CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous)

ACADEMIC REGULATIONS FOR B. TECH. DEGREE COURSE
(Applicable for Students admitted from the academic year 2014-2015)

1. Award of B. Tech. degree

A student will be declared eligible for the award of the B. Tech. Degree if he/she fulfils the following academic regulations:

1.1. The student shall pursue a course of study for not less than four academic years and not more than eight academic years.

1.2. After eight academic years of course of study, a student may be permitted to write the examinations for two more years.

1.3. The student shall register for 224 credits and secure a minimum of 216 credits, with compulsory subjects as listed in Table-1. The candidate shall also complete the non-credit courses as per the syllabus.

Table-1

S. No.	Subject Particulars
1	All practical subjects
2	Mini project
3	Comprehensive Viva-Voce
4	Seminar
5	Project Work

1.4. The students, who fail to fulfill all the academic requirements for the award of the degree within ten academic years from the year of their admission, shall forfeit their seats in B. Tech. course.

2. Courses of study

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

Branch Code	Branch
01	Civil Engineering.
02	Electrical & Electronics Engineering
03	Mechanical Engineering
04	Electronics & Communication Engineering
05	Computer Science & Engineering.

2.1. Eligibility criteria for admission

The eligibility criteria for admission into engineering courses by regular and lateral entry scheme students shall be as stipulated by the state government from time to time.

2.2. Medium of instruction

The medium of instruction and examinations for all courses is English.

3. Distribution and weightage of marks

3.1. The performance of a student in each semester shall be evaluated subject – wise with **a** maximum of 100 marks for theory and 75 marks for practical subjects. In addition, an Industry oriented mini-project, Seminar, Comprehensive viva-voce, and Project Work shall be evaluated for 50, 50, 100 and 200 marks respectively.

3.3. For Theory subjects, during a semester there shall be two internal examinations. Each internal examination consists of one objective paper, one essay paper and one assignment. The objective type paper shall be for 10 marks, essay type paper shall be for 15 marks each with a total duration of 1 hour 20 minutes (20 minutes for objective and 60 minutes for essay paper). The objective paper is set with 10 short answer questions of one mark each. The essay paper shall contain 5 full questions (2 questions each from fully completed Units and 1 question from partially completed Unit) out of which, the student has to answer 3 questions, each carrying 5 marks. While the first internal examination shall be conducted from 1 to 2.5 units of the syllabus, the second internal examination shall be conducted on 2.5 to 5 units. Five (5) marks are allocated for Assignments (as specified by the subject teacher concerned). The first Assignment should be submitted before the conduct of the first internal examination and second Assignment should be submitted before the conduct of the second internal examination. The total marks secured by the student in each internal examination are evaluated for 30 marks. The final marks secured in internal evaluation by each candidate are arrived at by giving a weightage of 70% to the best secured internal examination and 30% weightage to the least secured internal examination. A student who is absent from any assignment/ internal examination for any reason what so ever shall be deemed to have secured 'zero' marks in the test/ examination and no makeup test/ examination shall be conducted.

3.4. For practical subjects there shall be a continuous evaluation during a semester for 25 sessional marks and 50 end semester examination marks. Out of 25 marks of internal evaluation, day-to-day work in the laboratory shall be evaluated for 15 marks and internal practical examination shall be evaluated for 10 marks conducted by the laboratory teacher concerned. The end semester examination shall be conducted with an external examiner and the laboratory teacher. The external examiner from other institutions or industry shall be appointed by the Controller of Examinations in consultation with Head of the Department.

3.5. For the subjects having design and / or drawing, (such as Engineering Graphics, AutoCAD, Engineering Drawing, Machine Drawing and Estimation etc.,) the internal evaluation carries 30 marks (the distribution is 15 marks for day-to-day work and 15 marks for internal examination) and 70 marks shall be for end semester examination. There shall be two internal examinations in a semester. The final marks secured by each candidate in the internal evaluation is arrived at by giving a weightage of 70% to the best secured internal examination and 30% weightage to the least secured internal examination.

3.6. There shall be a Mini-Project, to be taken up in the college of industry during the summer vacation after VI Semester examination. The mini project shall be evaluated during the VIII Semester. The mini project shall be submitted in a report form and should be presented before a committee, which shall be evaluated for 50 marks. The committee consists of Head of the Department, the supervisor of mini project, a senior faculty member of the department and an external examiner. There shall be no internal marks for Mini-project. The external examiner from other institutions or industry shall be appointed by the Controller of Examinations in consultation with Head of the Department.

3.7. There shall be a Seminar presentation in VIII Semester. For the Seminar, the student shall collect the information on a specialized topic other than the project topic and prepare a technical report and submit to the department. The presentation demonstrating understanding of the topic and technical report shall be evaluated by a Departmental committee consisting of the Head of the department, Seminar supervisor and a senior faculty member from the department. The seminar will be evaluated for 50 marks. There shall be no internal marks for the seminar.

3.8. There shall be a Comprehensive Viva-Voce in VIII Semester. The Comprehensive Viva-Voce will be conducted by a Committee consisting of the Head of the Department and three Senior Faculty members of the Department. The Comprehensive Viva-Voce is intended to assess the student's understanding in various subjects he studied during the B. Tech. course of study. The Comprehensive Viva-Voce is evaluated for 100 marks by the Committee. There shall be no internal marks for the Comprehensive Viva-Voce.

3.9. The **project work** shall be evaluated for 200 marks out of which 60 marks for internal evaluation and 140 marks for end-semester evaluation. The project work shall be taken up in the beginning of VIII semester and shall be completed by the end of VIII semester. Internal evaluation shall be conducted by Head of the Department and the project supervisor for 60 marks. The end semester examination shall be based on the report submitted and a viva-voce exam for 140 marks by committee comprising of the Head of the Department, project supervisor and an external examiner. The external examiner shall be appointed by the Controller of Examinations from a panel of three members submitted by the Head of the Department.

4. Semester end Examination

4.1. Theory Courses

The end semester examination will be conducted for 70 marks which consists of Part-A and Part-B. The examination is of 3 hours duration. Question paper pattern is as follows

Part-A: 20 Marks

There shall be 10 questions each carrying 2 Marks. (Two questions from each Unit)

Part-B: 50 Marks

There shall be 10 questions out of which 5 questions (Internal choice within a unit i.e. two

questions from each unit out of which one question from each unit to be answered) are to be answered, each question carry 10 marks.

4.2. Practical Courses

Each lab course is evaluated for 50 marks. The examination shall be conducted by the laboratory teacher. One examiner will be appointed by the Controller of Examinations from other institutions or industry in consultation with HOD.

4.3. Supplementary Examinations

The schedule for supplementary examinations shall be as notified by the institute from time to time.

5. Attendance Requirements

5.1. A student shall be eligible to appear for the Semester end examinations if he/she acquires a minimum of 75% of attendance in aggregate of all the subjects for Semester.

5.2. 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. A student will not be permitted to write the end examination and not promoted to the next Semester unless he satisfies the attendance requirement of the present semester, as applicable.

5.3.Shortage of Attendance **below 65% in aggregate** shall in **No case be condoned.**

5.4 Students whose shortage of attendance is not condoned in any Semester are not eligible to take their end semester examination of that semester.

5.5. A stipulated fee shall be payable towards condonation of shortage of attendance.

5.6. A student who is short of attendance in a semester may seek re-admission into that semester when offered next within 4 weeks from the date of the commencement of class work.

5.7. A student will be promoted to the next semester if he satisfies the attendance requirement of the present semester including the days of attendance in sports, games, NCC and NSS activities. The consideration of attendance in such activities is restricted to a maximum of 15 instructional days in a semester. Prior permission of the Head of the Department in writing shall be obtained by the students to avail the attendance from above mentioned activities.

6. Minimum Academic Requirements

The following academic requirements have to be satisfied in addition to the attendance requirement mentions in item No.5.

6.1 A student is deemed to have satisfied the minimum academic requirements if he has earned the credits allotted to each theory/ practical design/drawing subject/project and secures not less than 35% of marks in the end semester exam, and minimum 40% of marks in the sum total of the internal and end semester examinations. A student shall obtain 40% of the marks in case of external evaluation alone.

6.2 Promotion of the student from first year to second year is not based on the credits secured and is subject to meeting the attendance criterion as specified in item No. 5

6.3 A student shall be promoted from II year to III year only if he fulfills the academic requirement of 34 credits up to III semester from all the examinations, whether or not the

candidate takes the examination and secures prescribed minimum attendance in IV semester.

6.4 A Student shall be promoted from III year to IV year only if he fulfils the academic requirement of 56 credits up to V semester from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in VI semester.

6.5 A student shall register and put up minimum attendance in all 224 credits.

6.6. In addition to securing a minimum of 216 credits the student must complete the non credit courses. The non-credit courses awarded with a grade of satisfactory or not satisfactory based on meeting the minimum attendance requirement by the student.

6.7. Students who fail to earn a minimum of 216 credits as indicated in the course structure within ten academic years (8 year of study +2 years additionally for appearing for exams) from the year of their admission shall forfeit their seat in B. Tech. course and their admission stands cancelled.

7. Course pattern

7.1. The entire course of study is for four academic years and on semester pattern.

7.2. A student, eligible to appear for the end examination in a subject, but absent from it or has failed in the end semester examination, may write the exam in that subject during the period of supplementary exams.

7.3. When a student is detained for lack of credits/shortage of attendance, he may be re-admitted into the same semester when offered next. However, the academic regulations under which he was first admitted shall be applicable to him. After the revision of the regulations, the students of the previous batches will be given two chances for passing in their failed subjects, one supplementary and the other regular. If the students cannot clear the subjects in the given two chances, they shall be given equivalent subjects as per the revised regulations which they have to pass in order to obtain the required number of credits.

8. Award of Class:

After a 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 classes:

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

9. Minimum Instruction Days

9.1. The minimum instruction days for each semester shall be 90**.**

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

9.3. The decision of the Institute Academic Committee will be final in respect of equivalent subjects for those students who are transferred from other colleges. The procedure for permitting students to transfer from other colleges will be decided by the principal / Institute Academic Committee keeping the Government Rules in view.

10. Withholding of Results

If the student has not paid dues to College, or if any case of indiscipline is pending against him, the result of the candidate may be withheld and he will not be allowed into the next semester. The award of the degree will be withheld in such cases.

11. Transitory Regulations

11.1. Discontinued, detained, or failed candidates are eligible for readmission as and when next offered.

11.2. After the revision of the regulations, the students of the previous batches will be given two chances for passing in their failed subjects, one supplementary and the other regular. If the students cannot clear the subjects in the given two chances, they shall be given equivalent subjects as per the revised regulations which they have to pass in order to obtain the required number of credits.

11.3. In case of transferred students from other Universities, the credits shall be transferred to as per the academic regulations and course structure of the college.

12. General

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

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

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

12.4. The Academic Council 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 college.

12.5. The students seeking transfer to colleges affiliated to JNTUH from various other Universities/ Institutions have to pass the failed subjects which are equivalent to the subjects of college, and also pass the subjects of college which the candidates have not studied at the earlier Institution on their own without the right to sessional marks. Further, though the students have passed some of the subjects at the earlier institutions, if the same subjects are prescribed in different semesters of college, the candidates have to study those subjects in college even if they are repeated.

Academic Regulations R1 For B. Tech. (Lateral Entry Scheme)

Applicable for the students admitted into II year B. Tech (LES) from the Academic Year 2015-2016 and onwards

1 Eligibility for award of B. Tech. Degree (LES)

1.1. The LES candidates shall pursue a course of study for not less than three academic years and not more than six academic years.

1.2. After six academic years of course of study, a lateral entry student may be permitted to write the examinations for two more years.

1.3. The candidates shall register for 168 credits and secure a minimum of 160 credits from II to IV year B. Tech. Program (LES) for the award of B. Tech. Degree with compulsory subjects as listed in Table-1.

Table 1: Compulsory Subjects

S. No.	Subject Particulars
1	All practical subjects
2	Mini project
3	Comprehensive Viva- Voce
4	Seminar
5	Project work

1.4. The students, who fail to fulfil the requirement for the award of the degree in 8 consecutive academic years (6 years of study + 2 years only for appearing in the exams) from the year of admission, shall forfeit their seats.

1.5. The attendance regulations of B. Tech .(Regular) shall be applicable to B. Tech. (LES)

2. Promotion Rule

2.1. Promotion of the student from second year to third year is not based on the credits secured and is subject to meeting the attendance criterion as specified in item No. 1.5

2.2. A student shall be promoted from III year to IV year only if he fulfils the academic requirements of 34 credits up to V semester from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in VI semester.

3. Award of Class:

Method of awarding class shall be same that of the regular entry students.

4. All the other regulations as applicable to B. Tech. 4-year degree course (Regular) will hold good for B. Tech. (Lateral Entry Scheme)**.**

5. General

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

ii. The academic regulations should be read as a whole for the purpose of any interpretation.

iii. In the case of any discrepancy/ambiguity/doubt arises in the above rules and regulations, the decision of the College Academic Council shall be final.

iv. The College may change or amend any or all of the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students concerned with

effect from the dates notified by the College.

MALPRACTICES RULES
DISCIPLINARY ACTION FOR
IMPROPER CONDUCT IN EXAMINATIONS

	Nature of Malpractices/ Improper conduct	Punishment
1.(a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only.
(b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled.
3.	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the

		Remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all end semester examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.
4.	Smuggles the answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all end semester Examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks	Cancellation of the performance in that subject
6.	Refuses to obey the orders of the Chief Superintendent/Assistant– Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the college or organizes a walk out or instigates others **to** examination hall walk out, or threatens the officer- in-charge or any person on duty in or outside the examination hall of any injury**,** to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer- in-charge, or any person on duty in or	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates are also debarred and forfeit their

	outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.
9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	If the student belongs to the college, expulsion from the examination hall an cancellation of performance in that subject and all other subjects hall and all other subjects that candidate has already appeared including practical examinations and project work

		and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and a police case will be registered against them.
10.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for other remaining examinations of the subjects of that semester/year.
11.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the College Academic Committee for further action to award suitable punishment.	

Malpractices identified by squad or special invigilators

Punishments to the candidates as per the above guidelines.

Malpractice identified at Spot center during valuation

The following procedure is to be followed in case of malpractice cases detected during valuation, scrutiny etc. at spot center.

1) Malpractice is detected at the spot valuation. The case is to be referred to the malpractice committee. Malpractice committee will meet and discuss/question the candidate and based on the evidences, the committee will recommend suitable action on the candidate.
2) A notice is to be served to the candidate(s) involved through the Principal to his address and to the candidate(s) permanent address regarding the malpractice and seek explanations.
3) The involvement of staff who are in charge of conducting examinations, invigilators valuing examination papers and preparing / keeping records of documents relating to the examinations in such acts (inclusive of providing incorrect or misleading information) that infringe upon the

course of natural justice to one and all concerned at the examinations shall be viewed seriously and recommended for award of appropriate punishment after thorough enquiry.

4) Based on the explanation and recommendation of the committee, action may be initiated.
5) **Malpractice committee:**

i.	Controller of Examinations	Chairman
ii.	Assistant controller of Evaluation	Member
iii.	Chief Examiner of the subject/ subject Expert	Member
iv.	Concerned Head of the Department	Member
v.	Concerned Invigilator	Member

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous)

DEPARTMENT OF ECE

Institute Vision:

To be a premier academic institution striving continuously for excellence in technical education, research and technological service to the nation.

Institute Mission:

- Create and sustain a community of learning in which students acquire knowledge and learn to apply it professionally with a concern for the society.
- Pursue and disseminate research findings and offer knowledge-based technological services to satisfy the needs of society and the industry.
- Promote professional ethics, leadership qualities and social responsibilities.

Department Vision:

To produce globally competitive engineering graduates with social awareness and become centre of excellence through research in the areas of Electronics & Communication Engineering.

Department Mission:

- To impart quality education to the students in the domain of Electronics & Communication Engineering and related fields to make them globally competitive.
- To pursue research in Electronics & Communication Engineering and related disciplines in order to serve the needs of the society.
- Develop self-learning abilities and professional ethics to enable them to serve the society

Program Educational Objectives:

PEO 1: Excel in their professional career and higher education in & Electronics & Communication Engineering and related fields.

PEO 2: Exhibit leadership through professional ability and team work

PEO 3: Adapt to emerging trends for sustained growth in their relevant areas of Interest and exhibit social responsibility

Program Outcomes:

1. Ability to apply the knowledge of mathematics, science, engineering fundamentals for solution of complex engineering problems.
2. Ability to identify, formulate, research literature, and analyse complex engineering problems with appropriate considerations
3. Ability to design solution for complex engineering problems with appropriate consideration for society.
4. Ability to use research –based knowledge and research methods including design of experiments to provide valid conclusions.
5. Ability to learn and apply appropriate modern tools for engineering solutions
6. Ability to assess societal, health, safety, legal and cultural issues and the consequent responsibilities and follow them in professional practice
7. Ability to understand the impact of the professional practices on environment, society and its

sustainable development

8. Ability to apply ethical principles and commit to professional ethics in engineering practice
9. Ability to function on an inter- disciplinary team
10. Ability to communicate effectively
11. Ability to understand engineering and management principles and apply them to one's own work, as a member and leader in a team, to manage projects
12. Ability to engage in lifelong learning.

CMR COLLEGE OF ENGINEERING & TECHNOLOGY,
(AUTONOMOUS)
B. Tech (ECE)
Course Structure – R 14 Regulation

B. TECH(ECE)

I Semester							
Subject Code	**Subject**	**L**	**T**	**P**	**C**	**Internal Marks**	**External Marks**
A1001	English -I	2	0	0	2	30	70
A1006	Linear Algebra & Calculus	3	1	3	4	30	70
A1013	Engineering Physics -I	4	0	0	4	30	70
A1016	Engineering Chemistry	4	0	0	4	30	70
A1501	Computer Programming through 'C'	4	1	0	4	30	70
A1342	Engineering Drawing	4	0	3	4	30	70
A1542	Computer Programming Lab	0	0	3	2	25	50
A1015	Engineering Physics Lab	0	0	3	2	25	50
A1544	IT Workshop	0	0	3	2	25	50
	Total:	21	2	12	28	255	570

II Semester							
Subject Code	**Subject**	**L**	**T**	**P**	**C**	**Internal Marks**	**External Marks**
A1002	English-II	2	0	0	2	30	70
A1007	Advanced Calculus	4	1	0	4	30	70
A1008	Mathematical Methods	4	1	0	4	30	70
A1014	Engineering Physics -II	3	0	0	3	30	70
A1017	Advanced Engineering Chemistry	3	0	0	3	30	70
A1502	Data Structures through 'C'	4	1	0	4	30	70
A1543	Data Structures Lab	0	0	3	2	25	50
A1019	Engineering Chemistry Lab	0	0	3	2	25	50
A1003	English Language & Communication Skills Lab	0	0	3	2	25	50
A1303	Engineering Workshop	0	0	3	2	25	50
	Total:	20	3	12	**28**	280	620

III Semester							
Subject Code	**Subject**	**L**	**T**	**P**	**C**	**Internal Marks**	**External Marks**

A1009	Special Functions & Complex Analysis	4	1	0	4	30	70
A1206	Network Theory	4	0	0	4	30	70
A1401	Electronic Devices & Circuits	4	1	0	4	30	70
A1402	Signals & Systems	4	0	0	4	30	70
A1403	Probability Theory & Stochastic Process	4	1	0	4	30	70
A1404	Switching Theory & Logic Design	4	1	0	4	30	70
A1405	Electronic Devices & Circuits Lab	0	0	3	2	30	70
A1406	Basic Simulation Lab	0	0	3	2	25	50
A1005	Soft Skills and Professional Ethics	2	0	0	0	25	50
Total:		26	4	6	**28**	260	590

IV Semester							
Subject Code	**Subject**	**L**	**T**	**P**	**C**	**Internal Marks**	**External Marks**
A1020	Environmental Studies	4	0	0	4	30	70
A1213	Electrical Technology	4	1	0	4	30	70
A1407	Electronic Circuit Analysis	4	1	0	4	30	70
A1218	Control Systems	4	0	0	4	30	70
A1408	Electromagnetic Theory & Transmission Lines	4	1	0	4	30	70
A1409	Pulse & Digital Circuits	4	1	0	4	30	70
A1214	Electrical Technology Lab	0	0	3	2	25	50
A1410	Electronic Circuits & Pulse Circuits Lab	0	0	3	2	25	50
Total:		24	4	6	**28**	230	520

V Semester							
Subject Code	**Subject**	**L**	**T**	**P**	**C**	**Internal Marks**	**External Marks**
A1411	Microprocessors & Microcontrollers	4	1	0	4	30	70
A1540	Computer Organization and Operating Systems	4	0	0	4	30	70
A1412	Antenna & Wave Propagation	4	1	0	4	30	70
A1413	Analog Communications	4	1	0	4	30	70
A1414	Linear and Digital IC Applications	4	0	0	4	30	70

A1415	Digital Design Using Verilog HDL	4	0	0	4	30	70
A1416	IC Applications &HDL simulation Lab	0	0	3	2	25	50
A1417	Microprocessors & Microcontrollers lab	0	0	3	2	25	50
A1011	Analytical Skills-I	2	0	0	0	0	0
	Total:	26	3	6	**28**	230	520

VI Semester

Subject Code	**Subject**	**L**	**T**	**P**	**C**	**Internal Marks**	**External Marks**
A1021	Managerial Economics & Financial Analysis	4	0	0	4	30	70
A1510	Object Oriented programming through JAVA	4	1	0	4	30	70
A1418	Digital Communications	4	1	0	4	30	70
A1419	Microwave Engineering	4	1	0	4	30	70
A1420	Digital Signal Processing	4	1	0	4	30	70
	ELECTIVE –I	4	0	0	4	30	70
A1421	Embedded Systems Design						
A1509	Database Management System						
A1422	Telecommunication Switching Systems & Networks						
A1423	Communication Lab	0	0	3	2	25	50
A1424	Digital signal processing Lab	0	0	3	2	25	50
A1012	Analytical Skills-II	2	0	0	0	0	0
	Total:	26	5	6	28	230	520

VII Semester							
Subject Code	**Subject**	**L**	**T**	**P**	**C**	**Internal Marks**	**External Marks**
A1022	Management Science	4	0	0	4	30	70
A1425	VLSI Design	4	1	0	4	30	70
A1426	Electronic Measurements & Instrumentation	4	1	0	4	30	70
A1427	Digital Data Communications	4	0	0	4	30	70
A1506	Computer Networks	4	1	0	4	30	70
	ELECTIVE –II	4	0	0	4	30	70
A1428	Satellite Communications						
A1429	Optical Communications						

A1430	Digital Image Processing						
A1004	Advanced English Communication Skills Lab	0	0	3	2	25	50
A1431	VLSI Lab	0	0	3	2	25	50
	Total:	24	3	6	**28**	230	520

VIII Semester

Subject Code	**Subject**	**L**	**T**	**P**	**C**	**Internal Marks**	**External Marks**
A1432	Cellular & Mobile Communications	4	0	0	4	30	70
	ELECTIVE –III	4	0	0	4	30	70
A1433	Radar Systems						
A1541	Network Security						
A1434	Digital Signal Processors and Architectures						
	ELECTIVE –IV	4	0	0	4	30	70
A1435	Wireless Communications & Networks						
A1436	Bio -Medical Instrumentation						
A1437	EMI&EMC						
A1438	Seminar	0	0	3	2	50	0
A1439	Industry Oriented Mini Project	0	0	0	2	50	0
A1440	Comprehensive Viva-Voce	0	0	0	2	100	0
A1441	Main Project	0	12	0	10	60	140
	Total:	12	12	3	**28**	350	350

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
ENGLISH-I

CODE: A1001

L	T	P	C
2	0	0	2

GENERAL OBJECTIVES:

- To improve the language proficiency of the students in English with emphasis on **LSRW** skills.
- To equip the students to study academic subjects more effectively using the theoretical and practical components of the English syllabus.
- To develop the study skills and communication skills in formal and informal situations.

SKILLS-WISE OBJECTIVES:

Listening Skills:

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

Speaking Skills:

- To make students aware of the role of speaking in English and its contribution to their success.
- To enable students to express themselves fluently and appropriately in social and professional contexts.

Reading Skills:

- To develop an awareness in the students about the significance of silent reading and comprehension.
- To develop the ability of students to guess the meanings of words from context and grasp the overall message of the text, draw inferences etc.

Writing Skills :

- To develop an awareness in the students about writing as an exact and formal skill
- To equip them with the components of different forms of writing, beginning with paragraph writing.

Unit –I:

- Chapter entitled 'Wit and Humour' from 'Skills Annexe' -Functional English to Success Published by Orient Black Swan, Hyderabad. **A Tea Party**
  - L-Listening For Sounds, Stress and Intonation
  - S-Greeting and Taking Leave, Introducing Oneself and Others (Formal and Informal Situations)
  - R- Reading for Subject/ Theme
  - W- Writing Paragraphs
  - G-Types of Nouns and Pronouns
  - V- Homonyms, homophones synonyms, antonyms

Unit –II

- Chapter entitled 'Mokshagundam Visvesvaraya' from "Epitome of Wisdom", Published by Maruthi Publications, Hyderabad.
    - L-Conversations – Introducing each other, Talking about a course.
    - S- Opinion based questions
    - R- Reading for Subject/ Theme - The Palm island
    - W- Writing Paragraphs
    - G- Joining ideas by conjunctions, Adverbs
    - V- Prefixes and suffixes

Unit –III

- Chapter entitled "Cyber Age" from "Skills Annexe -Functional English for Success" Published by Orient Black Swan, Hyderabad.
    - L – Listening for themes and facts
    - S – Apologizing, interrupting, requesting and making polite conversation
    - R- for theme and gist
    - W- Describing people, places, objects, events
    - G- Verb forms
    - V- noun, verb, adjective and adverb

Unit –IV

- Chapter entitled 'Three days To See' from "Epitome of Wisdom", Published by Maruthi Publications, Hyderabad.
    - L – Conversations – Planning for an outing
    - S – Debate
    - R- 'Physically challenged athletes
    - W- Report writing
    - G- Expressing yourself with modal auxiliary verbs
    - V- Collective nouns – Synonyms, Prefixes

Unit –V

- Chapter entitled 'The Last Leaf' from "Epitome of Wisdom", Published by Maruthi Publications, Hyderabad
    - L -Listening for specific details - 'Speech on Environmental conservation'
    - S- Group Discussions - narrating, expressing opinions
    - R –Choose how to start your day
    - W- Writing a Précis
    - G- Relating objects by using prepositions, Ergative verbs
    - V- Vocabulary - idioms

Course outcomes:

By the end of the course students will be able to:

1. Realize why humour and wit are important in our daily lives and share their anecdotes
2. Read and appreciate how scientific inventions have transformed our lives.
3. Debate on the issue of preferring to serve their country or go abroad to serve foreign countries.

4. Write coherently about the role of visvesvaraya as a true patriot and as an excellent engineer in solving complex, social problems.
5. Apologize, interrupt, request and make polite conversation using appropriate language.

TEXTBOOKS PRESCRIBED:

In order to improve the proficiency of the student in the acquisition of the four skills mentioned above, the following text books and course content, ,are prescribed:

A Text book entitled **"Skills Annexe", -Functional English to Success** Published by Orient Black Swan, Hyderabad

A text book entitled, **"Epitome of Wisdom",** Published by Maruthi Publications, Hyderabad.

