAMCET, for admission.

Admission Procedure:

As per the norms of A.P. State Council of Higher Education (APSCHE), Government of Andhra Pradesh, admissions are made to the first year of Four year B.Tech. Degree program as follows:-

a) As per the norms of Government of Andhra Pradesh, A-Category (based on the rank obtained in EAMCET) seats will be filled by the Convener, EAMCET.

b) As per the norms of Government of Andhra Pradesh, B-Category seats will be filled by the management.

Admission to the Second year of Four year B.Tech. Degree Program in Engineering:

i) Candidates qualified in ECET and admitted by the Convener, ECET, in such cases for admission, when needed permission from the statutory bodies is to be obtained.

ii) 20% of the sanctioned strength in each program of study (of RGMCET) shall be filled by the Convener, ECET as lateral entry.

List of Programs offered

1. B.Tech – Regular (& Lateral Entry)
2. M.Tech – Regular
3. MBA – Regular
4. MCA – Regular

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Academic Regulations for 2015 B. Tech. (Regular)

(Effective for the students admitted into the I year from the Academic Year 2015-2016)

The B.Tech.be conferred by the Jawaharlal Nehru Technological University Anantapur, Anantapuramu students who are admitted to the program and fulfill all the requirements for the award of the Degree as specified below:

1.0 Award of B.Tech. Degree

1.1 The student will be declared eligible for the award of the B. Tech. degree if he fulfils the following academic regulations:

1.2 Pursued a course of study for not less than prescribed course work duration and not more than double the prescribed course work duration.

1.3 Registered for 200 credits and secured a minimum of 194credits with compulsory subjects as listed in Table-1 below.

Table 1: Compulsory Subjects

S.No	SUBJECT PARTICULARS
1	All the first year subjects
2	All practical subjects
3	All Skill Development Courses/ value added courses
4	Mini project
5	Seminar
6	Comprehensive viva - voce
7	Project work
8.	Extra Academic Activities(EAA)

2.0 Forfeit of seat

Students, who fail to fulfill all the academic requirements for the award of the degree within **eight academic years** from the year of their admission, shall forfeit their seat in B.Tech. course.

3.0 Courses of study

The following courses of study are offered at present as specializations for the B.Tech. Course:

1. **Civil Engineering**
2. **Computer Science and Engineering**
3. **Electrical and Electronics Engineering**
4. **Electronics and Communication Engineering**
5. **Information Technology**
6. **Mechanical Engineering**

and any other course as approved by the authorities of the University from time to time.

Table 2: Credits

Subject	Semester			
	Periods/ Week	Credits	Internal Marks	External Marks
Theory	3+1*	03	30	70
Practical/Mini project	03	02	25	50
Drawing	03	03	30	70
Skill Development Courses/Value Added Course	1+2*	01**	100 **(30 IM + 70 EM)**	
EAA (Extra Academic Activities)	02	01	00	00
Seminar		01	50	
Comprehensive Viva-voce		02		50
Project		08	50	100

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*Tutorial

**[Skill Development Courses / value Added Course credits will not be considered for the award of division. However all these courses have to be cleared through internal evaluation by scoring minimum of 40%marks.EAA courses will not have any marks. The credits obtained in Skill development courses and EAA will be taken in to account for the award of degree.]

4.0 Distribution and Weight age of Marks

4.1 The performance of the student in each semester shall be evaluated subject –wise with a maximum of 100 marks for theory and 75 marks for practical subject. In addition, mini-project, comprehensive viva, seminar shall be evaluated for 50 marks each and the project work shall be evaluated for 150 marks.

4.2 For theory subjects the distribution shall be 30 marks for Internal Evaluation (25 marks for internal test and 05 marks for assignments or field work/group task) and 70 marks for the End-Examination.

4.3 During the semester there shall be 2 tests for theory subjects. In each Internal test there shall be one compulsory (short answers) question and 3 descriptive questions are to be answered. The duration of internal test will be for 2hours. First test to be conducted in 3 units and second test to be conducted in the remaining 3 units of each subject. For awarding of 25 Internal marks the performance of the student in two Internal examinations conducted one in the middle of the semester and the other towards the end of the semester giving a weight age of 0.75 for the better score and 0.25 for the other score will be considered. There shall be two assignments in each subject (problem based/ field work/group task) for award of 05 marks so that internal component (marks) will be 30 marks (25 marks for internal test+05 marks for assignments / field work/group task).

Table 3: Units for Internal Tests

Semester	
3 Units	First Internal test
3 Units	Second Internal test

4.4 In the case of Skill Development Courses, two Internal examinations shall be conducted one in the middle of the semester and the other at the end of the semester for 30 marks and the marks scored by the student in these exams with a weight age of 0.75 for better score and 0.25 for the other score will be awarded as Internal marks for 30. For the remaining 70 marks an end examination will be conducted along with other theory examinations. However skill development courses/Value added courses, end examination will be evaluated internally.

4.5 No makeup test for internal examination or assignments/group tasks will be conducted in any subject or practical. The student, who is absent for any test shall be deemed to have scored zero in that test.

4.6 Elective subjects will commence from 3rd year second semester onwards. Out of the electives offered in 3-2 semester, one elective will be MOOC/Elective offered by the department. Any student who is interested can opt for the MOOC (Self Study) / Elective offered by the department and acquires the required credits. Even if the student opts MOOC, he has to write two internal tests besides the end examination conducted by the institute like other subjects. However, he has to obtain the certificate from the organization in which he has registered. Any MOOC selected by the student should be of more than 45 hours duration and also from the reputed organization. Attendance of the student who has opted for MOOC will be taken from the remaining subjects and labs only in that semester while finalizing the attendance for fulfilling the minimum requirements of attendance for promotion to next semester. Attendance will not be recorded for MOOC.

4.7 Gap Year – Concept of student Entrepreneur in Residence shall be introduced and outstanding students who wish to pursue entrepreneurship are allowed to take a break of one year at any time after I/II/III year to pursue entrepreneurship full time. This period may be extended to two years at the most and these two years would not be counted for the time for the maximum time for graduation. An evaluation committee shall be constituted with to evaluate the proposal submitted by the student and committee

shall decide on permitting the student for having the Gap Year. The committee consists of Principal as Chairman and all HODs as members.

4.8 In the electives offered in 4-1 semester, one elective will be open elective offered by the other department (inter - department). Student has to select one subject among the offered list of open elective subjects. Student has to clear the subject as per norms to get the required credits. At least 40students should register for any open elective; otherwise that open elective will not be offered.

4.9 Out of the electives offered in 4-2 semester again one elective will be based on MOOC (Self Study)/Elective offered by the department and the student has to acquire the required credits to clear the subject as specified in 4.9.

4.10 The institute would like to offer Minor as optional feature of the B.Tech program aimed at providing additional learning opportunities for academically motivated and bright students. In order to earn a Minor, a student has to earn a minimum of 20 extra credits. For this in addition to the regular subjects, a student has to pursue Four subjects from 3-1 semester onwards. The Minor is indicated by separate CGPA and is reflected in the degree certificate as for example, B.Tech in ECE with Minor in Artificial Intelligence. Each department shall offer at least one Minor. The student has to select the subjects which are not studied in their regular course and student should have cleared all the subjects up to and including 2-1 semester with above 8.5 CGPA (For SC/ST students CGPA 8.0) without any backlog subjects are eligible for registering Minor. GPA and CGPA of 8.0 has to be maintained in the subsequent semesters without any backlog subjects in order to keep Minor discipline registration active else Minor discipline registration will be cancelled. The breakup of the credits are 4 subjects which carry 16 credits @4 credits for subject and project work carries 4 credits. The evaluation pattern of subjects and project work will be similar to the methods followed in regular course evaluation. Separate course / class work and time table will be arranged for various Minor discipline programmes. Attendance regulations for these Minor discipline programmes will be as per regular courses. Not more than two subjects are allowed for registration in any semester.

4.11 Extra - Academic Activity (EAA)

Each of the following activities carries one credit and every student is required to register for **two** activities during second year of study which is mandatory.

a) ***NSS/NCC***
b) ***Games and Sports***
c) ***Yoga/Meditation***
d) ***Extension Activities***
e) ***Literary/ Cultural Activities***

Any other which may be offered in future

The activities shall be carried out in the allotted hours. The activities will be monitored by the respective faculty in charge, senior faculty member of the department and the HOD. Grades will be awarded on the basis of participation, attendance, performance and behavior. Grades shall be entered in the marks statement as GOOD, SATISFACTORY and UNSATISFACTORY and shall not be counted towards CGPA calculation. If any student gets an Unsatisfactory Grade, he/she has to repeat the activity in the immediate subsequent year.

5.0 Question Paper Pattern

5.1 Each Internal Test question paper shall contain 5 questions, of which the First question is compulsory and three questions are to be answered from the remaining four. Compulsory question carries 10 marks (It contains 5 questions of two marks - no choice in first question). The remaining 3 questions carry 5 marks each. Each question shall have a,b,c.... parts.

5.2 The End Examination question paper will have 7 questions and students have to answer5 questions. However, the first question is compulsory and it consists of 7 short answer questions, each carrying 2

marks. The next 4 questions are to be answered from the remaining 6 questions and each carries 14 marks. Each 14 marks question shall have a, b, c ..parts.

5.3 For practical subjects, there shall be a continuous evaluation during the semester for 25 internal marks and End Examination carries 50 marks. Of the 25 marks for Internal, 20 marks shall be awarded for day-to-day work and 5 marks to be awarded by conducting an internal laboratory test. The End Examination shall be conducted by the teacher concerned and an external Examiner from other institutions.

5.4 For the subject having design and/or drawing, (such as Engineering Graphics, Machine Drawing etc.) and estimation, the distribution shall be 30 marks for Internal evaluation (15marks for day-to-day work and 5 marks for Internal tests and 10 marks for assignments) and 70 marks for End Examination. There shall be two internal tests in a Semester and the better of the two shall be considered for the award of marks for internal tests.

5.5 The Engineering drawing, wherever offered is to be treated as a theory subject. Evaluation method adopted for theory subjects shall be followed here as well.

5.6 There shall be mini-Project, in collaboration with an industry(wherever possible) of their specialization, to be taken up during the vacation(data collection, components etc.) after III year II Semester examination and implementation/simulation shall be carried out in IV year first semester during lab classes. Implementation or fabrication/simulation of mini project will be treated as laboratory. However, the mini project and its report shall be evaluated in IV year I Semester. The mini project shall be submitted in report form and should be presented before the committee, which shall be evaluated for 50 marks. The committee consists of an external Examiner, Head of the Department, the supervisor of mini project and a senior faculty member of the Department. There shall be 25 internal marks for mini project which will be awarded based on the performance and involvement of the student during mini project period.

5.7 There shall be a seminar presentation in IV year II semester. For the seminar, the student shall collect the information on a specialized topic and prepare a technical report, showing his understanding over the topic, and submit to the Department, which shall be evaluated by the Departmental committee consisting of Head of the Department, seminar supervisor and a senior faculty member of the department. The seminar report shall be evaluated for 50 marks. There shall be no external examination for seminar.

5.8 There shall be a comprehensive viva voce examination at the end of IV year II semester for 50 marks which shall be conducted by HOD, senior faculty and external Examiner from other institute.

5.9 The project topic should be approved by Internal Department Committee (IDC). Out of total 150 marks for the project work, 50 marks shall be for Internal Evaluation and 100 marks for the End Semester Examination. The evaluation of project work shall be conducted at the end of the IV year II semester. The project viva voce examination will be conducted by the committee consisting of an external Examiner from other institute, Head of the Department and the supervisor of the project. The Internal evaluation for 50 marks shall be on the basis of two seminars given by each student on the topic of the project. The Internal evaluation of the project work for 50 marks shall be conducted by the committee consisting of head of the Department or his nominee, senior faculty member and the supervisor of project.

5.10 For all practical /mini project/main project/comprehensive viva-voce etc the HOD of the concerned dept shall submit a panel of 4 external examiners from different institutes and one will be selected by the Chief Superintendent of the Examination for conducting of end examination.

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Table4: Distribution of weight ages for examination and evaluation

Sl. No.	Nature of subject	Marks	Type of examination and mode of assessment		Scheme of Examination
1	Theory	70	End Examination Double Evaluation (Internal + External evaluation)		End Examination in theory subjects will be for 70 marks.
		30	25	Internal Examinations (Internal evaluation)	These 25 marks are awarded to the students based on the performance in two (semester) Internal examinations with a weight age of 0.75 for better score and 0.25 for the other score.
			05	Assignments/Field work/group task (Internal evaluation)	Average of two assignments/Field work/group task in a semester each evaluated for 05 marks.
2	Practical	50	End lab examination (External evaluation)		This End Examination in practical subjects will be for a maximum of 50 marks.
		25	20	Internal evaluation	Day-to-day performance in lab experiments and record
			05	Internal evaluation	Internal lab examination at the end of year/semester
3	Mini Project	50	End Examination (External evaluation)		This End Examination in miniproject will be for a maximum of 50 marks.
		25	Internal evaluation		Day-to-day performance in executing mini project.
4	Seminar	50	Internal evaluation		Based on the performance in two seminars during semester
5	Comprehensive Viva	50	External evaluation		This end viva voce examinations in all the subjects for 50 marks
6	Project work	100	External evaluation		This end viva voce in project work for 100 marks
		50	Internal evaluation		These 50 marks will be based on the performance of the student in the project reviews apart from attendance and regularity
7	Skill Development Courses/ Value Added Course/ Mock interviews and Group Discussion	30	Internal evaluation		These 30 marks are awarded to the students based on the performance of two Internal examinations with a weight age of 0.75 for better score and 0.25 for the other score.
		70	Internal Evaluation		Based on the performance in the end examination.
8	EAA	00	Internal evaluation		Based on performance and committee report.

6.0 Attendance Requirements:

6.1 The student shall be eligible to appear for End examinations of the semester if he acquires a minimum of 75% of attendance in aggregate of all the subjects of that semester.

6.2 Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in a semester may be granted by the College Academic Committee.

6.3 The student will not be promoted to the next semester unless he satisfies the attendance requirement of the present semester. They may seek re-admission for that semester when offered next.

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

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

6.6 The stipulated fee shall be payable towards condonation of shortage of attendance.

6.7 The attendance in each subject will be recorded in the Marks memo.

7.0 Minimum Academic Requirements:

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

7.1 The student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory or practical or design or drawing subject or Skill Development Coursesor project if he secures not less than 35% of marks in the End Examination and he has to score minimum of 40% marks from Internal and external exam marks put together to clear the subject.

7.2 The student shall be promoted from II to III year only if he fulfils the academic requirement of securing a minimum of 51credits out of 102credits from all the exams conducted up to and including II year II semester regular examinations irrespective of whether the candidate takes the examination or not.

7.3 The student shall be promoted from third year to fourth year only if he fulfils the academic requirements of securing minimum of 76 credits out of 152credits from all the exams conducted up to and including III year II semester regular examinations ,whether the candidate takes the examinations or not.

Table 5: Promotion rules

Promotion from	Total credits to register	Minimum credits to obtain for promotion
II yr to III yr	102	51
III yr to IV yr	152	76

7.4 The student shall register and put up minimum attendance in all 200 credits and earn a minimum of 194credits.Marks obtained in the best186credits(excluding the credits obtained in Skill Development Courses/VAC/Mock interviews and GD and EAA) shall be considered for the calculation of percentage of marks.

7.5 Students who fail to earn 194 credits as indicated in the course structure including compulsory subjects as indicated in Table-1 within eight academic years from the year of their admission shall forfeit their seat in B.Tech. course and their admission shall stand cancelled.

8.0 Course pattern:

8.1 The entire course of study is of four academic years. Each academic year consists of two semesters

8.2 The student is eligible to appear for the End Examination in a subject, but absent at it or has failed in the End Examination may appear for that subject at the supplementary examination.

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Table: 6: Course pattern

Year	Semester	No. of Subjects		No. ofSkill Development Courses	Number of Labs		Total credits	
First year	First	CE/ME/ CSE	ECE/ EEE/ IT	00	CE/ ME/ CSE	ECE/ EEE/ IT	6X3=18 4X2=08	26
		06 {ENG-I, M-I, EP, MEC,CP, CORE-1}	06 {ENG-I M-I, ED, CP, EP, CORE-I}		EC lab, CP lab, EWS, ELCS	EP Lab, CP lab, ITWS, Core1 lab		
	Second	06 { Eng-II M-II, SSP/MP, DS,ED, CORE-II}	06 { Eng-II M-II, SSP, MEC,DS, CORE-II}	00	EP lab, DS Lab, ITWS Core-II lab	EC lab, DS lab, EWS, Core-II Lab	6X3=18 4X2=08	26
Second year	First	06		01	Subjects SDC/VAC Labs		6X3=18 1X1=01 3x2=06	25
	Second	06		01	Subjects SDC/VAC Labs		6X3=18 1X1=01 3X2=06	25
Third year	First	06		01	Subjects SDC/VAC Labs		6X3=18 1X1=01 3X2=06	25
	Second	04+01 Elective 01-MOOC/Elective		01	Subjects Elective MOOC/Elective SDC/VAC Labs		4X3=12 1X3=03 1X3=03 1X1=01 3x2=06	25
Fourth year	First	05+Open Elective		01	Subjects Open Elective Mock Interviews and GD Labs Mini project		5X3=15 1X3=03 1X1=01 2X2=03 1X2=03	25
	Second	01+Elective+ MOOC/Elective		01	Subjects Elective MOOC/Elective SDC/VAC Seminar Comprehensive Viva Project Viva EAA		1X3=03 1X3=03 1X3=03 1X1=01 1X1=01 1X2=02 1X8=08 2X1=02	23
							Grand total	**200**

9.0 Transitory Regulations:

Candidates who have been detained for want of attendance or not fulfilled academic requirements or who have failed after having undergone this course in earlier regulations or have discontinued and wish to continue the course are eligible for admission into the unfinished semester from the date of commencement of class work with the same or equivalent subjects as and when subjects are offered subject to section 2.0 and they continue to be in the academic regulations in which they were readmitted.

10.0 With-holding of results:

If the candidate has any dues not paid to the Institute or if any case of indiscipline of malpractice is pending against him, the result of the candidate shall be withheld and he will not be allowed/promoted into the next higher semester. The issue of degree is liable to be withheld in such cases.

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11.0 Award of Class:

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

Table 7: Award of Division

Class Awarded	% of marks to be secured	Division/ Class	CGPA	From the aggregate marks secured for the best 186 Credits (excluding Skill Development Courses, EAA)
First Class with Distinction	70% and above	First class With Distinction	≥ 7.5	
First Class	Below 70% but not less than 60%	First Class	6.5 and < 7.5	
Second Class	Below 60% but not less than 50%	Second Class	≥ 5.5 and < 6.5	
Pass Class	Below 50% but not less than 40%	Pass	≥ 4 and < 5.5	

(The marks in internal evaluation and End Examination shall be shown separately in the marks memorandum)

12.0 **Grading:**

After each subject is evaluated for 100 marks, the marks obtained in each subject will be converted to a corresponding letter grade as given below, depending on the range in which the marks obtained by the student falls.

Table 8: Conversion into Grades and Grade points assigned

Range in which the % of marks in the subject fall	Grade	Grade point Assigned	Performance
90 to 100	O	10	Outstanding
80 to 89.9	A^+	09	Excellent
70 to 79.9	A	08	Very Good
60 to 69.9	B^+	07	Good
50 to 59.9	B	06	Above Average
45 to 49.9	C	05	Average
40 to 44.9	P	04	Pass
<40	F	00	Fail
Ab	AB	00	Fail

12.1 Requirement for clearing any subject: The students have to obtain a minimum of 35% in End Examination and they have to score minimum of 40% marks from Internal and external exam marks put together to clear the subject. Otherwise they will be awarded fail grade.

12.2 F is considered as a fail grade indicating that the student has to reappear for the end supplementary examination in that subject and obtain a non fail grade for clearing that subject.

12.3 In case of skill development/ value added course / soft skill subjects, as there is no end exam, all 100 marks are for internal assessment only. Student has to score 40% in these courses to complete the subject which will be evaluated internally. Marks obtained in these courses shall not be considered for award of Division.

12.4 To become eligible for the award of degree the student must obtain a minimum CGPA of 4.0

13.0 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. The student is not permitted to improve his performance in any subject in which he has obtained pass grade.

14.0 Grade Point Average (GPA) and Cumulative Grade Point Average(CGPA)

The Grade Point Average (GPA) for each semester and Cumulative Grade Point Average (CGPA) up to any semester is calculated as follows:

i) Semester Grade Point Average will be computed as follows:

$$GPA = \frac{\sum_1^n C_j \times GP_j}{\sum_1^n C_j}$$

Where, n is the number of subjects in that semester. C_j is Credits for the subjects. GP_j is the grade point obtained for the subject and the summation is over all the subjects in that semester.

ii) A Cumulative Grade Point Average (CGPA) will be computed for every student at the end of each semester. The CGPA would give the cumulative performance of the student from the first semester up to the end of the semester to which it refers to and is calculated as follows:

$$CGPA = \frac{\sum_1^m GPA_j \times TC_j}{\sum_1^m TC_j}$$

Where 'm' is the number of semester under consideration. TC_j the total number of credits for a j^{th} semester and GPA_j is the Grade Point Average of the j^{th} semester. Both GPA and CGPA will be rounded off to the second digit after decimal and recorded as such.

While computing the GPA / CGPA, the subjects in which the student is awarded zero grade points will also be included.

15.0 Grade Sheet:

A grade sheet (Memorandum) will be issued to each student indicating his performance in all subjects of that semester in the form of grades and also indicating the GPA and CGPA.

16.0 Transcripts:

After successful completion of prerequisite credits for the award of degree, a Transcript containing performance of all academic years will be issued as a final record. Duplicate transcripts will also be issued if required after the payment of requisite fee and also as per norms in vogue.

17.0 Rules of Discipline:

17.1 Any attempt by any student to influence the teachers, Examiners, faculty and staff of Examination section for undue favours in the exams, and bribing them either for marks or attendance will be treated as malpractice cases and the student can be debarred from the college.

17.2 When the student absents himself, he is treated as to have appeared and obtained zero marks in that subject(s) and grading is done accordingly.

17.3 When the performance of the student in any subject(s) is cancelled as a punishment for indiscipline, he is awarded zero marks in that subject(s).

17.4 When the student's answer book is confiscated for any kind of attempted or suspected malpractice, the decision of the Chief Superintendent is final.

18.0 Minimum Instruction Days:

The minimum instruction days for each semester shall be 95 clear instruction days excluding the days allotted for tests/examinations and preparation holidays declared if any.

19.0 Amendment of Regulations:

The college may, from time to time, revise, amend or change the regulations, scheme of examinations and syllabi. However the academic regulations of any student will be same throughout the course of study in which the student has been admitted. However students will continue to be in the academic regulations in which they were readmitted.

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20.0 Transfers

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

21.0 General:

21.1 The Academic Regulations should be read as a whole for the purpose of any interpretation.

21.2 In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Academic Council is final.

21.3 The Institute may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the Institute.

21.4 Where the words “he”, “him”, “his”, occur in the regulations, they include “she”, “her”, “hers”.

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Academic Regulations for B. Tech. (Lateral Entry Scheme)

(Effective for the students getting admitted into II year from the Academic Year 2016-2017 onwards)

1.0 The Students have to acquire a minimum of 142credits out of 148from II to IV year of B.Tech. Program (Regular) for the award of the degree.

2.0 Students, who fail to fulfil the requirement for the award of the degree in 6 consecutive academic years from the year of admission, shall forfeit their seat.

3.0 The same attendance regulations are to be adopted as that of B. Tech. (Regular).

4.0 **Promotion Rule:**
The student shall be promoted from third year to fourth year only if he fulfils the academic requirements of securing minimum of 50 credits out of 100 credits from all the exams conducted up to and including III year II semester regular examinations, whether the candidate takes the examinations or not.

5.0 **Award of Class:**
After the student has satisfied the requirements prescribed for the completion of the program and is eligible for the award of B. Tech. Degree he shall be placed in one of the following four classes: The marks obtained in the best 134 credits will be considered for the calculation of percentage and award of class.

Table 1: Award of Division

Class Awarded	**% of marks to be secured**	Division/ Class	CGPA	From the aggregate marks secured for best 134 Credits (i.e. II year to IV year) excluding Skill Development Courses
First Class with Distinction	70% and above	First class With Distinction	≥ 7.5	
First Class	Below 70% but not less than 60%	First Class	$6.5 and < 7.5$	
Second Class	Below 60% but not less than 50%	Second Class	≥ 5.5 and < 6.5	
Pass Class	Below 50% but not less than 40%	Pass	≥ 4 and < 5.5	

(The marks in Internal evaluation and End Examination shall be shown separately in the marks memorandum)

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

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I B.TECH, I-SEMESTER COURSE STRUCTURE

Subject Code	Name of the Subject	Hours/Week			Credits	Marks		
		Theory	Tutorial	Lab		Internal	External	Total
THEORY								
A0001151	Professional English - I	3	1	-	3	30	70	100
A0004151	Mathematics - I	3	1	-	3	30	70	100
A0301152	Engineering Drawing	3	3	-	3	30	70	100
A0501151	C Programming	3	1	-	3	30	70	100
A0002151	Engineering Physics	3	1	-	3	30	70	100
A0242151	Network analysis	3	1	-	3	30	70	100
PRACTICALS								
A0093152	Engineering Physics Lab	-	-	3	2	25	50	75
A0591151	C Programming Lab	-	-	3	2	25	50	75
A0274151	Network Analysis Lab	-	-	3	2	25	50	75
A1291152	IT Workshop	-	-	3	2	25	50	75
Contact Periods / Week		**18**	**8**	**12**	**26**	**280**	**620**	**900**

I B.TECH, II-SEMESTER COURSE STRUCTURE

Subject Code	Name of the Subject	Hours/Week			Credits	Marks		
		Theory	Tutorial	Lab		Internal	External	Total
THEORY								
A0005152	Professional English – II	3	1	-	3	30	70	100
A0006152	Mathematics - II	3	1	-	3	30	70	100
A0008152	Solid State Physics	3	1	-	3	30	70	100
A0502152	Data Structures through C	3	1	-	3	30	70	100
A0407152	Electronic Devices and Circuits	3	1	-	3	30	70	100
A0003151	Modern Engineering Chemistry	3	1	-	3	30	70	100
PRACTICALS								
A0091151	Engineering Chemistry Lab	-	-	3	2	25	50	75
A0592152	Data Structures through C Lab	-	-	3	2	25	50	75
A0494152	Electronic Devices and Circuits Lab	-	-	3	2	25	50	75
A0391151	Engineering Work Shop	-	-	3	2	25	50	75
Contact Periods / Week		**18**	**6**	**12**	**26**	**280**	**620**	**900**

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II B.TECH, I-SEMESTER COURSE STRUCTURE

Subject Code	Name of the Subject	Hours/Week			Credits	Marks		
		Theory	Tutorial	Lab		Internal	External	Total
THEORY								
A0020153	Special Functions and Complex Variables	3	1	-	3	30	70	100
A0404154	Switching Theory & Logic Design	3	1	-	3	30	70	100
A0014157	Managerial Economics and Financial Analysis	3	1	-	3	30	70	100
A0408153	Electronic Circuit Analysis	3	1	-	3	30	70	100
A0409153	Signals and Systems	3	1	-	3	30	70	100
A0243153	Electrical Technology	3	1	-	3	30	70	100
SKILL DEVELOPMENT COURSE								
A0010153	Aptitude Arithmetic Reasoning and Comprehension	1	2	-	1	30	70	100
PRACTICALS								
A0495153	Signals & Systems Simulation Lab	-	-	3	2	25	50	75
A0289153	Electrical Technology Lab	-	-	3	2	25	50	75
A0496153	Electronic Circuit Analysis Lab	-	-	3	2	25	50	75
Contact Periods / Week		**19**	**8**	**9**	**25**	**285**	**640**	**925**

II B.TECH, II-SEMESTER COURSE STRUCTURE

Subject Code	Name of the Subject	Hours/Week			Credits	Marks		
		Theory	Tutorial	Lab		Internal	External	Total
THEORY								
A0009153	Environmental Science	3	1	-	3	30	70	100
A0410154	Pulse and Digital Circuits	3	1	-	3	30	70	100
A0411154	Electromagnetic Field and Transmission Lines	3	1	-	3	30	70	100
A0412154	Random variables and Random Processes	3	1	-	3	30	70	100
A0503158	Object Oriented Programming through JAVA	3	1	-	3	30	70	100
A0413154	Analog Communications	3	1	-	3	30	70	100
SKILL DEVELOPMENT COURSE								
A0011154	Corporate Management Skills	1	2	-	1	30	70	100
PRACTICALS								
A0593154	Object Oriented Programming through JAVA Lab	-	-	3	2	25	50	75
A0092151	English Language Communication Skills Lab	-	-	3	2	25	50	75
A0497154	Analog Communications Lab	-	-	3	2	25	50	75
Contact Periods / Week		**19**	**8**	**9**	**25**	**285**	**640**	**925**

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III B.TECH, I-SEMESTER COURSE STRUCTURE

Subject Code	Name of the Subject	Hours/Week			Credits	Marks		
		Theory	Tutorial	Lab		Internal	External	Total
THEORY								
A0414155	Digital Communications	3	1	-	3	30	70	100
A0019156	Industrial Management	3	1	-	3	30	70	100
A0415155	Antenna and Wave Propagation	3	1	-	3	30	70	100
A0416155	Analog IC Applications	3	1	-	3	30	70	100
A0417155	Digital IC Applications through VHDL	3	1	-	3	30	70	100
A0209154	Control Systems	3	1	-	3	30	70	100
SKILL DEVELOPMENT COURSE								
A0418155	Embedded 'C' & Verilog	1	2	-	1	30	70	100
PRACTICALS								
A0498155	Digital Communications Lab	-	-	3	2	25	50	75
A0499155	Digital IC Applications Using VHDL & Verilog Lab	-	-	3	2	25	50	75
A0481155	Analog IC Applications Lab	-	-	3	2	25	50	75
Contact Periods / Week		**19**	**8**	**9**	**25**	**285**	**640**	**925**

III B.TECH, II-SEMESTER COURSE STRUCTURE

Subject Code	Name of the Subject	Hours/Week			Credits	Marks		
		Theory	Tutorial	Lab		Internal	External	Total
THEORY								
A0406157	Digital Signal Processing	3	1	-	3	30	70	100
A0213155	Microprocessors & Microcontrollers	3	1	-	3	30	70	100
A0419156	Microwave Engineering	3	1	-	3	30	70	100
A0420156	Electronic Measurement & Instrumentation	3	1	-	3	30	70	100
	Elective-I	3	1	-	3	30	70	100
	Elective-II /MOOC	3	1	-	3	30	70	100
SKILL DEVELOPMENT COURSE								
A0013156	Professional Ethics and soft skills	1	2	-	1	30	70	100
PRACTICALS								
A0299156	Microprocessors & Microcontrollers Lab	-	-	3	2	25	50	75
A0482156	Electronic Circuit Design and Troubleshooting Lab	-	-	3	2	25	50	75
A0483156	Sensors and Transducers Lab	-	-	3	2	25	50	75
Contact Periods / Week		**19**	**8**	**9**	**25**	**285**	**640**	**925**

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IV B.TECH, I-SEMESTER COURSE STRUCTURE

Subject Code	Name of the Subject	Hours/Week			Credits	Marks		
		Theory	Tutorial	Lab		Internal	External	Total
THEORY								
A0424157	Optical Communications	3	1	-	3	30	70	100
A0425157	Cellular and Mobile Communications	3	1	-	3	30	70	100
A0426157	VLSI Design	3	1	-	3	30	70	100
A0427157	Digital Image Processing	3	1	-	3	30	70	100
	Elective-III	3	1	-	3	30	70	100
	Elective-IV	3	1	-	3	30	70	100
SKILL DEVELOPMENT COURSE								
A0433157	Group Discussion and Mock Interviews	1	2	-	1	30	70	100
PRACTICALS								
A0484157	Microwave and Optical Communications Lab	-	-	3	2	25	50	75
A0485157	DSP & Image Processing Lab	-	-	3	2	25	50	75
A0486157	Mini Project	-	-	3	2	25	50	75
Contact Periods / Week		**19**	**8**	**9**	**25**	**285**	**640**	**925**

IV B.TECH, II-SEMESTER COURSE STRUCTURE

Subject Code	Name of the Subject	Hours/Week			Credits	Marks		
		Theory	Tutorial	Lab		Internal	External	Total
THEORY								
A0434158	Radar Systems	3	1	-	3	30	70	100
	Elective-V	3	1	-	3	30	70	100
	Elective-VI/MOOC	3	1	-	3	30	70	100
SKILL DEVELOPMENT COURSE								
A0441158	Microwind and Lab View	1	2	-	1	30	70	100
A0487158	Seminar	-	-	-	1	50	-	50
A0488158	Comprehensive Viva	-	-	-	2	-	50	50
A0489158	Project	-	-	-	8	50	100	150
	Extra - Academic Activity (EAA)	-	-	-	2	-	-	-
Contact Periods / Week		**10**	**5**	**-**	**23**	**220**	**430**	**650**

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ELECTIVES

Subject Code	ELECTIVES
III B.TECH, II-SEMESTER	
ELECTIVE - I	
A0506156	Computer Architecture
A0507156	Fundamentals of Operating Systems
A0508156	Web Technologies
A0015153	Mathematical Methods
ELECTIVE - II/MOOC	
A0421156	Embedded system Concepts
A0422156	FPGA Architecture & Applications.
A0423156	Real Time Operating Systems
IV B.TECH, I-SEMESTER	
ELECTIVE-III / OPEN ELECTIVES	
A0428157	Satellite Communications
A0429157	Digital TV Technology
A0430157	Spread Spectrum Communications
ELECTIVE - IV	
A0509157	Computer Networks
A0431157	DSP Processors Architectures and Applications
A0432157	Radio Frequency Identification
IV B.TECH, II-SEMESTER	
ELECTIVE - V	
A0435158	Biomedical Instrumentation
A0436158	Advanced Digital Signal Processing
A0437158	Wireless Communications and Networks
ELECTIVE-VI/MOOC	
A0438158	Network security and cryptography
A0439158	Virtual Instrumentation
A0440158	Low Power VLSI Design

COURSES OFFERED TO OTHER DEPARTMENTS (OPEN ELECTIVES)

A0426157	VLSI Design
A0213155	Microprocessors and Microcontrollers
A0413154	Analog communications
A0411154	Electromagnetic Field and Transmission Lines
A0425157	Cellular & Mobile Communications
A0414155	Digital Communications
A0427157	Digital Image Processing
A0421156	Embedded systems Concepts

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MINOR ACADEMIC CURRICULUM 2015-16

CIVIL ENGINEERING

Subject Code	Course Title	Credits	Internal	External	Total Marks
A0149153	Strength of Materials-I	3	30	70	100
A0114155	Water Resources Engineering-I	3	30	70	100
A0110154	Concrete Technology	3	30	70	100
A0112155	Transportation Engineering-I	3	30	70	100
A0171158	Minor Project	6			

ELECTRICAL & ELECTRONICS ENGINEERING

POWER ENGINEERING

Subject Code	Course Title	Credits	Internal	External	Total Marks
A0242152	Principles of Electrical Engineering	3	30	70	100
A0208154	Generation & Distribution of Electrical Power	3	30	70	100
A0212155	Transmission of Electrical Power	3	30	70	100
A0239158	Electrical Distribution Systems	3	30	70	100
A0271158	Minor Project	6			

ELECTRICAL MACHINES

Subject Code	Course Title	Credits	Internal	External	Total Marks
A0205153	Circuit Theory	3	30	70	100
A0206153	Electrical Machines-I	3	30	70	100
A0207154	Electrical Machines-II	3	30	70	100
A0210155	Electrical Machines-III	3	30	70	100
A0272158	Minor Project	6			

POWER ELECTRONICS

Subject Code	Course Title	Credits	Internal	External	Total Marks
A0242152	Principles of Electrical Engineering	3	30	70	100
A0211155	Power Electronics-I	3	30	70	100
A0214156	Power Electronics-II	3	30	70	100
A0226157	Power Semiconductor Drives	3	30	70	100
A0273158	Minor Project	6			

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MECHANICAL ENGINEERING

THERMAL ENGINEERING

Subject Code	Course Title	Credits	Internal	External	Total Marks
A0306153	Thermodynamics	3	30	70	100
A0309154	Internal Combustion Engines	3	30	70	100
A0313155	Thermal Engineering	3	30	70	100
A0318156	Heat Transfer	3	30	70	100
A0372158	Minor Project	6			

MECHANICAL DESIGN

Subject Code	Course Title	Credits	Internal	External	Total Marks
A0302151	Engineering Mechanics-I	3	30	70	100
A0305153	Material Science & Metallurgy	3	30	70	100
A0312155	Design of Machine Elements-I	3	30	70	100
A0325157	CAD/CAM	3	30	70	100
A0373158	Minor Project	6			

PRODUCTION ENGINEERING

Subject Code	Course Title	Credits	Internal	External	Total Marks
A0311154	Manufacturing Technology	3	30	70	100
A0316155	Machine Tools	3	30	70	100
A0319156	Engineering Metrology	3	30	70	100
A0341158	Modern Manufacturing Methods	3	30	70	100
A0374158	Mini Project	6			

ELECTRONICS & COMMUNICATION ENGINEERING

SIGNAL PROCESSING

Subject Code	Course Title	Credits	Internal	External	Total Marks
A0409153	Signals and Systems	3	30	70	100
A0406157	Digital Signal Processing	3	30	70	100
A0427157	Digital Image Processing	3	30	70	100
A0431157	DSP Architecture and Applications	3	30	70	100
A0471158	Minor Project	6			

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EMBEDDED SYSTEMS

Subject Code	Course Title	Credits	Internal	External	Total Marks
A0213155	Microprocessors and Microcontrollers	3	30	70	100
A0426157	VLSI Design	3	30	70	100
A0421156	Embedded System Concepts	3	30	70	100
A0418155	Embedded 'C' & Verilog	3	30	70	100
A0473158	Minor Project	6			

COMPUTER SCIENCE & ENGINEERING

COMPUTER SCIENCE

Subject Code	Course Title	Credits	Internal	External	Total Marks
A0518154	Design and Analysis of Algorithms	3	30	70	100
A0519154	Operating Systems	3	30	70	100
A0514153	Database Management Systems	3	30	70	100
A0509157	Computer Networks	3	30	70	100
A0574158	Minor Project	6			

WEB PROGRAMMING

Subject Code	Course Title	Credits	Internal	External	Total Marks
A0516154	Core Java Programming	3	30	70	100
A0508156	Web Technologies	3	30	70	100
A0510155	C# & .NET Frame Work	3	30	70	100
A0540157	PHP Programming	3	30	70	100
A0575158	Minor Project	6			

INFORMATION TECHNOLOGY

DATABASE TECHNICS

Subject Code	Course Title	Credits	Internal	External	Total Marks
A1202153	Foundations of Software Engineering	3	30	70	100
A1207154	Relational Database Design and Development	3	30	70	100
A1213155	Database Management Concepts	3	30	70	100
A1217156	Software Testing Methodologies and Tools	3	30	70	100
A1271158	Minor Project	6			

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WEB TECHNOLOGY CONCEPTS

Subject Code	Course Title	Credits	Internal	External	Total Marks
A1203153	Fundamentals of Object-Oriented Design	3	30	70	100
A1209154	Java Programming	3	30	70	100
A1212155	Web Application Through JAVA & Python	3	30	70	100
A1216156	Basics Of Scripting Languages	3	30	70	100
A1272158	Minor Project	6			

MASTER OF BUSINESS ADMINISTRATION

MARKETING MANAGEMENT

Subject Code	Course Title	Credits	Internal	External	Total Marks
E0011152	Marketing Management	3	30	70	100
E0021153	Product & Brand Management	3	30	70	100
E0033153	Advertising Management	3	30	70	100
E0014152	Business Research Methods	3	30	70	100
E0047254	Minor Project	6			

HUMAN RESOURCE MANAGEMENT

Subject Code	Course Title	Credits	Internal	External	Total Marks
E0009152	Human Resource Management	3	30	70	100
E0028153	Performance Management	3	30	70	100
E0039154	Organization Development	3	30	70	100
E0014152	Business Research Methods	3	30	70	100
E0047154	Minor Project	6			

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Program Outcomes (POs)

Engineering Graduates will be able to:

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

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Program Educational Objectives (PEOs)

PEO-1: To train competent Electronics & Communication Engineers in analysis, design and testing of electronics systems by providing modern tools.

