R G M COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
NANDYAL-518501, KURNOOL DIST., A.P., INDIA

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING (ECE)

RGM-R-2019

(ESTD-1995)

B.TECH SYLLABUS 2019

Applicable for students admitted into
B.Tech (Regular) from 2019-20
B.Tech (Lateral Entry Scheme) from 2020-21
Regulations, Course Structure & Detailed Syllabus

RAJEEV GANDHI MEMORIAL COLLEGE OF ENGINEERING AND TECHNOLOGY
AUTONOMOUS
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 2019-20 and B.Tech. (Lateral Entry Scheme) from 2020-21

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 2019-20 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 Education) 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)** 10% 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

Academic Regulations for 2019 B. Tech. (Regular)

(Effective for the students admitted into the I year from the Academic Year 2019-2020)

The B.Tech. Degree 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 160 credits and secured 160 credits with compulsory subjects as listed in Table-1.

Table 1: Compulsory Subjects

S.No	SUBJECT PARTICULARS
1	All the subjects offered in B.Tech course / MOOCs
2	Mandatory Learning Courses [Environmental Science, Induction Program, Indian Constitution, Essence of Indian Traditional Knowledge]
3	All practical subjects
4	All Skill Development Courses/ value added courses
5	Mini projects
6	Comprehensive Viva-Voce
7	Seminar
8	Internship
9	Extra Academic Activities-EAA
10	Life Science
11	Project work Phase-I
12	Project Work Phase-II

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

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

Table 2: Credits

Subject	Semester			
	Periods/ Week	Credits	Internal Marks (IM)	External Marks (EM)
Theory	2+1*	03	30	70
English Theory	2+1*	02	30	70
Life Science	02	02	30	70
Mandatory Learning Courses	03	00	00	00
Mini project/ Practical	03	1.5	25	50
Drawing	03	03	30	70
Skill Development Courses/Value Added Course	1+2*	0.5**	30	70
Comprehensive Viva (CV)	--	0.5	00	50
Extra Academic Activities	02	00	00	00
Seminar		0.5	50	00
Internship		1.0	00	Certificate from Internship Agency
Project Phase-I		1.0	25	00
Project Phase-II	--	08	25	100

* Tutorial

** [Skill Development / value Added Courses 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. The credits obtained in Skill development courses will be taken in to account for the award of degree.]

Note:- Mandatory Learning Courses /EAA will not carry any credits but attendance requirements of 75% should be fulfilled otherwise they have to reregister to fulfill academic requirements.

4.0 Distribution and Weightage 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-Voce (CV) 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 (20 marks for internal test and 10 marks for assignment or field work/group task/Online test) 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 20 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/Online test) for award of 10 marks so

that internal component (marks) will be 30 marks (20 marks for internal test+10 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 marks in that subject.

4.6 Open and Professional Electives will commence from 3rd year Second semester onwards. The open elective offered in 3-2 semester will be based on self-study/MOOCs. All the students have to opt for the MOOCs (Self Study) and should acquire the required credits. If the student fails to opt for MOOCs, (Under unavoidable circumstances) he/she has to write two internal tests besides the end examination conducted by the institute (Elective offered in place of MOOCs by the Dept.) like other subjects. However, he/she has to obtain the certificate from the organization in which he has registered. Any MOOCs course selected by the student should be of more than 45 hours duration /12 weeks course with minimum of 3 credits and also from the reputed organization. Attendance of the student who has opted for MOOCs 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 the next semester. Attendance will not be recorded for MOOCs.

{Massive open online Courses (MOOCs') B.Tech students can avail the facility of earning up to a maximum of 5% credits of their degree requirements through MOOCs. MOOC courses eligible for this purpose are the courses offered by NPTEL/ SWAYAM/EDX/Course by any other reputed organisation approved by the department only. The student shall obtain prior approval of the Head of the Department before registering for MOOC's. MOOC courses can be taken in lieu of Elective courses such as Open Electives & Professional Electives (pertaining to their branch only) and Employability Enhancement Courses. No Core, Lab or Project Course can be dropped in lieu of MOOC. The student shall submit course Title, institute which offered MOOC, Examination system and Credits of the Course, duration of course - After deciding on the MOOC and a course which is approved as its equivalent in the curriculum a student can enrol for it and clear it any time as per his/her convenience and obtain the assessment certificate.

If the assessment certificate is submitted

(i) Before the commencement of the semester in which the equivalent course is offered, the student will be exempted from attending the regular class work and internal assessment exams of the equivalent subject.

(ii) During the semester the student is permitted to withdraw from the remaining part of the course work and internal assessment tests.

(iii) After the semester is over but before the results of that semester are declared the student can request for considering his performance in the MOOC in lieu of its equivalent.

The student shall submit to the HOD the original certificate issued by MOOC authorities along with a photocopy of the same. The original will be returned after verification and verification shall be certified by the Head of the Department on the photocopy which shall be kept in records. An equivalent Grade corresponding to grade/marks awarded by MOOC agency shall be determined by a committee consisting of Principal, Controller of Examinations, Dean Student affairs and HoD concerned. This equivalent Grade shall be shown in the grade sheet and accounted in the SGPA and CGPA calculations.

4.7 Gap Year – Concept of student Entrepreneur in Residence shall be introduced and the 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 full time entrepreneurship. This period may be extended for another one year (two years in total) and this period would not be counted for the maximum duration for completion of graduation. An evaluation committee shall be constituted 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 open electives offered from III year II Sem onwards Student has to select the subjects among the list of open elective subjects by the other departments (inter - department). Student has to clear the subject as per norms to get the required credits. At least minimum of 40 students should register for any open elective; otherwise that open elective will not be offered.

4.9 Out of the professional electives offered from III Year II Semester onwards again one Professional elective in IV Year I Sem will be a MOOCs (Self Study) and the student has to acquire the required credits to clear the subject as specified in 4.6.

4.10 The institute would like to offer **Honours** and **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 Honours or Minor, student has to earn a minimum of 20 extra credits. For this in addition to the regular subjects, a student has to pursue (Self-study/MOOCs) five additional subjects from 3-1 semester onwards and acquire the required credits. 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 and also Honours. 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 8.0 CGPA) to become eligible for registration for Honours/Minor. GPA and CGPA of 8.0 has to be maintained in the subsequent semesters without any backlog subjects in order to keep the Minor/Honours discipline registration active else Minor/Honours registration will be cancelled. The breakup of the credits are 5 subjects which carry 15 credits @3 credits per subject and project work carries 5 credits. The evaluation pattern of subjects and project work will be similar to methods followed in regular course evaluation. No attendance minimum will be considered for Honours/Minor. Not more than two subjects are allowed for registration in any semester for Honours/ Minor. The student is eligible to receive B.Tech with Honours if he acquires the required additional credits in the same discipline in which he is pursuing his B.Tech degree. If the students acquire the additional credits from other disciplines then he is eligible to

receive B.Tech along with Minor degree in the specified area. Minimum strength for offering Minor/Honours in a discipline is considered as One-Fifth (20% of the class) of the class size and Maximum size would size would be Four-Fifth of Class size (i.e 80% of the class).

4.11 Extra - Academic Activity (EAA)

Each of the following activities carries 0 credits and every student is required to register for **two** activities during second year of study (one in each semester) 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 Department 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.

4.12 The student has an option of going for internship in IV year, II Sem in a reputed organization (The finalization of the internship organization will be as per college guidelines (HOD, two Senior faculty members of the department and same will be recommended to the Principal for approval). In case any student opted for internship he need not attend the classes however he has to write internal and external examination of subjects when ever conducted in that semester and acquire the required credits. The project work in the final semester may be carried out during the internship and same may be submitted for evaluation. Student has to acquire 01 credit by going for internship (minimum of Two weeks) / carrying out internal project work/ study project report on any industry/ attending workshop in reputed institutions for two weeks. Certificate from the organization has to be submitted to this effect attested by Head of the Department and internship incharge to the academic section before the commencement of 3-2 semester. Student is expected to carry out the activities mentioned here during the summer break before the commencement of 3-1 semester.

4.13 The medium of instruction for all Course work, Examination, Seminar Presentations, Project Reports and all academic activities shall be English.

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 5 marks (It contains 5 questions of one 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. Evaluation of answer scripts shall be done by either

Internal or External examiners appointed by the Principal. A minimum of 50% of subjects will be evaluated by external examiners.

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, 15 marks shall be awarded for day-to-day work, 5 marks to be awarded by conducting an internal laboratory test and 05 marks will be allotted for any creativity/ innovation/ additional learning in lab beyond prescribed set of experiments etc. 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 two Mini-Projects, in collaboration with an industry/EPICS (Engineering Projects In Community Services) (wherever is possible) of their specialization, to be taken up during the vacation (data collection, components etc.) after II year II Semester and III Year II Semester examination and implementation/ simulation shall be carried out in III year I Semester and IV Year I Semester during lab classes. Implementation or fabrication/simulation of mini projects will be treated as laboratory. However, the mini project and its report shall be evaluated in III year I Semester and IV Year I Semester. The mini project shall be submitted in the 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 and the supervisor of mini project. 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 comprehensive Viva-Voce examination at the end of each semester. CV Examination shall be conducted by the committee consisting of Senior faculty (based on the recommendation of HOD), an external Examiner from other institutions and HOD and evaluated for 50 marks.

5.8 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 (25 marks for Phase-I and 25 marks for Phase-II) and 100 marks for the End Semester Examination. The evaluation of project work phase-I shall be conducted at the end of the IV year I semester and Phase-II 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 (25 marks for Phase-I and 25 marks for Phase-II) 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.

5.9 For all practical/mini project/main project/CV 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.

5.10 **Revaluation of End Examination Scripts**: Revaluation of End Examination scripts is allowed for theory subjects only by paying requisite fee. Procedure for Revaluation: The script will be revaluated by an examiner appointed by the Principal. The maximum of revaluation and regular end examination grade will be awarded for that subject. Student can apply for revaluation in a subject only once.

Table4: Distribution of weightages 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. Both internal and external Evaluation (at least a minimum of 50% subjects will be sent for external evaluation)		End Examination in theory subjects will be for 70 marks.
		30	20	Internal Examinations (Internal evaluation)	These 20 marks are awarded to the students based on the performance in two (per semester) Internal examinations with a weightage of 0.75 for better score and 0.25 for the other score.
			10	Assignments/Field work/Group task/Online Test (Objective Type) (Internal evaluation)	Average of two assignments /Field work/group task in a semester each evaluated for 10 marks.
2	Practical	50	End lab examination (External evaluation)		This End Examination in practical subjects will be for a maximum of 50 marks.
		25	15	Internal evaluation	Day-to-day performance in lab experiments and record.
			05	Internal evaluation	Internal lab examination at the end of year/semester
			05	Internal evaluation	05 marks will be allotted for any creativity/ innovation/ additional learning in lab beyond prescribed set of experiments etc.
3	Mini Project	50	End Examination (External evaluation)		This End Examination in mini project will be for a maximum of 50 marks.
		25	Internal evaluation		Day-to-day performance in executing mini project.

4	Comprehensive Viva-Voce(CV)	50	External evaluation		This end viva voce examinations in all the subjects for 50 marks.
5	Project work	100	External evaluation		This end viva voce in project work for 100 marks
		50	Internal evaluation 25 marks for Phase-I 25 Marks for Phase-II		These 50 marks will be based on the performance of the student in the project reviews apart from attendance and regularity(25 marks for Phase-I and 25 marks for Phase-II)
6	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.
7	Internship/Internal Project/Study Report/Work shop	00	-		Certificate form Internship Agency
8	Life Science	70	External Evaluation		End Examination in theory subjects will be for 70 marks.
		30	20	Internal Examinations (Internal evaluation)	These 20 marks are awarded to the students based on the performance in two (per semester) Internal examinations with a weightage of 0.75 for better score and 0.25 for the other score.
			10	Assignments/Field work/Group task/Online Test (Objective Type) (Internal evaluation)	Average of two assignments /Field work/group task in a semester each evaluated for 10 marks.
9	EAA	00	Internal evaluation		Based on performance and committee report.
10	Mandatory Learning Courses	00	Internal evaluation		No examinations. Attendance minimum is required

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.

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 CV 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 40.5 credits out of 81 credits 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 61.5 credits out of 123 credits 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	81	40.5
III yr to IV yr	123	61.5

7.4 The student shall register and put up minimum attendance in all 160 credits and earn 160 credits. Grades obtained in 157 credits (excluding the credits obtained in Skill Development Courses/Value added courses) shall be considered for the calculation of CGPA.

7.5 Students who fail to earn 160 credits as indicated in the course structure 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. of Skill Development Courses	Number of Labs		Total credits	
First Year	First	CE/ME/CSE	ECE/EEE	00	CE/ME/CSE	ECE/ EEE	4X3=12 1x2=02 3X1.5=4.5 1x0.5=0.5	19
		05 {CE-I-HSMC LAC-BSC MEC/AC-BSC PEE/EM/BEM-ESC PPS-I-ESC	05 {CE-I-HSMC LAC-BSC AP-BSC ED-ESC PPS-I-ESC}		EC lab-BSC PPS-I Lab-ESC DEL Lab-HSMC CV-I	EP Lab-BSC PPS-I Lab-ESC EW&ITW-LC CV-I		
	Second	05 {CE-II-HSMC OPDEVC-BSC AP/EP-BSC ED-ESC PPS-II-ESC}	05 {CE-II-HSMC OPDEVC-BSC MEC-BSC NA/BEE-ESC PPS-II-ESC}	00	EP lab-BSC PPS-II Lab-ESC EW&ITW-LC CV-II	EC lab-BSC PPS-II Lab-ESC DEL Lab-HSMC CV-II	4X3=12 1x2=02 3X1.5=4.5 1x0.5=0.5	19
Second Year	First	BSC Life Science Four Subjects	BSC Life Science Four Subjects	01	Subjects		5X3=15	22.5
					Life Science		1x2=2.0	
					Labs		3x1.5=4.5	
					CV (Comprehensive Viva)-III		1X0.5=0.5	
					SDC/VAC		1x0.5=0.5	
					EAA		No Credits	
	Second	MC-I/MC-2/MC-3 Five Subjects SDC/VAC	MC-I/MC-2/MC-3 Five Subjects SDC/VAC	01	Subjects		5X3=15	20.5
					Labs		3X1.5=4.5	
					CV (Comprehensive Viva)-IV		1X0.5=0.5	
					SDC/VAC		1x0.5=0.5	
					Mandatory Course-1/2/3 (ECE/CSE&EEE/CE&ME) (Indian Heritage, Culture Tradition) Mandatory Course-3 (Constitution of India)		No Credits	
					EAA		No Credits	
Third Year	First	Five Subjects SDC/VAC MC-I/MC-2/MC-3	Five Subjects SDC/VAC MC-I/MC-2/MC-3	01	Subjects(05S)		5X3=15	20.5
					Labs		3X1.5=4.5	
					SDC/VAC		1x0.5=0.5	
					CV (Comprehensive Viva)-V		1X0.5=0.5	
					Mandatory Course-1/2/3 (ECE/CSE&EEE/CE&ME) (Indian Heritage, Culture Tradition)		No Credits	
	Second	03S + OEC1(MOOCs) + PEC1 MC-I/MC-2/MC-3	03S + OEC1(MOOCs) + PEC1 MC-I/MC-2/MC-3	01	Subjects(03S, OEC1, PEC1)		5X3=15	21.5
					Labs		2x1.5=3.0	
					Mini Project-1(EPICS)		1x1.5=1.5	
					SDC/VAC		1X.5=0.5	
					CV (Comprehensive Viva)-VI		1X0.5=0.5	
					Internship		1x1.0=1.0	
					Mandatory Course-1/2/3 (ECE/CSE&EEE/CE&ME) (Indian Heritage, Culture Tradition) Mandatory Course-3 (Constitution of India)		No Credits	
Fourth Year	First	1S+PEC2+PEC3/(MOOCs)+PEC4+OEC2		01	Subjects (01S, PEC2, PEC3, PEC4, OEC2)		5X3=15	21.5
					Labs		2X1.5=03	
					SDC/VAC		1X0.5=0.5	
					CV (Comprehensive Viva)-VII		1X0.5=0.5	
					Project Phase 1		1x1.0=1.0	
					Mini project-2 (EPICS)		1X1.5=1.5	
	Second	PEC5 + OEC3		01	Subjects (PEC5, OEC3)		2X3=06	15.5
					SDC/VAC		1X0.5=0.5	
					CV (Comprehensive Viva)-VIII		1X0.5=0.5	
					Seminar		1x.5=0.5	
					Project Phase-2/Internship		1X8=08	
							GRAND TOTAL	**160**
MC-1 (Environmental Studies), MC-2 (Indian Heritage, Culture Tradition), MC-3 (Constitution of India)								

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.

10.0With-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.

11.0Award 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	CGPA secured from 157 Credits (Excluding the credits obtained in 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	

12.0Grading*:*

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	Out standing
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

12.1Requirement 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. For eighth semester, special (Advance) supplementary examinations will be conducted in second week following the results publication date of regular examination of eighth semester only.

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.

For any academic/employment purpose the following formulae shall be used for conversion of CGPA to % of marks. % of marks = (CGPA –0.5) x 10.

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 Award of Degree

After having admitted into the program, B.Tech degree shall be conferred on a student who has satisfied the following conditions.

(i) The student joining with Intermediate qualification must have, after admission into the Regular B.Tech programme of the college, pursued a regular course of study for not less than four academic years and not more than eight academic years.
(ii) The student joining under lateral entry scheme with diploma qualification must have, after admission into III Semester B.Tech, pursued a regular course of study for not less than three academic years and not more than six academic years.
(iii) The student must have satisfied the minimum academic requirements in appropriate branch of engineering in each semester of the program, herein after prescribed.
(iv) Students must register for all the courses and earn the credits specified
(v) Students who fail to fulfil all the academic requirements for the award of degree within the specified period from the year of their admission shall forfeit their seat in B.Tech course and their admission stands cancelled.
(vi) The student shall successfully complete non-credit courses like EAA/MC/Internship.
(vii) The student has no dues to the institution, library, hostels etc.
(viii) The student has no disciplinary action pending against him/her.

The Degree will be conferred and awarded by Jawaharlal Nehru Technological University Anantapur, Ananthapuramu on recommendations by the Academic council of RGMCET (Autonomous) basing on the eligibility as in clause 6.0 and 7.0.

17.0 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.

18.0 Rules of Discipline:

18.1 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.
18.2 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.
18.3 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).
18.4 When the student's answer book is confiscated for any kind of attempted or suspected malpractice, the decision of the Chief Superintendent is final.

19.0 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.

20.0 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.

21.0 Transfers

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

22.0 General:

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

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

22.3 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.

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

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

(Effective for the students getting admitted into II year from the Academic Year 2020-2021 onwards)

1.0 The Students have to acquire a minimum of 122 credits out of 122 from 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 42.5 credits out of 85 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 119 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	
First Class with Distinction	70% and above	First class With Distinction	≥ 7.5	CGPA secured from 119 Credits (Excluding the credits obtained in Skill Development Courses)
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	$\geq 5.5\ and < 6.5$	
Pass Class	Below 50% but not less than 40%	Pass	$\geq 4\ and < 5.5$	

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

I B.TECH, I-SEMESTER COURSE STRUCTURE

Subject Code	Name of the Subject	Hours/Week			Credits	Marks		
		Lecture/ Theory	Tutorial	Laboratory /Practical		Internal	External	Total
THEORY								
A0001191	Communicative English - I	1	1	-	2	30	70	100
A0002191	Linear Algebra and Calculus	2	1	-	3	30	70	100
A0004191	Applied Physics	2	1	-	3	30	70	100
A0301191	Engineering Drawing	2	1	-	3	30	70	100
A0501191	Programming for Problem Solving - I	2	1	-	3	30	70	100
PRACTICALS								
A0094191	Engineering Physics Lab	-	-	3	1.5	25	50	75
A0591191	Programming for Problem Solving – I Lab	-	-	3	1.5	25	50	75
A0592191	Engineering Workshop and IT Workshop	-	-	3	1.5	25	50	75
A0093191	Comprehensive Viva - I	-	-	-	0.5	-	50	50
	Contact Periods / Week	9	5	9	19	225	550	775

I B.TECH, II-SEMESTER COURSE STRUCTURE

Subject Code	Name of the Subject	Hours/Week			Credits	Marks		
		Lecture/ Theory	Tutorial	Laboratory/ Practical		Internal	External	Total
THEORY								
A0006192	Communicative English - II	1	1	-	2	30	70	100
A0007192	Ordinary, Partial Differential Equations and Vector Calculus	2	1	-	3	30	70	100
A0005191	Modern Engineering Chemistry	2	1	-	3	30	70	100
A0203192	Network Analysis	2	1	-	3	30	70	100
A0502192	Programming for Problem Solving - II	2	1	-	3	30	70	100
PRACTICALS								
A0091191	Engineering Chemistry Lab	-	-	3	1.5	25	50	75
A0593192	Programming for Problem Solving – II Lab	-	-	3	1.5	25	50	75
A0092191	Digital English Language Lab	-	-	3	1.5	25	50	75
A0095192	Comprehensive Viva - II	-	-	-	0.5	-	50	50
	Contact Periods / Week	9	5	9	19	225	550	775

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

II B.TECH, I-SEMESTER COURSE STRUCTURE

Subject Code	Name of the Subject	Hours/Week			Credits	Marks		
		Lecture/ Theory	Tutorial	Laboratory / Practical		Internal	External	Total
THEORY								
A0402193	Electronic Devices and Circuits	2	1	-	3	30	70	100
A0403193	Signals and Systems	2	1	-	3	30	70	100
A0404193	Random Variables and Random Process	2	1	-	3	30	70	100
A0207193	Electrical Technology	2	1	-	3	30	70	100
A0012193	Transformation Techniques and Complex variables	2	1	-	3	30	70	100
A0010193	Biology for Engineers (Life Sciences)	2	-	-	2	30	70	100
A0011193	Aptitude, Arithmetic, Reasoning and Comprehension (Skill Development Course)	1	2	-	0.5	30	70	100
PRACTICALS								
A0491193	Electronic Devices and Circuits Lab	-	-	3	1.5	25	50	75
A0492193	Basic Simulation Lab	-	-	3	1.5	25	50	75
A0293193	Electrical Technology Lab	-	-	3	1.5	25	50	75
A0096193	Comprehensive Viva - III	-	-	-	0.5	-	50	50
	Contact Periods / Week	13	7	9	22.5	285	690	975

II B.TECH, II-SEMESTER COURSE STRUCTURE

Subject Code	Name of the Subject	Hours/Week			Credits	Marks		
		Lecture/ Theory	Tutorial	Laboratory / Practical		Internal	External	Total
THEORY								
A0406194	Switching Theory and Logic Design	2	1	-	3	30	70	100
A0407194	Electronics Circuits – Analysis and Design	2	1	-	3	30	70	100
A0408194	Electromagnetic Fields and Transmission Lines	2	1	-	3	30	70	100
A0409194	Control Systems Engineering	2	1	-	3	30	70	100
A0503193	Python Programming	2	1	-	3	30	70	100
A0018194	Constitution of India (Mandatory Learning Course - I)	2	-	-	-	-	-	-
A0016194	Design Thinking for Innovation (Skill Development Course)	1	2	-	0.5	30	70	100
PRACTICALS								
A0494194	Electronics Circuits – Analysis and Design Lab	-	-	3	1.5	25	50	75
A0495194	Digital Logic Simulation Lab	-	-	3	1.5	25	50	75
A0594193	Python Programming Lab	-	-	3	1.5	25	50	75
A0097194	Comprehensive Viva - IV	-	-	-	0.5	-	50	50
	Contact Periods / Week	13	7	9	20.5	255	620	875

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III B.TECH, I-SEMESTER COURSE STRUCTURE

Subject Code	Name of the Subject	Hours/Week				Marks		
		Theory	Tutorial	Lab	Credits	Internal	External	Total
THEORY								
A0415195	Analog IC Applications	2	1	0	3	30	70	100
A0411195	Analog Communication	2	1	0	3	30	70	100
A0412195	Antennas and Wave Propagation	2	1	0	3	30	70	100
A0413195	Digital Circuit Design	2	1	0	3	30	70	100
A0512195	Core Java Programming	2	1	0	3	30	70	100
A0017194	Indian Heritage and Culture (MLC-II)	2	-	-	-	-	-	-
A0020195	Corporate Management Skills (Skill Development Course)	1	2	-	0.5	30	70	100
PRACTICALS								
A0498195	Analog IC Applications Lab	0	0	3	1.5	25	50	75
A0497195	Analog Communication Lab	0	0	3	1.5	25	50	75
A0581195	Core Java Programming Lab	0	0	3	1.5	25	50	75
A0098195	Comprehensive Viva Voce – V	0	0	0	0.5	0	50	50
	Contact Periods / Week	13	7	9	20.5	255	620	875

III B.TECH, II-SEMESTER COURSE STRUCTURE

Subject Code	Name of the Subject	Hours/Week				Marks		
		Theory	Tutorial	Lab	Credits	Internal	External	Total
THEORY								
A0416196	Digital Communication	2	1	-	3	30	70	100
A0417196	ARM Microcontroller and its Interfacing	2	1	-	3	30	70	100
A0418196	Digital Signal Processing	2	1	-	3	30	70	100
	Professional Elective-I	2	1	-	3	30	70	100
A0519196	Computer Networks							
A0419196	Sensors and Signal Conditioning							
A0420196	Neural Networks & Fuzzy Systems							
A0421196	Speech Processing							
	Open Elective-I / MOOCs	2	1	-	3	30	70	100
A0422196	Network Security and Cryptography							
A0022196	Mathematical Methods							
A0520196	Computer Architecture							
A0023196	Business Environment							
A0015194	Environmental Science (MLC-III)	2	-	-	-	-	-	-
A0423196	Arduino & MSP 430 Programming (Skill Development Course)	1	2	-	0.5	30	70	100
PRACTICALS								
A0499196	Digital Communication Lab	-	-	3	1.5	25	50	75
A0480196	ARM Programming Lab	-	-	3	1.5	25	50	75
A0082196	Mini Project - I	-	-	3	1.5	25	50	75
A0081196	Comprehensive Viva Voce - VI	-	-	-	0.5	-	50	50
A0099196	Internship	-	-	-	1	-	-	-
	Contact Periods / Week	13	7	9	21.5	255	620	875

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IV B.TECH, I-SEMESTER COURSE STRUCTURE

Subject Code	Name of the Subject	Hours/Week				Marks		
		Theory	Tutorial	Lab	Credits	Internal	External	Total
THEORY								
A0427197	Microwave Engineering and Optical Communication	2	1	0	3	30	70	100
	Professional Elective-II	2	1	0	3	30	70	100
A0428197	Digital TV Engineering							
A0429197	Mobile Communication							
A0430197	Information Theory and Coding							
A0426197	VLSI Design							
	Professional Elective-III /MOOCs	2	1	0	3	30	70	100
A0431197	Radio Frequency Identification							
A0432197	Advanced Digital Signal Processing							
A0433197	Virtual Instrumentation							
A0434197	Embedded System Concepts							
	Professional Elective-IV	2	1	0	3	30	70	100
A0435197	Digital Image Processing							
A0436197	Spread Spectrum Communication							
A0437197	Radar Systems							
A0438197	Low Power VLSI Design							
	Open Elective-II	2	1	0	3	30	70	100
A0024197	Managerial Economics and Financial Analysis							
A0525196	Cloud Infrastructure and Service							
A0536197	Artificial Intelligence							
A0439197	Opto Electronic Devices							
	Skill Development Course							
A0440197	Digital Design using Verilog	1	2	0	0.5	30	70	100
PRACTICALS								
A0483197	Microwave and Optical Communication Lab	0	0	3	1.5	25	50	75
A0484197	DSP and Image Processing Lab	0	0	3	1.5	25	50	75
A0084197	Mini Project-II	0	0	3	1.5	25	50	75
A0083197	Project Phase-I	0	0	0	1	25	0	25
A0085197	Comprehensive Viva Voce – VII	0	0	0	0.5	0	50	50
	Contact Periods / Week	11	7	9	21.5	280	620	900

IV B.TECH, II-SEMESTER COURSE STRUCTURE

Subject Code	Name of the Subject	Hours/Week				Marks		
		Theory	Tutorial	Lab	Credits	Internal	External	Total
THEORY								
	Professional Elective-V	2	1	0	3	30	70	100
A0441198	Satellite Communication							
A0442198	DSP Processors Architectures and Applications							
A0443198	FPGA Architecture and Applications							
A0531196	Internet of Things							
	Open Elective-III	2	1	0	3	30	70	100
A0522196	Data Warehousing and Mining							
A0539197	Cyber Security							
A0445198	Biomedical Instrumentation							
A0446198	Real Time Operating Systems							
	Skill Development Course							
A0532196	Campus to Corporate	1	2	0	0.5	30	70	100
PRACTICALS								
A0086198	Seminar	0	0	0	0.5	50	0	50
A0087198	Project Phase-II/ Internship	0	0	0	8	25	100	125
A0088198	Comprehensive Viva Voce- VIII	0	0	0	0.5	0	50	50
Contact Periods / Week		5	4	0	15.5	165	360	525

I B.Tech, I-Sem (ECE)

L	T	C
1	1	2

(A0001191) COMMUNICATIVE ENGLISH- I

(For Branches: CE, EEE, Mech, ECE & CSE)

COURSE OBJECTIVES:

- Communicative English-I is prescribed to make students communicate their thoughts, opinions and ideas freely and in real life situations. It has been framed with basics of English usage covering LSRW (Listening, Reading, Speaking and Writing Skills) with suitable practice versions. Further, this course is designed to update the learner in relevant English skills to face campus recruitments and other competitive exams.