REFERENCES:

1. Contemporary English Grammar Structures and Composition by David Green, MacMillan Publishers, New Delhi. 2010.
2. Innovate with English: A Course in English for Engineering Students, edited by T Samson, Foundation Books.
3. English Grammar Practice, Raj N Bakshi, Orient Longman.
4. Technical Communication by Daniel Riordan. 2011. Cengage Publications. New Delhi.
5. Effective English, edited by E Suresh Kumar, A RamaKrishnaRao, P Sreehari, Published by Pearson
6. Handbook of English Grammar& Usage, Mark Lester and Larry Beason, Tata McGraw –Hill.
7. Spoken English, R.K. Bansal&JB Harrison, Orient Longman.
8. Technical Communication, Meenakshi Raman, Oxford University Press
9. Objective English Edgar Thorpe &Showick Thorpe, Pearson Education
10. Grammar Games, Renuvolcuri Mario, Cambridge University Press.
11. Murphy's English Grammar with CD, Murphy, Cambridge University Press.
12. Everyday Dialogues in English, Robert J. Dixson, Prentice Hall India Pvt Ltd.,
13. ABC of Common Errors Nigel D Turton, Mac Millan Publishers.
14. Basic Vocabulary Edgar Thorpe &Showick Thorpe, Pearson Education
15. Effective Technical Communication, M Ashraf Rizvi, Tata McGraw –Hill.
16. An Interactive Grammar of Modern English, Shivendra K. Verma and HemlathaNagarajan , Frank Bros & CO
17. A Communicative Grammar of English, Geoffrey Leech, Jan Svartvik, Pearson Education
18. Enrich your English, Thakur K B P Sinha, Vijay Nicole Imprints Pvt Ltd.,
19. A Grammar Book for You And I, C. Edward Good, MacMillan Publisher

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1006)LINEAR ALGEBRA & CALCULUS

I - SEMESTER

L	T	P	C
4	1	0	4

Objectives :

1. Obtain and understand formation and solution of matrices. Solutions of linear systems through matrices.
2. Learn to find Eigen values, Eigen vectors and usage of Cayley-Hamilton Theorem. Understanding real & complex matrices and reduction to Canonical form.
3. A through treatment of sequences and series.
4. Develop the skills pertinent to the practice of mathematics (including the students) to formulate problems. (A treatment of limits) including all standard theorems about continuous and differentiable functions. Define nano materials and their preparation along with applications.
5. Identify major characteristics of graphs and relate them to first and second derivatives. Find areas of bounded regions can be found using methods of integrations.

Unit-I: Linear Algebra-I

Matrices and Linear Systems of Equations: Real matrices :- Symmetric, Skew-symmetric, Orthogonal, Linear Transformation- Orthogonal Transformation. Complex matrices: Hermitian, Skew- Hermitian and Unitary. Elementary row transformations- Rank – Echelon form, Normal form- Solution of Linear Systems – Direct Methods (Gauss Elimination, Gauss Jordan)-LU-Decomposition.

Unit-II: Linear Algebra-II

Eigen Values, Eigen Vectors- Properties, Cayley –Hamilton Theorem (without proof) – Inverse and Powers of a matrix by cayley-Hamilton theorem- Diagonolization of matrix. Calculation of Powers of matrix-Modal and spectral matrices. Quadratic forms- Reduction of quadratic form to canonical form-rank- positive , Negative definite-semi definite-Index-Signature.

Unit-III: Sequences – Series

Basic definitions of Sequences and Series- Convergence and divergence – Comparison test- Ratio test – Integral test-Cauchy's root test- Raabe's Test – Absolute and Conditional Convergence .

Unit-IV: Functions of Single& Several Variables

Rolle's theorem –Lagrange's Mean value Theorem – Cauchy's Mean value theorem- Generalized Mean value theorem(all theorems without proof) Functions of Several Variables- Functional dependence –Jacobian- Maxima and Minima of functions of two variables with constraints and without constraints.

Unit-V: Applications of Single Variable & Multiple Integrals

Radius, Centre and Circle of Curvature- Evolutes and Envelopes.

Multiple integrals : Double integral – Change of variables – Change of order of integration and Triple integrals.

Outcomes :

1. The students be able to solve linear system by using various methods of matrices.

2. The students be able to find Eigen values, Eigen vectors and Diagonolization of a square matrix. Finding the nature of real and complex matrices by reducing to Canonical form.
3. The students be able to determine when a series converges both from definition and the Cauchy criterion. Be able to use the standard convergence tests for series to determine if a particular series convergence.
4. The students be able to verify mean value theorems and they can find maximum and minimum for multiple variable functions.
5. The students be able to calculate the volumes solid objects, the length of arcs and the surface area; perform polar-to-rectangular and rectangular-to-polar conversions.

Text Books :

1. Kreyszig's Engineering Mathematics – I by Dr. A. Ramakrishna Prasad,2014 yr Edition John Wiley Publications.
2. Advanced Engineering Mathematics by R.K. Jain &S.R.K. Iyengar, 3rd edition, Narosa Publishing House, Delhi.

References :

1. Advanced Engineering Mathematics by Kreyszig, 8th Edition, John Wiley & Sons Publishers
2. Higher Engineering Mathematics by B.S. Grewal, 36th Edition, Khanna Publishers.
3. Advanced Engineering Mathematics with MATLAB, Dean G. Duffy, 3rd Edi, CRC Press Taylor & Francis Group.
4. Mathematics for Engineering and Scientists. Alan Jeffrey, 6th Edi, 2013, Chapman & Hall / CRC
5. Engineering Mathematics – I by T.K.V. Iyengar, B. Krishna Gandhi & Others, 2013 Yr. EditionS.Chand.
6. Engineering Mathematics – I by D.S. Chandrasekhar, Prison Books Pvt. Ltd.
7. Engineering Mathematics – I by G. ShankerRao& Others I.K. International Publications.

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1013)ENGINEERING PHYSICS-I

I - SEMESTER

L	T	P	C
4	0	0	4

Objectives:

- To understand the phenomenon of interference, diffraction and polarization of light.
- To understand the bonding and structural properties of the crystals and their study using X-ray diffraction techniques.
- To understand the origin of different crystal defects and the basics of statistical mechanics.
- To understand the classical, quantum approach to explain the electrical properties of solids and also band theory of solids.
- To understand the properties of semi-conductors materials.

UNIT-I

Optics: Interference: Introduction, interference in thin films (reflected light), Newton rings.

Diffraction: Introduction, Fraunhofer diffraction due to single slit, double slit and N-slits, diffraction grating experiment, Rayleigh criterion and resolving power of grating.

Polarization: Introduction, Malus law, Brewster's law, double refraction, construction and working of Nicol's prism, Polaroid's, quarter wave and half wave plates.

UNIT-II

Crystallography: Ionic bond, covalent bond, metallic bond, hydrogen bond, Vander-Waal's bond, calculation of cohesive energy ionic crystal, space lattice, unit cell, lattice parameters, seven crystal system, Bravais lattices, atomic radius, co-ordination number and packing factors of SC, BCC, FCC structures, structures of CsCl, NaCl and diamond.

Crystal planes and directions, Miller indices, inter planar spacing of orthogonal crystal

X-ray Diffraction: Bragg's law, X- ray diffraction methods: powder method, applications of X- ray diffraction;

UNIT-III

Defects in Solids: Point defects: vacancies, substitution impurities, interstitial impurities, Frenkel and Schottky defects, qualitative treatment of line defects(edge and screw dislocations), Burger's vector, surface defects.

Statistical Mechanics: Maxwell- Boltzman, Bose-Einstein and Fermi-Dirac statistics (qualitative treatment), concept of electron gas, density of states, Fermi distribution function - the effect of temperature on the distribution and Fermi energy.

UNIT-IV

Principles of Quantum Mechanics: Waves and particles, de-Broglie hypothesis, matter waves, Davisson and Germer's experiment, G.P. Thomson experiment, Heisenberg's uncertainty principle, Schrödinger's time independent wave equation - physical significance of the wave function – infinite square well potential.

Band Theory of Solids: Assumptions of classical and quantum free electron theory of metals and their limitations, origin of energy band formation in solids, electron in a periodic potential: Bloch theorem, Kronig- Penny model (qualitative treatment), E-K curve, concept of effective mass of an electron, classification of materials into conductors, semiconductors & insulators.

UNIT-V

Semiconductor Physics: Introduction, Fermi level in intrinsic and extrinsic semiconductors, calculation of carrier concentration in intrinsic and extrinsic semiconductors, direct & indirect band gap semiconductors, Hall effect.

Physics of Semiconductor Devices: Formation of PN junction, open circuit PN junction, energy diagram of PN diode, diode equation, I-V Characteristics of PN junction diode, LED photo diode and solar cell.

Outcomes:

- The student able to understand the properties of light propagation and interaction of light with matter, such interference, diffraction and polarization of light.
- The student able to understand the different types of bonding in solids and how they are classified in to different crystal groups. He also understand the non-destructive testing methods using X rays
- The student able to classify the crystal defects on the basis of their geometry. They can also understand different statistical distribution methods.
- The student is able to explain why the classical theory and quantum theory failed to explain the electrical properties of solids and how the band theory overcomes these failures.
- The student is able to understand various properties of semi-conductors materials.

TEXT BOOKS:

1. Engineering Physics by PK PalaniSamy, SciTechPublications.
2. Applied Physics for Engineers by Dr.P.MadhusudanaRao, Academic Publishing Company.
3. Solid State Physics by S.O.Pillai (Main edition) – New Age Publishers.

REFERENCES:

1. Fundamentals of Physics, David Halliday, Robert Resnick, Jearl Walker by John Wiley & Sons
2. Introduction to Solid State Physics – C. Kittel (Wiley Eastern).
3. Modern Physics by K. Vijaya Kumar, S. Chandralingam, *S*. Chand & Co.
4. Engineering Physics by R.K.Gaur and S.L.Gupta; DhanpatRai and Sons.

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY

(AUTONOMOUS)

ENGINEERING CHEMISTRY

CODE: A1016	L	T	P	C
	4	0	0	4

Objectives:

- Knowledge of purification techniques and various applications of soft water in industries.
- Understand electrochemistry which deals with the utilization of electrical energy of an external source for bringing about a physical or chemical change.
- Knowledge of "Corrosion engineering education" and Usage of polymers in modern world as an integral part of every human's life.
- Provide practices for the prevention for corrosion
- The course provides a comprehensive survey of the concepts involved in the study of phase and chemical equilibrium.

UNIT I

WATER TECHNOLOGY (20)

Sources of water – Impurities in water – Hardness of water – Temporary and Permanent Hardness – Units. Estimation of temporary and permanent hardness of water – EDTA method; Numerical problems; Potable Water treatment – Specifications; Steps involved in treatment - Sedimentation – Coagulation – Filtration – Sterilisation – Desalination of Brackish Water – Reverse Osmosis and Electro dialysis.

Industrial water treatment – Boiler Troubles – Scales and Sludges ; Caustic Embrittlement; Boiler Corrosion; Priming and Foaming. Hot lime and Cold lime soda process ; Numerical Problems; Zeolite Process and Ion Exchange Process. Internal conditioning methods like – Phosphate, Carbonate ,Calgon, Colloidal, Radioactive, Electrical and Sodium aluminate conditioning.

UNIT II

BATTERY TECHNOLOGY (6)

Electrode Potential – Determination of Single Electrode Potential;galvanic cells; Primary Cell – Dry or Leclanche Cell,Daniel cell, Secondary Cell – Lead acid storage Cell ; Ni – Cd batteries, , Fuel Cell – Hydrogen Oxygen Fuel Cell. Methanol – Oxygen fuel cell.

UNIT III

CORROSION AND ITS CONTROL (8)

Causes and effects of corrosion. Theories of Corrosion – Chemical & Electrochemical corrosion; Types of corrosion (Galvanic, Waterline, Pitting and Inter granular); Pilling bed-worth Rule. Factors affecting rate of corrosion – Nature of metal and Nature of Environment – Corrosion control methods – Cathodic protection (sacrificial anodic and Impressed current).

UNIT IV

PROTECTIVE COATINGS (8)

Surface coatings: Metallic coatings & methods of application of metallic coating – Hot dipping (Galvanization & Tinning); Cementation, Metal Cladding; Electroplating (copper plating); Electroless plating (Ni Plating); Organic coatings – Paints – Constituents and their functions. Varnishes, Enamels& Lacquers.

UNIT V

PHASE RULE

Definitions of terms - Phase, Component and Degree of Freedom. Phase Rule Equation. Phase diagrams – One Component System – Water System; Two Component System – Silver Lead System; Cooling Curves. Iron – Carbon Phase Diagram; Heat treatment of steel. Hardening.Annealing, and Normalizing

Outcomes:

At the end of the course student will be able to

- Benefits of treated water as source in steam generation and other fields like production of steel, paper, textiles, atomic energy etc.
- Analyze& describe how electrochemical concepts can be used in various practical applications, like batteries ,fuel cells etc.
- Apply knowledge of corrosion science to problems in materials engineering.
- Prevention of corrosion of metals and applications of polymers from domestic articles to sophisticated scientific and medical instruments.
- Develop chip level alloys by applying phase rule.

Text Books;

1. Engineering chemistry by B.Rama Devi & Ch. VenkataRamana Reddy; Cengage Learning, 2012
2. Engineering Chemistry P.C.Jain and M.Jain, DhanapatRai& Sons
3. Engineering chemistry by Dr.Bharathikumari,Dr.Jyotsna
4. Engineering chemistry by Thirumalachary,E.Laxminyarana ,SCITECHPublicationa(India) p ltd

REFERENCES:

1. A Textbook of Engineering Chemistry, S.S.Dara, S.Chand& Co.

2. A Textbook of Engineering Chemistry, SashiChawla, DhanapathRai& Sons

3. Engineering Chemistry, B.K.Sharma Et al

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1501)COMPUTER PROGRAMMING THROUGH C

B.Tech I Sem

L	T	P	C
4	1	0	4

Objectives:

1. Understand computer basic's, algorithms, flowcharts and write simple 'C' programs, data types and operators and Console I/O functions.

2. Understand Decision making statements and loops.

3. Understand the concepts of functions and pointers.

4. Understand the concepts of strings and various string handling functions and Arrays.

5. Understand the concepts related to structures and able to differentiate between structure and union, Storing of large data using files.

UNIT – I

Introduction to Computers- Elements of computer processing, Hardware and software, Computing Environments, Computer Languages, SDLC ,Problem solving-algorithms , Pseudo code, and flowcharts.

Introduction to C Language- History, Structure of a C program, Simple C Program, Compilation process (program development).Identifiers, Data Types, Variables, Constants, Console I/O (printf, scanf), Operators – arithmetic, Relational, Logical, Conditional, Increment/decrement etc, Expressions, Precedence and Associativity, Expression Evaluation, Type conversions, pre-processor directives, Simple C Programming examples.

UNIT-II

Decision Statements and loops- Introduction, IF statement- (Simple IF Statement, the IF ELSE Statement, Nesting of IF ELSE Statement, The ELSE IF Ladder), Switch Statement, Repetition statements – (for, While, do-while), Jump statements, Simple C Programming examples.

UNIT-III

Functions: Defining functions, user defined functions, Standard functions, inter function communication, Passing arguments to functions, Returning values from functions, function calls, Reference arguments, Variables and storage classes, recursion- recursive functions, Limitations of recursion, example C programs, Command line arguments.

Pointers – Introduction (Basic Concepts), Pointers for inter function communication, pointers to pointers, compatibility, Dynamic Memory Allocation, programming applications, pointers to void, pointers to functions.

UNIT-IV

Arrays – Concepts, using arrays in C, inter function communication, array applications, two – dimensional arrays, multidimensional arrays, C program examples, Arrays and Pointers, Pointer Arithmetic and arrays, Passing an array to a function, array of pointers.

Strings – Concepts, C Strings, String Input / Output functions, arrays of strings, string manipulation functions, string / data conversion, C program examples.

UNIT-V

Structures and Union: Declaring and initializing a structure, Accessing the members of a structure, Nested structures, self referential structures, Array of structures, Using structures in functions, Pointers and structures, Declaring and initializing a union. Enumerated types, typedef, bit fields.

Files- Concept of a file, streams, text files and binary files, Differences between text and binary files, Modes 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, C program examples.

Text Books:

1. C programming A Problem-Solving Approach by Behrouz A.Forouzan, E.V.Prasad, Richard F. Gilberg C How to Program Paul Deitel and Harvey Deitel, PH.
2. Computer Programming and Data Structures by E Balagurusamy, Tata McGraw Hill.

Reference Books

1.Kanetkar Yashavant, Let Us C, BPB.
2.The C Programming Language by Brain W.Kernighan, Dennis M.Ritchie.
3. Programming in C, 2/e By Ashok Kamthane.
4. Absolute beginner's guide to C, Greg M. Perry, Edition 2, Publisher: Sams Pub., 1994.
5. Schaum's Outline of Programming with C by Byron S. Gottfried,1996

Electronic Materials, Websites

- http://en.wikiversity.org/wiki/Topic:C
- www.cprogramming.com

Outcomes:

1. Understand the algorithms, flowcharts implementation of simple 'C' programs, data types and operators and Console I/O functions.

2. Implement the decision control statements, loop control statements and case control statements.

3. Declare and implement the pointers and functions.

4. Declare and implement the arrays and strings.

5. Understand the structures declaration, initialization and implementation, understand the file operations, Character I/O, String I/O, File pointers and importance of pre-processor directives.

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1306)ENGINEERING DRAWING

I - SEMESTER

L	T	P	C
3	0	3	4

UNIT – I

Introduction To Engineering Drawing : Principles of Engineering Graphics and their Significance, Conic Sections including the Rectangular Hyperbola – General method only. Cycloid, Epicycloid and Hypocycloid, Involute.

Scales – Plain, Diagonal and Vernier Scales.

UNIT- II

Orthographic projections:

Principles of Orthographic Projections – Conventions – Projections of Points and Lines

UNIT – III

Projections of Planes: Plane Regular geometric figures -Auxiliary Planes.

UNIT – IV

Projections of Solids: Projection of regular solids, cube, prisms, pyramids, cone –use of Auxiliary Views.

UNIT – V

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

UNIT-VI

Transformation of Projections: Conversion of Isometric Views to Orthographic Views and Vice-versa – Conventions

TEXT BOOKS:

1. Engineering Drawing N.D. Bhatt / Charotar
2. Engineering Drawing and Graphics Rane and Shah/ Pearson Edu.

REFERENCE BOOKS:

1. A Text Book of Engineering Drawing / Dhawan R K / S. Chand
2. Engineering Graphics With Auto CAD / James D Bethune / Pearson Edu.
3. Engineering Graphics / K R Mohan / Dhanpat Rai.
4. Text book on Engineering Drawing / KL Narayana/ P Kannaih / Scitech

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1542)COMPUTER PROGRAMMING LAB

I Sem

L	T	P	C
0	0	3	2

Objectives:

1. To understand the various steps in program development.
2. To understand the basic concepts in C Programming Language.
3. To understand different modules that includes conditional and looping expressions.
4. To understand how to write modular and readable C Programs.
5. To write programs in C to solve problems using arrays, structures and files.

	WEEK WISE PROGRAMS
Week1	(a)Write a simple C program to Print "Hello World" (b) Write a simple C program Declaring Variable and Printing its Value (c) Write a simple C Program to Calculate Area and Circumference of Circle (d)Write a simple C program to implement basic arithmetic operations - sum, difference, product, quotient and remainder of given numbers.
Week 2	Write C programs to demonstrate the following operators (a) Assignment Operator. (b) Relational and Logical Operator. (c) Increment and decrement operator. (d) Bitwise operators. (e) Ternary operator.
Week3	(a) Write a C programs - to find the largest and smallest of 2 numbers(if – else), to find the largest and smallest of 3 numbers(Nested if – else), roots of quadratic equation(else – if ladder). (b)The total distance travelled by vehicle in't' seconds is given by distance=$ut+1/2at^2$ where 'u' and 'a' are the initial velocity and acceleration. Write a c program to find the distance travelled at regular intervals of time given the Values of 'u' and 'a'. The program should provide the flexibility to the user to select his own time intervals and repeat the calculations for different values of 'u' and 'a'. (c)Write a c program, which takes two integer operands and one operator from the user, performs the operation and the prints the result. (consider the operators +,-,*,/,% and use switch statement).
Week4	(a)Write a C program to find the sum of individual digits of a positive integer (b) 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 .Write a c program to generate the first n terms of the sequence. (c) Write a c program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
Week5	(a)Write a C program to read in two numbers, x and n, and then compute the sum of this geometric progression: $1+x+x^2+x^3+\ldots\ldots\ldots\ldots+x^n$

	(b) Write a C program to generate Pascal's triangle. (c) Write a C program to construct a pyramid of numbers
Week6	(a)Write a programs that use both recursive and non-recursive functions (i)To find the factorial of a given integer.(non- recursive) (ii)To find the GCD of two given integers.(Non-recursive)
Week7	(a)Write a c program to find both the largest and smallest number in a list of integers. (b)write a c program that uses functions to perform the following: (i)Addition of Two Matrices. (ii)Multiplication of Two Matrices.
Week8	(a) Write a c program that uses functions to perform the following operations: (i)To insert a sub-string in given main string from a given 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
Week9	(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 .
week10	Write a C program that uses functions to perform the following operations: i) Reading a complex number ii) Writing a complex number iii) Addition of two complex numbers iv) Multiplication of two complex numbers (Note: represent complex number using a structure.)
week11	(a)Write a C program which copies one file to another (b) Write a C program to reverse the first n characters in a file. (Note: The file name and n are specified on the command line).
week12	(a) Write a C programme to display the contents of a file. (b) Write a C programme to merge two files into a third file (i.e., the contents of the first file followed by those of the second are put in the third file)

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1015)ENGINEERING PHYSICS LAB

I - SEMESTER

L	T	P	C
0	0	3	2

Objectives:

- This course on Physics lab is designed with 16 experiments in a semester. It is common to all branches of engineering.
- The objective of the course is that the student will have exposure to various experimental skills which is very essential for an engineering student.
- The experiments are selected from various area of Physics like Physical Optics, Lasers, Fiber Optics, Sound,Mechanics, Electricity & Magnetism and Basic Electronics.
- Also the student is exposed to various tools like Screw gauge, Vernier Callipers, Physics Balance , Spectrometer and Microscope.

(Any ten experiments compulsory)

1. Determination of wavelength of a source – Diffraction Grating.
3. Newton's Rings - Radius of curvature of plano convex lens.
4. Melde's experiment – Transverse and longitudinal modes.
5. Time constant of an R-C circuit.
6. L-C-R circuit.
7. Magnetic field along the axis of current carrying coil – Stewart and Gees method.
8. Bending losses of fibres & Evaluation of numerical aperture of a given fibre.
9. Energy gap of a material of p-n junction.
10. Torsional pendulum.
11. Wavelength of light –Diffraction grating using laser.
12. Sonometer -AC power supply.
13. Characteristics of a LED.
14. Characteristics of a photodiode.
15. Characteristics of a solar cell.
16. Determination of velocity of ultrasonic waves.

Outcomes:

- The student is expected to learn from this laboratory course the concept of error and its analysis. It also allows the student to develop experimental skills to design new experiments in Engineering.

- With the exposure to these experiments the student can compare the theory and correlate with experiment.

LABORATORY MANUAL:

1. Laboratory Manual of Engineering Physics by Dr.Y.Aparna & Dr.K.VenkateswaraRao (V.G.S Publishers).

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1544) IT WORKSHOP

I - SEMESTER

L	T	P	C
0	0	3	2

Objectives:

- The IT Workshop for engineers is a training lab course spread over 42 hours. The modules include training on PC Hardware, Internet & World Wide Web and Productivity tools including Word, Excel and Power Point.

Outcomes:

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

Internet & World Wide Web module introduces the different ways of hooking the PC on to the internet from home and workplace and effectively usage of the internet. Usage of web browsers, email, newsgroups and discussion forums would be covered. In addition, awareness of cyber hygiene, i.e., protecting the personal computer from getting infected with the viruses, worms and other cyber attacks would be introduced.
Productivity tools module would enable the students in crafting professional word documents, excel spread sheets and power point presentations using the Microsoft suite of office tools and LaTeX. (**Recommended to use**

Microsoft office 2007 in place of MS Office 2003).

PC Hardware:

Week 1 – Task 1 : Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.

Week 2 – Task 2 : Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also students need to go through the video which shows the process of assembling a PC. A video would be given as part of the course content.

Week 3 – Task 3 : Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.

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

Week 5 – Task 5: Hardware Troubleshooting: Students have to be given a PC which does not boot due to improper assembly or defective peripherals. They should identify the problem and fix it to get the computer back to working condition. The work done should be verified by the instructor and followed up with a Viva
Internet & World Wide Web:

Week 6 - Task 1 : **Orientation & Connectivity Boot Camp :** Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate, to the instructor, how to access the websites and email. If there is no internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.

Task 2 : Web Browsers, Surfing the Web : Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.

Week 7 -Task 3: Cyber Hygiene: Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to first install antivirus software, configure their personal firewall and windows update on their computer. Then they need to customize their browsers to block pop ups, block active x downloads to avoid viruses and/or worms.

Productivity tools

LaTeX and Word:

Week 8 – Word Orientation: The mentor needs to give an overview of LaTeX and Microsoft (MS) office 2007/ equivalent (FOSS) tool word: Importance of LaTeX and MS office 2007/ equivalent (FOSS) tool Word as word Processors, Details of the three tasks and features that would be covered in each, using LaTeX and word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter.

Task 1 : Using LaTeX and Word to create project certificate. Features to be covered:-Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both LaTeX and Word.

Week 9 - Task 2: Creating project abstract Features to be covered:-Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.

Week 10 - Task 3 : Creating a Newsletter : Features to be covered:- Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs and Mail Merge in word.

Excel:

Week 11 - Excel Orientation: The mentor needs to tell the importance of MS office 2007/ equivalent (FOSS) tool Excel as a Spreadsheet tool, give the details of the two tasks and features that would be covered in each. Using Excel – Accessing, overview of toolbars, saving excel files, Using help and resources.

Task 1: Creating a Scheduler - Features to be covered:- Gridlines, Format Cells, Summation, auto fill, Formatting Text

Week 12 - Task 2 : Calculating GPA - .Features to be covered:- Cell Referencing, Formulae in excel – average, std. deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function, LOOKUP/VLOOKUP, Sorting, Conditional formatting

LaTeX and MS/equivalent (FOSS) tool Power Point:

Week 13 - Task1: Students will be working on basic power point utilities and tools which help them create basic power point presentation. Topic covered during this week includes :- PPT Orientation, Slide Layouts,

Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in both LaTeX and Power point.Students will be given model power point presentation which needs to be replicated (exactly how it's asked).

Week 14 - Task 2: Second week helps students in making their presentations interactive. Topic covered during this week includes: Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts

Task 3: Concentrating on the in and out of Microsoft power point and presentations in LaTeX. Helps them learn best practices in designing and preparing power point presentation. Topic covered during this week includes: - Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), Inserting – Background, textures, Design Templates, Hidden slides.

REFERENCE BOOKS:

1. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.LaTeX Companion – Leslie Lamport, PHI/Pearson.
3. Introduction to Computers, Peter Norton, 6/e McGraw Hill Publishers.
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.
7. PC Hardware and A+Handbook – Kate J. Chase PHI (Microsoft)

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1002)ENGLISH-II

II - SEMESTER

L	**T**	**P**	**C**
2	**0**	**0**	**2**

Objective:
The fundamental aim of this course is to help the student to become a confident and competent communicator in written and spoken English. The methodology in teaching and evaluation shall be oriented towards this end, rather than rote memorization.

Prerequisite: Acquaintance with basic High School Grammar and Composition

GENERAL OBJECTIVES :

To enable the students :

1. to listen critically for speaker's tone or attitude
2. to narrate, express opinions and participate in conversations
3. to read critically to draw inferences and gain comprehension
4. to write project proposals, technical reports formally

SKILLS-WISE OBJECTIVES :

Listening Skills:

- To enable students to develop their listening skill for main points and sub-points for note taking
- To equip students with necessary training in listening for specific details and information

Speaking Skills:

- To make students aware of the language required for giving instructions and directions
- To enable students to express themselves clearly in hypothetical situations
- To enable students to make presentations formally.

R***eading Skills:***

- To develop an awareness among the students about the significance of reading for reference and details
- To develop the ability of Reading for specific details and information

Writing Skills :

- To develop an awareness in the students about Report writing and Information Transfer
- To equip them with the components of Writing formal letters and CVs
- To enable them with different forms of writing like Project proposals, Technical reports, Project Reports and Research Papers.