PEO-2: To prepare graduates to take up gainful employment in core sector and prepare them for a successful career in Multinational companies.

PEO-3: To impart skills to develop affordable products for rural people by adopting multidisciplinary approach.

PEO-4: To undertake sponsored projects, consultancy and internships by strengthening industry institute collaboration.

Program Specific outcomes (PSOs)

PSO-I: Students are able to analyze and design the electronic circuits with the knowledge of courses related circuits, networks, linear digital circuits and Analog electronics.

PSO-II: Student can explore the scientific theories, ideas, methodologies in operation and maintenance of communication systems to bridge the gap between academics and industries.

PSO-III: Students are able to work professionally with new cutting edge Technologies in the fields of electronic design, communication and automation

Note: Program Outcomes (POs) and Program Specific Outcomes (PSOs) are mapped with Course Outcomes (COs) and they are correlated in following levels

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

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I B.Tech, I-Sem (ECE) T C
3+1*3

(A0001151) PROFESSIONAL ENGLISH – I

(Common to All Branches)

English is the international language of business and opens up many opportunities to engineering professionals. This course introduces the essential learning theories and practices needed for a core professional. The course details the needs of LSRW Skills of the English language and explains how to face variant situations through soft skills. With a clear structure and can-do objectives in every Unit, Professional English Course is a straight forward, student-friendly course. It gradually builds up all the necessary knowledge to help students achieve their learning objectives.

OBJECTIVES

Students should be able to:

- Acquire basic language skills in order to communicate in English language.
- Develop their awareness of the importance of English as a means of international communication.
- Develop their LSRW skills, namely listening, speaking, reading and writing skills thereby improving their proficiency in oral and written communication in technical English.
- Develop the linguistic competence that enables them to be aware of the cultural, economical and social issues of the society in order to contribute in giving solutions.

OUTCOMES:

After the completion of the course the student will be able to:

- Introduction of English as a Lingua Franca and develop communication and Soft Skills.
- Develop LSRW skills by prescribed lessons and technical reading exercises
- Inculcate basic letter writing formats
- Develop language through different genres like Short stories, Poems and Films and thereby creating awareness on cultural, economic and social diversities.
- Acquire basic language skills through grammar usage and learn vocabulary from the conceptual clues.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1										3		3	1		
CO2	3					2	2	3	2	3		3		2	2
CO3	1									3					
CO4	2					3	2	3		3		3		2	3
CO5	1					2	2	3	1	3		3	2		1

UNIT I

Practical English Usage - I

a) Review of Grammar-Parts of Speech-Tenses
b) Introduction to International English Language Testing System (IELTS) Level-1

Practice Tests – IELTS

UNIT II

a) Technical Writing – I: Techniques of Writing-Comparison & Contrast Pattern-Cause & Effect Pattern - Paragraph Writing–Developing An Essay-Letter Formats-Full block Format–Official & Business Letters
b) Soft Skill – *Fish! Philosophy – Attitude is Everything* by Harry Paul

UNIT III

a) Reading Skills - SQR3 Technique–Skimming & Scanning- Reading Comprehension
b) Autobiography – New Horizons – *My Struggle for an Education* by Booker T. Washington

UNIT IV

a) Semantics - Etymology – Synonyms & Antonyms-Phrasal verbs–Idioms
b) Essay – *The Law of Pure Potentiality* by Deepak Chopra

UNIT V

a) Literary Techniques – Allegory – Metaphor - Epithet

b) Short story - New Horizons - *The Happy Prince* by Oscar Wilde

c) Poem – New Horizons - *Where the Mind is without Fear* by Rabindranath Tagore

UNIT VI

a) Movie Analysis – Life of Pi - Plot – Characterization – Techniques

b) Project & Case Studies

***TEXT BOOK PRESCRIBED: NEW HORIZONS, FOR THE JNTUA, PEARSON, 2014.**

SUGGESTED READING:

1. Practical English Usage by Michael Swan, Oxford University Press
2. Murphy's English Grammar by Raymond Murphy, Cambridge University press 2004
3. Technical writing 3rd edition by *Sharon J. Gerson & Steven M. Gerson*, Pearson Education 2001
4. Communication Skills for Engineers(Second Edition) by C. Muralikrishna & Sunita Mishra, Pearson Education Ltd, 2011
5. Top tips for IELTS, British Council, On line edition

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I B.Tech, I-Sem (ECE) T C
3+1*3

(A0004151) MATHEMATICS-I

(Common to All Branches)

OBJECTIVES:

- To make aware students about the importance and symbiosis between Mathematics and Engineering. Achieve confidence with mathematical tools which an essential weapon in modern Graduate Engineer's Armory. Balance between the development of understanding and mastering of solution techniques with emphasis being on the development of student's ability to use Mathematics with understanding to solve engineering problems by retaining the philosophy learning by doing.

OUTCOMES:

Course Outcomes: Engineering Graduates will be able to

- Acquire knowledge of Infinite series, real analysis, ordinary differential equations and Laplace transforms and its applications in Basic sciences, Biological sciences and engineering.
- Understand to solve differential equations of first and higher order with wide range of applications in circuit analysis, fluid dynamics.
- Analyze solutions of differential equations to various physical problems such as Electric circuits, temperature, Concentration and Velocity of fluids in fluid dynamics.
- Apply Laplace Transform and its Inverse to convert the equations of calculus in to the equations of algebraic with applications in signals and systems of Digital circuit analysis.
- Synthesize real analysis with functions and differential equations with Laplace transforms.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3		1		1							1	1		
CO2	1	3		2									1	2	
CO3		2											2		
CO4				1	3							1	3		2
CO5	1		2										1		

UNIT – I

Infinite Series: Sequence – Convergence and divergence of sequence. Series – Tests of convergence and divergence – P-Test, Comparison Test, Ratio Test, n-Root Test, logarithmic Test- Alternating Series – Absolute and conditional convergence of series.

UNIT-II

Differential equations of first order and first degree – Exact, linear and Bernoulli equations.Applications to LR & CR circuits, orthogonal trajectories.

UNIT – III

Non-homogeneous linear differential equations of second and higher order with constant coefficients with RHS term of the type e^{ax}, Sin ax, cos ax, polynomials in x, e^{ax} V(x), xV(x), Method of variation of parameters.

UNIT – IV

Rolle's Theorem – Lagrange's Mean Value Theorem – (excluding proof).Simple examples of Taylor's and Maclaurin's Series.

Functions of several variables – Jacobian – Maxima and Minima of functions of two variables, Lagrangian method of Multipliers with three variables only.Radius of Curvature.

UNIT – V

Laplace transform of standard functions – Inverse transform – 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.

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UNIT – VI

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

TEXT BOOKS:

1. Advanced Engineering Mathematics By Erwin Kreyszig.
2. Advanced Engineering Mathematics By R.K. Jain and S.R.K. Iyengar, Narosa Publications.

REFERENCES:

1. A Text Book of Engineering Mathematics, Vol – 1, T.K.V. Iyengar, B. Krishna Gandhi and Others S. Chand & Company.
2. Higher Engineering Mathematics by B.S.Grewal, Khanna Publishers.
3. A Text Book of Engineering Mathematics, Thomson Book Collection.
4. Engineering Mathematics By Srimantha Pal et.al. Oxford University Press.
5. Engineering Mathematics, Sarveswara Rao Koneru, Universities Press.

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Department of Electronics and Communication Engineering

I B.Tech, I-Sem (ECE) T C
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(A0301152) ENGINEERING DRAWING

(Common to all branches)

OBJECTIVES:

- To impart and inculcate proper understanding of the theory orthographic projection.
- To improve the visualization skills.
- To enable the students with various concepts like dimensioning, Construction of conic Sections and polygons.
- To impart the knowledge on understanding and drawing of simple solids.
- To know about sections and developments of solids etc.

OUTCOMES: After the completion of the course the student will be able to:

- Draw different engineering curves and know their applications.
- Draw orthographic projections of different objects.
- Visualize three dimensional objects and draw isometric projections.
- Use techniques and able to interpret the drawing in the engineering field.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1		1		3										
CO2	1	1	3		3								1		
CO3	1	1	3		3										
CO4	1	1	2		3					1	1		1		

UNIT-I

Polygons-Construction of Regular Polygons using given length of a side; Conic sections- Ellipse- Arcs of Circles and Oblong Methods, Construction of Parabola and Hyperbola by eccentricity method only.

UNIT-II

Introduction to Orthographic Projections- Projections of Points-Projections of Straight Lines parallel to both planes; Projections of Straight Lines-Parallel to one and inclined to other plane, inclined to both planes, determination of true lengths, angle of inclinations.

UNIT-III

Projections of Planes- Regular Planes Perpendicular / parallel to one Reference, Plane and inclined to other Reference Plane.

UNIT-IV

Projections of Solids-Prisms, pyramids, cones and Cylinders with the axis inclined to one Plane.

UNIT-V

Section of solids: Sectioning of prism, pyramid, cone and cylinder– sectional view – true shape. Solids in simple position and cutting plane inclined to one reference plane only.

Development of surface of solids: Development of truncated prism, pyramid, cone and cylinder – frustum of cone and pyramid.

UNIT-VI

Conversion of Isometric Views to Orthographic Views / Projections - Conversion of Orthographic Views to Isometric Projections and Views.

TEXT BOOK:

1. Engineering Drawing by N.D. Bhatt, Chariot Publications.
2. Engineering Drawing and Graphics, Venugopal/New age publications.

REFERENCE BOOKS:

1. Engineering Drawing , N.S Parthasarathy & Vela Murali, Oxford Publishers
2. Engineering Drawing. K.L Narayana, P. Kannaiah, Scitech Publications.
3. Engineering Drawing, B.V.R Gupta, J.K. Publishers.
4. Engineering Drawing by M.B. Shah and B.C.Rana, Pearson Publishers.
5. Engineering Drawing, Johle, Tata Mc Graw- Hill.
6. K.V. Natarajan, 'A text book of Engineering Graphics', Dhanalakshmi publishers, Chennai..

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(A0501151) C PROGRAMMING

(Common to All Branches)

OBJECTIVES:

- To make students aware about fundamentals of computer programming.
- To provide exposure on C programming language
- To provide exposure on various C programming concepts like arrays, functions, pointers, structures etc.,
- To develop solutions for various problems by using C programming language by students.

OUTCOMES:

Course Outcomes:Upon completion of the subject, students will be able to

- Understand the basic terminology used in computer programming
- Write, compile and debug programs in C language.
- Use different data types in a computer program.
- Design programs involving decision structures, loops, arrays and functions.
- Understand the dynamics of memory by the use of pointers.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	2		1							1	2		
CO2	1	2	2		3									2	
CO3	2	2	3	1	2	1							2		1
CO4	2	2	2		2	1						1			
CO5	1	2	1		2								3		

UNIT I- INTRODUCTION TO COMPUTER PROGRAMMING LANGUAGES:

Evolution of Computer Programming languages.Fundamentals of Algorithms and Flowcharts.Simple examples on how to write and trace an effective algorithms and how to draw an effective flow charts.Program control structures – sequence, selection and iteration.Software Development Method.

UNIT II - C LANGUAGE FUNDAMENTALS

General Form of a C Program, Steps to execute C program, Character set of C language, Data Types, Constants and Variables, Identifiers, Keywords, Operators, Precedence of operators, Expressions. Example Programs on the topics covered in this unit

UNIT III-CONTROL STATEMENTS IN C LANGUAGE

Non iterative statements – if statement, if else statement, nested if else statement, if else ladder statement, switch statement, goto statement. Iterative statements – while loop, do while loop and for loop.Example Programs on the topics covered in this unit.

UNIT IV – ARRAYS IN C LANGUAGE

Importance of an array in C language, Definition, Need of arrays while writing C programs. Types of arrays - One dimensional array, Two dimensional array. Declaration of One dimensional array, initialization of one dimensional array, storing and accessing the elements from a one dimensional array.Two-dimensional Arrays and their declaration, initialization, storing & accessing elements from it. Example Programs on the topics mentioned above. Strings - Definition, Declaring and initializing strings, Basic Operations on strings, String handling Functions. Example Programs on the topics mentioned above.

UNIT V- FUNCTIONS IN C LANGUAGE

Top down approach of problem solving, Library Functions and User defined functions. Need for user-defined functions. General form of declaring a function, Elements of an user defined functions- Function definition Function call, Function declaration, Function name, return type, parameters, return statements. Categorization of functions with respect to parameters and return values.Definition of Scope of a variable with suitable examples. Storage Classes - Automatic, External, Static, and Register. Arrays and functions - Passing an entire

array as an Argument to a function.Pre-processor Commands. Example Programs on the topics mentioned above.

UNIT VI- POINTERS IN C LANGUAGE

Pointers - Pointer variable and its importance, Pointer variable declaration, initialization of pointer variables, how to access a value from a memory location through it's pointer variable. Arithmetic operations on pointer variables, Scale factor length. Pointers and functions - pointers as function arguments (i.e., call-by-reference), Pointers and Arrays, Pointers and Strings, Array of Pointers, Pointers to Pointers, Generic Pointers, Pointer to Functions. Example Programs on the topics mentioned above.

TEXT BOOKS:

1. Programming in C,Pradeep Dey, Manas Ghosh,Oxford Heigher Education
2. Computer programming and Data Structures, E.Balaguruswamy, Tata Mc Graw Hill. 2009 revised edition.
3. The C Programming Language, Brian W.Kerninghan, Dennis M.Ritchie
4. Programming in C , Dr. N. Uday Bhaskar, Winger publications

REFERENCES:

1. Let us C – Yeshwanth kanetkar, 8th Edition.BPB Publications
2. C Programming with problem solving, J.A. Jones & K. Harrow, Dreamtech Press
3. Data Structures using C – A.M.Tanenbaum, Y.Langsam, and M.J. Augenstein, Pearson Education / PHI, Eighth Edition.
4. C Programming & Data Structures, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning.

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(A0002151) ENGINEERING PHYSICS

(Common to ALL Branches)

OBJECTIVES:

The Engineering Physics (Physics-I) for undergraduate program is designed

- To develop students with sufficient depth in both engineering and physics skills to produce engineers who can relate fundamental physics to practical engineering problems.
- To nurture innovative talent in modern applied physics, providing students both solid theoretical grounding and training in practical scientific research skills.
- To prepare students for careers in engineering where physics principles can be applied to the development of technology.

OUTCOMES: After the completion of the course the student will be able to:

- Understand the concept of electromagnetic signals by studying light behaviour.
- Apply the concepts of light in optical fibers and light wave communication systems.
- Solve electrical engineering problems using the concepts of wave and particle duality for electrons.
- Find remedies for acoustically defected buildings.
- Apply ultrasonics for the testing of materials

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2		2	1	1							1		2	
CO2	3		1	1	2										2
CO3		3		2	2							1	2		
CO4		3	2		1		1								
CO5		3	2		2							1			

UNIT I:

WAVE OPTICS: Interference – Types of Interference - Interference in thin films by reflection - Newton's rings – Applications - Diffraction – Distinction Between Interference and Diffraction - Fraunhofer diffraction at a single slit - Fraunhofer diffraction at a double slit (qualitative) - Diffraction grating – Determination of Wavelength of Light - Polarization – Optic axis - Double Refraction in Calcite Crystal - Nicol Prism – Different types of polarized lights - Quarter and Half wave plates – Applications - problems.

UNIT II:

FIBER OPTICS: Principle – Optical Fiber Cable- Propagation of Light in Optical fibres – Acceptance angle, Numerical aperture and Fractional Index change – Types of rays - Types of optical fibres (index, mode and material based) – Losses in Optical Fiber - Fibre optical communication system (Block diagram) – Merits of Optical Fibers – Applications - problems.

UNIT III:

LASERS: Introduction – Characteristics - Einstein's A and B coefficients - Principle of Spontaneous emission and stimulated emission, Population inversion, pumping. – Important Components of a laser - - Types of lasers – Nd-YAG, He-Ne, CO_2 and Semiconductor lasers (homo junction GaAs) – Hetrojunction laser – Applications - problems.

UNIT IV:

QUANTUM PHYSICS: Matter waves – properties - de-Broglie's hypothesis – Heisenberg's Uncertainty principle – Electron as a wave experiment - Schrödinger's Time independent wave equation – Physical significance of wave function – Particle in a one dimensional box - problems.

UNIT V:

ACOUSTICS AND ULTRASONICS: Introduction to acoustics - Reverberation and reverberation time - growth and decay of energy - Sabine's formula (qualitative) - absorption coefficient and its measurement - factors affecting architectural acoustics - problems.

Introduction to ultrasonics – Production – magnetostriction effect - magnetostriction generator, piezoelectric effect - piezoelectric generator- Detection of ultrasonic waves – Types of Ultrasonic waves - properties - Cavitations - Non Destructive Testing –pulse echo system through transmission and reflection modes - Testing Methods - A, B and C –scan displays - problems.

UNIT VI:

NUCLEAR ENERGY: Nuclear fission – Discovery of fission, binding energy curve, chain reaction (fission of U235), critical size, critical mass, essentials of nuclear reactor - problems.

Nuclear fusion – Thermonuclear reaction - fusion reaction in stars - p-p cycle, C-N cycle, controlled fusion – fusion reactor - problems.

REFERENCES:

1) Arthus Beiser, "Concepts of Modern Physics", Tata Mc Graw Hill Publications, New Delhi.
2) Resnick and Halliday, "Physics Volume – II", Wiley, New Delhi.
3) M.N. Avadhanulu and PG Kshirsagar, 'A Text book of Engineering Physics', S.Chand and company, Ltd., New Delhi, 2014.
4) D. K. Bhattacharya and Poonam Tandon, "Engineering Physics", Oxford University Press, 2015.
5) R. K. Gaur and S.C. Gupta, "Engineering Physics", Dhanpat Rai Publications, New Delhi.
6) Rajagopal, "Engineering Physics", PHI, New Delhi.
7) Rajendran, V and Marikani A, "Engineering Physics", Tata Mc Graw Hill Publications Ltd, III Edition, New Delhi.
8) Chitra Shadrach and Sivakumar Vadivelu, "Engineering Physics", Pearson Education, New Delhi.

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(A0242151) NETWORK ANALYSIS

OBJECTIVES:

- This course introduces the basic concepts of circuit analysis which is the foundation for all subjects of the Electrical Engineering & Electronics Engineering discipline.
- The emphasis of this course if laid on the basic analysis of circuits which include single phase circuits, magnetic circuits, theorems, transient analysis and network topology.

OUTCOMES:

Upon completion of the subject, students will be able to

- Knowledge on basic electrical quantities such as voltage, current, power, kcl, kvl,topology etc.
- Determine the unknown quantities by using theorems,kvl,kcl etc.
- Analyze the circuit using different theorems like thevinen's, Nortons, maximum, Millman.
- Analysis of single phase A.C circuits.
- Analyze the transient response of dc and ac circuits.
- Obtain the network parameters for the given circuit.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2							2	1			3	2	
CO2	2	3							3	2		2	2	2	
CO3	3	2							2	1		1	2	2	
CO4	3	3							3	1		1	2	1	
CO5	2	3	2						2	2		2	1	2	
CO6	3	3	2						2	2			1	1	1

UNIT – I

Basic Electrical Components-Sources: Circuit Concept – R-L-C components – Voltage and Current sources – specifications of components, sources- Independent and dependent sources-Source transformation – Voltage – Current relationship for passive elements – Kirchhoff's laws – network reduction techniques – series, parallel, series parallel, star-to-delta or delta-to-star transformation-Introduction to magnetically coupled circuits.

UNIT – II

Single Phase A.C Circuits: R.M.S and Average values and form factor for different periodic wave forms, Steady state analysis of R, L and C (in series, parallel and series parallel combinations) with sinusoidal excitation – Concept of Reactance, Impedance, Susceptance and Admittance – Phase and Phase difference – concept of power factor, Real and Reactive powers – J-notation, Complex and Polar forms of representation, Complex power –Resonance – series, parallel circuits, concept of band width and Q factor.

UNIT – III

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

UNIT – IV

Network theorems (without proofs): Tellegen's, Superposition, Reciprocity, Thevenin's, Norton's, Maximum Power Transfer, Millman's and Compensation theorems for d.c. and a.c. excitations

UNIT – V

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

UNIT – VI

Network Parameters: Two port network parameters – Z, Y, ABCD and hybrid parameters and their relations– – concept of transformed network – 2-port network parameters using transformed variables.

TEXTBOOKS:

1. Engineering Circuit Analysis by W.H. Hayt, Jr., J.E. Kemmerly, and S.M. Durbin, Tata McGraw hill, 6th Edition 2002.
2. Network Analysis byM.E Van Valkenberg, Prentice Hall (India), 3rd edition, 2011.
3. Circuit Theory (Analysis & Synthesis) – A.Chakrabarthi, Dhanpat Rai & Co,2000.

REFERENCES:

1. Electric Circuits - J. Edminister & M. Nahvi, - Schaum's Outlines, Tata Mc Graw-Hill Publishing Company Ltd., 1999.
2. Network Theory – Sudhakar and Shymmohan, TMH Publications

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(A0093152) ENGINEERING PHYSICS LAB

(Common to All Branches)

OBJECTIVES:

- The laboratory should help the student to develop a broad array of basic skills and tools of experimental physics and data analysis.
- The laboratory should help students to understand the role of direct observation in physics and to distinguish between inferences based on theory and the outcomes of experiments.
- To learn about the optical experiments, in establishing the fundamental Interference, Diffraction phenomena which will be clearly visualized with the light and laser experiments mentioned in the syllabus.
- To learn about the basic electronic experiments such as energy gap determination, type of extrinsic semiconductor using Hall Effect, Stuart – Gees experiment in field intensity determination and Solar I – V characteristics.

OUTCOMES:

After the completion of the course the student will be able to:

- Identify type of extrinsic semiconductors with the use of Hall Effect experiment.
- Analyze four probe conductivity experiments in the determination of bandgap of the semiconductors.
- Understand the electromagnetic spectrum in the dispersive power experiment.
- Apply the concept of interference and diffraction in LASER wavelength determination with the use of Grating.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1		1							1	3		
CO2	1		2	1										3	
CO3	2				1										3
CO4	2	1		1	2							1			3

List of experiments (Any10 Experiments)

1. Newton's rings
2. Determination of thickness of a thin film
3. Spectrometer – Transmission grating
4. Determination of wavelength of a Sodium light – Normal Incidence
5. Dispersive power of a prism - spectrometer
6. Laser experiment: wavelength determination using grating
7. Laser experiment: particle size determination
8. Determination of numerical aperture of an optical fiber
9. Field along the axis of coil carrying current – Stewart Gee's method
10. Determination of rigidity modulus – Torsional Pendulum
11. Determination of Band gap of Si or Ge – Four probe method
12. Study of B – H Curve.
13. Determination of Charge density and Hall coefficient or magnetic flux density – Hall effect.
14. Study of Solar I-V characteristics
15. Measurement of Dielectric constant

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(A0591151) CPROGRAMMING LAB

(Common to All Branches)

OBJECTIVES:

- To make the student to learn how to write programs in **C** language.
- To introduce different constructs of **C** language to the students to solve various kinds of problems.
- To make the students to implement different kinds of sorting algorithms like selection sort, bubble sort, insertion sort, quick sort and merge sort etc.
- To make the students to implement different kinds of searching algorithms like linear search and binary search etc.

OUTCOMES:

By the end of this course, students should be able

- Write a C program using various features of c language.
- Build sets of test data in order to evaluate computer programs
- Thoroughly test a program.
- Debug a program.
- Understand the organization of a computer program.
- Understand the process of compiling, linking, and running a program

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1			3						3						
CO2		3	2						3						
CO3			3						3		2		2		
CO4									3		3				
CO5			3										3		
CO6									3					2	

RECOMMENDED SYSTEMS /SOFTWARE REQUREMENTS:

- Intel based desktop PC with ANSI C Compiler and Supporting Editors

Exercise l:

Write a C program to demonstrate the various operators used in C language.

Exercise 2:

a) Write a C program to find the roots of a quadratic equation.
b) Write a C program to find both the largest and smallest number in a list of integers.

Exercise 2:

a) Write a C program, which takes two integer operands and one operator from the user, performs the specified operation and then prints the result. (Consider the operators +,- ,*, /, % and use Switch Statement)
b) Write a C Program to find the reverse of a given number.

Exercise 3:

a) Write a C program to find the sum of individual digits of a positive integer.
b) Write a C program to generate the first ‘n’ terms of the Fibonacci sequence.
[**Note:** A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence.]
c) Write a C program to generate all the prime numbers between 1 and n, where ‘n’ value is given by the user.
[**Note:** Develop each of the above programs by using different loop constructs supported by C language. (i.e., while, do while and for Loops)]

Exercise 4:

a) Write a C Program to mask the most significant digit of the given number.
b) Write a program which Prints the following patterns