COURSE OUTCOMES:

- Develop speaking, reading skills by prescribed lesson. Understand basic grammar principles.
- Write effective letters for job application and complaints, Enhance reading comprehension.
- Comprehend English speech sound system, stress and Intonation, Understand the usage of Vocabulary.
- Enhance reading comprehension, Vocabulary, Speaking, Grammar.
- Acquire knowledge in writing skills, learn Grammar usage and interpret the poem.

MAPPING WITH COs & POs:

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

UNIT I

Speaking - Describing Home Towns - Hobbies - Reading - Essay - My Vision for India by APJ. Abdul Kalam, (http://www.studypage.in) Essay Writing Practice - Remedial Grammar - Practice - Standard Abbreviations & Acronyms

UNIT II

Writing - Principles of Punctuation - Prewriting Techniques - Letter formats - Formal letter - Writing - Practice - Techniques of Spelling - Reading Comprehension Skills - Practice

UNIT III

Listening & Speaking - Introduction to English Pronunciation - Minimal Pairs Practice - Words with complex pronunciation - Movie Analysis - Discussion - Grammar & Vocabulary - Concord - Idioms & Phrases - Practice

UNIT IV

Reading - Skimming and Scanning - What is a Drone: Main Features & Applications of Today's Drones by Jack Brown - Vocabulary - Computer Terminology - Phrasal Verbs - Speaking - Current Affairs - Discussions - Grammar & Usage - Articles & Prepositions - Practice.

UNIT V

Writing: Structure of Paragraph Writing - Cause and Effect - Compare and Contrast -Practice - Techniques - Report writing - Official Reports - Business Reports - Practice -Grammar & Usage - Conditional sentences - IF Poem by Rudyard Kipling.

UNIT VI

Listening & Speaking - Indian English Variants - Difference between British and American English - Listening comprehensions - Test - Remedial Grammar - Correction of Sentences - Sentence Completions - Movie Analysis - Debate

REFERENCE TEXT BOOKS:

1) English Language & Communication Skills for Engineers (AICTE Syllabus**)** by Sanjay Kumar & Pushpa Latha, Oxford University Press, 2018
2) Practical English Usage by Michael Swan, Oxford University Press.
3) The Definitive Guide to IELTS Academic Writing, Oxford University Press, 2019.

I B.Tech, I-Sem (ECE)

L	T	C
2	1	3

(A0002191) LINEAR ALGEBRA & CALCULUS

(For Branches: CE, EEE, Mech, ECE & CSE)

COURSE OBJECTIVES:

- The essential tool of matrices and linear algebra in a comprehensive manner.
- The fallouts of Rolle's Theorem that is fundamental to application of analysis to Engineering problems.
- To deal with functions of several variables that are essential in most branches of engineering.
- Apart from some other applications they will have a basic understanding of Beta and Gamma functions.
- The mathematical tools needed in evaluating multiple integrals and their usage

COURSE OUTCOMES:

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

- Understand the use of matrices and linear system of equations in solving problems such as Network analysis, encoding and decoding in Cryptography and Quantum mechanics problems.
- Apply the concept of Gamma and Beta functions linear digital signal processing, discrete Fourier transform, digital filters and Oscillatory theory in engineering.
- Analyze differential and integral calculus to solve improper integrals and its applications in many engineering disciplines.
- Determine the process to evaluate double and triple integrals and understand its usage to find surface area and volumes of various bodies in engineering.
- Identify the applications of advanced calculus & Linear algebra in electro-magnetic theory and in telecommunication engineering.

MAPPING WITH COs & POs:

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

UNIT I

Matrices: Elementary row transformations – Rank – Echelon form, Normal form – Solutions of Linear System of Homogenous and Non Homogeneous equations.

UNIT II

Eigen Values, Eigen vectors – Properties; Cayley – Hamilton Theorem (without proof) – Inverse and Power of a matrix by Cayley – Hamilton theorem.

UNIT III

Quadratic forms: Linear Transformation – Reduction of quadratic form to canonical form and their nature.

UNIT IV

Mean value theorems: Rolle's Theorem – Lagrange's Mean Value Theorem – (excluding proof). Taylor's and Maclaurin's Series for e^x, sinx, cosx and log $(1 + x)$.

Functions of several variables – Jacobian – Maxima and Minima of functions of two variables - Lagrange's method of Multipliers with three variables only.

UNIT V

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

UNIT VI

Multiple integrals: – Evaluation of Double integrals (Cartesian and Polar) – Change of Variables – Change of order of Integration – Evaluation of triple integrals.

TEXT BOOKS/REFERENCES:

1) G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2) Erwin kreyszig, Advanced Engineering Mathematics, 10th Edition, John Wiley & Sons, 2011.
3) Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
4) Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11thReprint, 2010.
5) T.K.V. Iyengar, B. Krishna Gandhi and Others, Mathematical Methods, S. Chand & Company.
6) T.K.V. Iyengar, B. Krishna Gandhi and Others, A Text Book of Engineering Mathematics, Vol – 1,
S. Chand & Company.
7) S.R.K. Iyengar and R.K. Jain, Advanced Engineering Mathematics, Narosa publishing.

I B.Tech, I-Sem (ECE)

L	T	C
2	1	3

(A0004191) APPLIED PHYSICS

(For Branches EEE, ECE & CSE)

COURSE OBJECTIVES:

- To provide basic concepts of optics, quantum physics, semiconductors and their applications to the engineering students.

COURSE OUTCOMES:

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

- Understand the concept of signals by studying the properties of light.
- Construct a quantum mechanical model to explain the behaviour of a system at the microscopic level.
- Analyse the structures of materials.
- Identify the semiconducting materials for a particular application.
- Design new optoelectronic devices for various applications.

MAPPING WITH COs & POs:

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

UNIT I

WAVE – OPTICS

Interference: Introduction – Division of amplitude – Newton's rings and its applications.
Diffraction: Introduction – Fraunhofer diffraction at single slit – Diffraction Grating – Grating spectra – Determination of wavelength of light.
Polarization: Introduction to polarization – Applications

UNIT II

QUANTUM MECHANICS

Introduction to quantum physics – Wave-Particle duality – de Broglie hypothesis – Verification of wave character of Matter waves (Davison–Germer experiment) – Uncertainty principle – Thought experiment (Electron diffraction) – Wave function (ψ) – Schrodinger's one-dimensional time-independent wave equation – Particle in 1D-potential box.

UNIT III

QUANTUM OPTICS & FIBER OPTICS

Lasers: Characteristics – Einstein's coefficients – Radiation processes – Population inversion – Pumping processes Lasing action – Nd-YAG and He-Ne lasers – Engineering applications
Fiber Optics: Structure – Principle – Acceptance angle, Numerical aperture – Propagation of light in Step-index and Graded-index fibers – Applications: Fibre optic communication system (Block diagram) – Sensors.

UNIT IV

THE CRYSTAL STRUCTURE OF SOLIDS

Introduction – Space lattice – Basis – Unit cell (primitive and Non-primitive) – Crystal systems – Bravais lattices – Atomic radius, Nearest neighbouring distance, Coordination number and packing factor for SC, BCC, FCC lattices – Diamond structure – Crystal planes and directions – Miller Indices – calculation of interplanar distance.

UNIT V

FREE ELECTRON THEORY & BAND STRUCTURE OF SOLIDS

Introduction – Free electron theory – Sources of electrical resistivity – Fermi energy – Fermi level – Effect of temperature on Fermi distribution function – Kronig-Penny model (qualitative) – Energy bands – Effective mass – Classification of materials based on band theory.

UNIT VI

SEMICONDUCTOR PHYSICS & DEVICES

Introduction – Intrinsic and Extrinsic semiconductors – Fermi level (qualitative) – Carrier generation and recombination – Carrier transport: Diffusion and Drift – Hall Effect and its applications – Direct and indirect band gap semiconductors – p-n junction, Band diagram and Working principle – Metal-semiconductor junction (Ohmic and Schottky) – LED – Photo detector – Solar cell.

TEXT BOOKS:

1. M. N. Avadhanulu, P.G. Kshirsagar & TVS Arun Murthy" AText book of EngineeringPhysics"- S. Chand Publications, 11thEdition 2019.
2. R. K. Gaur and S.C. Gupta, "Engineering Physics", Dhanpat Rai Publications, New Delhi.

REFERENCES:

1. "Concepts of Modern Physics", Arthus Beiser Tata Mc Graw Hill Publications, New Delhi.
2. "Physics Volume – II", Resnick, Halliday and Krane, Wiley, New Delhi.
3. "Elements of Solid State Physics", J.P. Srivastava, PHI, 4th eds. New Delhi.
4. "Semiconductor Devices: Physics and Technology" S. M. Sze, 2nd eds. Wiley.
5. "Solid State Electronic Devices" Ben G. Streetman, Sanjay Kumar Banerjee, 6th eds. Phi Learning.
6. "Electronic Devices and Circuits", 2nd eds. Reston Publishing Company, Inc., Reston, Virginia.
7. "Solid State Physics" R.K. Puri and V.K. Babber, S. Chand.

RAJEEV GANDHI MEMORIAL COLLEGE OF ENGINEERING AND TECHNOLOGY
AUTONOMOUS
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

I B.Tech, I-Sem (ECE)

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(A0301191) ENGINEERING DRAWING

(For Branches: CE, EEE, Mech, ECE & CSE)

COURSE OBJECTIVES:

- Increase ability to communicate with people
- Learn to take data and transform it into graphic drawings.
- Learn basic engineering drawing formats
- Prepare the student for future Engineering positions

COURSE OUTCOMES:

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

- Understand the theory of orthographic projection.
- Understand the conventions and the methods adopted in engineering drawing.
- Know the importance of sectioning and Developments of solids in actual applications.
- Improve their visualization skills so that they can apply these skills in developing new products.

MAPPING WITH COs & POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	3	-	-	-	-	-	2	-
CO2	3	2	3	2	3	-	-	-	-	-	-	-
CO3	3	2	2	1	3	-	-	-	-	-	-	1
CO4	3	2	2	2	3	-	-	-	-	-	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 Projection/ 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. K.L Narayana, P. Kannaiah, Scitech Publications.
2) Engineering Drawing, B.V.R Gupta, J.K. Publishers.
3) Engineering Drawing by M.B. Shah and B.C. Rana, Pearson Publishers.
4) Engineering Drawing, Johle, Tata Mc Graw - Hill.
5) K.V. Natarajan, 'A text book of Engineering Graphics', Dhanalakshmi publishers, Chennai (2006).

I B.Tech, I-Sem (ECE) L T C
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(A0501191) PROGRAMMING FOR PROBLEM SOLVING-I

(For Branches: CE, EEE, Mech, ECE & CSE)

COURSE 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.

COURSE OUTCOMES:

At the end of this course, the student would be able to

- Design algorithms and flowcharts for real world applications
- Know the usage of various operators in Program development
- Design programs involving decision and iteration structures.
- Apply the concepts code reusability using Functions
- Analyse the concepts of Arrays and Strings for real world problems.
- Able to apply the pointers in programs

MAPPING WITH COs & POs:

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

UNIT I

Problem Solving Using Computers: Introduction, Algorithms, Flowcharts and pseudo code.

Overview of C Language: Introduction, Salient Features of C Language, Structure of a "C" Program.

C Language Preliminaries: Keywords and Identifiers, Constants, Variables, Data Types, and Input Output Statements with suitable illustrative "C" Programs.

UNIT II

Operators: Assignment Operators, Relational and Logical Operators, Increment and Decrement Operators, Bitwise Operators, Ternary Operator, Type Conversion, Precedence and Associativity with suitable illustrative C Programs.

UNIT III

Statements in C: Conditional/Decision Statements: if, if-else, Nested if-else, else-if ladder, Switch-Statement and goto statement with suitable illustrative C Programs.

Loop Control Statements: while, do-while and for with suitable illustrative "C" Programs, break, continue statements.

UNIT IV

Arrays: Definition, Importance of an array in C language, One-Dimensional Arrays, Two-Dimensional Arrays, Example programs on the topics mentioned above.

Strings: Introduction to Strings, String I/O, String Operations with and without built-in functions

(strlen( ), strcmp( ), strcat( ),strcpy( ), and strrev( )) Example Programs on the topics mentioned above

UNIT V

Functions: Introduction to Functions, benefits of functions, types of functions, Function calls, return vs. exit( ), Parameter Passing mechanisms, Call-by-Value, Recursion, Storage Classes, preprocessor directives

UNIT VI

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, Generic Pointers.

TEXT BOOKS:

1) B.A.Forouzon and R.F. Gilberg, “COMPUTER SCIENCE: A Structured Programming Approach Using C”, Third edition, CENGAGE Learning, 2016
2) Pradip Dey and ManasGhosh, Programming in C, Oxford University Press, 2nd Edition 2011.

REFERENCE BOOKS:

1) Byron Gottfried, “Programming with C “, Schaum’s Outlines, 2nd Edition, TATA McGraw-Hill.
2) M.T.Somashekara, “Problem Solving Using C”, PHI, 2nd Edition 2009.
3) A.K.Sharma, Computer Fundamentals and Programming in C, 2nd Edition, University Press
4) Rajaraman V., "The Fundamentals of Computers", 4th Edition,Prentice Hall of India, 2006.
5) R S Bichker, "Programming in C", University Press, 2012.

I B.Tech, I-Sem (ECE) P C
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(A0094191) ENGINEERING PHYSICS LAB

(For Branches: CE, EEE, Mech, ECE & CSE)

COURSE 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 inferences based on theory and the outcomes of experiments.
- To learn about the optical experiments in establishing the fundamentals in Interference and Diffraction phenomena which will be visualized with the light and laser experiments mentioned in the syllabus.
- To learn about the basic electronic experiments such as energy band gap determination, Hall Effect to know the type of extrinsic semiconductors, Stewart-Gee's experiment in field intensity determination and Solar I-V characteristics.

COURSE OUTCOMES:

After completion of the course the students will be able to

- Operate optical instruments like microscope and spectrometer.
- Determine thickness of a hair/paper with the concept of interference.
- Estimate the wavelength of different colors using diffraction grating.
- Measure the resolving power of the given optical device.
- Study the variation of intensity of the magnetic field due to circular coil carrying current with distance.
- Evaluate the acceptance angle of an optical fibre and numerical aperture.
- Calculate the band gap of the given semiconductor using four probe method.
- Identify the type of semiconductor (i.e., n-type or p-type) using Hall Effect.

MAPPING WITH COs & POs:

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

LIST OF EXPERIMENTS (ANY10 EXPERIMENTS)

1) Determination of wavelength of light – 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 I-V characteristics of Solar Cell.
15) Measurement of Dielectric constant

I B.Tech, I-Sem (ECE) P C
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(A0591191) PROGRAMMING FOR PROBLEM SOLVING LAB - I

(For Branches: CE, EEE, Mech, ECE & CSE)

COURSE OBJECTIVES:

- To learn about different types of operators
- To learn how decision making is done during programming
- To learn about various simple constructs used for programming
- To learn to define functions and call them with appropriate parameters
- To understand the usage of string libraries to do common string operations
- To understand pointer referencing and pointer dereferencing

COURSE OUTCOMES:

At the end of this course, the student would be able to

- Apply the specification of syntax rules for numerical constants and variables, data types
- Know the Usage of various operators and other C constructs
- Design programs on decision and control constructs
- Develop programs on code reusability using functions
- Implement various concepts of arrays and strings

MAPPING WITH COs & POs:

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

RECOMMENDED SYSTEMS /SOFTWARE REQUREMENTS:

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

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

Exercise-1

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 pattern

0
111
22222
3333333
444444444

Exercise-5

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 construct a pyramid of numbers.

Exercise-6

Write a C program to perform the following operations:

a) Addition of Two Matrices
b) Multiplication of Two Matrices
   [Note: Use functions to implement the above specified operations]

Exercise-7

Write C programs that use both recursive and non-recursive functions

a) To find the factorial of a given integer.
b) 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) Write a 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.

I B.Tech, I-Sem (ECE) P C
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(A0592191) ENGINEERING WORKSHOP AND IT WORKSHOP

(For Branches: CE, EEE, Mech, ECE & CSE)

ENGINEERING WORKSHOP

COURSE OBJECTIVES:

- To familiarize with the basic manufacturing processes and to study the various tools and equipment used, hands-on training is given in different sections. Essentially student should know the labour involved, machinery or equipment necessary, time required to fabricate and also should be able to estimate the cost of the product or job work.

COURSE OUTCOMES:

At the end of the Engineering Work Shop:

- 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.

MAPPING WITH COs & POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	-	1	2	2	1	-	-	-	2	-	2	1	1	-	-	1
CO2	-	-	-	-	2	1	-	-	2	2	2	-	2	-	-	1
CO3	-	-	-	-	2	1	-	-	2	2	2	-	2	-	-	1
CO4	-	-	-	-	2	1	-	-	2	2	2	-	2	-	-	1

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 & Disordering Practice
2) Series Circuit
3) Parallel Circuit

2) **TRADES FOR DEMONSTRATION:**

1. Plumbing
2. Machine Shop
3. 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

IT WORKSHOP

COURSE OBJECTIVES:

- The modules include training on PC Hardware, and Productivity tools including text processor, spread sheet, presentation tools. 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,
- It makes the students to understand and use the common office suite tools like word, excel etc. effectively in their daily usage.

COURSE OUTCOMES:

By the end of module students will be expected to demonstrate

- PC Hardware- introduces the students to a personal computer and its basic peripherals, the process of assembling a personal computer. The students should work on working PC to disassemble and assemble to working condition.
- To do installation of system software like MS Widows and Linux and the required device drivers.
- 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.

MAPPING WITH COs & POs:

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

PC HARDWARE

Exercise 1 - Identify the peripherals of a computer, components in a CPU and its functions.

Exercise 2 - Every student should disassemble and assemble the PC back to working condition.

Exercise 3 - Every student should individually install MS windows on the personal computer and also install Linux as dual boot with both Windows and

OFFICE TOOLS

Exercise 4 - Word Orientation: The mentor needs to give an overview of LaTeX and Microsoft (MS) office equivalent tool word: Importance of LaTeX and MS office 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 III: Using Word Processor 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.

SPREAD SHEET

Exercise 5 – Spread Sheet 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 III: Features to be covered: - Gridlines, Format Cells, Summation, auto fill, Formatting Text, Formulas, Functions

PRESENTATION

Exercise 6 - Students will be working on basic presentation 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).

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.

I B.Tech, II-Sem (ECE) L T C
1 1 2

(A0006192) COMMUNICATIVE ENGLISH- II

(For Branches: CE, EEE, Mech, ECE & CSE)

COURSE OBJECTIVES:

- The course Communicative English - II is an extension of Communicative English - I. This will provide inputs in business vocabulary to introduce Communicative style in writing and speaking to expose students to professional scenario. This will led students to write letters in professional contexts. Communicative English -II enhances the students' communication skills in terms of LSRW Skills.

COURSE OUTCOMES:

- Develop communicative competence by enunciating words and learn Language games.
- Build the habit of reading skills and enhance styles of writing.
- Interpret different accents and modulations through active listening and improvisation of writing skills.
- Write clear and coherent passages.
- Improve the ability to speak effectively in English in real life situations and understanding of Team Dynamics.

MAPPING WITH COs & POs:

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

UNIT I

a) Speaking - News Paper Reading - Narrating a Story/ Event
b) Vocabulary Development: Root words-Homonyms-Homophones-Wordlists - Quizzes - Language Games – Puzzles

UNIT II

a) Reading Comprehension-Life is a Pizza by Richard Templar from Rules of Life - Vocabulary on Eateries, Food & Travel
b) Business Writing - Memorandums - Letters - Style & Formats - E-mail Writing - Practice

UNIT III

a) Listening & Speaking - TED Talks - Listening Comprehension- Practice - Tests
b) Writing - Proposals - Technical Paper Writing- Practice – Movie Analysis

UNIT IV

a) Writing - Gadget Reviews - Technical Jargon - Resume Writing - Practice
b) Précis Writing - Techniques of Writing the Précis- Sample Analysis-Practice.

UNIT V

a) Speaking - Seeking Information - Preferences - Likes & Dislikes - Cross - Cultural Communication
b) Satya Nadella: When empathy is good for business https://www.morningfuture.com - Team Dynamics Activity

UNIT VI

a) Listening & Writing - Movie/Short Film/Documentary Analysis
b) Info Graphics- Techniques - Practice from IELTS Videos

REFERENCE TEXT BOOKS:

1) Word Power Made Easy by Norman Lewis, Goyal Publications

2) Group Dynamics for Teams 3rd Ed. By Levi, Daniel. Sage Publications India Pvt.Ltd. New Delhi, 2011.
3) Business English Essentials by Henderson, Greta Lafollette & Price R Voiles 7th Edition. Glencoe/McGraw Hill.
4) On Writing Well by William Zinsser, Harper Perennial Press, 2016

I B.Tech, II-Sem (ECE)

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(A0007192) ORDINARY, PARTIAL DIFFERENTIAL EQUATIONS & VECTOR CALCULUS

(For Branches: CE, EEE, Mech, ECE & CSE)

COURSE OBJECTIVES:

- The effective mathematical tools for the solutions of differential equations that model physical processes.
- To enlighten the learners in the concept of differential equations and multivariable calculus.
- To introduce the solution methodologies for second order Partial Differential Equations with applications in engineering
- To familiarize the concepts in vector calculus like gradient, divergent and curl, as well as, divergent theorems.

COURSE OUTCOMES:

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

- Obtain the knowledge of first and higher order differential equations and its use in solving Circuit analysis, heat transfer problems in engineering.
- Analyze solving higher order linear differential equations with variable coefficients and its applications.
- Understand about formation and solution of partial differential equations and importance in thermodynamics, continuum mechanics and fluid mechanics.
- Understand about vector differentiation and its applications in Electromagnetic theory.
- Apply the concept of vector integration to solve many problems in field theory, Electromagnetic theory and transmission lines.

MAPPING WITH COs & POs:

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

UNIT I

Differential equations of first order and first degree - Formation of ODEs - Solution of ODEs - Exact, Non - Exact, Linear and Bernoulli's equations - Applications of ODEs to L - R & C - R circuits.

UNIT II

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 III

Higher Order linear Differential Equations with variable coefficients: Cauchy's and Legendre's linear Differential equations, simultaneous linear differential equations with constant coefficients.

UNIT IV

Partial Differential Equations of First order:

First order partial differential equations, Formation of partial differential equations, solutions of first order linear and non – linear Partial differential equations, Method of separation of variables.