SYLLABUS:

UNIT I

Chapter entitled '**Risk Management'** from "Skills Annexe -Functional English for Success" Published by Orient Black Swan, Hyderabad

- L – for main points and sub-points for note taking
- S – giving instructions and directions; Speaking of hypothetical situations
- R – reading for details
- W – note-making, information transfer, punctuation
- G – present tense
- V – synonyms and antonyms
- Report writing
- Information Transfer

UNIT –II

- Chapter entitled 'The Convocation Speech' by N.R. Narayanmurthy' from "Epitome of Wisdom", Published by Maruthi Publications, Hyderabad
  - L- Speech on 'How do you make a teacher great?'
  - S- Role play – Interviewing famous personalities
  - R- Critical reading, reading for reference – 'What is meant by Entrepreneurship?'
  - W-Essay writing
  - G- Focussing with passive voice
  - V- One word substitutes

UNIT –III

- Chapter entitled 'Leela's Friend' by R.K. Narayan from "Epitome of Wisdom", Published by Maruthi Publications, Hyderabad
  - L – for main points and sub-points for note taking
  - S – Presentations
  - R – reading for details
  - W – note-making, information transfer, punctuation
  - V – Guessing the words, using an appropriate word, Phrasal verbs

UNIT –IV

- Chapter entitled 'Human Values and Professional Ethics' from "Skills Annexe -Functional English for Success" Published by Orient Black Swan, Hyderabad
  - L -Listening for specific details and information
  - S- narrating, expressing opinions and telephone interactions

- R -Reading for specific details and information
- W- Writing formal letters and CVs
- G- Past and future tenses
- V- Vocabulary - idioms and Phrasal verbs

UNIT –V

- Chapter entitled 'Sports and Health' from "Skills Annexe -Functional English for Success" Published by Orient Black Swan, Hyderabad
  - L- Critical Listening and Listening for speaker's tone/ attitude
  - S- Group discussion and Making presentations
  - R- Critical reading, reading for reference
  - W-Project proposals; Technical reports, Project Reports and Research Papers
  - G- Adjectives, prepositions and concord
  - V- Collocations and Technical vocabulary Using words appropriately

Course outcomes:

By the end of the course students will be able to:

1. Develop ability to listen critically for information
2. Express opinions and participate in conversations confidently
3. Develop focused reading for details and information
4. Write project proposals, technical reports and CVs formally

TEXT BOOKS PRESCRIBED

In order to improve the language skills needed for professional students, the following textbooks and course content have been prescribed to expose the students to a variety of genres, themes and language styles.

A Text book entitled **"Skills Annexe", -Functional English to Success** Published by Orient Black Swan, Hyderabad

A text book entitled, **"Epitome of Wisdom",** Published by Maruthi Publications, Hyderabad.

The course content and study material are divided into Five Units.

REFERENCES:

20. Contemporary English Grammar Structures and Composition by David Green, MacMillan Publishers, New Delhi. 2010.
21. Innovate with English: A Course in English for Engineering Students, edited by T Samson, Foundation Books.
22. English Grammar Practice, Raj N Bakshi, Orient Longman.
23. Technical Communication by Daniel Riordan. 2011. Cengage Publications. New Delhi.
24. Effective English, edited by E Suresh Kumar, A RamaKrishnaRao, P Sreehari, Published by Pearson
25. Handbook of English Grammar& Usage, Mark Lester and Larry Beason, Tata McGraw –Hill.
26. Spoken English, R.K. Bansal&JB Harrison, Orient Longman.
27. Technical Communication, Meenakshi Raman, Oxford University Press
28. Objective English Edgar Thorpe &Showick Thorpe, Pearson Education
29. Grammar Games, Renuvolcuri Mario, Cambridge University Press.

30. Murphy's English Grammar with CD, Murphy, Cambridge University Press.
31. Everyday Dialogues in English, Robert J. Dixson, Prentice Hall India Pvt Ltd.,
32. ABC of Common Errors Nigel D Turton, Mac Millan Publishers.
33. Basic Vocabulary Edgar Thorpe &Showick Thorpe, Pearson Education

34. Effective Technical Communication, M Ashraf Rizvi, Tata McGraw –Hill.
35. An Interactive Grammar of Modern English, Shivendra K. Verma and HemlathaNagarajan , Frank Bros & CO
36. A Communicative Grammar of English, Geoffrey Leech, Jan Svartvik, Pearson Education
37. Enrich your English, Thakur K B P Sinha, Vijay Nicole Imprints Pvt Ltd.,
38. A Grammar Book for You And I, C. Edward Good, MacMillan Publisher

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1007)ADVANCED CALCULUS

II - SEMESTER

L	T	P	C
4	1	0	4

Objectives:

1. Solve Differential Equations of first order using various methods and their applications.
2. Solve Differential Equations of multiple orders using various methods and their applications.
3. Possible to transform from one form another form by using Laplace Transforms(Used in Signals and systems).
4. In the diverse fields like electrical circuits, electronic communication, mechanical vibration and structural engineering, periodic functions naturally occur and hence their properties are very much required. Indeed, any periodic and non-periodic function.
5. Choose coordinate systems (polar, spherical, cylindrical, rectangular) appropriate to a given problem.

Unit-I: Differential equations of first order and their applications

Over view of Differential equations – exact, Linear and Bernoulli's. Applications to Newton's Law of cooling, Law of Natural growth and decay, Orthogonal trajectories.

Unit-II: Higher order Linear differential equations and their applications

Linear differential equations of second and higher order with constant coefficients.RHS term of the type $f(x) = e^{ax}, \sin ax, \cos axandx^n, e^{ax}V(x), x^nV(x),$ method of variation of parameters. Applications to bending of beams, Electrical circuits, Simple harmonic motion.

Unit-III: Laplace Transform and its applications to Ordinary Differential Equations

Laplace transform of standard functions – Inverse transform- First Shifting theorem, Transforms of derivatives and integrals – Unit step function – Second Shifting theorem – Dirac's delta function- Convolution theorem – Periodic function – Differentiation and integration of transforms – Application of Laplace transforms to ordinary differential equations.

Unit-IV: Fourier Series

Determination of Fourier coefficients – Fourier Series – even and odd function – Fourier Series in an arbitrary interval – even and odd periodic continuation – Half-range Fourier sine and cosine expansions.

Unit-V: Vector Calculus

Vector Differential Calculus: Scalar & vector point functions, Gradient – Divergence – Curl with geometrical & Physical interpretation. Directional derivatives, Vector differential operators &their related properties.

Vector Integral Calculus: Line integral – Work done – scalar potential function, surface integrals – Flux of Vector valued function, Volume integrals.

Vector integral theorems: Gauss's Divergence theorem, Green's theorem, Stoke's Theorem (Statement and their verification).

Outcomes:

1. The students be able understand the formation and evaluation of different differential equations by various methods.
2. The students be able to analyze certain physical problems (tank flow, mechanical and electrical vibration),set up their determining differential equations, solve them using the techniques to answer questions about the physical system.
3. The students be able to solve linear, simultaneous equations to analyze voltages and currents in AC to DC (phase) circuits. Determine the average power dissipated in a circuit. Calculate voltages and currents in single phase circuit.
4. The students be able to find the expansion of a given function by Fourier series and Fourier Transform of the function.

5. The students be able to evaluate multiple integrals (line, surface, volume integrals) and convert line integrals to area integrals and surface integrals to volume integrals.

Text Books :

1. Kreyszig's Engineering Mathematics – I by Dr. A. Ramakrishna Prasad, 2014yr Edition John Wiley Publications.
2. Advanced Engineering Mathematics by R.K. Jain &S.R.K. Iyengar, 3rd edition, Narosa Publishing House, Delhi.

References :

1. Differential Equations with Applications & Historical Notes by George F Simmons, 2ndEdi ,Tata Mc.graw Hill Publishing Co Ltd.
2. Kreyszig's Mathematical Methods by Dr. A. Ramakrishna Prasad, 1st Edition John Wiley Publications.
3. Advanced Engineering Mathematics by Kreyszig, 8th Edition, John Wiley & Sons Publishers
4. Higher Engineering Mathematics by B.S. Grewal, 36th Edition, Khanna Publishers.
5. Advanced Engineering Mathematics with MATLAB, Dean G. Duffy, 3rd Edi, CRC Press Taylor & Francis Group.
6. Mathematics for Engineering and Scientists. Alan Jeffrey, 6th Edi, 2013, Chapman & Hall / CRC
7. Engineering Mathematics – I by T.K.V. Iyengar, B. Krishna Gandhi & Others, 2012 Yr. Edition S.Chand.
8. Engineering Mathematics – I by D.S. Chandrasekhar, Prison Books Pvt. Ltd.
9. Engineering Mathematics – I by G. ShankerRao& Others I.K. International Publications.

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1008)MATHEMATICAL METHODS

II - SEMESTER

L	P	T	C
4	1	0	4

Objectives:

1. Obtain an intuitive and working understanding of some Mathematical Methods for the basic problems of numerical analysis.
2. Develop some experience in the implementation of numerical methods in engineering applications by using a computer.
3. Solutions of Ordinary Differential Equations using numerical methods.
4. The aim at forming a partial differential equation (PDE) for a function with many variables and their solution methods. Two important methods for first order PDE's are learnt. While separation of variables technique is learnt for typical second order PDE's such as Wave, Heat and Laplace equations.
5. Evaluate the Fourier transform of a continuous function, and be familiar with its basic properties.

Unit–I: Solutions of Linear & Non-Linear equations : Introduction to Algebraic and Transcendental Equations, Bisection Method, Method of False Position (Regula – False Method), Iteration Method, Newton – Raphson's Method, Errors in Polynomial.Gauss Jacobi's iterative method, Gauss-Seidel Method.

Unit–II: Interpolation& Curve fitting: Forward , Backward & Central Differences, Symbolic Relations, Newton's Forward & Backward Interpolation, Gauss's Forward & Backward Interpolation, Lagrange's Interpolation & Problems.

Fitting straight line, Fitting Non-Linear curve, Curve fitting by sum of Exponentials, Non-Linear Weighted least squares approximation.

Unit–III: Numerical Differentiation, Integrations & Solutions of ODE : Numerical Differentiation, Derivatives using forward & backward difference formula, Derivatives using central difference formula, Trapezoidal Rule, Simpson's 1/3 Rule,3/8 Rule.

Introduction to Numerical solutions of ODE, Taylor's series method, Picard's method of Successive Approximations, Euler's method, Euler's Modified method, Runga-Kutta method , Predictor and Corrector method, Milne's Predictor and Corrector method, Adams-Moulton method.

Unit– IV: Partial differential equations:

Introduction and Formation of partial differential equation by elimination of arbitrary constants and arbitrary functions solutions of first order linear (Lagrange) equation and non-linear equations (Charpit's method).Method of separation of variables for second order equations – applications of Partial differential equations – Two dimensional wave equation, Heat equation.

Unit–V: Fourier transforms & Z-transforms

Fourier integral theorem – Fourier sine and cosine integrals. Fourier transforms – Fourier sine and cosine transforms – properties – Inverse transforms – Finite Fourier transforms.

Z-transforms, inverse Z-transforms, properties, Damping rule, shifting rule, initial and final value theorems, convolution theorem, solution of difference equations by Z-transforms.

Outcomes:

1. The students be able to compute root of nonlinear equations by using different types of numerical methods.
2. The students be able to familiar with different kinds of techniques for interpolating data
3. The students be able to solve ODE Initial Value Problems using Euler's , Taylor's, Picard's & R-K methods,
4. The students be able to differential equation for an unknown function with many independent variables and to find their solution. Most of the problems in physical and engineering applications, problems are highly non-linear and hence expressing them as PDEs'. Hence understanding the nature of the equation and finding a suitable solution is very much essential.
5. The students be able to evaluate the Fourier transform of a continuous function, and be familiar with its basic properties.

Text Books :

1. Kreyszig's Mathematical Methods by Dr. A. Ramakrishna Prasad, 2014 yr Edition John Wiley Publications.

2. Advanced Engineering Mathematics by R.K. Jain &S.R.K. Iyengar, 3rd edition, Narosa Publishing House, Delhi.

References :

1. Advanced Engineering Mathematics by Kreyszig, 8th Edition, John Wiley & Sons Publishers
2. Higher Engineering Mathematics by B.S. Grewal, 36th Edition, Khanna Publishers.
3. Advanced Engineering Mathematics with MATLAB, Dean G. Duffy, 3rd Edi, CRC Press Taylor & Francis Group.
4. Mathematics for Engineering and Scientists. Alan Jeffrey, 6th Edi, 2013, Chapman & Hall / CRC
5. Introductory Methods of Numerical Analysis , S.S.Sastry, 4h Edition, Prentce Hall of India Pvt. Ltd.
6. Mathematical Methods by T.K.V. Iyengar, B. Krishna Gandhi & Others, 2013 Yr. Edition S.Chand.
7. Mathematical Methodsby D.S. Chandrasekhar, Prison Books Pvt. Ltd.
8. Mathematical Methods by G. ShankerRao& Others I.K. International Publications.

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1014)ENGINEERING PHYSICS-II

II - SEMESTER

L	T	P	C
3	0	0	3

Objectives:

- To understand the introductory level the concept of optical coherence, lasers and optical fibercharacteristics.
- To understand the basic principles of dielectric properties of solids.
- To understand the physical principles underlying the magnetic and super conducting properties of solids.
- To understand the fundamental concepts ofelectromagnetic fields and laws governing them.
- To understand the basic principles of nanotechnology, ultrasonics and acoustics of buildings.

UNIT-I

Lasers: Characteristics of lasers, spontaneous and stimulated emission of radiation, Einstein's coefficients and relation between them, population inversion, lasing action in ruby laser, helium-neon laser, semiconductor diode laser, applications of lasers.

Fiber Optics: Principle of optical fiber, construction of fiber, acceptance angle and acceptance cone, numerical aperture, types of optical fibers: step index and graded index profiles, attenuation in optical fibers, optical fiber communication, optical fiber sensors.

UNIT-II

Dielectric Properties: Electric dipole, dipole moment, dielectric constant, polarizability, electric susceptibility, displacement vector, electronic, ionic, orientation and space charge polarizations and derivation of polarizabilities, internal fields in solids, Clausius - Mossottiequation, piezo-electricity, ferro- electricity and pyro-electricity.

UNIT-III

Magnetic Properties & Superconducting Properties: Permeability, field intensity, magnetic field induction, magnetization, magnetic susceptibility, origin of magnetic moment, Bohr magneton, classification of dia, para and ferro, ferri and anti-ferro magnetic materials on the basis of magnetic moment, domain theory of ferro magnetism on the basis of hysteresis curve, soft and hard magnetic materials.

Superconductivity: Introduction, critical field, Meissner effect, effect of magnetic field, type-I and type-II superconductors, BCS theory (qualitative), applications of superconductors.

UNIT-IV

Electromagnetic Theory: Review of steady and varying fields,conduction and displacement current, Maxwell's equations in integral and differential forms, Electromagnetic wave equations in free space, dielectric and conducting media, Poynting theorem.

UNIT-V

Nanotechnology: Origin of nanotechnology, nano scale, surface to volume ratio, quantum confinement, bottom-up fabrication: sol-gel, precipitation, combustion methods; top-down fabrication: chemical vapour deposition, physical vapour deposition, pulsed laser vapour deposition methods, characterization by XRD & TEM, properties and applications.

Acoustics: Basic requirements of acoustically good hall,reverberation and time of reverberation, Sabine's formula for reverberation time, measurement of absorption coefficient of a material, factors affecting the architectural acoustics and their remedies.

Ultrasonics: Introduction, production of ultrasonics using piezoelectric method –magnetostriction method- applications.

Outcomes:

- The student able to understand to understand the principle, construction, characteristics of laser and their applications in optical fiber communication
- The student able to understand the various polarization processesin solids and classify different dielectric materials.
- The student able to classify the magnetic materials in to various classes depending upon their magnetic moment. They are also able to understand the basics principles of superconductivity.
- The student is able to understand of Maxwell's equations and be able to manipulate and apply them to EM problems.
- The student is able to understand how the properties of the material changes on nano scale. He can also understand the characteristics and production of ultrasonic. He will learn the basic requirements of a hall for good acoustics.

TEXT BOOKS:

1. Engineering Physics by P K PalaniSamy, ScitechPublications.
2. Applied Physics for Engineers by Dr.P.MadhusudanaRao, Academic Publishing Company.
3. Solid State Physics by S.O.Pillai (Main edition) – New Age Publishers.

REFERENCES:

1. Fundamentals of Physics, David Halliday, Robert Resnick, Jearl Walker by John Wiley & Sons
2. Introduction to Solid State Physics – C. Kittel (Wiley Eastern).
3.Modern Physics by K. Vijaya Kumar, S. Chandralingam: S. Chand & Co.
4. Engineering Physics by R.K.Gaur and S.L.Gupta; DhanpatRai and Sons.

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1017) ADVANCED ENGINEERING CHEMISTRY

II - SEMESTER

L	T	P	C
3	0	0	3

Objectives:

- Understand electrochemistry which deals with the utilization of electrical energy of an external source for bringing about a physical or chemical change.
- To give the students a basic understanding on polymers. The peculiar properties of the macromolecules are emphasized
- Understanding the significance of various Engineering materials like cement abrasives, adhesives and composites in structural enhancement of materials.
- A sustainable energy supply, is needed for promoting economic development as well as protecting the environment.
- To provide an overview of Industrial applications of surface chemistry.

UNIT I:

ELECTROCHEMISTRY

Electrochemistry- Conductance- Specific, Equivalent and Molar conductance and their units. Applications of Conductance (conductometric titration). Kohlrausch's law of Independent Migration of Ions, Concept of P^H and P^{OH}, Buffer solutions, Arrehenius Ionic Theory.

Galvanic cells, Types of Electrodes (Calomel, Quinhydrone and Glass Electrode); Nernst Equation and its applications; Concept of concentration cells; Electro chemical series, Potentiometric titrations, Determination of P^H using glass electrode – Numerical problems.

UNIT II: HIGH POLYMERS

polymers: Types of polymerization (addition, condensation and copolymerization) .

Plastics: Thermoplastic and Thermosetting resins, Compounding and fabrication of plastics (compression and injection moulding). Preparation, properties, Engineering applications of PVC, Teflon and Bakelite.

Fibers: Characteristics of fibers – preparation, properties and uses of Nylon – 6,6 and Dacron – Fibre Reinforced Plastics (FRP) – applications.

Rubbers: Natural rubber and its vulcanization.

Elastomers : Buna – s, Butyl rubber and Thiokol rubber.

Conducting Polymers: Polyacetylene, Polyaniline, Mechanism of conduction doping, applications of conducting polymers.

Bio-degradable Polymers: Preparation and applications of Polyvinyl acetate and Polylactic acid.

UNIT III :

MATERIAL CHEMISTRY

Nanomaterials: Introduction, preparation by sol-gel and chemical vapour deposition methods, Carbon nanofibres, Nano gold particles and fullerenes; Applications of nanomaterials.

Superconductors, Semiconductors, Insulators and its applications.

Glass: Manufacture of Glass; Types of glass – Hard glass, Soft glass and Pyrex glass.

Refractories – Classification, properties, Characteristics of a good refractory material and its applications.

UNIT IV :

ENERGY SOURCES

Fuels– Classification.

Solid fuels; Coal – analysis of coal – proximate and ultimate analysis and their significance.

Liquid fuels – Petroleum and its refining, Cracking, Types- fixed bed catalytic cracking; Knocking – octane and cetane rating; Synthetic petrol, Bergius and Fischer Tropsch process;

Gaseous fuels- constituents, characteristics and applications of natural gas, LPG and CNG. Analysis of flue gas by Orsat's apparatus – Numerical problems.

Combustion – Definition, calorific value of fuel – HCV, LCV, Determination of calorific value by Junker's gas calorimeter – theoretical calculation of calorific value by Dulong's formula – Numerical problems on combustion.

UNIT V :

SURFACE CHEMISTRY

Adsorption – Types of Adsorption, Isotherms – Freundlich and Langmuir adsorption isotherm, applications of adsorption.

Colloids: Classification of colloids; Mechanical – Brownian movement. Electrical – Electrophoresis, Electro-osmosis. Iso electric point.Optical – Tyndall effect.Micelles. Applications of colloids in industry.

Outcomes:

At the end of the course student will be able to

- Visualize the chemical applications of electricity.
- Understand why polymers are different than simple molecules, what are the basic kinds of polymers, their chemical structures and physical properties, the well-known techniques in polymer synthesis, the chemistry of polymer synthesis and the different types of mechanisms employed in polymer synthesis.
- The applicability and greater efficiency of using materials at different engineering fields, Understand the manufacturing process of cement, its properties and usage of abrasives, adhesives and composites in various industrial processes.
- Acquire knowledge of the types of fuels, their sources and purification techniques.
- Able to describe what kind of interactions may occur on the surface of adsorbent, Industrial applications of surface chemistry.

Text Books:

1. Engineering chemistry by B.Rama Devi & Ch. VenkataRamana Reddy; Cengage Learning, 2012
2. Engineering Chemistry P.C.Jain and M.Jain, DhanapatRai& Sons
3. Engineering chemistry by Dr.Bharathikumari,Dr.Jyotsna
4. Engineering chemistry by Thirumalachary,E.Laxminyarana ,SCITECHPublicationa(India) p ltd

REFERENCES:

1. A Textbook of Engineering Chemistry, S.S.Dara, S.Chand& Co.
2. A Textbook of Engineering Chemistry, SashiChawla, DhanapathRai& Sons
3. Engineering Chemistry, B.K.Sharma Et al

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1502)DATA STRUCTURES THROUGH C

II Semister

L	T	P	C
4	1	0	4

UNIT-I

Linear Data Structures - Introduction to Data Structures, Abstract data types, Strategies for choosing the appropriate data structure, Introduction to Linear and Non-Linear Data Structures.

Singly linked list- Operations, insertion, deletion, Concatenating singly linked lists, circular linked list- operations for Circular Linked lists. Doubly linked list- Operations- insertion, deletion, Representations of single, two dimensional arrays (RMO & CMO).

UNIT-II

Stack ADT: Definition, operations, array and linked representations of stacks, Applications: Infix to postfix conversion, postfix expression evaluation, Recursion implementation, Towers of Hanoi problem.

UNIT-III

Queue ADT: Definition & Operations, Array and linked implementation in C , Circular Queues- Insertion and deletion operations. Deque(Double ended queue)ADT- Array and linked implementation in C. Applications of Queues- Priority queues,

UNIT-IV

Non-Linear Data Structures

Trees- Terminology, Representation of Trees **,** Binary Tree ADT, Properties of Binary Trees ,Binary Tree Representations-Array and Linked Representation. Binary Search Tree, Binary Tree Traversals.

Graphs – Introduction, Definitions, Terminology Graph ADT Graph Representations-Adjacency Matrix, Adjacency Lists. Graph traversals-DFS and BFS.

UNIT-V

Searching and Sorting: Linear Search, Binary Search, Bubble Sort, Selection Sort, Insertion Sort, Quick Sort, Merge Sort, Performance analysis of Searching and Sorting techniques using Asymptotic notations. Comparison of sorting methods.

Text Books:

1. Yedidyah Langsam, Moshe J. Augenstein and Aaron M. Tenenbaum, Data Structures using C and C++. 2 ed, Pearson Education.
2. C Programming& Data Structures, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning.
3.Fundamentals of Data Structures in C,2nd Edition,E.Horowitz,S.Sahani and Susan.

Reference Books:

1. C Programming & Data Structures, E. Balagurusamy, TMH.
2. C& Data structures – P. Padmanabham, Third Edition, B.S. Publications.
3. Mark Allen Weiss, Data structures and Algorithm Analysis in C. Addison Wesley Publication.

Electronic Materials, Websites:

1. https://www.youtube.com/user/mycodeschool
2. http://freevideolectures.com/Course/2279/Data-Structures-And-Algorithms

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1543)DATA STRUCTURES LAB

II Semister

L	T	P	C
0	0	3	2

Objectives:

1. To understand the basic concepts such as Abstract Data Types, Linear and Non Linear Data Structures.
2. To understand the behaviour of data structures such as stacks, queues.
3. To write and execute programs in C to solve problems using Data Structures such as arrays, Linked Lists, Trees and Graphs.
4. To write and execute programs in C to implement various Sorting and Searching methods.

	WEEK WISE PROGRAMS
Week1	Write a C program that uses functions to perform the following (i)Creating a Singly linked list of integers (ii)Delete a given integer from above linked list. (iii)Display the contents of the above list after deletion
Week2	Write a C program that uses functions to perform the following (i)Creating a Doubly linked list of integers (ii)Delete a given integer from above linked list. (iii)Display the contents of the above list after deletion
Week 3	Write C programs to implement Stack ADT using (i)Array (ii)Linked List
Week4	Write C programs to implement Queue ADT using (i)Array (ii)Linked List
Week5	Write a C program that uses stack operations to convert a given infix expression in to its postfix equivalent.(Implement the Stack using Array)
Week6	Write a C program to implement double ended queue ADT using (i)Array and (ii) Doubly linked list respectively.
Week7	Write a C program that uses functions to perform the following

	(i)Create a Binary Search Tree of Integers (ii)Traverse above binary search tree recursively in Pre- Order Post -Order, In-Order
Week8	Write a C program that uses functions to perform the following (i)Create a Binary Search Tree of Integers (ii)Traverse above binary search tree non-recursively in In- Order.
Week9	Write C programs for implementing the following Sorting methods for sorting a given list of integers in ascending order. (i)Bubble Sort (ii)Quick Sort(iii) Insertion Sort
Week10	Write C programs for implementing the following Sorting methods for sorting a given list of integers in ascending order. (i) Selection Sort (ii) Merge Sort
Week 11	(a)Write a C program for implementing the Depth First Search graph traversal algorithm using (i) recursion (ii) without recursion. (b) Write a C program for implementing the Breadth First Search graph traversal algorithm using queues.
Week12	Write C programs for implementing the following Search methods (i)Linear Search (ii) Binary Search

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1019)ENGINEERING CHEMISTRY LAB

II - SEMESTER

L	T	P	C
0	0	3	2

Course objectives

- Estimation of hardness of water is essential for drinking water and in industries to avoid boiler troubles.
- Knowledge of instrumentation in conductometer,potentiometer,calorimeter and p^H meter.
- Knowledge of preparation of aspirin and Thiokol rubber
- Knowledge of physical properties of chemical compounds
- To gain the knowledge on existing devices,materials .

I Inorganic chemistry experiments by Analytical methods.

Water Analysis:

1.Estimation of Hardness of water by EDTA method

2. Estimation of Alkalinity of water.

II.Instrumentation.

3.Estimation of Copper by colorimetric Method.

4.Conductometric Titration of a strong acid vs a strong base

5.Potentiometric Titration of a strong acid vs a strong base

III.Identification and preparation of organic compounds

6.Preparation of ASPIRIN

7.Preparation of Thiokol Rubber

IV.Physical chemistry experiments

8.Determination of Viscosity of a Liquid.

9.Determination of Surface Tension of a liquid.

10.Adsorption of acetic acid on activated charcoal

11.Determination of melting point and Boiling point of given solids and liquids

V.Cement Analysis

12.Determination of Ferric iron in cement by Colorimetry

Course outcomes:

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

- To understand the extent of hardness range present in water sample and its consequences if used for various industrial operations
- Able to prepare drugs like aspirin and polymers like Thiokol rubber
- Able to determine the strength of solutions ,p^H of various solutions
- Able to determine the viscosity and surface tension of liquids
- Able to perform conductometric and potentiometric titrations
- Have a knowledge on the principles of adsorption phenomenon.

REFERENCES:

1. Engineering chemistry by B. Rama Devi & Ch. VenkataRamana Reddy; Cengage Learning, 2012
2. A Textbook of Engineering Chemistry, SashiChawla, DhanapathRai& Sons Engineering Chemistry, B.K.Sharma Et al

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1003)ENGLISH LANGUAGE COMMUNICATION SKILLS LAB
II - SEMESTER

L	T	P	C
0	0	3	2

Introduction:

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

Objectives:

- To facilitate computer-aided multi-media instruction enabling individualized and independent language learning
- To sensitize the students to the nuances of English speech sounds, word accent, intonation and rhythm
- To bring about a consistent accent and intelligibility in their pronunciation of English by providing an opportunity for practice in speaking
- To improve the fluency in spoken English and neutralize mother tongue influence
- To train students to use language appropriately for interviews, group discussion and public speaking

Syllabus:

English Language Communication Skills Lab shall have **two** parts:

a. Computer Assisted Language Learning (CALL) Lab

b. Interactive Communication Skills (ICS) Lab

The following course content is prescribed for the English Language Communication Skills Lab

Exercise – I

- **CALL Lab**: Introduction to Phonetics – Speech Sounds – Vowels and Consonants
- **ICS Lab**: Ice-Breaking activity and JAM session Articles, Prepositions, Word formation- Prefixes & Suffixes, Synonyms & Antonyms

Exercise – II

- **CALL Lab:** Structure of Syllables - Past Tense Marker and Plural Marker – Weak Forms and Strong Forms - Consonant Clusters.
- **ICS Lab:** Situational Dialogues – Role-Play- Expressions in Various Situations – Self-introduction and Introducing Others – Greetings – Apologies – Requests – Social and Professional Etiquette - Telephone Etiquette. Concord (Subject in agreement with verb) and Words often miss pelt- confused/misused

Exercise – III

- **CALL Lab**: Minimal Pairs- Word accent and Stress Shifts- Listening Comprehension.
- **ICS Lab**: Descriptions- Narrations- Giving Directions and guidelines. Sequence of Tenses, Question Tags and One word substitutes.