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```
ABCDEFGFEDCBA
ABCDEF  FEDCBA        0
ABCDE    EDCBA       111
ABCD      DCBA      22222
ABC        CBA     3333333
AB          BA   444444444
A            A
```

Exercise 5:

a) Write a C program to generate Pascal's triangle.
b) Write a C program to construct a pyramid of numbers.

Exercise 6:

a) Write a C program to find all the even numbers in the given one dimensional array.
b) Write a C program to print the elements of an array in reverse order.
c) Write a C program to perform the following operations:
   i) Addition of Two Matrices ii) Multiplication of Two Matrices
   [Note: Use functions to implement the above specified operations]

Exercise 7:

a)Write C programs that use both recursive and non-recursive functions
   i) To find the factorial of a given integer.
   ii) To find the GCD (greatest common divisor) of two given integers.

Exercise 8:

a) Write a C Program to solve the Towers of Hanoi problem by using recursive function.
b) Writea C Program to demonstrate the various storage classes, which are supported by the C language. [i.e., automatic, external, static and register]

Exercise 9:

a) Write a C Program to demonstrate that, how to pass an entire array as an argument to a function with a suitable example.
b) Write a C Program to perform various operations on given two strings using string handling functions.

Exercise 10:

a) Write a C Program to perform various arithmetic operations on pointer variables.
b) Write a C Program to demonstrate the following parameter passing mechanisms:
   i) call-by-value ii) call-by-reference

Exercise 11:

a) Write a C program that uses functions to perform the following operations:
   i) To insert a sub-string in to a given main string from the specified position.
   ii) To delete '**n**' Characters from a given position in a given string.
b) Write a C program to determine if the given string is a palindrome or not.

Exercise 12:

a) Write a C program that displays the position or index in the string 'S' where the string 'T' begins, or –1 if 'S' doesn't contain 'T'.
b) Write a C program to count the lines, words and characters in a given text.

REFERENCE BOOKS

1. Programming in C, Pradeep Dey, Manas Ghosh, Oxford Heigher Education
2. The Spirit of C, an introduction to modern programming, M.Cooper, Jaico Publishing House.
3. Mastering C, K.R. Venugopal and S.R. Prasad, TMH Publications.
4. Computer Basics and C Programming, V. Raja Raman, PHI Publications.

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(A0274151) NETWORK ANALYSIS LAB

OBJECTIVES:

- To understand various electrical circuit concepts..
- To understand the Network Topology & coupled circuits.
- To learn and analyse network theorem practically.
- To learn the synthesis of various networks.

OUTCOMES:

- Analyse series network and parallel networks using PSPICE software
- Analyse bridge networks using PSPICE software
- Analyse series resonance using PSPICE software
- Analyse parallel resonance using PSPICE software
- Verify the theorems for a given network using hardware kit.
- Finding two port parameters using hard ware kit.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2							2	1			3	1	
CO2	2	3							3	2		2	3	1	
CO3	3	2							2	1		1	3	1	
CO4	3	3							3	1		1	3	1	
CO5	2	3	2						2	2		2	2	2	1
CO6	3	3	2						2	2			1	1	1

PART-A

1. Determine the total current for the Series and parallel resistive circuits using Pspice.
2. Calculate node voltages and branch currents for the given circuits.
3. For the series and parallel circuits determine the total impedance, phase angle, voltage across the parallel branches for the AC circuits.
4. Using Pspice determine the frequency at which the circuits resonance, also fine the voltage across the inductor, capacitor and Q factor of the given circuits.
5. Using Pspice calculates the effective inductance of the series and parallel coupled circuits.
6. Using Pspice find the complete expression the circuit when the switch is closed at t=0.
7. A series RLC circuits comprising R=10 Ω, L=0.5 H and C=1 μf is excited by a constant voltage source of 100 volts using Pspice obtain the expression for current.
8. Using Pspice find the Z, Y, transmission parameters for the given circuits.

PART-B

9. Verification of superposition & Reciprocity theorems.
10. Verification of maximum power transfer theorem. Verification on DC, Verification on AC with resistive and reactive loads.
11. Experimental determination of Thevenin's and Norton's equivalent circuits and verification by direct test.
12. Determination of two port network parameters – Z, Y parameters of the given network.

Note: Total 8experiments have to be conducted. Choosing 4 from Part-A & all in Part-B.

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(A1291152) IT WORKSHOP

(Common to All Branches)

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. It enables the students to understand and fix the common hardware, software issues & makes the students to install either Windows or UNIX based Operating system in the machines.
- Enable students to understand how computers work, different types of computers, functions of applications, input and data storage devices, different operating systems, ethics, data communications, and systems analysis and design
- It makes the students to understand and use the common office suite tools like word, excel etc effectively in their daily usage.
- To ensure the students to understand the basic networking concepts like IP Address etc

OUTCOMES:

By the end of module students will be expected to demonstrate/able

- PC Hardware- introduces the students to a personal computer and its basic peripherals, the process of assembling a personal computer. In addition hardware and software level troubleshooting process, tips and tricks would be covered. The students should work on working PC to disassemble and assemble to working condition. Students are suggested to work similar tasks in the Laptop scenario wherever possible.
- To do installation of system software like MS Widows and Linux and the required device drivers.
- Internet & World Wide Web module introduces the different ways of hooking the PC on to the internet from home and workplace and effectively usage of the internet. Usage of web browsers, email, newsgroups and discussion forums would be covered. In addition, awareness of cyber hygiene, i.e., protecting the personal computer from getting infected with the viruses, worms and other cyber attacks would be introduced.
- Productivity tools- module would enable the students in crafting professional word documents; excel spread sheets and power point presentations using the Microsoft suite of office tools.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2		2									2		
CO2	2	2		2										3	
CO3	2	2								3					
CO4	2	2		2	3										

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.**

Internet & World Wide Web module introduces the different ways of hooking the PC on to the internet from home and workplace for usage of the internet. Usage of web browsers, email, newsgroups and discussion forums would be covered. In addition, awareness of cyber hygiene, i.e., protecting the personal computer from getting infected with the viruses, worms and other cyber attacks would be introduced.

Productivity tools module would enable the students in crafting professional word documents, excel spread sheets, power point presentations and personal web sites using the Microsoft suite of office tools

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PC HARDWARE

Exercise 1 - 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.

Exercise 2 - 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.

Exercise 3 - 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.

Exercise 4 - Task 4: Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot with both windows and Linux. Lab instructors should verify the installation and follow it up with a Viva

Exercise 5 - Task 5: 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

Exercise 6 - Task 6: 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.

OFFICE TOOLS

WORD

Exercise 7 - Word Orientation: The mentor needs to give an overview of LaTeX and Microsoft (MS) office 2007,2010/ equivalent tool word: Importance of LaTeX and MS office 2007,2010/ equivalent tool Word as word Processors, Details of the four tasks and features that would be covered in each. Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word.

Task 1-Task IV: Using Word 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 Word.

INTRODUCTION TO LATEX

EXCEL

Exercise 8 - Excel Orientation: The mentor needs to tell the importance of MS office 2007,2010/ equivalent 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 1-Task IV: Features to be covered:- Gridlines, Format Cells, Summation, auto fill, Formatting Text, Formulas, Functions

POWER POINT

Exercise 9 - Task1: 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 Powerpoint. Students will be given model power point presentation which needs to be replicated (exactly how it's asked).

Exercise 10 - 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

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INTERNET & WORLD WIDE WEB 2 EXERCISES

Exercise 11 - 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.

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

Exercise 12 - Task 2: **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.

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 antivirus software, configure their personal firewall and windows update on their computer.

REFERENCES:

1) Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
2) LaTeX Companion – Leslie Lamport, PHI/Pearson.
3) Introduction to Computers, Peter Norton, 6/e Mc Graw Hill
4) Upgrading and Repairing, PC's 18th e, Scott Muller QUE, Pearson Education
5) Comdex Information Technology course tool kit, Vikas Gupta, WILEY Dreamtech
6) IT Essentials PC Hardware and Software Companion Guide, Third Edition by David Anfinson and Ken Quamme. – CISCO Press, Pearson Education.

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(A0005152) PROFESSIONAL ENGLISH–II

(Common to All Branches)

Professional English II has been prescribed with specific objectives of enlightening the learners in the arena of Language competence. The curriculum has been designed to sharpen the skills of the professional students to meet the job tasks and to sustain the global milieu. This skill based curriculum will mould the young learners as competent engineers.

OBJECTIVES:

- Students will be able to read and explore for enrichment works from various genres (novels, plays, poems, essays).
- Students will be able to engage in formal writing assignments that require utilization of all stages of the writing process.
- Students will be able to evaluate their own language competence according to established criteria and rubrics like IELTS / TOEFL
- Students will be acquainted and be able to assess the LSRW skills.

OUTCOMES:

Students will be able to:

- Application of Advance grammar concepts
- Acquisition of English language skills and soft skills based on rubrics like IELTS/TOEFL
- Enriching LSRW through various genres viz. Autobiography, Essays
- Practice Technical writing and Documentation
- Understand engineering related concepts like environment and social media.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1										3		3	2		
CO2	3					2	1	3	2	3		3		2	3
CO3	1						3			3			2		
CO4	2					3		3		3		3		2	3
CO5	1					2		3	1	3		3	2	2	

UNIT I

Practical English Usage II

a) Review of Advance Grammar– Active & Passive Structures – Reported speech
b) Introduction to International English Language Testing System (IELTS) Level-2
Practice Tests – IELTS

UNIT II

a) **Listening Skills -** Active Listening – ROAR Technique – Note Making
b) **Autobiography** - *A Daughter is born* from **I am Malala** by Malala with Christina Lamb

UNIT III

a) **Technical Writing** –II - Design – Led Documentation - Online writing – E mails – Social Media – Netiquettes- Project Reports
b) **Essay**– *Green Living by* Neil Chambers

UNIT IV

a) **Concept of Communication** – Process - Principles
b) **Prose** – *Immortal Speeches – M.K.Gandhi*

UNIT V

a) **Introduction to Soft Skills** – Hard Skills vs Soft Skills – Team Dynamics
b) **Soft Skill** – *The Art of Time Management* by Ramesh & Ramesh

UNIT VI

a) **Expression through Art** - Fine Arts- Ravi Varma Paintings
b) Project / Case Studies

***Text book Prescribed:** *Falcon: Rise High, RGMCET Publication*

REFERENCE BOOKS

1. The Ace of Soft SkillsbyGopala Swamy Ramesh & Mahadevan Ramesh, Pearson Education.
2. The Basics of Communication by Steven Duck, Sage Publication, New Delhi.
3. I am Malala by Malala Yousazai with Christina Lamb, Phoenex, 2014.
4. The Art of Public Speaking by Dale Carneige, Cosimo, Inc., 01-Nov-2007.

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(A0006152) MATHEMATICS-II

(Common to All Branches)

OBJECTIVES:

- To make aware students about the importance and symbiosis between mathematics and engineering. Achieve confidence with mathematical tools which an essential weapon in modern Graduate Engineer's Armory. Balance between the development of understanding and mastering of solution techniques with emphasis being on the development of student's ability to use Mathematics with understanding to solve engineering problems by retaining the philosophy learning by doing.

OUTCOMES:

Engineering Graduates will be able to

- Gain knowledge of Multiple Integrals, vector calculus, Fourier series, Fourier transforms and Z-transforms.
- Understand Vector Differentiation to compute gradient of scalar fields, Curl and Divergence of vector fields and Vector Integration to find relations between line, surface and volume integrals by Green's, Stoke's and divergence theorems.
- Analyze the Problems of Fourier series of functions satisfying Dirichlet's conditions, both in general and arbitrary periods and half range series of sines and cosines.
- Apply Z-Transforms and Inverse Z-transforms of time invariant systems to study the analysis of the waves in communication systems which deal discrete functions.
- Synthesize Fourier transforms and Fourier series and difference equations with Z-transforms. Fourier Transforms can be used to solve partial differential equations with lot of applications in circuit analysis.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3			1	1								2		
CO2		3	1		1							1	2		
CO3		2												2	
CO4					3							1	2		
CO5	1		2		1								1		

UNIT – I

Multiple integrals: – Double and triple integrals – Change of Variables – Change of order of integration.

UNIT – II

Vector Differentiation: Introduction of Vector differentiation -Scalar and vector point functions-Gradient of scalar function– Directional derivatives- Divergence and curl of a vector function- properties of Grad, Div and Curl.

UNIT – III

Vector integration – Line integral - Potential function – Area, Surface and volume integrals. Vector integral theorems: Green's theorem – Stoke's and Gauss's Divergence Theorem (excluding their proof). Verification of Green's – Stoke's and Gauss's Theorems.

UNIT – IV

Fourier Series: Determination of Fourier coefficients – Fourier series of Even and odd functions – Fourier series in an arbitrary interval – Even and odd periodic continuation – Half-range Fourier sine and cosine expansions.

UNIT – V

Fourier integral theorem (statement only) – Fourier sine and cosine integrals. Fourier transform – Fourier sine and cosine transforms – Properties – Inverse transforms.

UNIT – VI

Z-transform – Inverse z-transform – Properties – Damping rule – Shifting rule – Initial and final value theorems. Convolution theorem – Solution of difference equations by z-transforms.

TEXT BOOKS:

1. Advanced Engineering Mathematics By Erwin Kreyszig.
2. Advanced Engineering Mathematics By R.K. Jain and S.R.K. Iyengar, Narosa Publications

REFERENCES:

1. A Text Book of Engineering Mathematics, Vol – 1, T.K.V. Iyengar, B. Krishna Gandhi and Others S. Chand & Company.
2. Higher Engineering Mathematics by B.S.Grewal, Khanna Publishers.
3. A Text Book of Engineering Mathematics, Thomson Book Collection.
4. Engineering Mathematics By Srimantha Pal et.al. Oxford University Press.
5. Engineering Mathematics, Sarveswara Rao Koneru, Universities Press.

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(A0008152) SOLID STATE PHYSICS

(Common to ECE,EEE,CSE& IT)

OBJECTIVES:

The Solid State Physics (Physics-II) is designed to meet the educational needs of each student and to provide the foundation for future career development.

- To provide students with a broad education required to recognize, understand, and further the evolving role that materials science plays in society.
- To prepare students for careers in solid state physics and engineering, or in fields that require an understanding of materials, by providing a broad, fundamental view of materials as well as a solid foundation in science and engineering.
- To identify important scientific and engineering problems related to materials, and then design systems and processes as well as perform relevant experiments and interpret data to aid the solution of these problems;
- To understand and appreciate materials research and its application in advancing a wide range of established and emerging technologies.

OUTCOMES:

After the completion of the course the student will be able to:

- Identify engineering material structures like Si, Ge etc. using the concepts of crystal structures.
- Understand the origin of resistance and band structures with the study of conductors.
- Find the suitable semiconductor materials for the fabrication of transistors.
- Apply the concepts of magnetism, dielectric and superconductivity in electrical machines, inductors, capacitors, magnets etc.
- Motivate towards new small scale technology where the behaviour of the materials is different.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		3										1	3		
CO2	3		1											3	
CO3		3		1	2								2		
CO4	2		3										3		
CO5	1		2		3							1			3

UNIT I:

CRYSTAL PHYSICS: Classification of solids - Lattice – Space lattice - Basis- Crystal Structure - Unit cell – Primitive cell – crystal systems - Bravais lattice –Atomic radius – Coordination number – Packing factor for SC, BCC, FCC structures – diamond and graphite structures - Lattice planes – Miller indices – inter planar spacing in a cubic lattice – X-Ray Diffraction - Bragg's law – Powder method of crystal structure determination - problems.

UNIT II:

CONDUCTING MATERIALS: Conductors – classical free electron theory of metals – Drift Velocity - Electrical and thermal conductivity – Quantum theory – Fermi energy – Fermi level - Effect of temperature on Fermi Function - Fermi distribution function – Sources of electrical resistivity – Kroning-Penney model (qualitative results-no derivation) – Energy bands – Effective mass – classification of materials - problems.

UNIT III:

SEMICONDUCTING MATERIALS: Introduction - Intrinsic semiconductor – extrinsic semiconductors – Drift and diffusion – Einstein relation - Hall effect – Determination of Hall coefficient – Applications – Direct and indirect band gap semiconductors – p-n junction – Band diagram of p-n junction – p-n junction under forward and reverse bias – energy band diagram - Diode equation – solar cell – Expressions for Vm and Im - problems.

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UNIT IV:

MAGNETIC AND SUPERCONDUCTING PROPERTIES: Terms and definitions - Origin of magnetic moment - Bohr magnetron - Dia and para magnetism - Ferro magnetism - Hysteresis - soft and hard magnetic materials - anti - ferromagnetic materials - Ferrites - applications - problems.

Introduction to superconductors - Properties of a superconductor - Meissner's effect - London penetration depth - Type of superconductors - BCS theory of Superconductivity (Qualitative) - Applications of superconductors - problems.

UNIT V:

DIELECTRIC PROPERTIES: Matter polarization and relative permittivity: definition - dipole moment and polarization vector P - polarization mechanisms: electronic, ionic, orientational, interfacial and total polarization - frequency dependence - Lorentz field and Clausius-Mossotti equation - dielectric constant and dielectric loss - capacitor materials - typical capacitor constructions - Ferro electricity - $BaTiO_3$ - applications - problems.

UNIT VI:

MODERN ENGINEERING MATERIALS:

Nanomaterials: Introduction - Properties - synthesis - ball milling - solgel - applications.

Carbon nanotubes: introduction - types of CNTs - synthesis - chemical vapor deposition - properties and applications.Metallic glasses - shape memory alloys (one way, two way) – applications.

REFERENCES:

1) Charles Kittel "Introduction to Solid State Physics", John Wiley & sons, 7th edition, Singapore.
2) Ali Omer, "Elementary Solid State physics", Person Publications 5th Edition, New Delhi.
3) M.N. Avadhanulu and PG Kshirsagar, "A Textbook of Engineering Physics", S.Chand and company, Ltd., New Delhi, 2014.
4) D. K. Bhattacharya and Poonam Tandon, "Engineering Physics", Oxford University Press, 2015.
5) Srivastava, "Elements of Solid State Physics", PHI, New Delhi.
6) Charles P. Poole and Frank J. Ownen, "Introduction to Nanotechnology", Wiley India.
7) S.P.Basavaraju, "Applied Physics", Subhas Stores, Bangalore.
8) M. Ratner & D. Ratner –"Nanotechnology", Pearson Ed, New Delhi.

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(A0502152) DATA STRUCTURES THROUGH C

(Common to All Branches)

OBJECTIVES:

- To make students aware about structures and unions in C language.
- To provide exposure on various searching and sorting techniques.
- To provide exposure on various data structures like stacks, queues, circular queues and linked lists etc.
- To develop solutions for various problems by using C Programming Language by students.

OUTCOMES:

Course Outcomes: Upon completion of the subject, students will be able to

- Understand the concepts of structures and unions.
- Perform operations on files.
- Understand the concepts of data structure and implement various data structures such as stacks, queues.
- Implement linked list data structure.
- Understand sorting and searching techniques.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2		2	1						1	2		2
CO2	1	2	1		2	2						1		2	
CO3	3	2	2		3	2								3	
CO4	1	3	1	1								2			
CO5	1	2	3		1	1		1				2		2	

UNIT I

STRUCTURE AND UNIONS IN C LANGUAGE: Structures – Introduction, Features of Structures. Declaration and Initialization of Structures, Accessing structure members, structure initialization. Nested Structures, Array of Structures, Arrays within structures and Pointers to Structures, Structures and Functions, Bit Fields, Unions, Union of Structures. Example Programs on the topics mentioned above.

UNIT II

FILE INPUT/OUTPUT: Introduction, Types of Files, File I/O Operations- High level I/O functions- Open & Close a file, Read and Write data into a file, Searching data in the file, Error handling during I/O operations on files. Command Line Arguments, Applications of Command Line Arguments. Example Programs on the topics covered in this unit.

UNIT III

INTRODUCTION TO DATA STRUCTURES: classification of data structures, dynamic memory allocation functions in C language. **Stacks:** Definition, Various representation methods, operations on stacks and their implementation in C language, applications of stacks.

UNIT IV

QUEUES: Definition, Various representation methods, operations on queues and their implementation in C language, applications of queues. Circular queues- operations on circular queues and their implementation in C language.

UNIT V

LINKED LISTS: Definition, Various representation methods, operations on linked lists and their implementation in C language.

UNIT VI

SEARCHINGAND SORTING TECHNIQUES:

Searching Techniques- Linear search and Binary Search Techniques.

Sorting techniques- Bubble Sort, Selection Sort, Quick Sort, Insertion Sort, and Merge Sort. Implementation of all the above mentioned techniques in C language and trace them by giving different test data.

TEXT BOOKS:

1. Programming in C,Pradeep Dey, Manas Ghosh, Oxford Heigher Education
2. Computer programming and Data Structures, E.Balaguruswamy, Tata Mc Graw Hill. 2009 revised edition.
3. The C Programming Language, Brian W.Kerninghan, Dennis M.Ritchie
4. Programming in C , Dr. N. Uday Bhaskar, Winger publications

REFERENCES:

1. Let us C – Yeshwanth kanetkar, 8th Edition.BPB Publications
2. C Programming with problem solving, J.A. Jones & K. Harrow, Dreamtech Press
3. Data Structures using C – A.M.Tanenbaum, Y.Langsam, and M.J. Augenstein, Pearson Education / PHI, Eighth Edition.
4. C Programming & Data Structures, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning.

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(A0407152) ELECTRONIC DEVICES AND CIRCUITS

OBJECTIVES:

- To understand the basic materials used for fabrication of different semiconductor devices.
- To understand construction details, principle of operation and equivalent electrical model of each device.
- Evolution of different diodes based on doping levels.

OUTCOMES:

- Understand the motion of charged particles under the influence of electric and magnetic fields.
- Understand and analyse the principle of operation and equivalent electrical model for semiconductor devices like PN diode, Zener diode, Tunnel diode, BJT, JFET, MOSFET, UJT, and SCR
- Apply the property of junction diode in rectifiers and regulators.
- Obtain the Q point for various biasing techniques.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2											2	2	
CO2	1	3											2	3	
CO3	2		3										1	2	1
CO4		2	3										2	1	

UNIT- I

ELECTRONIC DYNAMICS AND CRO: Motion of charged particles in electric and magnetic fields. Simple problems involving electric and magnetic fields only. Principles of CRT, deflection sensitivity (Electrostatic and magnetic deflection).Application of CRO, Voltage, Current and Frequency Measurements.

UNIT- II

SEMICONDUCTOR DIODE CHARACTERISTICS: Review of PN Junction Diode. V-I characteristics of PN diode, Static and Dynamic resistances, Temperature dependence of parameters(Derivation not necessary)Diode equivalent circuits, Diode capacitances, Breakdown Mechanisms in Semiconductor Diodes, Zener diode characteristics, Principle of operation and Characteristics of Tunnel Diode with the help of energy band diagrams, Schottky Barrier Diode.

UNIT- III

RECTIFIERS, FILTERS AND REGULATORS: PN junction as a Rectifier, Half wave rectifier, ripple factor, Efficiency, regulation and Transformer utilization factor (TUF). Full wave rectifier, Bridge rectifier. **Filters:** Harmonic components in a rectifier circuit, Inductor filter, Capacitor filter, L-Section filter, Π- Section filter, comparison of various filter circuits, Simple circuit of a regulator using Zener diode.

UNIT-IV

BIPOLAR JUNCTION TRANSISTORS (BJT): Study of operation of BJT, Detailed study of currents in a transistor, Input and Output characteristics of transistor in CB, CE, and CC configurations, Relation between Alpha, Beta and Gamma. Principle of operation and characteristics of SCR. Small signal equivalent circuit of BJT, Specifications of BJT and SCR.

UNIT- V

TRANSISTOR BIASING AND STABILISATION: Importance of Biasing, Operating point, Load line(DC and AC) Types of Biasing: Fixed bias, Collector to Base, Voltage Divider bias, Bias stability, Stabilization factors, (S, S', S''), Compensation techniques, (Compensation against variation in V_{BE}, I_{co},) Thermal run away, Thermal stability in CE configuration, Transistor as an amplifying device.

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UNIT-VI

JUNCTION FIELD EFFECT TRANSISTORS (JFET): Construction, operation and transfer and output characteristics, Pinch-Off voltage, Small signal equivalent model of JFET, construction of MOSFET and its characteristics (Enhancement and depletion mode), Comparison of Transistors (BJT, FET, and MOSFET). Principle of operation and characteristics of UJT. Specifications of JFET, MOSFET and UJT.

TEXT BOOKS :

1. Electronic Devices and Circuits – J.Millman, C.C.Halkias, and Satyabratha Jit Tata McGraw Hill, 2nd Ed., 2007.
2. Electronic Devices and Circuits – R.L. Boylestad and Louis Nashelsky, Pearson/Prentice Hall, 9th Edition, 2006.
3. Electronic Devices and Circuits- David A. Bell, Oxford University Press, 5th Edition, 2008.

REFERENCES :

1. Electronic Devices and Circuits – T.F. Bogart Jr., J.S.Beasley and G.Rico, Pearson Education, 6th edition, 2004.
2. Principles of Electronic Circuits – S.G.Burns and P.R.Bond, Galgotia Publications, 2nd Edn.., 1998.
3. Microelectronics – Millman and Grabel, Tata McGraw Hill, 1988.
4. Electronic Devices and Circuits – Dr. K. Lal Kishore, B.S. Publications, 2nd Edition, 2005.
5. Electronic Devices and Circuits- Prof G S N Raju I K International Publishing House Pvt. Ltd 2006.

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(A0003151) MODERN ENGINEERING CHEMISTRY

(Common to All Branches)

OBJECTIVES:

- To know the importance of water and sustainable utilization of water resources and alternative methods for potable water like Reverse osmosis and the problems raised in the Production of steam by using the boilers are included in Water technology.
- To identify the structure of organic molecules using photo chemistry and chemical spectroscopy.
- To acquaint the student with concepts of important photo physical and Photochemical processes and spectroscopy.
- To make the students conversant with basics of polymer chemistry
- To develop an understanding of the basic concepts of phase rule and its applications to single and two component systems.
- To Understand and apply the concepts in electrochemistry and corrosion science

OUTCOMES:

Upon completion of the subject, students will be able to

- Apply the concepts of Organic chemistry for synthesis.
- Synthesize polymers.
- Estimate the hardness of water in terms of Calcium and magnesium ions.
- Standardize solutions using titration, conductivity meter and colorimeter.
- Know the fundamentals of spectroscopy like electromagnetic spectrum, UV visible, IR spectroscopy.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3		1											3	
CO2	1		3									1			
CO3		3			2										
CO4		3		1	1									3	
CO5	3				1							1			2

UNIT I:

WATER TECHNOLOGY: Sources of Water- Types of impurities in Water- Hardness of Water – Temporary and Permanent hardness - Disadvantages of hard water-Estimation of hardness by EDTA Method, Numerical Problems on Hardness.

Boiler troubles (Sludge, Scale, Caustic Embrittlement, Priming and foaming)–Softening of water (Ion exchange, Zeolite Methods).

Desalination-Reverse Osmosis Method.

Analysis of Water- Alkalinity Dissolved Oxygen.

UNIT II:

SURFACE CHEMISTRY:

Adsorption: Definition – Types-Langmuir Adsorption isotherm-Applications.

Phase Rule: Statement-Explanation of Terms involved with examples –One component System –Water & Sulphur Systems-Condensed Phase Rule- Pb-AgSystem.

Engineering Materials: Abrasives –Mho' s Scale of Hardness-Natural &Synthetic Abrasives-Engineering Applications.

Refractories: Introduction, Classification &Properties Refractories-Reasons for failure of Refractories.

UNIT III:

ELECTRO CHEMISTRY: Conductance – Specific Conductance -Equivalent Conductance – Molar Conductance-Determination of conductance by Wheat Stone Bridge Method-Effect of dilution On Conductance – Conductometric Titrations(Acid Base& Precipitative Titration)- Electrode Potential- Reference Electrodes

(SHE, Calomel)-Nernst equation- Numerical Problems. Representation of Cell- electro chemical cells-concentration cells.
Ion Selective Electrode-Principle & Applications.
Chemically Modified Electrodes (CMEs): CMEs as Potentiometric and amphereometric sensors.

UNIT IV:

CHEMISTRY OF CORROSSION & ITS PREVENTION: Definition, Mechanism of Dry(oxidation),Wet(Evolution of hydrogen & Absorption of Oxygen) Types of corrosion- Dry Corrosion, and Wet Corrosion, Theories and Mechanism- Galvanic Series- Galvanic Corrosion, Concentration Cell Corrosion, Water line corrosion, Pitting Corrosion. Factors Influencing Corrosion.
Control of Corrosion – Proper designing and material selection-Cathodic Protection – Sacrificial anode and Imprest Current methods. Use of Inhibitors.
Protective coatings: Metallic coatings & applications.
Electro Plating of Chromium & Nickel

UNIT V:

PHOTO CHEMISTRY&SPECTROSCOPY: Photo Chemistry: Principles-Growthers Droppers law–Stark Einstein law-Lamberts Beers law-Flouroscence-Phosphorescence-Chemiluminiscence-Photosensitization-Quantum efficiency determination-problems
Spectroscopy: Electromagnetic spectrum-absorption of radiation-Electronic, Vibrational and Rotational Transitions.
UV-Visible and IR Spectroscopy Principles, Instrumentation (block diagrams) & applications (Qualitative)

UNIT VI:

POLYMERS AND FUELS:

Polymer: Basic concepts- Types of Polymerization – Addition and Condensation Polymerization. Mechanism of Addition polymerization.

Plastics: Definition, Thermo& plastics. Preparation, Properties and Engineering Uses of Poly ethylene, Poly vinyl chloride, Teflon, Bakelite,& Nylons.

Elastomers: Processing of Natural Rubber, Compounding of Rubber Drawbacks of Raw Rubber, Vulcanization of Rubber. Preparation, Properties & Uses of Buna-S, Buna-N, Silicone Rubber.

Fuels: Definition, Classification of fuels. Characteristics of a good fuel. Calorific Value and its Units. Determination Calorific Value by Bomb Calorimeter.
Solid Fuel: Analysis of Coal (Proximate & Ultimate)
Liquid Fuels: Petroleum, Refining, Knocking, Octane, Cetane Number.
Gaseous Fuels: Producer Gas, Water Gas.
Combustion: Principles and Numerical Problems- Flue gas analysis by Orsat's apparatus.

TEXT BOOKS:

1) Text book of Engineering Chemistry by Jain & Jain, Dhanpat Rai Publishing Company, 15th edition New Delhi (2008).
2) Text book of Engineering Chemistry by sashi chawla, Dhanpat Rai Publishing Company, 12th edition New Delhi (2011).

REFERENCE:

1) A text book of Engineering Chemistry by S.S. Dara, S.Chand & Co, New Delhi (2008)
2) Dara S.S Text Book Of Engineering Chemistry, S.Chand & Company Ltd, NewDelhi 2003.
3) Chemistry of Engineering Materials by C.V. Agarwal, Tara Publication, Varanasi.2008.
4) Physical Chemistry - Glasston & Lewis.

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(A0091151) ENGINEERING CHEMISTRY LAB

(Common to All Branches)

OBJECTIVES:

- Chemistry is one subject which gives adequate knowledge about the applications involved in the aerospace, mechanical, environmental and other engineering fields. Knowledge of chemistry plays a vital role in engineering profession enabling the potential engineers to understand and to perform successfully while working on multidisciplinary tasks.
- The main objective of the department is to develop the necessary theoretical and practical aspects required for understanding intricacies of the subject and also give adequate exposure to the applied chemistry aspects in different disciplines of engineering. Our faculty educates the engineering students with all necessary concepts related to chemistry and develops a scientific attitude by means of distinguishing, analyzing and solving various engineering problems. We are training the students to develop their experimental skills and important practical knowledge in engineering by providing sophisticated chemistry laboratory.

OUTCOMES:

- Keen Observation and Skills developed.
- Knowledge of estimation of Quality of water.
- They acquired the knowledge of synthesis of polymering organic compounds.
- The total alkalinity of water and total dissolved oxygen calculated and this will useful while using the water for industrial applications.
- They acquire the knowledge determine the viscosity of oil and bulk density of solid substances.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3			2			1					1			
CO2				2	2	1	1								
CO3					3		1								
CO4		1	1		3										
CO5					2	1									

Detailed Syllabus:

1) Standardization of $KMnO_4$ By using Mohr's salt.

Complexometric Titrations:

2) Determination of Hardness of water by using EDTA titration method.
3) Estimation of Magnesium ion by using EDTA titration method.
4) Estimation of copper ion by using EDTA titration method.
5) Estimation of dissolved oxygen by Winkler's Method.

Dichrometry:

6) Determination of Ferrous ion by using potassium dichromate.

Conductometric titration:

7) Determination of Strength of the given HCL by using Conductometric titration.
8) Determination of Strength of the given CH_3COOH by using Conductometric titration.
9) Determination of Alkalinity Present in a given solution.
10) Verification of Beer's-Lambert's Law by $KMnO_4$.
11) Determination of Strength Manganese by Colorometric Method
12) Determination of Calorific Value of Solid/Liquid fuel using Bomb Calorimeter.
13) Determination of Viscosity by using Red wood Viscometer-I (or) II
14) Potentiometric Determination of iron using Standard$K_2Cr_2O_7$ Solution.

Demonstration:

15) Determination of Bulk density.
16) Determination of Refractive index of a given Solution.
17) Preparation of Ethyl Acetate.
18) Preparation of Bakelite.
19) Determination of pH of Water and various other samples.

REFERENCES:

1) Laboratory Manual on Engineering Chemistry, Sudharani (Dhanpat Rai Publishing Company).
2) Vogel's Textbook of Quantitative chemical analysis, J. Mendham et.al. (Pearson Education).
3) Advanced Inorganic Analysis, Agarwal & Keemtilal, Pragati prakashan.
4) Chemical tables, Dr N. S. Gnanapragasam, (Sultan Chand & sons).

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Department of Electronics and Communication Engineering

I B.Tech, II-Sem (ECE) P C
3 2

(A0592152) DATA STRUCTURES THROUGH C LAB

(Common to All Branches)

OBJECTIVES:

- To introduce different constructs of C language like structures and unions to the students to solve various kinds of problems.
- To introduce different types of linear data structures like stacks, queues, circular queues and linked lists etc.
- To make the students to implement different kinds of sorting algorithms like selection sort, bubble sort, insertion sort, and quick sort and merge sort etc.
- To make the students to implement different kinds of searching algorithms like linear search and binary search etc.
- To implement various searching and sorting techniques

OUTCOMES:

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

- To understand how to develop C programs to solve various kinds of problems by using different C programming concepts like structures and unions.
- To develop programs by performing I/O operations through Files.
- To implement different linear data structures like stacks, queues, circular queues and linked lists etc.,
- To implement various searching and sorting techniques

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	2	2	1			2		1	2			
CO2	2	1	2	2	1	1			2	1	1	1			
CO3	2	2	2	2	1	2			2	1	1	3			
CO4	3	3	3	2		2			1	1	1	1			

RECOMMENDED SYSTEMS /SOFTWARE REQUREMENTS:

- Intel based desktop PC with ANSI C Compiler and Supporting Editors

Exercise l:

a) Write a C Program to copy the contents of one structure variable to another structure variable.
b) Write a C program to implement nested structure to store and display the student information. The structure student contains the field's S.no, name, and date. Date is the nested structure and it contains the fields day, month and year.

Exercise 2:

a) Write a C program to simulate the multiplication of two fractions by passing individual structure members to a function.
b) Write a C program to simulate the multiplication of two fractions by passing the whole structure to a function.

Exercise 3:

a) Write a C program that uses functions to perform the following operations:
   i) Reading a complex number
   ii) Writing a complex number
   iii) Addition of two complex numbers
   iv) Multiplication of two complex numbers (Note: represent complex number using a structure.)
b) Write a C program to implement Union Concept.

Exercise 4:

a) Write a C program which copies last 'n' characters from one file to another.
b) Write a C program to reverse the first 'n' characters in a file.
c) Write a C program to merge two files into a third file.

Exercise 5:

Write a C program to implement the following operations on Stack using array representation

a) Push b) Pop c) Display

Exercise 6:
Write a C program to implement the following operations on Queue using array representation
a) Insert b) Delete c) Display

Exercise 7:
Write a C program to implement the following operations on Singly Linked list using linked representation
a) Insert b) Delete c) Display d) Search

Exercise 8:
Write a C program that implements the following sorting methods to sort a given list of integers in ascending order.
a) Bubble sort b) Selection sort c) Insertion sort

Exercise 9:
Write a C program that implements the following sorting methods to sort a given list of integers in ascending order.
a) Quick Sort b) Merge sort

Exercise 10:
Write C program to implement the following searching methods to search an element in a given list of integers
a) Linear Search b) Binary Search

REFERENCE BOOKS

1. Programming in C, Pradeep Dey, Manas Ghosh, Oxford Heigher Education
2. Computer programming and Data Structures, E.Balaguruswamy, Tata Mc Graw Hill. 2009 revised edition.
3. Mastering C, K.R. Venugopal and S.R. Prasad, TMH Publications.

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I B.Tech, II-Sem (ECE) P 3 C 2

(A0494152) ELECTRONIC DEVICES AND CIRCUITS LAB

OBJECTIVES:

- This Lab provides the students to get an electrical model for various semiconductor devices. Students can find and plot V_I characteristics of all semiconductor devices. Student learns the practical applications of the devices. They can learn and implement the concept of the feedback and frequency response of the small signal amplifier

OUTCOMES:

- Generate sine, square and triangular waveforms with required frequency and amplitude using function generator.
- Measure voltage, frequency and phase of any waveform using CRO
- Understand and analyse the operation of half wave and full wave rectifiers with and without filters.
- Understand the application of the Zener diode experimentally.
- Analyse the characteristics of different electronic devices such as PN diode, BJT, JFET and UJT.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3				2				3				2		1
CO2	3	1	2		2				3				2	1	
CO3	3	3	2	2	1	2			3		2		2	2	
CO4	3	1	1	1		1			3				1	2	1
CO5	3	2	1	2		2			3		2		1	1	1

ELECTRONIC WORKSHOP PRACTICE (in 3 lab sessions):

1. Identification, Specifications, Testing of R, L, C Components (Color Codes), Potentiometers, Switches (SPDT, DPDT, and DIP), Coils, Gang Condensers, Relays, Bread Boards.
2. Identification, Specifications and Testing of Active Devices, Diodes, BJTs, Low power JFETs, MOSFETs, Power Transistors, LEDs, LCDs, SCR, UJT. Study and operation of
   - Multi-meters (Analog and Digital)
   - Function Generator
   - Regulated Power Supplies.
3. Study and Operation of CRO.

(For Laboratory examination – Minimum of 8 experiments)

1. Generating the Lissajious patterns and finding unknown frequency.
2. PN Junction diode characteristics.
3. Zener diode characteristics and Zener as a Regulator.
4. Transistor CB characteristics (Input and Output).
5. Transistor CE characteristics (Input and Output).
6. Rectifier without filters (Full wave &Half wave).
7. Rectifier with filters (Full wave &Half wave).
8. FET characteristics.
9. MOSFET characteristics.
10. SCR characteristics.
11. UJT characteristics.
12. Series and shunt regulators using transistors.