UNIT V

Vector Differentiation: Introduction of Vector differentiation– Scalar and vector point functions – Gradient of scalar function– Directional derivatives – Divergence of a vector function – Curl of a vector function.

UNIT VI

Vector integration: Line integral - Potential function – Area, Surface and volume integrals. Vector integral theorems: Green's theorem (without proof) – Stoke's theorem (without proof) and Gauss Divergence Theorem (without proof); Verification of Green's, Stoke's and Gauss Theorems.

TEXT BOOKS/REFERENCES:

1) G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2) Erwin kreyszig, Advanced Engineering Mathematics, 10th Edition, John Wiley & Sons, 2011.
3) Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
4) T.K.V. Iyengar, B. Krishna Gandhi and Others, Mathematical Methods, S. Chand & Company.
5) T.K.V. Iyengar, B. Krishna Gandhi and Others, A Text Book of Engineering Mathematics, Vol – 1, S. Chand & Company.
6) S.R.K. Iyengar and R.K. Jain, Advanced Engineering Mathematics, Narosa publishing.
7) Ian Sneddon, Elements of Partial Differential equations, McGraw Hill.

I B.Tech, II-Sem (ECE)

L	T	C
2	1	3

(A0005191) MODERN ENGINEERING CHEMISTRY

(For Branches CSE, ECE & EEE)

COURSE OBJECTIVES:

- To familiarize engineering chemistry and its applications
- To train the students on the principles and applications of electrochemistry and polymers
- To train the concepts of molecular structures and bonding
- To introduce the basic principles of spectroscopy and Supra molecules.

COURSE OUTCOMES:

At the end of the course, the students will be able to

- Concept of Ψ and Ψ^2 (L2)
- Compare the materials of construction for different types of batteries
- Explain the preparation, properties, and applications of thermoplastics, thermosetting & elastomers (L2)
- Understanding the principles of UV-Visible, IR and HPLC (L2)
- Applications of Supramolecular devices (L3)

MAPPING WITH COs & POs:

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

UNIT I

Molecular Structure and Bonding: (10 hrs)

Planck's quantum theory, dual nature of matter, Schrodinger equation, significance of Ψ and Ψ^2, molecular orbital theory – bonding in homo and heteronuclear diatomic molecules – energy level diagrams of O_2, Calculation of bond order - Band theory of solids – Crystal field theory and its salient features – band diagrams for conductors, semiconductors and insulators, role of doping on band structures.

UNIT II

Electrochemistry and Applications: (10 hrs)

Types of Conductance – Conductance, Specific conductance, Equivalent Conductance and molar conductance. Determination of equivalent conductance by Wheatstone bridge method. Numerical Problems on conductance. Electrodes – concepts, reference electrodes (Standard hydrogen electrode and Calomel electrode) Nernst equation, cell potential calculations, concept of conductivity, conductivity cell, conductometric titrations (acid-base titrations), photovoltaic cell – working and applications.

Primary cells – Daniell cell, Fuel cells- hydrogen-oxygen and their working. Secondary cells – lithium ion batteries.

UNIT III

Polymer Technology: (10 hrs)

Polymers: Classification of polymers, functionality, chain growth and step growth polymerization, Copolymerization with specific examples and mechanisms of additional polymerization.

Plastics - Thermoplastics and Thermosets, Preparation, properties and applications of – Bakelite, urea- formaldehyde, Nylon-6:6, Nylon 6, Nylon 11 and polyethylene.

Rubbers: Natural Processing of Rubber, Vulcanization, preparation, properties and uses of Buna-S, Buna-N, Chloroprene.

UNIT IV

Advanced Engineering Material (8 hrs)

Composites- Definition, Constituents, Classification- Particle, Fibre and Structural reinforced composites, properties and Engineering applications

Refractories- Classification, Properties and its Applications, Reasons for failure of the refractory materials

Nanoparticles: Introduction, preparation methods – Sol-gel method, Chemical reduction method –properties and applications in electronics.

UNIT V

Fundamental aspects of Instrumental Methods (10 hrs)

Electromagnetic spectrum, Absorption of radiation: Beer-Lambert's law. UV-Visible and IR.

Spectroscopies: Principle and Instrumentation and its applications. Chromatography: Principle and methods of Thin Layer Chromatography, separation of liquid mixtures of High Performance Liquid Chromatography (HPLC)

UNIT VI

Molecular Machines and Molecular Switches: (10 hrs)

Concepts and terms of supra molecular chemistry, complementarity, Basic Lock and Key principle, examples of Supramolecules, Molecular recognition- cation binding, anion binding.

Applications of Supramolecular Devices- Ionic devices, Electronic devices, switching devices.

TEXT BOOKS:

1) Jain and Jain, Engineering Chemistry, 16/e, Dhanpat Rai, 2013.
2) Peter Atkins, Julio de Paula and James Keeler, Atkins' Physical Chemistry, 10/e, Oxford University Press, 2010.

REFERENCE BOOKS*:*

1) K N Jayaveera, G V Subba Reddy and C Rama Chandraiah, Engineering Chemistry 1/e McGraw Hill Education (India) Pvt Ltd, New Delhi 2016
2) J. D. Lee, Concise Inorganic Chemistry, 5/e, Oxford University Press, 2008.
3) Skoog and West, Principles of Instrumental Analysis, 6/e, Thomson, 2007.
4) K Sesha Maheswaramma and Mridula Chugh, Engineering Chemistry, Pearson India Education Services Pvt. Ltd
5) J.M.Lehn, Supra Molecular Chemistry, VCH Publications

I B.Tech, II-Sem (ECE)

L	T	C
2	1	3

(A0203192) NETWORKS ANALYSIS

COURSE OBJECTIVES:

- To introduce basic laws, mesh & nodal analysis techniques for solving electrical circuits
- To impart knowledge on applying appropriate theorem for electrical circuit analysis
- To explain transient behavior of circuits in time and frequency domains
- To teach concepts of resonance
- To introduce open circuit, short circuit, transmission, hybrid parameters and their interrelationship.

COURSE OUTCOMES:

Upon completion of the subject, students will be able to

- Knowledge on basic electrical quantities such as voltage, current, power etc.
- Determine the unknown quantities by using theorems, KVL,KCL etc.
- Analyze the circuit using different theorems like thevinen's, Nortons, Maximum Power Transfer, Millman theorems.
- Analyze the transient response of dc and ac circuits.
- Obtain the network parameters for the given circuit

MAPPING WITH COs & POs:

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

UNIT I

Introduction to Electrical Circuits: Passive components and their V-I relations, Energy sources - Ideal, Non-ideal, Independent and dependent sources, Source transformation technique, Kirchhoff's laws, Network reduction techniques :Series-to-parallel, parallel-to-Series, Star–to-Delta or Delta-to-Star Transformations,

UNIT II

Mesh analysis and Nodal analysis problem solving, Super node and Super mesh analysis using DC (including Dependent sources also).

UNIT III

Network Theorems (Without Proofs): Superposition theorem, Thevenin & Norton theorems, Maximum power transfer theorem, Reciprocity theorem, Millman theorem, Tellegens Theorem, Compensation theorem - problem solving using dependent sources also, Duality and dual networks.

UNIT IV

Transient Analysis: First order differential equations, Definition of time constants, R-L circuit, R-C circuit with DC excitation, Evaluating initial conditions procedure, second order differential equations, homogeneous, nonhomogeneous, problem solving using R-L-C elements with DC excitation and AC excitation, Solutions using Laplace/differential equations methods.

UNIT V

Resonance and Coupled Circuits: Self-inductance, Mutual inductance, dot rule, coefficient of coupling, Analysis of multi winding coupled circuits, series & parallel connection of coupled inductors.

Resonance: Introduction, Definition of Q, Series resonance, Bandwidth of series resonance, Parallel resonance, Condition for maximum impedance, current in anti-resonance, Bandwidth

of parallel resonance, general case resistance present in both branches, anti resonance at all frequencies.

UNIT VI

Two Port Networks: Two Port Networks, relationship of two port variables, impedance parameters, admittance parameters, transmission parameters, hybrid and inverse hybrid parameters, relationship between parameters, Condition for reciprocity and symmetry.

TEXT BOOKS:

1) W. H. Hayt and J. E. Kemmerly, "Engineering Circuit Analysis", McGraw HillEducation, 2013.
2) M. E. Van Valkenburg, "Network Analysis", Prentice Hall, 2006.

REFERENCES:

1) D. Roy Choudhury, "Networks and Systems", New Age International Publications,1998.
2) Network lines and Fields by John. D. Ryder 2nd edition, Asia publishing house.
3) Joseph Edminister and Mahmood Nahvi, "Electric Circuits", Schaum's Outline Series, Fourth Edition, Tata McGraw Hill Publishing Company, New Delhi, 2003.
4) C. K. Alexander and M. N. O. Sadiku, "Electric Circuits", McGraw Hill Education,2004.

RAJEEV GANDHI MEMORIAL COLLEGE OF ENGINEERING AND TECHNOLOGY
AUTONOMOUS
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

I B.Tech, II-Sem (ECE)

L	T	C
2	1	3

(A0502192) PROGRAMMING FOR PROBLEM SOLVING - II

(For Branches: CE, EEE, Mech, ECE & CSE)

COURSE 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.

COURSE OUTCOMES:

At the end of this course, the student would be able to

- Develop programs with user defined data types.
- Apply various file handling techniques for better data management
- Apply stacks in various applications
- Apply queues in various applications and distinguish between stacks and queues.
- Analyze various dynamic data structures.
- Implement various searching and sorting techniques

MAPPING WITH COs & POs:

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

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, Unions, typedef. Example Programs on the topics mentioned above.

UNIT II

Files : Input and Output – Concept of a file, streams, text files and binary files, Differences between text and binary files, State of a file, Opening and Closing files, file input / output functions(standard library input / output functions for files), file status functions (error handling),Positioning functions, command –line arguments, C program examples.

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

SEARCHING AND SORTING TECHNIQUES: Searching Techniques - Linear search and Binary Search Techniques. Sorting techniques - Bubble Sort, Selection Sort, Insertion Sort. Implementation of all the above mentioned techniques in C language and trace them by giving different test data.

TEXT BOOKS:

1) B.A.Forouzon and R.F. Gilberg, "COMPUTER SCIENCE: A Structured Programming Approach Using C", Third edition, CENGAGE Learning, 2016
2) PradipDey and ManasGhosh, Programming in C, Oxford University Press, 2nd Edition 2011.

REFERENCE BOOKS:

1) Byron Gottfried, "Programming with C", Schaum's Outlines, 2nd Edition, TATA McGraw-Hill.
2) M.T.Somashekara, "Problem Solving Using C", PHI, 2nd Edition 2009.
3) A.K.Sharma, Computer Fundamentals and Programming in C, 2nd Edition, University Press
4) Rajaraman V., "The Fundamentals of Computers", 4th Edition, Prentice Hall of India, 2006.
5) R S Bichker, "Programming in C", University Press, 2012.

I B.Tech, II-Sem (ECE) P C
3 1.5

(A0091191) ENGINEERING CHEMISTRY LAB

(For Branches: CE, EEE, Mech, ECE & CSE)

COURSE OBJECTIVE:

- Verify the fundamental concepts with experiments

COURSE OUTCOMES:

At the end of the course, the students will be able to

- Learning the analytical skills while doing the experiments (L3)
- Learning the quality of water and its significance (L2)
- Importance of the Conductometric titrations while determine the strength of weak acids an coloured solutions (L3)
- Analyse the IR and UV-Visible Spectra of some organic compounds (L3)

MAPPING WITH COs & POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	-	1	-	-	-	-	1	-	-	1
CO2	-	2	1	-	2	1	1	1	-	-	1	-
CO3	-	1	-	-	1	-	1	-	1	-	-	1
CO4	1	3	2	1	2	-	1	-	-	-	1	1
Course	1	2	1	-	2	1	-	-	1	1		1

LIST OF EXPERIMENTS:

1) Preparation of standard $K_2Cr_2O_7$ solution
2) Estimation of Hardness of Water by using Standard EDTA solution
3) Estimation of Copper by using Standard EDTA solution
4) Estimation of Magnesium by using Standard EDTA solution
5) Estimation of dissolved oxygen by Winkler's method
6) Determination of Strength of given Hydrochloric Acid against standard sodium hydroxide solution by Conductometric titrations
7) Determination of Strength of given Acetic Acid against standard sodium hydroxide solution by Conductometric titrations
8) Determination of strength of mixture of acids against standard sodium hydroxide solution by conductometric method.
9) Verification of Beer-Lambert's law
10) Determine the strength of Cu(II) ion by colorimeter
11) Determination of total alkalinity of water
12) Preparation of a simple polymer
13) Thin layer chromatography
14) Identification of simple organic compounds by IR and UV-Visible Spectroscopy
15) HPLC method in separation of liquid mixtures

I B.Tech, II-Sem (ECE) P C
3 1.5

(A0593192) PROGRAMMING FOR PROBLEM SOLVING LAB - II

(For Branches: CE, EEE, Mech, ECE & CSE)

COURSE OBJECTIVES:

- To understand how to use structures and unions as a compound data types
- To understand various basic file operations
- To understand various stack and queue operations
- To understand various linked list operations
- To understand basic searching and sorting techniques

COURSE OUTCOMES:

At the end of this course, the student would be able to

- Develop applications on user defined data types
- Apply dynamic memory allocation through pointers
- Use different data structures for create/update basic data files
- Implement linear data structures through stacks and queues
- Implement various searching and sorting techniques, Linked lists.

MAPPING WITH COs & POs:

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

RECOMMENDED SYSTEMS /SOFTWARE REQUREMENTS:

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

Exercise-1

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 add two distances which is in feet and inches
b) Write a C program to illustrate passing the whole structure as argument to a function.

Exercise-3

Write a C program that uses functions to perform the following operations:

a) Reading a complex number
b) Writing a complex number
c) Addition of two complex numbers
d) Multiplication of two complex numbers (Note: represent complex number using a structure.)

Exercise-4

a) Write a C program to implement Union Concept.
b) Write a C program which copies last ‘n‘ characters from one file to another.

Exercise-5

a) Write a C program to reverse the first ‘n‘ characters in a file.
b) Write a C program to merge two files into a third file.

Exercise-6

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

a) Push

b) Pop
c) Display

Exercise-7

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

a) Insert
b) Delete
c) Display

Exercise-8

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-9

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-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.

I B.Tech, II-Sem (ECE) P C
3 1.5

(A0092191) DIGITAL ENGLISH LANGUAGE LAB

(For Branches: CE, EEE, Mech, ECE & CSE)

The Digital English Language Lab focuses on the production and practice of sounds of language and equips students with the use of English and vocabulary in everyday situations and contexts.

COURSE OBJECTIVES:

- To facilitate the students to use language effectively in everyday social conversations
- To expose the students to the blend of self-instructional and modes of language learning teacher assisted through digital lab
- To improve the fluency and intelligibility of student in spoken English and neutralize their mother tongue influences
- To help the students to participate in group discussions, to face interviews and shape the individual language learning.

COURSE OUTCOMES:

- Social interactions, greetings, self-introductions and group talk
- Improving standard pronunciation patterns and neutralize the mother tongue impact
- Developing communication through listening, reading, speaking and writing activities
- Enhancing vocabulary and grammar to develop professional language
- Improving life skills through GD and role plays practices

MAPPING WITH COs & POs:

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

Digital English Language Lab consists of two parts:

1) CALL (Lab): Computer Assisted Language Learning
2) ICS (Lab): Interactivity Communication Skills

Exercise-1

Introduction to Phonetics - Speech Sounds - Vowels - Phonetic Transcription - CALL Lab - Ice Breaking Activity - Self Introductions (SWOT) - Social Interactions - Pair work - ICS Lab

Exercise-2

Diphthongs - Consonants - Phonetic Transcription - CALL Lab - Just A Minute (JAM) - ICS Lab

Exercise-3

Listening Comprehension (audio) - IELTS Testing Exercises - CALL Lab - Speaking Activity - Group talk - ICS Lab

Exercise-4

Vocabulary Building - Synonyms & Antonyms - Analogy - Testing Exercises - CALL Lab - Narration of a Story/Event/ Describing an Object - ICS Lab

Exercise-5

Situational Dialogues - CALL Lab - Role Play - ICS Lab

Exercise-6

Pronunciation Evaluation Testing Exercises through EPD - CALL Lab - Group Discussion - ICS Lab - Any student-based activities

PRESCRIBED SOFTWARE:

- K-VAN Solutions (licensed software)
  - Advance Communication Skills Lab
  - English Language Communication Skills Lab
- Cambridge Advanced Learners' English Dictionary with CD
- IELTS Academic Preparation and Practice with CD

BOOKS SUGGESTED FOR DELL: (CENTRAL LIBRARY)

1) Skill Pro – A Course in Communication Skills and Soft Skills by Prof. K. Sumakiran et.al, EMESCO.
2) Skill Pro-I Foundation Course - 4 - by Dr. G. Gulam Tariq et.al, Maruthi Publications.
3) Strengthen Your Steps – A Multimodal Course in Communication skills by Dr. M. Hari Prasad et.al
4) English Pronouncing Dictionary Daniel Jones Current Edition with CD
5) English Dictionary for Advanced Learners, (with CD) International edn. Macmillan 2009.

II B.Tech, I-Sem (ECE)

L	T	C
2	1	3

(A0402193) ELECTRONIC DEVICES AND CIRCUITS

COURSE 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.

COURSE OUTCOMES:

- Understand and analyse the principle of operation and equivalent electrical model for semiconductor devices like PN diode, Zener diode.
- Understand and analyse the principle of operation and equivalent electrical model for semiconductor devices like BJT, JFET, MOSFET.
- Apply the property of junction diode in rectifiers and regulators.
- Obtain the Q point for various biasing techniques.

MAPPING WITH COs & POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO11	PO11	PO11	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

Semiconductor Diode: Open circuited PN junction, Current components in a PN diode, Diode Equation and its mathematical derivation, Volt-Ampere Characteristics, Energy band diagram of PN diode, Temperature dependence of Volt-Ampere Characteristics, Diode resistance (Static and Dynamic resistance), Transition capacitance, Diffusion capacitance, Step graded and linear graded junction. Avalanche breakdown, V-I Characteristics of Zener diode, Zener breakdown.

UNIT II

Diode Applications: Diode as switch – Forward recovery and reverse recovey times of a diode, Rectifier – Half wave and Full wave rectifier, Bridge rectifier, Ripple factor, PIV. **Filters**: Inductor and Capacitor, L-Section and Π-Section Filters, Zener diode as voltage regulator, brief introduction to Clipping and Clamping circuits.

UNIT III

Bipolar Junction Transistor (BJT): Transistor – Structure, Current components and their relationship, PNP and NPN transistors - Active mode of operation, Symbols and conventions, Transistor equations, Transistor as an amplifier, input and output characteristics of Common Base, Common Emitter and Common collector configurations. DC analysis of Common Base, Common Emitter and Common collector circuits.

UNIT IV

BJT Biasing: Load line and modes of operations, Operating point, Bias stability, Fixed bias, Self bias, Stabilization against variations in I_{co}, V_{BE}, β, Bias compensation, Thermal runaway, Condition for thermal stability, Problem solving. Applications: As a Switch and definitions of switching times, as an Amplifier.

UNIT V

Field-Effect Transistors (FET): Structure, principle of operation and V-I characteristics of n-channel and p-channel Junction Field Effect Transistors (JFET), Problem solving.

Metal Oxide Semiconductor Field-effect Transistor (MOSFET): Structures, MOSFET current equation and V-I characteristics. n-channel MOSFET: Enhancement mode and Depletion mode**.** p-channel MOSFET: Enhancement mode and Depletion mode. MOSFET

symbols and conventions, Complementary MOSFETs (CMOSFETs) - Structure, V-I characteristics, symbols and conventions. MOSFET act as capacitor.

UNIT VI

Biasing Circuits Using MOSFETS: Different configurations using MOSFETs, load line and modes of operation, different biasing circuits (self-bias, voltage divider bias) using MOSFETs, DC Analysis of n-channel and p-channel MOSFETs (both Enhancement and Depletion modes), Problem solving. Applications: MOSFETs as switch and small signal amplifier.

TEXT BOOKS:

1) Millman's Electronic Devices and Circuits; by Jacob Millman, Christos C. Halkias, Satyabrata Jit, 4th edition, McGraw Hill Publication, June 26th 2015.
2) Electronic Devices and Circuits; by R.L. Boylestad and Louis Nashelsky, 9th Edition, Pearson, 2006.

REFERENCES:

1) Electronic Devices and Circuits; by David A Bell, Oxford Higher Education, Fifth Edition.
2) Electronic Circuits – analysis and design; Donald A Neamen, 3rd Edition, McGraw Hill (India), 2019.
3) Microelectronics; by Behzad Razavi, 2nd edition, Wiley, 2013.
4) Electronic Devices and Circuits; by Jimmie J Cathey, Schaum's outlines series, 3rd edition, McGraw-Hill (India), 2010.

II B.Tech, I-Sem (ECE)

L	T	C
2	1	3

(A0403193) SIGNALS AND SYSTEMS

COURSE OBJECTIVES:

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

COURSE OUTCOMES:

- Classification of continuous and discrete time signals & systems and sampling theorem.
- Analyze the periodic and aperiodic signals using Fourier analysis.
- Analyze the discrete time signal using DTFT.
- Apply the Laplace transform and z-transform to analyze the continuous and discrete time signals.
- Concept of convolution, correlation are useful for analysis in the areas of linear systems and communication theory.

MAPPING WITH COs & POs:

	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		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 and Systems

Continuous-time and Discrete-time Signals: Representation of signals, Signal classification, Types of signals, Operations on signals - Scaling, Shifting, Transformation of independent variables, Sampling.

Continuous-time and Discrete-time Systems: Classification of systems - Static and dynamic, Linear and non-linear, Time-variant and time-invariant, Causal and non-causal, Stable and unstable, Impulse response and step response of systems.

UNIT II

Fourier analysis of Continuous-time Signals

Introduction to Fourier series, Gibbs Phenomenon, Continuous-time Fourier transform (CTFT), Existence, Properties, Magnitude and phase response, Parseval's theorem, Inverse Fourier transform.

UNIT III

Fourier analysis of Discrete-time Signals

Discrete-time Fourier transform, Properties, Inverse discrete-time Fourier transform, Comparison between CTFT and DTFT.

UNIT IV

Convolution and Correlation

Continuous-time convolution, Convolution sum, Correlation between signals, Cross correlation, Autocorrelation, Energy spectral density, Power spectral density.

UNIT V

System analysis using Laplace Transform

Relation between Laplace and Fourier transforms, Properties, Inverse Laplace transform, Solution to differential equations using Laplace transform, Region of convergence, Stability analysis.

UNIT VI

System Analysis using z-Transform

Z-transform, Properties, s-plane to z-plane mapping, Inverse z-transform, Solution to difference equations using Z-transform, Region of convergence, Stability analysis**.**

TEXT BOOKS:

1) Signals and Systems, second edition-P. Rama Krishna Rao and Shankar Prakriya- Mc-Graw Hill, 2013.
2) Signals and Systems - *A V Oppenheim A S Willsky* With S Hamid *Nawab,* Publisher: Prentice Hall;*2nd* Edition, 2011.

REFERENCES:

1) Signal processing and linear systems- B. P. Lathi, Oxford university press,2009
2) Signals & Systems - *Simon Haykin,* Barry *Van Veen,* Signals and Systems*, 2nd edition,* John*Wiley*& Sons, 2003.
3) Network Analysis - M.E. Van Valkenburg, PHI Publications, 3rdEdn., 2000.
4) Fundamentals of Signals and Systems Michel J. Robert, MGH International Edition, 2008.
5) Signals, Systems and Transforms - C. L. Philips, J.M.Parr and Eve A.Riskin, Pearson education.3rd Edition, 2004.

II B.Tech, I-Sem (ECE)

L	T	C
2	1	3

(A0404193) RANDOM VARIABLES AND RANDOM PROCESSES

COURSE 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.

COURSE 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

MAPPING WITH COs & POs:

	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												

UNIT I

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

RANDOM VARIABLE: 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 Distribution and 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 Inequalities (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.

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, McGraw Hill, 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) Probabilistic 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 & Communication - B.P. Lathi, B.S. Publications, 2003.

II B.Tech, I-Sem (ECE)

L	T	C
2	1	3

(A0207193) ELECTRICAL TECHNOLOGY

COURSE OBJECTIVES:

- This course introduces the working principles of different types of DC motors, Generators.
- This course introduces working principles of Transformer.
- This course introduces basic knowledge on series and parallel circuits.
- It also helps to understand the basic concepts of magnetic circuits.
- To provide theoretical pre requisites necessary to do lab work on DC machines and Transformer.

COURSE OUTCOMES:

- Know the basic knowledge of AC and DC supply systems.
- Learn the detailed features of dc machines and Transformer 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.

MAPPING WITH COs & POs:

	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

AC FUNDAMENTALS: Basic definitions-ac voltage source-time period-frequency-average value- RMS value-maximum value-form factor-peak factor-behavior of R, L and C- Simple problems.

UNIT –II

SINGLE PHASE AC CIRCUITS: – RL series and parallel- RC series and parallel- RLC series and parallel -P-Q-S- impedance triangle-power triangle- power factor-Introduction to three phase system-Simple problems

UNIT –III

MAGNETIC CIRCUIT TERMS AND ELEMENTS: Flux-reluctance-Permeance – mmf – reluctivity-comparison between electrical circuit and magnetic circuit-self inductance–mutual inductance-coefficient of coupling Problems on relations of basic terms in electric circuits and magnetic circuits

UNIT –IV

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 –V

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-load test-speed control of DC shunt motor-Numerical problems on E.M.F equation and types of motors.

UNIT –VI

TRANSFORMERS: Principle of operation of Transformer-constructional features-core type & shell type, ideal conditions of transformer, induced emf equation, Phasor Diagram on no load and load – equivalent circuit, losses, efficiency of a transformer, OC & SC tests on transformer- Numerical problems on E.M.F equation, Efficiency.