Exercise – IV

- **CALL Lab**: Intonation and Common errors in Pronunciation.
- **ICS Lab**: Extempore- Public Speaking Active and Passive Voice, –Common Errors in English, Idioms and Phrases

Exercise – V

- **CALL Lab**: Neutralization of Mother Tongue Influence and Conversation Practice
- **ICS Lab**: Information Transfer- Oral Presentation Skills Reading Comprehension.

Learning Outcomes:

By the end of the course students will develop :

1. Better Understanding of nuances of language through audio- visual experience and group activities
2. Neutralization of accent for intelligibility
3. Speaking ability with clarity and confidence to enhance their employability skills.

Minimum Requirement of infra structural facilities for ELCS Lab:

1. Computer Assisted Language Learning (CALL) Lab: The Computer aided Language Lab for 40 students with 40 systems, one master console, LAN facility and English language software for self- study by learners. R13 B.Tech I year syllabus System Requirement (Hardware component): Computer network with Lan with minimum 60 multimedia systems with the following specifications: i) P – IV Processor a) Speed – 2.8 GHZ b) RAM – 512 MB Minimum c) Hard Disk – 80 GB ii) Headphones of High quality
2.
3. Interactive Communication Skills (ICS) Lab: The Interactive Communication Skills Lab: A Spacious room with movable chairs and audio-visual aids with a Public Address System, a T. V., a digital stereo –audio & video system and camcorder etc.

DISTRIBUTION AND WEIGHTING OF MARKS

English Language Laboratory Practical Examination:

1. The practical examinations for the English Language Laboratory shall be conducted as per the University norms prescribed for the core engineering practical sessions.
2. For the Language lab sessions, there shall be a continuous evaluation during the year for **25** sessional marks
3. and **50** year-end Examination marks. Of the **25** marks, **15** marks shall be awarded for day-to-day work and **10** marks to be awarded by conducting Internal Lab Test(s). The year- end Examination shall be conducted by the teacher concerned with the help of another member of the staff of the same department of the same institution.

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1303) ENGINEERING WORKSHOP

II - SEMESTER

L	T	P	C
0	0	3	2

I. TRADE FOR EXERCISE:

(Two experiments each from any six trades of the following)

1. Carpentry
2. Fitting
3. Tin-smithy
4. House-wiring
5. Foundry
6. Plumbing
7. Welding
8. Black smithy

II TRADES FOR DEMONSTRATION AND EXPOSURE:

1. Power tools
2. Machine tools

Text Book: Workshop Manual, Second edition/ P Kannaiah and K L Narayana/ Scitech publishers

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1009)SPECIAL FUNCTIONS & COMPLEX ANALYSIS

III - SEMESTER

L	T	P	C
4	1	0	4

Objectives: To learn

- Series solutions for Legendre and Bessel differential equations, analyzing the properties of Legendre and Bessel polynomials**.**
- Evaluation of improper integrals using Beta, Gamma functions
- Differentiation and Integration of Complex valued functions
- Evaluation of integrals using Cauchy's integral formula.
- Taylor's series , Maclaurin's series and Laurent's series expansions of complex functions
- Evaluation of integrals using residue theorem
- Transform a given function from z-plane to w-plane
- Identify the transformations like translation magnification,rotation and reflection and inversion
- Properties of bilinear transformations

Unit–I: SPECIAL FUNCTIONS: Gamma and Beta Functions – Their properties – evaluation of improper integrals. Bessel's functions – properties – Recurrence relations – Orthogonality.Legendre's polynomials – Properties – Rodrigue's formula – Recurrence relations – Orthogonality.

Unit–II: FUNCTIONS OF COMPLEX VARIABLES: Continuity – Differentiability – Analyticity – Properties – Cauchy- Riemann conditions, Maxima – Minima Principle, Harmonic and conjugate harmonic functions – Milne – Thompson method. Elementary functions, general power of Z principal value Logarithmic function.

Unit–III: COMPLXINTEGRATION& COMPLEX POWER SERIES :

Line integral – evaluation along a path and by indefinite integration – Cauchy's integral theorem – Cauchy's integral formula – Generalized integral formula.

COMPLEX POWER SERIES: Radius of convergence – Expansion in Taylor's series, Maclaurin's series and Laurent series. Singular point – Isolated singular point – pole of order m – essential singularity. (Distinction between and real analyticity and complex analyticity)

Unit–IV: CONTOUR INTEGRATION & CONFORMAL MAPPING :

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

(a) Improper real integrals $\int_{-\infty}^{\infty} f(x)\,dx$ (b) $\int_{0}^{2\pi} f(\cos\theta, \sin\theta)\,d\theta$

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

CONFORMAL MAPPING : Transformation by $e^z, \operatorname{Im} z, z^2, z^n, \sin z, \cos z, z + a/z$. Translation, Rotation, inversion and bilinear transformation – fixed point – cross ratio – properties – invariance of circle and cross ratio – determination of bilinear transformation mapping 3 given points.

Unit–V: ELEMENTARY GRAPH THEORY: Graphs, Representation by matrices Adjacent matrix – Incident matrix – Simple, Multiple, Regular, complete, Bipartite& Planar graphs – Hamiltonian and Eulerian Circuits – Trees Spanning tree – minimum spanning tree.

Text Books :

1. Advanced Engineering Mathematics by R.K. Jain &S.R.K. Iyengar, 3rd edition, Narosa Publishing House, Delhi.
2. Complex variables and applicationsbyJames Ward Brown, Ruel V Churchill – 8th Edition McGraw Hill.

References :

1. Higher Engineering Mathematics by B.S. Grewal, 36th Edition, Khanna Publishers.
2. Engineering Mathematics – III by T. K. V. Iyengar, B.Krishna Gandhi and others, 2014 YrEdition S. Chand.
3. Engineering Mathematics – III by P.B. BhaskaraRao, S.K.V.S. Rama Chary, M. BhujangaRao& others.
4. Engineering Mathematics – III by C. Shankaraiah, V.G. S. Book Links.
5. Advanced Engineering Mathematics by Allen Jaffrey. 1st Edition, Academic Press.

Outcome: After going through this course the student will be able to:

- Identify Bessel equation and Legendre equation and solve them under special conditions with the help of series solutions method. Also recurrence relations and orthogonality properties of Bessel and Legendre polynomials. Evaluation of improper integrals using Beta and Gamma functions

- Analyze the complex functions with reference to their analyticity, integration using Cauchy's integral theorem

- Find the Taylor's and Laurent series expansion of complex functions
- The conformal transformations of complex functions can be dealt with ease
- Various graphs and trees can be analyzed

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1206) NETWORK THEORY

III - SEMESTER

L	T	P	C
4	0	0	4

Objective

This course introduces the basic concepts of circuit analysis which is the foundation for all the subjects of the Electrical Engineering discipline. The emphasis of this course is laid on the basic analysis of circuits which includes single phase circuits, magnetic circuits, theorems and network topology, concepts of transient analysis of the circuits and basic two port network parameters

UNIT – I INTRODUCTION TO ELECTRICAL CIRCUITS

Circuit Concept – R-L-C parameters – Voltage and Current sources – Independent and dependent sources-Source transformation – Voltage – Current relationship for passive elements – Kirchhoff's laws – network reduction techniques – series, parallel, series parallel, star-to-delta or delta-to-star transformation, Mesh analysis, Nodal analysis.

UNIT – II A.C CIRCUITS

R.M.S and Average values and form factor for different periodic wave forms, Steady state analysis of R, L and C (in series, parallel and series parallel combinations) with sinusoidal excitation-

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

Concept of self and mutual inductances- co-efficient of coupling series circuit analysis with mutual inductance. Resonance – series, parallel circuits, concept of band width and Q factor

UNIT –III NETWORK THEOREMS

Tellegens, Superposition, Reciprocity, Thevenin's, Norton's. Max Power Transfer theorem.Milliman's Theorem-Statement and proofs problem solving using dependent and independent sources for d.c and a.c excitation.

UNIT –IV TWO PORT NETWORKS

Z,Y ABCD,h-parameters – Conversion of one parameter to another parameter –condition for reciprocity and symmetry - 2 port network connections in series ,parallel and cascaded –problem solving.

UNIT –V TRANSIENT ANALYSIS

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

TEXT BOOKS:

1. Electrical circuits by A.Chakarborthy, Dhanpath Rai & Co.,
2. Network Analysis – N.C. Jagan and C.Lakshminarayana, B.S Publications, 2006.

REFERENCES:

1. Engineering Circuit Analysis – William Hayt and Jack E Kemmerly, McGraw Hill, 5th Edition, 1993.
2. Electric Circuits – J.Edminister and M.Nahvi – Schaum's Outlines, TMH, 1999.
3. Electric Circuits- – ME Van Valkenburg, Prentice Hall of India, 3rd Edition, 2000
4. Networks, Lines and Fields – JD Ryder, PHI, 2nd Edition, 2009.

COURSE OUTCOME:

1. Able to know the circuit elements , Kirchoff's Laws & network reduction techniques
2. Able to understand AC fundamentals of single & three phase circuits , principles of magnetic circuits
3. Able to identify when and how to use network reduction techniques with the help of theorems for AC & DC excitations
4. Acquire the knowledge of two port networks , its parameters & connections
5. Able to analyze the transient response for different series circuits with DC & sinusoidal excitations and its solutions with Laplace transforms.

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1401) ELECTRONIC DEVICES & CIRCUITS

III - SEMESTER

L	T	P	C
4	1	0	4

OBJECTIVES:
This is a fundamental course, basic knowledge of which is required by all the circuit branch engineers. This course focuses:

- To familiarize the student with the principle of operation, analysis and design of junction diode, BJT and FET transistors and amplifier circuits.
- To understand diode as rectifier.
- To study basic principle of filter circuits and various types.

UNIT-I:
P-N Junction Diode: Qualitative Theory of P-N junction, P-N junction as a Diode, Diode Equation, Volt-Ampere Characteristics, Temperature dependence of V-I characteristics, Ideal versus Practical- Resistance levels (Static and Dynamic). Transition and Diffusion Capacitances, Diode Equivalent Circuits, Load Line Analysis, Breakdown Mechanisms in Semiconductor Diodes, Zener Diode Characteristics.

Special Purpose Electronic Devices: Principle of Operation and Characteristics of Tunnel Diode (with the help of Energy Band Diagram) , Varactor Diode, SCR and Semiconductor Photo Diode.

UNIT- II:
Rectifiers and Filters: The P-N junction as a Rectifier, Half wave Rectifier, Full wave Rectifier, Bridge Rectifier, Harmonic components in a Rectifier Circuit, Inductor Filters, Capacitor Filters, L- Section Filters, P- Section Filters, Comparison of Filters, Voltage Regulation using Zener diode.

UNIT –III:
Bipolar Junction Transistor and UJT : The Junction Transistor, , Transistor Current Components, , Transistor as an Amplifier, transistor Construction, BJT Operation, symbol, Common base, Common Emitter and Common Collector Configurations, Limits of operation, BJT Specifications, BJT Hybrid model , Determination of H parameters from Transistor characteristics, Comparison of CB, CE, and CC amplifiers configurations, UJT and Characteristics.

UNIT- IV:
Transistor Biasing and Stabilization: Operating Point, The DC and AC Load lines, Need for Biasing, Fixed Bias, Collector to base bias Feedback, Voltage Divider Bias, Bias Stability, Stabilization Factors, Stabilization against variations in V_{BE} and β, Bias Compensation using Diodes and Transistors, Thermal Runaway, Thermal Stability, Analysis of a transistor amplifier circuit using h- parameters.

UNIT- V:
Field Effect Transistor and FET Amplifiers
Field Effect Transistor: The Junction Field Effect Transistor (Construction, principle of operation, Symbol)-Pinch-off Voltage-Volt-Ampere characteristics, The JFET small signal model, MOSFET (Construction, principle of operation, Symbol), MOSFET Characteristics in Enhancement and Depletion modes.

FET Amplifiers: FET Common Source Amplifier, Common Drain Amplifier, Generalized FET Amplifier, Biasing of FET, FET as Voltage Variable Resistor, Comparison of BJT and FET.

TEXT BOOKS:

1. Millman's Electronic Devices & Circuits-J. Millman, C.C. Halkais & Satyabrata Jit, 2 Ed., 1998, TMH.
2. Electronic Devices & Circuits- Mohammad Rashid, Cengage Learning, 2013
3. Electronic Devices & Circuits- David A. Bell, 5 Ed, Oxford

REFERENCE BOOKS:

1. Integrated Electronics- J. Millman and Christos C. Halkais, 1991 Ed., 2008, TMH.
2. Electronic Devices and Circuits- R.L. Boylstad and Louis Nashelsky, 9 Ed., 2006, PEI/PHI
3. Electronic Devices and Circuits- B. P. Singh, Rekha Singh, Pearson, 2 Ed, 2013.
4. Electronic Devices and Circuits- K. Lal Kishore, 2 Ed., 2005, BSP.
5. Electronic Devices and Circuits- Anil K. Maini, Varsha Agarwal, 1 Ed., 2009, Wiley India Pvt Ltd.
6. Electronic Devices and Circuits- S. Salivahanan, N. Suresh Kumar, A. Vallavaraj, 2 ed., 2008, TMH.

Course outcomes:

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

- Understand and analyze the different types of diode, operation and its characteristics.
- Design and analyze the DC bias circuitry of BJT and FET.
- Design biasing circuits using diode and transistors.
- To analyze and design diode application circuits, amplifier circuits and oscillators employing BJT, FET devices.

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1402) SIGNALS & SYSTEMS

III - SEMESTER

L	T	P	C
4	0	0	4

OBJECTIVES:
This is a core subject, basic knowledge of which is required by all the engineers.

This course focuses on:
To get an in depth knowledge about signals, systems and analysis of the same using various transforms

UNIT-I : SIGNAL ANALYSIS AND FOURIER SERIES:
Signal Analysis: Introduction, classification of signals, elementary signals, basic operation of signals. Analogy between vectors and signals, Orthogonal signal space, Signal approximation using orthogonal functions, Mean square error, Closed or complete set of orthogonal functions, Orthogonality in complex functions,

FOURIER SERIES: Representation of Fourier series, Continuous time periodic signals, properties of Fourier series, Dirichlet's conditions, Trigonometric Fourier series and Exponential Fourier series, Complex Fourier spectrum

UNIT-II : FOURIER TRANSFORMS AND SAMPLING
FOURIER TRANSFORMS: Deriving Fourier transform from Fourier series, Fourier transform of arbitrary signal, Fourier transform of standard signals, Fourier transform of periodic signals, properties of Fourier transforms, Fourier transforms involving impulse function and Signum function. Introduction to Hilbert Transform.

SAMPLING : Sampling theorem – Graphical and analytical proof for Band Limited Signals, Types of sampling- impulse sampling, Natural and Flat top Sampling, Reconstruction of signal from its samples, effect of under sampling – Aliasing, Introduction to Band Pass sampling.

UNIT-III : SIGNAL TRANSMISSION THROUGH LINEAR SYSTEMS
Linear system, impulse response, Response of a linear system, Linear time invariant (LTI) system, Linear time variant (LTV) system, Transfer function of a LTI system. Filter characteristics of linear systems. Distortion less transmission through a system, Signal bandwidth, system bandwidth, Ideal LPF, HPF and BPF characteristics, Causality and Paley-Wiener criterion for physical realization, relationship between bandwidth and rise time.

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

UNIT-V : LAPLACE TRANSFORMS AND Z-TRANSFORMS

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

Z–TRANSFORMS : Fundamental difference between continuous and discrete time signals, Concept of Z-Transform of a discrete sequence. Distinction between Laplace, Fourier and Z transforms. Region of convergence in Z-Transform, constraints on ROC for various classes of signals, Inverse Z-transform, properties of Z-transforms.

TEXT BOOKS :

1. Signals, Systems & Communications - B.P. Lathi, BS Publications, 2003.
2. Signals and Systems - A.V. Oppenheim, A.S. Willsky and S.H. Nawab, PHI, 2nd Edn.

REFERENCES :

1. Signals & Systems - Simon Haykin and Van Veen,Wiley, 2nd Edition.
2.. Fundamentals of Signals and Systems Michel J. Robert, MGH International Edition, 2008.
3. Signals, Systems and Transforms - C. L. Philips, J.M.Parr and Eve A.Riskin, Pearson education.3rd Edition, 2004.
4.Signals and signals- Iyer and K.Satya Prasad, Cengage Learning.
5.Signals and Systems – A. Rama Krishna Rao-2008,TMH
6. Introduction to Signal and System Analysis-K.Gopalan 2009, Cengage Learning.

COURSE OUTCOMES:

Upon completing this course the student will be able to

- Represent any arbitrary signals in terms of complete sets of orthogonal functions and understand the principles of impulse functions, step function and signum function
- Express periodic signals interms of fourier series and express the spectrum and express the arbitrary signals(discrete) as fourier transform to draw the spectrum
- Understands the principle of linear system, filter characteristics of a system and its bandwidth, the concepts of auto correlation and cross correlation and power density spectrum
- Can design a system for sampling a signal
- For a given system, response can be obtained using laplace transform, properties and ROC of LT
- Study the continuous and discrete signal relation and relation between F.T, L.T& Z.T properties, ROC of Z-Transform

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1403) PROBABILITY THEORY & RANDOM PROCESSES

III - SEMESTER

L	T	P	C
4	1	0	4

OBJECTIVES:

The primary objective of this course is

- To provide mathematical background and sufficient experience so that the student can read, write and understand sentences in the language of probability theory, as well as solve probabilistic problems in signal processing and communication engineering
- To introduce students to the basic methodology of probabilistic thinking and to apply it to problems
- To understand basic concepts of probability theory and random variables, how to deal with multiple random variables, conditional probability and conditional expectation, joint distribution and independence, mean square estimation
- To understand the difference between time averages and statistical averages
- Analysis of random process and application to the signal processing in the communication system
- To teach students how to apply sums and integrals to compute probabilities, means and expectations

UNIT I : PROBABILITY AND RANDOM VARIABLES

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, Independent Events

THE RANDOM VARIABLE : Definition of a Random Variable, Conditions for a Function to be a Random Variable, Discrete and Continuous and Mixed Random Variables.

UNIT-II : DISTRIBUTION AND DENSITY FUNCTIONS AND OPERATION ON ONE RANDOM VARIABLE-EXPECTATONS.

DISTRIBUTION AND DENSITY FUNCTIONS: Distribution and Density functions and their Properties, Binomial, Poisson, Uniform, Gaussian, Exponential, Rayleigh and Conditional Distribution, Methods of defining Conditioning Event, Conditional Density, Properties.

OPERATION ON ONE RANDOM VARIABLE EXPECTATIONS : Introduction, Expected Value of a Random Variable, Function of a Random Variable, Moments about the Origin, Central Moments, Variance and Skew, chebyshev's inequality, Characteristic Function, Moment Generating Function, Transformations of a Random Variable: Monotonic Transformations for a Continuous Random Variable, Nonmonotonic Transformations of Continuous Random Variable, Transformation of a Discrete Random Variable.

UNIT-III : MULTIPLE RANDOM VARIABLES AND OPERATIONS

MULTIPLE RANDOM VARIABLES: Vector Random Variables, Joint Distribution Function, Properties of Joint Distribution, Marginal Distribution Functions, Conditional Distribution and Density Point Conditioning, Conditional Distribution and Density Interval conditioning, Statistical Independence, Sum of

Two Random Variables, Sum of Several Random Variables, Central Limit Theorem, (Proof not expected). Unequal Distribution, Equal Distributions.

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 case, N Random Variable case, Properties, Transformations of Multiple Random Variables, Linear Transformations of Gaussian Random Variables.

UNIT-IV : STOCHASTIC PROCESSES-TEMPORAL CHARACTERISTICS

The Stochastic process, concept, Classification of Processes, Deterministic and Nondeterministic Processes, Distribution and Density Functions, concept of Stationarity and 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 and its properties,Linear system response of mean and mean-squared value, Autocorrelation function, Cross-correlation functions, Gaussian Random Processes, Poisson Random Process.

UNIT-V : STOCHASTIC PROCESSES-SPECTRAL CHARACTERISTICS

The Power Spectrum: Properties, Relationship between Power Spectrum and Autocorrelation Function, the Cross-Power Density Spectrum, Properties, Relationship between Cross-Power Spectrum and Cross-Correlation Function.

Spectral Characteristics of System Response: Power Density spectrum of response, Cross-Power Spectral Density of Input and Output of a linear system.

TEXT BOOKS :

1. Probability, Random Variables & Random Signal Principles - Peyton Z. Peebles, TMH, 4th Edition, 2001.
2. Principles of communication systems H Taub, Donald L Schilling, Goutham Saha 2007 TMH

REFERENCES :

1. Probability, Random Variables and Stochastic Processes - Athanasios Papoulis and S. Unnikrishna Pillai, PHI, 4th Edition, 2002.
2. Theory of probability and stochastic Processes- Pradeep kumar Ghosh
3. Probability and Random Processes with application to signal processing -Henry stark and john w woods 3ed PE
4. Probability Methods of signal and system analysis - George r cooper clave d mc giflem 3ed 1999 oxford.
5. Statistical theory of communication - sp Eugene Xavier 1997 new age publications.

COURSE OUTCOMES:

Upon completion of the subject students will be able to compute

- Simple probabilities using an appropriate sample space
- Simple probabilities and expectation from probability density functions(pdfs)
- Likelihood ratio tests from pdfs for statistical engineering problems
- Least-square and maximum likelihood estimator for engineering problems
- Mean and covariance functions for simple random processes.

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1404) SWITCHING THEORY & LOGIC DESIGN

III - SEMESTER

L	T	P	C
4	1	0	4

COURSE OBJECTIVES:

This course provides in-depth knowledge of switching theory and the design techniques of Digital Circuits, which is the basis for design of any digital circuit. The main objectives are:

- To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.
- To understand common forms of number representation in digital electronic circuits and to be able to convert between different representations.
- To implement simple logical operation using combinational logic circuits.
- To design combinational logic circuits, sequential logic circuits.
- To impart to student the concepts of sequential circuits, enabling them to analyze sequential systems in terms of state machines.
- To implement synchronous state machines using Flip-Flops.

UNIT I: NUMBER SYSTEM AND BOOLEAN ALGEBRA AND SWITCHING FUNCTIONS

Number Systems, Base Conversion Methods, Complements of numbers, Codes – binary codes, Binary Coded Decimal code and its properties, UNIT Distance Codes, Alpha Numeric Codes, Error Detecting and Correcting Codes.

Boolean Algebra: Basic theorems and properties - Switching Functions, Canonical and Standard forms-Algebraic simplification Digital Logic Gates, Properties of XOR gates &Universal gates-Multilevel NAND/NOR realizations.

UNIT-II : MINIMIZATION AND DESIGN OF COMBINATIONAL CIRCUITS:

Introduction, The Minimization with Theorem, The Karnaugh Map Method, Five and Six Variable Maps , Prime and Essential Implications, Don't Care Map Entries, Using Map for SIMPLIFYNG TABULAR METHOD, Partially Specified Expressions Multi Output minimization and combinational design, Arithmatic Circtuits, Comparator, Multiplexer, Code-converters.

UNIT-III : SEQUENTIAL MACHINES FUNDAMENTALS

Introduction, Basic Architectural Distinctions between combinational and sequential circuits.The Binary Cell, Fundamentals of Sequential Machine Operations, The Flipflop, D-Latch Flipflop, The clocked T-flipflop, the clocked J-K flipflop, Design of a clocked flipflop, Conversion from one type of Flip-Flop to another, Timing and Triggering Consideration.

UNIT-IV: SEQUENTIAL CIRCUIT DESIGN AND ANALYSIS

Introduction, State Diagram, Analysis of synchronous Sequential Circuits, Approaches to the Design of Synchronous Sequential Finite State Machines , Design Aspects, State Reduction , Design Steps, Realization using Flip-Flops.

Counters –Design of single mode counter, ripple counter, ring counter, shift register, shift register sequences, ring counter using shift register.

UNIT-V : SEQUENTIAL CIRCUITS

Finite state machine-capabilities and limitations, Mealy and Moore models-minimization of completely specified and incompletely specified sequential machines, Partition techniques and Merger chart methods-concept of minimal cover table.

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

TEXT BOOKS:

1.Switching & Finite Automata theory - ZviKohavi, & Niraj K. Jha ,,3rd Edition, Cambridge.
2. Digital Design -Morris Mano, PHI, 3rd Edition, 2006.

REFERENCE BOOKS:

1 Introduction to switching design and logic design _ Fredriac J. Hill, Gerald R. Peterson, 3rd ED, John Wiley & Sons Inc
2. Digital fundamentals – A Systems approach-Thomas L. Floyd, Pearson, 2013.
3. Digital logic design- Ye Brian and Holds Worth, Elsevier.
4. Fundamentals of Logic Design - Charles H. Roth, Thomson Publications, 5th Edition, 2004.
5. Digital Logic Applications and Design - John M. Yarbrough, Thomson Publications, 2006.
6. Digital Logic and state machine design – Comer, 3rd, oxford, 2013.

COURSE OUTCOMES:

Upon completion of the course, students should posses the following skills

- Be able to manipulate numeric information in different forms, e.g., different bases , signed integers, various codes such as ASCII, gray and BCD
- Be able to manipulate simple Boolean expressions using the theorems and postulates of Boolean algebra and to minimize combinational functions
- Be able to design and analyze small combinational circuits and to use standard combinational functions/building blocks to build larger more complex circuits
- Be able to design and analyze small sequential circuits and devices and to use standard sequential functions/ building blocks to build larger more complex circuits.

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1405) ELECTRONIC DEVICES & CIRCUITS LAB

III - SEMESTER

L	T	P	C
0	0	3	2

PART A: (Only for viva voce Examination)

ELECTRONIC WORKSHOP PRACTICE (in 3 lab sessions):

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

PART B: (For Laboratory examination - Minimum of 10 experiments)

1. Forward & Reverse Bias Characteristics of PN Junction diode characteristics.
2. Zener diode characteristics and Zener as Voltage regulator.
3. Input & Output characteristics of Transistor in CB configurations and h-parameter calculations.
4. Input & Output characteristics of Transistor in CE configurations and h-parameter calculations
5. Half wave Rectifiers with & without filters.
6. Full wave Rectifiers with & without filters.
7. FET characteristics
8. Design of self - bias circuit
9. Frequency response of CC Amplifier
10. Frequency response of CE Amplifier (Emitter Follower).
11. Frequency response of Common Source FET amplifier.
12. SCR characteristics.
13. UJT characteristics.

PART C : Equipment required for Laboratories:

1. Regulated Power supplies (RPS) - 0-30v
2. CROs: 0-20 MHz
3. Function Generators: 0-1 MHz
4. Multi meters
5. Decade Resistance Boxes/Rheostats
6. Decade Capacitance Boxes
7. Ammeters (Analog or Digital): 0-20μ A, 0-50 μA, 0-100 μA, 0-200 μA, 0 – 10mA
8. Voltmeters (Analog or Digital): 0-50V, 0-100V, 0-250V
9. Electronic Components: Resistors, Capacitors, BJTs, LCDs, SCRs, UJTs, FETs, LEDs, MOSFETs, Diodes (Ge & Si type), transistors (NPN & PNP type)

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1406) BASIC SIMULATION LAB

III - SEMESTER

L	T	P	C
0	0	3	2

List of Experiments:

1. Basic Operations on Matrices.
2. Generation of Various Signals and Sequences (Periodic and Aperiodic), such as UNIT impulse, UNIT step, square, saw tooth, triangular, sinusoidal, ramp, sinc.
3. Observations on signals and sequences such as addition, multiplication, scaling , shifting, folding, computation of energy and average power.
4. Finding the even and odd parts of signal/ sequence and real and imaginary parts of signal.
5. Convolution between signals and sequences.
6. Autocorrelation and cross correlation between signals and sequences.
7. Verification of linearity and time invariance properties of a given continuous/discrete system.
8. Computation of UNIT sample, UNIT step and sinusoidal responses of the given LTI system and verifying its physical realizability and stability properties.
9. Gibbs phenomenon.
10. Finding the Fourier transform of a given signal and plotting its magnitude and phase spectrum.
11. Waveform synthesis using Laplace Transform
12. Locating the zeros and poles and plotting the pole-zero maps in S plane and Z-plane for the given transfer function.
13. Generation of Gaussian noise (real and complex), computation of its mean, M.S. Value and its Skew, Kurtosis, and PSD, Probability Distribution Function.
14. Sampling theorem verification.
15. Removal of noise by autocorrelation / cross correlation.
16. Extraction of periodic signal masked by noise using correlation.
17. Verification of Weiner-Khinchine Relations
18. Checking a random process for stationarity in wide sense

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1005) SOFT SKILLS & PROFESSIONAL ETHICS

III - SEMESTER

L	T	P	C
2	0	0	0

MODULE 1. BUSINESS COMMUNICATION SKILLS

- **English Language Enhancement**
- **The Art of Communication**

OBJECTIVES

- The student will gain a functional understanding of basic English Grammar
- Practice language skills to eliminate errors in pronunciation and sentence construction
- Understand and enhance interpersonal communication process

MODULE 2. INTRAPERSONAL & INTERPERSONAL RELATIONSHIP SKILLS

- **Intrapersonal Relationships**
- **Interpersonal Relationships – To be an Effective Team Player**

OBJECTIVE

- The student will understand the importance of the various skills involved in developing, enriching interpersonal relationships
- Be more aware of his/her own self – confidence, values
- Understand and handle emotions of self and others.
- Understand the necessity and importance of working together as a team
- Learn how to go about being a good team player and form an effective team
- Have put their team building skills to test in the various activities to understand where they stand and improve themselves with each succeeding activity.