Equipment required for Laboratories:

1. Regulated Power supplies (RPS) - 0-30v
2. CROs - 0-20M Hz.
3. Function Generators- 0-1 M Hz.
4. Multimeters
5. Decade Resistance Boxes/Rheostats
6. Decade Capacitance Boxes
7. Micro Ammeters (Analog or Digital) - 0-20 µA, 0-50µA, 0-100µA, 0-200µA
8. Voltmeters (Analog or Digital)- 0-50V, 0-100V, 0-250V
9. Electronic Components- Resistors, Capacitors, BJTs, LCDs, SCRs, UJTs, FETs, LEDs, MOSFETs, Diodes (Ge & Si type), Transistors (NPN&PNP type)

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3 2

(A0391151) ENGINEERING WORKSHOP

(Common to all branches)

OBJECTIVES:

- The budding Engineer may turn out to be a technologist, scientist, entrepreneur, practitioner, consultant etc. There is a need to equip the engineer with the knowledge of common and newer engineering materials as well as shop practices to fabricate, manufacture or work with materials. Essentially he should know the labor involved, machinery or equipment necessary, time required to fabricate and also should be able to estimate the cost of the product or job work. Hence engineering work shop practice is included to introduce some common shop practices and on hand experience to appreciate the use of skill, tools, equipment and general practices to all the engineering students.

OUTCOMES:

- A student should know the basic knowledge of various tools and their use in different sections of manufacturing such as fitting, carpentry, tin smithy, welding etc. and basic engineering practices such as plumbing, electrical wiring, electronic circuits, machine shop practice.
- Ability to design and model various basic prototypes in the trade of fitting such as Straight fit, V- fit.
- Ability to make various basic prototypes in the trade of Tin smithy such as rectangular tray, and open Cylinder.
- Ability to perform various basic House Wiring techniques such as connecting one lamp with one switch, connecting two lamps with one switch, connecting a fluorescent tube, Series wiring, Go down wiring.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		1	2	2	1				2		2	1	2		
CO2					2	1			2	2	2				
CO3					2	1			2	2	2		1		
CO4					2	1			2	2	2			2	

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

1. TRADES FOR EXERCISES:

A] Carpentry
1. T-Lap Joint
2. Cross Lap Joint
3. Dovetail Joint
4. Mortise and Tennon Joint

B] Fitting
1. Vee Fit
2. Square Fit
3. Half Round Fit
4. Dovetail Fit

C] House Wiring
1. Parallel / Series Connection of two/three bulbs
2. Stair Case wiring
3 Tube Light Wiring
4. Measurement of Earth Resistance/Go down Wiring

D] Tin Smithy
1. Rectangular Tray
2. Square Box without lid
3. Open Scoop
4. Funnel

E] Welding 1. Single V butt joint
2. Lap joint
3. Double V butt joint
4. T fillet joint.

F] Soldering 1.Soldering & Desoldering Practice
2. Series Circuit
3. Parallel Circuit

2. TRADES FOR DEMONSTRATION:

a) Plumbing
b) Machine Shop
c) Bosch Power Tools

REFERENCE BOOKS:

1. Engineering Work shop practice for JNTU, V. Ramesh Babu, VRB Publishers Pvt. Ltd., 2009.
2. Work shop Manual / P.Kannaiah/ K.L.Narayana/ SciTech Publishers.
3. Engineering Practices Lab Manual, Jeyapoovan, Saravana Pandian, 4/e Vikas.
4. Dictionary of Mechanical Engineering, GHF Nayler, Jaico Publishing House.

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II B.Tech, I-Sem (ECE) T C
3+1* 3

(A0020153) SPECIAL FUNCTIONS AND COMPLEX VARIABLES

OBJECTIVES:

- To make aware students about the importance and symbiosis between mathematics and engineering. Achieve confidence with mathematical tools which an essential weapon in modern Graduate Engineer's Armory. Balance between the development of understanding and mastering of solution techniques with emphasis being on the development of student's ability to use Mathematics with understanding to solve engineering problems by retaining the philosophy learning by doing.

OUTCOMES:

Engineering Graduates will be able to

- Acquire Knowledge of special functions such as Beta, Gamma, Legendre and Bessel functions, and complex analysis to solve various Engineering Problems. (PO1)
- Understand Problem Analysis of complex numbers, analytic functions and the Cauchy-Riemann equations, elementary transformations, complex integration, the Cauchy integral formulas, Taylor and Laurent series, and the theory of residues.(PO2)
- Analyze Special functions and analysis of function of a complex variables to various Engineering problem(PO2)
- Apply the solutions of complex analysis to the problems which do not have solutions in the real plane such as the problems in space study, aero system, potential functions, fluid mechanics etc.(PO5)
- Synthesize the problems of Analyticity in the extension of Differentiability from real to complex plane and to find the mappings of various complicated regions in the image plane.(PO3)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3													1	1
CO2		2						1					2		
CO3		2													2
CO4					2					1				2	
CO5			2											1	2

UNIT-I

Special functions: Gamma function-Properties- Beta function-properties- Relation between Gamma and Beta function – Evaluation of Integrals.

Bessel function –Legendre polynomials – Generating function-Recurrence relations – Orthogonality.

UNIT - II

Functions of complex variable – Continuity – Differentiability – Analyticity Properties – Cauchy - Riemann equations in Cartesian and polar coordinates. Harmonic and conjugate harmonic functions – Milne -Thompson method.

UNIT-III

Elementary functions: Exponential, trigonometric, hyperbolic functions and their properties - General power Z^c (c is complex), principal value.

Con formal mapping: Transformation by e^z, ln z ,z^2,z^n (n positive integer)sin z,cosz, z + a/z, Translation, rotation, inversion and bilinear transformation – fixed -points- cross ratio- properties- invariance of circles and cross ratio – determination of bilinear transformation mapping of 3 given points.

UNIT-IV

Complex integration:Line integral-evaluation along a path by indefinite integration-Cauchy's integral theorem-Cauchy's integral formula-Generalized integral formula.

UNIT-V

Complex power series: Radius of convergence-Expansion in Taylor's series, Maclaurin's series and Laurent series. Singular point-Isolated singular point-pole of order m- essential singularity.

UNIT-VI

Statement of Fundamental Theorem of Algebra and its applications.

Residue- Evaluation of residue by formula and by Laurent series – Residue theorem. Evaluation of integrals of the type :

a) Improper real integrals $\int_{\infty}^{\infty} f(x)dx$

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

c) $\int_{-\infty}^{\infty} e^{imx} f(x)dx$d) Integrals by indentation.

TEXT BOOKS:

1. Advanced Engineering Mathematics By Erwin Kreyszig.
2. Advanced Engineering Mathematics By R.K. Jain and S.R.K. Iyengar, Narosa Publications.

REFERENCES:

1. A Text Book of Engineering Mathematics, Vol – 1, T.K.V. Iyengar, B. Krishna Gandhi and Others S. Chand & Company.
2. Higher Engineering Mathematics by B.S.Grewal, Khanna Publishers.
3. A Text Book of Engineering Mathematics, Thomson Book Collection.
4. Engineering Mathematics By Srimantha Pal et.al. Oxford University Press.
5. Engineering Mathematics, Sarveswara Rao Koneru, Universities Press.

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(A0404154) SWITCHING THEORY AND LOGIC DESIGN

(Common to ECE & EEE)

OBJECTIVES:

- 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.
- Analysis of logic circuits and optimization techniques to minimize gate count, signals, IC count, or time delay.
- To strengthen the principles of logic design and use of simple memory devices, flip-flops, and sequential circuits.
- To fortify the documentation standards for logic designs, standard sequential devices, including counters and registers.
- To understand design of logic functions using PLDs (ROM, RAM, PAL, PLA).

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

- Convert one number system to other number system, Performs various arithmetic operations, Classifications of different BCD codes,
- Simplify the given logical function by using Boolean algebra, k-map and tabular methods.
- Understand the concepts of PLD's (ROM/PROM, PAL & PLA).
- Design and analyse combinational and sequential logic circuits.
- Optimize combinational and sequential logic circuits.
- Design of Sequential circuits using ASM charts.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	1										1	2	
CO2		3	3										1	2	
CO3		2	3									1	1		2
CO4	2	3	2									1	1	1	1
CO5	2	3										1		2	1
CO6	1	2	2									1	1	2	1

UNIT-I

NUMBER SYSTEMS, CODES AND BOOLEAN ALGEBRA: Philosophy of number systems – complement representation of Negative numbers, Binary arithmetic, BCD addition and subtraction, Excess-3 addition, Binary codes, Error correcting and detection codes- parity codes, Hamming codes.

UNIT-II

SWITCHING FUNCTIONS AND IT'S MINIMIZATION:

Fundamental postulates of Boolean algebra, Basic theorems and properties, Switching functions, Canonical and standard forms, Algebraic simplification, Digital Logic Gates, Universal Gates ,Multilevel NAND/NOR realizations. K-map method, Prime-Implicants, Don't care combinations, Minimal SOP and POS forms, Tabular Method, Prime-Implicant chart.

UNIT-III

COMBINATIONAL LOGIC DESIGN: Half adder, Full adder, Ripple carry adder, Carry look ahead generator, BCD adder, Half substractor, Full substractor, Encoder, Decoder, Multiplexer, De-Multiplexer, MUX realization of Switching functions, Code-converters, 2x2 and 2x3 array multipliers, Magnitude comparator, BCD to 7-segment display.

UNIT-IV

PROGRAMABLE LOGIC DEVICES, THRESHOLD LOGIC: Basic PLD's-ROM, PROM, PLA, PAL Realization of switching function using PLD's Capabilities and limitations of Threshold gate, realization basic logic gates and universal logic gates using threshold gates, analysis of simple threshold gates.

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UNIT-V

SEQUENTIAL CIRCUITS: Classification of sequential circuits, Basic Flip-Flops, Excitation and Characteristic Tables. Steps in Synchronous Sequential circuit design. Design of modulo-N counters, Ring and Johnson counters, Universal shift register, Serial Binary adder, Sequence Detector. FSM-capabilities and Limitations, Mealy and Moore models, Minimization of completely specified Sequential Machines using partition method.

UNIT-VI

ASM CHARTS: Salient features of the ASM chart, components of ASM charts, difference between ASM chart and conventional flow chart, difference between ASM chart and state diagram, system design using control logic, examples sequence detector, MOD-N counter, binary multiplier.

TEXTBOOKS:

1. Switching & Finite Automata theory- ZviKohavi, TMH,2nd Edition.
2. Digital Design-Morries Mano, PHI, 3rd Edition,2006.
3. Switching Theory and Logic design-A. Anand Kumar,2008.

REFERENCES:

1. An Engineering Approach to Digital Design-Fletcher, PHI.
2. Fundamentals of Logic Design-Charles H.Roth.5th Edition, 2004, Thomson publications.
3. Digital Logic Applications and Design-John M.Yarbrough, 2006, Thomson Publications.

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3+1* 3

(A0014157) MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS

(Common to ECE, EEE& CE)

OBJECTIVE:

- To impart the students with fundamental concepts of economics, budgeting and accounts and its relevance in business management.

OUTCOME:

The student will be able to…….

- Identify managerial problems with optimum solutions.
- Analyse the demand factors on a product that may be existed/new.
- Know various methods of Demand forecasting
- Understand different business organizations.
- Know techniques and evaluation of capital budgeting.
- Understand financial performance through financial statements

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		3	2	1											
CO2				1	2										
CO3				2			2								
CO4								1	2	2					
CO5		3	2	1	1										
CO6										1	3				

UNIT I

INTRODUCTION TO MANAGERIAL ECONOMICS: Definition, nature and scope of managerial economics- relation with other disciplines- Demand Analysis: Demand Determinants, Law of Demand and its exceptions

UNIT II

ELASTICITY OF DEMAND: Definition, Types, Measurement and Significance of Elasticity of Demand. Demand forecasting, factors governing demand forecasting, methods of demand forecasting (Survey methods, Statistical methods, Expert opinion method, Test marketing, Controlled experiments, Judgmental approach to Demand Forecasting)

UNIT III

TYPES OF BUSINESS ORGANISATIONS AND NEW ECONOMIC ENVIRONMENT: Characteristic features of business, features and evaluation of sole proprietorship, partnership, Joint Stock Company, public enterprises and their types, changing business environment in post-liberalization scenario.

UNIT IV

CAPITAL AND CAPITAL BUDGETING: Capital and its significance, types of capital, estimation of fixed and working capital requirements, methods and sources of raising finance.

Nature and scope of capital budgeting, features of capital budgeting proposal, methods of capital budgeting – payback method, accounting rate of return (ARR) and Net present value method (Simple problems).

UNIT V

INTRODUCTION TO FINANCIAL ACCOUNTING: Double-Entry Book Keeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments).

UNIT VI

FINANCIAL ANALYSIS THROUGH RATIOS: Computation, Analysis and Interpretation of financial statements through Liquidity Ratios (Current and Quick ratio), Activity ratios (Inventory Turnover Ratio and Debtor Turnover Ratio), Capital Structure Ratios (Debt- Equity Ratio, Interest Coverage Ratio) and Profitability ratios (Gross Profit Ratio, Net Profit Ratio, Operating Ratio, P/E Ratios and EPS), Du Pont Chart.

TEXT BOOKS:

1. Management Economics and Financial Analysis, Aryasri, 4/e, TMH, 2009.
2. Managerial Economics, Varshney & Maheswari, Sultan Chand, 2009.

REFERENCES

1. Financial Accounting and Analysis, Premchand Babu, Madan Mohan, Himalaya, 2009
2. Managerial Economics and Financial Analysis, S.A. Siddiqui, and A.S. Siddiqui, New Age
3. Principles of Business Economics, Joseph G. Nellis and David Parker, 2/e, Pearson.
4. Managerial Economics in a Global Economy, Domnick Salvatore, Cengage, 2009.
5. Managerial Economics, H.L.Ahuja, 3/e, S.Chand, 2009

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II B.Tech, I-Sem (ECE) T C
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(A0408153) ELECTRONIC CIRCUIT ANALYSIS

OBJECTIVES:

- To study the analysis and design of single stage and multistage amplifiers at low and high frequencies.
- Electrical equivalent model of transistor at low and high frequencies.
- Study of small signal and large signal amplifiers and their area of applications.
- To understand the concepts of feedback and their applications (Voltage feedback amplifiers and oscillators)

OUTCOMES:

- Design and Analysis of small signal model of BJT (CE, CB, CC) and FET amplifiers.
- Analysis of multistage (CE) and feedback amplifiers.
- Design the different types of oscillator circuits.
- Design and analysis of transistor circuits at high frequencies.
- Determine the efficiency of power amplifiers.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	3	2		1							1	3	1	
CO2	2	2			2							2	3	2	
CO3	2	3	2	2	1							2		2	1
CO4	1	3	2	2								1	1	2	1
CO5	3	1	2		1							2		2	1

UNIT-I

SINGLE STAGE AMPLIFIERS: Review of small signal equivalent model of BJT and JFET, Analysis of single stage transistor amplifier (CE, CB, and CC) using h-parameters: Input impedance, Output impedance voltage gain and current gain, Comparison of transistor configurations in terms of A_I, R_i, A_v, R_o, Analysis of single stage JFET amplifiers (CS, CG, and CD) using h-parameters, design consideration of small signal amplifiers, Illustrative problems.

UNIT-II

MULTI STAGE AMPLIFIERS: Millers Theorem, Different Coupling Methods used in Amplifiers-RC, Direct, Transformer coupled Amplifiers. Analysis of two stage (Cascaded) RC Coupled amplifiers (CE configuration). High input Resistance Transistor Circuits. Cascode Transistor Configuration, CE-CC Amplifiers. Two Stage RC Coupled JFET amplifier (in Common Source (CS) configuration, Illustrative problems).

UNIT-III

HIGH FREQUENCY TRANSISTOR CIRCUTS: Transistor at High Frequencies, Hybrid-□π Common Emitter Transistor Model, Determination of Hybrid- π Parameters, Variation of Hybrid Parameters with $|I_C|$, $|V_{CE}|$ and Temperature. The Hybrid-π CE Short Circuit Current Gain, CE Current Gain with Resistance Load, Gain Bandwidth product, Design of High frequency Amplifier. Frequency Effects, Amplifier Analysis, Illustrative problems.

UNIT-IV

FEEDBACK AMPLIFIERS: Concept of feedback, Classification of feedback amplifiers, General characteristics of negative feedback amplifiers, Effect of Feedback on Amplifier characteristics, Voltage series, voltage shunt, current series, and current shunt feedback amplifiers with discrete components and their analysis, series and shunt regulators using transistor, Illustrative problems.

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UNIT-V

OSCILLATORS: Condition for Oscillations. RC and LC type Phase Shift oscillators. Hartley and Colpitts oscillators, Wein bridge oscillator, Crystal oscillator, Frequency and amplitude stability of Oscillators, Illustrative problems.

UNIT-VI

LARGE SIGNAL AMPLIFIERS: Importance of Power Amplifiers, Types of Power amplifiers, Class A Power Amplifier, Maximum Efficiency of Class A amplifier, Transformer Coupled Audio amplifier, Types of Distortions in amplifiers, Push Pull amplifier (Class A, Class B), Complimentary Symmetry , Phase Inverters, Class C, D and S operations, Heat Sinks, Introduction to tuned amplifiers, Illustrative problems.

TEXT BOOKS :

1. Integrated Electronics – J. Millman and C.C. Halkias, Mc Graw-Hill, 1972.
2. Electronic Circuit Analysis and Design – Donald A. Neaman, Mc Graw Hill.

REFERENCES :

1. Electronic Devices and Circuits Theory – Robert L. Boylestad and Louis Nashelsky, Pearson/Prentice Hall, 9thEdition,2006.
2. Micro Electronic Circuits – Sedra A.S. and K.C. Smith, Oxford University Press, 5th ed.
3. Principles of Electronic Circuits – S.G.Burns and P.R.Bond, Galgotia Publications, 2nd Edn.., 1998.
4. Electronic Devices and Circuits, Theodore F. Bogart Jr., J.S. Beasley and G. Rico, Pearson Edition, 6th Edition, 2004.

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II B.Tech, I-Sem (ECE) T C
3+1* 3

(A0409153) SIGNALS AND SYSTEMS

OBJECTIVES:

- Study of signals and systems.
- Analysis of signals & systems and frequency transform methods.
- To understand the concepts of convolution and correlation.

OUTCOMES:

- Classification of continuous and discrete time signals and concept of orthogonality.
- Analyze the periodic and a periodic signals using Fourier analysis.
- Classify the systems based on their properties and determine the response of LTI system.
- Apply the laplace transform and Z-transform for analyze the continuous and discrete time signals.
- Concept of convolution, correlation and sampling theorem are useful for analysis in the areas of linear systems and communication theory.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1			1							1			
CO2	3	2		2	1							1		1	
CO3	2	1										1		1	
CO4	3	3		2	1				2			2		3	1
CO5	2	1		2	1				1			1			1

UNIT-I

INTRODUCTION TO SIGNALS: Definition of signals, classification of signals and systems, 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, exponential and sinusoidal signals, concepts of impulse function, Unit step function, Signum function.

UNIT-II

REPRESENTATION OF SIGNALS USING FOURIER SERIES AND FOURIER TRANSFORMS: Representation of Fourier series, Continuous time periodic signals, properties of Fourier series, Dirichlet's conditions, Trigonometric Fourier series and Exponential Fourier series, Complex Fourier spectrum, Deriving Fourier transform from Fourier series, Fourier transform of arbitrary signal, Fourier transform of standard signals, Fourier transform of periodic signals, properties of Fourier transforms, Fourier transforms involving impulse function and unit step function.

UNIT-III

SIGNAL TRANSMISSION THROUGH LINEAR SYSTEMS: Linear system, Impulse response of a linear system, Linear time invariant (LTI) system, Linear time variant (LTV) system, Transfer function of a LTI system. Filter characteristics of linear systems. Distortion less transmission through a system, Signal bandwidth, system bandwidth, Ideal LPF, HPF and BPF characteristics, Causality and physical realization-The poly-wiener criterion, Relationship between bandwidth and rise time.

UNIT-IV

CONVOLUTION AND CORRELATION OF SIGNALS: Concept of convolution in time domain and frequency domain, Graphical representation of convolution, Convolution properties of Fourier transforms. Cross correlation and auto correlation of functions, properties of correlation function, Energy density spectrum, Parseval's theorem, Power density spectrum, Properties of convolution, Relation between convolution and correlation, Detection of periodic signals in the presence of noise by correlation, Extraction of signal from noise by filtering.

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UNIT-V

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

UNIT-VI

SAMPLING THEOREM AND Z-TRANSFORM: Representation of continuous time signals by its sample - Sampling theorem – Reconstruction of a Signal from its samples, aliasing – discrete time processing of continuous time signals, sampling of discrete time signals. Fundamental difference between continuous and discrete time signals, discrete time signal representation using complex exponential and sinusoidal components, Concept of Z- Transform of a discrete sequence. Distinction between Laplace, Fourier and Z transforms. Region of convergence in Z-Transform, constraints on ROC for various classes of signals, Inverse Z-transform, properties of Z-transforms.

TEXT BOOKS:

1. Signals, Systems & Communications - B.P. Lathi, BS Publications, 2003.
2. Signals and Systems - *A V Oppenheim A S Willsky* With S Hamid *Nawab*, Publisher: Prentice Hall;*2nd*Edition, 2011.

REFERENCES:

1. Signals & Systems - *Simon Haykin*, Barry *Van Veen*, Signals and Systems, *2nd edition*, John*Wiley*& Sons, 2003.
2. Network Analysis - M.E. Van Valkenburg, PHI Publications, 3rdEdn., 2000.
3. Fundamentals of Signals and Systems Michel J. Robert, MGH International Edition, 2008.
4. Signals, Systems and Transforms - C. L. Philips, J.M.Parr and Eve A.Riskin, Pearson education.3rd Edition, 2004.

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II B.Tech, I-Sem (ECE) T C
3+1* 3

(A0243153) ELECTRICAL TECHNOLOGY

OBJECTIVE:

- This course introduces the working principles of different types of AC and DC motors, Generators and Transformers.
- This course introduces different types of AC and DC machines, Transformers
- It also helps to understand the construction and working of single phase motors and some special machines
- To provide theoretical prerequisites necessary to do lab work on DC machines and AC machines

OUTCOMES:

- Know the basic knowledge of AC and DC supply systems.
- Learn the detailed features of dc machines and AC machines including construction and operation.
- Analyse losses, efficiency, voltage regulation and other parameters of different machines.
- Know the EMF equations, torque equations, characteristics, Speed control methods, starting methods of different electrical machines.
- Learn the behaviour and response of different machines under different load conditions.
- Identify the type of electrical machines for a given application.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	1	1		1	1		2	1	1	2			
CO2	3	1	1	2	1	1			2		1	2			
CO3	3	3	2	2	1				2		2	2	2		1
CO4	3	3	2	2	1				2		2	2	2		1
CO5	3	3	2	2	1				2		2	2			
CO6	3			1		1	1		2	1	1	1			

UNIT –I

DC Generator: Principle of operation of DC Generator, Construction details of DC Generator - EMF Equation, simple numerical problems on E.M.F equation. Types of Generators-series shunt& compound Generator. Magnetization Characteristics of Separately excited Generators-Numerical problems on types of Generators.

UNIT –II

DC Motors: Principle of operation of DC Motor- Significance of Back E.M.F-Types of DC Motors-Applications of dc motors – 3 point starters for dc shunt motor-losses and efficiency-Swinburne's test, load test-speed control of DC shunt motor-Numerical problems on E.M.F equation and types of motors.

UNIT –III

Transformers: Principle of operation of Transformer-constructional features- Phasor Diagram on no load and load – equivalent circuit-losses, efficiency and regulation of a transformer, OC & SC tests on transformer-Numerical problems on E.M.F equation, Voltage Regulation and Efficiency.

UNIT –IV

Three phase Induction motor: Principle of operation of 3-phase Induction motor-slip ring and squirrel cage motors- slip torque characteristics-efficiency calculation-starting methods-Auto Transformer & DOL starter. Numerical problems on Torque, slip & efficiency.

UNIT –V

Alternators: Constructional features- Principle of operation-types-EMF equation- distribution and coil span factors- pre determination of regulation by synchronous impedance method – OC & SC test- Numerical problems

UNIT –VI

Single phase motors: Principle of operation of 1-phase Induction motor- constructional features-split phase motors,

Special machines: Construction and principle of operation of DC, AC Servomotors- AC tachometers- Stepper Motors - variable reluctance, permanent magnet and hybrid types(Two-Phase ON-Mode) – Synchros Transmitter & Receiver , Switched reluctance motor- universal motor- Applications.

TEXT BOOKS:

1. Principle of Electrical Engineering by V.K.Mehta, Rohith Mehta, S.Chand publications.
2. Electrical Technology-volume II – B L Theraja- S. Chand.

REFERENCE BOOKS:

1. Electrical Machinery- J B Guptha- katsonbooks.
2. Electrical Machines – I J Nagrath and D P Kothari- PHI Publications.
3. Generalized Theory of Electrical Machines by P.S.Bimbra, Khanna publication

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Department of Electronics and Communication Engineering

II B.Tech, I-Sem (ECE) T C

1+2* 1

(A0010153) APTITUDE ARITHMETIC REASONING AND COMPREHENSION

(Common to All Branches)

(Skill Development Course)

OBJECTIVES:

- To make the students ready to the recruitment drives.
- To raise the confidence of the students to face the written test of any Company.
- To train the students regarding employability skills.

OUTCOMES:

Engineering Graduates will be able to:

- Acquire knowledge of Number Systems, Time and Work, Time and Distance , Geometry and Menstruation ,Coding, Decoding and Reasoning
- Understand to solve Quadratic Equations, Mixtures & Allegations, Simple Interest, Compound Interest, Permutations & Combinations and Non Verbal Reasoning.
- Analyse Data Interpretation, Data Sufficiency, Probability, Coding, Decoding, Connectives Clocks and Calendars Analytical.
- Apply Verbal and Non Verbal Reasoning to solve Analytical Puzzles, Sequencing, Routes and Networks.
- Synthesize Quantitative Techniques and Data Interpretation for Data Sufficiency

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1						3							2		
CO2				2										1	
CO3											2				2
CO4										3					
CO5				3											

UNIT I

Numbers, Number Systems Simple Equations, Ratio, Proportion, Variation Quadratic Equations, Progressions Percentages.

UNIT II

Profit, Loss, Partnerships Averages, Mixtures & Allegations, Simple Interest, Compound Interest, Time and Work-Pipes, indices, surds, inequalities ,Cisterns Time and Distance Geometry and Menstruation.

UNIT III

Permutations & Combinations and Probability Data Interpretation & Data Sufficiency.

UNIT IV

Number & Letter Series, Analogies, Coding Decoding, Odd Man Out Blood Relations.

UNIT V

Direction Sense, Symbols and Notations Deductions & Connectives Clocks, Calendars Analytical

UNIT VI

Reasoning (Distribution+ Binary Logic + Puzzles) Cubes, Venn Diagrams Analytical Puzzles (Linear + Circular +Selections + Sequencing + Routes & Networks + Comparisons) and Non Verbal Reasoning

REFERENCES:

1. R.S.Agarwal " Quantitative Techniques" S.Chand Series
2. Shankuntala Devi " Techniques of Reasoning" S.Chand Series

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3 2

(A0495153) SIGNALS & SYSTEMS SIMULATION LAB

OBJECTIVES:

- The main objective of the Lab is to give the introduction about all signals with the help of their characteristics using MATLAB. This lab also deals with signal processing operation to understand various systems and simulate them using MATLAB.

OUTCOMES:

- Generation of continuous and discrete time signals
- Operations on different signals and sequences
- Convolution and Correlation between signals and sequences
- Apply the Laplace transform and Z-transform for analyze the continuous and discrete time signals.
- Verification of sampling theorem.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2			1							2	1		1
CO2	2	1										1			
CO3	2	2		2	1										2
CO4	2	2			1							2		3	
CO5	2	1		2	1							1			

Minimum 8 experiments/programs to be conducted

1. Basic operations on Matrices.
2. Generation of various signals and sequences (Periodic and aperiodic). Such as unit impulse, unit step, square, saw tooth, triangular, sinusoidal, ramp, sinc function.
3. Operation on signals and sequences such as addition, multiplication, scaling, shifting, folding, computation of energy and average power.
4. Finding the even and odd parts of signal or sequence and real imaginary parts of signals.
5. Convolution between signals and sequences.
6. Autocorrelation and cross correlation between signals and sequences.
7. Verification of linearity and time invariance properties of a given continuous/discrete system.
8. Computation of unit sample, unit step and sinusoidal responses of the given LTI system and verifying its physical reliability and stability properties.
9. Gibbs phenomenon.
10. Finding the Fourier transform of a given signal and plotting its magnitude and phase spectrum.
11. Waveform synthesis using Laplace Transform.
12. Locating zeros and poles and plotting the pole-zero maps in S-plane and Z-plane for the given transform functions.
13. Generation of Gaussian noise (real and complex), computation of its mean, M.S.Values and its skew, kurtosis and PSD, probability distribution function.
14. Sampling theorem verification.
15. Removal of noise by auto correlation/cross correlation in a given signal corrupted by noise.
16. Impulse response of a raised cosine filter.
17. Verification of Weiner-Khinchine relations.
18. Checking a Random process for stationary in wide sense.

Using Licensed MATLAB of version 7.0 and above

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(A0289153) ELECTRICAL TECHNOLOGY LAB

OBJECTIVES:

- To provide practical experience in observing the performance of DC and AC machines, Transformers
- To study the behaviour and characteristics of different machines

OUTCOMES:

- To Understand the AC and DC fundamentals
- To Evaluate the Efficiency of the machine by analyzing test results
- To Identify the type of electrical machines for a given application
- To Select range of apparatus based on the type of machines
- To understand the behaviour and characteristics of different equipments
- Verification of theoretical concepts through experimentation

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1			2			1			1			
CO2	3	3	1			2			1	1		1			
CO3	3	1	1			2			1			1			
CO4	3	3	1			1			2	1		1			
CO5	2	2	1			1			1	2		1	1		
CO6	3	2	1			1			2	1		1			

The following experiments are required to be conducted as compulsory experiments:

1. OCC test on dc generator.
2. Load Test on DC shunt motor.
3. Load test on DC series motor.
4. Swinburne's test on DC Shunt motor.\
5. Speed control of DC Shunt motor by Armature control method.
6. Speed control of DC Shunt motor by Field control method.
7. OC & SC test on 1 phase Transformer (Efficiency)
8. OC & SC test on of 1 phase Transformer (regulation)
9. Load test on 3-phase Induction motor
10. Regulation of Alternator by using Synchronous Impedance methods.
11. Characteristics of Synchro.

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II B.Tech, I-Sem (ECE) P C
3 2

(A0496153) ELECTRONIC CIRCUIT ANALYSIS LAB

OBJECTIVES

- Help students make transition from analysis of electronic circuits to design of electronic circuits.
- To understand the Analysis of transistor at high frequencies.
- To understand the concept of designing of tuned amplifier.
- The student will construct and analyse voltage regulator circuits.
- To understand the circuit configuration and the principle operation of converters, including diode rectifiers, controlled AC-DC converters and DC choppers

OUTCOMES:

- Design and draw the frequency response of small signal BJT (CE) and FET(CS) amplifiers.
- Draw the frequency responses of multistage (CE-CE) and feedback amplifiers.
- Design the different types of oscillator circuits.
- Design and analysis of transistor circuits at high frequencies.
- Determine the efficiency of power amplifiers.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	3	2		1							1		2	1
CO2	2	2			2							2	1	2	
CO3	2	3	2	2	1							2	2	1	
CO4	1	3	2	2								1	3	1	1
CO5	3	1	2		1							2		1	1

I) Design and Simulation of following circuits using Multisim OR Pspice OR Equivalent Simulation Software. (any four of the following)

1. Common Emitter and Common Source amplifier
2. Two Stage RC Coupled Amplifier
3. Current shunt Feedback Amplifier
4. Cascade Amplifier
5. Wien Bridge Oscillator using Transistors
6. RC Phase Shift Oscillator using Transistors
7. Class A Power Amplifier (Transformer less)
8. Class B Complementary Symmetry Amplifier
9. High Frequency Common base (BJT) / Common gate (JFET) Amplifier.

II) Testing in the Hardware Laboratory

A) **Any two circuits simulated in Simulation laboratory**

B) **Any two of the following**

1. Class A Power Amplifier (with transformer load)
2. Class B Power Amplifier
3. Single Tuned Voltage Amplifier
4. RC Phase Shift Oscillator
5. Wien Bridge Oscillator
6. Crystal Oscillator

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II B.Tech, II-Sem (ECE) T C
3+1* 3

(A0009153) ENVIRONMENTAL SCIENCE

(Common to All Branches)

OBJECTIVES:

- Creating the awareness about environmental problems among people.
- Imparting basic knowledge about the environment and its allied problems.
- Developing an attitude of concern for the environment.
- Motivating public to participate in environment protection and environment improvement.
- Acquiring skills to help the concerned individuals in identifying and solving environmental problems.
- Striving to attain harmony with Nature.
- Environmental education should be compulsory, right from the primary up to the post graduate stage.
- Environmental education should have an interdisciplinary approach by including physical, chemical, biological as well as socio-cultural aspects of the environment. It should build a bridge between biology and technology.
- Environmental education should take into account the historical perspective, the current and the potential historical issues.
- Environmental education should emphasize the importance of sustainable development i.e., economic development without degrading the environment.
- Environmental education should emphasize the necessity of seeking international cooperation in environmental planning.
- Environmental education should lay more stress on practical activities and first hand experiences.

OUTCOMES:

- Understand environmental problems arising due to developmental activities.
- Realize the importance of ecosystem and biodiversity for maintaing ecological balance.
- Identify the natural resources and suitable methods for conservation and sustainable development.
- Identify the environmental pollutants and abatement devices.
- Adopt practices that help in promoting balance in nature by making judicious utilization of recourses

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2					1	3	2				2			
CO2	1	2					3	1	2			2			
CO3	1				1	1	3	1	1		1	2			
CO4		1	1		2	1	1	1			1	2			
CO5		1	1				2	1				2			

UNIT I

MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL SCIENCE: Environment -Definition, scope and importance, Segments of Environment-Importance, Productivity, Aesthetical& Optional values of nature, need for public awareness.

UNIT II

RESOURCES AND UTILIZATION: Renewable and non-renewable resources.

a) Natural Resources: soil & water sources (salinity intrusion –conflicts of over utilization of water Resources-water logging, Hydro power project-problems), forest & mineral resources – Utilization-problems.
b) Nonconventional resources of energy(Solar Energy, wind energy and their applications)
c) Chemical fertilizers and pesticides-problems.
d) Green Revolution-white revolution- blue Revolution.
e) Non equitable distribution of Resources.

UNIT III

a) CONCEPTS OF ECO-SYSTEM: Structure and functions of an ecosystem: producers, consumers and decomposers- Interaction between biotic and a biotic factors in an ecosystem- Energy flow and its importance- Tropic levels- food chain- Food web –Ecological Pyramid, Ecological succession

b) TYPES OF ECOSYSTEM: Understanding the types of ecosystem:
(i) Terrestrial (forest, grassland and desert) and
(ii) Aquatic (fresh water and salt water) with an example of each.

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UNIT IV

BIODIVERSITY: Introduction – Definition - genetic, species and ecosystem diversity- Bio-geographical classification of India- Value of biodiversity- Hot-sports of biodiversity- Biodiversity at global, National and local levels- India as a mega diversity nation - Hot-spots of biodiversity- Threats to biodiversity- IUCN Red data book.

Conservation of bio diversity (IN-SITU and EX-SITU conservation)

UNIT V

ENVIRONMENTAL POLLUTION: Introduction - Cause, effects and control measures of

a) Air pollution
b) Water pollution
c) Soil pollution
d) Marine pollution
e) Noise pollution
f) Thermal pollution
g) Nuclear hazards

Municipal Solid waste Management: Sources and Disposable methods.

Disaster management: floods, earthquake, cyclone.

UNIT VI

HUMAN POPULATION:

a) Population and Environment:- Definition of species, community, population; Population growth rate curves, Sex ratio, From unsustainable to sustainable development, Diseases-HIV, Malaria, Diaharia, Cancer.
b) Human rights, fundamental duties and value education.
c) Women and child welfare & Family welfare programs.

SOCIAL ISSUES:

a) Resettlement and rehabilitation of people.
b) Energy Crisis – urban and rural sectors.
c) Greenhouse effect and global warming.
d) Climatic changes.
e) Acid rain.
f) Ozone layer depletion.
g) Sustainability- water conservation methods- Rain water harvesting.

TEXT BOOKS:

1) Deswal, S and Deswal A., (2004), A Basic Course in Environmental Studies, Dhanpat Rai & Co. Delhi.
2) Anubha Kousik and C P Kousik, New age international publishers.
3) Garg, S.K and Garg, R., (2006), Ecological and Environmental Studies, Khanna Publishers, Delhi.
4) Chauhan, A.S., (2006), Environmental Studies, Jain Brothers, New Delhi

REFERENCES:

1) Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
2) Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad –380 013, India, Email:mapin@icenet.net (R).
3) Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p.
4) Clark R.S., Marine Pollution, Clanderson Press Oxford (TB).
5) Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumabai, 1196p.
6) De A.K., Environmental Chemistry, Wiley Eastern Ltd.

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II B.Tech, II-Sem (ECE) T C
3+1* 3

(A0410154) PULSE AND DIGITAL CIRCUITS

OBJECTIVES:

- To understand the concepts of different Pulse and Digital Circuits,
- To understand the concepts of different Switching Circuits,
- To understand the concepts of Time Base Generator Circuits.

OUTCOMES:

- Analyze and design the RC circuits.
- Design the circuits for generating desired wave shapes (Clippers and Clampers)
- Study the working principle of various Multivibrators (Bistable, Monostable, and Astable Multivibrators).
- Explain the importance of voltage time-base generators in this domain
- Realize simple logic gates using diodes and transistors

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3											2	2	
CO2	2	2	2											2	1
CO3	3	3	1										1	2	1
CO4	2												1	2	
CO5	3	3											1	1	1

UNIT I

LINEAR WAVE SHAPING: Introduction to Linear wave shaping, Frequency response of High pass RC circuit- theoretical and mathematical analysis, Sinusoidal, Step, Pulse, Square Wave, Exponential, and Ramp response of High Pass RC circuit, High Pass RC Circuit as differentiator, Frequency response of Low pass RC circuit- theoretical and mathematical analysis, Sinusoidal, Step, Pulse, Square Wave, Exponential, and Ramp response of Low Pass RC circuit, Low Pass RC Circuit as an integrator, Introduction to Attenuators and their applications, RL circuits, Step response of RLC circuit.

UNIT II

SWITCHING CHARACTERISTICS OF DEVICES: Introduction to Switching Devices, Switching action of a Diode, Diode Switching Times: Forward recovery time and reverse recovery time, Transistor switching action, Transistor Switching times: on-time, delay time, rise time, fall time, storage time, off time, Improving Transistor switching times, Design of a transistor switch.

UNIT III

NON-LINEAR WAVE SHAPING: Diode Clipping Circuits: Introduction, applications, Classification, Sinusoidal response of different clipping circuits, Transfer characteristics of diode clipper, Temperature Compensation techniques, Transistor Clipper, Emitter Coupled Clipper, Introduction to Voltage Comparator and Applications of Voltage Comparators, Introduction to Clamping Circuits, clamping operation, Different Clamping Circuits, and Clamping Circuit theorem.

UNIT IV

MULTIVIBRATOR CIRCUITS: Introduction to multivibrators, Classification, Analysis of Fixed-Bias Binary, Design of Fixed-Bias Binary, Self-Bias Binary(brief explanation), Triggering methods, Emitter coupled Binary, Working Principle and Designing of Schmitt Trigger Circuit, Collector-Coupled Monostable Multivibrator: Analysis and design, Astable Multivibrator : Analysis and design.

UNIT V

VOLTAGE TIME BASE GENERATORS: Introduction, General features of Voltage Time-Base signal, Miller time-base generator: Principle, Transistor Miller Sweep Circuit, Bootstrap Sweep Circuit: Principle, Transistor Bootsrap Sweep Circuit, and Sweep Circuit using UJT (UJT Relaxation Oscillator).

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UNIT VI

REALIZATION OF LOGIC GATES USING DIODES AND TRANSISTORS: Diode AND gate, Diode OR gate, Transistor NOT gate and its design, Diode-Transistor Logic, Resistor-Transistor Logic, Resistor-Capacitor-Transistor logic, DCTL, ECL logic, TTL NAND, TTL NOR, TTL NOT gates, and CMOS NOT, NOR, NAND gates.

TEXT BOOKS:

1. Pulse, Digital and Switching Waveforms – Jacob Millman and Herbert Taub, McGraw-Hill, 1991.
2. Solid State Pulse circuits - David A. Bell, PHI, 4th Edn., 2002.

REFERENCES:

1. Pulse and Digital Circuits – A.Anand Kumar, PHI, 2005.
2. Wave Generation and Shaping - L. Strauss.
3. Pulse, Digital Circuits and Computer Fundamentals - R.Venkataraman.
4. Pulse and Digital Electronics – G.K.Mithal.
5. Semiconductor Pulse Circuits With Experiments by Brinton B. Mitchell,Holt Rinehart & Winston; 1970 Edition.

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Department of Electronics and Communication Engineering

II B.Tech, II-Sem (ECE) T C
3+1* 3

(A0411154) ELECTROMAGNETIC FIELDS AND TRANSMISSION LINES

OBJECTIVES:

- To provide the basic skills required to understand, develop, and design various engineering applications involving electromagnetic fields.