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

RAJEEV GANDHI MEMORIAL COLLEGE OF ENGINEERING AND TECHNOLOGY
AUTONOMOUS
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

II B.Tech, I-Sem (ECE)

L	T	C
2	1	3

(A0012193) TRANSFORMATION TECHNIQUES AND COMPLEX VARIABLES

(For Branches: EEE & ECE)

COURSE OBJECTIVES:

- To familiarize the transformation techniques and complex variables.
- To equip the students to solve various application problems in Signals and Systems, Control systems, Network analysis and Digital signal processing etc.

COURSE OUTCOMES:

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

- Understand the concept of Laplace and Inverse Laplace transformation and solving ODEs using Laplace transformation technique. Analyze applications of Laplace transforms in control system engineering and Signals and system engineering
- Determine the process of expanding periodic functions into Fourier series and non-periodic functions into Fourier transform its use in Electrical circuit analysis and signal processing
- Obtain the knowledge of Z – Transforms and its applications in digital electronics, control systems, signal processing & discrete systems
- To familiarize the complex variables and to analyze the importance of Caychy – Riemann equations in engineering
- Identify Residue theorem to solve many improper integrals and its use in control theory and electro-magnetic engineering.

MAPPING WITH COs & POs:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	2	2	-	-	-	-	-	-	-
CO2	3	2	3	2	3	-	-	-	-	-	-	-
CO3	2	3	2	3	2	-	-	-	-	-	-	-
CO4	3	2	2	3	2	-	-	-	-	-	-	-
CO5	2	3	3	2	3	-	-	-	-	-	-	-

UNIT – I

Laplace transform of standard functions – Inverse Transform – First shifting Theorem, Transforms of derivatives and integrals – Unit step function – Second shifting theorem – Dirac's delta (UNIT Impulse) function – Initial and Final value theorems – Convolution theorem.

Laplace transform of Periodic function. Application of Laplace transforms to solve ODEs of first and second order.

UNIT – II

Fourier Series: Determination of Fourier coefficients – Fourier series in $[C, C + 2\pi]$ – Fourier series of Even and odd functions – Half – range Fourier sine and cosine series expansions – Fourier series expansion in arbitrary intervals.

UNIT – III

Fourier integral theorem (statement only) – Fourier sine and cosine integrals. Fourier transform – Fourier sine and cosine transforms – Properties – Inverse transforms – Parseval's identity for Fourier transforms.

UNIT – IV

Z-transform: Z – transform – Properties – Damping rule – Shifting rules – Initial and final value theorems – Inverse Z – transform – Partial fractions method– Convolution theorem – Solution of difference equations by Z – transforms.

UNIT – V

Complex Variables: Continuity – Differentiability – Analyticity – Cauchy – Riemann equations in Cartesian and polar coordinates. Milne – Thompson method.

Complex Integration: –Line integral – Evaluation along a path by indefinite integration- Cauchy's Integral Theorem – Cauchy's Integral Formula

UNIT VI

Complex Series: Taylors series and Laurent series - Singular point – Isolated singular point – pole of order m – Removable – Essential singularity. Residue – Evaluation of residue – Cauchy's Residue theorem – Conformal Mapping – Bi – linear transformation.

TEXTBOOKS/REFERENCES:

1) Erwin kreyszig, Advanced Engineering Mathematics, 10th Edition, John Wiley & Sons, 2011.
2) J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7th Ed., Mc-Graw Hill, 2004.
3) Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11thReprint, 2010.
4) B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2010.
5) N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
6) T.K.V. Iyengar, B. Krishna Gandhi and Others, A Text Book of Engineering Mathematics-III, S. Chand & Company.
7) T.K.V. Iyengar, B. Krishna Gandhi and Others, A Text Book of Engineering Mathematics, Vol-1, S. Chand & Company.

II B.Tech, I-Sem (ECE)

L	T	C
2	0	2

(A0010193) BIOLOGY FOR ENGINEERS

(Life Sciences)

(Common to CE, EEE, Mech, ECE & CSE)

COURSE OBJECTIVES:

- To familiarize about biological components and their applications
- To train the students on the principles and Mechanisms in Biological Chemistry
- To train the concepts of molecular structures of Biomolecules
- To introduce the basic principles of Cell Structures and Functions
- To apply the concepts in the development of biosensors for mankind.

COURSE OUTCOMES:

At the end of the course, the students will be able to

- Explain concept and function of cell and cell organelles
- Develop knowledge about various physiological processes in biological systems
- Explain about biomolecules, their structure and function and their role in living organisms. How biomolecules are useful in industry.
- Understanding about human physiology
- Identify and describe the functions of the skeletal system

MAPPING WITH COs & POs:

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

UNIT I

Cell Structure and Function - Cell theory, Ultra structure of eukaryotic cell (Cell wall, Cell membrane, Golgi complex, Endoplasmic Reticulum, Peroxisome, Lysosomes), Semi-autonomous cell Organelles (Mitochondria & Chloroplast) (5 periods)

Learning outcomes

1) Understand the structure and importance of the cell.
2) Explain the importance of eukaryotic cell.
3) Explain the functions of cell organelles.

UNIT II

Human Physiology – Nutrition (Functions of micro & macro nutrients and their role), Respiration (Definition, Types, Respiration in humans), Digestion (Process and digestive organs in humans), Excretion (Definition, Urinary system in humans). (6 Periods)

Learning outcomes

1) Understand the metabolism in living organism.
2) Explain about the importance of human physiological process.
3) Identify the nutritional values in human body.

UNIT III

Biomolecules - Proteins (Denaturation of proteins), Nucleic acids (Mechanism of Replication & Transcription), Vitamins (Classification & functions of vitamins in bio-systems). (5 Periods)

Learning outcomes

1) Describe the denaturation of proteins.
2) Illustrate replication of nucleic acids.
3) Identify the importance of Vitamins in human body.

UNIT IV

Biomaterials - Definition of biomaterials, Requirements of biomaterials, Classification of biomaterials, Physical and Mechanical properties of bio-materials, Comparison of properties of some common biomaterials. (5 Periods)

Learning outcomes

1) Understand the role of biomaterials for humans.
2) Understand the properties of biomaterials for organ substitution.

UNIT V

Skeletal System-Types of bones, Structure and composition of bone, artificial bone replacements with soft engineering materials. (6 Periods)

Learning outcomes

1) Understand bone structure and composition
2) Able to develop knowledge about bone replacement.

UNIT VI

Applications of Biology- Stem Cells (Sources, Types and its Uses) Cancer Therapy, Basics of bio-sensors and bio-chips for bio-engineering. (5 Periods)

Learning outcomes

1) Understand the role of stem cells in biology.
2) Develop new type of biosensors, biochips etc.

TEXT BOOKS

1) Nelson, D. L. and Cox, M.M. (2008).Lehninger, Principles of Biochemistry, 5th Edition, W.H.Freeman and Company, N.Y., USA.
2) Ross & Wilson, Anatomy and Physiology, Churchill Livigstone publications (2014).

REFERENCE BOOKS

1) Voet, D. and Voet, J.G. (2004). Biochemistry, 3rd Edition, John Wiley & Sons, Inc. USA.
2) Karp, G. 2010. Cell and Molecular Biology: Concepts and Experiments. 6th Edition, John Wiley & Sons. Inc.
3) De Robertis, E. D. P. and De Robertis R. E. 2009. Cell and Molecular Biology, 8th edition. Lippincott Williams and Wilkins, Philadelphia.
4) Cooper G. M. Hausman R. E. 2009. The Cell: A Molecular Approach. 5th edition. ASM Press and Sunderland, Washington D. C.; Sinnauer Academic Press.
5) L. Hench & E.C. Ethridge, Biomaterials – An Interfacial approach, Academic Press, 1982.

II B.Tech, I-Sem (ECE)

L	T	C
1	2	0.5

(A0011193) APTITUDE, ARITHMETIC, REASONING AND COMPREHENSION

(For branches CE, EEE, Mech, ECE & CSE)

COURSE OBJECTIVES:

- To familiarize the students about the concepts of aptitude, arithmetic and reasoning
- To cope up the students to improve their employable skills

COURSE OUTCOMES:

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

- Understand number system which helps to become well trained for recruitment drives.
- Analyze permutations and combinations concept.
- Obtain the knowledge of coding and decoding concept.
- Understand the topics related to clock and probability.
- Identify the topics related to Venn diagrams, reasoning and Non-verbal reasoning.

MAPPING WITH COs & POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	-	-	-	-	-	-	-	-	-
CO2	3	3	2	-	-	-	-	-	-	-	-	-
CO3	3	2	2	-	-	-	-	-	-	-	-	-
CO4	3	2	3	-	-	-	-	-	-	-	-	-
CO5	3	3	2	-	-	-	-	-	-	-	-	-

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 (Verbal and Non-Verbal) , Venn Diagrams, Analytical Puzzles and Octal number system.

REFERENCES:

1) R.S.Agarwal. Quantitative Techniques. S.Chand Series.
2) Shankuntala Devi. Techniques of Reasoning. S.Chand Series.
3) https://www.fresherslive.com/online-test/verbal-ability-test/questions-and- answers
4) https://www.fresherslive.com/online-questions/verbal-ability-test/arithmetic-Reasoning

II B.Tech, I-Sem (ECE) P C
3 1.5

(A0491193) ELECTRONIC DEVICES AND CIRCUITS LAB

(For Branches: ECE & EEE)

COURSE 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

COURSE OUTCOMES:

- Students able to learn electrical model for various semiconductor devices and learns the practical applications of the semiconductor devices.
- Understand and analyse the applications of PN junction diode (Clipper, Clamper, Half wave rectifier and Full wave rectifier with and without filters)
- Understand the application of the Zener diode experimentally.
- Analyse the characteristics of different electronic devices such as PN diode, BJT and JFET
- Analyse the characteristics of MOSFET and CMOS inverter.

MAPPING WITH COs & POs:

	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

List of Experiments

(For Laboratory examination – Minimum of 8 experiments)

1) PN Junction diode characteristics.
2) Zener diode characteristics and Zener as a Regulator.
3) Design a clipper circuit using PN junction diode.
4) Design a clipper circuit using Zener diode.
5) Design a clamper circuit using PN junction diode.
6) Rectifier without filters (Full wave & Half wave).
7) Rectifier with filters (Full wave & Half wave).
8) Transistor CB characteristics (Input and Output).
9) Transistor CE characteristics (Input and Output).
10) Design and verification of BJT biasing techniques
11) FET characteristics.
12) MOSFET characteristics.
13) Design and verification of MOSFET biasing techniques
14) CMOS inverter

II B.Tech, I-Sem (ECE) P C
3 1.5

(A0492193) BASIC SIMULTION LAB

COURSE 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 operations to understand various systems and simulate them using MATLAB.

COURSE OUTCOMES:

- Generation of continuous and discrete time signals.
- Operations on different signals and sequences.
- Convolution and Correlation between signals and sequences.
- Analyze signals using Fourier, Laplace and Z-transforms.
- Verification of sampling theorem.

MAPPING WITH COs & POs:

	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			

LIST OF EXPERIMENTS:

1) Generation of various signals and sequences (Periodic and aperiodic). Such as UNIT Impulse, unit step, square, saw tooth, triangular, sinusoidal, ramp, sinc function.
2) Operation on signals and sequences such as addition, multiplication, scaling, shifting, folding, computation of energy and average power.
3) Finding the even and odd parts of signal and sequence, Energy and power of signal and sequence.
4) Write a program to find the trigonometric & exponential Fourier series coefficients of a rectangular periodic signal. Reconstruct the signal by combining the Fourier series coefficients with appropriate weightages- Plot the discrete spectrum of the signal
5) Finding the Fourier transform of a given signal and plotting its magnitude and phase spectrum.
6) Verification of linearity and time invariance properties of a given continuous/discrete system.
7) Write a program to find magnitude and phase response of first order low pass and highpass filter. Plot the responses in logarithmic scale.
8) Convolution between signals and sequences.
9) Autocorrelation and cross correlation between signals and sequences.
10) Locating zeros and poles and plotting the pole-zero maps in S-plane and Z-plane for the given transfer functions and find the stability.

Note: All the experiments are to be simulated using MATLAB or equivalent software

II B.Tech, I-Sem (ECE) P C
3 1.5

(A0293193) ELECTRICAL TECHNOLOGY LAB

COURSE OBJECTIVES:

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

COURSE 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

MAPPING WITH COs & POs:

	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			

LIST OF EXPERIMENTS

1) OCC test on DC generator.
2) Load Test on DC shunt motor.
3) Load test on DC series motor.
4) Speed control of DC Shunt motor by Armature control method.
5) Speed control of DC Shunt motor by Field control method.
6) OC & SC test on 1-phase Transformer (Efficiency)
7) Calculation of inductive and capacitive reactance in ac circuits.
8) Measurement of Active & Reactive power in Single Phase AC RL circuit.
9) Determination of R M S & average values, form factor & peak factor.
10) Study & Experiment of 2-point & 3-point Starter
11) Capacitors in series and parallel.
12) Load Test on Single phase Transformer.

II B.Tech, II-Sem (ECE)

L	T	C
2	1	3

(A0406194) SWITCHING THEORY AND LOGIC DESIGN

COURSE 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.
- Know the fundamental programing skills using VHDL.

COURSE 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.
- Design and analyse combinational and sequential logic circuits.
- Optimize combinational and sequential logic circuits.
- Able to write the VHDL code for digital logic design.

MAPPING WITH COs & POs:

	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

UNIT I

BINARY CODES AND BOOLEAN ALGEBRA: Review of Number system, complement representation of Negative numbers, Binary codes, Error correcting and detection codes - parity codes, Hamming codes. Fundamental postulates of Boolean algebra, Basic theorems and properties, Switching functions, Canonical and standard forms, Algebraic simplification,

UNIT II

SWITCHING FUNCTIONS AND IT'S MINIMIZATION: Digital Logic Gates, Universal Gates, K-map method, Prime-Implicants, Tabular Method, Prime-Implicant chart, Don't care combinations, Minimal SOP and POS forms, Multilevel realizations of switching functions.

UNIT III

THE HARDWARE DESCRIPTION LANGUAGE: Design flow, program structure, types and constants, functions and procedures, libraries and packages.

THE HDL 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-1: Half adder, Full adder, Ripple carry adder, Carry look ahead generator, BCD adder, Half substractor, Full substractor, 4-bit Adder/Substractor, 2x2 and 4x4 array multipliers, Parity generators, logic diagram of 74X86 and 74X280, Code-converters. VHDL models.

UNIT V

COMBINATIONAL LOGIC DESIGN-II: Encoder, Priority encoder, Logic symbol of 74X148, Decoder, Logic diagram of 74X139 and 74X138, Realization of half adder, full adder, half substractor, full substractor, and parity generators using Decoder. Multiplexer: 74X151, 74X157, 74X153. De-Multiplexer, MUX realization of logic gates and switching functions. Design of comparator: 1-bit, 2-bit and 4-bit, Logic symbol of 74X85. BCD to 7-segment display, Logic symbol of 74X49. Design of dual parity encoder. VHDL models.

UNIT VI

SEQUENTIAL LOGIC DESIGN: Classification of sequential circuits, Basic Flip-Flops, Excitation and Characteristic tables, Conversion of Flip-Flops. Steps in Synchronous sequential circuit design. Logic symbols of 74X74, 74X109, 74X112. 4-bit register, 6-bit register: 74X174, 74X175. Counters: 74X163, 74X160, 74X169, Design of Mod counters. Shift register: SISO, SIPO, PISO and PIPO, Logic symbol of 74X194, Ring counter, Johnson counter. VHDL models.

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

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

II B.Tech, II-Sem (ECE)

L	T	C
2	1	3

(A0407194) ELECTRONICS CIRCUITS – ANALYSIS AND DESIGN

COURSE 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)

COURSE OUTCOMES:

- Design and analyze single stage amplifiers using BJT and MOSFET at low frequencies.
- Design and analyze multi stage amplifiers using BJT and MOSFET at low frequencies.
- Discuss frequency response of single stage BJT and MOSFET amplifiers at low and high frequencies.
- Explain effect of negative feedback on amplifier characteristics.
- Discuss basic principles for analyzing RC & LC oscillator circuits using BJT and MOSFET.
- Design and analyse different types of large signal amplifiers.

MAPPING WITH COs & POs:

	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
CO6	2	1	2	2	1								2	1	1

UNIT I

Small Signal Analysis of BJT: Basic CE amplifier circuit, Circuit with Emitter resistance, AC load line analysis, Small signal analysis-input and output impedances, Voltage gain, Current gain of CE,CB, CC amplifiers using h-parameter model and simplified model, Problem solving.

Small Signal Analysis of MOSFETs: Graphical and Load line analysis, small signal parameters, Small signal equivalent circuit, Small signal analysis of Common source, Common drain, Common gate amplifiers, Comparison of the three basic amplifier configurations, Problem solving.

UNIT II

Differential and Multistage Amplifiers:

The MOS Differential Pair, Small-Signal Operation of the MOS Differential Pair, The BJT Differential Pair, Other Non-ideal Characteristics of the Differential Amplifier, The Differential Amplifier with Active Load, Multistage Amplifiers – RC coupled amplifier – Darlington pair – Cascode amplifier, Problem solving.

UNIT III

Frequency Response:

Introduction, Low-Frequency Response of the CS and CE Amplifiers, Internal Capacitive Effects and the High-Frequency Model of the MOSFET and the BJT, High-Frequency Response of the CS and CE Amplifiers, Useful Tools for the Analysis of the High-Frequency Response of Amplifiers, A Closer Look at the High-Frequency Response of the CS and CE Amplifiers, High-Frequency Response of the CG and Cascode Amplifiers, High-Frequency

Response of the Source and Emitter Followers, High-Frequency Response of Differential Amplifiers, Other Wideband Amplifier Configurations, Multistage Amplifier Examples, Problem solving.

UNIT IV

Feedback Amplifiers:

Introduction, The General Feedback Structure, Some Properties of Negative Feedback, The Four Basic Feedback Topologies, The Feedback Voltage Amplifier (Series—Shunt), The Feedback Transconductance Amplifier, The Feedback Transresistance Amplifier (Shunt—Shunt), The Feedback Current Amplifier (Shunt—Series), Summary of the Feedback Analysis Method, Determining the Loop Gain, Problem solving.

UNIT V

Power Amplifiers:

Introduction, Classification of Output Stages, Class A Output Stage, Class B Output Stage, Class AB Output Stage, Biasing the Class AB Circuit, CMOS Class AB Output Stages, Power BJTs, Variations on the Class AB Configuration, IC Power Amplifiers, MOS Power Transistors, Problem solving.

UNIT VI

Oscillators and Tuned Amplifiers:

Oscillators: General Considerations, Classification of Oscillators, LC Oscillators using BJT and FET-Heatly and Colpit's Oscillators, RC Oscillators using BJT and FET- Phase Shift and Wien-Bridge Oscillators, Crystal Oscillators, Illustrative Problems.

Tuned Amplifiers: Basic Principle, Inductor losses, use of transformers, Amplifiers with multiple tuned circuits.

TEXT BOOKS:

1) Adel S. Sedra and Kenneth C. Smith, "Micro Electronic Circuits", Oxford University Press International 6th edition, 2013.
2) Donald A Neamen, "Electronic Circuits – analysis and design", 3rd Edition, McGraw Hill (India), 2019.

REFERENCES:

1) J. Milliman and C Halkias, "Integrated electronics", 2nd Edition, Tata McGraw Hill, 1991.
2) Behzad Razavi, "Microelectronics", Second edition, Wiley, 2013.
3) R.L. Boylestad and Louis Nashelsky, "Electronic Devices and Circuits," 9th Edition, Pearson, 2006.
4) Jimmie J Cathey, "Electronic Devices and Circuits," Schaum's outlines series, 3rd edition, McGraw-Hill (India), 2010.

II B.Tech, II-Sem (ECE)

L	T	C
2	1	3

(A0408194) ELECTROMAGNETIC FIELDS AND TRANSMISSION LINES

COURSE 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

COURSE 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.

MAPPING WITH COs & POs:

	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; λ/4, λ /2, λ /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, 3rded., 2001.
2) Engineering Electromagnetics – William H. Hayt Jr. and John A. Buck, TMH, 7thed., 2006.

REFERANCES:

1) Electromagnetic Waves and Radiating Systems – E.C. Jordan and K.G. Balmain, PHI, 2ndEdition, 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.

II B.Tech, II-Sem (ECE)

L	T	C
2	1	3

(A0409194) CONTROL SYSTEMS ENGINEERING

COURSE 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

COURSE 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.

MAPPING WITH COs & POs:

	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, 2nd edition.
2) Automatic control systems – B.C. Kuo, Jhon wiley and son's 2003

REFERENCE BOOKS:

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

II B.Tech, II-Sem (ECE)

L	T	C
2	1	3

(A0503193) PYTHON PROGRAMMING

(For branches CE, Mech, EEE, ECE, CSE)

COURSE OBJECTIVES:

This course will enable students to

- Learn Syntax and Semantics of various Operators used in Python.
- Understand about Various Input, Output and Control flow statements of Python.
- Handle Strings and Files in Python.
- Understand Lists, Tuples in Python.
- Understand Sets, Dictionaries in Python.
- Understand Functions, Modules and Regular Expressions in Python.

COURSE OUTCOMES:

The students should be able to

- Examine Python syntax and semantics and be fluent in the use of various Operators of Python.
- Make use of flow control statements and Input / Output functions of Python.
- Demonstrate proficiency in handling Strings and File Systems.
- Create, run and manipulate Python Programs using core data structures like Lists and Tuples.
- Apply the core data structures like Sets and Dictionaries in Python Programming.
- Demonstrate the use of functions, modules and Regular Expressions in Python.

MAPPING WITH COs & POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	1	-	-	-	1	1	1
CO2	2	3	-	-	-	-	-	-	1	-	-	-	1	1	1
CO3	1	-	2	-	-	-	-	-	1	-	-	-	1	1	1
CO4	2	-	2	-	-	-	-	-	1	-	-	-	1	1	1
CO5	2	-	2	-	-	-	-	-	1	-	-	-	1	1	1
CO6	2	-	2	-	-	-	-	-	1	-	-	-	1	1	1

UNIT I

Introduction: History of Python, Need of Python Programming, Applications Basics of Python Programming Using the REPL(Shell), Running Python Scripts, Variables, Assignment, Keywords, Input-Output, Indentation. Overview on data types: Numbers, Strings, Lists, Set, Tuple and Dictionaries.

Operators in Python: Arithmetic Operators, Comparison (Relational) Operators, Assignment Operators, Logical Operators, Bitwise Operators, Shift Operators, Ternary operator, Membership Operators, Identity Operators, Expressions and order of evaluations. Illustrative examples on all the above operators.

UNIT II

Input and Output statements: input() function, reading multiple values from the keyboard in a single line, print() function, 'sep' and 'end' attributes, Printing formatted string, replacement operator ({}). Illustrative examples on all the above topics.

Control flow statements: Conditional statements – if, if-else and if-elif-else statements. Iterative statements – for, while. Transfer statements – break, continue and pass. Illustrative examples on all the above topics.

UNIT III

Strings: Introduction to strings, Defining and Accessing strings, **Operations on string** - String slicing, Mathematical Operators for String, Membership operators on string, Removing spaces from the string, Finding Substrings, Counting substring in the given String, Replacing a string with another string, Splitting of Strings, Joining of Strings, Changing case

of a String, Checking starting and ending part of the string, checking type of characters present in a string. Illustrative examples on all the above topics.

Files: Opening files, Text files and lines, Reading files, Searching through a file, Using try, except and open, Writing files, debugging.

UNIT IV

Lists: Creation of list objects, Accessing and traversing the elements of list. **Important functions of list** – len(), count(), index(), append(), insert(), extend(), remove(), pop(), reverse() and sort(). **Basic Operations on list:** Aliasing and Cloning of List objects, Mathematical Operators for list objects, Comparing list objects, Membership operators on list, Nested Lists, List Comprehensions. Illustrative examples on all the above topics.

Tuples: Creation of Tuple objects, Accessing elements of tuple, Mathematical operators for tuple, Important functions of Tuple – len(),count(),index(), sorted(), min(), max(), cmp().Tuple Packing and Unpacking. Illustrative examples on all the above topics.

UNIT V

Sets: Creation of set objects, Accessing the elements of set. Important functions of set –add(), update(), copy(), pop(),remove(),discard(),clear(). Basic Operations on set **-** Mathematical Operators for set objects, Membership operators on list, Set Comprehensions. Illustrative examples on all the above topics.

Dictionaries: Creation of Dictionary objects, Accessing elements of dictionary, Basic operations on Dictionary - Updating the Dictionary, Deleting the elements from Dictionary. Important functions of Dictionary – dict(), len(), clear(), get(), pop(), popitem(), keys(), values(), items(), copy(), setdefault(). Illustrative examples on all the above topics.

UNIT VI

Functions - Defining Functions, Calling Functions, Types of Arguments - Keyword Arguments, Default Arguments, Variable-length arguments, Anonymous Functions, Fruitful functions (Function Returning Values), Scope of the Variables in a Function - Global and Local Variables. Recursive functions, Illustrative examples on all the above topics**.**

Modules: Creating modules, **import** statement, from Import statement.

Regular Expressions: Character matching in regular expressions, Extracting data using regular expressions, combining searching and extracting, Escape character.

TEXT BOOKS:

1) Python for Everybody: Exploring Data Using Python 3, 2017 Dr. Charles R. Severance

REFERENCE BOOKS:

1) Think Python, 2 Edition, 2017 Allen Downey, Green Tea Press
2) Core Python Programming, 2016 W.Chun, Pearson.
3) Introduction to Python, 2015 Kenneth A. Lambert, Cengages
4) https://www.w3schools.com/python/python_reference.asp
5) https://www.python.org/doc/

II B.Tech, II-Sem (ECE)

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(A0018194) CONSTITUTION OF INDIA

(Mandatory Learning Course-I)
(For Branches CE, EEE, MECH., ECE,CSE)

COURSE OBJECTIVES:

Students will be able to

- Study the structure and composition of Indian Constitution
- Learn about the federalism in the Indian context.
- Study the Panchayathi Raj Institutions as a medium of decentralization
- Learn about the three organs of the state in the contemporary scenario.