MODULE 3. CAMPUS TO COMPANY

- **Corporate Dressing**
- **Corporate Grooming**
- **Business Etiquette**
- **Communication Media Etiquette**

OBJECTIVE

- The student will understand what constitutes proper grooming and etiquette in a professional environment.
- Have some practical tips to handle him/her in a given professional setting.
- Have practiced the skills necessary to demonstrate a comfort level in executing the same.

MODULE 4. GROUP DISCUSSIONS, INTERVIEWS AND PRESENTATIONS

- **Group Discussions**
- **Interviews**
- **Presentations**

OBJECTIVE

- The student will be able to appreciate the nuances of the Group Decision-making process.
- Understand the skills tested and participate effectively in Group Discussions.
- Learn the basics of how to make an effective presentation and have numerous practice presentations in small groups and larger audiences.
- Attend any type of interview with the confidence borne out of knowledge gained and practice sessions.

MODULE 5. ENTREPRENEURIAL SKILLS DEVELOPMENT

- **Goal Setting**
- **Entrepreneurial Skills – Awareness and Development**

OBJECTIVE

- The student will be able to set specific measurable goals for themselves in their personal and/or professional life.
- Understand the skills and the intricacies involved in starting an entrepreneurial venture.

COURSE OUTCOMES

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

- Understand the basics of English Grammar and enhance interpersonal communication process.
- Be a good team player and form an effective team.
- Know how to handle himself/herself in any given professional setting.
- Handle any type of Interview with confidence.
- Understand the skills and intricacies involved in starting an entrepreneurial venture

REFERENCES

1. UNLEASH the power within….Soft Skills – Training Manual (Infosys Campus Connect)

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1020) ENIVRONMENTAL STUDIES

IV - SEMESTER

L	T	P	C
4	0	0	4

OBJECTIVES:

1. Understanding the importance of ecological balance for sustainable development.
2. Understanding the impacts of developmental activities and mitigation measures.
3. Understanding the environmental policies and regulations

UNIT-I :

Ecosystems: Definition, Scope and Importance of ecosystem. Classification, structure and function of an ecosystem, Food chains, food webs and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnification, ecosystem value, services and carrying capacity, Field visits.

UNIT-II:

Natural Resources: Classification of Resources: Living and Non-Living resources**, water resources:** use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. **Mineral resources:** use and exploitation, environmental effects of extracting and using mineral resources, **Land resources:** Forest resources, **Energy resources:** growing energy needs, renewable and non renewable energy sources, use of alternate energy source, case studies

UNIT-III:

Biodiversity And Biotic Resources: Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.

UNIT-IV:

Environmental Pollution and Control Technologies: Environmental Pollution: Classification of pollution, **Air Pollution:** Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. **Water pollution:** Sources and types of pollution, drinking water quality standards. **Soil Pollution:** Sources and types, Impacts of modern agriculture, degradation of soil. **Noise Pollution:** Sources and Health hazards, standards, **Solid waste:** Municipal Solid Waste management, composition and characteristics of e-Waste and its management. **Pollution control technologies:** Wastewater Treatment methods: Primary, secondary and Tertiary.Overview of air pollution control technologies, Concepts of bioremediation. **Global Environmental Problems and Global Efforts: C**limate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol and Montreal Protocol.

UNIT-V:

Environmental Policy, Legislation & EIA: Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical

waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio-economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP). **Towards Sustainable Future:** Concept of Sustainable Development, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA), Low carbon life style.

SUGGESTED TEXT BOOKS:

1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
2. Environmental Studies by R. Rajagopalan, Oxford University Press.

REFERENCE BOOKS:

1. Environmental Science: towards a sustainable future by Richard T.Wright. 2008 PHL Learning PrivateLtd. New Delhi.
2. Environmental Engineering and science by Gilbert M.Masters and Wendell P. Ela .2008 PHI LearningPvt. Ltd.
3. Environmental Science by Daniel B.Botkin & Edward A.Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers.
5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications

Outcomes:

Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn helps in sustainable development

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1214) ELECTRICAL TECHNOLOGY

IV - SEMESTER

L	T	P	C
4	1	0	4

Objective

The emphasis of this course is laid on the basic operation of the DC machines and the transformers which includes DC generators and motors, single phase transformers, constructional features, operational principle of three phase induction motor, alternators and single phase motors.

UNIT I: DC Machines

Principle and operation of DC Machines-EMF equation-Types of Generators-Magnetization and load characteristics of DC generators.

DC Motors

DC Motors-types of DC motors- characteristics of DC motors-3 point starters for DC shunt motor-losses and efficiency-Swinburne's test-speed control of DC shunt motor-Flux and Armature voltage control methods.

UNIT II: Transformers

Principle of operation of single phase transformer-types-constructional features-phasor diagram on No load and Load-equivalent circuit. Losses and efficiency of transformer and regulation - OC and SC tests-predetermination of efficiency and regulation (simple problems)

UNIT III: Three Phase Induction Motors

Principle of operation of three phase induction motors-slip ring and squirrel cage motors-slip torque characteristics-efficiency calculation-starting methods.

UNIT IV: Alternators

Alternators-Constructional features-principle of operation-Types-EMF equation-Distribution and coil span factors-predetermination of regulation by synchronous impedance method-OC and SC tests

UNIT V: Single Phase Motors

Principle of operation-shaded pole motors-Capacitor motors, AC servomotors, stepper motors-Characteristics.

TEXT BOOKS:

1. Introduction to Electrical Engineering: M.S.Naidu and S.Kamakshaiah, TMH Publ.
2. Basic Electrical Engineering-T.K.Nagasarkar and M.S.Sukhaija.Oxford Univ.press

REFERENCES:

1. Principles of Electrical Engineering-V.K.Mehta,S.Chand Publications
2. Electrical Technology volume 2-A.K.Theraja,B.L.Theraja, S.Chand Publications
3. Electrical Machines, Ashfaq Hussain
4. Theory and problems of Basic Electrical Engineering-I.J Nagarath and D.P.Kothari,PHI Publications

COURSE OUTCOMES:

1. Able to understand types of DC machines, operation and its characteristics, tests and speed control methods.
2. Acquire the knowledge of operation and performance of transformers along with various tests.
3. Ability to understand the operation and characteristics of three phase induction motors.
4. Able to understand the operation and constructional features of alternators and its regulation.
5. Able to understand the operation of different single phase motors

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1407) ELECTRONIC CIRCUIT ANALYSIS

IV - SEMESTER

L	T	P	C
4	1	0	4

COURSE OBJECTIVE:

- Familiarize the student with the analysis and design of basic transistor amplifier circuits and their frequency response characteristics, Feedback amplifiers, Oscillators, Large signal amplifiers and Tuned amplifiers.

UNIT-I: SINGLE STAGE AND MULTI STAGE AMPLIFIERS

Single Stage Amplifiers: Classification of amplifiers – Distortion in Amplifiers, Analysis of CE, CC and CB configurations with simplified Hybrid model, Analysis of CE amplifier with emitter resistance and Emitter follower, Millers theorem and its dual, design of single stage RC coupled amplifier using BJT.

Multi Stage Amplifiers: Analysis of Cascaded RC Coupled BJT amplifiers ,Cascade Amplifier, Darlington Pair, Different Coupling Schemes used in Amplifiers - RC Coupled Amplifier, Transformer Coupled Amplifier, Direct Coupled Amplifier.

UNIT -II: BJT AMPLIFIERS AND TUNED AMPLIFIERS

BJT amplifiers – Frequency response: Logarithms, Decibels, General frequency considerations, Frequency response of BJT amplifier, Analysis at Low and High frequencies, Effect of coupling and bypass Capacitors, The Hybrid- pi (p) - Common Emitter Transistor Model, CE Short Circuit Current Gain, Current Gain with Resistive Load, Single Stage CE Transistor Amplifier Response, Gain-Bandwidth Product, Emitter follower at higher frequencies.

Tuned Amplifiers: Single tuned amplifier operation, Q-factor, bandwidth and applications

UNIT -III: FEEDBACK AMPLIFIERS

Feedback Amplifiers: Concepts of Feedback, Classification of Feedback Amplifiers, General characteristics of Negative Feedback Amplifiers, Effect of Feedback on Amplifier Characteristics, Voltage Series, Voltage Shunt, Current Series and Current Shunt Feedback Configurations, Illustrative Problems.

UNIT -IV: OSCILLATORS

Oscillators: Classification of Oscillators, Conditions for Oscillations, RC Phase Shift Oscillator, Generalized analysis of LC oscillators - Hartley, and Colpitts Oscillators, Wien-Bridge & Crystal Oscillators, Stability of Oscillators.

UNIT -V: LARGE SIGNAL AMPLIFIERS

Classification, Class A Large Signal Amplifiers, Transformer Coupled Class A Audio Power Amplifier, Efficiency of Class A Amplifier, Class B Amplifier, Efficiency of Class B Amplifier, Class-B Push- Pull Amplifier, Complementary Symmetry Class B Push-Pull Amplifier, Distortion in Power Amplifiers, Thermal Stability and Heat Sinks.

TEXT BOOKS:

1.Integrated Electronics-Jacob Millman and Christos C Halkias, 1991 Ed., 2008, TMH.
2.Electronic Devices and Circuits, B. P. Singh, Rekha Singh, Pearson, 2013.
3.Design of Analog CMOS Integrated Circuits - Behzad Razavi, 2008, TMH.

REFERENCE BOOKS:

1.Electronic Circuit Analysis - Rashid, Cengage Learning, 2013
2.Electronic Devices and Circuit Theory - Robert L.Boylestad, Louis Nashelsky, 9 Ed., 2008 PE.
3.Micro electric Circuits-Sedra and Smith-5Ed., 2009, Oxford University Press.
4.Electronic Circuit Analysis - K. Lal Kishore, 2004, BSP.
5.Electronic Devices and Circuits - S. Salivahanan, N.Suresh Kumar, A. Vallavaraj, 2 Ed., 2009, TMH.

Course Outcomes:

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

- Design and analysis the DC bias circuitry of BJT and FET.
- Analyze the different types of amplifiers, operation and its characteristics.
- Design circuits like amplifiers, oscillators using transistor diodes and oscillators.

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1218)CONTROL SYSTEMS

IV - SEMESTER

L	T	P	C
4	0	0	4

OBJECTIVE:

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

UNIT – I INTRODUCTION

Concepts of Control Systems- Open Loop and closed loop control systems and their differences- Different examples of control systems- Classification of control systems, Feed-Back Characteristics, Effects of feedback.

Mathematical models – Differential equations, Impulse Response and transfer functions - Translational and Rotational mechanical systems

UNIT II TRANSFER FUNCTION REPRESENTATION

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

UNIT-III TIME RESPONSE ANALYSIS

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

STABILITY ANALYSIS IN S-DOMAIN

The concept of stability – Routh's stability criterion – qualitative stability and conditional stability – limitations of Routh's stability

Root Locus Technique: The root locus concept - construction of root loci-effects of adding poles and zeros to G(s)H(s) on the root loci. Basics of PID Controllers

UNIT –IV FREQUENCY RESPONSE ANALYSIS

Introduction, Frequency domain specifications-Bode diagrams-Determination of Frequency domain specifications and transfer function from the Bode Diagram-Phase margin and Gain margin-Stability Analysis from Bode Plots. Polar Plots-Nyquist Plots-Stability Analysis-Applications of Nyquist criterion to find the stability.

UNIT – V STATE SPACE ANALYSIS OF CONTINUOUS SYSTEMS

Concepts of state, state variables and state model, derivation of state models from block diagrams, Diagonalization- Solving the Time invariant state Equations- State Transition Matrix and it's Properties – Concepts of Controllability and Observability

TEXT BOOKS:

1. Automatic Control Systems 8th edition– by B. C. Kuo 2003– John wiley and son's.,
2. Control Systems Engineering – by I. J. Nagrath and M. Gopal, New Age International (P) Limited, Publishers, 2nd edition.

REFERENCE BOOKS:

1. Modern Control Engineering – by Katsuhiko Ogata – Prentice Hall of India Pvt. Ltd., 3rd edition, 1998.
2. Control Systems by N.K.Sinha, New Age International (P) Limited Publishers, 3rd Edition, 1998.
3. Control Systems Engg. by NISE 3rd Edition – John wiley
4. "Modelling & Control Of Dynamic Systems" by Narciso F. Macia George J. Thaler, Thomson Publishers.

Course Outcomes

1. Able to know the basics of control systems and their classifications
2. Able to design the mathematical models of Electrical and mechanical systems
3. Capable of determining the performance characteristics of any linear system with respect to time and frequency
4. Capable of determining the stability and design of classical controllers' using time and frequency domain analysis
5. Capable of realizing the linear systems in state space model and estimate the controllability and observability of linear systems using state space analysis

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1408) ELECTROMAGNETIC THEORY & TRANSMISSION LINES

IV - SEMESTER

L	T	P	C
4	1	0	4

Course objectives:

The course objectives are:

- To introduce the student to the fundamental theory and concepts of electromagnetic waves and transmission lines, and their practical applications
- To study the propagation, reflection, and transmission of plane waves in bounded and unbounded media

UNIT-I : ELECTROSTATICS

Coulomb's Law, Electric Field Intensity- Fields due to Different charge Distributions, Electric Flux Density, Gauss Law and Applications, Electric Potential, Relations Between E and V, Maxwell's Two Equations for Electrostatic fields, Energy Density, Illustrative Problems. Convection and conduction Currents, Dielectric constant, Isotropic and Homogeneous Dielectrics, Continuity Equation, Relaxation Time, Poisson's and Laplace Equations; Illustrative Problems.

UNIT-II : MAGNETOSTATICS

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

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

UNIT-III : EM WAVE CHARACTERISTICS

Wave Equations for Conducting and perfect Dielectric Media, Uniform Plane waves- Definition, All Relations Between E& H, Sinusoidal variations, Wave Propagation in lossless and conducting Media, Conductors & Dielectrics- Characterization, Wave Propagation in Good Conductors and good Dielectrics, Polarization, Illustrative Problems.

Reflection and Refraction of plane waves- Normal and Oblique incidences for both perfect Conductor and perfect Dielectrics, Brewster Angle, Critical Angle and Total internal Reflection Surface Impedance, Poynting Vector and Poynting Theorem-Applications, Illustrative problems.

UNIT-IV :TRANSMISSION LINES-I

Types, Parameters, Transmission Line Equations, Primary & Secondary Constants, Expressions for characteristic impedence, Propagation Constant, Phase and Group Velocities, infinite line Concepts, Losslessness/Low Loss Characterization, Distortion – Condition for Distortionlessness and minimum Attenuation, Loading- Types of Loading, Illustrative problems.

UNIT-V : TRANSMISSION LINES-II

Input impedence Relations, SC and OC Lines, Reflection Coefficient, VSWR, UHF Lines as Circuit Elements; **λ/4, λ /2. λ /8** Lines- Impendence Transformations, Smith Chart – Construction and Applications, Single and Double Stub Matching, Illustrative Problems.

TEXT BOOKS:

1. Elements of Electromagnetics-Mattew N.O. Sadiku, 4thEd, OxfordUniv.Press.
2. Electromagnetic Waves and Radiating Systems – E.C. Jordan andK.G. Balmain, 2nd, 2000, PHI.
3. Transmission Lines and Networks- Umesh Sinha, Satya Prakashan, 2001, (Tech India Publications), New Delhi.

REFERENCE BOOKS:

1. Engineering Electromagnetics- Nathan Ida, 2ndEd, 2005, Springer(India) Pvt Ltd., New Delhi.
2. Engineering Electromagnetics – William H.Hayt Jr. and John A.Buck, 7th Ed., 2006, TMH.
3. Electromagnetic Field Theory and Transmission Lines – G.Sashibhushana Rao, Wiley Inia, 2013.
4. Networks, Lines and fields – John D. Ryder, 2nd Ed, 1999, PHI

Course Outcomes:

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

- Study time varying Maxwell's equations and their applications in electromagnetic problems
- Determine the relationship between time varying electric and magnetic field and electromotive force
- Analyze basic transmission line parameters in phasor domain
- Use Maxwells equations to describe the propagation of electromagnetic waves in vacuum
- Show howwaves propagate in dielectrics and lossy media
- Demonstarte the reflection and refraction of waves at boundaries
- Explain the basic wave guide operation and parameters

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1409) PULSE & DIGITAL CIRCUITS

IV - SEMESTER

L	T	P	C
4	1	0	4

OBJECTIVES:

The main objectives are:

- To explain the complete response of R-C and R-L-C transient circuits.
- To explain clippers, clampers, switching characteristics of transistors and sampling gates
- To construct various multivibrators using transistors, design of sweep circuits and sampling gates.
- To discuss and realize logic gates using diodes and transistors

UNIT -I: **LINEAR WAVE SHAPING**

High pass and low pass RC circuits asnd their response for sinusoidal, step, pulse, square& Ramp inputs, High pass RC network as Differentiator, low pass RC circuit as an integrator, attenuators and its application as a CRO probe, RL and RLC circuits and their response for Step input ,ringing circuit .

UNIT- II: NON- LINEAR WAVE SHAPING

Diode clippers, transistor clippers, clipping at two independent levels, comparators applications of voltage comparators. Clamping operation, clamping circuit taking source and diode resistances into account, clamping circuit theorem, practical clamping circuits, effect of diode characteristics on clamping voltage, synchronized clamping

UNIT-III : SWITCHING CHARACTERISTICS OF DEVICES

Diode as a switch, Piecewise Linear Diode Characteristics, Diode Switching times, Transistor as a switch, Break down voltages, Transistor in Saturation, Temperature variation of Saturation Parameters, Transistor-Switching times, Silicon-Controlled-Switch circuits, Sampling gates: Basic operating principles of sampling gates, Unidirectional and Bi-directional Sampling Gates, Four Diode Sampling Gate,Reduction of pedestal in Gate circuits.

UNIT-IV : MULTIVIBRATORS

Analysis and design of Bistable, Monostable, Astable Multivibrators and Schmitt trigger using Transistors, Time Base Generators: General features of a Time base Signal, Methods of generating Time Base Waveform, Operation of Miller and Bootstrap Time Base Generators-

UNIT-V : SYNCHRONIZATION AND FREQUENCY DIVISION

Pulse Synchronization of Relaxation Devices, Frequency division in sweep Circuit, Stability of Relaxation Devices, Astable Relaxation Circuits, Monostable Relaxation Circuits, Synchronization of sweep circuit with Symmetrical Signals, Sine wave frequency division with a sweep Circuit, A Sinusoidal Divider using Regeneration and Modulation

Realization of Logic Gates using Diodes & Transistors: AND,OR and NOT Gates Using Diodes and Transistors, DCTL,RTL,DTL,TTL and CML Logic Families and its Comparision.

TEXT BOOKS:

1. Millman's Pulse, Digital and Switching Waveforms- J.Millman, H.Taub and Mothaiki S.Prakash Rao, 2 Ed, 2008,TMH
2. Solid State Pulse Circuits- David A. Bell, 4 Ed,2002 PHI

REFERENCE BOOKS:

1. Pulse and Digital Circuits- A.Anand Kumar, 2005,PHI
2. Fundamentals of Pulse and Digital Circuits- Ronald J.Tocci, 3 Ed,2008
3. Pulse and Digital Circuits- Motheki S.Prakash Rao,2006,TMH
4. Wave Generation and Shaping- L.Strauss

Course Outcomes:

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

- Understand the applications of diode as integrator, differentiator, clippers, clamper circuits
- Learn various switching devices such as diode, transistor, SCR
- Difference between logic gates and sampling gates
- Design multivibrators for various applications, synchronization techniques and sweep circuits
- Realizing logic gates using diodes and transistors.

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1214)ELECTRICAL TECHNOLOGY LAB

IV - SEMESTER

L	T	P	C
0	0	3	2

Objective

This course provides the indepth knowledge of theorems , resonance phenomena two port network parameters time response of electrical networks by verifying practically. It also introduces different tests on DC machines and transformer to know the performance.

PART - A

1. Verification of KCL and KVL.
2. Verification of Superposition and Reciprocity theorems
3. Verification of Maximum power transfer theorem.
4. Verification of Thevenin's and Norton's theorems.
5. Series and Parallel resonance in RLC Network
6. Two port network parameters- Z and Y parameters
7. Two port network parameters- ABDC and Hybrid Parameters.
8. Time Response of First Order RC/RL network for periodic non-sinusoidal inputs- time constant and steady state error determination

PART - B

1. Magnetization characteristics of D.C. Shunt generator.
2. Swinburne's Test on DC shunt machine.
3. Brake test on DC shunt motor
4. OC and SC tests on Single-phase transformer.
5. Load Test on Transformer

Note: Any **12** of the above experiments are to be conducted

Course Outcomes

- Able to verify KCL & KVL.
- Able to verify different theorems.
- Able to calculate different two parameters.
- Able to understand resonance phenomena for RLC networks.
- Able to analyze time response of RC/RL networks.
- Acquire the knowledge of different tests conducted on DC machines and single phase transformers

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1410) ELECTRONICS CIRCUITS AND PULSE CIRCUITS LAB

IV - SEMESTER

L	T	P	C
0	0	3	2

List of Experiments (16 experiments to be done):

PART – 1: ELECTRONIC CIRCUITS

Minimum eight experiments to be conducted:

I) Design and Simulation in Simulation Laboratory using any Simulation Software (Minimum 6 Experiments):
   1. Common Emitter Amplifier
   2. Common Source Amplifier
   3. Two Stage RC Coupled Amplifier
   4. Current Shunt and Voltage Series Feedback Amplifier
   5. Cascode Amplifier
   6. Wien Bridge Oscillator using Transistors
   7. RC Phase Shift Oscillator using Transistors
   8. Class A Power Amplifier (Transformer less)
   9. Class B Complementary Symmetry Amplifier
   10. Common Base(BJT) / Common Gate (JFET) Amplifier

II) Testing in Hardware Laboratory
   1. Class A power Amplifier (With transformer load)
   2. Class C Power Amplifier
   3. Single Tuned Voltage Amplifier
   4. Hartley & Colpitts Oscillator
   5. Darlington Pair
   6. MOS Common Source Amplifier

Experiments Required for the Laboratory:

1. For Software Simulation of Electronic Circuits
   i) Computer Systems with Latest Specifications
   ii) Connected in LAN (Optional)
   iii) Operating System (Windows XP)
   iv) Suitable Simulation Software
2. For Hardware Simulation of Electronic Circuits
   i) Regulated Power Supply (0 – 30 V)
   ii) CRO's
   iii) Function Generators
   iv) Multi meters
   v) Components
3. Win XP/ Linux etc.

PART – II: PULSE CIRCUITS

Minimum eight experiments to be conducted:

1. Linear Wave Shaping
   a. RC Low Pass Circuit for different time constants
   b. RC High Pass Circuit for Different time constants
2. Non – linear wave shaping
   a. Transfer characteristics and response of clippers:
      i) Positive and Negative Clippers
      ii) Clipping at two independent levels
   b. The Steady State Output Waveform of Clampers for a Square wave input
      i) Positive and Negative Clampers
      ii) Clamping at Reference Voltage
3. Comparison Operation of Comparators
4. Switching characteristics of a transistor
5. Design a Bistable Multivibrator and draw its waveforms
6. Design an Astable Multivibrator and draw its wave forms
7. Design a Monostable Multivibrator and draw its waveforms
8. Response of Schmitt Trigger Circuit for loop gain less than and greater than one
9. UJT relaxation oscillator
10. The output – voltage waveform of Boot strap sweep circuit
11. The output- voltage waveform of Miller sweep circuit

Equipment Required for Laboratories:

Regulated Power Supply – 0-30 V

CRO – 0 – 20 M Hz

Function Generators – 0 – 1 M Hz

Components

Multi meters

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1411) MICROPROCESSORS AND MICROCONTROLLERS

V - SEMESTER

L	T	P	C
4	1	0	4

Course Objective:
The Course Objectives are:

- To develop an in-depth understanding of the operation of Microprocessors and Microcontrollers, Machine language programming & Interfacing techniques.

UNIT- I: 8086ARCHITECTURE
8086 Architecture-Functional diagram, Register organization, Memory segmentation, programming model, Memory addresses, physical memory organization, Architecture of 8086, signal descriptions of 8086-Common Function Signals, Timing diagrams, Interrupts of 8086.

UNIT- II: INSTRUCTION SET AND ASSEMBLY LANGUAGE PROGRAMMING OF 8086
Instruction formats, Addressing modes, Instruction Set, Assembler Directives, Macros, simple Programs involving Logical, Branch and Call Instructions, Sorting, Evaluating Arithmetic Expressions, String Manipulations.

UNIT- III: I/O INTERFACE
8255 PPI, Various Modes of Operation and Interfacing to 8086, Interfacing keyboard, Display, D/A and A/D Converter.
Interfacing with advanced devices: Memory interfacing to 8086,Interrupt Structure of 8086,Vector interrupt table, Interrupt service routine.
Communication Interface: Serial Communication Standards, Serial Data Transfer Schemes, 8251 USART Architecture and Interfacing.

UNIT – IV: INTRODUCTION TO MICROCONTROLLERS
Overview of 8051 Microcontroller, Architecture, I/O Ports, Memory Organization, Addressing Modes and Instruction set of 8051, Simple Programs.

UNIT – V: 8051 REAL TIME CONTROL
Programming Timer Interrupts, Programming External Hardware Interrupts, Programming the Serial Communication Interrupts, Programming 8051 Timers and Counters.

TEXT BOOKS:

1. D.V. Hall, Micro Processors and Interfacing, TMGH, 2nd edition 2006.
2. Kenneth.J.Ayala,The 8051 Microcontroller, 3rd Ed, Cengage Learning.

REFERENCE BOOKS:

1. Advanced microprocessor and Peripherals - A.K. Ray and K.M. Bhurchandi, TMH, 2nd edition 2006.
2. The 8051 Microcontrollers, Architecture and programming and Applications- K.Uma Rao, Andhe Pallavi, Pearson, 2009.
3. Micro Computer System 8086/8088 Family Architecture, Programming and Design - By Liu and GA Gibson, PHI, 2nd Ed.
4. Microcontrollers and Application, Aijay.V. Deshmukh, TMGH, 2005.
5. The 8085 Microprocessor: Architecture, Programming and interfacing- K. Uday Kumar, B.S. Umashankar, 2008,Pearson.

Course Outcome:

Up on completion of the course:

- The Student will learn the internal organization of popular 8086/8085 Microprocessors/Microcontrollers.
- The Student will learn hardware and software interaction and integration.
- The student will learn the design of Microprocessors/Microcontrollers-based systems.

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1540) COMPUTER ORGANIZATION & OPEARATING SYSTEMS

V - SEMESTER

L	T	P	C
4	0	0	4

Objectives:

- To understand basic components of computers
- To explore the I/O organizations in depth & the memory organization
- To understand the basic chip design and organization of 8086 with assembly language programming
- To understand main components of OS and their working .
- To study the operations performed by OS as a resource manager.
- To understand the scheduling policies of OS, process concurrency and synchronization.
- To understand the concepts of input/output , storage and file management.
- To study different OS and compare their features

UNIT I :

Basic structure of Computer: Computer types, Functional UNIT, Basic Operational Concepts, Bus structures, software, performance, multiprocessors and multi computers, data representations, fixed point representation, floating point representation.

Register transfer language and micro operations: Register transfer language, register transfer bus and memory transfer, Arithmetic Micro operations, Logic Micro Operation, shift Micro Operations, Arithmetic Logic Shift UNIT, Instruction Codes, Computer Registers Computer Instructions Instruction Cycle.

Instruction formats- one address, two addresses, zero addresses and three addresses and comparison: addressing modes with numeric examples: Program Control – status bit conditions, conditional branches instructions, Program Interrupts: Types of Interrupts.