- To lay the foundations of electromagnetism and its practice in modern communications such as wireless, guided wave principles such as fiber optics and electronic electromagnetic structures including those on the sub-micron scale.
- To provide basic laboratory exposure to electromagnetic principles and applications

OUTCOMES:

- Apply knowledge of mathematics, science, and engineering to the analysis and design of systems involving electric and magnetic fields as well as electromagnetic waves.
- Identify, formulate, and solve engineering problems in the area of electric and magnetic fields and waves.
- Use the techniques, and skills, which are necessary for engineering practice.
- Acquire skills to carry out research for technical issues.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2												1	
CO2		3	1										3		
CO3	1		2											2	
CO4		1	2	3											3

UNIT I

Coordinate Systems, Cartesian coordinate system, polar coordinate system and spherical coordinate system, Vector Calculus: Curl and divergence, Vector identities, Illustrative problems.

UNIT-II

Static Electric Fields : 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, convection and conduction currents, Continuity Equation, Poisson's and Laplace's Equations, Illustrative Problems.

UNIT III

Static Magnetic Fields: Biot-Savart Law, Ampere's Circuital Law and Applications, Magnetic Flux Density, Maxwell's Two Equations for Magnetostatic Fields, Magnetic Scalar and Vector Potentials, Force due to magnetic fields, Ampere's Force Law, Related Problems.

UNIT IV

Time Varying EM Fields: Faraday's Law of induction 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, Pointing vector and pointing theorem, power loss in a plane conductor, Related Problems.

UNIT V

Uniform plane waves: Wave Equations for Conducting and Perfect Dielectric Media, Uniform Plane Waves – Definition, 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 types, Related Problems

UNIT VI

Transmission Lines: Types, Equivalent Electrical circuits, Transmission Line Equations, Primary & Secondary Constants, Characteristic Impedance, Propagation Constant, Phase and Group Velocities, VSWR, Infinite Line, Distortion – Distortion less and minimum attenuation condition, Input Impedance Relations, SC and OC Lines, Reflection Coefficient, VSWR. UHF Lines as Circuit Elements; $\lambda/4$, $\lambda/2$, $\lambda/8$ Lines, impudence transformations, smith chart-its configuration and applications, single stub and double stub matching.

TEXT BOOKS:

1. Elements of Electromagnetics – Matthew N.O. Sadiku, Oxford Univ. Press, 3rd ed., 2001.
2. Engineering Electromagnetics – William H. Hayt Jr. and John A. Buck, TMH, 7th ed., 2006.

REFERANCES:

1. Electromagnetic Waves and Radiating Systems – E.C. Jordan and K.G. Balmain, PHI, 2nd Edition, 2000.
2. Electromagnetic Field Theory and Transmission Lines – G.S.N. Raju, Pearson Edn. Pte. Ltd., 2005.
3. Transmission Lines and Networks – Umesh Sinha, Satya Prakashan (Tech. India Publications), New Delhi, 2001.

Rajeev Gandhi Memorial College of Engineering and Technology

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Department of Electronics and Communication Engineering

II B.Tech, II-Sem (ECE) T C

3+1* 3

(A0412154) RANDOM VARIABLESAND RANDOM PROCESSES

OBJECTIVES:

- To understand the concepts of a Random Variable and operations that may be performed on a single Random variable.
- To understand the concepts of Multiple Random Variables and operations that may be performed on Multiple Random variables.
- To understand the concepts of Random Process and Temporal & Spectral characteristics of Random Processes.

OUTCOMES:

- Understand the concepts of random variables and their characteristics.
- Apply the concepts of probability theory to determine the statistical parameters of random variables.
- Understand the concepts of random process and their characteristics.
- Apply the concepts of random process to analyze linear systems

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3													1	
CO2	1	3	1												2
CO3	3														
CO4	1	3	1												
CO5													1		2

UNIT I

RANDOM VARIABLE: Basic concepts of probability, Definition of a Random Variable, Conditions for a Function to be a Random Variable, Discrete and Continuous Random Variables, Mixed Random Variable, Distribution Function, Density function, Properties of Density Functions, Gaussian Random Variable, Binomial, Poisson, Uniform, Exponential, and Rayleigh Random Variables, Conditional Distribution and Density Functions, and their properties, Methods of defining Conditioning Event.

UNIT II

OPERATION ON ONE RANDOM VARIABLE – EXPECTATION : Introduction, Expected Value of a Random Variable, Expected Value of a Function of a Random Variable, Conditional Expected Value, Moments about the Origin, Central Moments, Variance and Skew, Statement of Chebychev's, Markov's, and Chernoff's Inequlities (Statements only), Characteristic Function, Moment Generating Function, Transformations of a Random Variable: Monotonic Transformations of a Continuous Random Variable, Nonmonotonic Transformations of a Continuous Random Variable, Transformation of a Discrete Random Variable.

UNIT III

MULTIPLE RANDOM VARIABLES : Vector Random Variables, Joint Distribution Function, Properties of Joint Distribution, Marginal Distribution Functions, Joint Density Function, Properties of Joint Density, Marginal Density Functions, Conditional Distribution and Density – Point Conditioning, and Interval conditioning, Statistical Independence, Sum of Two Random Variables, Sum of Several Random Variables, Central Limit Theorem (Statement only).

UNIT IV

OPERATIONS ON MULTIPLE RANDOM VARIABLES: 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, N Random Variables, Properties of Gaussian Random Variables, Transformations of Multiple Random Variables: One Function and Multiple Functions, Linear Transformation of Gaussian Random Variables.

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UNIT V

RANDOM PROCESSES – TEMPORAL CHARACTERISTICS: The Random Process Concept, Classification of Processes, Deterministic and Nondeterministic Processes, Distribution and Density Functions, Statistical Independence, First-Order Stationary Processes, Second- Order and Wide-Sense Stationarity, N-Order and Strict-Sense Stationarity, Time Averages and Ergodicity, Mean-Ergodic Processes, Correlation-Ergodic Processes, Autocorrelation Function and Its Properties, Cross-Correlation Function and its Properties, Covariance Functions, Discrete-Time Processes and Sequences, Gaussian Random Processes, Poisson Random Process.

UNIT VI

RANDOM PROCESSES – SPECTRAL CHARACTERISTICS: The Power Density Spectrum and its Properties, Bandwidth of the Power Density Spectrum, Relationship between Power Spectrum and Autocorrelation Function, The Cross-Power Density Spectrum and its Properties, Relationship between Cross-Power Spectrum and Cross-Correlation Function.

LINEAR SYSTEMS WITH RANDOM INPUTS: Fundamentals of Linear System, Random Signal Response of Linear Systems: System Response– Convolution, Mean and Mean-squared Value of System Response, autocorrelation Function of Response, Cross-Correlation Functions of Input and Output, System Evaluation using Random Noise, Spectral Characteristics of System Response: Power Density Spectrum of Response, Cross-Power Density Spectrums of Input and output.

TEXT BOOKS:

1. Probability, Random Variables & Random Signal Principles - Peyton Z. Peebles, TMH, 4th Edition, 2001.
2. Probability, Random Variables and Stochastic Processes – Athanasios Papoulis and S. Unnikrishna Pillai, PHI, 4th Edition, 2002.

REFERENCES:

1. Communication Systems Analog& Digital – R.P. Singh and S.D. Sapre, TMH, 1995.
2. Probability and Random Processes with Application to Signal Processing – Henry Stark and John W. Woods, Pearson Education, 3rd Edition,2001.
3. Probability Methods of Signal and System Analysis. George R. Cooper, Clave D. MC Gillem,Oxford, 3rd Edition, 1999.
4. Statistical Theory of Communication - S.P. Eugene Xavier, New Age Publications, 2003.
5. Signals, Systems & Communications - B.P. Lathi, B.S. Publications, 2003.

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II B.Tech, II-Sem (ECE) T C
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(A0503158) OBJECT ORIENTED PROGRAMMING THROUGH JAVA

(Common to ECE & EEE)

OBJECTIVES:

After taking this course, the student should be able to:

- Describe the Windows event-driven programming model
- Build simple JAVA applications according to the model
- Write fluent JAVA code for creating classes
- Use JAVA variables, data, expressions and arrays
- Design and create forms, menus and controls
- Write clear, elementary Java programs (applets and applications)
- Use a Java-enabled browser and/or the applet viewer to execute Java applets
- Use the Java interpreter to run Java applications
- Design and construct effective graphic user interfaces for application software.
- Use Java Beans, RMI to build complex business applications

OUTCOMES:

- Student can able to apply Object oriented approach to design a software .
- Student can able to write programs using classes and objects.
- Able to specify the forms of inheritance and use them in program's
- Able to analyze the polymorphic behavior of objects.
- Student can able to create files in java and Handling runtime errors using Exception handling.
- Students can able to develop the multithread programming

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	3	1	2				1		2	2	2	1	1
CO2	2	1	3	2	2							3	2	2	1
CO3	1	2	2	1	1							2	2	2	2
CO4	1	1	2	1	2						2	2			1
CO5	2	2	2		2						1	2		1	
CO6	2	2	2		2						1	2		1	2

UNIT I

Introduction To Java – Introduction to OOP, OOP Concepts, History of Java, Java buzzwords, How Java differs from C , Structure of Java Program, data types, variables, constants, type conversion and casting, enumerated types, scope and life time of variables, operators, expressions , control flow- conditional statements, break and continue, simple java program, arrays, parameter passing.

UNIT II

Classes, Object and Methods- Defining a class, Fields declaration, Method Declaration, static fields and methods, access control, this, overloading methods and constructors, recursion, garbage collection.

Inheritance –Inheritance concept, types of Inheritance, Super and Sub classes, Member access rules, super uses.

UNIT III

Polymorphism- final classes and methods, casting, polymorphism- dynamic binding, method overriding, abstract classes and methods, the Object class and its methods.

Strings: Strings, string functions, String Buffer

UNIT IV

Interfaces – Interfaces vs. Abstract classes, defining an interface, implementing interfaces, accessing implementations through interface references, extending interface.

Packages- Defining, Creating and Accessing a Package, Understanding CLASSPATH, importing packages.

UNIT V

Files – streams, byte stream class, character stream class, random access file operations; File management using, File class, using java.io.

Exception handling – benefits of exception handling, exception hierarchy, checked exceptions and unchecked exceptions, usage of try, catch, throw, throws and finally, rethrowing exceptions, built in exceptions, creating own exceptions

UNIT VI

Multithreading - Differences between multiple processes and multiple threads, thread states, creating threads, interrupting threads, thread priorities, synchronizing threads, interthread communication, thread groups, daemon threads, thread deadlock.

TEXT BOOKS

1. Java; the complete reference, 7th editon, Herbert schildt, TMH.
2. Programming with java, 4th edition, E Balaguruswamy TMH.

REFERENCES

1. An Introduction to programming and OO design using Java, J.Nino and F.A. Hosch, John wiley & sons.
2. An Introduction to OOP, second edition, T. Budd, pearson education.
3. Introduction to Java programming 6th edition, Y. Daniel Liang, pearson education.
4. An introduction to Java programming and object oriented application development, R.A. Johnson-Thomson.
5. Core Java 2, Vol 1, Fundamentals, Cay.S.Horstmann and Gary Cornell, seventh Edition, Pearson Education.

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II B.Tech, II-Sem (ECE) T C
3+1* 3

(A0413154) ANALOG COMMUNICATIONS

OBJECTIVES:

- To study the fundamental concept of the communication systems.
- To study various analog modulation techniques.
- To study various transmitters and receivers.
- To study the influence of noise and communication systems.

OUTCOMES:

- Acquire the basic knowledge of various CW and pulse Modulation techniques and distinguish these systems.
- Comprehend the basics of Communication System and Analog Modulation Methods.
- Apply the basic knowledge of signals and systems and basic mathematics while analyzing the modulation systems mathematically.
- Choose and design appropriate type of transmitter and receiver for the given area of communication system.
- Recognize and purge the effects of noise on different modulation systems using hardware components and/or CAD tools (MATLAB).

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3													2	
CO2	2	3	1										1		
CO3	3	3	2											2	1
CO4		3	3	2									2		
CO5	2	2	3	2											3

UNIT I

INTRODUCTION TO COMMUNICATION SYSTEMS: Communication process, Elements of Communication Systems; Types of communication systems, its frequency ranges, Modulation: Need for Modulation, Types of modulation: AM, FM, PM, Advantages, Disadvantages and Applications.

UNIT II

LINEAR CW MODULATION: Introduction, Mathematical Representation of AM, single tone modulation index and multi tone modulation index, Power Relationships, AM signal generation (Square law, switching modulation), demodulation (Envelop detector), Virtues and Limitations of AM.

DSB-SC: Mathematical Representation of DSB-SC, DSB-SC generation (Ring modulation), Demodulation: Coherent detection, filtering of AM Signals and Spectra, DSB signals and spectra.

SSB-SC: Filtering of sidebands, SSB signal generation and demodulation using Hilbert transform, VSB Generation and demodulation, illustrative problems.

UNIT III

ANGLE CW MODULATION: Introduction, Types of Frequency Modulation (FM), Mathematical representation of FM, Modulation index, Deviation sensitivity, Deviation ratio, Transmission bandwidth of FM (Carson's rule), Narrow band FM, Wide band FM, generation of FM: Direct Method, Indirect Method, demodulation of FM. Voltage and Power for FM, Pre-emphasis and De-emphasis, Illustrative Problems.

Pulse Modulation (PM): Introduction, Narrow band PM, Phase modulation and indirect FM; FM demodulators, Slope detector, Balanced slope discriminators, Phase difference discriminators, Ratio detector, PLL Detectors, Distortion and Transmission estimates.

UNIT IV

TRANSMITTERS AND RECEIVERS: AM TRANSMITTERS: Low level and high level transmitters, FM TRANSMITTERS: Armstrong FM transmitters, RECEIVERS: TRF receivers, super heterodyne receiver.

UNIT V

PULSE MODULATION TECHNIQUES: Definition, Types: PAM, PWM, PPM, Sampling, Nyquist rate, Different sampling techniques, Generation and Detection of PAM, PWM, PPM.

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UNIT VI

NOISE IN COMMUNICATION SYSTEMS: Introduction, Noise in Base band Systems, Noise figure, different types of noise, System Model and Parameter, SNR at the output of a Base band System. Noise in AM systems: System model and parameter, Noise in DSB and SSB Systems. Noise in Angle Modulation Systems: Output SNR in Angle Modulation, Threshold effects in Angle Modulation Systems. Improvement of SNR using Pre-emphasis and De-emphasis, Comparison of Continuous Wave Modulation.

TEXT BOOKS:

1. Simon Haykin, "Communication Systems", Wiley-India edition, 3rd edition, 2010.
2. B.P. Lathi, & Zhi Ding, "Modern Digital & Analog Communication Systems", Oxford University Press, International 4th edition, 2010.

REFERENCES:

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. Communication systems by Kennedy.
3. Linear Integrated Circuits – D. Roy Chowdhury, New Age International (p) Ltd, 2nd Edition, 2003.
4. Sham Shanmugam, "Digital and Analog Communication Systems", Wiley-India edition, 2006.
5. "Electronic Communications systems" Modulation and Transmission-Robert Schoenbeck, UBS Publications, New Delhi.

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II B.Tech, II-Sem (ECE) T C

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(A0011154) CORPORATE MANAGEMENT SKILLS

(Skill Development Course)

(Common to All Branches)

OBJECTIVE:

- To educate the students about the importance of communication skills in the corporate sector and personality development with respect to the behavioural aspects of the individuals.

OUTCOME:

- Able to improve the communication skills.
- Able to obtain confidence of the student with respect to the interpersonal communication.
- Able to cultivate the team culture and teamwork.
- Able to take the challenges of group discussion.
- Able to perform better way in personal interviews and presentations.
- Able to identify the emotions of the people.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1										3		1			
CO2									3	1		1			
CO3							1		3			1			
CO4									2	2		1			
CO5							1	2	2	2		1			
CO6								3	2						

UNIT-1:

Concept of Communication: Significance-Functions of Communication-Process-Different types of Communication-Essentials of good communication-Channels of communication-Formal and informal communication networks.

UNIT-2:

Types of Communication: Oral Communication-Tips to make oral communication effective-Merits and Demerits of oral communication-Written Communication-Steps in Writing-Merits and Demerits of written communication-Non verbal communication and Different types in it.

UNIT-3:

Barriers to Communication: Types of barriers-Technological, Sociopsychological-How to overcome the barriers-Different communication styles and models.

UNIT-4:

Interviews: Resume preparation, Interview Process-Types-Common mistakes in interview- Preparation for interviewer- Preparation for interviewee.

UNIT-5:

Emotional Intelligence: Felt Vs Displayed emotions-Emotional dimensions- External constraints on emotion-Gender and emotion-Importance of emotional intelligence.

UNIT-6:

Personality and Perception: Determinants of personality-Theories of personality-Components of perception-Factors influencing the perception process-Johari Window

REFERENCE BOOKS:

1) Business communication Meenakshi Raman oxford university prof
2) Business communication Lalitha Ramakrishna
3) Business communication Hudson,5 /E,Jaico publication
4) Effective communication Harward Business school, Harward Business review no 1214
5) Management and organization Behaviour by P.Subbarao

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II B.Tech, II-Sem (ECE) P C
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(A0593154) OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB

OBJECTIVES:

- To make the student operating systems.
- Learn a object oriented way of solving problems.
- To teach the student to write programs in Java to solve the problems

OUTCOMES:

After Completion of the Lab Course student should be able:

- Student can able to write a programs using classes and objects.
- Student can able to develop the polymorphic behaviour of objects.
- Students can able to design a software using object oriented approach.
- Able to implement the programs handling built in exceptions and creating custom exceptions.
- Able to develop the Mutli thread programming

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	3	1	2				1		2	2	2	1	2
CO2	2	1	3	2	2							3	1	1	1
CO3	1	2	2	1	1							2	2		1
CO4	1	2	1	1					2		2	2		1	
CO5	2	2	2		2						1	2	1	1	

EXPERIMENTS

1) a) Write a Java program that prints all real solutions to the quadratic equation ax2 + bx + c = 0. Read in a, b, c and use the quadratic formula. If the discriminant b2 -4ac is negative, display a message stating that there are no real solutions.

   b) The Fibonacci sequence is defined by the following rule: The first two values in the sequence are 1 and 1. Every subsequent value is the sum of the two values preceding it. Write a Java program that uses both recursive and non-recursive functions to print the nth value in the Fibonacci sequence.

2) a) Write a Java program that prompts the user for an integer and then prints out all prime numbers up to that integer.

   b) Write a Java program to multiply two given matrices.

3) Write a Java Program that reads a line of integers, and then displays each integer, and the sum of all the integers (Use String Tokenizer class of java. until)

4) Write a Java program to find both the largest and smallest number in a list of integers.

5) a) Write a Java program to illustrate constructor overloading.

   b) Write a Java program to illustrate method overloading.

   c) Write a Java program to illustrate method overriding.

6) Write a Java program that implements the Sieve of Eratosthenes to find prime numbers.

7) Write a Java program to sort a list of names in ascending order.

8) a) Write a Java program to illustrate single inheritance.

   b) Write a Java program to illustrate multilevel inheritance.

9) Write a Java Program that uses a recursive function to compute ncr. (Note: n and r values are given)

10) Write a Java program to perform the following operations:
    a) Concatenation of two strings.
    b) Comparison of two strings.

11) Write a Java Program to solve Towers of Hanoi problem.

12) a) Write a Java program to implement multiple inheritance.

b) Write a java program to implement creation of package, accessing package.

13) Write a Java program that uses functions to perform the following operations:

a) Inserting a sub-string in to the given main string from a given position.
b) Deleting n characters from a given position in a given string.

14) Write a Java program that checks whether a given string is a palindrome or not. Ex: MADAM is a palindrome.

15) a) Write a Java program that reads a file name from the user, then displays information about whether the file exists, whether the file is readable, whether the file is writable, the type of file and the length of the file in bytes.

b) Write a Java program that reads a file and displays the file on the screen, with a line number before each line.

c) Write a Java program that displays the number of characters, lines and words in a text file.

16)a) Write a Java program to implement how multiple exceptions are handling.

b) Write a Java program to implement user defined exceptions.

17) a) Write a Java program that creates three threads. First thread displays "Good Morning" every one second, the second thread displays "Hello" every two seconds and the third thread displays "Welcome" every three seconds.

b) Write a Java program that correctly implements producer consumer problem using the concept of inter thread communication.

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. JDK Kit. Recommended

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(A0092151) ENGLISH LANGUAGE COMMUNICATION SKILLS LAB

(Common to All Branches)

English Language Lab acts as a platform for learning, practicing and producing language skills through interactive lessons and communicative mode of teaching. Communicative method for learning languages combines extensive, high-quality content with flexible and interactive multimedia technology. Learners can act and respond in a variety of ways at their own pace. Through a wide range of activities, a variety of skills are aimed to develop in a learner. A learner needs to communicate: oral and written comprehension, as well as oral and written expression. It also addresses the concepts of grammar, lexicon**,** phonetics and conjugation.

OBJECTIVES:

- To develop language learning through accuracy in grammar
- To enrich the discourse competence, to prepare the learner to be able to produce contextualize written text and speech.
- To achieve good pronunciation patterns and accent.
- To acquire strategic competence to use both spoken & written language to use in a wide range of communication strategies.

OUTCOMES:

- Social interactions, greetings, self-introductions and small talk
- Practice standard pronunciation patterns and accent
- To present oral and technical presentations
- Acquire communication skills
- Learn participate in GDs.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1				2	1	2	2	3		2	2		2
CO2	1	1				2	1	2	2	3		2		2	
CO3	1	1				2	1	2	2	3		2		2	2
CO4	1	1				2	1	2	2	3		2		3	
CO5	1	1				2	1	2	2	3		2	2		3

UNIT I

Functional English – self Introduction - Greetings – Requests – seeking information Invitations Ice breaking activities

UNIT II

Multi Media Lab Practice: Introduction to Phonetics I – Speech sounds –Vowels – Diphthongs – Consonants

UNIT III

Multi Media Lab Practice: Phonetics II– Word Accent – Intonation –Rhythm

UNIT IV

Information Transfer – Activity -Description of Technical Objects

UNIT V

Oral Presentations - Activity – JAM

UNIT VI

Group Communication – Activity – GD/Role plays

LICENSED SOFT WARE AVAILABLE IN THE LANGUAGE LAB:

- K-VAN , SOFTX Technologies: English Language and Communication Skills Soft ware IV.0
- Alania Series, English Mastery, Visual & Media Works:Listening Comprehension – Grammar – Vocabulary
- Rosetta Stone Soft ware, Visual & Media Works: LSRW Skills
- EL Client, Globerena Technologies: Phonetics – Job Skills
- K-VAN Solutions: Advanced Communication Skills Lab Soft ware.

REFERENCE BOOKS:

- Better English Pronunciation by J.D. O' Connor, Cambridge University Press,1980
- Longman Dictionary of Contemporary English for Advanced Learners, Pearson Education Ltd.
- Speak with Power and Confidence: Tested Ideas for Becoming a More Powerful Communicator by Patric Collins , 2007
- Professional Communication Skills **,**by Praveen S.R. Bhatia (Author), A.K. Jain (Author), A.M. Sheikh (Author),2006.

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3 2

(A0497154) ANALOG COMMUNICATIONS LAB

(Hardware and Simulation using MATLAB)

OBJECTIVES:

- To study the various steps involved in generating different analog modulation techniques.
- To study the process of detecting different analog modulation techniques.
- To study different pulse modulation techniques.

OUTCOMES:

- Study and Comprehend different Analog Modulation Systems.
- Analyze the operation of each device in various types of modulation systems.
- Design and conduct experiments of different analog modulation systems,in order to interpret the results.
- Demonstrate the skill to use modern engineering tools like CAD tools.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		2	1										2		
CO2	3	3	2	1	1				1	2			2		
CO3	1	3	3	2	1	1			2	1		2		3	2
CO4		2	2	1	3				2	1	1	2			3

Minimum 10 experiments should be conducted:

PART-A:

1. Amplitude modulation and demodulation.
2. Diode detector characteristics.
3. Frequency modulation and demodulation.
4. Balanced modulator.
5. Pre-emphasis & De-emphasis.
6. Digital Phase detector.
7. Phase locked loop.
8. Synchronous detector.
9. SSB system.
10. Squelch Circuit.
11. Frequency Synthesizer.
12. AGC Characteristics.
13. Pulse Width Modulation and Demodulation.
14. Pulse Position Modulation and Demodulation.

PART-B:

Modelling of Analog Communications Using MATLAB

1. Amplitude Modulation and Demodulation Technique.
2. DSB-SC Modulation and Demodulation Technique.
3. FM Modulation and Demodulation Technique.
4. SSB Modulation and Demodulation Technique.
5. PWM Modulation and Demodulation Technique.
6. PPM Modulation and Demodulation Technique.

Equipment required for Laboratories:

1. RPS - 0 – 30 V
2. CRO/DSO - 0 – 20 M Hz.
3. Function Generators - 0 – 1 M Hz
4. RF Generators - 0 – 1000 M Hz/0 – 100 M Hz.
5. Multimeters.
6. Lab Experimental kits for Analog Communication
7. Required Components.
8. Radio Receiver/TV Receiver Demo kits or Trainees.
9. Spectrum Analyzer - 60 M Hz.
10. PC Installed with MATLAB Software.

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(A0414155) DIGITAL COMMUNICATIONS

OBJECTIVES

- Understand, analyze, and design fundamental digital communication systems.
- The course focuses on developing a thorough understanding of digital communication systems by using a series of specific examples and problems.
- Understand analysis and design of modern digital communication systems.
- Analyze and design noise-free digital communication systems

OUTCOMES:

After the completion of the course the student will be able to:

- Understand the basic process of analog to digital conversion by applying the basics of Fourier Transform.
- Formulate the merits and demerits of various digital modulation systems in order to evaluate their performance based on output Signal-to-Noise ratio[SNR] and transmission bandwidth.
- Apply the knowledge of digital electronics and signals & systems to evaluate Power spectral density [PSD] and Error Probability [P_e] of various digital modulation techniques [binary and m-ary].
- Design a digital communication system with error control sub-systems by applying various coding Techniques.
- Choose and design appropriate modulation and demodulation system for the given specifications of application.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3		2											2	
CO2	2	3	3	2											
CO3	3	3	2	1									1	2	
CO4		1	3	2										3	1
CO5		3	3												2

UNIT I

DIGITIZATION TECHNIQUES FOR ANALOG MESSAGES: Introduction - Importance of Digitization Techniques, Elements of Pulse Code Modulation (PCM) - Generation and Reconstruction, Quantization and coding, Quantization error, PCM with Noise, Companding in PCM, Delta modulation, Adaptive Delta Modulation, Differential PCM systems (DPCM), Adaptive differential PCM systems.

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, Optimum filtering.

UNIT III

BAND PASS DIGITAL TRANSMISSSION: Digital modulation formats, Coherent binary modulation techniques: coherent binary ASK, coherent BPSK and coherent BFSK, Coherent quadrature modulation techniques: Coherent QPSK, Error probability calculation of BASK, BPSK, BFSK, Signal space representation of BPSK,BFSK, QPSK, Non coherent binary modulation techniques: Non-coherent ASK, Non-coherent FSK, DPSK.

UNIT IV

INFORMATION THEORY: Uncertainty, information and entropy, source coding theorem, Huffman coding, discrete memory less channels, mutual information, channel capacity, channel coding theorem, differential entropy and mutual information for continuous ensembles, channel capacity theorem.

UNIT V

CHANNELCODING-I: Linear block codes: Matrix representation of linear block codes, Syndrome decoding ,Minimum distance considerations, Error detection and correction of linear block codes Hamming codes,

Convolution codes: Encoding of convolution codes using time domain and transform domain approach, code tree, trellis and state diagram, Maximum-likehood decoding of convolution codes: Viterbi algorithm.

UNIT VI

CHANNEL CODING-II: Cycliccodes: Generator polynomial for the cyclic codes, parity check polynomial, encoder for cyclic codes, calculation of the syndrome, Introduction to Cyclic Redundancy Check (CRC) codes, numerical problems in CRC.

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. Digital communications - Simon Haykin, John Wiley, 2005.

REFERENCES:

1. Herbert Taub& Donald L Schilling, "Principles of Communication Systems", Tata McGraw-Hill, 3rd Edition, 2009.
2. Digital Communications – John Proakis, TMH, 1983. Communication Systems Analog & Digital – Singh &Sapre, TMH, 2004.
3. Digital Communications by Bernard Sklar, Tata McGraw Hill.

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III B.Tech, I-Sem (ECE) T C
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(A0019156) INDUSTRIAL MANAGEMENT

(Common to ECE & CE)

OBJECTIVE:

- To know the evolution of concept of management
- To learn about the plant layout in Production
- To know about the process of work study
- To learn about the inventory management and the marketing strategies
- To study the importance of statistical quality control techniques in industries
- To learn about human resource management and their job evaluation

OUTCOME:

The student will be able to….

- Relate the importance of management at the work place
- Practically assess the concept of plant layouts in production
- Using the techniques of work study and time study in measurement of work
- Analysing the inventory stock by using the inventory control techniques and also apllying the marketing strategiesof the product in different stages of product life-cycle.
- Learn to judge the quality of a product by application of different techniques of quality control
- Implement the various aspects of human resource management

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1									3	2	2			3	
CO2	2		2		3								2		
CO3			2	1	2						3		1	2	
CO4					2		1			2				2	
CO5			2	3	2								1	2	
CO6								3		3	2	2			2

UNIT I:

PROFESSIONAL MANAGEMENT: Concepts of Management – Functions of Management – Systems Approach to Management Evolution of Management Thought : Taylor's Scientific Management, Fayol's Principles of Management, Douglas Mc-Gregor's Theory X and Theory Y, Mayo's Hawthorne Experiments, Hertzberg's Two Factor Theory of Motivation, Maslow's Hierarchy of Human Needs –Leadership styles and characteristics of effective leadership.

UNIT-II

Plant Location And Plant layout: Plant Location , definition, factors affecting the plant location –plant layout,- types of plant layout-Productivity and Production: Definition of productivity, production, techniques for enhancing productivity level.

UNIT III

Work study - Definition, Method study - definition, method study an outline, various types of charts Work measurement- definition, time study, , Work Sampling – definition , standard time calculations

UNIT-IV

Materials Management-Objectives, Inventory – functions types associated costs, inventory control techniques(ABC and EOQ). Stores management and stores records. Purchase management, duties of purchase manager, associated forms.

Marketing Management: Definition-4Ps of Marketing Mix -Market segmentation- Targeting and positioning-product life cycle and marketing strategies in different stages of product life cycle-

UNIT V

Quality Control: Meaning, process control, Statistical Quality Control-techniques-variables Attributes-assignable and non-assignable causes- variable control charts, and R charts, attributes control charts, p charts

and c charts. Acceptance sampling plan- single sampling and double sampling plans,OC curves. Introduction to TQM- Quality Circles, ISO 9000 series procedures.

UNIT VI

HUMAN RESOURCE MANAGEMENT: Functions of HRM, Job Evaluation, methods of job evaluation-merit rating and different methods of merit rating.

TEXT BOOKS:

1) Manufacturing Organization and Management, Amrine/ Pearson, 2nd Edition, 2004.
2) Industrial Engineering and Management O.P. Khanna Dhanpat Rai.

REFERENCES:

1) Stoner, Freeman, Gilbert, Management, 6th Ed, Pearson Education, New Delhi, 2005.
2) Panner Selvam, Production and Operations Management, PHI,2004.
3) Dr. C. Nadha Muni Reddy and Dr. K. Vijaya Kumar Reddy, Reliability Engineering & Quality Engineering, Galgotia Publications, Pvt., Limited.
4) Ralph M Barnes, Motion and Time Studies, John Wiley and Sons, 2004.
5) Chase, Jacobs, Aquilano, Operations Management, TMH 10th Edition, 2003

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3+1* 3

(A0415155) ANTENNA AND WAVE PROPAGATION

OBJECTIVES:

- To make the students to be aware of fundamentals of antenna theory and its basic parameters.
- To make them learn the fundamental principles of transmission line theory related to communications including the propagation of signals on a transmission line and in free space
- To make them to understand how a radio wave propagates through various layers of atmosphere and against its climatic changes.

OUTCOMES:

- Examine the characteristics and comprehend various parameters of a given antenna by applying the Vector Calculus for Radiation (Pattern) Measurement.
- Design various antennas: from simple single-wire antenna to complex antenna arrays and to evaluate their parameters.
- Characterize different types of antennas depending on the application.
- Assess the need for Antenna Arrays and analyze different Antenna Arrays mathematically.
- Outline the factors involved in the Propagation of Radio Waves and decide which Mode of Wave Propagation

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2												1	
CO2		2	3	1				1	1						2
CO3		3	2		1		2					1	1	2	
CO4	2	2	3	1										2	
CO5		3	2									1		1	

UNIT I

ANTENNA FUNDAMENTALS: Introduction, Radiation Mechanism – single wire, Two-wire, Current Distribution on a Thin wire Antenna of different lengths. Antenna Parameters - Radiation Patterns, Patterns in Principal Planes, Main Lobe and Side Lobes, Beam Width, Beam Area, Radiation Intensity, Radiation Resistance, Beam Efficiency, Directivity, Gain and Resolution, Antenna Apertures, Aperture Efficiency, Effective Height. Near-field and Far-field regions.

UNIT II

BASIC ANTENNA ELEMENTS: Retarded Potentials (Vector and Scalar Descriptions), Hertzian Dipole, Half-wave Dipole, Quarter-wave Monopole; Current Distribution, Evaluation of Field Components, Expression for Radiated Power and antenna parameters for Alternating Current-Carrying Element, Half-wave Dipole and Quarter-wave Monopole; Small Loop Antenna, Comparison between Loop Antenna and Dipole, Illustrative problems.

UNIT III

ANTENNA ARRAYS: Introduction to Antenna Arrays, Purpose of Antenna Arrays; N-element Uniform Linear Arrays – Broadside Arrays (BSA), End-Fire Arrays (EFA), Collinear Arrays, Parasitic Arrays, Derivation of their Characteristics of BSA and EFA with Increased Directivity, Comparison of BSA and EFA. Principle of Pattern Multiplication, Binomial Arrays; Effects of Uniform and Non-Uniform Amplitude Distributions, Related Problems.

UNIT IV

HF, VHF ANTENNAS: Classification of Antennas based on different characteristics. HF,VHF Antennas: V-antennas, Rhombic Antennas and Design Relations, Helical Antennas– Significance, Geometry, Basic properties; Design considerations, Modes of Helical antennas- Axial Mode and Normal Mode. Yagi - Uda Antenna Arrays, Folded Dipoles & their characteristics.

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UNIT V

UHF AND MICRO-WAVE FREQUENCY ANTENNAS: Reflector Antennas: Flat Sheet and Corner Reflectors; Paraboloidal Reflectors– Geometry, Characteristics, Types of Feeds. Cass grain feed system. Horn Antennas – Types, Optimum Horns, Design Characteristics of Pyramidal Horns, Babinet's Principle; Lens Antennas – Geometry, Features, Types- Non-metallic & Metallic lens and Zoning, Patch and Slot Antennas. Applications of all antennas,

Antenna Measurements - Introduction, Co-Ordinate System, Patterns to be measured, Pattern Measurement Arrangement, Directivity and Gain Measurements (Comparison, Absolute and 3-Antenna Methods).

UNIT VI

WAVE PROPAGATION: Introduction-Frequency ranges and modes of propagations.Ground Wave Propagation– Characteristics, Parameters, Wave Tilt, Flat and Spherical Earth Considerations and Roughness Calculations.

SKY WAVE PROPAGATION– Formation of Ionospheric Layers and their Characteristics, Mechanism of Reflection and Refraction, Critical Frequency, MUF & Skip Distance –Optimum Frequency, LUHF, Virtual Height, Ionospheric Abnormalities, Ionospheric Absorption. SPACE WAVE PROPAGATION - Introduction, field strength variation with distance and height, effect of Earth's Curvature, M-curves and Duct propagation, scattering phenomena, fading path loss calculations.

TEXT BOOKS

1. Antennas and Wave Propagation – K.D. Prasad, Satya Prakashan, Tech India Publications, New Delhi, 2001.
2. Antenna Theory - C.A. Balanis, John Wiley & Sons, 2nd ed., 2001.

REFERENCE

1. Electromagnetic Waves and Radiating Systems – E.C. Jordan and K.G. Balmain, PHI, 2nd Edition, 2000.
2. Antennas and Wave Propagation - GSN Raju, Pearson Education India, 2009.
3. Antennas and Wave Propagation- John D. Krauss and Ronald J. Marhefka and Ahmad S. Khan, 4th Edition, TMH, New Delhi.
4. Transmission and Propagation – E.V.D. Glazier and H.R.L. Lamont, The Services Text Book of Radio, vol. 5, Standard Publishers Distributors, Delhi.
5. Antennas and Wave Propagation by V.Soundararajan, SCITECH Publications.

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III B.Tech, I-Sem (ECE) T C
3+1* 3

(A0416155) ANALOG IC APPLICATIONS

OBJECTIVES:

- Study of Op-Amps, Classification of Op-Amps.
- To study and design various linear applications of Op-Amps.
- To study and design various nonlinear applications of Op-Amps.
- Study of Analog filters.
- Study of Timers and Phase Locked Loops.
- Study of D/A and A/D converters.

OUTCOMES:

- Understand the characteristics of op-amps
- analysis and design of the linear and non-linear applications of an opamps
- Analysis and design of active filters,
- Analysis and Design of multi vibrators using IC555 and understand working principle of PLL
- Classify and comprehend the working principle of data converters.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2												1	2	
CO2	1	3	3										2	2	
CO3	1	3	3										2	2	1
CO4	1	3	3										2	2	
CO5	2												1	1	2

UNIT-I

INTRODUCTION TO OP-AMPS: Integrated circuits-types, classification, temperature ranges, power supplies, OP-Amp Block diagram, Differential amplifier circuit configurations, Characteristics of OP-Amps, ideal and practical OP-Amp specifications, DC and AC characteristics, 741 OP-Amp and its features, OP-Amp parameters, input and output offset voltages and currents, slew rate, CMRR, PSRR.

UNIT-II

LINEAR APPLICATIONS OF OP-AMPS: Inverting and non-inverting amplifier, adder, subtractor, integrator and differentiator, difference amplifier, instrumentation amplifier, AC amplifier, Voltage to Current, Current to Voltage converters, Buffers.

UNIT-III

NON LINEAR APPLICATIONS OF OP-AMPS: Non-linear function generation, comparators, Multivibrators, Triangular and square wave generators, Log and antilog amplifiers, precision rectifiers, Three terminal voltage regulators, IC 723 voltage regulators.

UNIT-IV

ANALOG FILTERS: Introduction, Butterworth filters-first order, second order LPF, HPF filters. Band pass, Band reject and all pass filters, notch filters.

UNIT-V

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, Introduction to IC 566, VCO applications and details.

UNIT–VI

D/A AND A/D CONVERTERS: Introduction, Basic DAC techniques, weighted resistor DAC, R-2R Ladder DAC, Inverted R-2R DAC and different types of ADCs-parallel comparator type ADC, counter type ADC, successive approximation ADC and Dual slope ADC.DAC and ADC specifications

TEXT BOOKS:

1. Op-Amps & Linear ICs - Ramakanth A. Gayakwad, 4th edition, PHI, 1987.
2. Linear Integrated Circuits – D. Roy Chowdhury, New Age International (p) Ltd, 2nd Edition, 2003

REFERENCES:

1. Design with Operational Amplifiers & Analog Integrated Circuits - Sergio Franco, McGraw Hill, 1988.
2. Operational Amplifiers & Linear ICs by David A. Bell, 2nd edition, Oxford University Press, 2010.

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III B.Tech, I-Sem (ECE) T C
3+1* 3

(A0417155) DIGITAL IC APPLICATIONS THROUGH VHDL

OBJECTIVES:

- To be able to use computer-aided design tools for development of complex digital logic circuits
- To be able to model, simulate, verify, analyze, and synthesize with hardware description languages
- To be able to design and prototype with standard cell technology and programmable logic
- To be able to design tests for digital logic circuits, and design for testability

OUTCOMES:

- Study the operation of CMOS and TTL logic families and CMOS electrical behavior
- Study of different modeling styles of VHDL language