COURSE OUTCOMES:

Students will be able to

- Understand historical background of the constitutional making and its importance for building a democratic India.
- Be aware of the History, features of Indian constitution, the role Governor and Chief Minister, role of state election commission, the decentralization of power between central, state and local self-government.
- Aware of Indian government, the structure of state government, the local Administration.
- Able to evaluate Preamble, Fundamental Rights and Duties, Zilla Panchayat, block level organization, various commissions.

UNIT I

History of Indian Constitution: History of Making of the Indian Constitution - History Drafting Committee - Composition & Working of Constitution.

UNIT II

Philosophy of the Indian Constitution: Preamble Salient Features of Indian Constitution.

UNIT III

Contours of Constitutional Rights & Duties: Fundamental Rights: Right to Equality - Right to Freedom - Right against Exploitation - Right to Freedom of Religion - Cultural and Educational Rights - Right to Constitutional Remedies - Directive Principles of State Policy.

UNIT IV

Organs of Governance: Parliament - Composition - Qualifications and Disqualifications Powers and Functions of Executive - President - Governor - Council of Ministers – Judiciary – Qualifications, Appointment and Transfer of Judges.

UNIT V

Local Administration: Role and Importance of Municipal Corporation Role and Importance Pachayati raj: Role and Importance Zilla Pachayat: Position and role - Village level: Role of Elected and Appointed officials - Importance of grass root democracy.

UNIT VI

Election Commission: Role and Functioning of Election Commission Role and Functioning of Chief Election Commissioner and Election Commissioners - Role and Functioning of State Election Commission.

TEXT BOOKS

1) Introduction to Constitution of India, D.D. Basu, Lexis Nexus
2) The Constitution of India, PM Bhakshi, Universal Law

II B.Tech, II-Sem (ECE)

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(A0016194) DESIGN THINKING FOR INNOVATION

(Skill Development Course)

(Common to CE, Mech, EEE, ECE & CSE)

COURSE PRE-REQUISITES: None

COURSE OBJECTIVES:

- To create awareness of design thinking among students of engineering
- To teach a systematic approach to identifying and defining a problem before brainstorming for a solution
- To instil a sense of significance towards applying creativity to product and service design
- To motivate students to apply design thinking while implementing a project focusing on local or global societal problems

COURSE OUTCOMES:

After completion of this course, the student will be able to

- Identify design principles from an engineering perspective.
- Cultivate sensitivity towards design aspects of Activities, Environments, Interactions, Objects, and Users (A-E-I-O-U) in daily life.
- Validate problem statements through user empathisation with societal and environmental consciousness.
- Devise visual design and documentation to communicate more effectively.
- Develop project management skills in a multidisciplinary environment

MAPPING WITH COs & POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1	2	2	2	1	3	2	2	2	2	-	2	2
CO2	2	2	2	2	2	2	2	2	2	2	2	2	-	2	2
CO3	1	2	3	3	2	2	1	1	2	1	1	1	-	2	2
CO4	1	1	1	1	2	2	2	1	2	2	2	2	-	2	2
CO5	1	1	1	1	1	1	1	1	3	3	3	2	-	2	2

STUDENTS' RESPONSIBILITIES:

1. Forming diverse teams of 3–5 members each to work collaboratively throughout the semester.
2. Proactively engaging to observe the objects and interactions in their daily life and society from a design perspective.
3. Identifying general societal and social problems that may be effectively addressed using design thinking principles
4. Presenting and reporting the tasks to the concerned faculty members using their creative communication and people skills.

UNIT I:

Design Thinking Overview and Motivation

Introduction, What is Design thinking, Why design, Design is Everywhere, – Various perspectives, Four principles of successful innovation, A model of design Innovation process, Seven Modes of the Design Innovation Process, Understanding. Design Engineering vs. Engineering Design

UNIT II:

Sense Intent and Know Context

Sense Intent: Mindsets, Sensing Changing Conditions, Seeing Overviews, Foreseeing Trends, Reframing Problems, Forming an Intent. Methods: Buzz Reports, Popular Media Scan, Key Facts, Innovation Sourcebook, Trends Expert Interview, Keyword Bibliometrics, Ten Types of Innovation Framework, Innovation Landscape, Trends Matrix, Convergence

Map, From…To Exploration, Initial Opportunity Map, Offering-Activity-Culture Map, Intent Statement

Know Context: Mindsets, Knowing Context History, Understanding Frontiers, Seeing System Overviews, Understanding Stakeholders, Using Mental Models, Know Context: Methods, Contextual Research Plan, Popular Media Search, Publications Research, Eras Map, Innovation Evolution Map, Financial Profile, Analogous Models, Competitors-Complementors Map, Ten Types of Innovation Diagnostics, Industry Diagnostics, SWOT Analysis, Subject Matter Experts Interview, Interest Groups Discussion.

UNIT III:

Know People & Frame Insights

Know People: Mindsets, Observing Everything, Building Empathy, Immersing in Daily Life, Listening Openly, Looking for Problems and Needs, Know People: Methods, Research Participant Map, Research Planning Survey, User Research Plan, Five Human Factors, POEMS, Field Visit, Video Ethnography, Ethnographic Interview, User Pictures Interview, Cultural Artifacts, Image Sorting, Experience Simulation, Field Activity, Remote Research, User Observations Database,

Frame Insights: Mindsets, Exploring Systems, Looking for Patterns, Constructing Overviews, Identifying Opportunities, Developing Guiding Principles, Frame Insights: Methods, Observations to Insights, Insights Sorting, User Observation Database Queries, User Response Analysis, ERAF Systems Diagram, Descriptive Value Web, Entities Position Map, Venn Diagramming, Tree/Semi-Lattice Diagramming, Symmetric Clustering Matrix, Asymmetric Clustering Matrix, Activity Network, Insights Clustering Matrix, Semantic Profile, User Groups Definition, Compelling Experience Map, User Journey Map, Summary Framework, Design Principles Generation, Analysis Workshop

UNIT IV:

Explore Concepts

Explore Concepts: Mindsets, Challenging Assumptions, Standing in the Future, Exploring Concepts at the Fringes, Seeking Clearly Added Value, Narrating Stories about the Future, Explore Concepts: Methods, Principles to Opportunities, Opportunity Mind Map, Value Hypothesis, Persona Definition, Ideation Session, Concept-Generating Matrix, Concept Metaphors and Analogies, Role-Play Ideation, Ideation Game, Puppet Scenario, Behavioral Prototype, Concept Prototype, Concept Sketch, Concept Scenarios, Concept Sorting, Concept Grouping Matrix, Concept Catalog.

UNIT V:

Frame Solutions

Frame Solutions: Mindsets, Conceiving Holistic Solutions, Conceiving Options, Making Value Judgments, Envisioning Scenarios, Structuring Solutions, Frame Solutions: Methods, Morphological Synthesis, Concept Evaluation, Prescriptive Value Web, Concept-Linking Map, Foresight Scenario, Solution Diagramming, Solution Storyboard, Solution Enactment, Solution Prototype, Solution Evaluation, Solution Roadmap, Solution Database, Synthesis Workshop

UNIT VI:

Realize Offerings

Realize Offerings: Mindsets, Reiterating Prototypes, Evaluating in Reality, Defining trategies, Implementing in Reality, Communicating Vision, Realize Offerings: Methods, Strategy Roadmap, Platform Plan, Strategy Plan Workshop, Pilot Development and Testing, Implementation Plan, Competencies Plan, Team Formation Plan, Vision Statement, Innovation Brief

TEXT BOOKS:

1. Vijay Kumar, "101 Design Methods: A Structured Approach for Driving Innovation in Your Organization", John Wiley & Sons (2012) (ISBN: 978-1118083468)
2. Jeanne Liedtka and Tim Ogilvie , Designing for Growth: A Design Thinking Tool Kit for Managers, Columbia Business School Publishing, E-ISBN 978-0-231-52796-5
3. B. K. Chakravarthy, Janaki Krishnamoorthi, Innovation By Design: Lessons from Post Box Design & Development, Springer India, 2013
4. Donald A. Norman, "The Design of Everyday Things", MIT Press, 2013 (ISBN: 978-0262525671)

REFERENCES:

1. Tim Brown, "Change by Design", Harper Business, 2012 (ISBN: 978-0062337382)
2. Daniel Ling, "Complete Design Thinking Guide for Successful Professionals", Create Space Independent Publishing, 2015 (ISBN: 978-1514202739)
3. Bruno Munari, "Design As Art", Penguin UK, 2009 (ISBN: 978-0141035819)
4. Tom Kelly, Jonathan Littman, "The Art of Innovation", HarperCollins Business, 2002 (ISBN: 978-0007102938)
5. Thomas Lockwood, "Design Thinking: Integrating Innovation, Customer Experience, and Brand Value", Allworth Press, 2009 (ISBN: 978-1581156683)
6. Joost Groot Kromelink, "Responsible Innovation: Ethics, Safety and Technology", 2nd ed., TU Delft, Faculty of Technology, Policy and Management, 2019 (e-Book ISBN: 978-9463662024)
7. Jimmy Jain, "Design Thinking for Start-up's: A Handbook for Readers and Workbook for Practitioners", Notion Press, 2018 (ISBN: 978-1642495034)
8. Beverly Rudkin Ingle, "Design Thinking for Entrepreneurs and Small Businesses: Putting the Power of Design to Work", A Press, 2013 (ISBN: 978-1430261810)

II B.Tech, II-Sem (ECE) P C
3 1.5

(A0494194) ELECTRONICS CIRCUITS – ANALYSIS AND DESIGN LAB

COURSE OBJECTIVES:

- Help students make transition from analysis of electronic circuits to design of electronic circuits.
- To understand the Analysis of transistor at low frequencies.
- To understand the concept of designing of power amplifier.
- To understand the concept of negative feedback in amplifier circuit.

COURSE OUTCOMES:

- Design and draw the frequency response of small signal BJT , FET and MOSFET amplifiers.
- Draw the frequency responses of multistage amplifiers.
- Design the different types of oscillator circuits.
- Determine the efficiency of power amplifiers.
- Design and draw the frequency response of Feedback amplifiers.

MAPPING WITH COs & POs:

	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

PART-A

Note: Design & simulate any 9 experiments with Multisim / PSPICE or equivalent software and verify the results in hardware lab with discrete components.

LIST OF EXPERIMENTS:

1) Soldering practice of electronic circuits.
2) Design and implement voltage divider based Common emitter amplifier and calculate the gain and the bandwidth of the amplifier from its frequency response.
3) Design and implement common source MOSFET (Enhance mode) amplifier and calculate the gain and the bandwidth of amplifier from its frequency response.
4) Design and implement two stage RC coupled amplifier for given specifications. Determine Gain and Bandwidth from its frequency response curve.
5) Design and implement Darlington amplifier. Determine Gain and Bandwidth from its frequency response curve.
6) Design and implement CE – CB Cascode amplifier. Determine Gain and Bandwidth from its frequency response curve.
7) Design and implement voltage series feedback amplifier for the given specifications. Determine the effect of feedback on the frequency response of a voltage series feedback amplifier.
8) Design and implement current shunt feedback amplifier for the given specifications. Determine the effect of feedback on the frequency response of a current shunt feedback amplifier.
9) Design and implement RC Phase shift oscillator and Wien bridge oscillator for the given specification. Determine the frequency of oscillation.
10) Design and implement Hartley and Colpitts oscillators for the given specifications. Determine the frequency of oscillation.
11) Design and implement class A power amplifier and find out the efficiency. Plot the output waveforms.

12) Design and implement single tuned amplifier. Determine the resonant frequency and bandwidth of a tuned amplifier.

PART-B

Note: Implement the following experiments in PCB with discrete components that are designed in PART-A.

1) Common Emitter amplifier.
2) Two stage RC coupled amplifier.
3) Voltage Series feedback amplifier.
4) RC phase shift Oscillator.

II B.Tech, II-Sem (ECE) P C
3 1.5

(A0495194) DIGITAL LOGIC SIMULATION LAB

COURSE 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.

COURSE OUTCOMES:

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

MAPPING WITH COs & POs:

	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

Simulation of Functional verification of Digital IC's using HDL

1) Logic Gates- 74XX
2) Half Adder, Full Adder
3) Ripple Carry Adder
4) 3-8 Decoder -74138
5) 8-3 Encoder- 74X148
6) 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) Floating-point encoder
15) Dual parity encoder
16) RAM, ROM

II B.Tech, II-Sem (ECE) P C
3 1.5

(A0594193) PYTHON PROGRAMMING LAB

(For branches CE, Mech, EEE, ECE, CSE)

COURSE OBJECTIVES:

- To be able to introduce core programming basics and various Operators of Python programming language.
- To demonstrate about Python data structures like Lists, Tuples, Sets and dictionaries
- To understand about Functions, Modules and Regular Expressions in Python Programming.

COURSE OUTCOMES:

- Student should be able to understand the basic concepts of scripting and the contributions of scripting language.
- Ability to explore python data structures like Lists, Tuples, Sets and dictionaries.
- Ability to create practical and contemporary applications using Functions, Modules and Regular Expressions.

MAPPING WITH COs & POs:

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

LIST OF EXPERIMENTS

1) Program to demonstrate basic data type in python
2) Program to demonstrate operators in python
3) A cashier has currency notes of denominations 10, 50, and 100.If the amount to be withdrawn is input through the keyboard using input() function in hundreds, find the total number of currency notes of each denomination the cashier will have to give to the withdrawer
4) Program to demonstrate list and tuple in python
5) Write a program in Python, A library charges a fine for every book returned late. For first 5 days the fine is 50 paisa, for 6-10 days fine is one rupee and above 10 days fine is 5 rupees. If you return the book after 30 days your membership will be cancelled. Write a program to accept the number of days the member is late to return the book and display the fine or the appropriate message
6) Write a program to calculate overtime pay of 10 employees. Overtime is paid at the rate of Rs.12.00 per hour for every hour worked above 40 hours. Assume that employee do not work for fractional part of an hour.
7) Two numbers are entered through the keyboard; write a program to find the value of one number raised to the power of another.
8) Write a function that receives marks received by a student in 3 subjects and returns the average and percentage of these marks. Call this function from main() and print the result in main
9) Write a program to read a file and display its contents.
10) Write a program to demonstrate Regular Expressions in python.

TEXT BOOKS:

1) Learning Python, Mark Lutz, Orielly, 3 Edition 2007.
2) Python Programming: A Modern Approach, Vamsi Kurama, Pearson, 2017.

REFERENCE BOOKS:

1) Think Python, 2 Edition, 2017 Allen Downey, Green Tea Press
2) Core Python Programming, 2016 W.Chun, Pearson.
3) Introduction to Python, 2015 Kenneth A. Lambert, Cengages
4) https://www.w3schools.com/python/python_reference.asp
5) https://www.python.org/doc/

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III B.Tech, I-Sem (ECE)

L	T	C
2	1	3

(A0415195) ANALOG IC APPLICATIONS

COURSE 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.

COURSE 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.

MAPPING WITH COs & POs:

	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 AND OSCILLATORS: Introduction, Butterworth filters-first order, second order LPF, HPF filters. Band pass, Band reject and all pass filters, notch filters. Basic principle of sine wave oscillators: RC phase shift oscillators, Wien bridge oscillators, Quadrature and Biphasic oscillators.

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.

Introduction to IC 8038: Functional diagram and applications, Introduction to IC 1496: Functional diagram and applications

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, PHI , Revised 4th edition, 2021.
2. Linear Integrated Circuits – D. Roy Chowdhury, New Age International (p) Ltd, 5th Edition, 2018

REFERENCES:

1. Design with Operational Amplifiers & Analog Integrated Circuits - Sergio Franco, McGraw Hill, 3rd ed., 2012.
2. Operational Amplifiers & Linear ICs by David A. Bell, 3rd ed., Oxford University Press, 2011.
3. Integrated circuits by K.R.Botkar, Khanna Publishers, 2013.

III B.Tech, I-Sem (ECE)

L	T	C
2	1	3

(A0411195) ANALOG COMMUNICATION

COURSE 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.

COURSE 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).

MAPPING WITH COs & POs:

	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.

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, 5th edition, 2010.
2. B.P. Lathi, Zhi Ding, & Hari Mohan Gupta, "Modern Digital & Analog Communication Systems", Oxford University Press, 4th edition, 2017.

REFERENCES:

1. A.Bruce Carlson, & Paul B. Crilly, "Communication Systems – An Introduction to Signals & Noise in Electrical Communication", McGraw-Hill International Edition, 5th Edition, 2012.
2. Electronic Communication Systems by George Kennedy, Bernard Davis, S. R. M Prasanna, McGraw Hill Education, 6th edition 2017.
3. Linear Integrated Circuits – D. Roy Chowdhury, New Age International (p) Ltd, 2nd Edition, 2003.
4. Digital and Analog Communication Systems, Sham Shanmugam, Wiley, 1st edition, 2019.
5. "Electronic Communications systems" Modulation and Transmission-Robert Schoenbeck, Prentice Hall India Learning Private Limited, 2nd edition, 1998.

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L	T	C
2	1	3

(A0412195) ANTENNAS AND WAVE PROPAGATION

COURSE 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.

COURSE 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 analyse different Antenna Arrays mathematically.
- Outline the factors involved in the Propagation of Radio Waves and decide which Mode of Wave Propagation

MAPPING WITH COs & POs:

	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.

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. Microstrip antennas: Geometry, Features, applications; mm Wave Antennas: In-Package antennas for mm waves, Emerging Applications of mm wave 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, 3rd ed., Reprint 2003.
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, Pearson Education India, 2nd Edition, 2015.
2. Antennas and Wave Propagation - GSN Raju, Pearson Education India, 1st ed., 2009.
3. Antennas and Wave Propagation- John D. Krauss and Ronald J. Marhefka and Ahmad S. Khan, McGraw Hill, 5th Edition, 2017.
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 & Salai Thillai Jhilagam.J., Scitech Publications India Pvt. Ltd., 3rd ed., 2013.
6. Millimeter Wave Wireless Communications, Robert W. Heath, Robert C. Daniel, James N. Theodore S. Rappaport, Murdock, Prentice Hall, 2014.

III B.Tech, I-Sem (ECE)

L	T	C
2	1	3

(A0413195) DIGITAL CIRCUIT DESIGN

COURSE OBJECTIVES:

- To understand the concept of CMOS logic, realization of simple logic expressions using CMOS logic and steady state electrical behaviour of CMOS.
- To understand the concept of Bipolar logic, Transistor logic, TTL families and interfacing of CMOS-TTL.
- To provide in depth knowledge in designing of Arithmetic building blocks: Different types of Adders and Multipliers.
- To provide the knowledge in designing of logic using PLDs: PROM, PAL, and PLA. And to provide the fundamental knowledge of FPGA and CPLD architecture.
- To provide the knowledge of FSM and its capabilities and Limitation. And to understand the concepts of ASM Charts and design examples using ASM charts.

COURSE OUTCOMES:

- Understand and analyse the CMOS and Bipolar logic families and their interfacing.
- Understand and analyse arithmetic building blocks like adder cell, n-bit adders and multipliers and able to design simple arithmetic building blocks.
- Understand and analyse the logic design using PLDs and able to distinguish FPGA and CPLD.
- Understand Design sequential logic blocks and ASM charts.

MAPPING WITH COs & POs:

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

UNIT III

DESIGNING ARITHMETIC BUILDING BLOCKS: Design of adders: Full adder, Static adder circuit, Mirror adder design, Transmission-Gate-Based adder, Manchester carry chain, Carry bypass adder, CSA, Linear CSLA, Square root CSLA. Multiplier: Definition, Partial product generation, Partial product accumulation, Final addition. 4x4 Array multiplier, 4x4 carry save multiplier,

UNIT IV

DESIGN EXAMPLES: Introduction to Radix-N multiplier, Booth multipliers, Wallace multiplier, Dadda Multiplier. Mode dependent comparator, floating-point encoder, dual parity encoder.

UNIT V

DESIGNING USING PROGRAMABLE LOGIC DEVICES: Basic PLD's-ROM, PROM, PLA, PAL Realization of switching function using PLD's. Introduction to FPGA and CPLD, General architecture of FPGA and CPLD, Xilinx XC 9500 CPLD and Xilinx XC 4000 FPGA architectures. Comparison between FPGA and CPLD.

UNIT VI

DESIGNING SEQUENTIAL LOGIC BLOCKS: Steps in Synchronous Sequential circuit design. FSM-capabilities and Limitations, Mealy and Moore models, Serial Binary adder, Sequence Detector. **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) Digital Design Principles & Practices – John F. Wakerly, PHI/ Pearson Education Asia, 3rd Ed., 2005.
2) Essentials of VLSI circuits and systems – Kamran Eshraghian, Eshraghian Dougles and A. Pucknell, PHI, 2005 Edition.
3) Digital Integrated Circuits – A design perspective, John M. Rabaey, Anantha Chandrakasan, Borivoje Nikolic, Pearson Education, 2rd Edition.
4) Switching & Finite Automata theory- ZviKohavi, TMH, 2nd Edition.

REFERENCES:

1) Fundamentals of Logic Design-Charles H.Roth.5th Edition, 2004, Thomson publications.
2) Digital Logic Applications and Design-John M.Yarbrough, 2006, Thomson Publications

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L	T	C
2	1	3

(A0512195) CORE JAVA PROGRAMMING

(For Branches EEE, Mech., ECE)

COURSE 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

COURSE OUTCOMES:

- Understand the syntax and concepts of JAVA
- Write JAVA programs to implementing Object Oriented Concepts
- Able to build directories and manage applications with interfaces
- Write JAVA programs that use data from flat files and databases
- Develop programs with error free and Multi-tasking.
- Program assignment utilizing Java GUI components, event listeners and event-handlers.

MAPPING WITH COs & POs:

	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	2	
CO2	2	1	3	2	2			1				3	1	2	1
CO3	1	2	2	1	1							2		1	
CO4	1	1	2	1	2			1			2	2		2	1
CO5	2	2	2		2			1			1	2	2	2	
CO6		1	1		2							1		1	1

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, static fields and methods, access control, this, overloading methods and constructors, recursion, garbage collection.

UNIT-II

Inheritance –Inheritance concept, Super and Sub classes, Member access rules, types of Inheritance, super uses, final classes and methods, casting, polymorphism- dynamic binding, method overriding, abstract classes and methods, the Object class and its methods.

UNIT-III

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-IV

Files – streams, text Input/output, binary input/output, random access file operations, File management using File class, Using java.io.

Strings: Strings, string functions.

UNIT-V

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

UNIT-VI

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

TEXT BOOKS:

1. Java; the complete reference, 7th editon, Herbert schildt, TMH.
2. Understanding OOP with Java, updated edition, T. Budd, pearson eduction.

REFERENCES:

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

III B.Tech, I-Sem (ECE)

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(A0017194) INDIAN HERITAGE AND CULTURE

(Mandatory Learning Course-II)
(For Branches CE, EEE, Mech., ECE, CSE)

INTRODUCTION:

- Indian Heritage is an ancient facet pertaining to bygone ages. It reflects strong ethical culture and embodiment of nature in life style. It had its deep roots in great Indian epics and Upanishads. It has been transformed and strengthened by many kings and queens. It is received by erudite writers. The glory of Indian Heritage & culture have been ignored or distorted in wake of western culture. The present generation ought to know their indigenous culture and heritage.

COURSE OBJECTIVES:

- To enable the students to have an insight into and understanding of the great heritage and culture of India.
- To sensitize them towards preservation and progression of the same.

COURSE OUTCOMES:

- Equip themselves with knowledge about the heritage and culture of India.
- Apply the ancient wisdom to become successful professionals.

UNIT I

Origin of Indian Culture - Indus valley & Vedic Culture Evolution - Political unification of India under Mauryas and Guptas - Cultural achievements - Cultural conditions under the Sathavahanas - Contribution of Pallavas and Cholas to art and letters.

UNIT II

Influence of Islam on Indian Culture - The Sufi, Bhakti and Vishnavite Movements - Cultural achievements of Vijayanagara rulers - Contribution of Shershah and Akbar to the evolution of administrative system in India - Cultural Developments under Mughals - Great Indian Monuments.

UNIT III

Great Indian Epics - Ramayana and Mahabharata - Upanishads - Vedas - Pathanjali - Yoga - Principles of Jainism and Buddhism.

UNIT IV

Indian Literature - Rabindranath Tagore - Arundhathi Roy - RK.Narayan - Sri Sri - Gurajada -Jashuva - Western Impact on India - Introduction of Western Education - End of the Gurukulas educational system.

UNIT V

Social and Cultural awakening and social reform movements - Raja Rama Mohan Roy - Dayananda Saraswathi -Theosophical Society - Ramakrishna Paramahamsa and Vivekananda - Iswara Chandra Vidyasagar and Kandukuri Veeresalingam - Emancipation of women and struggle against Caste.

UNIT VI

Mahatma Gandhi - Non-violence and Satyagraha - Great leaders of Freedom struggle - Post Independent Era.

TEXT BOOK

1) Madanlal Malpani & Shamsunder Malpani (2016), ***Indian Heritage and Culture,*** New Delhi: Kalyani Publishers.

REFERENCE BOOKS

1) Romila Thapar (2018), Indian Cultures as Heritage: Contemporary Pasts, India.

2) Anurag Mathur (2017), Indian Culture & Heritage, Create space independent publishing Platform, 2017.
3) P.R.Rao & P. Raghavendra, Indian Heritage and culture, Sterling Publication Pvt. Ltd.
4) Madhukar kumar Bhagat, Indian Heritage and culture, Access Publications.
5) Dhirendra Singh, Indian Heritage and culture, APH Publications.
6) http://www.indiaculture.nic.in/
7) http://www.indiaculture.nic.in/world-heritage

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III B.Tech, I-Sem (ECE)

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(A0020195) CORPORATE MANAGEMENT SKILLS

(Skill Development Course)

COURSE 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.