Memory: Reference Instruction, I/O and Interrupt, Stack organization, Instruction formats, Addressing modes, DATA Transfer and Manipulation. Program control, RISC,

UNIT II :

Micro Programmed Control: Control Memory, Address Sequencing, Micro program Examples, Design of Control UNIT, Hard Wired Control, Micro programmed Control.

The Memory systems: Basic Concepts of Semiconductors RAM Memories, ROM, Cache Memory performance considerations, Virtual memory, Introduction to RAID

UNIT III :

Input-Output Organizations: Peripheral Devices, Input-Output Interface, Asynchronous Data Transfer Modes**,** Priority Interrupt, DMA, IOP, Serial Communication, Introduction to Peripheral

components, Interconnect(PCI) bus, Introduction to serial communication protocols like RS 232, USB, IEEE1394

UNIT IV :

Operating System Overview: Overview of Computer Operating systems function, Protection, Security, Distributed Systems, Special purpose systems. Operating systems structures- services, systems calls, systems, programs, operating systems generations.

Memory Management and Virtual memory – Logical & Physical Address space, Swapping, Contiguous Allocation, Paging, Structure of Page Table, Segmentation, Segmentation with Paging, Virtual memory, Demand paging, Performance of Demand paging, Page Replacement, Page Replacement Algorithms, Allocation of Frames, Thrashing. Case Studies UNIX,LINUX, WINDOWS

Deadlocks – System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection and Recovery from Deadlock.

UNIT V :

File System Interface- The Concept of a File, Access methods, Directory Structure, File System Mounting, File Sharing, Protection, File System Implementation- File System Structure, Allocation methods, Free-space Management, Directory Implementation, Efficiency and Performance.

TEXT BOOKS :

1. Computer Organization- Carl Hamachar 5th Edition, McGraw Hill
2. Computer Systems Architecture – M. Moris Mano,
3. Advanced micro Processors & peripherals Hall/AK Ray
4. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 8TH Edition, John Wiley.
5. Operating Systems – Internals and Design Principles, William Stallings, Sixth Edition, Pearson education.

REFERENCES :

1. Computer Organization and Architecture – William Stallings Sixth Edition, Pearson/PHI
2. Structured Computer Organization – Andrew S. Tanenbaum, 4th Edition PHI/Pearson
3. Fundamentals or Computer Organization and Design, - Sivaraama Dandamudi Springer Int. Edition.
4. Computer Architecture a quantitative approach, John L. Hennessy and David A. Patterson, Fourth Edition Elsevier
5. Computer Architecture: Fundamentals and principles of Computer Design, Joseph D. Dumas II, BS Publication.
6. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 8TH Edition,

John Wiley.
7. Modern Operating Systems, Andrew S Tanenbaum 3rd edition Pearson/PHI
8. Operating System A Design Approach-Crowley,TMH

Outcomes:

- After this course students understand in a better way the I/O and memory organization in depth. They should be in a position to write assembly language programs for various applications.
- Apply optimization techniques for the improvement of system performance.
- Ability to understand the synchronous and asynchronous communication mechanisms in their respective OS.
- Learn about minimization of turnaround time, waiting time and response time and also maximization of throughout put with keeping CPU as busy as possible.
- Ability to compare the different OS.

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1412) ANTENNAS AND WAVE PROPAGATION

V - SEMESTER

L	T	P	C
4	1	0	4

Course Objectives:

The Main Objective Are

- Understand Basic Terminology And Concepts Of Antennas.
- To attain Knowledge on the basic parameters those are considered in the antenna design process and the analysis while designing that.
- Analyze the electric and magnetic field emission from various basic antennas and mathematical formulation of the analysis.
- To have knowledge on antenna operation and types as well as their usage in real time field.
- Aware of the wave spectrum and respective band based antenna usage and also to know the prorogation of the waves at different frequencies through different layers in the existing layer field free space environment structure.

UNIT-I : ANTENNA BASICS

Introduction, Basic Antenna Parameters- Patterns, Beam Area, Radiation Intensity, Beam Efficiency , Directivity- Gain- Resolution, Antenna Apertures, Effective Height, Illustrative Problems. Fields From Oscillating Dipole, Field Zones, Front-to-Back Ratio, Antenna Theorems, Radiation, Retarded Potentials-Helmholtz Theorem.

Thin Linear Wire Antennas-Radiation from Small Electric Dipole, Quarter Wave Monopole And Half Wave Dipole-Current Distributions, Field Components, Radiated Power, Radiation Resistance, Beam Width, Directivity, Effective Area And Effective Height, Natural Current Distributions, Far Fields And Patterns Of Thin Linear Center- fed Antennas of Different Lengths, Illustrative Problems. Loop Antennas - Introduction, Small Loop, Comparison of Far Fields of Small Loop and Short Dipole, Radiation Resistances and Directivities of Small and Large Loops (Qualitative Treatment).

UNIT-II: VHF,UHF AND MICROWAVE ANTENNAS-I

Arrays With Parasitic Elements- Yagi-Uda Array, Folded Dipoles and their Characteristics, Helical Antennas-Helical Geometry, Helix Modes, Practical Design Considerations for Monofilar Helical Antenna in Axial And Normal Modes, Horn Antennas - Types ,Fermat's Principle, Optimum Horns, Design Considerations of Pyramidal Horns, Illustrative Problems.

UNIT-III : VHF, UHF AND MICROWAVE ANTENNAS-II

Microstrip Antennas- Introduction, Features, Advantages And Limitations, Rectangular Patch Antennas-Geometry And Parameters, Characteristics of Microstrip Antennas. Impact of Different parameters on Characteristics, Reflector Antennas –Introduction, Flar Sheet and Corner Reflectors,

Paraboloidal Reflectors-Geometry, Pattern Characteristics, Feed Methods, Reflectors Types-Related Features, Illustrative Problems.

LENS ANTENNAS - Introduction, Geometry of Non Metallic Dielectric Lenses, Zoning, Tolerances, Applications.

UNIT-IV : ANTENNA ARRAYS

Point Sources-Definition, Patterns, Arrays of 2 Isotropic Sources-Different Cases, Principle of Pattern Multiplication, Uniform Linear Arrays-Broadside Arrays, Endfire Arrays, EFA With Increased Directivity, Derivation of their Characteristics And Comparison, BSAs With Non-Uniform Amplitude Distributions-General Considerations and Binomial Arrays , Illustrative Problems.

ANTENNA MEASUREMENTS: Introduction, Concepts – Reciprocity, Near and Far Fields, Coordinate System, Sources of Errors. Patterns to Be Measured, Pattern Measurement Arrangement, Directivity Measurement, Gain Measurements (By Comparison, Absolute and 3 –Antenna Methods).

UNIT-V : WAVE PROPAGATION – I

Introduction, Definitions, Categorizations and General Classifications, Different Modes of Wave Propagation. Ray/Mode Concepts. Ground Wave Propagation (Qualitative Treatment)-Introduction. Plane Earth Reflections, Space And Surface Waves, Wave Tilt, Curved Earth Reflections. Space Wave Propagation- Introduction, Field Strength Variation with Distance and Height, Effect of Earth's Curvature, Absorption, Super Refraction, M-Curves and Duct Propagation, Scattering Phenomena, Tropospheric Propagation.

WAVE PROPAGATION – II: Sky Wave Propagation- Introduction, Structure Of Ionosphere, Refraction And Reflection of Sky Waves By Ionosphere, Ray Path, Critical Frequency, MUF, LUF, OF, Virtual Height And Skip Distance. Relation between MUF and Skip Distance, Multi-hop Propagation.

TEXT BOOKS:

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

REFERENCE BOOKS:

1. Antenna Theory-C.A.Balanis, John Wiley &Sons, 3rd Ed., 2005.
2. Antennas and Wave Propagation-K.D.Prasad, Satya Prakashan, Tech India Publications, New Delhi, 2001.
3. Transmission and Propagation-E.V.D.Glazier and H.R.L.Lamont, The Services Text Book of Radio, vol.5, Standard Publishers Distributors, Delhi.
4. Electronic and Radio Engineering-F.E.Terman, McGraw-Hill, 4th Edition, 1955.
5. Antennas-John D.Kraus, McGraw-Hill (International Edition), 2nd Ed.1988.

Course Outcomes:

Student will be:

- Aware of the parameter considerations viz. antenna efficiency, beam efficiency, radiation resistance etc. in the design of an antenna.
- Capable to analyze the designed antenna and field evaluation under various conditions and formulate the electric as well as the magnetic fields Equation set for Far Field and near field conditions.
- Understand the Array system of Different antennas and field analysis under application of different currents to the individual antenna elements
- Understand the design issues, operation of fundamental antennas like Yagi-Uda, Horn antennas and helical structure and also their operation methodology in practice.
- Design a lens structure and also the bench setup for antenna parameter measurement of testing for their effectiveness.
- Knowledge about the means of propagation of electromagnetic wave i.e. free space propagation and also about frequency dependent layer selection, its respective issues for an effective transmission of information in the form of EM wave to a remote location and related issues.

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1413) ANALOG COMMUNICATIONS

V - SEMESTER

L	T	P	C
4	1	0	4

Course Objectives:
This Course aims at:

- Developing and understanding of the design of analog communication system.
- Study of Analog Modulation Techniques.
- Subject will develop analytical abilities related to Circuit members.
- Establishing a firm foundation for the understanding of telecommunication systems, and the relationship among various technical factors when such systems are designed and operated.

UNIT I : AMPLITUDE MODULATION
Introduction to communication system, Need for modulation, Frequency Division Multiplexing , Amplitude Modulation, Definition, Time domain and frequency domain description, single tone modulation, power relations in AM waves, Generation of AM waves: square law Modulator, Switching modulator, Detection of AM Waves: Square law detector, Envelope detector.
DSB MODULATION: Double side band suppressed carrier modulators, time domain and frequency domain description, Generation of DSBSC Waves: Balanced Modulators, Ring Modulator, Coherent detection of DSB – SC modulated waves, COSTAS Loop.

UNIT II : SSB MODULATION
Frequency domain description, Frequency discrimination method for generation of AM-SSB Modulated Wave, Time domain description, Phase discrimination method for generating AM-SSB Modulated waves. Demodulation of SSB Waves, Vestigial Side Band Modulation: Frequency description, Generation of VSB Modulated wave, Time domain description, Envelope detection of a VSB Wave pulse Carrier, Comparison of AM Techniques, Applications of different AM Systems.

UNIT III : ANGLE MODULATION
Basic concepts, Frequency Modulation: Single tone frequency modulation, Spectrum Analysis of Sinusoidal FM Wave, Narrow band FM, Wide band FM, Constant Average Power, Transmission bandwidth of FM Wave-Generation of FM Waves, Direct FM, Detection of FM Waves: Balanced Frequency discriminator, Zero crossing detector, Phase locked loop, Comparison of FM and AM.

UNIT IV : NOISE IN ANALOG COMMUNICATION SYSTEM
Types of noise: Resistive (Thermal) Noise source, Shot Noise, Extraterrestrial Noise, Arbitrary Noise Sources, White Noise, Narrow Band Noise- In phase and quadrature phase components and its properties, Modeling of Noise sources, Average Noise bandwidth, Effective noise temperature, Average Noise Figures, Average Noise Figure of cascaded networks.

Noise in DSB & SSB System, Noise in AM System, Noise in Angle Modulation System, Noise Triangle in Angle Modulation System, Pre-emphasis and de-emphasis.

UNIT V : RECEIVERS

Radio Receiver - Receiver Types - Tuned radio frequency receiver, Super heterodyne receiver, RF section and Characteristics - Frequency changing and tracking, Intermediate frequency, AGC, FM Receiver, Comparison with AM Receiver, Amplitude limiting.

Pulse Modulation: Types of Pulse modulation, PAM (Single polarity, double polarity) PWM: Generation & demodulation of PWM, PPM, Generation and demodulation of PPM, Time Division Multiplexing.

TEXTBOOKS:

1. Communication Systems - Simon Haykin, 2nd Ed., Wiley publications.
2. Communication Systems – B.P. Lathi, BS Publication, 2004.

REFERENCES:

1. Electronic Communications – Dennis Roddy and John Coolean, 4th Edition, PEA, 2004.
2. Electronic Communication Systems – Modulation and transmission – Robert J.Schoenbeck, 2nd Edition, PHI.
3. Analog and Digital Communication – K. Sam Shanmugam, Willey, 2005.
4. Electronics & Communication System – George Kennedy and Bernard Davis, TMH 2004.
5. Principles of Communication Systems – H Taub & D. Schilling, Gautam Sahe, TMH, 3rd Edition, 2007.

Course Outcomes:

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

- Conceptually understand the baseband signal & systems.
- Identify various elements, processes, and parameters in telecommunication systems, and describe their functions, effects, and interrelationship.
- Design procedure of AM transmission and Reception, analyze, measure, and evaluate the performance of a telecommunication system against given criteria.
- Understand the basic knowledge of FM transmission and Reception.
- Understand various types of SSB Transmission and Reception.
- Design typical telecommunication systems that consist of basic and essential building blocks.

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1414) LINEAR AND DIGITAL IC APPLICATIONS

V - SEMESTER

L	T	P	C
4	1	0	4

Course Objectives:
The main objectives of the course are:

- To introduce the basic building blocks of linear integrated circuits.
- To teach the linear and non-linear applications of operational amplifiers.
- To introduce the theory and applications of analog multipliers and PLL.
- To teach the theory of ADC and DAC.
- To introduce the concepts of waveform generation and introduce some special function ICs.
- To understand and implement the working of basic digital circuits.

UNIT-I : OPERATIONAL AMPLIFIER
Ideal and Practical Op-Amp, Op-Amp characteristics, DC and AC characteristics, Features of 741 Op-Amp, Modes of Operation- Inverting, Non-inverting, Differential, Instrumentation Amplifier, AC Amplifier, Differentiators and Integrators, Comparators, Schmitt trigger, Introduction to Voltage Regulators, Features of 723 Regulator, Three Terminal Voltage Regulators.

UNIT-II : OP-AMP, IC 555 & IC 565 APPLICATIONS
Introduction to Active Filters, Characteristics of Band Pass, Band Reject and All Pass Filters, Analysis of 1^{st} Order LPF & HPF Butterworth Filters, Waveform Generators- Triangular, Sawtooth, Square wave, IC 555 Timer- Functional Diagram, Monostable and Astable Operations, Applications, IC565 PLL- Block Schematic, Description of Individual Blocks, Applications.

UNIT-III: DATA CONVERTERS
Introduction, Basic DAC techniques, Different types of DACs-Weighted resistor DAC, R-2R ladder DAC, Inverted R-2R DAC, Different types of ADCs-Parallel Comparator Type ADC, Counter Type ADC, Successive Approximation ADC and Dual Slope ADC, DAC and ADC Specifications.

UNIT-IV : DIGITAL INTEGRATED CIRCUITS
Classification of Integrated Circuits, Comparison of Various Logic Families, CMOS Transmission Gate, IC interfacing-TTL driving CMOS & CMOS Driving TTL, Combinational Logic ICs-Specifications and Applications of TTL-74XX & CMOS 40XX Series ICs- Code Converters, Decoders, Demultiplexers, LED & LCD Decoders with Drivers, Encoders, Priority Encoders, Multiplexers, Demultiplexers, Priority Generators/Checkers, Parallel Binary Adders/Subtractor, Magnitude Comparators.

UNIT-V: SEQUENTIAL LOGIC ICS AND MEMORIES
Familiarity with Commonly Available 74XX & CMOS 40XX Series ICs - All Types of Flip-Flops, Synchronous Counters. Decade counters, Shift Registers.

Memories- ROM Architecture, Types of ROMs & Applications, RAM Architecture, Static & Dynamic RAMs.

TEXT BOOKS:

1. Op-Amps & Linear ICs - Ramakanth A. Gayakwad, PHI, 2003.
2. Linear Integrated Circuits -D. Roy Chowdhury, New Age International (p)Ltd, 2nd Ed., 2003.
3. Digital Fundamentals - Floyd and Jain, Pearson Education,8th Edition, 2005.

REFERENCE BOOKS:

1. Op-Amps and Linear Integrated Circuits - Concepts and Applications - James M.Fiore, Cengage Learning/Jaico, 2009.
2. Operational Amplifiers and Liner Integrated Circuits by K.Lal Kishore -Pearson, 2009
3. Linear Integrated Circuits and Applications – Salivahana, TMH.
4. Modern Digital Electronics - RP Jain - 4/e - TMH, 2010.
5. Digital Design Principles and Practices – John F. Wakerly 3/e, 2005.
6. Operational Amplifiers with Liner Integrated Circuits, 4/e William D. Stanley, Pearson Education India, 2009.

Course Outcomes:

On completion of this course, the students will have:

- A thorough understanding of operational amplifiers with linear integrated circuits.
- Understanding of the different families of digital integrated circuits and their characteristics.
- Also students will be able to design circuits using operational amplifiers for various applications.

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1415) DIGITAL DESIGN USING VERILOG HDL

V - SEMESTER

L	T	P	C
4	1	0	4

Course Objectives:

This course teaches:

- Designing Digital Circuits, behavioral and RTL modeling of digital circuits using Verilog HDL, verifying these models, and synthesizing RTL models to standard cell libraries and FPGAs.
- Students gain practical experience by designing, modeling, implementing and verifying several digital circuits.
- This course aims to provide students with the understanding of the different technologies related to HDLs, construct, compile and execute Verilog HDL programs using provided software tools. Design digital components and circuits that are testable, reusable and synthesizable.

UNIT I : INTRODUCTION TO VERILOG HDL

Verilog As HDL, Levels Of Design Description, Concurrency, Simulation and Synthesis, Function Verification, System Tasks, Programming Language Interface, Module, Simulation and Synthesis Tools.

LANGUAGE CONSTRUCTS AND CONVENTIONS: Introduction, Keywords, Identifiers, White Space Characters, Comments, Numbers, Strings, Logic Values, Strengths, Data Types, Scalars and Vectors, Parameters, Operators.

UNIT II : GATE LEVEL MODELING

Introduction, AND Gate Primitive, Module Structure, Other Gate Primitives, Illustrative Examples, Tristate Gates, Array of Instances of Primitives, Design of Flip-Flops with Gate Primitives, Delays, Strengths and Construction Resolution, Net Types, Design of Basic Circuit.

MODELING AT DATAFLOW LEVEL: Introduction, Continuous Assignment Structure, Delays and Continuous Assignments, Assignment To Vectors, Operators.

UNIT III : BEHAVIORAL MODELING

Introduction, Operation and Assignments, Functional Bifurction. 'Initial' Construct, 'Always' Construct, Assignments With Delays, 'Wait' Construct, Multiple Always Block, Design at Behavioral Level, Blocking And Non-Blocking Assignments, The 'Case' Statement, Simulation Flow, 'If' and 'If-Else 'Constructs. 'Assign-De-Assign' Construct, 'Repeat' Construct, For Loop, 'The Disable' Construct, 'While Loop', For Ever Loop, Parallel Blocks. 'Force-Release' Construct, Event.

UNIT IV : SWITCH LEVEL MODELING

Basic Transistor Switches, CMOS Switches, BiDirectional Gates, Time Delays with Switch Primitives, Instantiation with 'Strengths' and 'Delays'. Strength Contention with Trireg Nets.

SYSTEM TASKS, FUNCTIONS AND COMPILER DIRECTIVES: Parameters, Path Delays, Module Parameters, System Tasks and Functions, File Based Tasks and Functions, Computer Directives, Hierarchical Access, User Defined Primitives.

UNIT V : **SEQUENTIAL CIRCUIT DESCRIPTION**

Sequential Models-Feedback Model, Capacitive Model, Implicit Model, Basic Memory Components, Functional Register, Static Machine Coding, Sequential Synthesis.

COMPONENT TEST AND VERIFICATION: Test Bench-Combinational Circuit Testing, Sequential Circuit Testing, Test Bench Techniques, Design Verification, Assertion Verification.

TEXT BOOKS:

1. T R. Padmanabhan, B Bala Tripura Sundari, Design Through Verilog HDL, Wiley, 2009.
2. Zainalabdien Navabi, Verilog Digital System Design, TMH, 2nd Edition.

REFERENCE BOOKS:

1. Fundamentals Of Digital Logic With Veilog Design - Stephen Brown, Zvonkoc Vranesic, TMH, 2nd Edition, 2010.
2. Advanced Digital Logic Design Using Verilog, State Machine & Synthesis For FPGA-Sunggu Lee, Cengage Learning, 2012.
3. Verilog HDL-Samir Palnitkar,2nd Edition, Pearson Education, 2009.
4. Advanced Digital Design with The Verilog HDL- Michel D.Ciletti, PHI, 2009.

Course Outcomes:

By the end of this course, the students should be able to:

- Describe Verilog Hardware Description Language (HDL).
- Design Digital Circuits.
- Write Behavioral models of digital circuits.
- Write Register Transfer Level (RTL) models of digital circuits.
- Verify Behavioral and RTL models.
- Describe standard cell libraries and FPGAs.
- Synthesize RTL models to standard cell libraries and FPGAs.
- Implement RTL models on FPGAs and testing & verification.

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1416) IC APPLICATIONS & HDL SIMULATION LAB

V - SEMESTER

L	T	P	C
0	0	3	2

Course Objectives:

The main objectives of the course are:

- To introduce the basic building blocks of linear integrated circuits.
- To teach the linear and non-linear applications of operational amplifiers.
- To introduce the theory and applications of analog multipliers and PLL.
- To teach the theory of ADC and DAC.
- To introduce the concepts of waveform generation and introduce some special function ICs.
- To understand and implement the working of basic digital circuits.

Note: Minimum of 12 experiments have to be conducted (Six from each part):

LIST OF EXPERIMENTS

Part-1: TO VERIFY THE FOLLOWING FUNCTIONS.

1. Adder, Subtractor, Comparator using IC 741 Op-Amp.
2. Integrator and Differentiator using IC741 Op-Amp.
3. Active Low Pass & High Pass Butterworth (second Order)
4. RC Phase Shift and Wein Bridge Oscillators using IC 741 OP-Amp.
5. IC 555 timer in Monostable operation.
6. Schmitt trigger circuits using IC741 & IC 555.
7. IC565-PLL applications
8. Voltage regulator IC 723, three terminal voltage regulators-7805, 7809, 7912.
9. Sample and Hold LF398 IC.

Part-2: TO VERIFY THE FUNCTIONALITY OF THE FOLLOWING 74 SERIES TTL ICS.

1. D Flip-Flop (74LS74) and JK Master –Slave Flip-Flop (74LS73).
2. Decade counter (74LS90) and UP-Down Counter (74LS192).
3. Universal Shift registers-74LS194/195.
4. 3-8 decoder-74LS138.
5. 4 bit comparator 74LS85.
6. 8x1 Multiplexer-74151 and 2x4 demultiplexer-74155.

7. RAM (16x4)-74189(read and write operations).
8. Stack and queue implementation using Ram, 74189

Course Outcomes:

On completion of this course, the students will have:

- A thorough understanding of operational amplifiers with linear integrated circuits.
- Understanding of the different families of digital integrated circuits and their characteristics.
- Also students will be able to design circuits using operational amplifiers for various applications.

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1417) MICROPROCESSORS & MICROCONTROLLERS LAB

V - SEMESTER

L	T	P	C
0	0	3	2

Course Objective:

The Course Objectives are:

- To develop an in-depth understanding of the operation of Microprocessors and Microcontrollers, Machine language programming & Interfacing techniques.

Note: Minimum of 12 experiments are to be conducted.

LIST OF EXPERIMENT

The following programs /experiments are to be written for assembler and execute the same with 8086 and 8051 kits.

List of Experiments:

1. Program for 16 bit arithmetic operations for 8086 (using Various Addressing Modes).
2. Program for sorting an array for 8086.
3. Program for searching for a number or character in a string for 8086.
4. Program for string manipulations for 8086.
5. Program for digital clock design using 8086.
6. Interfacing ADC and DAC to 8086
7. Parallel communication between two microprocessors using 8255
8. Serial communication between two microprocessors using 8251
9. Interfacing to 8086 and Programming to control stepper motor.
10. Program using arithmetic, logical and bit manipulation instructions of 8051.
11. Program and verify Timer/Counter in 8051.
12. Program and verify interrupt handling in 8051.
13. UART Operation in 8051
14. Communication between8051 kit and PC.
15. Interfacing LCD to 8051.
16. Interfacing matrix/keyboard to 8051.
17. Data transfer from Peripheral to memory through DMA controller 8237/8257.

Course Outcome:

Up on completion of the course:

- The Student will learn the internal organization of popular 8086/8085 Microprocessors/Microcontrollers.
- The Student will learn hardware and software interaction and integration.
- The student will learn the design of Microprocessors/Microcontrollers-based systems.

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1011)ANALYTICAL SKILLS-I

V - SEMESTER

L	T	P	C
2	0	0	0

Quantitative Aptitude

- Number System
- LCM and HCF
- Averages
- Simple Equations
- Ratios & Proportions
- Partnerships
- Percentages
- Profit & Loss
- Time & Work
- Time & Distance
- Simple and compound interest
- Permutations & Combinations
- Probability

REFERENCE BOOKS :

1. Quantative Aptitude by R.S. Agarwal.

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1021) MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

VI - SEMESTER

L	T	P	C
4	0	0	4

Objectives:

- The students should be able to apply the principles of economics in business decision making process, Demand analysis, Elasticity of Demand and Demand forecasting.
- Study cost concepts and Break Even Analysis.
- Describe "Business" and new economic environment and also the capital and its significance and capital budgeting techniques.
- Describe the accounting concepts and conventions and financial statements to be prepared for any business.
- Describe the accounting concepts and financial analysis through ratios.

Unit I Introduction & Demand Analysis:
Definition, Nature and Scope of Managerial Economics Demand Analysis: Demand Determinants, Law of Demand and its exceptions. 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 II Theory of Production and Cost Analysis:
Production Function Isoquants and Is costs, MRTS, Least Cost Combination of Inputs, Cobb-Douglas Production function, Laws of Returns, Internal and External Economies of Scale.
Cost Analysis: Cost concepts, Opportunity cost, fixed vs. Variable costs, explicit costs Vs. Implicit costs, Out of pocket costs vs. Imputed costs. Break-even Analysis (BEA)-Determination of Break-Even Point (simple problems)- Managerial Significance and limitations of BEA.

Unit III Introduction to Markets & New Economic Environment:
Market structures: Types of competition and Markets, Features of Perfect competition, Monopoly and Monopolistic Competition. Price-Output Determination in case of Perfect Competition and Monopoly. Pricing: Objectives and Policies of Pricing- Methods of Pricing, Business: Features and evaluation of different forms of Business Organization: Sole Proprietorship, Partnership, Joint Stock Company, Public Enterprises and their types, New Economic Environment in Post-liberalization scenario.

Unit IV Capital and Capital Budgeting:
Capital Budgeting: Capital and its significance, Types of Capital, Estimation of Fixed and Working capital requirements, Methods and sources of raising finance. Capital Budgeting: Nature and scope of capital budgeting, features of capital budgeting proposals, Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR) and Net Present Value Method (simple problems)

Unit V Introduction to Financial Accounting& Financial Analysis:
Accounting concepts and conventions-Introduction IFRS-Double-Entry Book Keeping, Journal,

Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments). Financial Analysis: Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability ratios. Conversion of Ratios into preparation of Financial Statements.

TEXT BOOKS:

1) S. Asiddiqui & A.S Siddiqui Managerial Economics& Financial Analysis, New Age International Publishers, Hyderabad 2013 .
2) Varshney & Maheswari: Managerial Economics, Sultan Chand, 2009.

REFERENCES:

1. Ambrish Gupta, Financial Accounting for Management, Pearson Education, New Delhi.
2. H. Craig Peterson & W. CrisLewis, Managerial Economics, Person, 2012.
3. Lipsey&Chrystel, Economies, Oxford University Press,2012.
4. Dwivedi: Managerial Economics,Vikas2012.
5. Shailaja&Usha: MEFA, University Press,2012.
6. Aryasri: Managerial Economics & Financial Analysis, TMH,2012.

Outcomes:

- To understand the results of the managerial decisions taken in business organization and study the different types of elasticity of demand.
- Understand and apply Production Function formula in determining increasing, constant and decreasing returns, the price, output determination under perfect competition, monopoly.
- To know the requirements for starting a business and understand the effect of the principles of LPG in the new economic environment, the importance of capital in starting a business unit.
- Understand the accounting concepts and conventions followed in double entry book keeping system and know the preparation of final accounts.
- Understand the application of different financial ratios to study the liquidity, solvency and profitability of a business concern.