- Analyze the operations of various combinational and sequential logic elements
- Design and implementation of the various combinational and sequential logic elements using VHDL

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	1									1		2	1
CO2					2								2	1	1
CO3		1											3	2	1
CO4		3	3	1									1	1	2

UNIT I

CMOS LOGIC: Introduction to Logic families, CMOS logic: CMOS logic levels, MOS Transistors, Basic CMOS inverter circuit, Switch model for CMOS inverter, CMOS NAND, NOR gates and its switch models, Fan-In, CMOS Non-Inverting gates, CMOS AND-OR-INVETR gates and OR-AND-INVERT gates. CMOS steady state electrical behavior: Logic levels and Noise margins, Circuit behavior with Resistive loads, Estimating sink and source currents, Circuit behavior with Non ideal inputs, Fanout, Effects of Loading, Unused Inputs, How to Destroy a CMOS Device. CMOS dynamic electrical behavior: Transition Time, Propagation Delay, Power Consumption, CMOS logic families.

UNIT II

BIPOLAR LOGIC AND INTERFACING: Bipolar logic, Transistor logic, TTL families, 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 III

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**: Component Statement, Component Declaration. **Data flow design elements**: Simple concurrent signal assignment statement, conditional signal assignment statement, Select signal assignment statement. **Behavioral design elements:** Process statement**,** Sensitivity list**,** Variable declaration, Variable assignment, IF, CASE, LOOP, FOR-LOOP, WHILE LOOP statements.

UNIT IV

COMBINATIONAL LOGIC DESIGN: **COMBINATIONAL LOGIC DESIGN:** Decoders: Logic diagrams of 74X139 and 74X138. Seven segment decoder: 74X49. Encoder: 74X148.Three state devices: 74X125, 74X126, 74X240, 74X241, 74X540 and 74X541, Logic diagram of 74X245. Multiplexers: 74X151, 74X157, 74X153, 74X251, 74X257 and 74X252. Logic diagrams of 74X151 and 74X157Expanding Multiplexers. EX-OR gates and parity circuits: 74X86, 74X280, Logic diagrams of 74X86, 74X280. Comparators: 74X85 and 74X682, Higher order comparator designs. Adders and Subtractors : Half adder, Full adder, Full Subtractor, 74x999, Ripple carry adder, Carry-Lookahead adder, 74X283, Group ripple adders. ALUs: 74X181, 74X381, 74X382 Combinational multipliers. VHDL modes for the above ICs.

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UNIT V

DESIGN EXAMPLES (USING VHDL): Barrel shifter, Mode dependent comparator, floating-point encoder, dual parity encoder, designing with ROM.

UNIT VI

SEQUENTIAL LOGIC DESIGN: Latches and flip-flops: 74X74, 74X109, 74X112, 74X375, 74X174, 74X175, 74X374, 74X373, 74X273, 74X377.counters: 74X163, 74X161, 74X160, 74X162, 74X169, design of Mod counters, shift register: 74X164, 74X166, 74X194, Ring counter, Johnson counter, self correcting counters and their VHDL models.

TEXT BOOKS:

1. Digital Design Principles & Practices – John F. Wakerly, PHI/ Pearson Education Asia, 3rd Ed., 2005.
2. Fundamentals of Digital Logic with VHDL Design – Stephen Brown and Zvonko Vramesic, McGraw Hill, 2nd Edition., 2005.

REFERENCES:

1. Digital System Design Using VHDL – Charles H. Roth Jr., PWS Publications, 2nd edition, 2008.
2. A VHDL Primer – J. Bhasker, Pearson Education/ PHI, 3rd Edition.

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(A0209154) CONTROL SYSTEMS

(Common to ECE & EEE)

OBJECTIVES

- Be prepared to apply mathematics, established scientific and engineering knowledge, for the development and implementation of a broad range of electronic systems
- Be knowledgeable about current technologies and be prepared to adapt to technology advances and ensure professional growth through an appreciation for lifelong learning.
- Basic skill in methods of design and analysis across a broad range of electrical and computer engineering areas

OUTCOMES

- Obtain the transfer function of the LTI systems.
- Analyze the system behaviour for different test signals using time domain specifications.
- Determine the stability of the LTI system
- Understand and draw the Bode plot, Polar plot and Nyquist plot
- Usage of state space analysis.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2											3	2	1
CO2	2	3											3	2	1
CO3		2		2									2	2	2
CO4			1	3									2	3	1
CO5	1		2										2	1	2

UNIT-I

INTRODUCTION: Concepts of control systems – Open loop and closed loop control systems and their differences, examples – Types of feedback control systems

Mathematical modeling of Electrical & Mechanical(translational & rotational) systems, differential equations-Electrical analogous (F-V,F-I) of mechanical system- use of Laplace transforms in control systems-Transfer function: concepts, features-Transfer functions of above systems

UNIT-II

BLOCK DIAGRAM REDUCTION & SIGNAL FLOW GRAPH REPRESENTATION: Block diagram representation of electrical systems and reduction techniques - Signal flow graphs and reduction using mason's gain formula- Transfer function of DC servomotor, AC servomotor

UNIT-III

TIME RESPONSE ANALYSIS: Definition & classification of time response- Standard test signals – Type & order of a system- Transient response of fist order and 2^{nd} order systems for step input- Transient response specifications- Steady state response- Steady sate errors and error constants- Effects of PD, PI & PID controllers.

UNIT- IV

STABILITY ANALYSIS IN S-DOMAIN: The concept of stability - Routh stability criterion, special cases, advantages and limitations

Root locus technique: The root locus concept, construction of root loci- Effects of adding poles and zero's to G(s) H(s) on the root loci.

UNIT- V

FREQUENCY RESPONSE ANALYSIS: Introduction – Steady state response to sinusoidal input (frequency response) - Bode diagrams- Phase margin and gain margin- Stability analysis from Bode plots- Determination of transfer function from Bode diagram- Polar plots - Nyquist plots- Stability analysis

UNIT – VI

STATE SPACE ANALYSIS: Concept of state, state variables and state model, derivation of state models from block diagrams- solving time invariant state equations –state transition matrix and its properties.

TEXT BOOKS:

1) Control System Engineering – I.J. Nagarath and M.Gopal, New age international (P) limited, 2^{nd} edition.
2) Automatic control systems – B.C. Kuo, Jhon wiley and son's 2003

REFERENCE BOOKS:

1) Modern control engineering – Katsuhiko Ogata, PHI, 3^{rd} edition1998
2) Control Systems Engineering- NISE, 3^{rd} Edition-John Wiley
3) Control systems – U A Bakshi & V U Bakshi, Technical Publications, Pune

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1+2* 1

(A0418155) EMBEDDED 'C' & VERILOG

(Skill Development Course)

OBJECTIVES:

- To understand the fundamental concepts of Embedded systems
- To learn various syntax in embedded c.
- To know various embedded Tools.
- To understand the basics of the Language and its conventions.
- To form an introduction to design through Verilog.
- To design various components like Flip-flops,decoders and multiplexers using different modelling.

OUTCOMES:

- Understand the fundamentals and core of the embedded system
- Write a program in keil and generate the hex file.
- Design examples like Traffic light, Digital Camera, Home Automation
- Understand the basics of the verilog HDL language and its conventions.
- Learn the concepts of dataflow, behavioural and structural models for digital circuits.
- Design and analyze the combinational circuits and sequential logic circuits through verilog HDL using different modelling.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2											1	2	1
CO2	2	2	1										2	3	
CO3	1	2	3										3	2	2
CO4	2	1										2	2	2	1
CO5	2	2										2	2	2	1
CO6	3	3										3	3	2	1

UNIT I

INTRODUCTION TO EMBEDDED SYSTEMS: Fundamentals of Embedded System-Definition, characteristics, constraints, Examples of embedded systems, Core of Embedded systems, Classification of Embedded Systems- Small, Medium and Large Scale Embedded System, System On-Chip.

UNIT II

EMBEDDED 'C': Introduction, Purpose of the Standard, Guiding Principles, Comparison with 'C'; General Rules- Line Width Braces Parentheses, Common Abbreviations;

Data Types: -Naming Conventions, Fixed-Width Integers and Signed Integers, Floating Point, Structures and Unions; Modules-Naming Conventions, Header Files, Source Files, File Templates, Procedures -Naming Conventions, Functions, Function-Like Macros, Tasks, Variables-Naming Conventions, Initialization, Variable Declarations; Expressions and Statements, If-Else Statements, Switch Statements Loops, Unconditional Jumps. Preprocessor directives, Modifiers, Command line Arguments.

UNIT III

Embedded software development process and tools: Development process and hardware-software, software tools-compilers, cross compilers, testing and debugging tools, Introduction to keil, Testing sample programs.

UNIT IV

Verilog Hardware Description Language: Program structure, Logic system, Nets, Variables, Constant, Vectors, Operators, Arrays, Logical operators and expressions, Compiler directives.

UNIT V

Design elements: Structural design elements, Dataflow design elements, Behavioral design elements, Time dimension, Simulation.

UNIT VI

Combination circuit modeling: Decoders (74X138), Priority encoder (74X148), Multiplexers (74X151), Comparators (74X85).

Sequential circuit modeling: Flip Flops (74X74); Counters: Binary counters (74X163); Decade counters (74X160); Shift registers (74X194); Ring counter, Johnson counter.

TEXT BOOKS

1. Embedded system Architecture, Programming and Design-Raj Kamal, Second Edition, TMH Companies.
2. Embedded C coding Standard –Michael Barr from Neutrino.
3. Digital Design Principles & Practices – John F. Wakerly, PHI/ Pearson Education Asia, 4th Ed., 2007.

REFERENCES

1. An Embedded Primer – David E. Simon, Pearson Edition,2005
2. Computer as Components, Principles of Embedded Computing System Design.– Wayne Wolf, 2nd Edition.

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III B.Tech, I-Sem (ECE) P C
3 2

(A0498155) DIGITAL COMMUNICATIONS LAB

OBJECTIVES:

- To study the signal sampling by determining the sampling rates for baseband signals and reconstruct the signal.
- To study various modulation and demodulation process.
- To study the various steps involved in generating and degenerating different pulse modulation techniques.
- To study various modulation techniques using simulation process (MATLAB).
- To study the generation and demodulation of PSK, DPSK, FSK.

OUTCOMES:

- Study and comprehend the basics of Communication system and different Digital Modulation Systems.
- Analyze the operation of each device in various types of modulation systems.
- Design and conduct experiments of different Digital modulation systems, in order to interpret the results.
- Demonstrate the skill to use modern engineering tools like CAD tools.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		2	1											1	
CO2	3	3	2	1	1				1	2				2	
CO3	1	3	3	2	1	1			2	1		2	3	1	
CO4		2	2	1	3				2	1	1	2		1	3

Minimum of 8 experiments to be conducted (Four from each Part-A&B)

PART-A

1. Sampling Theorem – verification.
2. Time division multiplexing.
3. Pulse code modulation.
4. Differential pulse code modulation.
5. Delta modulation.
6. Frequency shift keying.
7. Differential phase shift keying.
8. QPSK modulation and demodulation.

PART-B

Modeling of Digital Communications using MATLAB

1. Sampling Theorem – verification.
2. Pulse code modulation.
3. Differential pulse code modulation.
4. Delta modulation.
5. Frequency shift keying.
6. Phase shift keying.
7. Differential phase shift keying.
8. QPSK modulation and demodulation.
9. Channel and its characteristics.

Equipment required for Laboratories:

1. RPS - 0 – 30 V
2. CRO - 0 – 20 M Hz.
3. Function Generators - 0 – 1 M Hz
4. RF Generators - 0 – 1000 M Hz./0 – 100 M Hz.
5. Multimeters
6. Lab Experimental kits for Digital Communication
7. Components
8. Radio Receiver/TV Receiver Demo kits or Trainees.

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3 2

(A0499155) DIGITAL IC APPLICATIONS USING VHDL & VERILOG LAB

OBJECTIVES:

- To use computer-aided design tools for development of complex digital logic circuits.
- To model, simulate, verify, analyse, and synthesize with hardware description languages.
- To design and prototype with standard cell technology and programmable logic.
- To design tests for digital logic circuits, and design for testability.

OUTCOMES:

- Design and verify the operation of various combinational circuits using VHDL and verilog
- Design and verify the operation of various synchronous sequential circuits using VHDL and verilog.
- Design and verify the operation of various asynchronous sequential circuits using VHDL and verilog.
- Design and verify the operation of various memories using VHDL and verilog.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1		2							1	2	3	
CO2	1	1	1		2							1	2	3	1
CO3	1	1	1		2							1	2	2	1
CO4	1	1	1		2							1	2	3	1
CO5															

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 8 experiments to be conducted

1. Logic Gates- 74XX
2. Half Adder, Full Adder
3. Ripple Carry Adder
4. 3-8 Decoder -74138
5. 8-3 Encoder- 74X148
6. 8 x 1 Multiplexer -74X151
7. 4 bit Comparator-74X85
8. D Flip-Flop 74X74
9. Decade counter-74X160
10. Mod-Counters
11. Universal shift register -74X194
12. Ring counter
13. Johnson counter
14. RAM, ROM

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Department of Electronics and Communication Engineering

III B.Tech, I-Sem (ECE) P C
3 2

(A0481155) ANALOG IC APPLICATIONS LAB

OBJECTIVES:

- Study of OPAMPS, Classification of Op-Amps.
- To study and design various linear applications of Op-Amps.
- To study and design various nonlinear applications of Op-Amps.
- Study of Analog filters.

OUTCOMES:

- Implementation of mathematical operations using op-amp
- Design and implementation of non-linear applications of an op-amp
- Design and implementation of active filters using op-amp
- Design and implementation Monostable and Astable multivibrators using 555 IC.
- Realization of data converter using op-amp

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1							3				2	2	1
CO2		2	3						3		1		2	3	1
CO3		2	3						3		1		2	3	1
CO4		2	3						3		1		2	3	1
CO5	1	2							3				1	1	2

Minimum 8 experiments to be performed

1. OP AMP Applications – Adder, Subtractor, Comparator Circuits.
2. Active Filter Applications – LPF, HPF (first order)
3. Function Generator using OP AMPs.
4. IC 555 Timer – Monostable Operation Circuit
5. IC 555 Timer – Astable Operation Circuit.
6. IC 566 – VCO Applications.
7. Voltage Regulator using IC 723.
8. 4 bit DAC using OP AMP.
9. Schmitt trigger using 741 Op-Amp.
10. Integrator and differentiator using 741 Op-Amp.
11. V-I and I-V converter using Op-amp.
12. AC amplifiers-inverting, non-inverting, buffers

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III B.Tech, II-Sem (ECE) T C
3+1* 3

(A0406157) DIGITAL SIGNAL PROCESSING

(Common to ECE & EEE)

OBJECTIVES:

The course content enables students to:

- Enhance the analytical ability of the students in facing the challenges posed by growing trends in communication, control and signal processing areas.
- Develop ability among students for problem formulation, system design and solving skills
- Demonstrate basic knowledge of Digital Signal Processing by understanding various transformations
- Understand Various Discrete-time signals and classification of linear shift-invariant systems will be studied using the convolution sum, and the frequency domain transformations.
- Design of systems with digital network composed of adders, delay elements, and coefficient multipliers.

OUTCOMES:

At the end of the course students are able to

- Represent of Discrete Time signals analytically & visualize them in the Time domain.
- Ready to utilize FT.
- To implement DFT's using FFT.
- To determine and implement the appropriate type of design method for FIR filters.
- Choose appropriate decimation and interpolation factors for high performance filters

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2								1			2	1	
CO2	2	2			1							1	2		1
CO3	2	2												2	1
CO4	2	2												1	2
CO5	2	2	1									1	1	2	1

UNIT I

INTRODUCTION: Review of Discrete Time Signals and Sequences, Frequency domain representation of Discrete Time Signals and Systems, DTFT.

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. Review of Z-Transforms, applications of Z-Transforms, Relation between Z-Transform and DFS.

UNIT II

FAST FOURIER TRANSFORMS: Radix-2 Fast Fourier Transforms (FFT), Decimation in Time and Decimation in Frequency FFT Algorithms, Inverse FFT.

UNIT III

REALIZATION OF DIGITAL FILTERS: Solution of Difference Equations of Digital Filters, Block Diagram Representation of Linear Constant Coefficient Difference Equations, Basic structures of IIR systems: Direct form-I realization, Direct form-II realization, Cascade form realization, Parallel form realization, Basic structures of FIR systems: Direct form realization, Cascade form realization, Lattice structures of IIR systems, Lattice structures of FIR systems. Conversion from Lattice structure to direct form, Conversion from direct from to Lattice structure, Lattice-ladder structure.

UNIT IV

IIR DIGITAL FILTERS: Analog filter approximations using Butterworth and Chebyshev, Design of IIR digital filters from analog filters, Design examples, Frequency Transformations in Analog Domain and Frequency Transformations in digital domain, Illustrative Problems.

UNIT V

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.

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UNIT VI

MULTIRATE DIGITAL SIGNAL PROCESSING FUNDAMENTALS: Basic Sampling Rate Alteration Devices, Multirate Structures for Sampling Rate Converters, Multistage Design of Decimator and Interpolator, Poly-Phase Decomposition.

APPLICATIONS OF DSP: Spectral analysis of non-stationary Signals, Trans multiplexers,

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.

REFERENCES:

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 Publishing House Pvt. Ltd.
3. Digital signal processing: M H Hayes, Schaum's outlines, TATA Mc-Graw Hill, 2007.
4. Digital Signal Processing by Ramesh Babu.

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III B.Tech, II-Sem (ECE) T C
3+1*3

(A0213155) MICROPROCESSORS AND MICROCONTROLLERS

(Common to ECE & EEE)

OBJECTIVES:

- Understand the need of microprocessors and microcontrollers in development of various projects.
- To know the complete architectural, programming, interfacing details of 8085, 8086 microprocessors and 8051 microcontroller.

OUTCOMES

- Learn and understand the instruction set of 8086 and 8051.
- Develop skill in simple assembly programme writing for 8086, 8051 and applications.
- Learn and understand concept of interfacing of peripheral devices and their applications
- Ability to learn Microprocessor and Microcontroller Architecture
- Understand & design of microprocessors and microcontrollers based systems (small).

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		2											3	1	
CO2	2												2	3	1
CO3					3	3	3						1	2	1
CO4												2	1	1	2
CO5		2											1	2	2

UNIT I

8085 MICROPROCESSOR: Evaluation of microprocessors. **Overview of 8085:** Architecture, Pin diagram, addressing modes, register organization, Simple ALU programs using 8085 instruction set.

UNIT II

8086 MICROPROCESOR: Architecture, Register organization, signal description, physical memory organization, general bus operations, I/O addressing capability, special processor activities, Minimum mode and maximum mode of operation, Timing diagram.

UNIT III

8086 INSTRUCTION SET AND ASSEMBLER DIRECTIVES: Addressing modes of 8086, Instruction set of 8086, Assembler Directives and operators.

UNIT IV

8086 ASSEMBLY LANGUAGE PROGRAMMING: 8086 Assembly language programs involving logical, branch and call instructions, sorting, evaluation of arithmetic expressions, string manipulation.

UNIT V

PROGRAMMABLE PERIPHERAL DEVICES AND THEIR INTERFACING: Memory interfacing to 8086 (static RAM and EPROM). 8255 PPI various modes of operation, Interrupt structure of 8086, Vector interrupt table. Interrupt service routines.8259 PIC architecture and interfacing cascading of interrupt controller and its importance.

UNIT VI

8051 MICROCONTROLLER: Evaluation of microcontrollers, Architecture of 8051 microcontroller. Pin Diagram of 8051, external memories, counters and timers, serial communication, interrupts, Instruction set of 8051, Addressing modes of 8051, Assembly Language Programming examples using 8051.

TEXT BOOKS:

1. Microprocessor Architecture, Programming and Applications with8085 By Ramesh SGaonkar.
2. Advanced microprocessor and peripherals A.K. Ray and K.M.Bhurchandi, 2nd edition, TMH, 2000.
3. 8051 microcontroller and embedded systems by mazidi and mazidi,pearson education 2000.

REFERENCES:

1. Microprocessors Interfacing Douglas V.Hall, Revised 2nd edition, 2007.
2. The 8088 and 8086 Microprocessors Walter A. Triebel, Avtar Singh, PHI, 4th Edition, 2003.
3. 8051 Microcontroller Internals, Instructions, Programming and Interfacing by Subrata Ghoshal, Pearson, 2010.

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III B.Tech, II Sem (ECE) T C
3+1*3

(A0419156) MICROWAVE ENGINEERING

OBJECTIVES:

- To analyse microwave circuits incorporating hollow, dielectric and planar waveguides, transmission lines, filters and other passive components, active devices.
- To Use Sparameter terminology to describe circuits.
- To explain how microwave devices and circuits are characterized in terms of their "S" Parameters.
- To give students an understanding of microwave transmission lines.
- To Use microwave components such as isolators, Couplers, Circulators, Tees, Gyrators etc..
- To give students an understanding of basic microwave devices (both amplifiers and oscillators).
- To expose the students to the basic methods of microwave measurements

OUTCOMES:

- Apply the knowledge of mathematics for analyzing the propagation of different microwaves in different transmission lines
- Analyze the working principles of different wave guide components using Sparameters
- Study the performance of specialized microwave tubes such as klystron, reflex klystron, magnetron and travelling wave tube.
- Study the performance characteristics of different solid state devices
- To measure the different parameters of the micro wave transmission using Microwave bench.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2		1												
CO2		3	2										1	2	
CO3		2		1										1	
CO4			2	2									1		
CO5	2													1	

UNIT I

Introduction, Microwave Spectrum and Bands, Applications of Microwaves.

Guided Waves: Parallel Plane Waveguides Introduction, Transverse Electric waves(TE), Transverse Magnetic waves(TM), TEM Modes – Concepts, expressions and Analysis, Cutoff Frequencies, Velocities, Wavelengths, wave impedance, attenuation factor, expressions, Microwave transmission lines: Rectangular Waveguides – 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; Power Transmission and Power Losses in Rectangular Guide, Illustrative Problems,

UNIT II

WAVEGUIDE COMPONENTS AND APPLICATIONS: Scattering Matrix– Significance, Formulation and Properties. S Matrix Calculations for – Two port Junction, E plane and H plane Tees, Magic Tee, Hybrid Ring, Directional Coupler Two Hole type only. Ferrites Composition and Characteristics, Faraday Rotation; Ferrite Components Gyrator, Isolator, Circulator. Cavity Resonators– Introduction, Rectangular Cavities, Dominant Modes and Resonant Frequencies, Q factor and Coupling Coefficients. Illustrative Problems.

UNIT III

MICROWAVE TUBES – I: Limitations and Losses of conventional tubes at microwave frequencies. Microwave tubes – O type and M type classifications. Otype tubes : Two 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, Applegate Diagram and Principle of working, Mathematical Theory of Bunching, Power Output, Efficiency, Electronic Admittance; Oscillating Modes and o/p Characteristics, Electronic and Mechanical Tuning. Illustrative Problems.

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UNIT IV

MICROWAVE TUBESII: HELIX TWTS: Significance, Types and Characteristics of Slow Wave Structures; Structure of TWT and Amplification Process (qualitative treatment), Suppression of Oscillations, Nature of the four Propagation Constants, Gain Considerations.

Mtype Tubes: Introduction, Crossfield effects, Magnetrons – Different Types, 8Cavity Cylindrical Travelling Wave Magnetron – Hull Cutoff and Hartree Conditions, Modes of Resonance and πMode of Operation, Separation of πMode, o/p characteristics.

UNIT V

MICROWAVE SOLID STATE DEVICES: Introduction, Classification, Applications. TEDs Introduction, Gunn Diode – Principle, RWH Theory, Characteristics, Basic Modes of Operation, Oscillation Modes, Varactor diode, parametric amplifiers, Brief Introduction to Avalanche Transit Time Devices IMPATT and TRAPATT Diodes – Principle of Operation and Characteristics.

UNIT VI

MICROWAVE MEASUREMENTS: Description of Microwave Bench – Different Blocks and their Features, Precautions; Microwave Power Measurement – Bolometer Method. Measurement of Attenuation, Frequency, VSWR, Cavity Q. Impedance Measurements.

TEXT BOOKS :

1. Microwave Devices and Circuits – Samuel Y. Liao, PHI, 3rd Edition,1994.
2. Microwave Principles – Herbert J. Reich, J.G. Skalnik, P.F. Ordung and H.L. Krauss, CBS Publishers and Distributors, New Delhi, 2004.

REFERENCES :

1. Elements of Microwave Engineering – R. Chatterjee, Affiliated EastWest Press Pvt. Ltd., New Delhi, 1988.
2. Foundations for Microwave Engineering – R.E. Collin, IEEE Press, John Wiley, 2nd Edition, 2002.
3. Microwave Engineering by Pozar,
4. Microwave Engineering and its applications by Om.P.Gandhi.
5. Microwave Circuits and Passive Devices – M.L. Sisodia and G.S.Raghuvanshi, Wiley Eastern Ltd., New Age International Publishers Ltd., 1995.
6. Microwave Engineering Passive Circuits – Peter A. Rizzi, PHI, 1999.
7. Electronic and Radio Engineering – F.E. Terman, McGrawHill, 4th ed., 1955.
8. Micro Wave and Radar Engineering – M. Kulkarni, Umesh Publications, 1998

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III B.Tech, II Sem (ECE) T C
3+1*3

(A0420156) ELECTRONIC MEASUREMENT AND INSTRUMENTATION

OBJECTIVES:

- In this subject, the student can able to read the basic characteristics and the errors associated with an instrument.
- Studies on various analysers and signal generators and can analyse the frequency component of a wave generated and its distortion levels.
- Studies on the difference between the various parameters which are to be measured that are getting out from the different sensors.
- Studies on the basics of instrumentation and various signal measurements and can signal condition the circuit to the required level which are getting out from the sensor.

OUTCOMES:

- Know different types of measurements suitable for specific measurements (V, I, R) and estimate errors in measurement systems.
- Estimate accurately the values of RLC employing suitable bridges.
- Understand the concepts of electronic instruments such as digital volt meters and q meters.
- Understand the working operation of different oscilloscopes.
- Know specific measurement instruments such as wave analyzers, Harmonic Distortion Analyzers and spectrum Analyzers.
- Understand frequency and time measurements using suitable instruments.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1												1	
CO2	1	2							1					2	
CO3	2		1						1			1	1		
CO4	1		1						1			1	2		
CO5	2	2										1			2
CO6	1								1			1	1		

UNIT I:

ELECRICAL MEASUREMENTS: Electrical standards: ampere, voltage, resistance, capacitance & inductance standards Suspension Galvanometer Torque & deflection of the galvanometer PMMC mechanism DC Ammeters DC voltmeters Voltmeter sensitivity Series and Shunt type ohm meters Multimeters Alternating current indicating instruments: electrodynamometer, rectifier type Thermo instruments Electrodynamometers in power measurements Watt hour meter Power factor meter.

UNIT II:

BRIDGE MEASUREMENTS: Resistance Measurement: Wheat stone bridge, Kelvin bridge AC bridges: Condition for bridge balance Inductance measurement: Maxwell Bridge, Hay Bridge Capacitance measurement: Schering Bridge Frequency measurement: Wein Bridge Problems of shielding and grounding.

UNIT III:

ELECTRONIC MEASUREMENTS: FET input electronic volt ohm ammeters AC voltmeters: rectifier type, true RMS type Digital voltmeters: Ramp, Dual slope integration & SAR types – Q meter Vector impedance meter Vector volt meter RF power and voltage measurement.

UNIT IV:

OSCILLOSCOPES: Oscilloscope block diagram Vertical deflection system Delay line Horizontal deflection system Vertical I/p and sweep generator signal synchronization Oscilloscope probes: 1:1 probes, attenuator probes, active probes, current probes Oscilloscope controls Measurement of voltage, frequency, phase and pulse Multi I/p oscilloscopes: dual beam, dual trace Sampling oscilloscopes Digital storage oscilloscopes.

UNIT V:

SIGNAL GENERATORS AND ANALYZERS: Low frequency signal generators Function generators Pulse generators RF signal generators Frequency synthesized signal generator Heterodyne wave analyzer Harmonic distortion analysers Spectrum analyser (Basics only).

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UNIT VI:

FREQUENCY & TIME MEASUREMENT: Time & frequency standards Frequency measurement time base Period measurement errors.

TEXT BOOKS:

1. Modern Electronic Instrumentation and Measurement Techniques Albert D. Helfrick, Willium D. Cooper PHI2002
2. Electronic Instrumentation and Measurements David A. BellPHI2nd edition2003.

REFERENCES:

1. A course in Electrical and Electronic Measurements and Instrumentation A.K. Sawhney Dhanpati Rai&CO7th edition2005
2. Electronic Instrumentation H Kalsi TMH3rd edition
3. Electronic Measurements and Instrumentation Oliver and Cage TMH

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III B.Tech, II Sem (ECE) T C
3+1* 3

(A0506156) COMPUTER ARCHITECTURE

(ELECTIVEI)

(Common to ECE and CSE)

OBJECTIVES:

- To understand the structure, function, characteristics and performance issues of computer systems.
- To understand the design of the various functional units of digital computers.
- To understand the basic processing unit and how they are connected and how it generates control signals (using hardwired and micro programmed approaches).
- To understand the different types of memory and how they are related.
- To learn basics of Parallel Computing and Pipelining.

OUTCOMES:

- Explain the organization of basic computer, its design & the design of control unit and tradeoffs between hardware and software.
- Students will formulate and solve problems, understand the performance requirement of the systems and the operations & languages of the register transfer, micro operations and input/output organization.
- Students can understand how computer stores positive and negative numbers.
- Understand the organization of memory and memory management hardware.
- Elaborate advanced concepts of computer architecture, Parallel Processing, interprocessor communication and synchronization

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		1	3						2				1		
CO2			2	3	1									2	
CO3	3	2	1										1		
CO4			3	2								1	1		
CO5					3						2	1			2

UNIT I

BASIC STRUCTURE OF COMPUTERS: Computer Types, Functional unit, Basic operational concepts, Bus structures, Software, Performance, multiprocessors and multi computers.

DATA REPRESENTATION: Fixed Point Representation, Floating Point Representation. Error Detection codes.

UNIT II

REGISTER TRANSFER LANGUAGE AND MICROOPERATIONS: Register Transfer language, Register Transfer, Bus and memory transfers, Arithmetic Micro operations, logic micro operations, shift micro operations

BASIC COMPUTER ORGANIZATION AND DESIGN: Instruction codes, Computer Registers, Computer instructions, Instruction cycle, Memory reference instructions, Input – Output and Interrupt.

UNIT III

CENTRAL PROCESSING UNIT: Stack organization, Instruction formats, Addressing modes, Data transfer and manipulation, Program control, Reduced Instruction set computer

COMPUTER ARITHMETIC: Fixed point operations Addition and subtraction, multiplication, Division Algorithms

UNIT IV

THE MEMORY SYSTEM: Basic concepts, semiconductor RAM memories, Readonly memories, Cache memories, performance considerations

UNIT V

PIPELINE AND VECTOR PROCESSING: Parallel processing, Arithmetic pipeline, Instruction Pipeline, RISC Pipeline, Vector processing, Array Processors.

UNITVI

MULTI PROCESSORS: Characteristics of Multi Processors, Inter Connection Structures, Inter Processor Arbitration, Inter Processor Communication & Synchronization, Cache Coherence

TEXT BOOKS

1. Computer Systems Architecture – M. Moris Mano, III Edition, Pearson/PHI
2. Computer Organization – Carl Hamacher, Zvonks Vranesic, SafeaZaky, V Edition, McGraw Hill.

REFERENCES

1. Computer Organization and Architecture – William Stallings Sixth Edition, Pearson/PHI

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Department of Electronics and Communication Engineering

III B.Tech, II Sem (ECE) T C
3+1* 3

(A0507156) FUNDAMENTALS OF OPERATING SYSTEMS
(ELECTIVEI)

OBJECTIVES:

- This course deals with functions, structures and history of operating systems.
- To understand the design issues associated with operating systems.
- To understand various process management concepts including scheduling, synchronization, deadlocks.
- To be familiar with multithreading and the concepts of memory management including virtual memory.
- To understand the issues related to file system interface and implementation, disk management with protection and security mechanisms.
- Some example operating systems (Unix, Windows, Solaris etc)

OUTCOMES:

- At the end of the course the students knows the need Avend requirement of an interface between Man and Machine.
- To enable them to identify the difference between the system software and the application software and their design requirements.
- Students will be able to relate the features of operating systems and the fundamental theory associated with process, memory and file managements components of different operating systems.
- Students will learn about and understand theoretical concepts and programming constructs used for the operation of modern operating systems.
- Students will gain practical experience with software tools available in modern operating systems such as semaphores, system calls, sockets and threads

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2												2	1	2
CO2	1	2	1										2	2	2
CO3	1	1	1										1		1
CO4	1	2	1											1	
CO5	1	2											1	1	1

UNIT I

Introduction what operating systems do, process management, memory management, protection and security, distributed systems, special purpose systems

System structure operating system services, systems calls, types of system calls, system programs, operating system structure, operating systems generation, system boot.

UNIT II

Process concepts – overview, process scheduling, operations on process, interprocess communication.

Multithread Programming – overview, multithreading models

Process scheduling – basic concepts, scheduling criteria, process scheduling algorithms.

UNIT III

Principles of deadlock: system model, deadlock characterization, deadlock prevention, detection and avoidance, recovery form deadlock.

UNIT IV

Memory Management Strategies Swapping, contiguous memory allocation, paging, structure of the page table, segmentation

Virtual memory management – background, demand paging, copy on write, page replacement algorithms, Thrashing.

UNIT V

File system – file concept, Access Methods, Directory structure, protection.

File System implementation File system structure, file system implementation, directory implementation, allocation methods, free space management, Recovery.

UNIT VI

Secondary storage structure overview of Mass storage structure, Disk structure, disk attachment, disk scheduling, swap space management, RAID structure, stable storage implementation

TEXT BOOKS:

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

REFERENCES:

1. Operating Systems: Internals and Design Principles, Stallings, Sixth Edition–2009, Pearson Education.

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III B.Tech, II Sem (ECE) T C
3+1*3

(A0508156) WEB TECHNOLOGIES

(Common to ECE and CSE)
(ELECTIVEI)

OBJECTIVES:

- This course demonstrates an indepth understanding of the tools and Web technologies necessary for business application design and development. The course covers client side scripting like HTML, JavaScript and server side scripting like servlets, JSPs. And also XML and web servers and database interfacing.

OUTCOMES:

- Student can able to demonstrate the HTML important tags and for designing static web pages and separate design from content using CSS.
- Able to design a webpage with more user interactivity using Javascript.
- Students can able to understand the need of XML in the developing of Web applications.
- Students able to understand the need of Server side scripting using Servlets and JSP.
- Able to develop the web applications with MVC architecture design using Struts.
- Students can able to apply the java programming to develop interactive of databases and develop the scalable web applications

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2		3	1	2	2	1		2			2	1		
CO2	1		1		2	1		1	2			2	1	1	
CO3	1				2	1			1			2			
CO4	1	2	1	1	2	2			2	1		2	1		2
CO5	1	1	1	2	3				2					2	
CO6	1	1	1		2				2			1	1		2

UNIT I

Introduction to HTML HTML common tags, HTML program structure, Attributes, List, Tables, images, image maps, forms, Frames; Cascading Style sheets;

UNIT II

JavaScript Introduction to Java Scripts, Objects in Java Script, Dynamic HTML with Java Script, Data Validation using Java Script.

UNIT III

XML Document type definition, XML Schemas, Document Object model, Presenting XML, Using XML Processors: DOM and SAX

UNIT IV

More On Servlets – Reading Initialization parameters, the javax. Servlet HTTP package, Handling Http Request & Responses, Using Cookies Session Tracking.

JSP Application Development Generating Dynamic Content, Using Scripting Elements Implicit JSP Objects, Conditional Processing – Displaying Values Using an Expression to Set an Attribute, Declaring Variables and Methods Sharing Data between JSP pages, Sharing Session and Application Data.

UNIT VI

Struts: Tomcat &Struts Installation, Struts Request life cycle, Struts Configuration file, Form Validation with Struts, Simple Struts application.

UNIT VI

Database Access Database Programming using JDBC, Types of JDBC Drivers, Studying Javax.sql.* package, Accessing a Database from a JSP Page, Application – Specific Database Actions.

AJAX – Introduction, Background, How AJAX works, Common steps AJAX will follow.

TEXT BOOKS:

1. HTML Black Book – Steve Holzner.
2. Web Programming, building internet applications, Chris Bates 2nd edition, WILEY Dreamtech
3. The complete Reference Java 2 Fifth Edition by Patrick Naughton and Herbert Schildt. TMH
4. Java Server Pages –Hans Bergsten, SPD O'Reilly

REFERENCE BOOKS:

1. Programming world wide webSebesta, Pearson.
2. Web Technologies, Uttam K. Roy, Oxford.
3. Core SERVLETS ANDJAVASERVER PAGES VOLUME 1: CORE TECHNOLOGIES By Marty Hall and Larry Brown Pearson.
4. Internet and World Wide Web – How to program by Dietel and Nieto PHI/Pearson Education Asia.
5. Jakarta Struts Cookbook , Bill Siggelkow, S P D O'Reilly
6. Murach's beginning JAVA JDK 5, Murach, SPD.
7. An Introduction to web Design and Programming –Wang Thomson.

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Department of Electronics and Communication Engineering

III B.Tech, II Sem (ECE) T C
3+1*3

(A0015153) MATHEMATICAL METHODS

(Common to ECE, EEE, IT,CE& ME)
(ELECTIVEI)

OBJECTIVES:

- To make aware students about the importance and symbiosis between mathematics and engineering. Achieve confidence with mathematical tools which an essential weapon in modern Graduate Engineer's Armory. Balance between the development of understanding and mastering of solution techniques with emphasis being on the development of student's ability to use Mathematics with understanding to solve engineering problems by retaining the philosophy learning by doing.

OUTCOMES:

- Get knowledge of algebra of Matrices, curve fitting, Partial Differential Equations and Numerical Methods to solve various Engineering Problems.(PO1)
- Understand Numerical methods including the study of iterative solutions of equations, interpolation, curve fitting, numerical differentiation and integration and the solution of ordinary differential equations.(PO2)
- Analyze the numerical solutions of ODE's to various real time problems in quantum mechanics, electrical networks etc.(PO2)
- Apply Trapezoidal rule and Simpson's rules in numerical differentiation and integration (PO5)
- Synthesize problems of one and two dimensional Partial Differential Equations for the wave equation, heat equation, Laplace's equation subject to simple boundary conditions.(PO3)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1		2											2	1
CO2		2				2							2	1	
CO3		1									1		1	1	
CO4					2							1	1	2	
CO5			2							1				1	2

UNIT – I

Matrices: Elementary row transformations – Rank – Echelon form, Normal form – Solutions of Linear System of Homogenous and Non Homogeneous equations

Eigen Values, Eigen vectors – Properties. Cayley – Hamilton Theorem – Inverse and powers of a matrix by Cayley–Hamilton theorem

UNIT – II

Real matrices – Symmetric, skew – Symmetric, orthogonal matrices.

Complex matrices: Hermitian, Skew Hermitian and Unitary matrices – Eigen values and Eigen vectors and their properties. Quadratic forms – Linear Transformation – Reduction of quadratic form to canonical form and their nature(Signature and Index).

UNIT – III

Solution of Algebraic and Transcendental Equations: Introduction – The Bisection Method – The Method of False Position – The Iteration Method – Newton Raphson Method.

Interpolation: Introduction – Finite differences – Forward Differences – backward Differences –Newton's forward and backward difference formulae for interpolation – Lagrange's Interpolation formula.

UNIT – IV

Curve fitting: Fitting a straight line – Second degree curve – Exponential curve Power curve by method of least squares.

Numerical Differentiation and Integration – Trapezoidal rule – Simpson's 1/3 Rule – Simpson's 3/8 Rule.

UNIT – V

Numerical solution of Ordinary Differential equations: Solution by Taylor's series Picard's Method of successive Approximations Euler's Method Runge Kutta Method– Milne's Predictor Corrector Method.

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UNIT – VI

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 equation under initial and boundary conditions

TEXT BOOKS:

1. Advanced Engineering Mathematics By Erwin Kreyszig.
2. Advanced Engineering Mathematics By R.K. Jain and S.R.K. Iyengar, Narosa Publications.

REFERENCES:

1. A Text Book of Engineering Mathematics, Vol – 1, T.K.V. Iyengar, B. Krishna Gandhi and Others S. Chand & Company.
2. Higher Engineering Mathematics by B.S.Grewal, Khanna Publishers.
3. A Text Book of Engineering Mathematics, Thomson Book Collection.
4. Engineering Mathematics by Srimantha Pal et.al. Oxford University Press.
5. Engineering Mathematics, Sarveswara Rao Koneru, Universities Press.

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III B.Tech, II Sem (ECE) T C 3+1*3

(A0421156) EMBEDDED SYSTEM CONCEPTS

(ELECTIVEII)

OBJECTIVES:

- To understand the importance of the embedded system in electronic system design.