COURSE OUTCOMES:

- 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.

MAPPING WITH COs & POs:

	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 I:

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 II:

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-Nonverbal communication and Different types in it.

UNIT III:

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

UNIT IV:

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

UNIT V:

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

UNIT VI:

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

III B.Tech, I-Sem (ECE) P C
3 1.5

(A0498195) ANALOG IC APPLICATIONS LAB

COURSE 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.

COURSE 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

MAPPING WITH COs & POs:

	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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3 1.5

(A0497195) ANALOG COMMUNICATION LAB

(Hardware and Simulation using MATLAB)

COURSE 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.

COURSE 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.

MAPPING WITH COs & POs:

	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.

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3 1.5

(A0581195) CORE JAVA PROGRAMMING LAB

(For Branches Mech., ECE)

COURSE OBJECTIVES:

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

COURSE 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

MAPPING WITH COs & POs:

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

RECOMMENDED SYSTEMS/SOFTWARE REQUIREMENTS:

- Intel based desktop PC with minimum of 166 MHZ or faster processor with at least 64 MB RAM and100 MB free disk space.
- JDK Kit. Recommended

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 discriminate b2 -4ac is negative, display amessage 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 primenumbers 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 theintegers (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) Write a Java program to illustrate method overloading.

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) Write a Java program to implement the matrix ADT using a class. The operations supported by this ADT are:

   a) Reading a matrix. c) Addition of matrices.

   b) Printing a matrix. d) Subtraction of matrices. e) Multiplication of

matrices.

9) Write a Java Program to solve Tower's of Hanoi problem.

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

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

12) Implement the complex number ADT in Java using a class. The complex ADT is used to represent complexnumbers of the form c=a+ib, where a and b are real numbers. The operations supported by this ADT are:
   a) Reading a complex number. d) Subtraction of complex numbers.
   b) Writing a complex number. e) Multiplication of complex numbers.
   c) Addition of Complex numbers. f) Division of complex numbers.

13) Write a Java program that makes frequency count of letters in a given text.

14) 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.

15) a) Write a Java program that checks whether a given string is a palindrome or not. Ex: MADAMis a palindrome.
   b) Write a Java program to make frequency count of words in a given text.

16) 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 fileand 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 linenumber before each line.
   c) Write a Java program that displays the number of characters, lines and words in atext file.
   d) Write a Java program to change a specific character in a file.

   Note: Filename, number of the byte in the file to be changed and the new character arespecified on the command line.

17) Write a Java program that:
   i) Implements stack ADT.
   ii) Converts infix expression into Postfix form
   iii) Evaluates the postfix expression.

18) 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 usingthe concept of inter thread communication.

REFERENCES:

1. Java; the complete reference, 7th editon, Herbert schildt, TMH.
2. An Introduction to programming and OO design using Java, J.Nino and F.A. Hosch, John wiley &sons.
3. Programming in Java, Sachin Malhotra, Saurabh Choudhary, Second Edition.
4. An Introduction to OOP, second edition, T. Budd, pearson education.
5. Introduction to Java programming 6th edition, Y. Daniel Liang, pearson education.

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III B.Tech, II-Sem (ECE)

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(A0416196) DIGITAL COMMUNICATION

COURSE 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

COURSE OUTCOMES:

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

- 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.
- To analyse the performance of the communication system by the mathematical study of information in the form of symbols, impulses.
- To design a digital communication system with error control subsystems by applying block and cyclic code techniques.
- To design a digital communication system with error control subsystems by applying convolution coding techniques.

MAPPING WITH COs & POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	3										2	
CO2	3	3	3	2	2										
CO3	3	3	3	3	2	1							1	2	
CO4	2	3	3			1								3	1
CO5	3	3	3	2	3	2									2
CO6	3	3	3	2	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, Commanding in PCM, Time Division Multiplexing(TDM), 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. Raised cosine filter & its spectrum. Eye diagrams.

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, Forward Error correction systems. Error detection and correction of linear block codes Hamming codes, Low Density parity check (LDPC) codes, Automatic Retransmission Query (ARQ) systems, Brief introduction to polar codes, Cyclic codes: 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.

UNIT VI

CHANNEL CODING-II: Convolution codes: Encoding of convolution codes using time domain and transform domain approach, code tree, trellis and state diagram, Maximum-likelihood decoding of convolution codes.

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, II-Sem (ECE)

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(A0417196) ARM MICROCONTROLLER & ITS INTERFACING

COURSE OBJECTIVES:

- To study the concepts of RISC Architecture and Assembly language programming of ARM Processor
- To study the concepts of Architectural Support for High level language and memory hierarchy
- To study the concepts of Architectural support for system Development and Operating system

COURSE OUTCOMES:

Upon completion of the course, the students will be able to

- Understand microprocessors and Microcontrollers
- Analyse the architecture of ARM processors and Internal Features.
- Develop assembly and C programming for ARM processor (STM32).
- Understanding GPIO and interfacing various devices.
- Develop societal applications using CAN and I2C protocols.

MAPPING WITH COs & POs:

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

UNIT I: Introduction

Introduction to Microprocessor and Microcontrollers, Differences between microprocessor and microcontroller, Different types of Microcontrollers.

ARM Micro-controller: History and Features, Importance of 32-bit Microcontrollers, Introduction to ARM, Difference between ARM & MIPS, Brief description of ARM Family Microcontrollers, Introduction to ARM Cortex M Series (M0 & M3),Description of STM32Fxxx Microcontrollers (STM32F0xxx & STM32F1xxx)

UNIT II: Architecture description of ARM

Pin Diagram, Memory Organisation, SFRs description, Introduction to general microcontroller terms, Program Counter, Accumulator (or Working Register), Reset, Clock Cycle, Machine Cycle, Instruction Cycle, Interrupts, SFRs & GPRs, Stack, Stack Pointer, Stack Operation, *Internal features:* General Purpose Input-Output PORTs, Interrupt, Timers, Analog to Digital Convertors, USART, EEPROM, Device Protection features – Watchdog Timer, BOR, Power up Timer

UNIT III: ARM Programming

Arithmetic and Logic Instructions, Branch, Call, and Stack in Arm, Signed Integer Numbers Arithmetic, ARM Addressing Modes; Embedded C Programming.

UNIT IV: Interfacing of GPIO and Basic Internal Peripherals of ARM (STM32F103) Controller

LED Interfacing with Microcontroller, LED Patterns programming, switches Interfacing with Microcontroller, Interfacing of Solid-State Devices with Microcontroller, Programming concept of SSD, Interfacing of Keypad with Microcontroller, Programming Concept of Keypad Matrix, Liquid crystal display, Understanding the Timer/Counter Concepts, Introduction to Timer2 & Timer3 Concepts, Introductions to Timer SFRs and their access, Programming concept of Timers to Generate delays.

UNIT V: Programming of Advanced Internal Peripherals of STM32Fxxx Controller

ADC: Introduction to ADC Process, Need of ADC, ADC Resolutions & Relation between Vin & Digital Output, Introduction to STM32Fxxx, internal ADC and its SFRs, Programming Concept of ADC, *DAC:* Concept & Description to STM32Fxxx DAC, Description to SFRs & their Access, Programming Concept of DAC. *UART:* Introduction to Serial & Parallel Communication, Introduction to Synchronous & Asynchronous Communication, Introduction to UART and its SFRs, Programming concept of Serial Transmitter & Receiver using UART.

UNIT VI: Interrupts and Applications with STM32Fxxx

Interrupts: Introduction to Interrupt, Polling Vs. Interrupt, Types of Interrupts (Maskable & Non-Maskable, Internal & External), Description to NVIC Interrupt Logic Diagram of STM32Fxxx, Introduction to SFRs related to Interrupts, Programming Concept of Interrupts.

Applications: Design and development of a closed loop system for health applications, Agriculture applications, Automobile applications, Domestic applications including design of signal conditioning circuits and programming, Robotic applications, Motors (PMDC, Stepper & Servo) and utilisation CAN, I^2C and SPI protocols.

TEXT BOOKS:

1) Sarmad Naimi, Muhammad Ali Mazidi, Sepehr Naimi, The STM32F103 Arm Microcontroller & Embedded Systems: Using Assembly & C, MicroDigitalEd publishing, 2020
2) Shujen Chen, Muhammad Ali Mazidi, Eshragh Ghaemi, STM32 Arm Programming for Embedded Systems: Using C Language with STM32 Nucleo, Micro Digital Ed., 2018.
3) Geoffrey Brown, Discovering the STM32 Microcontroller, Indiana University, 2016

REFERENCE BOOKS:

1) Warren Gay, Beginning STM32: Developing with FreeRTOS, libopencm3 and GCC, Apress, 2018
2) Kirk Zurell, C Programming for Embedded Systems, Lawrence, Kansas: R&D Books, 2000.
3) STM32F discovery datasheets, reference manuals & Application notes.
4) Anbazhagan K, Ambika Parameswari K, Programming STM32 Microcontroller circuit
5) STM32 Microcontroller, Keil uVision and STM32CubeMX, ESP8266 with STM32F103C8, Stepper & Servo Motor with STM32F103C8, Heartbeat Moduation.
6) Cortex M3 Reference manual
7) Joseph Yiu, The Definitive Guide to the ARM Cortex M3, Newnes, 2007
8) WANG YONG HONG, XU WEI, HAO LI PING, STM32 family of ARM Cortex-M3 Microcontrollers Principles and Practice
9) Carmine Noviello, Mastering the STM32 Microcontroller, Lean pub, 2016

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III B.Tech, II-Sem (ECE)

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2	1	3

(A0418196) DIGITAL SIGNAL PROCESSING

(For Branches: ECE & EEE)

COURSE 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.

COURSE OUTCOMES:

At the end of the course students are able to

- Ready to utilize FT.
- To implement DFT's using FFT.
- To determine and implement the appropriate type of design method for IIR filters.
- To determine and implement the appropriate type of design method for FIR filters.
- Choose appropriate decimation and interpolation factors for high performance filters

MAPPING WITH COs & POs:

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

UNIT I

INTRODUCTION: Review of discrete-time signals and systems-Time domain analysis of discrete-time signals and systems, Frequency domain analysis of discrete –time signals and systems.

Discrete Fourier Transforms: Properties of DFT, Linear Convolution of Sequences using DFT, and Computation of DFT, The relationship between DFT to other transforms.

UNIT II

FAST FOURIER TRANSFORMS: Radix-2 Fast Fourier Transforms (FFT), Radix-4 FFT, Decimation in Time and Decimation in Frequency FFT Algorithms, Inverse FFT.

UNIT III

REALIZATION OF DIGITAL FILTERS: 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.

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, Illustrative Problems.

UNIT V

FIR DIGITAL FILTERS: Characteristics of FIR Digital Filters, Frequency Response. Design of FIR Digital Filters Using Fourier series, Window Techniques, Frequency Sampling Technique, Comparison of IIR and FIR filters, Illustrative Problems.

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, Tran multiplexers,

TEXT BOOKS:

1. Digital signal processing, principles, Algorithms and applications: John G. Proakis, Dimitris G. Manolakis, Pearson Education/PHI, 4th ed., 2013.
2. Digital signal processing, A computer base approach- Sanjit K Mitra, Tata Mcgraw Hill, 4th edition, 2013.
3. Discrete Time Signal Processing-A.V. Oppenheim and R.W. Schaffer, PHI, 3rd Ed., 2009.

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., 2009.
3. Digital signal processing: M H Hayes, Schaum's outlines, TATA Mc-Graw Hill, 2nd ed., 2011.
4. Digital Signal Processing by Ramesh Babu, Scitech Publications, 6th ed., 2014.

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III B.Tech, II-Sem (ECE)

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(A0519196) COMPUTER NETWORKS

(Professional Elective-I)

COURSE 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.

COURSE 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

MAPPING WITH COs & POs:

	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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(A0419196) SENSORS AND SIGNAL CONDITIONING

(Professional Elective-I)

COURSE OBJECTIVES:

- Understanding various input interfacing techniques for different kind of sensors like resistive, capacitive, inductive etc.
- Leaning non-idealities of amplifiers, improvement, reduction of noise, improvement of system performance etc.

COURSE OUTCOMES:

- Able to carry out research and development in the area of advanced instrumentation and signal conditioning.
- To be well versed with the sensor characteristics, basic signal conditioning circuits and sensor interfaces.
- Able to analyze and design different kinds of signal amplifiers, their non-idealities, and performances.
- Able to analyze and design noise and interference reduction circuits and improve the system performance.
- Solve practical and state of the art problems related to sensor interfacing circuits and serve the related industries.

MAPPING WITH COs & POs:

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

UNIT I

INTRODUCTION TO SENSOR-BASED MEASUREMENT SYSTEMS

General concepts and terminology - Sensor classification- Static characteristics of measurement systems**:** accuracy, precision, sensitivity, linearity, threshold, resolution- Systematic errors-Random errors-Dynamic characteristics of measurement systems: zero-order, first-order, and second-order measurement systems and response to step, ramp and sinusoidal inputs.

UNIT II

RESISTIVE SENSORS

Potentiometers - Strain gages and types - Resistive temperature detectors (RTDs), - Thermistors - Magneto resistors - Light-dependent resistors (LDRs).

UNIT III

SIGNAL CONDITIONING FOR RESISTIVE SENSORS

Measurement of resistance - Voltage dividers - Wheatstone bridge: Balance and deflection measurements - Sensor bridge calibration, balance and compensation - Instrumentation amplifiers.

UNIT IV

REACTANCE VARIATION AND ELECTROMAGNETIC SENSORS

Capacitive sensors**:** variable & differential - Inductive sensors**:** Variable reluctance and eddy current sensors, LVDTs, Variable transformers (synchros and resolvers), Magneto elastic and magnetostrictive sensors - Electromagnetic sensors: Sensors based on faraday's law, Hall Effect sensors.

UNIT V

SIGNAL CONDITIONING FOR REACTANCE VARIATION SENSORS

Problems and alternatives- AC bridges- Carrier amplifiers, Detection & application to LVDTs

UNIT VI

SELF-GENERATING SENSORS

Thermoelectric sensors**:** Thermocouples, Piezoelectric and Pyroelectric sensors- Photovoltaic sensors- Electrochemical sensors.

SIGNAL CONDITIONING FOR SELF-GENERATING SENSORS: Offset and drifts in OP amps-Chopper and Auto zero amplifiers- Electrometer- Transimpedemce amplifiers- Charge amplifiers- Noise in amplifiers.

TEXT BOOK:

1) Sensors and Signal Conditioning: Ramon Pallás Areny, John G. Webster, 2nd edition, John Wiley and Sons, 2000.

REFERENCES:

1) Sensor Technology Hand Book-Jon Wilson ,Newne 2004
2) Instrument Transducers – An Introduction to Their Performance and Design – by Herman K.P. Neubrat, Oxford University Press.
3) Measurement System: Applications and Design – by E.O. Doeblin, McGraw Hill Publications.
4) Instrumentation Devices and Systems – by C.S.Rangan, G.R.Sarma, V.S.V.Mani Tata McGraw Hill Publications.
5) A Course in Electrical and Electronic Measurements and Instrumentation –by A.K.Sawhney, Puneet Sawhney Dhanpat Rai & Co (P) Ltd.
6) Industrial instrumentation, principles and design- by Tattamanglam R. Padmanabhan-springer india-2005.

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(A0420196) NEURAL NETWORKS & FUZZY SYSTEMS

(Professional Elective-I)

COURSE OBJECTIVES:

- This course introduces the basics of neural networks, single &multi-layer feed forward networks, fuzzy sets & fuzzy logic components.

COURSE OUTCOMES:

- To differentiate Biological system, intelligent systems and the concepts of crisp and fuzzy set theory
- To analyze the learning strategies of Artificial Neural networks and learning rules
- To understand training algorithms and are able to provide adequate knowledge about feed forward and feedback neural networks.
- To design training algorithms for associative memory network for pattern recognition problems
- To demonstrate knowledge and understanding of fuzzy system as they apply in real time systems
- To apply different methodologies to solve the problems related to defuzzification.

MAPPING WITH COs & POs:

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

UNIT I

ARTIFICIAL NEURAL NETWORKS: Introduction, Biological Neuron, Artificial Neuron, Basic concepts of Neural Networks, Basic Models of ANN Connections, McCulloch-Pitts Model, Characteristics of ANN, Applications of ANN.

UNIT II

ESSENTIALS OF ARTIFICIAL NEURAL NETWORKS: Artificial Neuron Model, Operations of Artificial Neuron, Types of Neuron Activation Function, ANN Architectures, Classification Taxonomy of ANN – Connectivity, Learning Strategies (Supervised, Unsupervised, Reinforcement), Learning Rules, Numerical problems, Types of Application

UNIT III

SUPERVISED LEARNING NETWORKS: Perceptron Network, Perceptron Learning Rule, Architecture, Perceptron Training Algorithm, ADALINE, MADALINE, Back Propagation Network, BP Learning Rule, Input Layer Computation, Hidden Layer Computation, Output Layer Computation, Radial Basis Function Demonstration through MATLAB

UNIT IV

ASSOCIATIVE MEMORY NETWORK: Training Algorithms for Pattern Association, Auto Associative Memory Network, Hetero Associative Memory Network, BAM, Hopfield Networks, Applications

UNIT V

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

UNIT VI

FUZZY LOGIC SYSTEM COMPONENTS: Fuzzification, Membership value assignment, development of rule base and decision making system, Defuzzification to crisp sets, Defuzzification methods, Applications

TEXT BOOKS:

1. Neural Networks and Fuzzy Logic System by Bart Kosko, PHI Publications.
2. Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications by Rajasekharan and Pai – PHI Publications.
3. Fundamental of Artificial Neural Network and Fuzzy Logic-by Rajesh Kumar, Lakshmi publications

REFERENCE BOOKS:

1. Neural Networks – James A Freeman and Davis Skapura, Pearson Education.
2. Neural Networks – Simon Hakins , Pearson Education

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(A0421196) SPEECH PROCESSING

(Professional Elective-I)

COURSE OBJECTIVES:

- Explain fundamentals of speech production, its perception and inherent features.
- Develop an ability to analyse parameter estimation and feature representations of speech signals.
- Develop an ability to evaluate the pattern comparison and design issues of speech recognition.
- Develop the concept and utilization of statistical and pattern recognition models.
- Develop and apply different classifiers and features for different real-life applications.

COURSE OUTCOMES:

- Demonstrate the understanding on the speech production, its perception and features.
- Analyse various components of parameter estimation and feature representations of speech signals.
- Illustrate various models for speech synthesis and automatic recognition.
- Analyse the speech recognition and implementation issues.
- Develop an ability to create and apply the speech recognition techniques in various applications in different areas

MAPPING WITH COs & POs:

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

Correlation Levels 1, 2 or 3 as defined below:
1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT 1

Principle Characteristics of Speech: Linguistic information, Speech and Hearing, Speech production mechanism, Acoustic characteristic of speech Statistical Characteristics of speech. Speech production models, Linear Separable equivalent circuit model, Vocal Tract and Vocal Cord Model.

UNIT 2

Speech Analysis and Synthesis Systems: Digitization, Sampling, Quantization and coding, Spectral Analysis, Spectral structure of speech, Autocorrelation and Short Time Fourier transform, Window function, Sound Spectrogram, Mel frequency Cepstral Coefficients, Filter bank and Zero Crossing Analysis, Analysis –by-Synthesis ,Pitch Extraction.

UNIT 3

Speech Coding: Reversible coding, Irreversible coding and Information rate distortion theory, Coding in time domain: PCM, ADPCM, Adaptive Predictive coding, Coding in Frequency domain: Sub band coding, Adaptive transform coding, Vector Quantization, Code Excited Linear Predictive Coding (CELP).

UNIT 4

Linear Predictive Coding Analysis: Principle of LPC analysis, Maximum likelihood spectral estimation, Source parameter estimation from residual signals, LPC Encoder and Decoder, PARCOR analysis and Synthesis, Line Spectral Pairs, LSP analysis and Synthesis.

UNIT 5

Speech Recognition: Principles of speech recognition, Speech period detection, Spectral distance measure, Structure of word recognition system, Dynamic Time Warping (DTW),

Theory and implementation of Hidden Markov Model (HMM), Study of Speech Interpretation and Recognition Interface (SIRI).

UNIT 6

Speech Processing Applications: Text dependen t and Text Independent speaker recognition systems, Text to Speech Synthesis, Speech Enhancement, Sound-Source Localization. Broad overview of Natural Language Processing (NLP), Examples: Text Classification task, News flow classification, sentiment analysis, spam filtering.

TEXT BOOKS:

1) Rabiner and Schafer, “Digital Processing of Speech Signals”, Pearson Education.
2) Shaila D. Apte “Speech and Audio Processing” Wiely Precise

REFERENCE BOOKS:

1) Rabiner and Juang, “Fundamentals of Speech Recognition”, Pearson Education.
2) Sadaoki Furui, “Digital Speech Processing, Synthesis and Recognition” 2/e

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(A0422196) NETWORK SECURITY AND CRYPTOGRAPHY

(Open Elective-I)

COURSE 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

COURSE 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.

MAPPING WITH COs & POs:

	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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(A0022196) MATHEMATICAL METHODS

(Open Elective-I)

COURSE 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.

COURSE OUTCOMES:

- Get knowledge of algebra of Matrices, curve fitting, Partial Differential Equations and Numerical Methods to solve various Engineering Problems
- 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.
- Analyze the numerical solutions of ODE's to various real time problems in quantum mechanics, electrical networks etc.
- Apply Trapezoidal rule and Simpson's rules in numerical differentiation and integration
- Synthesize problems of one and two dimensional Partial Differential Equations for the wave equation, heat equation, Laplace's equation subject to simple boundary conditions

MAPPING WITH COs & POs:

	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.

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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(A0520196) COMPUTER ARCHITECTURE

(Open Elective-I)

COURSE 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.

COURSE OUTCOMES:

- Explain the organization of basic computer, its design & the design of control unit and trade-offs 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

MAPPING WITH COs & POs:

	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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(A0023196) BUSINESS ENVIRONMENT

(Open Elective-I)

(For Branches: ECE & CSE)

COURSE OBJECTIVES:

- To understand the dynamics of business world and its environment
- To develop an understanding of the economic environment affecting business.
- To learn about the changing dimensions of laws and impact on business.
- To study about the impact of technology and cultural aspects and LPG on Indian industry
- To study the role of the Indian Financial system in business

COURSE OUTCOMES:

- The students should be able to practically visualize the factors relevant to business and economy
- To know the significance of the policies which govern the business environment in the country
- To understand the impact of the changing dimensions of laws on political and legal environment of business
- To analyse how LPG has brought drastic transformation in Indian business
- To be able to understand why the financial system is an important part in operating any business.

MAPPING WITH COs & POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	1			2	2				2		1	2	1
CO2	2					2	2	1				2	2	1	2
CO3				2	2	2	3	1				2	1	2	
CO4		2	3	2	1	2	2						1	2	2
C05	1	3	1	1	2			2		2		2		2	

UNIT I

Introduction: Dynamics of business & its environment, Concept of business cycle, Significance, India as an emerging and mixed economy, Economic planning in India.

UNIT II

Economic Environment: Industrial policy in recent years – Fiscal policy – Monetary policy, Economic Reforms in India - Overview of Indian International trade - Bilateral and Multilateral trade agreements – Trade Blocks

UNIT III Political & Legal environment of Business:

Critical elements of political environment – Government & Business – Changing dimensions of laws and impact on business–GST-Implications and Impediments,- MRTP & FEMA and Licensing Policy, Competition Act

UNIT IV

Technological and Socio-Cultural Environment: Impact of Technology on organizations, Process of Technology adoption and development, Patents, Technology assessment at government level, ISO standards and Bureau of Indian Standards, Cross Cultural environment, Social responsibility with respect to Indian Business.

UNIT V Liberalization in India:

Liberalization, Privatization and Globalization (LPG), EXIM policy and role of EXIM Bank, FDI policy, Role of WTO in promoting world trade – Agreements reached in the Uruguay round including TRIPS, TRIMS and GATS, Disputes Settlement Mechanism - Dumping and Anti-dumping measures, Special Economic zones, Technology parks

UNIT VI

Capital Markets: Features and components of Indian Financial system, Objectives, Features and structure of Capital market and Money market, Recent developments - Stock Exchanges, Investor Protection and Role of SEBI - Legal Framework**:** Consumer Protection Act, 1986, BIFR

REFERENCES:

1. Indian Economy, Dutt and Sundaram, S. Chand, New Delhi, 2009.
2. Essentials of Business Environment, K.Aswathappa, Himalaya, 2008.
3. Business Environment – Text and Cases, Justin Paul, TMH, 2009
4. Business Environment: Text & Cases, Francis Cherunilam, Himalaya Publishing, Latest edition

III B.Tech, II-Sem (ECE)

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(A0015194) ENVIRONMENTAL SCIENCE

(Mandatory Learning Course-III)
(For Branches CE, EEE, Mech., ECE, CSE)

COURSE 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.

COURSE OUTCOMES:

- Understand environmental problems arising due to developmental activities.
- Realize the importance of ecosystem and biodiversity for maintaining 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.

UNIT I

MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL SCIENCE:

Environment -Definition, Scope and importance, Segments of Environment (Atmosphere, Lithosphere, Hydrosphere and Biosphere)-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) Non-conventional resources of energy (Solar Energy, wind energy and their applications)

C) Chemical fertilizers and pesticides-problems.

UNIT III

a) CONCEPTS OF ECO-SYSTEM

Structure and functions of an ecosystem: Producers, Consumers and Decomposers- Interaction between biotic and abiotic factors in an ecosystem- Energy flow and its importance- Trophic levels- Food chain- Food web –Ecological Pyramid, Ecological succession

b) TYPES OF ECOSYSTEM

Understanding the types of ecosystem: (i) Terrestrial (forest and grassland) (ii) Aquatic (fresh water and salt water) with an example of each.

UNIT IV

BIODIVERSITY

Introduction – Definition - genetic, species and ecosystem diversity- Biogeographical classification of India- Value 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,
b) Diseases- AIDS, Malaria, COVID, Cancer.
c) Human rights, Fundamental duties and Value education.
d) Women and Family welfare Programs.