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1510) OBJECT ORIENTED PROGRAMMING THROUGH JAVA

VI - SEMESTER

L	T	P	C
4	1	0	4

Objectives:

- To understand object oriented programming concepts and applications in problem solving.
- Learn the Java programming language: its syntax, idioms, patterns, and styles.
- Become comfortable with object oriented programming: Learn to think in objects.
- Learn the essentials of the Java class library, and learn how to learn about other parts of the library when you need them.
- To learn the basics of java console and GUI based programs.
- Introduce event driven Graphical User Interface (GUI) programming.

UNIT I:

Java Programming: History of java, comments, data types, variables, constants, scope and life time of variables, operators, hierarchy expressions, type conversions and casting, enumerated types, control for block scope, conditional statements, loops, break and continue statements, simple java stand alone programs, arrays, console input and output, formatting output, constructors, methods, parameter passing, static fields and methods, access controls, his reference, overloading methods and constructors, recursions, garbage collections, building strings, exploring strings class.

UNIT II:

Inheritance: Inheritance hierarchies super and sub classes, member access rules, super keyword, and preventing inheritance: final classes and methods, the object class and its methods.

Polymorphism: dynamic binding, method overloading, abstract classes and methods. **Interface:** interface vs. Abstract classes, defining an interface, implementing interfaces, accessing implementations through interfaces references, extending interface.

Packages: Defining, creating and accessing a package, understanding CLASSPATH, importing packages

UNIT III:

Exception Handling: Dealing with errors, benefits of exception handling, the classification of exceptions, exception hierarchy, checked exceptions and unchecked exception, usage of try , catch, throw, throws, and finally, re-throwing exceptions, exception specification, built in exceptions, creating own exception sub classes.

Multithreading- difference between multiple processes and multiple threads, thread states, creating threads, interrupting threads, thread priorities, synchronizing threads, inter-thread communication, producer consumer pattern.

UNIT IV:

Event Handling: Events, Event sources, Event classes, Event Listeners, Relationship between Event sources and Listeners, Delegation event model, examples: handling a button click, handling mouse events, Adapter classes.

The AWT class hierarchy, User interface components-labels, button, canvas, scrollbars, text components, check box, checkbox groups, choices, list panels-scroll pane, dialogs, menu bar, graphics, layout manager-layout manager types-border, grid, flow, card and grid bag.

UNIT V:

introduction to Swing, Swing vs. AWT, Hierarchy for Swing components, Containers-JFrame, JApplet, JDialog, JPanel, Overview of some swing components, JButton, JLabel, JTextField, JTextArea, simple Swing applications, Layout management- Layout manager types- border grid and flow.

Applets: Inheritance hierarchy for applets, differences between applets and applications, life cycle of an Applet, is passing parameters to applets, applet security issues.

TEXTBOOKS:

1. Java the complete reference ,7th edition, Herbert schildt, TMH
2. Understanding oop with Java, updated edition, T. Budd, Pearson education

REFERENCES:

1. Java for programming, P.J. Dietel Pearson education (OR) Java: How to Program P.J. Dietel and H.M. Dietel, PHI
2. Object Oriented Programming through java, P. Radha Krishna, Universities Press.
3. Thinking in Java, Bruce Eckel, Pearson Education
4. Programming in Java, S. Malhotra and S. Choudhary, Oxford University Press.
5. Java Fundamentals- A Comprehensive introduction, Herbert schildtand Dale skrien, TMH

Course Outcomes:

- Understanding of OOP concepts and basics of java programming (Console and GUI Based)
- Understand the format and use of objects.
- Understand basic input/output methods and their use.
- The skills to apply OOP and java Programming in problem solving.
- Should have the ability to extend his/her knowledge of java programming future on his/her own.
- Understand object inheritance and its use.
- Understand development of JAVA applets vs. JAVA applications.
- Understand the use of various system libraries.

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1418) DIGITAL COMMUNICATIONS

VI - SEMESTER

L	T	P	C
4	1	0	4

Course Objectives:
The objectives are:

- To understand different digital modulation techniques such as PCM, DM and various shift keying techniques.
- Understand the concepts of different digital modulation techniques
- To study about different error detecting and error correcting codes like block codes, cyclic codes and convolution codes
- To study the advantages of spread spectrum techniques and performance of spread spectrum, PN codes in jamming, noise etc.

Unit- I : Elements Of Digital Communication Systems
Advantages of Digital Communication Systems, Bandwidth – S/N trade off, Hartley Shannon Law and Sampling Theorem.
Pulse Code Modulation: PCM Generation and Reconstruction, Quantization noise, Non uniform Quantization and Companding, DPCM, Adaptive DPCM, DM and Adaptive DM, Noise in PCM and DM.

Unit-II: Digital Modulation Techniques
Introduction ,ASK,ASK Modulator, Coherent ASK Detector, Non – Coherent ASK Detector, FSK, Bandwidth and Frequency Spectrum FSK, Non coherent FSK Detector, Coherent FSK Detector, FSK Detection Using PLL,BPSK, Coherent PSK Detection, QPSK, Differential PSK.

Unit-III : Baseband Transmission And Optimal Reception Of Digital Signal
Pulse shaping for optimum transmissions, A Baseband Signal Receiver, Probability of Error, Optimum Receiver, Optimal of Coherent Reception, Signal Space Representation and Probability of Error and eye diagrams for ASK, PSK, FSK, Cross talk.
INFORMATION THEORY: Information and entropy, conditional entropy and redundancy, Shannon Fano coding, Mutual Information, Information loss due to noise, source coding – Huffman Code, variable length coding, Source coding to Increase average Information per bit , Lossy source coding.

Unit-IV : Error Control Codes
Linear Block Codes: Matrix description of Linear block Codes, Error detection and error Correction capabilities of linear block codes.
Cyclic Codes: Algebraic structure, encoding, syndrome calculation, Decoding.

Convolution Codes: Encoding, Decoding using State, tree and trellis diagrams, Decoding using Viterbi algorithm, Comparison of Error Rates in Coded and Uncoded Transmission.

Unit-V : Spread Spectrum Modulation

Use of spread Spectrum, Direct Sequence Spread Spectrum (DSSS), Code Division Multiple Access, Ranging using DSSS, Frequency Hopping Spread Spectrum, PN – Sequences: Generation and Characteristics, Synchronization in Spread Spectrum Systems.

Textbooks:

1. Principles of communication systems – Herbert Taub, Donald L Schiling, Goutam Saha,3rd Edition, McGraw-Hill, 2008.
2. Digital and Analog Communication Systems – Sam Shanmugam, John Wiley, 2005.
3. Digital Communications- John G. Proakis, Masoud Salehi- 5th Edition, Mcgarw- Hill,2008.

References:

1. Digital Communications – Simon Haykin, Jon Wiley, 2005.
2. Digital Communications- Ian A. Glover, Peter M Grant, 2nd Edition, Pearson EDU, 2008.
3. Communications Systems – B.P. Lathi, BS Publications, 2006.
4. A First course in Digital Communications- Nguyen, Shewedyh, Cambridge.
5. Digital Communications- Theory, Techniques, and Applications- R. N. Mutagi, 2nd Ed.2013

Course Outcomes:

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

- Understand basic components of digital communication systems.
- Design optimum receivers for digital modulation techniques.
- Analyze the error performance of digital modulation techniques.
- Know about different error detecting and error correcting codes like block codes, cyclic codes and convolution codes.
- Understand the advantages of spread spectrum techniques and performance of spread spectrum, PN codes in jamming, noise etc.

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1419) MICROWAVE ENGINEERING

VI - SEMESTER

L	T	P	C
4	1	0	4

Course Objectives:

The objectives of the course are

- To develop knowledge on various applications of Microwave frequencies and difficulties in handling the signals at Microwave frequencies.
- To enable the students to understand and analyze various transmission lines used at Microwave frequencies.
- To enable the students to understand and analyze construction and operation of Microwave Tubes.
- To understand Scattering matrix parameters and their application to Microwave components.
- To enable the students to understand construction and operation of Microwave solid state devices.
- To introduce the student the microwave test bench for measurement of different important parameters.

Unit- I : Microwave Transmission Lines

Introduction, Microwave Spectrum and Bands, Applications of Microwaves.

Rectangular Waveguides - Solution of Wave Equations in Rectangular Coordinates, TE/TM mode analysis, Expressions for Fields, Cut-off Frequencies, Dominant and Degenerate Modes, Sketches of TE and TM mode fields in the cross-section, Mode Characteristics - Phase and Group Velocities, Wavelengths and Impedance Relations, Power Transmission and Power Losses, Impossibility of TEM Mode.

Micro Strip Lines- Introduction, Zo Relations, Effective Dielectric Constant, Losses and Q factor.

Cavity Resonators- Introduction, Rectangular Cavities, Dominant Modes and Resonant Frequencies, Q factor and Coupling Coefficients. Illustrative Problems.

Unit- Ii : Waveguide Components and Applications

Coupling Mechanisms - Probe, Loop, - Waveguide Windows, Tuning Screws and Posts, Matched Loads. Waveguide Attenuators - Different Types, Resistive Card and Rotary Vane Attenuators; Waveguide Phase Shifters - Types, Dielectric and Rotary Vane Phase Shifters, Waveguide Multiport Junctions - E plane and H plane Tees, Magic Tee. Directional Couplers-2 Hole, Bethe Hole types. Illustrative Problems.

Ferrites- Composition and Characteristics, Faraday rotation; Ferrite Components- Gyrator, Isolator, Circulator. Scattering Matrix- Significance, Formulation and Properties. S Matrix Properties, Calculation of S Matrix for - 2 port Junctions, E plane and H plane Tees, Magic Tee, Circulator and Isolator.

Unit- III : Microwave Tubes

Limitations and Losses of conventional tubes at microwave frequencies. Classification of **O–** type and M type Microwave tubes.

2-Cavity Klystrons - Structure, Reentrant Cavities, Velocity Modulation Process and Applegate Diagram, Bunching Process and Small Signal Theory - Expressions for o/p Power, efficiency and illustrated problems.

Reflex Klystrons - Structure, Velocity Modulation and Applegate Diagram, Mathematical Theory of Bunching, Power Output, Efficiency, Oscillating Modes and *output* Characteristics, Effect of Repeller Voltage on Power output. Illustrative Problems.

Unit- IV : Helix TWTs

Significance, Types and Characteristics of Slow Wave Structures; Structure of TWT and Amplification Process (qualitative treatment), Suppression of Oscillations, Gain Considerations.

M-Type Tubes : Introduction, Cross-field effects, Magnetrons - Different Types, Cylindrical Traveling Wave Magnetron - Hull Cut-off and Hartree Conditions, Modes of Resonance and π Mode Operation, Separation of π -Mode, *o/p* characteristics. Illustrative Problems.

Unit-V : Microwave Solid State Devices

Introduction, Classification, Applications. TEDs -Introduction, Gunn Diodes - Principle, RWH Theory, Characteristics, Basic Modes of Operation - Gunn Oscillation Modes, LSA Mode, Introduction to Avalanche Transit Time Devices.

Microwave Measurements: Description of Microwave Bench - Different Blocks and their Features, Errors and Precautions; Microwave Power Measurement - Bolometers. Measurement of Attenuation, Frequency and Standing Wave Measurements - Measurement of Low and High VSWR, Cavity Q and Impedance Measurements.

Text Books:

I. Microwave Devices and Circuits - Samuel Y. Liao, Pearson, 3rd Edition,2003.

2. Microwave Principles - Herbert J. Reich, J.G. Skalnik, PF. Ordung and H.L. Krauss, CBS Publishers and Distributors, New Delhi, 2004.

Reference Books:

1. Foundations for Microwave Engineering – R.E. Collin, IEEE Press, John Wiley, 2nd Edition, 2002.

2. Microwave Circuits and Passive Devices – M.L. Sisodia and G.S.Raghuvanshi, Wiley Eastern Ltd., New Age International Publishers Ltd., 1995.

3. Microwave Engineering Passive Circuits – Peter A. Rizzi, PHI, 1999.

4. Electronic and Radio Engineering – F.E. Terman, McGraw-Hill, 4th ed., 1955.

5. Elements of Microwave Engineering – R. Chatterjee, Affiliated East-West Press Pvt. Ltd., New Delhi, 1988.

6. Micro Wave and Radar Engineering – M. Kulkarni, Umesh Publications, 1998.

Course Outcomes:

1. Understand the applications and technical difficulties involved in using microwave frequencies.
2. Analyze functioning of wave guide transmission lines, different modes of propagation, and parameters of transmission lines.
3. Understand functioning and use of various wave guide accessories and their mathematical analysis using S-parameters
4. Understand functioning, usage and limitations of various microwave tubes and solid state devices.
5. Ability to understand methodology of measurement of important microwave parameters.

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1420) DIGITAL SIGNAL PROCESSING

VI - SEMESTER

L	T	P	C
4	1	0	4

Course Objectives:

This course is an essential course that provides design techniques for processing all type of signals in various fields. The main objectives are:

- To provide background and fundamental material for the analysis and processing of digital signals.
- To familiarize the relationships between continuous – time and discrete – time signals and systems.
- To study fundamentals of time, frequency and Z – plane analysis and to discuss the inter - relationships of these analytic method.
- To study the designs and structures of digital (IIR and FIR) filters from analysis to synthesis for a given specifications.
- The impetus is to introduce a few real – world signal processing applications.
- To acquaint in FFT algorithms, Multi – rate signal processing techniques and finite world length effects.

UNIT- I : INTRODUCTION: INTRODUCTION TO DIGITAL SIGNAL PROCESSING

Discrete time signals & sequences, linear shift invariant systems, stability and causality, linear constant coefficient difference equations, Frequency domain representation of discrete time signals and systems.

REALIZATION OF DIGITAL FILTERS: Applications of Z-transforms, solution of difference equations of digital filters, System function ,Stability criterion, Frequency response of stable systems, Realization of digital filters – Direct, Canonic, Cascade and Parallel forms.

UNIT –II : DISCRETE FOURIER SERIES

DFS representation of periodic Sequences, Properties of Discrete Fourier Series, Discrete Fourier Transforms: Properties of DFT, linear convolution of sequences using DFT, Computation of DFT: Over – lap Add method, over – lap Save method, Relation between DTFT, DFS, DFT and Z-Transform.

FAST FOURIER TRANSFORMS: Fast Fourier Transforms (FFT) - Radix-2 decimation-in-time and decimation – in-frequency FFT Algorithms, Inverse FFT, and FFT with general Radix-N.

UNIT- III : IIR DIGITAL FILTERS

Analog filer approximations- Butterworth and Chebyshev, Design of IIR Digital filters from analog filters, Step and Impulse invariant techniques, bilinear transformation method, spectral transformations.

UNIT- IV : FIR DIGITAL FILTERS

Characteristics of FIR Digital Filters, Frequency response, Design of FIR Filters: Fourier Method, Digital Filters using Window techniques, Frequency Sampling technique, Comparison of IIR & FIR filters.

UNIT- V : MULTI RATE DIGITAL SIGNAL PROCESSING

Introduction, down sampling, Decimation, Up sampling, interpolation, sampling rate conversion.
Finite word Length effects: Limit Cycles, Overflow oscillations, round-off noise in IIR digital filters, Computational output round off Noise, Methods to prevent overflow, Tradeoff between Round off and overflow noise, Dead band effects.

TEXT BOOKS:

1. Digital Signal Processing, Principles, Algorithms, and Applications, John G.Proakis, Dimitris G.Manolakis, Pearson Education /PHI, 2007.
2. Discrete Time Signal Processing - A.V. Oppenheim and R.W.Schaffer, PHI, 2009.
3. Fundamentals of Digital Signal Processing- Loney Ludeman, John Wiley, 2009.

REFERENCES:

1. Digital Signal Processing – Fundamentals and Applications – Li Tan, Elsevier, 2008.
2. Fundamentals of Digital Signal Processing Using MATLAB – Robert J.Schilling, Sandra L.Harris, Thomson, 2007.
3. Digital Signal Processing - S.Salivahanan, A.Vallavaraj and C.Gnanapriya, TMH, 2009.
4. Discrete Systems and Digital Signal Processing with MATLAB – Taan S.EIAli, CRC press, 2009.
5. Digital Signal Processing – A practical approach, Emmanuel C.I `feachor and Barrie W.Jervis, 2nd Edition Pearson Education, 2009.
6. Digital Signal Processing - Nagoor kani, TMG, 2012.

Corse Outcomes:

On completion of this subject, the students should be able to:

- Perform Time, Frequency and Z- transform analysis on signals and systems.
- Understand the inter – relationship between DFT and various transforms.
- Understand the significance of various filter structures and effects of round off errors.
- Design a digital filter for a given specification.
- Understand the fast computation of DFT and appreciate the FFT processing.
- Understand the tradeoffs between normal and multi rate DSP techniques and finite length word effects.

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1421)EMBEDDED SYSTEMS DESIGN
(ELECTIVE-I)

VI - SEMESTER

L	T	P	C
4	0	0	4

Course Objective:

- For embedded systems, the course will enable the students to :
- Understand the basics of an embedded system
- Program an embedded system
- To learn the method of designing an Embedded System for any type of applications
- To understand operating systems concepts, types and choosing RTOS.

UNIT- I : INTRODUCTION TO EMBEDDED SYSTEMS

Definition of Embedded System, Embedded Systems Vs General Computing Systems, History of Embedded Systems, Classification, Major Application Areas, Purpose of Embedded Systems, Characteristics and Quality Attributes of Embedded Systems.

UNIT- II : TYPICAL EMBEDDED SYSTEM

Core of the Embedded System: General Purpose and Domain Specific Processors, ASICs, PPLDs, Commercial Off- The- Shelf Components (COTS), Memory,: ROM, RAM, Memory according to the type of Interface, Memory Shadowing, Memory selection for Embedded Systems, Sensors and Actuators, Communication Interface: Onboard and External Communication Interfaces.

UNIT –III : EMBEDDED FIRMWARE

Reset Circuit, Brown-out Protection Circuit, Oscillator UNIT, Real Time Clock, Watchdog Timer, Embedded Firmware Design Approaches and Development Languages.

UNIT – IV : RTOS BASED EMBEDDED SYSTEM DESIGN

Operating System Basics, Types of Operating Systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling.

UNIT – V : TASK COMMUNICATION

Shared Memory, Message Passing, Remote Procedure Call and Sockets, Task Synchronization: Task Communication/ Synchronization issues, Task Synchronization Techniques, Device Drivers, How to choose an RTOS.

TEXT BOOK:

1. Introduction to Embedded Systems – Shibu K.V. Mc Graw Hill

REFERENCE BOOKS:

2. Embedded Systems – Raj Kamal, TMH
3. Embedded System Design – Frank Vahid, Tony Givargis, John Wiley.

4. Embedded Systems – Lyla, Pearson, 2013
5. An Embedded Software Primer- David E Simon, Pearson Education

Course Outcomes:

- Upon completion of this course, the student will be able to
- Understand and design embedded systems
- Learn basic of OS and RTOS
- Understand types of memory and interfacing to external world

Understand embedded firmware design approaches

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1509) DATABASE MANAGEMENT SYSTEMS
(ELECTIVE-I)

VI - SEMESTER

L	T	P	C
4	0	0	4

Objectives:

- To understand the basic concepts and the applications of database systems.
- To master the basics of SQL and construct queries using SQL.
- To understand the relational database design principles.
- To become familiar with the basic issues of transaction processing and concurrently control.
- To become familiar with database storage structures and access technologies.

UNIT- I:

Introduction: Data base System Applications, Purpose of Database Systems, View of Data – Data Abstraction –Instances and Schemas – data Models – the ER Model – Relational Model – Other Models – Database Languages – DDL – DML – database Access for applications Programs – data base Users and Administrator, History of data base systems

Introduction to Data base design and ER diagrams – ER Model - Entities, Attributes and Entity sets – Relationships and Relationship sets – Additional features of ER Model – Conceptual Design with ER model – Conceptual Design for Large Enterprise.

Introduction to the Relational Model, Integrity constraints over Relations, Enforcing Integrity Constraints, Query Relational Data, Logical database Design, Introduction to views- Destroying/ altering tables & Views

UNIT- II:

Relational Algebra & Calculus– Selection and projection set operations – renaming – Joins – Division – Examples of Algebra overviews – Relational calculus – Tuple relational Calculus – Domain relational calculus – Expressive Power of Algebra and calculus.

Form of Basic SQL Query- Examples of SQL Queries – introduction to Nested Queires, Correlated Nested Queries, Set comparison Operators, Aggregate Operators, Null values comparison, using Null values, logical connectives, AND, OR & NOT Impact on SQL constructs, Outer Joins, Disallowing Null Values, and Complex Integrity constraints in SQL Triggers and Active Data bases.

UNIT III:

Introduction to Schema Refinement – Problems Caused by redundancy, Decompositions – Problem related to decomposition, Functional Dependencies - Reasoning about FDS, Normal Forms – FIRST,SECOND, THIRD Normal forms – BCNF –Properties of Decompositions- Loss less- join Decomposition, Dependency preserving Decomposition, Schema Refinement in Data base Design – Multi valued Dependencies – FOURTH Normal Form, Join Dependencies, FIFTH Normal form, Inclusion Dependencies

UNIT IV:

Transaction management Transaction Concept- Transaction State- Implementation of Atomicity and Durability – Concurrent – Executions – Serializability- Recoverability – Implementation of Isolation – Testing for Serializability-

Concurrency control-Lock –Based Protocols – Timestamp Based Protocols- Validation- Based Protocols – Multiple Granularity.

Recovery System- Failure classification, storage structure, Recovery & atomicity, Log – Based Recovery – Recovery with Concurrent Transactions – Buffer Management – Failure with loss of nonvolatile storage-Advance Recovery systems- Remote Backup systems.

UNIT V:

Overview of Storage and Indexing: Data on External Storage, File Organization and Indexing – Clustered Indexes, Primary and Secondary Indexes, Index data Structures – Hash Based Indexing, Tree based Indexing, Comparison of File Organizations. Storing data: Disks and Files: -The Memory Hierarchy – Redundant Arrays of Independent Disks.

Tree Structured Indexing: Intuitions for tree Indexes, Indexed Sequential Access Methods (ISAM) B+Trees: A Dynamic Index Structure, Search, Insert, and Delete.

Hash Based Indexing: Static Hashing, Extendable hashing, Linear Hashing, Extendible Vs. Linear Hashing.

TEXTBOOKS:

1. Data base Management Systems, Raghu Ramakrishnan, Johannes Gehrke, TMH, 3rd Edition, 2003.
2. Data base System Concepts, A.Silberschatz, H.F. Korth, S.Sudarshan, McGraw hill, VI edition, 2006.
3. Fundamentals of Database Systems 5th edition, Ramez Elmasri, Shamkant B.Navathe, Pearson Education, 2008.

REFERENCES:

1. Database Management System Oracle SQL and PL/SQL, P.K.Das Gupta, PHI.
2. Database System Concepts, Peter Rob & Carlos Coronel, Cengage Learning, 2008.
3. Database Systems, A Practical approach to Design Implementation and Management Fourth edition, Thomas Connolly, Carolyn Begg, Pearson education.
4. Database-Principles,Programming,andPerformance,P.O'Neil,E.O'Neil, 2nd Edition Elesevier
5. Fundamentals of Relational Database Management Systems, S.Sumathi, S.Esakkirajan, Springer.
6. Introduction to Database Management, M.L.Gillenson and others, Wiley Student Edition.
7. Database Development and Management, Lee Chao, Auerbach publications, Taylor & Francis Group.
8. Introduction to Database Systems, C.J.Date, Pearson Education.

OUTCOMES:

- Demonstrate the basic elements of a relational database management system.
- Ability to identify the data models for relevant problems.
- Ability to design entity relationship and convert entity relationship diagrams into RDBMS and formulate SQL queries on the respect data.
- Apply normalization for the development of application softwares.

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1422)TELECOMMUNICATION SWITCHING SYSTEMS & NETWORKS
(ELECTIVE-I)

VI - SEMESTER

L	T	P	C
4	0	0	4

Course objectives:

The following are the course objectives:

- To learn Switching, Signaling and traffic in the context of telecommunication network.
- To expose through the evolution of switching systems from manual and electromechanical systems to stored-program-controlled digital systems.
- To study signaling, packet switching and networks.

UNIT- I

Switching System: Evolution Of Telecommunications ; Basics of A Switching Systems; Functions of A Switching Systems; Crossbar Switching- Principle of Crossbar Switching; Crossbar Switching Configurations; Cross-Point Technology; Crossbar Exchange Organization; a General Trunking; Electronic Switching; Digital Switching Systems.

Telecommunications Traffic: Introduction; The UNIT Of Traffic; Congestion; Traffic Measurement; A Mathematical Model; Lost-Call Systems- Theory; Traffic Performance; Loss Systems In Tandem; Use Of Traffic Tables; Queuing Systems- The Second Erlang Distribution; Probability Of Delay; Finite Queue Capacity; Some Other Useful Results; Systems With A Single Server; Queue In Tandem; Delay Tables; Applications Of Delay Formulae.

UNIT- II

Switching Networks: Single Stage Networks; Gradings- Principle; Two Stage Networks; Three Stage Networks; Four Stage Networks.

Time Division Switching: Basic Time Division Space Switching; Basic Time Division Time Switching; Time Multiplexed Space Switching; Time Multiplexed Time Switching; Combination Switching; Three Stage Combination Switching.

Control of Switching Systems: Call Processing Functions- Sequence Of Operations; Signal Exchanges; State Transition Diagrams; Common Control; Reliability; Availability And Security; Stored Program Control.

UNIT - III

Signaling: Introduction; Customer Line Signaling; Audio Frequency Junctions And Trunk Circuits; FDM Carrier Systems-Out band Signaling; In band (VF) Signaling; PCM Signaling; Inter Register Signaling; Common Channel Signaling Principles-General Signaling Networks; CCITT Signaling Systems Number 6; CCITT Signaling System Number 7; The High Level Data Link Control Protocol; Signal UNITs; The Signaling Information Field.

UNIT- IV

Packet Switching: Introduction; Statistical Multiplexing; Local Area And Wide Area Networks-Bus Networks; Ring Networks; Compression of Bus And Ring Networks; Optical Fiber Networks; Large Scale Networks- General; Datagrams And Virtual Circuits; Routing; Flow Control; Standards; Frame Relay; Broadband Networks-General; The Asynchronous Transfer Mode; ATM Switches.

UNIT- V

Networks: Introduction; Analog Networks; Integrated Digital Networks; Integrated Services Digital Networks; Cellular Radio Networks; Intelligent Networks; Private Networks; Charging; Routing-General, Automatic Alternative Routing.

TEXT BOOKS:

1. J.E Flood, "Telecommunications Switching and Traffic Networks", Pearson Education, 2006.
2. Tyagarajan Viswanathan, "Telecommunications Switching Systems and Networks", Prentice Hall of India Pvt. Ltd., 2006.

REFERENCE BOOKS:

1. John C Bellamy, "Digital Telephony", John-Wiley International student Edition,3rd Edition, 2000.
2. Behrouz A. Forouzan, "Data Communications and Networking", TMH, 2nd Edition, 2002.
3. Tomasi, "Introduction to Data Communications and Networking", Pearson Education, 1st Edition, 2007.

Course outcomes:

On completion of this course, it is expected that the student will be able to:

- Understand the main concepts of telecommunication network design.
- Analyze and evaluate fundamental telecommunication traffic models.
- Understand basic modem signaling system.
- Solve traditional interconnection switching system design problems.
- Understand the concept of packet switching.

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1423) COMMUNICATION LAB

VI - SEMESTER

L	T	P	C
0	0	3	2

Course Objectives:

The objectives are:

- To understand different digital modulation techniques such as PCM, DM and various shift keying techniques.
- Understand the concepts of different digital modulation techniques
- To study about different error detecting and error correcting codes like block codes, cyclic codes and convolution codes
- To study the advantages of spread spectrum techniques and performance of spread spectrum, PN codes in jamming, noise etc.

Note: Minimum of 12 Experiments should be conducted

All the **Part-A** experiments are to be simulated first using Comsim, MATLAB, SCILAB, OCTAVE or any other simulation package and then to be realized in hardware.