- To know the fundamental concepts in embedded system design like memory organization, role of Buses.
- To identify the suitable soft ware architecture for different applications.
- To understand the fundamental concepts of RTOS.
- To knows the Hard ware /Soft ware co-design methodology.
- To know the different case studies in embedded system design.

OUTCOMES;

- Compare embedded system design models using different processor technologies (single purpose, general-purpose, application specific processors
- Describe and compare the various types of peripherals used in embedded systems.
- Analyze a given embedded system design and identify its performance critical points.
- Use modern engineering tools necessary for integrating software and hardware components in embedded system designs.
- Utilize a top down modular design process to complete a medium complexity embedded system design project under instructor specified design constraints

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1			1					2		2		1	
CO2	3	2		2	1							2	2		
CO3	2	1										3	2		
CO4	3	3		2	1				2	2		2		1	2
CO5	2	1		2	1				1			3	1		1

UNIT I

AN INTRODUCTION TO EMBEDDED SYSTEMS: An Embedded System, Processor embedded into a system, Embedded hardware units and devices in a system, Embedded Software in a System, Embedded System – On – Chip (SOC) and in use of VLSI Circuit design technology.

UNIT II

ADVANCED PROCESSOR ARCHITECTURES, MEMORY ORGANIZATION: Introduction to Advanced architectures, Processor and Memory organization, Instruction level parallelism, Performance metrics, Memory types, Memory maps and addresses, Processor selection, memory selection

UNIT III

DEVICES AND COMMUNICATION BUSES FOR DEVICES NETWORK: IO types and examples, serial communication devices, parallel device ports ,timer and counting devices, networked embedded systems, serial bus communication protocols, parallel bus device protocols: ISA,PCI,PCIX and advanced buses.

UNIT IV

SURVEY OF SOFTWARE ARCHITECTURES: Round –Robin, Round Robin with interrupts, Function Queue Scheduling Architecture, Real time operating System Architecture, Selecting architecture.

INTRODUCTION TO RTOS: Tasks and Task states, Tasks and data, Semaphores and Shared data, Message queues, Mail boxes, and Pipes

UNIT V

EMBEDDED SOFTWARE DEVELOPMENT PROCESS AND TOOLS: Introduction to Embedded software development process and tools, Host and Target machines, Linking and locating software, getting embedded software into the target system, Issues in Hardware /software design and Code sign.

UNITVI

DESIGN EXAMPLES: Case Study of Embedded system design and coding for an coding for an automatic chocolate vending machine(ACVM), Case study of Digital camera hard ware and software architecture, Case study of communication between orchestra Robots, Embedded systems in automobiles, Case study of an embedded system for smart card, Case study of Mobile phone software for key inputs.

TEXTBOOKS:

1. Rajkamal, "Embedded systems: Architecture, Programming and Design", TMH
2. David Simon, "An embedded software primer", Pearson Education 2004.

REFERENCES:

1. Arnold S Burger, "Embedded system design", CMP
2. Steve Heath; Butterworth Heinenann, "Embedded systems design: Real world design", Newton mass USA 2002.

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III B.Tech, II Sem (ECE) T C
3+1*3

(A0422156) FPGA ARCHITECTURE & APPLICATIONS
(ELECTIVEII)

OBJECTIVES:
- Study of PLDs, Classification of PLDs.
- To study CPLDS and FPGAs.
- To study and design with PLDs and FPGAS
- Study of Altera, Xilinx, Actel industry FPGAs.
- Study of Programming Technologies and Technology mapping for FPGAs.
- Study of FSM and realization of FSM

OUTCOMES:
- Acquire Knowledge about various architectures and device technologies of PLD's and various FPGAs.
- Comprehend FPGA Architectures from different vendors.
- Describe FSM and different FSM techniques like petrinets& different case studies.
- Analyze System level Design and their application for Combinational and Sequential Circuits.
- Study the different case studies using one hot design methods.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		3										2	1		
CO2		2										1	2	1	
CO3	3				2									1	
CO4	2		3										2		
CO5				3											2

UNIT I

PROGRAMMABLE LOGIC: ROM, PLA, PAL, PLD, FPGA – Features, Complex Programmable Logic Devices: ALTERA MAX 7000 CPLD, Speed Performance.

UNIT II

FPGA: Xilinx logic Cell array, CLB,I/O Block Programmable interconnect, Technology Mapping for FPGA: Library based, LUT based, Multiplexer based Technology Mapping.

UNIT III

CASE STUDIES: programming Technologies, Xilinx XC3000, XC4000, Actel FPGAs, Alteras FPGAs, Plus Logic FPGA, AMD FPGA, Quick Logic FPGA, Algotronix FPGA, Cross point solutions FPGA, FPGA Design Flow.

UNIT IV

FINITE STATE MACHINES (FSM): Finite State Machine– State Transition Table, State Assignments for FPGAs. Problem of the Initial State Assignment for One Hot Encoding.

UNIT V

REALIZATION OF STATE MACHINE: Derivation of SM Charts. Realization of State Machine Chart, Alternative Realization of State Machine Chart using Microprogramming.Linked State Machines. One–Hot State Machine, Petri nets for State Machines – Basic Concepts, Properties.

UNIT VI

FSM ARCHITECTURES: Architectures Centered Around NonRegistered PLDs. State Machine Designs Centered Around A Shift Register. Using Xilinx ISE EDA Tool Guidelines front front end design for FPGAs

TEXT BOOKS:

1. P.K.Chan& S. Mourad, Digital Design Using Field Programmable Gate Array, Prentice Hall (Pte), 1994.
2. J. Old Field, R.Dorf, Field Programmable Gate Arrays, John Wiley & Sons, Newyork, 1995.

REFERENCES:

1. Fundamentals of logic Design, 5/e, Charles H Roth.Jr.
2. S. Brown, R. Francis, J. Rose, Z. Vransic, Field Programmable Gate Array, Kluwer Pubin, 1992.
3. Engineering Digital Design, 2/e, Richard F Tinder **Unit VI**.

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III B.Tech, II Sem (ECE) T C 3+1*3

(A0423156) REAL TIME OPERATING SYSTEMS
(ELECTIVEII)

OBJECTIVES:

- To learn real time scheduling and schedule ability analysis
- To understand formal specification and verification of timing constraints and properties
- To enable students to design real time systems
- To development and implement new techniques to advance real time systems research

OUTCOMES:

- The basic knowledge on real time operating system used in the embedded real time systems.
- Study and analysis of various real time scheduling algorithms.
- The skill to learn basic shell programming in Linux and RT Linux.
- Ability to design real time embedded system.
- Knowledge on the design of fault tolerant embedded real time system.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2														
CO2	2		2										2		
CO3												1		1	3
CO4		2	3		1								1	2	1
CO5		2	2										1		2

UNITI

REAL TIME OPERATING SYSTEMS: Architecture of kernel, Tasks and Task scheduler, Task States, Context Switching, Scheduling Algorithms, Rate Monotonic Analysis, Task Management Call Functions, Interrupt services routines, Semaphores, Mutex, Mailboxes, Message queues, Event register, Pipes, Signals, Timers, Memory management, Priority inversion problem, Priority Inheritance, Path Finder Problem Revisited.

UNITII

REAL TIME APPLICATIONS: Digital control, Selection of sampling period, Multirate Systems, Example of software controlled systems, Timing characteristics, Complex control law computations, Kalman filter, High level controls, Control hierarchy ,Guidance and control, Timing requirements, Real time command and Control, signal processing, Radar systems, other real time applications.

UNITIII

HARD and SOFT REAL TIME SYSTEMS: Jobs and processors, release times, deadlines, and timing constraints. Hard and soft timing constraints. Hard real time systems, soft real time systems

REFERENCE MODEL OF REALTIME SYSTEMS: Processors and Resources, Temporal parameters of real time work load, Periodic task model, Precedence Constraint and data dependency, Precedence graph and Task graph.

UNITIV

REAL TIME SCHEDULING APPROACHES: Clock Driven, Weighted round robin, priority driven, dynamic vs static systems, effective release times and deadlines.

REAL TIME OPERATING SYSTEM:QNX Neutrino, VX works, Microc/osII, RT Linux

UNITV

PROGRAMMING IN LINUX: overview of unix/Linux, Features, Commands, File Manipulation Commands, Editors, Directory Commands, Input/Output redirection, Pipes and Filters

SHELL PROGRAMMING: Shell programming shell variables, shell programming constructs.

PROGRAMMING IN RT LINUX: Overview of RT Linux, core RT Linux API

UNITVI

FAULT TOLERANCE TECHNIQUES: Introduction, fault causes, Types, detection, Fault and error containment, Hardware, software and timing redundancy

TEXTBOOKS

1) Embedded Real Time Systems Blackbook, Dr.K.V.K.K.Prasad, 2005 edition, Dreamtech press.
2) Jane W.S.Liu, “Real Time Systems”, Pearson education, 2007.
3) C.M.Krishna, KANGG. Shin” Real Time Systems”, McGraw Hill, 1997.

REFERENCES

1) www.kernel.org.
2) Vxworks Programming Guide.

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III B.Tech, II Sem (ECE) T C
1+2*1

(A0013156) PROFESSIONAL ETHICS AND SOFT SKILLS

(Skill Development Course)
(Common to All Branches))

OBJECTIVES:

- The main objective of Engineering Ethics is to increase the awareness in engineering failures. Engineering decisions can impact public health, safety, business practices and politics**.** Engineering ethics is the field of applied ethics and system of moral principles that apply to the practice of engineering. The field examines and sets the obligations by engineers to society, to their clients, and to the profession. Engineering ethics in academic institutions has been undertaken by the directives of Supreme Court for creating awareness interactively among engineering students of all disciplines. By studying engineering ethics, the students develop awareness and assessment skill of the likely impact of their future decisions on moral and ethical grounds.

OUTCOMES:

- To apply ethical theories and moral reasoning to a good professional
- Understand the professional behaviour and implementation of process of communication
- To approach of corporate communication problem solving techniques
- To have a practical orientation of interpersonal communication
- Aware of intellectual property rights

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2					2	2	3	3	3	1	2	2	2	
CO2	1		1			2	1	3	3	3	1	2			2
CO3	1		2			2	1	2	3	2	1	2	2		
CO4	2					2	1	3	2	2	1	3		3	
CO5	3					2	1	3	2	3	1	3		2	3

UNIT I

Nature and Scope of Engineering Ethics: Definition, Nature, Scope – Moral Dilemmas – Moral Autonomy – Kohlberg's theory – Gilligan's theory Moral Reasoning and Ethical theories – Theories of Right ActionSelf – Utilitarianism interest Use of ethical Theories case study.

UNIT II

Professional Etiquettes : Professional Etiquettes **–** Mobile Etiquettes – Email Etiquettes Kinesics – Proxemics Chronemics – Chromatics – Olfacts Haptics – Case study.

UNIT III

Corporate Communication: Communication Models Types of Communication – Downward and Upward Communication Business Deliberations – Meetings – Negotiation Skills Case Study.

UNIT IV

Soft Skills: Interpersonal Communication – Johari Window – Interpersonal conflict resolutions Daniel Goleman's Emotional Intelligence.

UNIT V

Global Issues: Multinational Corporations – Corporate Governance Corporate Social Responsibility Environmental Ethics – case study.

UNIT VI

Introduction to Intellectual Property: Meaning and Types of Intellectual Property – Recent developments of the copy right act –Trademark Protection – Patent Law Plagiarism.

TEXT BOOKS:

1. Professional Ethics by R.Subramanian, OXFORD
2. Business Communication , P.D. Chaturvedi, Mukesh Chaturvedi

REFERENCES:

1. The ACE of Soft Skills(Attitude, Communication and Etiquette for success) by –Gopalaswamy Ramesh & Mahadevan Ramesh, Pearson 2010.
2. Essentials of Business Communication, Rajendra Pal, JS.Korlahhi, S.Chand
3. Intellectual Property Right , Deborah E. BouchouxS, Cengage, 2005
4. Business Ethics and Professional Values, A.B. Rao, Excel,2009
5. M.P. Raghavan [2006], Professional Ethics and Human Values, Scitech Publications, Chennai.

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Department of Electronics and Communication Engineering

III B.Tech, II Sem (ECE) P C

3 2

(A0299156) MICROPROCESSORS & MICROCONTROLLERS LAB

(Common to ECE & EEE)

OBJECTIVES:

- To become skilled in 8086 Assembly Language programming.
- To understand programmable peripheral devices and their Interfacing.
- To understand and learn 8051 microcontroller.
- To learn 8051 assembly Language programming.
- To design embedded system projects with micro controller.

OUTCOMES:

- Ability to write assembly language programs to microprocessors and microcontrollers based systems.
- Ability to know the hardware details of microprocessor or microcontroller.
- Ability to interface various I/O devices with microprocessor based systems.
- Ability to debug microprocessor based systems using debugging tools.
- Ability to write embedded C programs to microcontrollers (simple). .

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2												1		
CO2		2											2	1	
CO3							3						1		3
CO4												1		2	
CO5	2													2	2

Minimum eight Experiments to be conducted (Four from each section)

I) 8086 Microprocessor Programs using TASM/8086 kit.

1. Introduction to TASM Programming.
2. Arithmetic operation – Multi byte Addition and Subtraction, Multiplication and Division – Signed and unsigned Arithmetic operation, ASCII – arithmetic operation.
3. Logic operations – Shift and rotate – Converting packed BCD to unpacked BCD, BCD to ASCII conversion.
4. By using string operation and Instruction prefix: Move Block, Reverse string, Sorting, Length of the string, String comparison.

Interfacing:

1. 8259 – Interrupt Controller and its interfacing programs
2. 8255 – PPI and its interfacing programs (A /D, D/A, stepper motor,)
3. 7 Segment Display.

II) Microcontroller 8051 Trainer kit Using Keil

1. Introduction to Keil µvision
2. Arithmetic operation – Multi byte Addition and Subtraction, Multiplication and Division – Signed and unsigned Arithmetic operation.
3. Logic operations – Shift and rotate.
4. Sorting Ascending and descending order.

Interfacing using 8051 Trainer kit:

1. Key board Interfacing
2. Seven Segment display
3. Switch Interfacing
4. Relay Interfacing
5. UART

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Department of Electronics and Communication Engineering

III B.Tech, II Sem (ECE) P C

3 2

(A0482156) ELECTRONIC CIRCUIT DESIGN AND TROUBLESHOOTING LAB

OBJECTIVES:

- To design various electronic circuits with the given specifications.
- To verify theoretical results with experiment results.
- To identify the faults and correct the various faulty in electronic equipment

OUTCOMES:

After the completion of the lab, the student will be able to

- Design a transistor amplifier of various configurations (with various biasing techniques) and verify its functionality.
- Design a multivibrator circuit with the specifications and verify its functionality.
- Design various frequency selective circuits and study its characteristics.
- Identify the faults in various electronic equipment and rectify the same.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2			2							2	2	3	
CO2	2	2	1		2							2	2	3	
CO3	2	2	1		2		3					2	2	3	
CO4	2	2							2			2	2	3	

PART – A

Minimum six experiments to be conducted.

1. Design Emitter-bias configuration circuit with the give specifications and verify its functionality same as for all
2. Design Self-bias configuration circuit and verify its functionality with the given specifications.
3. Design a amplifier in Emitter bias configuration and verify its functionality with the given specifications.
4. Design a Multivibrator circuit and verify its functionality with the given specifications.
5. Design a Schmitt trigger circuit and verify its functionality with the given specifications.
6. Design a collector coupled one-shot and verify its functionality with the given specifications.
7. Design a Astable Multivibrator circuit and verify its functionality with the given specifications.
8. Design a high pass filter with the given cut-off frequency & pass band gain. Verify its functionality experimentally.
9. Design a wide band pass filter with the given specifications and verify its characteristics experimentally.
10. Design a wide band reject filter with the given specifications and verify its functionality.
11. Design a RC phase shift oscillator using 741 IC with the given oscillating frequency.
12. Design a Series resonant circuit with the given specifications. Verify its characteristics.

PART - B

TROUBLESHOOTING OF ELECTRONIC EQUIPMENTS

1. Regulated Power Supplies.
2. Function Generators.
3. Analog and Digital Communication kits.
4. Identifying the faults in electronic circuits and rectify the same.
5. Cathode ray oscilloscope.

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Department of Electronics and Communication Engineering

III B.Tech, II Sem (ECE) P C
3 2

(A0483156) SENSORS AND TRANSDUCERS LAB

OBJECTIVES:

- To impart knowledge about the principles and analysis of sensors.
- Discussion of errors and error analysis.
- Emphasis on characteristics and response of transducers.
- To have an adequate knowledge in resistance transducers.
- Basic knowledge in inductance and capacitance transducers and exposure to other transducers.

OUTCOMES:

After successful completion of this course the student will

- Analyse the performance characteristics of various transducers and infer the reasons for the behaviour.
- Critically analyse any measurement application and suggest suitable measurement methods.
- To demonstrate the working of various measurement bridges.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1				1	1					1	1	1	
CO2	1	2	2										1		
CO3	1	2	2											1	

List of experiments: (Minimum of 10 Experiments to be conducted, Optionally LabVIEW may be used for implementing the experiments)

1. Measurement of Physical variables based on change in resistance.
   a) Strain (Strain Gauge)
   b) Temperature (RTD, Thermistor)
2. Measurement of Physical variables based on induced emf LVDT
3. Measurement of Physical variables based on change in dielectric Capacitive pick up.
4. Measurement of Pressure using Bourdon tube
5. Measurement of Vibration using Acceleration transducer.
6. pH Measurement.
7. Measurement of Speed using Digital Stroboscope.
8. Conversion of D'Arsonal Galvanometer into DC meter (Voltage & Current).
9. Measurement of R, L, C and Q using Q meter.
10. Measurement of R, L and C using Bridge circuits.
11. Conversion of D'Arsonal galvanometer into Ohm Meter.
12. Conversion of D'Arsonal galvanometer into AC meter (Current & Voltage).

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IV B.Tech, I Sem (ECE) T C 3+1*3

(A0424157) OPTICAL COMMUNICATIONS

OBJECTIVES:

- To learn the basic concepts of fibre optics communications.
- To make the students learn the system with various components or process for various applications.
- To enlighten the student with latest trends in optical communications.

OUTCOMES:

- Attain the knowledge of basic optical fiber communication systems and learn the latest trends in optical communications.
- Recognize and classify the structures, types and channel impairments like losses and dispersion in optical fibers.
- Classify optical sources and detectors and analyze various coupling losses.
- Understand the design issues in deploying an optical communication system.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	1										1		2
CO2	1	3	2										2	1	
CO3	1	2	3										2		2
CO4	1	2	3											2	

UNIT I

OVERVIEW OF OPTICAL FIBER COMMUNICATION: Historical development, The general system, Advantages of optical fiber communications. Optical fiber wave guides, Introduction to Ray theory transmission, Total Internal Reflection, Acceptance angle, Numerical Aperture, Skew rays.

UNIT II

CYLINDRICAL FIBERS: Modes, Vnumber, Mode coupling, Step Index fibers, Graded Index fibers. Single mode fibers Cut off wavelength, Mode Field Diameter, Effective Refractive Index. Fiber materials:Glass, Halide, Active glass, Chalcogenide glass, Plastic optical fibers.

UNIT III:

SIGNAL DISTORTION IN OPTICAL FIBERS: Attenuation, Absorption, Scattering and Bending losses, Core and Cladding losses. Material dispersion, Waveguide dispersion, Polarization mode dispersion, Intermodal dispersion. Pulse broadening

UNIT IV

OPTICAL SOURCES AND DETECTORS: Optical sources LEDs, Structures, Materials, Quantum efficiency, Power, Modulation, Power bandwidth product. Injection Laser Diodes Modes, Threshold conditions, External quantum efficiency, Laser diode rate equations, Resonant frequencies. Reliability of LED&ILD. Optical detectors Physical principles of PIN and APD, Detector response time, Temperature effect on Avalanche gain, Comparison of Photo detectors.

UNIT V

OPTICAL FIBER CONNECTORS: Connector types, Single mode fiber connectors, Connector return loss. Fiber Splicing Splicing techniques, Splicing single mode fibers. Fiber alignment and joint loss Multimode fiber joints, single mode fiber joints,.

UNIT VI

OPTICAL SYSTEM DESIGN: Considerations, Component choice, Multiplexing. Point to Point links, System considerations, Link power budget with examples.Overall fiber dispersion in Multi mode and Single mode fibers, Rise time budget with examples. WDM, Necessity, Principles, Types of WDM, Measurement of Attenuation and Dispersion

TEXT BOOKS:

1. Optical Fiber Communications – Gerd Keiser, Mc GrawHill International edition, 4th Edition, 2008.
2. Optical Fiber Communications – John M. Senior, PHI, 2nd Edition, 2002.

RERFERENCES :

1. Fiber Optic Communications – D.K. Mynbaev, S.C. Gupta and Lowell L. Scheiner, Pearson Education, 2005.
2. Text Book on Optical Fibre Communication and its Applications – S.C.Gupta, PHI, 2005.
3. Fiber Optic Communication Systems – Govind P. Agarwal , John Wiley, 3rd Ediition, 2004.
4. Fiber Optic Communications – Joseph C. Palais, 4th Edition, Pearson Education, 2004.

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Department of Electronics and Communication Engineering

IV B.Tech, I Sem (ECE) T C 3+1*3

(A0425157) CELLULAR AND MOBILE COMMUNICATIONS

OBJECTIVES:

- To enable the student to learn basic analog cellular system and its working operation.
- To enable the student to study the design and evaluation of AMPS system.
- To enable the student to understand various digital cellular systems.
- To enable the student to understand various multiple access techniques.

OUTCOMES:

- Attain the knowledge of fundamentals in cellular radio system design and its evolution.
- Measure the co channel interference in the system designed and can evaluate the cell coverage in various environments.
- Understands the concepts of antenna design in cellular systems.
- Gain knowledge of numbering the radio channels, channel sharing and hand off in cellular.
- Ability to work in advanced research wireless and mobile cellular systems.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1										2		
CO2	1	3	2										2		
CO3	2	2	1										1		1
CO4	2	3	1												2
CO5	2	2	3											1	

UNIT I

INTRODUCTION TO CELLULAR MOBILE SYSTEMS:A basic cellular system, Performance criteria, uniqueness of mobile radio environment, operation of cellular systems, Hexagonal shaped cells, Elements of mobile radio system design, General description of the problem, concept of frequency channels, Cochannel Interference Reduction Factor, desired C/I from a normal case in a Omni directional Antenna system, Cell splitting,

UNIT II

INTERFERENCE: Introduction to CoChannel Interference, real time CoChannel interference, CoChannel measurement, design of Antenna system, Antenna parameters and their effects, Non cochannel interference.

CELL SITE AND MOBILE ANTENNAS: Omni directional antennas, directional antennas for interference reduction, space diversity antennas, umbrella pattern antennas, minimum separation of cell site antennas, high gain antennas.

UNIT III

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 IV

FREQUENCY MANAGEMENT, CHANNEL ASSIGNMENT AND HANDOFF: Numbering and grouping, setup access and paging channels channel assignments to cell sites and mobile units, channel sharing and borrowing, sectorization, overlaid cells. Handoff: types of handoff, handoff initiation, delaying handoff, forced handoff, mobile assigned handoff. Intersystem handoff

UNIT V

MULTIPLE ACCESS TECHNIQUES IN MOBILE COMMUNICATIONS: FDMA/TDMA,CDMA, FDM/TDM Cellular systems ,Cellular CDMA, Comparison. Soft Capacity, Erlang Capacity.

UNIT VI

DIGITAL CELLULAR SYSTEMS: Global system for mobile (GSM), GSM architecture, GSM Air specifications, GSM Channels, Mobility management, Network Signaling,

TEXTBOOKS :

1. Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2rdEdn., 2006.
2. Wireless Communications Theodore. S. Rapport, Pearson education, 2nd Edn., 2002.

REFERENCES :

1. Wireless and Mobile Communications – Lee McGraw Hills, 3rd Edition, 2006.
2. Wireless Communication and Networking – Jon W. Mark and WeihuaZhqung, PHI, 2005.
3. Wireless Communication Technology – R. Blake, Thompson Asia Pvt. Ltd., 2004.

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IV B.Tech, I Sem (ECE) T C
3+1* 3

(A0426157) VLSI DESIGN

OBJECTIVES:

- To know the fabrication process of CMOS technology and its layout design rules
- To study the concepts of CMOS inverters and their sizing methods
- To understand basic circuit concepts and designing Arithmetic Building Blocks.
- To have an overview of Low power VLSI.
- To know the concepts of power estimation and delay calculations in CMOS circuits.

OUTCOMES:

- Understand and calculate device and circuit parameters of MOSFET.
- Draw the Stick diagram and Layout diagrams for nMOS/CMOS circuits.
- Design basic logic functions with different logic styles and compare various logic design styles on their performance metrics.
- Study the importance of low power design and basic techniques for low power design.
- Impart the research skills and encourage continuous learning in the area of microelectronics and VLSI design.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2											2		
CO2		2	3											1	
CO3	1	1	3												2
CO4						3	2						2		
CO5											2	3			2

UNIT I

INTRODUCTION : Introduction to IC Technology – MOS, PMOS, NMOS, CMOS technologies Oxidation, Lithography, Diffusion, Ion implantation, Metallization, Encapsulation, Integrated Resistors and Capacitors, types of packages sets significance.

UNIT II

BASIC ELECTRICAL PROPERTIES: Basic Electrical Properties of MOS Circuits: Enhancement mode transistor action, $I_{ds}V_{ds}$ relationships, MOS transistor threshold Voltage, g_m, g_{ds}; Pass transistor, Inverter with ntype MOSFET Load, Enhancement load NMOS, Depletion Load NMOS, CMOS Inverter analysis and design, BiCMOS Inverters.

UNIT III

VLSI CIRCUIT DESIGN PROCESSES: MOS Layers, Stick Diagrams, Design Rules and Layout: Lambda based CMOS Design rules for wires, Contacts and Transistors.Layout Diagrams for NMOS and CMOS Inverters and Gates.

UNIT IV

BASIC CIRCUIT CONCEPTS: Sheet Resistance R_S and its concept to MOS, Area Capacitances of layers, standard unit of capacitance Cg, area capacitance calculations, The Delay unit, Inverter delays, estimation of CMOS inverter delay, Wiring Capacitances, Choice of layers.

UNIT V

DESIGNING ARITHMETIC BUILDING BLOCKS: Design of adders: Static, Dynamic, Manchester carry chain, Carry bypass adder, CSA, Carry look ahead adder ,Linear CSLA, Square root CSLA. Multiplier: Definition, Partial product generation, Partial product accumulation, Final addition, 4x4 Array multiplier,4x4 carry save multiplier, Multiplier summary. Brief elementary Introduction to FPGAs, CPLDs.

UNIT VI

INTRODCTION TO LOW POWER VLSI: Introduction, overview of power consumption,Sources of Power Dissipation, Static Power Dissipation, Active Power Dissipation, low power design through voltage scaling, estimation and optimization of switching activity.

TEXTBOOKS:

1. Essentials of VLSI circuits and systems – Kamran Eshraghian, EshraghianDougles and A. Pucknell, PHI, 2005 Edition.
2. CMOS digital integrated circuits analysis and design by SungMo Kand and Yusuf Leblebici, Tata McGraw Hill, 3rd edition.

REFERENCES:

1. Introduction to VLSI Circuits and Systems John .P. Uyemura, JohnWiley, 2003.
2. Modern VLSI Design Wayne Wolf, Pearson Education, 3rd Edition, 1997.
3. VLSI Technology – S.M. SZE, 2nd Edition, TMH, 2003.
4. Principles of CMOS VLSI Design Weste and Eshraghian, Pearson Education, 1999.
5. Digital Integrated Circuits – A design perspective, John M. Rabaey, Anantha Chandrakasan, Borivoje Nikolic, Pearson Education, 2rd Edition.

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Department of Electronics and Communication Engineering

IV B.Tech, I Sem (ECE) T C 3+1*3

(A0427157) DIGITAL IMAGE PROCESSING

OBJECTIVES:

- To learn the digital image fundamentals.
- To learn the sampling and reconstruction procedures.
- To learn the various transforms used in image Processing.
- To learn the various concepts of image enhancement, reconstruction and image compression.

OUTCOMES:A Student will able to

- Understand the basics of image processing, concepts of Image transforms.
- Choose appropriate technique for image enhancement both in spatial and frequency domains and understand basics of color image Processing.
- Identify causes for image degradation and apply restoration techniques.
- Understand the concepts of different Image segmentation techniques.
- Choose the appropriate image compression techniques for their application.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1									2		2	
CO2	2	3										1	1	1	
CO3	2	3										1			1
CO4	2	3										2	2		
CO5	2	3										3			2

UNIT I

DIGITAL IMAGE FUNDAMENTALS: Definition of an Image, Digital Image, and Digital Image Processing, Applications of Digital Image Processing(Brief Note), Fundamental Steps in Digital Image Processing, Components of an Image Processing System, A Simple Image Formation Model, Basic Concepts in Image Sampling and quantization, Representing Digital Images, Spatial and Gray Level Resolution(Brief Note), Some Basic Relationships between pixels, Imaging Geometry: Some Basic Transformations Translation, Rotation, Concatenation and inverse transformations.

UNIT II

IMAGE TRANSFORMS: Introduction to the 2D Fourier Transform, 2D Discrete Fourier Transform, Some Properties of 2D DFT, Other Separable Image Transforms: Walsh transform, Hadamard Transform, Discrete cosine Transform, Haar transform, Hotelling transform.

UNIT III

IMAGE ENHANCEMENT IN SPATIAL DOMAIN: Background, Some Basic Gray Level Transformations: Image Negatives, Log Transformations, Power Law Transformations, Piecewise Linear Transformation Functions: Contrast Stretching, Gray Level Slicing, Bit Plane Slicing, Definition of Histogram, Histogram Processing: Histogram Equalization(Brief Note), Histogram Matching(Specification), Local Enhancement, Enhancement Using Arithmetic/Logic Operations: Image Subtraction, and Image Averaging(Brief Note), Basics of Spatial filtering: Smoothing and sharpening Filters(Brief Note).

IMAGE ENHANCEMENT IN THE FREQUENCY DOMAIN: Filtering in the Frequency Domain, Smoothing Filters: Ideal, Butterworth, and Gaussian Lowpass Filters, Sharpening Filters: Ideal, Butterworth, and Gaussian Highpass Filters.

UNIT IV

IMAGE RESTORATION: A Model of the Image Degradation/Restoration Process, Noise models, Restoration in the presence of noise only, Spatial filtering: Mean Filters, Order Statistics Filters, and Adaptive Filters, Periodic Noise Reduction by Frequency Domain Filtering: Bandreject, Bandpass, and Notch Filters, Linear, Position Invariant Degradations, Estimating the Degradation Function, Inverse filtering, Wiener Filtering.

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UNIT V

IMAGE SEGMENTATION: Introduction, Detection of discontinuities: Point Detection, Line Detection, Edge Detection; Edge linking and boundary detection: Local Processing, Global Processing using Hough Transform, and Graph Theoretic Technique; Thresholding: Foundation, Role of Illumination, Global Thresholding, Adaptive Thresholding; Region based segmentation: Basic Formulation, Region Growing, Region Splitting and merging.

UNIT VI

IMAGE COMPRESSION: Fundamentals: Coding Redundancy, Interpixel Redundancy, psychovisual Redundancy, Fidelity criteria, Image compression models, Source encoder and decoder, Elements of Information Theory: Measuring Information; Error free compression: Variable Length Coding, Huffman Coding, Arithmetic Coding, LZW Coding, Bit Plane Coding, Run Length Coding, Lossless Predictive Coding; Lossy compression: Lossy Predictive Coding, and Transform Coding.

TEXT BOOK :

1. Digital Image processing – R.C. Gonzalez & R.E. Woods, Addison Wesley/ Pearson education,2nd Education, 2002.
2. Digital image processing by S.Jayaraman, S.Esakkirajan & T.Veera Kumar, Tata McGraw Hill, 2010.

REFERENCES :

1. Fundamentals of Digital Image processing – A.K.Jain , PHI.
2. Digital Image processing using MAT LAB – Rafael C. Gonzalez, Richard E Woods and Steven L. Edition, PEA, 2004.
3. Digital Image Processing – William K. Pratt, John Wilely, 3rd Edition, 2004.
4. Fundamentals of Electronic Image Processing – Weeks Jr., SPIC/IEEE Series, PHI.
5. Digital Image Processing with Matlab, Elsevier

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IV B.Tech, I Sem (ECE) T C
3+1* 3

(A0428157) SATELLITE COMMUNICATIONS
(ELECTIVE III)

OBJECTIVES:

- To introduce the basic principles of Satellite Communication systems, orbital mechanics, launchers.
- To know the different subsystems of satellites.
- To introduce the basic concepts and designing of Satellite links.
- To introduce the basic concepts of earth station transceiver.
- To know the basics of direct broadcast satellite television
- To know the basic concepts of various multiple access techniques and GPS systems.

OUTCOMES:

- To introduce the basic principles of satellite communication system, orbital mechanics and launchers.
- To understand the concepts of satellite subsystems and designing of satellite uplink and downlinks.
- To analyze the concepts of various multiple access techniques.
- To introduce the basic concepts of earth station transmitter and receiver.
- To know the concepts of global positioning system and its operation.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2		1										2	
CO2			3							2	1		2		
CO3		2		1						3			2		2
CO4					3	1				2				1	
CO5							1			3		2			1

UNIT I

INTRODUCTION: Background, A brief history of satellite communications, satellite communications in 2000, Overview of satellite communications

ORBITAL MECHANICS AND LAUNCHERS: Orbital Mechanics, Developing the equations of the orbit, Kepler's three laws of planetary motion, Describing the orbit of a satellite, Locating the satellite in the orbit, Locating the satellite with respect to the earth, Orbital elements. Look Angle determination, The sub satellite point, Elevation angle calculation, Azimuth angle calculation, Specialization to geostationary satellites. Orbital perturbations, Longitudinal and Inclination changes. Orbit determination, launches and launch vehicles, Expandable launch vehicles, placing satellites into geostationary orbit. Orbital effects in communications systems performance.

UNIT II

SATELLITE SUBSYSTEMS: Attitude and Orbit Control System (AOCS), Telemetry, Tracking, Command and Monitoring (TTC&M), Power system, Communication subsystems, Description of the communications systems, Transponders, Satellite antennas Basic antenna types and relationships, Satellite antennas in practice, Equipment reliability and space qualification, Redundancy.

UNIT III

SATELLITE LINK DESIGN: Introduction, Basic transmission theory, system noise temperature and Gain to Temperature (G/T) ratio Noise temperature, Calculation of system noise temperature, Noise figure and noise temperature G/T ratio for earth stations. Design of down links, budgets, link budget example. Up link design, Design of satellite links for specified Carrier to NOISE (C/N) Combining C/N and C/I values in satellite links, Overall (C/N) with uplink and Downlink attenuation, Uplink and downlink attenuation in rain, Uplink attenuation and (C/N) up, Down link attenuation and (C/N)dn, System design for specific performance, Satellite communication link design procedure.

UNIT IV

MULTIPLE ACCESSES: Introduction, Frequency Division Multiple Access (FDMA): Intermediation, Calculation of C/N with inter modulation. Time division Multiple Access (TDMA): Bits, Symbols, and Channels, Frame structure. Reference burst and preamble, Unique word, Guard times, Synchronization in

TDMA networks, Transmitter power in TDMA networks, Satellite Switched TDMA, Onboard processing Baseband processing transponders, Satellite switched TDMA with onboard processing. Demand Access Multiple Access (DAMA), Code Division Multiple access (CDMA), Spread spectrum Transmission and reception.

UNIT V

DIRECT BROADCAST SATELLITE TELIVISION AND RADIO:C band and Ku band home satellite TV, Digital DBS TV, DBS-TV system design, DBS-TV link budget, Error control in digital DBS-TV, Master control station and uplink, Installation of DBS TV antennas, Satellite radio broadcasting, Orbit considerations, coverage and frequency considerations.

UNIT VI

SATELLITE NAVIGATION & THE GLOBAL POSITIONING SYSTEM: Introduction, radio and satellite navigation, GPS Position Location principles Position location in GPS,GPS time. GPS Receivers and codes The C/A code. Satellite Signal Acquisition, GPS Navigation Message, GPS Signal Levels, timing accuracy, GPS Receiver operation.

TEXT BOOKS:

1. Satellite Communications – Timothy Pratt, Charles Bostian and Jeremy Allnutt, WSE Wiley Publications, 2nd Edition, 2006.
2. Satellite Communications – Dennis Roddy, McGraw Hill, 3rd Edition, 2001.

REFERENCES:

1. Satellite Communications: Design Principles – M. Richharia, BS Publications, 2nd Edition, 2003.
2. Satellite Communication –Dr.D.C Agarwal, Khanna Publications, 5th Ed.
3. Fundamentals of Satellite Communications – K.N. Raja Rao, PHI, 2004
4. Satellite communications Robert M.Gagliardi, CBS publications, first edition 1987.

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IV B.Tech, I Sem (ECE) T C
3+1* 3

(A0429157) DIGITAL TV TECHNOLOGY
(ELECTIVE – III)

OBJECTIVES:

- To study the basic principles and development of the TV systems
- To study the analysis and synthesis of TV pictures, receiver picture tubes and Television tubes
- To study the principles of monochrome television transmitter and receiver systems
- To study the various colour TV systems with greater emphasis PAL systems
- To study the advance topics in TV systems
- To learn protected skills for working with digital TV technology

OUTCOMES:

- Analyze and understand Colour T.V System
- Understand fundamental techniques of Different T.V. standards.
- Understand Advanced T.V. Technology.
- Understand different video recording, display and its consumer application.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1											2		
CO2	1	1				1							1	2	
CO3			2			1	1							1	3
CO4			2				1						1		2

UNIT 1: FUNDAMENTALS OF TELEVISION AND DISPLAY

Television basics: Factors of TV systems, Composite video signal, Signal transmission and channel bandwidth etc.., Color TV systems, color fundamentals, mixing of colors, color perception, chromaticity diagram.

UNIT 2: TV STANDARDS

NTSC, PAL, SECAM systems, color TV transmitter, high level, low level transmitters, color TV receivers, remote control, antennas for transmission. TV alignment and fault finding with Wobbuloscope and TV pattern generation, field strength meter

UNIT 3: DIGITAL TV

Introduction to Digital TV, Principle of Digital TV, Digital TV signals and parameters, Digital TV Transmitters, MAC signals, advanced MAC signal transmission, Digital TV receivers, Basic principles of Digital Video compression techniques, MPEG1, MPEG2, MPEG4, Video compression ITUStandards(H.). Digital TV recording techniques.

UNIT 4: HDTV

HDTV standards and systems, HDTV transmitter and receiver/encoder, Digital TV satellite Systems, video on demand, CCTV, CATV, direct to home TV, set top box with recording facility, conditional access system (CAS), 3D TV systems, Digital broadcasting, case study (Cricket match, Marathon, Football match).

UNIT 5: VIDEO RECORDERS

IP Audio and Video, IPTV systems, Mobile TV, Video transmission in 3G mobile System, IPod(MPEG4 Video player), Digital Video Recorders, Personal Video Recorders, WiFi Audio /Video Transmitter and Receivers. Video Projectors, HD Video projectors, Video Intercom systems/ Video door phones.

UNIT 6: CONSUMER APPLICATIONS

Color TV Digital cameras, Camcoders, Handycams, and Digicams. Display devices: LED, LCD, TFT, Plasma, HDTV, CD/ DVD player, MP3 player, Blue Ray DVD Players, MPEG, and MP3.

TEXT BOOKS

1. Television and video Engineering, A. M. Dhake, TMH Publication.
2. Video Demisified, Kelth jack, Penram International Publication.
3. Audio Video Systems, R.G. Gupta, Technical Education.

REFERENCE BOOKS

1. S. P. Bali, “Color TV Theory and Practice”.
2. Bernard Grobb, Charles E, “Basic TV and Video Sytems”.
3. Gulathi, “Monochrome & Color TV”.

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(A0430157) SPREAD SPECTRUM COMMUNICATIONS

(ELECTIVE – III)

OBJECTIVES:

- To understand the general concepts of spread spectrum
- To generate spread spectrum signals.
- To study various applications of spread spectrum.
- To learn the working operation of CDMA systems.

OUTCOMES:

On successful completion of this course, the students will be able to:

- Demonstrate knowledge in various types of spread spectrum and code division multiple access digital cellular systems and generation and detection of spread spectrum signals.
- Analyse problems in direct sequence and avoidance type spread spectrum systems.
- Design and develop spread spectrum communication systems.
- Choose proper multiple accessing methods depending on channel model.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1					1	2	2							2	
CO2	2				2	2	1					2	2		
CO3	2				2	2	1								2
CO4	1				2		2						1	2	1

UNITI

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, Base band modulation techniques.

UNITII

ANALYSIS OF DIRECT SEQUENCE SPREAD SPECTRUM SYSTEMS: Properties of PN sequences, Classes of periodic sequences, Properties of m sequences, Partial correlation, PN signal from PN sequences, Partial correlation of PN signals, The PN signal, Dispreading the PN signal, Interference rejection, Output signal to noise ratio, Antijam characteristics, Interception, Energy bandwidth efficiency.

UNITIII

ANALYSIS OF AVOIDANCETYPE 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.

UNITIV

DETECTION OF SPREAD SPECTRUM SIGNALSTRACKING: Coherent direct sequence receiver, other method of carrier tracking, Delay lock loop analysis, TauDither loop, Coherent carrier tracking, Non coherent frequency hop receiver.

DETECTION OF SPREAD SPECTRUM SIGNALSACQUISITION: 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.

UNITV

APPLICATION OF SPREAD SPECTRUM TO COMMUNICATIONS: General capabilities of spread spectrum, Multiple access considerations, Energy and bandwidth efficiency in multi access, Selective calling and Identification, Antijam considerations, Error correction coding, Intercept consideration (AI), Miscellaneous considerations, Examples of spread spectrum system.

UNITVI

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, Modern Communications and Spread Spectrum, McGraw Hill.