SOCIAL ISSUES:

a) Climatic changes
b) Greenhouse effect and global warming.
c) Ozone layer depletion.
d) Acid rain.
e) Resettlement and rehabilitation of people.
f) 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.

III B.Tech, II-Sem (ECE)

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(A0423196) ARDUINO & MSP 430 PROGRAMMING

(Skill Development Course)

COURSE OBJECTIVES:

To understand the basic concepts of embedded system using various micro controllers and its architectures.

- To Learn the Arduino programming language and IDE.
- To learn how to prototype circuits with Arduino UNO.
- To learn how to Program the Arduino board to make the circuits work for any given application.

COURSE OUTCOMES:

Understand the concepts of various micro controllers used in embedded systems.

- Understand basics of ardunio & MSP 430 programming and various types of functions libraries.
- Understand how to interface Ardunio & MSP 430 to various sensors and actuators.
- Gains Knowledge of interfacing various sensors and actuators.
- Able to Integrate hardware and software for embedded system for any given application

MAPPING WITH COs & POs:

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

UNIT I

Embedded System design: Basics, Introduction to embedded systems, Components of embedded system, Advantages and applications of embedded systems, Examples of real time embedded systems.

Learning Arduino Platform: Arduino Overview, Introduction to Arduino, Arduino History and Family, Features, Board Types, Arduino Uno board Description, input vs output, Arduino Program Structure, Data Types, Variables & Constants, Operators, Control Statements , Loops, Functions, Strings , Time, Arrays, **Arduino Function Libraries**

UNIT II

Learning Arduino Platform: Blinking Led, Fading Led, Switches, Push Buttons, Reading Analog voltage, Relays (AC Appliance Control), PWM Generation: DC motor, Stepper Motor, servo.

UNIT III

Working with Displays: Led Bar Graph, Seven Segment Display, Multi Segment Displays, I2C display, LCD.

Working with Sound and Sensors: Piezo Buzzer, Audio SOS Signal, Arduino Piano Keyboard, LM393 Digital Sound Sensor

UNIT IV

The basic sensors and actuators using Arduino: Introduction to sensors and actuators; How to connect and work with different sensors, such as IR Sensor, Ultrasonic Sensor, Humidity, PIR Sensor, Water Detector Sensor, Accelerometer, Sound, Light Distance, Pressure etc., to ARDUINO Board, Reading various sensor data on serial monitor and LCD Display. Home Automation, Robot Control etc.

UNIT V

RISC – MSP 430: Low power RISC MSP430 – block diagram, features and architecture, Variants of the MSP430 family viz. MSP430x2x, MSP430x4x, MSP430x5x and their targeted applications, MSP430x5x series block diagram, Addressing modes, Instruction set, Memory address space, on-chip peripherals (analog and digital), and Register sets. Sample embedded system on MSP430 microcontroller.

UNIT VI

I/O ports pull up/down resistors concepts, Interrupts and interrupt programming. Watchdog timer. System clocks. Low Power aspects of MSP430: low power modes, Active vs Standby current consumption, FRAM vs Flash for low power & reliability.

Timer & Real Time Clock (RTC), PWM control, timing generation and measurements. Analog interfacing and data acquisition: ADC and Comparator in MSP430

BOOKS/REFERENCE:

1) Arduino Made Simple by Ashwin Pajankar
2) Arduino-Based Embedded Systems: By Rajesh Singh, Anita Gehlot, Bhupendra Singh, and Sushabhan Choudhury.
3) Arduino Cookbook by Michael Margolis, O'Reilly Media, Inc., 1st edition.
4) John H. Davies, MSP430 microcontroller basics, 1st Ed., Newnes, Elsivier, 2008.
5) Cem Unsalan, H. Deniz Gurhan, Programmable Microcontrollers with Applications: MSP430 LaunchPad with CCS and Grace, 1st Ed., McGraw Hill India, New Delhi, 2018.
6) https: //www.arduino.cc/en/Tutorial/HomePage
7) Arduino for beginners: Essential Skills Every Maker Needs, John Baichtal, Person Education, Inc.
8) MSP430™ MCUs Development Guide Book, Texas Instruments

III B.Tech, II-Sem (ECE) P C
3 1.5

(A0499196) DIGITAL COMMUNICATION LAB

COURSE 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.

COURSE 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.

MAPPING WITH COs & POs:

	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.

RAJEEV GANDHI MEMORIAL COLLEGE OF ENGINEERING AND TECHNOLOGY
AUTONOMOUS
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

III B.Tech, II-Sem (ECE) P C
3 1.5

(A0480196) ARM PROGRAMMING LAB

COURSE OBJECTIVES:

- To understand the architecture of 16 Bit Microprocessor and its programming structure.
- To understand the architecture, programming and interfacing of RISC microcontroller.
- To development real world applications incorporating various communication protocols.

COURSE OUTCOMES:

- Students can understand the evaluation of microprocessors and microcontrollers.
- They can analyse the differences between a microprocessor and a microcontroller.
- Understanding of architecture of 8086 microprocessors and MSP430 microcontroller.
- They can write efficient programs in Assembly level language 8086 microprocessor and MSP 430 microcontroller with the help of instruction set easily.
- They can know the techniques of interfacing between the processors and peripheral devices so that they themselves can design and develop a complete microprocessor/ microcontroller based systems (projects).

MAPPING WITH COs & POs:

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

Part A: 8086 Microprocessor Programs using 8086 simulation environments.

1. Introduction to Programming environment/ software (Study Experiment)
2. Programs for Data transfer (Incorporating various addressing modes)
3. Programs incorporating arithmetic and logical operations (Addition, substation, multiplication, division, AND, OR, NOT, XOR, XNOR)
4. Programs based on string operations (Move Block, Reverse string, Sorting, Length of the string, String comparison.)
5. Programs for code conversion (ASCII – BCD, Packed BCD – Unpacked BCD, Gray Code)
6. Programs for Sorting operations (Ascending, Descending, Largest, Smallest, positive and negative numbers, even & odd numbers, parity, number of 0's & 1's)

Part B: Embedded C Experiments using MSP430 Microcontroller

1. Introduction to MSP430 launch pad and Programming Environment. (Study Experiment)
2. Read input from switch and Automatic control/flash LED (software delay).
3. Interrupts programming example using GPIO.
4. Configure watchdog timer in watchdog mode & interval mode.
5. Configure timer block for signal generation (with given frequency)
6. Interfacing potentiometer/ Temperature sensor with MSP430
7. Test various Power Down modes in MSP430.
8. PWM based Speed Control of Motor controlled
9. Use Comparator to compare the signal threshold level
10. Master slave communication between MSPs using SPI
11. Networking MSPs using Wi-Fi
12. Low Power modes and Energy trace++:
    a. Enable Energy Trace and Energy Trace ++ modes in CCS
    b. Compute Total Energy, and Estimated lifetime of an AA battery.

Note: A minimum of five experiment from Part A and Ten experiments from Part B are to be conducted

IV B.Tech, I-Sem (ECE)

L	T	C
2	1	3

(A0427197) MICROWAVE ENGINEERING AND OPTICAL COMMUNICATIONS

COURSE OBJECTIVES:

- To analysemicr owave circuits incorporating hollow, dielectric and planar waveguides, transmission lines, filters and other passive components, active devices.
- To explain how microwave devices and circuits are characterized in terms of their S-Parameters.
- To use microwave components such as isolators, Circulators, Tees, Gyrators etc.
- To give students an understanding of basic microwave devices (both amplifiers and oscillators).
- To learn the basic concepts of fibre optics communications.
- To make the students learn the system with various components or process for various applications.

COURSE 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 S-parameters.
- Study the performance of specialized microwave tubes such as klystron, reflex klystron, magnetron, travelling wave tube anddifferent solid state devices.
- 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.

MAPPING WITH COs & POs:

	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										1		2
CO5	1	3	2										2	1	

UNIT I

Introduction, Advantages and applications of Microwaves.

Guided Waves: Introduction, Transverse Electric waves(TE), Transverse Magnetic waves(TM), TEM Modes – Concepts, expressions and Analysis, Cutoff Frequencies, Velocities, Wavelengths expressions. Wave equations of Rectangular waveguides, Propagation of TE and TM waves in Rectangular waveguide, Filter Characteristics-Dominant and Degenerate Modes. Mode Characteristics – Phase and Group Velocities, Wave Impedance Relations, 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, Two hole Directional Coupler , Ferrites Composition and Characteristics, Faraday rotation; Ferrite Components- Gyrator, Isolator, Circulator.

UNIT III

Microwave Amplifiers and oscillators:

Microwave Tubes: (i) Linear Beam Tubes: Two cavity Klystron amplifier –Construction, Operation, Applegate diagram, output power and efficiency. Reflex Klystron oscillator-Construction, Operation, Applegate diagram output power and efficiency. Travelling Wave Tube (TWT) –Construction, Operation, amplification process and Gain considerations.(ii)

Crossed Field Tubes :Magnetron oscillator-Construction, pi-mode operation, power output and efficiency.

Microwave Semiconductor Devices: Gunn Oscillator – Principle of operation, Characteristics, Two valley model, IMPATT, TRAPATT diodes, Parametric Amplifier.

UNIT IV

OVERVIEW OF OPTICAL FIBER COMMUNICATION: Historical development, the general system, Advantages of optical fiber communications. Introduction to Ray theory transmission, Total Internal Reflection, Acceptance angle, Numerical Aperture, Skew rays, V-number, Mode coupling, Step Index fibers, Graded Index fibers, Mode Field Diameter.

UNIT V

Signal degradation inoptical fibers: Signalattenuation- absorption, scattering losses, Bending Losses, Core and Cladding losses, Groupdelay, Dispersion- Material dispersion, waveguide dispersion, Inter model dispersion.

UNIT VI:

Optical Sources and Detectors: Introduction, LEDs–structure –Lightsource, Quantum efficiency, Modulation of an LED, LASER diodes, Sourceto Fiber power launching, Fiber Splicing, OpticalFiber connectors, Photodiodes– Principle of Photodiodes,Avalanche Photodiodes, detector response time, Comparisonof Photo diodes.

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.
3. Optical Fiber Communications – Gerd Keiser, Mc GrawHill International edition, 4th Edition, 2008.
4. Optical Fiber Communications – John M. Senior, PHI, 2nd Edition, 2002.

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
9. Text Book on Optical Fibre Communication and its Applications – S.C.Gupta, PHI, 2005.
10. Fiber Optic Communication Systems – Govind P. Agarwal, John Wiley, 3rd Ediition, 2004.
11. Fiber Optic Communications – Joseph C. Palais, 4th Edition, Pearson Education, 2004.

IV B.Tech, I-Sem (ECE)

L	T	C
2	1	3

(A0428197) DIGITAL TV ENGINEERING

(Professional Elective-II)

COURSE 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

COURSE 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.

MAPPING WITH COs & POs:

	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 I 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 II 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 III 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 ITU Standards(H.). Digital TV recording techniques.

UNIT IV 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 V 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 VI 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 Systems”.
3. Gulathi, “Monochrome & Color TV”.

IV B.Tech, I-Sem (ECE)

L	T	C
2	1	3

(A0429197) MOBILE COMMUNICATION

(Professional Elective-II)

COURSE OBJECTIVES:

- To study the concept of cellular system design with frequency-reuse, cell sectoring and handoff techniques
- To understand GSM, CDMA mobile technologies their design issues and comparison
- To understand important features of advance technologies (higher generations) starting form 2.5 G to 5G.
- To learn and understand the basic principles of Telecommunication and Networks.

COURSE OUTCOMES:

At the end of this course, students will demonstrate the ability to:

- Attain the knowledge of fundamentals in cellular radio system design and its evolution.
- Analyze radio channel and cellular capacity
- Design and apply concepts of mobile cellular systems like GSM, CDMA.
- Understand emerging technologies for fourth generation mobile systems such as LTE and 5G

MAPPING WITH COs & POs:

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

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

CELL COVERAGE FOR SIGNAL AND TRAFFIC: Signal reflections in flat and hilly terrain, effect of human made structures, phase difference between direct and reflected paths, constant standard deviation, straight-line path loss slope, general formula for mobile propagation over water and flat open area, near and long distance propagation antenna height gain, form of a point to point model.

UNIT III

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 IV

GSM ARCHITECTURE AND INTERFACE: Global system for mobile (GSM), GSM architecture, GSM Air specifications, GSM Channels, Mobility management, Network Signaling,Spectral efficiency calculations with multiple access technologies like TDMA, FDMA,CDMA Comparison .

UNIT V

Code Division Multiple Access: CDMA technology, RAKE receiver, IS 95 system Architecture, Air Interface, Forward Link, Reverse link, Physical and Logical channels of IS

95 CDMA, IS 95 CDMA Call Processing, soft Handoff, Comparison of GSM and CDMA technology, Spectral efficiency calculations for CDMA.

UNIT VI

Higher Generation Cellular Standards: 4G Introduction and vision, LTE enabler Technologies: OFDMA, SC-FDMA, MIMO etc. Adaptive multiple antenna techniques, radio resource management, QOS requirements for 4G. LTE Network architecture, interfaces and node functionalities.

Introduction to 5G: Drivers for 5G, 5G Roadmap and Vision, 5GEnabler technologies / Key building Blocks (High Level View), 5G current state, Recent Trends in Telecommunication Industries.

TEXT BOOKS

1) Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2nd Edn., 2006.
2) T.S.Rappaport, "Wireless Communications Principles and Practice", II Ed. PHI
3) V.K.Garg, "IS-95 CDMA & CDMA 2000", Pearson Education.

REFERENCE BOOKS

1) J. E. Flood, "Telecommunications Switching, Traffic and Networks", Pearson Education
2) Krzysztof Wesolowski, "Mobile Communication Systems", Wiley Student Edition.
3) Mischa Schwartz, "Mobile Wireless Communications", Cambridge University Press
4) John C. Bellamy, "Digital Telephony", Third Edition; Wiley Publications
5) Fundamentals of 5G Mobile Networks - By: Jonathan Rodriguez, Publisher: John Wiley & Sons

IV B.Tech, I-Sem (ECE)

L	T	C
2	1	3

(A0430197) INFORMATION THEORY AND CODING

(Professional Elective-II)

COURSE OBJECTIVES:

- To understand the concept of information
- To understand the limits of error free representation of information signals and the transmission of such signals over a noisy channel
- To design and analyze data compression techniques with varying efficiencies a per requirements
- To understand the concept of various theorems proposed by Shannon for efficient data compression and reliable transmission
- To have idea on the different coding techniques for reliable data transmission
- To design an optimum decoder for various coding schemes used.

COURSE OUTCOMES:

At the end of the course, students will be able to

- Apply the knowledge of Shannon's source coding theorem and Channel coding theorem for designing an efficient and error free communication link.
- Analyze various coding schemes
- Design an optimum decoder for various coding schemes used.

MAPPING WITH COs & POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	1	1	2	1	1						1		3	2	
CO 2	1	2	3	1									2	2	
CO 3	1	1	2	1	1								2	2	
CO 4	1	1	1	1	1						1	1	1	1	
CO 5	2	2	1	1	1								1	1	
CO 6	1	2	3	1	1						1		2	2	

UNIT I

Introduction to Information Theory. Concept of information, units, entropy, marginal, conditional and joint entropies, relation among entropies, mutual information, information rate. Source coding: Instantaneous codes, construction of instantaneous codes, Kraft's inequality, coding efficiency and redundancy Noiseless coding theorem , construction of basic source codes, Shannon – Fano Algorithm, Huffman coding,

UNIT II

Channel capacity – redundancy and efficiency of a channel, binary symmetric channel (BSC), Binary erasure channel (BEC) – capacity of band limited Gaussian channels

UNIT III

Continuous Sources and Channels: Differential Entropy, Mutual information, Waveform channels, Gaussian channels, Shannon – Hartley theorem, bandwidth, SNR trade off, capacity of a channel of infinite bandwidth, Shannon's limit.

UNIT-IV

Introduction to rings, fields, and Galois fields. Codes for error detection and correction – parity check coding – linear block codes – error detecting and correcting capabilities – generator and parity check
matrices – Standard array and syndrome decoding

UNIT V

Perfect codes, Hamming codes, encoding and decoding Cyclic codes, polynomial and matrix descriptions, generation of cyclic codes, decoding of cyclic codes BCH codes, Construction and decoding, Reed Solomon codes

UNIT VI

Convolutional Codes – encoding – time and frequency domain approaches, State Tree & Trellis diagrams – transfer function and minimum free distance – Maximum likelihood decoding of convolutional codes – The Viterbi Algorithm. Sequential decoding.

TEXT BOOKS:

1. Simon Haykin: Digital Communication Systems , Wiley India, 2013.
2. P.S.Sathya Narayana: Concepts of Information Theory & Coding , Dynaram Publications, 2005

REFERENCES:

1. Bose, Information theory coding and cryptography, 3e McGraw Hill Education India , 2016
2. J S Chitode, Information Theory and Coding, Technical Publications, Pune, 2009
3. Kelbert & Suhov, Information theory and coding by examples, Cambridge University Press, 2013
4. Shu Lin & Daniel J. Costello.Jr., Error Control Coding : Fundamentals and Applications,
   2/e, Prentice Hall Inc.,Englewood Cliffs, NJ,2004
5. D.E.R. Denning, Cryptography and Data Security, Addison Wesley, 1983.
6. David J.C Mackay, Information Theory, Inference and Learning Algorithms, Cambridge, 2005.
7. Paul Garrett, The mathematics of Coding Theory, Prentice Hall, 2004.
8. Das Mullick Chatterjee, Principles of Digital communication , Wiley Eastern Ltd, 1986

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IV B.Tech, I-Sem (ECE)

L	T	C
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(A0426197) VLSI DESIGN

(Professional Elective-II)
(For Branches: EEE & ECE)

COURSE 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.

COURSE 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.

MAPPING WITH COs & POs:

	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 and 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 n-type 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

SHORT-CHANNEL EFFECTS AND DEVICE MODELS: Scaling Theory, Threshold voltage variation, Mobility Degradation, Velocity Saturation, Hot Carrier Effects, Output Impedance Variation with Drain-Source Voltage, MOS Device Models, Level 1, Level 2, Level 3, BSIM Series, Charge and Capacitance Modeling, Temperature Dependence, Process Corners, Analog Design in a Digital World.

UNIT VI

INTRODCTION TO LOW POWER VLSI: Introduction, overview of power consumption: Switching power Dissipation, Observation on switching power reduction, Short-circuit power dissipation, Leakage power dissipation, Low power design through voltage scaling: Influence of volatege scaling, power and delay, VTCOMS Circuits, MTCOMS Circuits, Pipelining approach, Estimation and optimization of switching activity: Concept of switching activity, Reduction of switching activity, Glitch reduction, Gated clock signals.

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, AnanthaChandrakasan, BorivojeNikolic, Pearson Education, 2nd Edition.

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(A0431197) RADIO FREQUENCY IDENTIFICATION

(Professional Elective-III)

COURSE 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.

COURSE 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.

MAPPING WITH COs & POs:

	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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(A0432197) ADVANCED DIGITAL SIGNAL PROCESSING

(Professional Elective-III)

COURSE 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.

COURSE 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.

MAPPING WITH COs & POs:

	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.

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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(A0433197) VIRTUAL INSTRUMENTATION

(Professional Elective-III)

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.

MAPPING WITH COs & POs:

	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.

TEXT BOOKS:

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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(A0434197) EMBEDDED SYSTEM CONCEPTS

(Professional Elective-III)

COURSEOBJECTIVES:

- 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 know the Hardware /Software co-design methodology.
- To know the different case studies in embedded system design.

COURSE 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.

MAPPING WITH COs & POs:

	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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(A0435197) DIGITAL IMAGE PROCESSING

(Professional Elective-IV)

COURSE 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.

COURSE 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.
- 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.

MAPPING WITH COs & POs:

	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.

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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(A0436197) SPREAD SPECTRUM COMMUNICATION

(Professional Elective-IV)

COURSE 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.

COURSE 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 avoidancetype spread spectrum systems.
- Design and develop spread spectrum communication systems.
- Choose proper multiple accessing methods depending on channel model.

MAPPING WITH COs & POs:

	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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(A0437197) RADAR SYSTEMS

(Professional Elective-IV)

COURSE 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.

COURSE 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.

MAPPING WITH COs & POs:

	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.

IV B.Tech, I-Sem (ECE)

L	T	C
2	1	3

(A0438197) LOW POWER VLSI DESIGN

(Professional Elective-IV)

COURSE 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.

COURSE 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

MAPPING WITH COs & COs:

	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.

IV B.Tech, I-Sem (ECE)

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2	1	3

(A0024197) MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

(Open Elective-II)

(For Branches: CE & ECE)

COURSE OBJECTIVES:

- To enhance the knowledge of the students regarding importance of management and managerial problems with optimum solutions
- To provide the knowledge regarding the concept of demand and demand forecasting methods
- To provide the knowledge regarding forms of business organizations
- To provide awareness regarding capital budgeting decisions(long term investment decisions)
- To introduce the concepts –financial accounting and financial analysis
- To give an idea of practicing techniques of ratio analysis

COURSE OUTCOMES:

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 the techniques and evolution of capital budgeting
- Understand financial performance through financial statements

MAPPING WITH COs & POs:

	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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(A0525196) CLOUD INFRASTRUCTURE AND SERVICE

(Open Elective-II)
(For Branches: ECE & CSE)

COURSE OBJECTIVES:

- Explain the importance and benefits of Cloud computing and the need for its rapid adoption
- Explain roadmap for transformation from classic to cloud environment
- Identify and differentiate various infrastructure components of classic and virtualized data center
- Explain virtualization requirements and available tools at each layer of IT infrastructure
- Explain business continuity options in a virtualized environment
- Discuss effective cloud computing deployment model for businesses/IT organizations

COURSE OUTCOMES:

Upon successful completion of this course, participants should be able to:

- Explain the phases of transition from classic data center to virtual data center and then to the Cloud
- Describe virtualization technology at server, storage, network, desktop, and application layers of IT infrastructure
- Explain the key characteristics, services, and deployment models of Cloud
- Describe the Cloud infrastructure components and service management processes
- Describe Cloud security concerns and solutions
- List the key considerations for migration to the Cloud

MAPPING WITH COs & POs:

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

UNIT I:

Journey to the Cloud: This unit focuses on the business drivers, definition, essential characteristics, and phases of journey to the Cloud. Business drivers for Cloud computing, Definition of Cloud computing, Characteristics of Cloud computing as per NIST, Steps involved in transitioning from Classic data center to Cloud computing environment.

UNIT II:

Classic Data Center (CDC); This unit focuses on the key elements of CDC – compute, storage, and network, with focus on storage networking, business continuity, and data center management. Application, DBMS, Compute, Storage and Networking, Object based and Unified storage technologies, Business continuity overview and backup, Replication technologies, CDC Management.

UNIT III:

Virtualized Data Center (VDC) – Compute and Storage: VDC Compute: compute aspect of the VDC, fundamental concepts of compute virtualization and techniques, virtual machine (VM) components and management of compute resources, process to convert physical machine to VM.

VDC Storage: storage virtualization implementation, key underlying technologies, methods for providing virtual storage to compute systems in a VDC environment.

UNIT IV:

Virtualized Data Center (VDC) – Networking and desktop applications: VDC Networking: network virtualization in VDC, VDC network infrastructure and components, virtual LAN, and virtual SAN. key network traffic management techniques.

VDC Desktop and Application: the various aspects of desktop and application virtualization technologies.

Business Continuity in VDC: concepts and techniques employed for ensuring business continuity, mechanisms to protect single point of failure, various technology options for backup, replication, and migration of VMs and their data, various options for recovering from total site failure due to a disaster.

UNIT V:

Cloud Computing and Infrastructure: Cloud Computing Primer: essential characteristics of Cloud Computing, Cloud services and deployment models, the economics of Cloud.

Cloud Infrastructure and Management: Cloud infrastructure components, Cloud service creation processes. Cloud service management processes, delivery of Cloud services is aligned with business objectives, expectations of Cloud service consumers.

UNIT VI:

Cloud Security and Migration to cloud: Cloud Security: Security concerns and counter measures in a VDC and Cloud environment, Key security concerns and threats, infrastructure security mechanisms in VDC and cloud environments, access control, identity management, governance, cloud security best practices.

Cloud Migration Considerations: considerations for migration to the cloud, details 'cloud models' suitable for different categories of users, governance, risk and compliance aspects in Cloud, considerations for choosing applications suitable for Cloud, different phases to adopt the Cloud.

TEXT BOOKS:

1. **Cloud Computing: A Practical Approach** Author: Anthony T. Velte, Publisher: Tata Mcgraw Hill Education Private Limited (2009), ISBN: 0070683514

REFERENCE BOOKS:

1. **Cloud Computing For Dummies** Author: Halper Fern, Kaufman Marcia, Bloor Robin, Hurwit Judith, Publisher: Wiley India Pvt Ltd (2009), ISBN: 8126524871

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(A0536197) ARTIFICIAL INTELLIGENCE

(Open Elective-II)
(For Branches: ECE & CSE)

COURSE OBJECTIVES:

This course is designed to:

- Learn different AI techniques and their implementation.
- Understand types of agents and the activities of agents.
- Learn problem solving using searching techniques, Problem characteristics and their implementations.
- Apply knowledge representation using pre-positional logic and First Order logic.
- Understand various learning algorithms

COURSE OUTCOMES:

- Understand and Learn Foundations of Artificial Intelligence.
- Learn Formulation of Problems as Search Problem and How to Solve Problems using
- Informed and Uninformed Techniques: Gradient Descent, Heuristic Search Strategies.
- Represent Knowledge using Logic. Interpret world-using process of inference. Develop
- programs that extract Knowledge
- Handle Uncertainity using Probability Notations
- Learning Agents: Inductive Learning, Learning Decision Trees, Neural Network Learning
- Applying Probabilistic Language Processing Interface for Machines.