2. Roger L.Peterson, Rodger E.Ziemer & David E.Ziemer & David E.Both, 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 Datal, Wireless Communication, Oxford Higher Education, 2009.
3. Andrea Goldsmith, Wireless Communications, Cambridge University Press, 2005.

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IV B.Tech, I Sem (ECE) T C 3+1*3

(A0509157) COMPUTER NETWORKS

(Common to CSE and ECE)

OBJECTIVES:

- An understanding of the overriding principles of computer networking, including protocol design, protocol layering, algorithm design, and performance evaluation.
- An understanding of computer networking theory, including principles embodied in the protocols designed for the application layer, transport layer, network layer, and link layer of a networking stack.
- An understanding of specific implemented protocols covering the application layer, transport layer, network layer, and link layer of the Internet (TCP/IP) stack
- An understanding of security issues.

OUTCOMES:

- Understand the basis and structure of an abstract layered protocol models like OSI reference model and TCPIP reference model.
- Analyse and compare a number of data link, network, and transport layer protocols
- Analyse various related technical, administrative and social aspects of specific computer network protocols
- Analyse the features and operations of various application layer protocols such as Http, DNS, and SMTP and Have a basic knowledge of the use of cryptography and network security

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2												1	
CO2	1	2	3										2		2
CO3	2					3	2						2		1
CO4											2	3		2	

UNIT I

Introduction: Network Hardware, Network Software, References Models. The Physical Layer: Guided Transmission Media, Communication Satellites, The public Switched Telephone Network The Local Loop: Modern ADSL, and wireless, Trunks and Multiplexing, Switching.

UNIT II

The Data Link Layer: Data link Layer Design Issues, Elementary Data Link Protocols, and Sliding Window Protocols.

UNIT III

The Medium Access Control Sub layer: Multiple Access protocols, Ethernet Ethernet Cabling, Manchester Encoding, the Ethernet MAC Sub layer Protocol. The Binary Exponential Back off Algorithm, Ethernet Performance, Switched Ethernet, Fast Ethernet. Wireless LANs The 802.11 Protocol Stack, the 802.11 Physical Layer, The 802.11 MAC Sub Layer Protocol, The 802.11 Frame Structure.

UNIT IV

The Network Layer: Network Layer Design Issues, Routing Algorithms (Shortest path, Flooding, Distance Vector, Link state and Hierarchical routing, Broad cast routing, Multicast routing), Congestion Control Algorithms, Internetworking, IPV4 Addresses.

UNIT V

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

UNTI VI

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

TEXT BOOKS:

1. Computer Networks, Andrew S. Tanenbaum, Fouth Edition, Pearson Education.
2. TCP/IP Protocol suite Fourth Edition Behrouz A.Forouzan

REFERENCES:

1. Computer Communications and Networking Technologies, Michael A. Gallo, William M. Hancock, Cengage Learning.
2. Computer Networks, Bhushan Trivedi, Oxford.
3. Computer Networks: Principles, Technologies and Protocols for Network Design, Natalia Olifer, Victor Olifer, Wiley India.
4. Data Communications and Networking, Behrouz A. Forouzan, Fourth Edition, Tata McGraw Hill.
5. Understanding Communications and Networks, Third Edition, W.A.Shay, Cengage Learning.
6. Computer and Communication Networks, Nader F. Mir, Pearson Education
7. Computer Networking: A TopDown Approach Featuring the Internet, James F.Kurose, K.W.Ross, Third Edition, Pearson Education.
8. Data and Computer Communications, G.S.Hura and M.Singhal, CRC Press, Taylor and Francis Group.

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IV B.Tech, I Sem (ECE) TC

3+1*3

(A0431157) DSP PROCESSORS ARCHITECTURES AND APPLICATIONS

(ELECTIVE – IV)

OBJECTIVES:

- To understand the concept of DSP Architecture & comparison of this with that of microprocessors.
- To understand addressing modes, instruction sets , pipelining and application programs in TMS320C54XX processor
- To understand the architectural issues of programmable DSP devices and their relationship to the algorithmic requirements, architectures of commercially popular programmable devices and the use of such devices for software development and system design
- To highlight the suitability of programmable DSP devices for various application areas and motivate to design systems around these devices.

OUTCOMES:

- To become familiar with fundamentals of DSP processors and architectures.
- To become familiar with computational accuracy in DSP implementations.
- To understand architectures of programmable DSP devices and processors.
- Students can able to implement basic DSP algorithms.
- To understand interfacing and applications of programmable DSP devices.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3		1									1		
CO2			1							3	2				1
CO3		3		1						2			2		2
CO4					3	2				1				2	
CO5							2			3		1			2

UNIT I:

ARCHITECTURE OF DSP PROCESSOR (TMS320C5X): Introduction, Bus structure, Central Arithmetic Logic Unit(CALU),Auxiliary Register ALU (ARAU),Index Register(INDX),Auxiliary Register Compare Register(ARCR),Block Move Address Register(BMAR)Block Repeat Registers(RPTC,BRCR, PASR,PAER), Parallel Logic Unit(PLU),Memory Mapped Registers, Program Controller, Some flags in the status registers

UNIT II:

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 III:

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

UNIT IV:

PROGRAMMABLE DIGITAL SIGNAL PROCESSORS: Commercial Digital signal processing Devices, Data Addressing modes of TMS320C54XX DSPs, Data Addressing modes of TMS320C54XX Processors, Memory space of TMS320C54XX Processors, Program Control, TMS320C54XX instructions and Programming, OnChip Peripherals, Interrupts of TMS320C54XX processors, Pipeline Operation of TMS320C54XX Processors.

UNIT V:

IMPLEMENTATIONS OF BASIC DSP ALGORITHMS: The Quotation, FIR Filters, IIR Filters, Interpolation Filters, Decimation Filters, Implementation of FFT algorithms: An FFT Algorithm for DFT

Computation, A Butterfly Computation, Overflow and scaling, Bit Reversed index generation, An 8Point FFT implementation on the TMS320C54XX, Computation of the signal spectrum.

UNIT VI:

INTERFACING &APPLICATIONS OF PROGRAMMABLE DSP DEVICES: DSP based Biotelemetry receiver, A speech processing system, An Image processing system, Memory interfacing, Synchronous serial interface, MCBSP, A CODEC interface circuit.

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.

REFERENCES:

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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IV B.Tech, I Sem (ECE) T C 3+1*3

(A0432157) RADIO FREQUENCY IDENTIFICATION
(ELECTIVE – IV)

OBJECTIVES:

The course content enables students to:

- Introduce and define radiofrequency identification or RFID.
- Identify the advantages and disadvantages of radiofrequency identification.
- Demonstrate the difference between radiofrequency identification and barcodes.

OUTCOMES:

- Students understand the technology and features of RFID.
- Students know the history and operation of RFID.
- To understand global privacy policy.
- Students aware of regulations of RFID.
- Students able to apply RFID technology for different areas.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2		1											1
CO2			2							3	1		2		
CO3		2		1						3					2
CO4					3	2				1					
CO5							1			3		2		2	1

UNIT I

UNDERSTANDING RFID TECHNOLOGY: Introduction, RFID Technology, The Elements of an RFID system, Coupling, Range, and Penetration, RFID Applications, Veri Chip and Mark of the Beast.

UNIT II

A 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 III

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 IV

PRIVACY OF RFID: Introduction, Understanding RFID's Privacy Threats. RFID and the United States Regulatory Landscape.

UNIT V

REGULATION OF RFID: Introduction, Current State of RFID Policy, Individuals, Business, Government, Miscellaneous, Integrity and Security of the System, Government Access, Health Impact, Labor Impact

UNIT VI

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
2. Steven Shepard, "Radio Frequency Identification", First edition, McGrawHill Professional.

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1+2* 1

(A0433157) GROUP DISCUSSION AND MOCK INTERVIEW

OBJECTIVES:

- To make the students aware of the GD session in selection process
- To learn the art of presentation and organising meetings
- To learn about the benefits of team work at the work place
- To learn the process of interviews an also extempore sessions
- To motivate the students with the help of popular motivational stories

.

OUTCOMES:

- The students can develop good leadership skills, communication skills, good interpersonal skill, analytical and lateral thinking.
- To apply the principles of a good presentation and develop the art of presenting effectively
- To become a good team player by learning about the advantages of team building
- The student would be able to perform well in interviews and extempore sessions
- The student also learns the importance of developing self motivation by being influenced by successful stories.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1								2	2	3		3	2		
CO2										3		3		1	
CO3								2	3	3	2				3
CO4						2				3					
CO5								2	2	3		3			2

UNIT - I

GROUP DISCUSSION: Introduction Types of GDD topics Do's and Don't's in GDGD Tips Difference between GD and Debate Mock GD's and Debate Role Play in a Group Discussion

UNIT - II

PRESENTATION SKILLS: Presentation Evaluation Just a minute speeches Creating a power point presentation Body language Conclusions Planning a meeting Analyzing a meeting Analyzing agendas Round table discussions Small group presentation Shaking hands Logging silences Talent search To speak or not to speakrelationships.

UNIT - III

TEAM WORK SKILLS: Dimensions of team building Components of team building Purpose of teams Building blocks for team Types of team Team leader skills.

UNIT - IV

INTERVIEW SKILLS: **I**ntroduction – concept – Types of Interviews – Characteristics of Interviewer – Characteristics of Interviewee – Recruitment interview – Appraisal interview – Research interview.

UNIT – V

Extempore: Introduction To Extempore Common Extempore Topics – SWOT Analysis

UNIT – VI

Motivational Themes: How to win Friends and influence people by Dale Carnegie, The GoGiver: A little story about a powerful Business idea by Bob Burg and John David Mann, How to talk to anyone – 92 little tricks for big success in relationship by Leil Lowndes.

REFERNCE BOOKS:

1. How to win Friends and influence people by Dale Carnegie.
2. The GoGiver: A little story about a powerful Business idea by Bob Burg and John David Mann
3. How to talk to anyone – 92 little tricks for big success in relationship by Leil Lowndes

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(A0484157) MICROWAVE AND OPTICAL COMMUNICATIONS LAB

OBJECTIVES:

- To verify the characteristics of various microwave components using microwave test bench.
- Initiate an expose the newcomers to exciting area of optical communication

OUTCOMES:

- The foundation education in Microwave and optical communications and make the student to analyze the operation of each device.
- Study and analysis of microwave equipments and optical components.
- Ability to design and conduct experiments, analyze and interpret data
- Demonstrate the skill to use modern engineering tools and equipment to analyze problems

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	2										3	1	
CO2	1	2	2										2		1
CO3	2	2	3											2	
CO4	2	2	2												2

Minimum 8 Experiments to be conducted:

Part – A (Any 4 Experiments):

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

Part – B (Any 4 Experiments):

1) Characterization of LED.
2) Characterization of Laser Diode.
3) Intensity modulation of Laser output through an optical fiber.
4) Measurement of Data rate for Digital Optical link.
5) Measurement of NA.
6) Measurement of losses for Analog Optical link.
7) Radiation Pattern Measurement of Antennas (at least two antennas).

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3 2

(A0485157) DSP& IMAGE PROCESSING LAB

OBJECTIVES:

- To design real time DSP systems and real world applications.
- To implement DSP algorithms using both fixed and floating point processors.
- To generate the basis function of different transforms.
- To perform Image processing techniques.

OUTCOMES:

- Able to analyze the systems using DFT.
- Understand circular convolution, and how circular convolution can be achieved via the DFT.
- Alter the sampling rate of signal using decimation and interpolation.
- Able to design digital FIR filters using window method and IIR filters by prototype method analog filters then transform to digital filters.
- Able to perform various image processing operations such as enhancement, compression, edge detection, restoration

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1		2							1			1
CO2	2	2	1		2					1			1		
CO3	1	2	3		2										
CO4	2	1	2		2								2		
CO5	3	2	1		2	1						2			2

I. DSP LAB (Any 5 of the following):

1) Simulation of discrete time systems.
2) Verification of DTFT properties.
3) Stability test.
4) Effect of sampling in frequency and time domain.
5) Design of analog filters.
6) Realization of IIR and FIR transfer functions.
7) Design of IIR & FIR filters.
8) Design of tunable digital filters.
9) Multirate signal processing techniques: Decimation and interpolation.

II. **Image Processing LAB (Any 5 of the following)**:

1) Verification of image scaling properties.
2) To generate the basis function of different transforms.
3) Image enhancement using special domain and frequency domain techniques.
4) Image restoration using inverse and weiner filtering.
5) Edge detection using various operators.
6) Image compression techniques.

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(A0486157) MINI PROJECT

There shall be mini Project, in collaboration with an industry (wherever possible) of their specialization, to be taken up during the vacation(data collection, components etc) after III year II Semester examination and implementation/simulation shall be carried out in IV year first semester during lab classes. Implementation or construction of mini project will be treated as laboratory. However, the mini project and its report shall be evaluated in IV year I Semester. The mini project shall be submitted in report form and should be presented before the committee, which shall be evaluated for 50 marks. The committee consists of an external Examiner, Head of the Department, the supervisor of mini project and a senior faculty member of the Department. There shall be 25 Internal marks for mini project which will be awarded based on the performance and involvement of the student during mini project period.

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3+1* 3

(A0434158) RADAR SYSTEMS

OBJECTIVES:

- This course describes the understanding of the components of a radar system and their relationship to overall system performance
- To become familiar with design, operation, and applications of various types of radar systems
- To understand clutter and its effects of radar system performance and learn the principle of target track and various types of radar antennas.
- To find the target information in the presence of noise.

OUTCOMES:

- To become familiar with fundamentals of radar.
- To gain in knowledge about the different types of radar and their operation
- Students acquire knowledge on the different tracking radars and radar signal detection techniques.
- Students will demonstrate the ability to design a system component or process as per needs and specifications.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3										1	2		
CO2			3		2				1						1
CO3				3		1	2						1	2	
CO4								1		3	2		2	1	

UNIT I

INTRODUCTION TO RADAR: Basic Radar, The Simple Form of the Radar Equation, Radar block Diagram and operation, Radar Frequencies, Applications of Radar.

THE RADAR EQUATION: Prediction of range performance, Minimum detectable signal, Receiver noise, Probability Density Functions, Signal to noise ratio, Integration of radar Pulses, Radar Cross section of Targets, Radar Cross section Fluctuations, Transmitter Power, Pulse Repetition Frequency and range ambiguities, Antenna Parameters, System Losses.

UNIT II

CW AND FREQUENCYMODULATED RADAR: The Doppler Effect, CW Radar, Frequency Modulated CW Radar, Air Borne Doppler Navigation, Multiple –Frequency CW Radar.

UNIT III

MTI AND PULSE DOPPLER RADAR: Introduction to Doppler and MTI Radar, Delay line Cancellers, Staggered Pulse Repetition Frequencies, Range gated Doppler Filters, Digital MTI Processing, Moving Target Detector, Limitations of MTI Performance, MTI from a moving Platform (AMTI), Pulse Doppler Radar.

UNIT IV

TRACKING RADAR: Tracking with Radar, Sequential Lobbing Conical scan and Mono pulse tracking, Target reflection characteristics and angular accuracy Low Angle Tracking, Tracking in Range, Other Tracking Radar Topics and Comparison of Trackers.

UNIT V

RECEIVERS AND DETECTION OF RADAR SIGNALS IN NOISE: The Radar Receiver, Noise Figure, Mixers, Low Noise Front Ends, Displays, Duplexers and Receiver Protectors; Matched Filter Receiver, Correlation Detection, Detection Criteria, Detector Characteristics, Performance of Radar Operator, Automatic Detection, Constant False Alarm Rate (CFAR) Receiver, ECMS & ECCMS.

UNIT VI

INFORMATION FROM RADAR SIGNALS: Introduction, Information available from a radar, Theoretical accuracy of Radar measurements, Ambiguity diagram, Pulse compression, Classification of targets with radar

TEXT BOOKS:

1. Introduction to Radar systems by Merrill I.Skolnik, Second edition, Tata McGraw Hill.

REFERENCES :

1. Introduction to Radar systems by Merrill I.Skolnik, 3rd edition, Tata McGraw Hill.

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(A0435158) BIOMEDICAL INSTUMENTATION
(ELECTIVEV)

OBJECTIVES:

At the end of the course the student is expected to learn the

- Introduction biomedical instrumentation system and bio electrodes
- Cardiac, neuro an respiratory instrumentation
- Medical imaging principles

OUTCOMES:

At the end of the course students are able to:

- Analyze the problems encountered in human body and their measurement by using various Instruments.
- Differentiate the different types of Electrodes suitable for measurement of different parameters of human body.
- Can able to analyze the functioning of Heart, eventually able to determine the characteristics of P, Q, R, S, T ECG waveform.
- Analyze the working of different types of Pacemakers, Defibrillators etc.,
- Get to know about the Neuronal Communication system, Brain working and Measurement of EMG and EEG by Electrodes.
- Get to know the functioning of Spirometers Body Plethysmograph Respiratory Therapy Equipment: Inhalators, Ventilators/Respirators

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	3	2		1							1	2		
CO2	2	2			2							2		2	
CO3	2	3	2	2	1							2	1		
CO4	1	3	2	2								1	2		
CO5	3	1	2		1							2			1
CO6	3	2	2		2							3		2	

UNITI

INTRODUCTION: Components of Medical Instrumentation System Problems, encountered with measurements from human beings levels of structural organization of the human body Physiological systems of the body Organization of cell Resting membrane potential Generation of Action Potential and conduction through nerve cell.

UNITII

BIO ELECTRODES: Electrode theory Electrode characteristics Bio potential Electrodes**:** micro, skin surface and needle electrodes Biochemical electrodes**:** reference electrodes, ph electrode, blood gas electrodes.

UNITIII

CARDIAC INSTRUMENTATIONI: Cardiovascular system Electrical Conduction system of the heart Cardiac cycle The ECG**:** Einthoven triangle, Standard 12lead configurations Interpretation of ECG waveforms with respect to electromechanical activity of the heart ECG recorder principles.

UNITIV

CARDIAC INSTRUMENTATIONII: Blood flow measurements Blood pressure measurements Pace maker Defibrillators Hemo dialysis.

UNITV

NEURO MUSCULAR INSTRUMENTATION: Nervous system**:** anatomy, structure, functions, organization Neuronal communication Brain**:** anatomy, organization EEG: electrode placement, recorder principles, interpretation of waveforms Neuromuscular junction and EMG.

UNITVI

RESPIRATORY INSTRUMENTATION: The Physiology of the Respiratory systemlung volumes and capacities Spirometers Body Plethysmograph Respiratory Therapy Equipment: Inhalators, Ventilators/Respirators, Humidifiers, Nebulizers, Aspirators.

TEXT BOOKS:

1. Biomedical Instrumentation and Measurements – by Leslie Cromwell, F.J.Weibell, E.A. Pfeiffer, PHI.

REFERENCES:

1. Human Phsiology: from cells to systemby Lauralee Sherwood, 6 th edition, Thomson Brooks/Cole.
2. Medical Instrumentation, Application and Design – by John G. Webster, John Wiley.
3. Principles of Applied Biomedical Instrumentation – by L.A. Geoddes and L.E.Baker, John Wiley and Sons.
4. Introduction to Biomedical Equipment Technology, Joseph J Carr, John M.Brown, 4th Edition Pearson Education.

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IV B.Tech, II Sem (ECE) TC

3+1*3

(A0436158) ADVANCED DIGITAL SIGNAL PROCESSING

(ELECTIVEV)

OBJECTIVES:

The course content enables students to:

- Enhance the analytical ability of the students in facing the challenges posed by growing trends in communication, control and signal processing areas.
- Develop ability among students for problem formulation, system design and solving skills
- Demonstrate basic knowledge of Digital Signal Processing by understanding various transformations
- Understand Various Discretetime signals and class of linear shiftinvariant systems will be studied using the convolution sum, and the frequency domain, using transformations.
- Design system with digital network composed of adders, delay elements, and coefficient multipliers.
- Enhance the basic digital filter structures and their realization diagrams.
- Understand the analysis of finite word length effects in signal processing.

OUTCOMES:

- Compare the performance of LMS and RLS algorithms in terms of speed of convergence for a given application.
- Choose an appropriate transform for the given signal
- Choose appropriate decimation and interpolation factors for high performance filters
- Model and design an AR system
- Implement filter algorithms on a given DSP processor platform.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3											2		
CO2	2	2												2	
CO3	2	2											1	2	1
CO4	2	3	2									2	1		1
CO5	2	1	3									2	2		

UNIT I

OVERVIEW : Discrete Time Signals, Sequences and sequence Representation, Discrete Time Systems, Time Domain Characterization and Classification of LTI Discrete Time Systems. The Continuous Time Fourier Transform, The discrete Time Fourier Transform, energy Density Spectrum of a Discrete Time Sequence, Band Limited Discrete Time signals, The Frequency Response of LTI Discrete Time System.

UNIT II

LTI DISCRETETIME SYSTEMS IN THE TRANSFORM DOMAIN: Types of Linear Phase transfer functions, Simple Digital Filters, Complementary Transfer Function, Inverse Systems, System Identification, Digital Two Pairs, Algebraic Stability Test.

UNIT III

DIGITAL FILTER SRTUCTURE AND DESIGN: All Pass Filters, Tunable IIR Digital Filter, IIR Tapped Cascade Lattice Structures, FIR Cascaded Lattice Structures, Parallel All Pass Realization of IIR Transfer Functions, State Space Structures, Polyphone Structures, Digital Sine Cosine Generator, Computational Complexity of Digital Filter Structures, Design of IIR Filter using pade' approximation, Least Square Design Methods, Design of Computationally Efficient FIR Filters.

UNIT IV

DSP ALGORITHEMS: Fast DFT algorithms based on Index mapping, Sliding Discrete Fourier Transform, DFT Computation Over a narrow Frequency Band, Split Radix FFT, Linear filtering approach to Computation of DFT using Chirp Z Transform.

UNIT V

POWER SPECTRAL ESTIMATION: Estimation of spectra from finite duration observation of signals, Nonparametric methods: Bartlett, Welch & Blackmann & Tukey methods. PARAMETRIC METHODS FOR POWER SPECTRUM ESTIMATION: Relation between auto correlation & model parameters, Yule Waker & Burg Methods, MA & ARMA models for power spectrum estimation.

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UNIT VI

APPLICATIONS OF DIGITAL SIGNAL PROCESSING: Dual Tone Multifrequency Signal Detection, Spectral Analysis of Sinusoidal Signals, Spectral Analysis of Non stationary Signals, Musial Sound Processing, Over Sampling A/D Converter, Over Sampling D/A Converter, Discrete Time Analytic Signal Generation.

TEXTBOOKS:

1. Digital Signal Processing by Sanjit K Mitra, Tata MCgraw Hill Publications.
2. Digital Signal Processing Principles, Algorithms, Applications by J G Proakis, D G Manolokis, PHI.

REFERENCES:

1. DiscreteTime Signal Processing by A V Oppenhiem, R W Schafer, Pearson Education.
2. DSP A Practical Approach Emmanuel C Ifeacher Barrie. W. Jervis, Pearson Education.

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IV B.Tech, II Sem (ECE) T C 3+1*3

(A0437158) WIRELESS COMMUNICATIONS AND NETWORKS
(ELECTIVEV)

OBJECTIVES:

- To emphasize the core principles of wireless communication systems.
- To make the students to analyse the networking in wireless communication.
- To make the student aware of the latest trends in wireless communications.
- To make the student to analyze and design advanced wireless systems.
- To solve the technical challenges in wireless communications and networks.

OUTCOMES:

- Understand the basics of wireless communications.
- Attain knowledge in mobile radio propagation and in various diversity techniques.
- Understand the basic concepts of wireless lan's
- Classify and understand the various mobile data networks, multiple access techniques and basics of orthogonal frequency division multiplexing.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1													2
CO2	2	2													1
CO3	2	2	1											2	
CO4	2	2	1										1		1

UNITI

INTRODUCTION TO WIRELESS COMMNICATIONS: Evolution of Mobile Radio Communication, Examples of Wireless Communication System ,Basic Cellular system, Cellular concept, Frequency Reuse, Channel assignment , Hand off , Interference & System capacity, Trunking and Erlang, capacity calculation, Improving coverage and capacity**,** Practical link budget design using path loss models.

UNIT II

MOBILE RADIO WAVE PROPAGATION (LARGE SCALE FADING) :Introduction to Radio wave Propagation , Free Space Propagation Model, Three basic propagation mechanisms, Reflection, Brewster angle, Two Ray Model, Diffraction, Fresnel Zone Geometry, Knife Edge Diffraction Model, Multiple Knife Edge diffraction, Scattering, Practical link budget design using path loss models.

UNIT III

MOBILE RADIO WAVE PROPAGATION (SMALL SCALE FADING & MULTIPATH): Small Scale Multipath Propagation, Impulse response model of a Multipath Channel, Small Scale Multipath Measurements, Parameters of Mobile Multipath Channels, Types of fading, Rayleigh and Ricean Distribution

UNIT IV

DIVERSITY AND EQUALIZATION IN WIRELESS SYSTEM: Diversity Technique, Selection combining, Equal Gain Combining, Maximal Ratio Combining, Feedback, Time, Frequency, Rake Receiver, Interleaving, Equalization, Linear Equalization, Nonlinear (DFE & MLSE).

UNIT V

WIRELESS LAN TECHNOLOGY: Infrared LANs, spread spectrum LANs, Narrow band Microwave LANs, IEEE 802 protocol Architecture, IEEE 802 architecture and services, IEEE 802.11a, IEEE 802.11b.physical layer

MOBILE DATA NETWORKS: GPRS, SMS, WAP, Bluetooth

UNIT VI

MULTIPLE ACESS: Introduction to Multiple Access, TDMA, FDMA, CDMA, CDMA and spread spectrum, Multi carrier modulation, OFDM, Discrete implementation of OFDM..

TEXT BOOKS:

1) Wireless Communication, principles & practice" by T.S. Rappaport, Pearson education, 2nd edition, 2009
2) Wireless Communications by Andrea Goldsmith, Cambridge University press
3) Wireless Communication and Networking by William Stalling, Pearson Education Asia, 2009
4) Wireless Digital Communications by Feher K.", Prentice Hall 1995.

REFERENCES:

1) Mobile Communication by Schiller Pearson Education Asia Ltd., 2008
2) Wireless Communication Andrews F.Molisch, Wiley India,2006.
3) Principles of Wireless Networks Kaveh PahLahen and P .Krishna Murthi, Pearson Education,2002

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(A0438158) NETWORK SECURITY AND CRYPTOGRAPHY

(ELECTIVEVI)

OBJECTIVES:

- To study various aspects of Network Security Attacks, Services and Mechanisms.
- To understand the mathematical concepts of various Encryption, Authentication and Digital Signature Algorithms.
- To standby the design of different general purpose and application specific security Protocols and standards.
- To identify suitable methods for applying security features for network traffic

OUTCOMES:

- To have a fundamental understanding of the objectives of cryptography and network security become familiar with the cryptographic techniques
- To attain knowledge on Encryption techniques, Design Principles and Modes of operation.
- To understand Authentication functions and Hash Functions works.
- To examine the issues and structure of Authentication Service and Electronic Mail Security
- To provide familiarity in Intrusion detection and Firewall Design Principles.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	1												1
CO2	1	3	2										2	1	
CO3	2	2	1											2	
CO4	1	2	3											1	
CO5	1	2	2											1	1

UNIT I

INTRODUCTION: Computer Security concepts, The OSI Security Architecture, Security attacks, Security services and Security mechanisms, A model for Network Security, Classical encryption techniques symmetric cipher model, substitution ciphers, transposition ciphers, Steganography, Modern Block ciphers, Modern Stream ciphers. Modern Block Ciphers: Block ciphers principles, Data encryption standard (DES), Strength of DES, linear and differential cryptanalysis, block cipher modes of operations, AES, RC4

UNIT II

INTRODUCTION TO NUMBER THEORY : Integer Arithmetic, Modular Arithmetic, Matrices, Linear Congruence, Algebraic Structures, GF(2n) Fields, Primes, Primarily Testing, Factorization, Chinese remainder Theorem, Quadratic Congruence, Exponentiation and Logarithm.

PUBLICKEY CRYPTOGRAPHY: Principles of public key cryptography, RSA Algorithm, Diffie Hellman Key Exchange, EL Gamal cryptographic system, Elliptic Curve Arithmetic, Elliptic curve cryptography

UNIT III

CRYPTOGRAPHIC HASH FUNCTIONS: Applications of Cryptographic Hash functions, Requirements and security, Hash functions based on Cipher Block Chaining, Secure Hash Algorithm (SHA)

MESSAGE AUTHENTICATION CODES: Message authentication Requirements, Message authentication functions, Requirements for Message authentication codes

DIGITAL SIGNATURES: RSA with SHA & DSS

UNIT IV

KEY MANAGEMENT AND DISTRIBUTION: Symmetric key distribution using Symmetric Encryption, Symmetric key distribution using Asymmetric, Distribution of Public keys, X.509 Certificates, Public key Infrastructure.

USER AUTHENTICATION: Remote user Authentication Principles, Remote user Authentication using Symmetric Encryption, Kerberos, Remote user Authentication using Asymmetric Encryption, Federated Identity Management

UNIT V

SECURITY AT THE TRANSPORT LAYER (SSL AND TLS): SSL Architecture, Four Protocols, SSL Message Formats, Transport Layer Security, HTTPS, SSH .

SECURITY AT THE NETWORK LAYER (IPSEC): Two modes, Two Security Protocols, Security Association, Security Policy, Internet Key Exchange.

UNITVI

SYSTEM SECURITY: Description of the system, users, Trust and Trusted Systems, Buffer Overflow and Malicious Software, Malicious Programs, Worms, Viruses, Intrusion Detection System(IDS), Firewalls.

TEXT BOOKS:

1. Cryptography and Network Security: Principals and Practice, William Stallings, Fifth Edition, Pearson Education.
2. Cryptography and Network Security, Behrouz A. Frouzan and Debdeep Mukhopadhyay, 2nd edition, Mc Graw Hill Education.

REFERENCES:

1. Cryptography and Network Security, William Stallings, PHI, New Delhi, 2nd Edition, 1999
2. Cryptography and Security, C.K. Shymala, N. Harini and Dr. T.R. Padmanabhan, WileyIndia.

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IV B.Tech, II Sem (ECE) T C 3+1*3

(A0439158) VIRTUAL INSTRUMENTATION
(ELECTIVEVI)

OBJECTIVES:

- To understand what is Virtual instrumentation and to realize the architecture of VI.
- To familiarize with the VI software and learn programming in VI.
- To study various Instrument Interfacing and data acquisition methods.
- To understand various analysis tools and develop programs for Process control applications.
- To study a few applications in virtual instrumentation.

OUTCOMES:

- Understand the basics of virtual instrumentation and its Architecture.
- Familiarize with VI software (Labview) and learn programming
- To familiarize with various interfacing and data Acquisition methods
- To understand various analysis tools in Virtual Instrumentation
- Student will be able to develop programs for process control applications.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1			1	1							1		
CO2	2	2	2		1	1								2	
CO3	1		3	2						1		1	1		1
CO4	2	1	1		1					1		1	2	1	
CO5	1	3		2	2	1				1		1		1	2

Course Aim: This course aims to introduce the latest instrumentation system design and development tools available today.

Prerequisite: Course on Personal Computer Systems and Interfacing.

UNIT I

VIRTUAL INSTRUMENTATION: An introduction Historical perspective, advantages, block diagram and architecture of a virtual instrument, dataflow techniques, graphical programming in data flow, comparison with conventional programming. Development of Virtual Instrument using GUI, Realtime systems.

UNIT II

VI PROGRAMMING TECHNIQUES: VIs and subVIs, loops and charts, arrays, clusters and graphs, case and sequence structures, formula nodes, local and global variables, string and file I/O, Instrument Drivers, Publishing measurement data in the web.

UNIT III

DATA ACQUISITION BASICS: Introduction to data acquisition on PC, Sampling fundamentals, Input/output techniques and buses. ADC, DAC, Digital I/O, counters and timers, DMA, Software and hardware installation, Calibration, Resolution, Data acquisition interface requirements.

UNIT –IV

VI INTERFACE REQUIREMENTS: Common Instrument Interfaces: Current loop, RS 232C/ RS485, GPIB. **Bus Interfaces**: USB, PCMCIA, VXI, SCSI, PCI, PXI, Fire wire. PXI system controllers, Ethernet control of PXI. Networking basics for office & Industrial applications, VISA and IVI.

UNIT V

VI TOOLSETS, DISTRIBUTED I/O MODULES: Application of Virtual Instrumentation: Instrument Control, Development of process database management system.

UNIT –VI

SIMULATION OF SYSTEMS USING VI: Development of Control system, Industrial Communication, Image acquisition and processing, Motion control.

TEXTBOOKS :

1. LabVIEW Graphical Programming, Gary Johnson, Second edition, McGraw Hill, Newyork, 1997.
2. LabVIEW based Advanced Instrumentation Systems, S. Sumathi and P. Surekha, Spinger.
3. Virtual Instrumentation Using LabVIEW, Sanjay Gupta & Joseph John, TMH, New Delhi.

REFERENCES :

1. PC Interfacing and Data Acquisition: Techniques for Measurement, Instrumentation and Control, Kevin James, Newnes, 2000.
2. WEB RESOURCES: www.ni.com.
3. LabVIEW for everyone, Lisa K. wells & Jeffrey Travis Prentice Hall, New Jersey, 1997.

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IV B.Tech, II Sem (ECE) T C 3+1*3

(A0440158) LOW POWER VLSI DESIGN

(ELECTIVEVI)

OBJECTIVES:

The objective of this course is to provide students with

- Understanding of sources of power consumption of CMOS and BiCMOS circuits
- Knowledge of the scientific principles involved in fabrication of integrated circuits.
- Understanding of fabrication steps involved in fabrication process of MOSFET for CMOS and BiCMOS circuits.
- A comprehensive understanding of process integration and manufacturing for integrated circuits in emerging nanometerscale technologies.
- Understanding of Power Reduction Techniques and Low Power Logic design Styles.
- knowledge of MOSFET models and limitations of MOSFET models for analysis of digital CMOS and BiCMOS circuits
- Be able to create models of moderately sized CMOS and BiCMOS circuits that realize specified digital functions.
- Describe the general steps required for processing of CMOS and BiCMOS integrated circuits.

OUTCOMES:

- Capability to recognize advanced issues in VLSI systems, specific to the deep submicron silicon technologies.
- Students able to understand deep submicron CMOS technology and digital CMOS design styles.
- Students are able to understand the need of BiCMOS technology and different designs using BiCMOS technology
- To design chips used for battery powered systems and high performance circuits.
- At the end of the course students will have good understanding about low power modules and can able to design low power adders, multipliers and low power memory

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1		1							3		2	
CO2	2	2		3	2		1					3		2	
CO3	3	2										2			
CO4	3	3		2	1		1		2			2		3	
CO5	2	1		2	1				1			2			1

UNIT I

LOW POWER DESIGN, AN OVER VIEW: Introduction to low voltage low power design, limitations, Silicon on Insulator (SoI).

UNIT II

MOS/BiCMOS PROCESSES: BiCMOS processes, Integration considerations, BiCMOS Isolation considerations.

UNIT III

LOWVOLTAGE/LOW POWER CMOS/ BICMOS PROCESSES: Deep submicron processes, SOI CMOS.

UNIT IV

DEVICE BEHAVIOR AND MODELING: Advanced MOSFET models, limitations of MOSFET models.

UNIT V

Sub half micron MOS devices: Analytical and Experimental characterization of sub half micron MOS devices, MOSFET in a Hybrid mode environment.

UNIT VI

CMOS AND BiCMOS LOGIC GATES: Conventional CMOS and BiCMOS logic gates, Performance Evaluation.

TEXT BOOKS:

1. CMOS/BiCMOS ULSI low voltage, low power by Yeo Rofail/ Gohl (3 Authors) Pearson Education Asia 1st Indian reprint, 2002.
2. Gary K. Yeap, "Practical Low Power Digital VLSI Design", KAP, 2002.

REFERENCES:

1. Basic VLSI Design, Douglas A.Pucknell & Kamran Eshraghian, 3rd edition PHI.
2. Digital Integrated circuits, J.Rabaey PH. N.J 1996
3. CMOS Digital ICs Sungmo Kang and yusuf leblebici 3rd edition TMH 2003.

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IV B.Tech, II Sem (ECE) T C
1+2* 1

(A0441158) MICROWIND & LAB VIEW

(Skill Development Course)

OBJECTIVES:

- To understand the Technology and features of microwind.
- To learn the simulation and performance estimations at circuit level
- To learn the basics of labview.

OUTCOMES:

- Understand the features and technology of micro wind
- Design and simulate the performance of various combinational and sequential circuits
- Understand the different parameter variations at the circuit level
- Understand the basics of the Labview software
- Learn the concepts of implementing a VI
- Understand the interfacing of simple VI's to DAQ

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1							1			2		1	
CO2	2	1													
CO3		2		2	2									2	
CO4	1	2							1			2		1	1
CO5	1		2		3								1		
CO6	1	2		2								2	1		

UNIT I

INTRODUCTION & FEATURES OF MICROWIND: Nanometer Era, Technology scaling, Micro wind design flow, DSCH, Nanoloamda, Virtuoso fab, Prothumbtransient analysis of voltage, current, transfer curve, eye diagram, parametric analysis, simulation on layout, Protutor, MEMsim, SOI, Design trends, Extractions, technology rule files.

UNIT II

SIMULATION AND PERFORMANCE ESTIMATIONS AT CIRCUIT LEVEL: Basic CMOS inverter simulation, layout, power, delay, area and metrics calculations, Simulations of basic gates and, or, xor, nand, 8 to 1 multiplexor, arithmetic circuits full adder, 4bit, 8bit, 16bit adders, comparator and sequential circuits – basic latch, RS latch, D latch at layout level.

UNIT III

STUDY OF DIFFERENT PARAMETER VARIATIONS AT CIRCUIT LEVEL: Study of variations of W/L ratio, threshold variations, Process, Voltage and temperature variations on the values of on current, off current, power dissipation, propagation delay and metrics of basic circuits.

UNIT IV

BASICS OF LABVIEW: Introduction, Components of LabVIEW, Owned and free labels, Tools and other pallets, Arranging Objects, PopUp menus, color coding, code debugging, and context help.

UNIT V

IMPLEMENTING A VI: Front panel design, LabVIEW data types, for loop, while loop, timing a VI, case structures, iterative data transfer.Relating Data Arrays, Clusters, type definitions.

UNIT VI

DATA ACQUISITION: Introduction, classification of signals, guidelines, practical Vs Ideal interfacing, Measurement and Automation explorer, Use of Simple VI's, Use of DAQmx.

TEXT BOOKS:

1. Microwind lab user manual.
2. Sanjay Gupta & Joseph John, Virtual Instrumentation Using LabVIEW, TMH, New Delhi.
3. Jovitha Jerome, Virtual Instrumentation Using LabVIEW, PHI, New Delhi.
4. Gary Johnson, Richard Jennings, LabVIEW graphical programming, McGraw Hill

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IV B.Tech, II Sem (ECE) **C 1**

(A0487158) SEMINAR

There shall be a seminar presentation in IV year II semester. For the seminar, the student shall collect the information on a specialized topic and prepare a technical report, showing his understanding over the topic, and submit to the Department, which shall be evaluated by the Departmental committee consisting of Head of the Department, seminar supervisor and a senior faculty member of the department. The seminar report shall be evaluated for 50 marks. There shall be no external examination for seminar.

IV B.Tech, II Sem (ECE) **C 2**

(A0488158) COMPREHENSIVE VIVA

There shall be a comprehensive viva voce examination at the end of IV year II semester for 50 marks which shall be conducted by HOD, senior faculty and external Examiner from other institute.

IV B.Tech, II Sem (ECE) **C 8**

(A0489158) PROJECT

The project topic should be approved by Internal Department Committee (IDC). Out of total 150 marks for the project work, 50 marks shall be for Internal Evaluation and 100 marks for the End Semester Examination. The evaluation of project work shall be conducted at the end of the IV year II semester. The project viva voce examination will be conducted by the committee consisting of an external Examiner from other institute, Head of the Department and the supervisor of the project. The Internal evaluation for 50 marks shall be on the basis of two seminars given by each student on the topic of the project. The Internal evaluation of the project work for 50 marks shall be conducted by the committee consisting of head of the Department or his nominee, senior faculty member and the supervisor of project.

IV B.Tech, II Sem (ECE) **C 2**

EXTRA ACADEMIC ACTIVITY (EAA)

Each of the following activities carry one credit and every student is required to register for **two activities** during second year of study which is mandatory.

a) NSS/NCC

b) Games and Sports

c) Yoga/Meditation

d) Extension Activities

e) Literary/ Cultural Activities

Any other which may be offered in future

The activities shall be carried out in the allotted hours. The activities will be monitored by the respective faculty in charge, senior faculty member of the department and the HOD. Grades will be awarded on the basis of participation, attendance, performance and behavior. Grades shall be entered in the marks statement as GOOD, SATISFACTORY and UNSATISFACTORY and shall not be counted towards CGPA calculation. If any student gets an Unsatisfactory Grade, he/she has to repeat the activity in the immediate subsequent year.