MAPPING WITH COs & POs:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	2	1	2	1	1			1		2	1	1	1	2
CO2	2	3	3	2	2	1		1	1		2	1	1	1	2
CO3	3	3	3	2	2	2			1		2	2	1	2	2
CO4	2	3	1	2	2	3			1		1	2	1	2	2
CO5	2	2	3	1	2	1		1	1		1	2	1	2	2
CO6	2	3	2	3	2	1		1	2	2	2	2	1	2	2

*** 3: Strong 2: Medium 1: Week 0- NA**

UNIT I: Introduction to AI:

What is AI, Foundations of AI, History of AI, the State of Art. **Intelligent Agents**: Agents and Environments, The Concept of Rationality, The Nature of Environments: PEAS, properties of Task Environment, The Structure of Agents: 4 Types of Agents

UNIT – II: Solving Problems by Searching:

Problem Solving Agents, Example problems, searching for Solutions, Uninformed Search Strategies, **Informed search strategies,** Heuristic Search Strategies, Heuristic Functions, **Local & Heuristic Search Algorithms** and Optimization Problems: Hill Climbing search, Simulated Annealing, Genetic Algorithms. Constraint Satisfaction Problems.

UNIT – III: Knowledge Reasoning and Inference:

Knowledge basesd Agent, The Wumpus World Problem, **Logic**: Propositional Logic, First-Order Logic Knowledge and Reasoning: Inference in First-Order Logic: Propositional vs first Order inference. First-Order Logic: Syntax and Symantics of First order Logic, Using First Order Logic, Unification and Lifting, Forward Chaining. **Planning**: The planning problem formulation, The Language of Planning Problems, Examples: Air Cargo Transport, Spare Tyres

UNIT IV: Uncertainty Handling:

Acting under Uncertainity, Basic Probability Notation, Axioms of Probability, Inference using Full Joint Distribution, Bayes Rule and its Use, Probabilistic Reasoning Representing Knowledge in an Uncertain Domain, The semantics of Bayesian Networks.

UNIT V: Learning:

Forms of Learning, Inductive Learning, Learning Decision Trees, Ensembled Learning, Computational Learning. **Statistical Learning**: Instance Based Learning, nearest neighbor Models, **Neural Networks**: Units in Neural Networks, Neural Network Structures, Single Layer Feed Forward Networks, Multilayer Feed Forward Neural Networks. Learning Neural Network structures.

UNIT VI: Language Processing and **Present and Future of AI:**

Probabilistic Language Processing: Phrase structure grammars, Syntactic Analysis, Augmented Grammars and semantic Interpretation, Information Retrival, Information Extraction, Machine Translation. **Philosophical foundations:** Weak AI, Strong AI, Ethics and Risks of AI, **AI Present and Future:** Agent Components**,** Agent Architectures, Are we going in the right direction, what if AI does succeed.

Textbook:

1. Stuart J.Russell, Peter Norvig, "Artificial Intelligence A Modern Approach", 3rd Ed, Pearson Education/ Prentice Hall 2019.

References:

1. Nilsson, Nils J., and Nils Johan Nilsson. Artificial intelligence: a new synthesis. Morgan Kaufmann, 1998.
2. Elaine Rich, Kevin Knight and Shivashankar B. Nair, Artificial Intelligence, 3/e, McGraw Hill Education, 2008.
3. Dan W. Patterson, Introduction to Artificial Intelligence and Expert Systems, PHI Learning, 2012.

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L	T	C
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(A0439197) OPTO ELECTRONIC DEVICES

(Professional Elective-II)

COURSE OBJECTIVES:

- Explain the physics of absorption, recombination and photoemission from semiconductors.
- Analyse different types of photo detectors based on their performance parameters.
- Discuss different LED structures with material properties and reliability aspects.
- Explain optical modulators and optical components
- Illustrate different types of lasers with distinct properties.

COURSE OUTCOMES:

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

- Explain the property of absorption, recombination and photoemission in semiconductors.
- Illustrate different types of lasers with distinct properties
- Explain different LED structures with material properties
- Analyse different types of photo detectors
- Explain optical modulators and optical components.

MAPPING OF COs & POs:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2			1											
CO2	1			2											
CO3	2		1												
CO4	2														
CO5	2		1												

UNIT I

Optical processes in semiconductors – electron hole recombination, absorption, Franz-Keldysh effect, Stark effect, quantum confined Stark effect, deep level transitions, Auger recombination heat generation and dissipation, heat sources.

UNIT II

Lasers – threshold condition for lasing, line broadening mechanisms, axial and transverse laser modes, heterojunction lasers, distributed feedback lasers, DBR lasers, quantum well lasers, tunneling based lasers, modulation of lasers.

Nitride light emitters, nitride material properties, InGaN/GaN LED, structure and working, performance parameters,

UNIT III

InGaN/GaN Laser Diode, structure and working, performance parameters. White-light LEDs, generation of white light with LEDs, generation of white light by dichromatic sources, generation of white light by trichromatic sources, temperature dependence of trichromatic, 7 generation of white light by tetrachromatic and pentachromatic sources, white-light sources based on wavelength converters.

UNIT IV

Optical modulators using pn junction, electro-optical modulators, acousto-optical modulators, Raman-Nath modulators, Franz-Keldysh and Stark effect modulators, quantum well electro-absorption modulators, optical switching and logic devices, optical memory.

UNIT V

Optical detection – PIN, APD, modulated barrier photodiode, Schottky barrier photodiode, wavelength selective detection, micro cavity photodiodes. Optoelectronic ICs, advantages, integrated transmitters and receivers, guided wave devices. Working of LDR, liquid crystal display, structure, TFT display, structure, polymer LED, organic LED.

UNIT VI

Introduction to optical components, directional couplers, multiplexers, attenuators, isolators, circulators, tunable filters, fixed filters, add drop multiplexers, optical cross connects, wavelength convertors, optical bistable devices.

TEXT BOOKS:

1. Pallab Bhattacharya: Semiconductor Optoelectronic Devices, Pearson, 2009
2. Yariv, Photonics Optical Electronics in modern communication,6/e ,Oxford Univ Press,2006.

REFERENCES:

1. Fundamentals of Photonics: B E Saleh and M C Teich, Wiley-Interscience; 1991
2. Bandyopadhay, Optical communicatoion and networks, PHI, 2014.
3. Mynbaev, Scheiner, Fiberoptic Communication Technology, Pearson, 2001.
4. Piprek, Semiconductor Optoelectronic Devices, Elsevier, 2008.
5. Alastair Buckley, Organic Light-Emitting Diodes, Woodhead, 2013.
6. Xun Li, Optoelectronic Devices Design Modelling and Simulation, Cambridge University Press,2009

IV B.Tech, I-Sem (ECE)

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(A0440197) DIGITAL DESIGN USING VERILOG

(Skill Development Course)

COURSE OBJECTIVES:

To understand the basics of the Language Constructs and its conventions.

- To form an introduction to design and verify logic circuits through Verilog.
- To design various combinationaldesigns like decoders, multiplexers using Verilog HDL
- To design various sequential designs like Flip-flops, Counters and shift operations using Verilog HDL

COURSE OUTCOMES:

Student understands the basics of the Language and its conventions.

- Understand types of modeling, modules, and functions of Verilog and simulate related Programs.
- Student becomes skilled in design through Verilog.
- Gains Knowledge of designing and simulating various combinational circuit designs using Verilog HDL
- Gains Knowledge of designing and simulating various Sequential circuit designs using Verilog HDL

MAPPING WITH COs & POs:

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

UNIT I

Verilog Hardware Description Language: Importance of HDL, Popularity of Verilog HDL, Program structure, Comparison of Verilog and VHDL, Language constructs and conventions, Logic Values, Data types-Value Set-Nets-Registers-Vectors-Integer and Real register data type-Arrays-Parameters-Strings, Compiler directives.

UNIT II

Design elements: Continuous Assignment statements, Procedural Assignment Statements-Blocking and Non-Blocking procedural assignment, if statements, Case Statements, Structural design elements, Time dimension, Simulation.

UNIT III

Combination circuit modeling-I: Adders and Subtractors : Half adder, Full adder,74x283, Full Subtractor, Ripple carry adder, Carry-Look ahead adder ,Decoders (74x139) (74x138),Seven segment decoder(74x49), Priority encoder (74X148)- Verilog codes

UNIT IV

Combination circuit modeling-II: Multiplexers: 74X151, 74X157, 74X153, 74X251, 74X257,EX-OR gates and parity circuits:74X86,74X280, Comparators-74X85,74X682-Verilog codes.

UNIT V

Sequential circuit modeling-I: Latches and flip-flops: 74X375 74X74, 74X109, 74X112,74x175, 74x174, 74x374, Counters: 74X163, 74X161, 74X160, Design of mod-N counters- Verilog codes

UNIT VI

Sequential circuit modeling-II: Shift register: 74X164, 74X166, 74X194, Ring counter, Johnson counter, Verilog codes.

Design Examples: Dual Priority Encoder, Floating Point Encoder.

TEXT BOOKS:

1. Digital Design Principles & Practices – John F. Wakerly, Pearson Education India, 4th Ed., 2008.
2. Verilog HDL-A Guide to Digital Design and Synthesis-Samir Palnitkar, Pearson India,2nd edition,2003

REFERENCES:

1. A VHDL Primer – J. Bhasker, Pearson Education/ PHI, 3rd Edition.
2. Stephen Brown and Zvonko Vranesic - Fundamentals of Digital Logic with Verilog, 2nd Edition, TMH, 2008
3. Digital design with an Introduction to the Verilog HDL- M. MORRIS MANO MICHAEL D. CILETTI, Pearson, 5th edition,2013
4. Z Navabi - Verilog Digital System Design, 2nd Edition, McGraw Hill, 2005.

IV B.Tech, I-Sem (ECE) P C
3 1.5

(A0483197) MICROWAVE AND OPTICAL COMMUNICATION LAB

COURSE OBJECTIVES:

- To verify the characteristics of various microwave components using microwave test bench.
- Initiate an expose the newcomers to exciting area of optical communication

COURSE 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

MAPPING WITH COs & POs:

	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).

IV B.Tech, I-Sem (ECE) P C
3 1.5

(A0484197) DSP AND IMAGE PROCESSING LAB

COURSE 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.

COURSE 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

MAPPING WITH COs & POs:

	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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L	T	C
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(A0441198) SATELLITE COMMUNICATION

(Professional Elective-V)

COURSE 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.

COURSE 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 direct broadcast satellite television and radio.
- To know the concepts of global positioning system and its operation.

MAPPING WITH COs & POs:

	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,Overview of satellite communications, frequency allocations of satellite services, design considerations of satellite communications, Advantages & Disadvantages 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,Orbit considerations, coverage and frequency considerations.

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 antennasBasic antenna types and relationships,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: link budgets, link budget example.

Uplink design, Design of satellite links for specifiedCarrier to NOISE (C/N) Combining C/N and C/I value 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. Interference effects on complete link design. 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, 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, Master control station and uplink, Installation of DBS TV antennas, Satellite radio broadcasting.

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 C/A code accuracy, differential GPS, selective availability.

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 communicationsRobert M.Gagliardi, CBS publications, first edition 1987.

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(A0442198) DSP PROCESSORS ARCHITECTURES AND APPLICATIONS

(Professional Elective-V)

COURSE 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.

COURSE 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.

MAPPING WITH COs & POs:

	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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(A0443198) FPGA ARCHITECTURE AND APPLICATIONS

(Professional Elective-V)

COURSE 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

COURSE 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.

MAPPING WITH COs & POs:

	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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(A0531196) INTERNET OF THINGS

(Professional Elective-V)
(For Branches: ECE & CSE)

COURSE OBJECTIVES:

- To study the fundamentals about IoT
- To study about IoT Access technologies
- To study the design methodology and different IoT hardware platforms.
- To study the basics of IoT Data Analytics and supporting services.
- To study about various IoT case studies and industrial applications.

COURSE OUTCOMES:

- After completion of the course, the student should be able to
- Understand the use of Devices, Gateways and Data Management in IoT
- Analyze various protocols for IoT
- Familiarize various IoT Development frameworks
- Develop and understand various applications in IoT
- Understand the need of Security and Vulnerabilities in IoT

MAPPING WITH COs&POs:

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

UNIT I

FUNDAMENTALS OF IoT: Evolution of Internet of Things – Enabling Technologies – IoT Architectures: oneM2M, IoT World Forum (IoTWF) and Alternative IoT models – Simplified IoT Architecture and Core IoT Functional Stack -– Fog, Edge and Cloud in IoT – Functional blocks of an IoT ecosystem – Sensors, Actuators, Smart Objects and Connecting Smart Objects

UNIT II

IoT PROTOCOLS: IoT Access Technologies: Physical and MAC layers, topology and Security of IEEE 802.15.4, 802.15.4g, 802.15.4e, 1901.2a, 802.11ah and LoRaWAN – Network Layer: IP versions, Constrained Nodes and Constrained Networks – Optimizing IP for IoT: From 6LoWPAN to 6Lo, Routing over Low Power and Lossy Networks – Application Transport Methods: Supervisory Control and Data Acquisition – Application Layer Protocols: CoAP and MQTT

UNIT III

DESIGN AND DEVELOPMENT: Design Methodology – Embedded computing logic – Microcontroller, System on Chips – IoT system building blocks – Arduino – Board details, IDE programming – Raspberry Pi – Interfaces and Raspberry Pi with Python Programming.

UNIT IV

DATA ANALYTICS AND SUPPORTING SERVICES: Structured Vs Unstructured Data and Data in Motion Vs Data in Rest – Role of Machine Learning – No SQL Databases – Hadoop Ecosystem – Apache Kafka, Apache Spark – Edge Streaming Analytics and Network Analytics – Xively Cloud for IoT, Python Web Application Framework – Django – AWS for IoT – System Management with NETCONF-YANG

UNIT V

INDUSTRIAL APPLICATIONS: Cisco IoT system – IBM Watson IoT platform – Manufacturing – Converged Plantwide Ethernet Model (CPwE) – Power Utility Industry –

GridBlocks Reference Model – Smart and Connected Cities: Layered architecture, Smart Lighting, Smart Parking Architecture and Smart Traffic Control.

UNIT-VI

DEVELOPING IoT SOLUTIONS & VULNERABILITIES, ATTACKS AND COUNTERMEASURES IN IoT: Introduction to different IoT tools- Introduction to Arduino and Raspberry Pi- Implementation of IoT with Arduino and Raspberry - Primer on threats, vulnerability, and risks (TVR): The classic pillars of information assurance, Threats, Vulnerability and Risks. Primer on attacks and countermeasures: Common IoT attack types, Attack trees, Fault trees and CPS, Privacy and Security Issues in IoT.

TEXTBOOK:

1. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry, IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things, Cisco Press, 2017
2. Russell Brian and Drew Van Duren, Practical Internet of Things Security, 1st Edition, Packt Publication, 2016.

REFERENCES:

1. Arshdeep Bahga, Vijay Madisetti, Internet of Things - A hands-on approach, Universities Press, 2015
2. Olivier Hersent, David Boswarthick, Omar Elloumi, The Internet of Things – Key applications and Protocols, Wiley, 2012 (for Unit 2).
3. Jan Ho¨ ller, Vlasios Tsiatsis, Catherine Mulligan, Stamatis, Karnouskos, Stefan Avesand. David Boyle, "From Machine-to-Machine to the Internet of Things – Introduction to a New Age of Intelligence", Elsevier, 2014.
4. Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), Architecting the Internet of Things, Springer, 2011.
5. Michael Margolis, Arduino Cookbook, Recipes to Begin, Expand, and Enhance Your Projects, 2nd Edition, O'Reilly Media, 2011.

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(A0522196) DATA WAREHOUSING AND MINING

(Open Elective-III)
(For Branches: ECE & CSE)

COURSE OBJECTIVES:

The main objective of this course is to provide students

- With the basic data warehousing and data mining concepts
- To learn mining rules in large databases
- To get idea on clustering analysis
- Applications that can enable them to set up and manage an industrial data warehousing and data mining system.
- To learn about OLTP and OLAP systems

COURSE OUTCOMES:

Upon completion of the course students should:

- Ability to do Conceptual, Logical, and Physical design of Data Warehouses
- Familiarity with Requirements Engineering for Data Warehouses
- OLAP applications and OLAP deployment
- Have a good knowledge of the fundamental concepts that provide the foundation of data mining.
- Learn broad classes of data mining technologies
- Understand how these concepts are engineered to use some of the basic data mining tools.

MAPPING WITH COs & POs:

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

UNIT – I

Introduction: What Motivated Data Mining? Why is it Important?; What is Data Mining?; Data Mining-On What Kind of Data?; Data Mining Functionalities: What kinds of Data Can be Mined?; Are all of Patterns Interesting?; Classification of Data Mining Systems; Data Mining task primitives;

Data Warehouse and OLAP Technology: What is a Data Warehouse?; A Multidimensional Data Model: From Tables and Spreadsheet to Data Cubes, Stars, Snowflakes and Fact constellation schemas for Multidimensional Databases, Measures: Their Categorization and Computation, Concept Hierarchies, OLAP operations in the Multidimensional Data Model; Data Warehouse Architecture: Steps for the Design and Construction of Data Warehouses, A three-tier Architecture.

UNIT-II

Data Pre-processing: Why pre-process the data; Descriptive Data Summarization: Measuring the Central Tendency, Measuring the Dispersion of Data, Graphic Displays of Basic Descriptive Data Summaries; Data Cleaning: Missing values, Noisy Data Cleaning as a process; Data Integration and Transformation: Data Integration, Data Transformation, Data Reduction: Data Cube aggregation, attribute subset selection; Dimensionality Reduction, Numerosity Reduction;

UNIT-III

Mining Frequent patterns, Associations, and Correlations: Basic Concepts; Efficient and Scalable Frequent Itemset Mining methods: The Apriori Algorithm, Generating Association Rules from Frequent Itemsets, Improving Efficiency of Apriori, Mining Frequent Itemsets without Candidate Generation; Mining various kinds of Association Rules: Mining multilevel & multi-dimensional association rules; From Association Mining to Correlation Analysis: Strong Rules are not necessarily Interesting, From Association analysis to Correlation analysis;

UNIT-IV

Classification I: Overview of Classification and Prediction: What is Classification, What is prediction?; Issues Regarding Classification and Prediction: Preparing data for Classification and Prediction, Comparing Classification and Prediction Methods; Bayesian Classification: Bayes' theorem, Naïve Bayesian Classification; Classification by Decision Tree Induction: Decision Tree Induction, Attribute Selection Measures, Tree Pruning, Scalability and Decision Tree Induction; Rule-Based Classification: Using IF-THEN rules for Classification, Rule Extraction from Decision Tree, Rule Induction using a Sequential Covering Algorithm; Classification by Back propagation: A Multilayer Feed-Forward Neural Network, Defining Network Topology, Back propagation;

UNIT-V

Classification II and Prediction: Support Vector Machines: The Case when the Data are Linearly Separable, The Case when the Data are Linearly Inseparable; Lazy Learners: k-Nearest-Neighbour Classifiers, Case-Based Reasoning; Prediction: Linear Regression, Nonlinear Regression; Accuracy and Error Measures: Classifier Accuracy Measures, Predictor Error Measures; Evaluating the Accuracy of a Classifier or Predictor: Holdout Method and Random sub sampling, Cross validation, Bootstrap;

UNIT-VI

Cluster Analysis: Overview of Cluster Analysis; Types of data in Cluster Analysis: Interval-Scaled Variables, Binary Variables, Categorical, Ordinal, and Ratio-Scaled variables, Variables of Mixed Types; A Categorization of Major Clustering Methods; Partitioning Methods: Classical Partitioning Methods: k-Means and k-Medoids, Partitioning Methods in Large Databases: From k-Medoids to CLARANS; Hierarchical Methods: Agglomerative and Divisive Hierarchical Clustering, BIRCH, ROCK; Density-Based Methods: DBSCAN; Grid-Based Methods: STING; Model-Based Clustering Methods: Expectation-Maximization;

TEXT BOOKS:

1. Data Mining – Concepts and Techniques - Jiawei Han & Micheline Kamber Harcourt India, second Edition.

REFERENCES:

1. Data Mining Introductory and advanced topics–Margaret H Dunham, Pearson Education
2. Data Mining Techniques – Arun K Pujari, University Press.
3. Data Warehousing in the Real World – Sam Anahory & Dennis Murray. Pearson Edn Asia.
4. Data Warehousing Fundamentals – Paulraj Ponnaiah Wiley Student Edition
5. The Data Warehouse Life cycle Tool kit – Ralph Kimball Wiley Student Edition.

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(A0539197) CYBER SECURITY

(Open Elective-III)
(For Branches: ECE & CSE)

COURSE OBJECTIVES:

- This course provides insight knowledge about cyber crime and it portrays preventive measures the security policies and procedures that must be adapted to prevent the end user from cyber threats. It also conveys a basic knowledge on the how to analyze the cyber incidents through cyber forensic methods.

COURSE OUTCOMES:

- Students will be able to gain the knowledge on cyber crime and the challenges and threats in cyber security.
- Students will have knowledge on External and Internal reconnaissance through various tools.
- Students will have better understanding upon how the system is compromised and user identity is compromised.
- Students will have an effective knowledge on web and mobile security
- Students will be aware on the ethics and policy guidelines that must be followed.
- Students will be given a fundamental knowledge on Cyber Forensics

MAPPING WITH COs & POs:

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

UNIT-1

Introduction to cyber crime- classification of cyber crime – Reasons for commission of cyber crime – Malware and its types – Kinds of cyber crime

Security Posture: The current threat landscape- Cyber security challenges- Enhancing your security posture- The Red and Blue Team.

UNIT-2

Understanding the Cyber security Kill Chain: External reconnaissance - Internal reconnaissance - Access and privilege escalation – Sustainment – Assault –Obfuscation - Threat life cycle management.

UNIT-3

Compromising the System: Analyzing current trends – Phishing-Exploiting a vulnerability-Zero-day-Performing the steps to compromise a system.

Chasing a User's Identity: Identity is the new perimeter- Strategies for compromising a user's identity -Hacking a user's identity

UNIT-4

Web & Mobile security: Introduction – Fundamental concepts and approaches-Appification – Webification – sandboxing - permsission dialog based access control – Web PKI and HTTPS - Cookies – Password and Alternatives – Frequent software updates- Client side vulnerabilities and mitigation: Phishing & clickjacking – client side storage- physical attacks. Server side vulnerabilities and mitigation.

UNIT-5

Security Policy: Reviewing your security policy - Educating the end user-Policy enforcement - Monitoring for compliance

Legal issues and Ethics: Protecting programs and data – Information and Law-Rights of Employees and Employers- Computer Crime- Ethical issues in computer security.

UNIT –6

Computer Forensics: What is Computer Forensics?, Use of Computer Forensics in Law Enforcement, Computer Forensics Assistance to Human Recourses/Employment Proceedings, Computer Forensics Services, Benefits of professional Forensics Methodology, Steps taken by Computer Forensics Specialists. Types of Computer Forensics Technology

TEXT BOOKS:

1. The Cyber Security Body of Knowledge, version 1.0 by Awais Rashid, The National Cyber Security Centre 2019.
2. Introduction to cyber crime, by Jeetendra Pande, Uttarakhand Open University, Haldwani
3. Security in computing by Charles p pfleeger, Pearson Education; Fifth edition
4. Computer Forensics, Computer Crime Investigation by John R,Vacca, Firewall Media, New Delhi

REFERENCE BOOKS:

1. Information Security and Auditing in the Digital Age: A Practical Managerial Perspective Amjad Umar
2. Cybersecurity: Attack and Defense Strategies: Infrastructure security with Red by Erdal Ozkaya and Yuri Diogenes
3. Cyber Security Audit A Complete Guide - 2020 by Gerardus Blokdyk
4. Practical Malware Analysis: The Hands-On Guide to Dissecting Malicious Software By Michael Sikorski, Andrew Honig
5. Information Technology Control and Audit" by Angel R. Otero

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(A0445198) BIOMEDICAL INSTRUMENTATION

(Open Elective-III)

COURSE 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

COURSE 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

MAPPING WITH COs & POs:

	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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(A0446198) REAL TIME OPERATING SYSTEMS

(Open Elective-III)

COURSE 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

COURSE 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.

MAPPING WITH COs & POs:

	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

UNIT I

REAL TIME OPERATING SYSTEMS CONCEPTS: 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.

UNIT II

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.

UNIT III

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

UNIT IV

INTRODUCTION TO LINUX: overview of unix/Linux, Features, Commands, File Manipulation Commands, Editors, Directory Commands, Input/Output redirection, Pipes and Filters, File Protection, Process Commands,
About the Shell.

UNIT V

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, Multimedia applications.

UNIT VI

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.

RAJEEV GANDHI MEMORIAL COLLEGE OF ENGINEERING AND TECHNOLOGY
AUTONOMOUS
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

IV B.Tech, II-Sem (ECE)

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(A0532196) CAMPUS TO CORPORATE

(Skill Development Course)
(For Branches: ECE & CSE)

COURSE OBJECTIVES:

- To make the students aware of the GD session in selection process
- To learn the art of presentation and organizing 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

COURSE OUTCOMES:

- The students can develop leadership skills, communication skills, interpersonal skill, analytical and lateral thinking.
- To apply the principles of a good presentation and develop the art of presenting effectively.
- The student can be 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 leadership themes by successful stories.

MAPPING WITH COs & POs:

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

UNIT-I

Group Discussion: Introduction – Concept of GD, Types of GD's, Importance of GD in selection, Do's and Don'ts in GD -GD Tips- Difference between GD and Debate - Mock GD's and Debate - Practical session on GD.

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 speak-relation ships

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: Introduction – 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

Leadership Content Themes: Leader – Characteristics – Leader Vs. Manager – Leadership styles – Entrepreneur leadership style – Role of Women as leaders – Success stories of Leadership.

REFERENCE BOOKS:

1. Master the Group Discussion & Personal Interview by Sheetal Desarda, Notion Press
2. Leadership wisdom by Robin Sharma
3. Organizational Behavior, Stephen P. Robbins, Pearson Education
4. Principles of Management, Koonz, Weihrich and Aryasri, Tata McGraw Hill, 2004.