Part-A (Any four experiments to be conducted)

1. Amplitude modulation and demodulation
2. SSB-SC Modulator and Detector (Phase Shift Method)
3. Frequency modulation and demodulation
4. Study of spectrum analyzer and analysis of AM and FM Signals
5. Pre-emphasis and De-emphasis
6. Time Division Multiplexing & De multiplexing
7. Pulse Position Modulation& Demodulation

Part-B (Any four experiments to be conducted)

1. Differential Pulse Code Modulation
2. Delta Modulation
3. Generation and Detection of Amplitude Shift Keying
4. Generation and Detection of Frequency Shift Keying
5. Generation and Detection of Phase Shift Keying & Differential Phase Shift Keying
6. Generation and Detection of Quadrature Phase Shift Keying
7. Study the spectral characteristics of PAM, QAM

Part-C (Any four experiments to be conducted)

1. Reflex Klystron Characteristics
2. Gunn Diode Characteristics
3. Directional Coupler Characteristics
4. Measurement of Impedance of a given load
5. Measurement of scattering parameters of a Magic Tee
6. Attenuation Measurement

Equipment required for Microwave Lab

1. Microwave Bench set up with Klystron Power Supply
2. Microwave Bench set up with Gunn Power Supply
3. Micro Ammeter
4. VSWR meter
5. Microwave Components

Equipment required

1. RPS - 0-30V
2. CRO - 0-20 M Hz
3. Function Generators - 0-1M Hz
4. RF generators - 0-1000 M Hz/0-100M Hz
5. Multimeters
6. Lab Experimental kits for Analog Communication/Digital Communication
7. Components
8. Radio Receiver/TV Receiver Demo kits or Trainees
9. Spectrum Analyzer -60 M Hz

Course Outcomes:

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

- Understand basic components of digital communication systems.
- Design optimum receivers for digital modulation techniques.
- Analyze the error performance of digital modulation techniques.
- Know about different error detecting and error correcting codes like block codes, cyclic codes and convolution codes.
- Understand the advantages of spread spectrum techniques and performance of spread spectrum, PN codes in jamming, noise etc.

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1424) DIGITAL SIGNAL PROCESSING LAB

VI - SEMESTER

L	T	P	C
0	0	3	2

Course Objectives:

This course is an essential course that provides design techniques for processing all type of signals in various fields. The main objectives are:

- To provide background and fundamental material for the analysis and processing of digital signals.
- To familiarize the relationships between continuous – time and discrete – time signals and systems.
- To study fundamentals of time, frequency and Z – plane analysis and to discuss the inter - relationships of these analytic method.
- To study the designs and structures of digital (IIR and FIR) filters from analysis to synthesis for a given specifications.
- The impetus is to introduce a few real – world signal processing applications.
- To acquaint in FFT algorithms, Multi – rate signal processing techniques and finite world length effects

Note:

- Minimum of 12 experiments are to be conducted.
- The programs shall be implanted in software (using MATLAB / LAB VIEW / C programming /OCTAVE or Equivalent) and hardware (Using TI / Analog devices / Motorola / Equipment DSP processors).

LIST OF EXPERIMENTS

1. Generation of Sinusoidal waveform / signal based on recursive difference equations.
2. To find DFT/IDFT of given DT signal
3. To find frequency response of a given system given in (Transfer Function / Differential equation form).
4. Implementation of FFT of given sequence
5. Determination of Power Spectrum of a given signal(s).
6. Implementation of LP FIR filter for a given sequence.
7. Implementation of HP FIR filter for a given sequence.
8. Implementation of LP IIR filter for a given sequence.
9. Implementation of HP IIR filter for a given sequence.

10. Generation of Sinusoidal signal through filtering
11. Generation of DTMF signals
12. Implementation of Decimation Process.
13. Implementation of Interpolation Process.
14. Implementation of I/D sampling rate converters.
15. Audio application such as to plot a time and frequency display of microphone plus a cosine using DSP , Read a wav file and match with their respective spectrograms.
16. Noise removal : Add noise above 3 KHZ and then remove , interference suppression using 400Hz tone.
17. Impulse response of first order and second order systems.

Corse Outcomes:

On completion of this subject, the students should be able to:

- Perform Time, Frequency and Z- transform analysis on signals and systems.
- Understand the inter – relationship between DFT and various transforms.
- Understand the significance of various filter structures and effects of round off errors.
- Design a digital filter for a given specification.
- Understand the fast computation of DFT and appreciate the FFT processing.
- Understand the tradeoffs between normal and multi rate DSP techniques and finite length word effects.

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1012)ANALYTICAL SKILLS-II

VI - SEMESTER

L	T	P	C
2	0	0	0

Logical Reasoning

- Analogy
- Classification
- Series & Sequence
- Coding & Decoding
- Directions
- Blood Relations
- Seating Arrangements
- Clocks and Calendars

Analytical Ability & Reasoning

- Cubes
- Logical Deductions
- Figure Analysis
- General Puzzles
- Data Sufficiency
- Data Interpretation

Business English

- Basics of Communication Skills
- Articles
- Tenses
- S+ V agreement
- Model Verbs
- Be/do/has/have Forms
- Question Forms

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1022) MANAGEMENT SCIENCE

VII - SEMESTER

L	T	P	C
4	0	0	4

Objectives:

- Understand the concepts of management Administration and find & the difference between Organizing and organization and principles of Organization.
- Identifies the factors determining plant location and explain the concepts of plant layout, Marketing functions and the concepts of marketing and selling and channels of distribution.
- Understand the concept of job analysis, job description and job specification and the concepts of network, PERT and CPM& Understanding the direct cost and indirect cost.
- To identify the internal and external environmental factors and SWOT Analysis.
- The widely known concepts and practices prevalent in modern business and service Organization.

UNIT I: Introduction to Management &Organization:

Introduction to Management : Concepts of Management and organization- nature, importance and Functions of Management, Taylor's Scientific Management Theory, Fayol's Principles of Management, Mayo's Hawthorne Experiments, Maslow's Theory of Human Needs, Douglas McGregor's Theory X and Theory Y, Herzberg's Two-Factor Theory of Motivation, Systems Approach to Management, Leadership Styles, Social responsibilities of Management.

UNIT II: Operations& Marketing Management:

Principles and types of plant layout-Methods of Production, Work study Basic procedure involved in method study and Work Measurement-Business process reengineering Statistical Quality Control: control charts for variables and Attributes and Acceptance sampling, Total Quality Management (TQM), Six sigma, Deming's contribution to quality, objectives of inventory control EOQ, ABC Analysis, Functions of marketing, marketing mix, marketing Strategies based on product life cycle, channels of distribution.

UNIT III: Human Resource Management:

Human Resources Management (HRM) : Concepts of HRM, HRD and Personnel Management and Industrial Relations (PMIR), HRMvs. PMIR, Basic functions of HR Manager: Manpower planning, Recruitment, Selection, Training and Development, Placement, Wage and Salary Administration, Promotion, Transfer, Separation, Performance Appraisal, Grievance Handling and Welfare Administration, Job Evaluation and Merit Rating.

UNIT IV: Project Management:

Project Management (PERT/CPM) : Network Analysis, Programme Evaluation and Review Technique (PERT), Critical Path Method (CPM), Identifying critical path, Probability of Completing the project within given time, Project Cost Analysis, Project Crashing. (simple problems)

UNIT V:Strategic Management and Contemporary Strategic Issues:

Strategic Management : Mission, Goals, Objectives, Policy, Strategy, Programmes, Elements of Corporate Planning Process, Environmental Scanning, Value Chain Analysis, SWOT Analysis, Steps in Strategy Formulation and Implementation, Generic Strategy alternatives. Bench Marking and Balance Score Card as contemporary Business Strategies.

TEXT BOOKS:

1. Aryasri: Management Science, McGraw Hill,2012.
2. Vijay kumar and Apparao Management Science, Cenage,2012.

REFERENCES:

1. Kotler Philip & Keller Kevin Lane: Marketing Mangement,pearson,2012
2. Koontz &Weihrich: Essentials of Management, McGraw Hill,2012.
3. Thomas N.Duening& John M.Ivancevich Management—Principles and Guidelines, iztantra,2012.
4. KanishkaBedi, Production and Operations Management, Oxford University Press, 2012.
5. Schermerhorn, Capling, Poole &Wiesner: Management, Wiley, 2012.
6. Parnell: Strategic Management, Cengage2012.
7. Lawrence R Jauch, R.Gupta&William F.Glueck:Business Policy and Strategic Management, Frank Bros.2012.

Outcomes:

- Understanding the Organization environment and which kind of structure they have to follow to reach the Department goal after next Organization goal.
- Understanding before start the plant what are the factors they have to check and they know the production and to utilize the each and every raw materials.
- Knowing the recruitment of each and every employee, how they can show the performance appraisal and knowing the logical thinking to complete the work within the time period.
- Knowing the MISSION, VISION and OBJECTIVE Of corporate company and how to reach all those things and how to implement the strategy to reach the corporate goal.
- Knowing the just in time and how to maintain the quality and others.

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1425) VLSI DESIGN

VII - SEMESTER

L	T	P	C
4	1	0	4

Course objective

The objective of the course is to

- Give exposure to different steps involved in the fabrication of ICs using MOS transistors, CMOS/BICMOS transistors and passive components
- Explain electrical properties of MOS and BICMOS devices to analyze the behavior of inverters designed with various loads.
- Provide concept to design different types of logic gates using CMOS inverter and analyze their transfer characteristics.
- Provide design concepts to design building blocks of data path of any system using gates.
- Understand basic programmable logic devices and testing of CMOS circuits.

UNIT- I:

Introduction :Review of Semiconductors, Introduction to IC Technology, PMOS, NMOS, CMOS & BiCMOS technologies, Steps involved in Fabrication Process.

Basic Electrical Properties: Basic Electrical Properties of MOS and Bi CMOS Circuits: Ids-Vds relationships, MOS transistor threshold Voltage, Transconductance, figure of merit, NMOS Inverter, Various pull ups, CMOS Inverter analysis and design, Bi-CMOS Inverters.

UNIT- II :

VLSI Circuit Design Processes :VLSI Design Flow,Design Constraints, MOS Layers, Stick Diagrams, Design Rules and Layout, 2 um CMOS Design rules for wires, Contacts and Transistors Layout Diagrams for NMOS and CMOS Inverters and Gates, Scaling of MOS circuits, Limitations of Scaling.CAD tools

UNIT- III :

Gate Level Design: Logic Gates and Other complex gates, Switch logic, Alternate gate circuits, Basic circuit concepts, Concept of Sheet Resistance and Area Capacitance, Delays, Driving large Capacitive Loads, Wiring Capacitances, Fan-in and fan-out, Choice of layers.

UNIT- IV:

System Level Design Considerations: ALU unit , Multipliers, Parity generators, Comparators, Zero/One Detectors, Counters, High Density Memory Elements. SRAM, DRAM, ROM, Serial access memories, Content Addressable Memory.

UNIT- V :

Programmable logic Devices: PLD's, CPLD's, FPGAs, Standard Cells, sea of gates, Design Approach, Parameters influencing low power design.

CMOS Testing: Need and importance of testing, CMOS Testing, Test Principles, Design Strategies for test, Chip level Test Techniques.

TEXTBOOKS :

1. Essentials of VLSI circuits and systems – Kamran Eshraghian, Eshraghian Dougles and A. Pucknell, PHI, tion.
2. CMOS VLSI Design – A Circuits and Systems Perspective , Neil.H.E.Weste a,David Harris,Ayan Banerjee,3rd Ed, Pearson Education, 2009.
3 .VLSI Technology SM SZE.

REFERENCES:

1. Introduction to VLSI Systems: A Logic, Circuit and System Perspective - Ming-BO Lin, CRC Press, 2011
2. CMOS logic circuit Design - John .P. Uyemura, Springer, 2007.
3. Modern VLSI Design - Wayne Wolf, Pearson Education, 3rd Edition, 1997.
4. VLSI Design- K .Lal Kishore, V. S. V. Prabhakar, I.K International, 2009.
5. Introduction to VLSI - Mead & Convey, BS Publications, 2010.

Course Outcomes:

- Upon successfully completing the course, the student should be able to:
- Acquire qualitative knowledge about the fabrication process of integrated circuit using MOS transistors.
- Choose an appropriate inverter depending on specifications required for a circuit
- Draw the layout of any logic circuit which helps to understand and estimate parasitic of any logic circuit
- Design different types of logic gates using CMOS inverter and analyze their transfer characteristics
- Provide design concepts required to design building blocks of data path using gates.
- Design simple memories using MOS transistors and can understand
- Design of large memories.
- Design simple logic circuit using PLA. PAL. FPGA and CPLD.
- Understand different types of faults that can occur in a system and learn the concept of testing and adding extra hardware to improve testability of system

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1426) ELECTRONIC MEASUREMENTS & INSTRUMENTATION

VII - SEMESTER

L	T	P	C
4	1	0	4

Course Objectives:

This course provides:

- An introduction to measurement techniques and instrumentation design and operation.
- The basic concept of UNITs, Measurement error and Accuracy, The construction and design of measuring devices and circuits, measuring instruments and their proper applications
- To use different measuring techniques and the measurement of different physical parameters using different transducers.

UNIT- I : BLOCK SCHEMATIC OF MEASURING SYSTEMS

Performance characteristics, Static characteristics, Accuracy, Resolution, Precision, Types ofErrors, Gaussian Error, Root Sum Squares formula, Dynamic Characteristics, Repeatability, Reproducibility, Fidelity, Lag; Measuring Instruments: DC Volt meters, D'Arsonval Movement, DC Current Meters, AC voltmeters and Current Meters, Ohmmeters ,Multi meters , Meter Protection, Extension of Range, True RMS Responding Voltmeters, Specifications of Instruments.

UNIT –II : SIGNAL ANALYZERS

AF, HF Wave Analyzers, Harmonic Distortion, Heterodyne Wave Analyzers, Spectrum Analyzers, Power Analyzers, Capacitance-Voltage Meters, Oscillators. Signal Generator- AF ,RF signal generators, Sweep frequency Generators, pulse and Square wave Generators ,Function Generators, Arbitrary waveform Generator, Video signal Generators, Specifications

UNIT- III : OSCILLOSCOPES

CRT, Block Schematic of CRO, Time base circuits, Lissajous Figures, CRO Probes, High Frequency CRO Considerations, Delay Lines, Applications: Measurement of time, Period and Frequency specifications.

Special Purpose oscilloscopes: Dual trace, Dual Beam CROs, sampling oscilloscopes, storage oscilloscopes, digital storage CROs.

UNIT- IV : TRANSDUCERS

Classification, Strain gauges, Bounded, Un bounded; force and displacement transducers, Resistance Thermometers ,hotwire anemometers, LVDT, Thermocouples, Synchros, Special Resistance Thermometers ,Digital temperature sensing system. Piezo Electric transducers, variable capacitance transducers, Magneto Strictive Transducers.

UNIT- V: BRIDGES

Wheat stone bridge, Kelvin Bridge, and Maxwell's bridge

MEASUREMENT OF PHYSICAL PARAMETERS: Flow Measurement, displacement meters, Liquid level Measurements , Measurement of Humidity and Moisture, Velocity, Force, Pressure – High Pressure , Vacuum level , Temperature – Measurements, Data Acquisition Systems.

TEXT BOOKS:

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

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REFERENCES:

1. Electronic Instrumentation & Measurements - David A. Bell, Oxford Univ. Press, 1997.
2. Electronic Measurements And Instrumentation: B.M.Oliver, J.M.cage TMH reprint 2009.
3. Measurement Systems - Emest O. Doebelin and Dhanesh N Manik, 6^{th} Ed., TMH,
4. Electronic Measurements & Instrumentations by K. Lal Kishore, Pearson Education – 2010.
5. Industrial Instrumentation: T.R.Padmanabham Springer 2009.

Course Outcomes:

Upon a successful completion of this course, the student will be able to :

- Describe the fundamental concepts and principles of instrumentation.
- Explain the operations of the various instruments required in measurements.
- Apply the measurement techniques for different types of tests.
- To select the specific instrument for specific measurement function.
- Understand principle of operation, working of different electronic instruments like Digital multi meter, Vector volt meter.
- Learners will apply knowledge of different oscilloscopes like CRO, DSO.
- Student will understand functioning, specification, and applications of signal analyzing instruments.

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1427) DIGITAL DATA COMMUNICATIONS

VII - SEMESTER

L	T	P	C
4	1	0	4

Course Objectives:
The objectives are:

- To understand different Point-to-point, Multi-point configurations and Topologies, transmission modes.
- Understand the concepts of different Data communication protocols
- To study about different error detecting and error correcting codes like block codes, cyclic codes and convolution codes
- To study the concepts of digital multiplexing and optical communication basics.

UNIT-I : DATA COMMUNICATION METHODS
Data Communication Circuit, Point-to-point, Multi-point configurations and Topologies, transmission modes, 2-wire and 4-wire operations, codes, Error detection methods, Error correction methods, Character synchronization.

UNIT –II: DATA COMMUNICATION PROTOCOLS:
Asynchronous protocols Synchronous protocols, Bisync Protocol, SDLC, HDLC – Frame format, Flow control and error control.
SWITCHING TECHNIQUES: Circuit Switching Message Switching and Packet Switching principles, virtual circuit and datagram techniques, X.25 and frame relay.

UNIT – III: LINE PROTOCOLS AND CONGESTION CONTROL:
Line protocols: Basic mode, Half-duplex point-to point protocol, Half-Duplex Multi-Point Protocol, Full – Duplex Protocols, Polling, Roll Call and Hub Polling, Traffic management, Congestion control in packet switching networks and Frame relay.

UNIT – IV : DIGITAL MULTIPLEXING:
TDM, TI carrier system, CCITT-TDM carrier system, CODEC chips, Digital hierarchy, Line Encoding, Frame Synchronization, .Multiplexers, Statistical multiplexer, concentrator, front-end communication processor, Digital PBX long haul communication with FDM, Hybrid data.

UNIT – V: OPTICAL COMMUNICATION
Basic Optical Network Topologies and their performances, SONET/SDH – Transmission formats and Speeds, Optical interfaces, SONET/SDH rings and networks.

TEXT BOOKS:
1.W.TOMASI: Advanced Electronic Communication Systems, PHI

2. Data and Computer Communications – William Stallings 7/c,PEI.
3.Optical Communication – B.Gerd Keiser, PHI

REFERENCES:

1.T. Housely: Data Communications and Teleprocessing systems, PHI.
2.Data and Computer Networking Communications – B.A.Forouzon,3rd TMH.

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1506)COMPUTER NETWORKS

VII - SEMESTER

L	T	P	C
4	1	0	4

Objectives:

- To introduce the fundamental various of computer networks.
- To determine the TCP/IP and OSI models with merits and demerits.
- To explore the various layers of OSI Model
- To introduce UDP and TCP Models.

UNIT- I:

Introduction: Networks, Layering Scenario, TCP/IP Protocol, Protocol Suite: The OSI Model, Internet History Standards and administration; Comparison of the OSI and TCP/IP Reference Model.
Physical Layer: Data Transmission- Guided Transmission media, Wireless Transmission media.
Data Link Layer: Design Issues, CRC Codes, Elementary Data Link Layer Protocols, Sliding Window Protocol.

UNIT- II:

Multiple Access Protocols: ALOHA, CSMA, Collision free protocols, Ethernet- Physical Layer, Ethernet Mac Sub layer, Data Link layer switching & use of bridges, learning bridges, spanning tree bridges, repeaters, hubs, switches, routers and gateways.

UNIT- III:

Network Layer: Design Issues, Store and Forward Packet Switching, Connection less and Connection Oriented networks, Routing Algorithms-Optimality principle, Shortest Path, Flooding, Distance Vector routing, Count to Infinity Problem, Hierarchical routing, Congestion Control Algorithms, Admission control.

UNIT IV:

Internetworking: Tunneling, Internet Routing, Packet fragmentation, IPV4, IPV6 Protocol, IP Addresses, CIDR, IMCP, ARP, RARP, DHCP.
Transport Layer: Services provided to the upper layers elements of transport protocol-addressing connection establishment, Connection release, Crash Recovery.

UNTI V:

The Internet Transport Protocols: Introduction to TCP, The TCP Service Model, The TCP Segment Header, The connection Establishment, The TCP Connection Release, The TCP Connection Management Modeling, The TCP sliding window, The TCP Congestion control, The future of TCP.
Application Layer: Introduction, providing services, Application Layer Paradigms, Client Server Model, Standard Client Server application-HTTP, FTP, Electronic mail, TELNET, DNS, SSH.

TEXT BOOKS:

1. William Stallings, Data and Computer Communication, 8th Edition, Pearson Education, Asia-2004.
2. Computer Networks — Andrew S Tanenbaum,4th Edition. Pearson Education/PHI

REFERENCES:

1 Data Communications and Networking – Behrouz A. Forouzan.Third Edition TMH.

Outcomes:

- Students should be understand and explore the basics of computer networks and various protocols. He/she will be in a position to understand the world wide web concepts.
- Students will be in position to administrate a network and flow of information further he/she can understand easily the concepts of network security, mobile and adhoc networks.

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1428) SATELLITE COMMUNICATIONS
(ELECTIVE-II)

VII - SEMESTER

L	T	P	C
4	0	0	4

Course Objectives:

The course objectives are:

- To prepare students to excel in basic knowledge of satellite communication principles
- To provide students with solid foundation in orbital mechanics and launches for the satellite communication
- To train the students with a basic knowledge of link design of satellite with a design examples.
- To provide better understanding of multiple access systems and earth station technology
- To prepare students with knowledge in satellite navigation and GPS & satellite packet communications

UNIT-I:

Communication Satellite: Orbit and Description: A brief History of Satellite Communication, Satellite Frequency bands, Satellite Systems, Applications, Orbital Period and Velocity, Effects of Orbital inclination, Azimuth and Elevation, Coverage and Slant range, Eclipse, Orbital perturbations , Placement of a Satellite in a Geo-Stationary Orbit.

UNIT-II:

Satellite Sub-Systems: Altitude and orbit control system, TT&C Sub-System, Altitude control Sub-System, Power Systems, Communication Subsystems, Satellite antenna Equipment.

Satellite Link: Basic transmission theory, system noise temperature and G/T ratio, Basic Link Analysis, Interference Analysis, Design of satellite links for specified C/N,(with and without frequency Re-use), Link Budget.

UNIT-III:

Propagation effects: Introduction, Atmospheric Absorption, Cloud Attenuation, Tropospheric and Ionospheric Scintillation and Low angle fading, Rain Induced attenuation, rain induced cross polarization interference.

Multiple Access: Frequency Division Multiple Access(FDMA), Intermodulation, Calculation of C/N. Time Division Multiple Access(TDMA), Frame structure, Burst structure, Satellite Switched TDMA Onboard processing, Demand Assignment Multiple Access (DAMA) – Types of Demand Assignment, Characteristics, CDMA Spread Spectrum Transmission and Reception

UNIT-IV:

Earth Station Technology: Transmitters, Receivers, Antennas, Tracking systems, Terrestrial Interface, Power Test methods, Lower Orbit Considerations.

Satellite Navigation & Global Positioning Systems: Radio and Satellite Navigation, GPS Position Location principles, GPS Receivers, GPS C/A code accuracy, Differential GPS.

UNIT-V:

Satellite Packet Communications: Message Transmission by FDMA: M/G/1 Queue, Message Transmission by TDMA, PURE ALOHA-Satellite Packet Switching, Slotted Aloha, Packet Reservation, Tree Algorithm.

TEXT BOOKS:

1. Satellite Communications- Timothy Pratt, Charles Bostian and Jeremy Allnutt, WSE, Wiley Publications, 2nd Edition, 2003, John Wiley & Sons.
2. Satellite Communication Engineering- Wilbur L. Pritchand, Robert A Nelson and Henri G.Suyderhoud, 2nd Edition, Pearson Publications.
3. Digital Satellite Communications-Tri.T.Ha, 2nd Edition, 1990, Mc. Graw Hill.

REFERENCE BOOKS:

1. Satellite Communications- Dennis Roddy, 2nd Edition, 1996, McGraw Hill.
2. Satellite Communications: Design Principles- M. Richharia, 2nd Edition,BS Publications, 2003.
3. Digital Satellite Communications-Tri. T. Ha,2nd Ed.,MGH,1990.
4. Fundamental of Satellite Communications- K. N Raja Rao, PHI, 2004

Course Outcomes:

At the end of the course,

- Students will understand the historical background, basic concepts and frequency allocation for satellite communication
- Students will demonstrate orbital mechanics, launch vehicles and launchers
- Students will demonstrate the design of satellite links for specified C/N with system design examples
- Students will be able to visualize satellite sub systems like Telemetry, tracking, command and monitoring power systems etc
- Students will understand the various multiple access for satellite communication systems and packet communications

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1429) OPTICAL COMMUNICATIONS
(ELECTIVE-II)

VII - SEMESTER

L	T	P	C
4	0	0	4

Course Objectives:
The objectives of the course are:

- To realize the significance of optical fibre communications.
- To understand the construction and characteristics of optical fibre cable.
- To develop the knowledge of optical signal sources and power launching.
- To identify and understand the operation of various optical detectors.
- To understand the design of optical systems and WDM.

UNIT- I
Overview of optical fiber communication: Historical development, The general system, Advantages of Optical Fiber Communications, Optical Fiber Wave Guides-Introduction, Ray Theory Transmission, Total Internal Reflection, Acceptance Angle, Numerical Aperture, Skew Rays, Cylindrical Fibers-Modes, Vnumber, Mode Coupling, Step Index Fibers, Graded Index Fibers.
Single mode fibers- Cut off wavelength, Mode Field Diameter, Effective Refractive Index, Fiber Materials Glass, Halide, Active glass, Chalgenide glass, Plastic optical fibers.

UNIT-II
Signal Distortion in Optical Fibers: Attenuation, Absorption, Scattering and Bending losses, Core and Cladding losses. Information capacity Determination, Group delay, Types of Dispersion - Material Dispersion, Wave-Guide Dispersion, Polarization Mode Dispersion, Intermodal Dispersion, Pulse Broadening. Optical Fiber Connectors- Connector Types, Single Mode Fiber Connectors, Connector Return Loss.

UNIT-III
Fiber Splicing: Splicing techniques, Splicing Single Mode Fibers. Fiber Alignment and Joint Loss-Multimode Fiber Joints, Single Mode Fiber Joints, Optical Sources- LEDs, Structures, Materials, Quantum Efficiency, Power, Modulation, Power Bandwidth Product, Injection Laser Diodes-Modes, Threshold Conditions, External Quantum Efficiency, Laser Diode Rate Equations, Resonant Frequencies. Reliability of LED& ILD.
Source to Fiber Power Launching: Output Patterns, Power Coupling, Power Launching, Equilibrium Numerical Aperture, Laser Diode to Fiber Coupling.

UNIT-IV
Optical Detectors: Physical Principles of PIN and APD, Detector Response Time, Temperature Effect on Avalanche Gain, Comparison of Photo Detectors, Optical Receiver Operation-Fundamental Receiver Operation, Digital Signal Transmission, Error Sources, Receiver

Configuration, Digital Receiver Performance, Probability of Error, Quantum Limit, Analog Receivers.

UNIT- V

Optical System Design: Considerations, Component Choice, Multiplexing, Point-to- Point Links, System Considerations, Link Power Budget with Examples, Overall Fiber Dispersion in Multi Mode and Single Mode Fibers, Rise Time Budget with Examples.

Transmission Distance, Line Coding in Optical Links, WDM, Necessity, Principles, Types of WDM, Measurement of Attenuation and Dispersion, Eye Pattern.

TEXT BOOKS :

1. Optical Fiber Communications – Gerd Keiser, TMH,4th Edition,2008.
2. Optical Fiber Communications – John M. Senior, Pearson Education,3rd Edition,2009.

REFERENCE BOOKS :

1. Fiber Optic Communications – D.K. Mynbaev , S.C. Gupta and Lowell L. Scheiner, Pearson Education, 2005.
2. Text Book on Optical Fibre Communication and its Applications – S.C.Gupta, PHI, 2005.
3. Fiber Optic Communication Systems – Govind P. Agarwal , John Wiley, 3rd Ediition, 2004.
4. Introduction to Fiber optics by Donald j. Sterling Jr.- Cengage Learning, 2004.
5. Optical Communication Systems- John Gowar, 2nd Edition, PHI

Course Outcomes:

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

- Understand and analyze the constructional parameters of optical fibers.
- Be able to design an optical system.
- Estimate the losses due to attenuation, absorption, scattering and bending.
- Compare various optical detectors and choose suitable one for different applications.

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1430) DIGITAL IMAGE PROCESSING
(ELECTIVE-II)

VII - SEMESTER

L	T	P	C
4	0	0	4

Course objectives:

The objectives of the course are:

- Provide the student with the fundamentals of digital image processing.
- Give the students a taste of the applications of the theories taught in the subject. This will be achieved through the project and some selected lab sessions.
- Introduce the students to some advanced topics in digital image processing.
- Give the students a useful skill base that would allow them to carry out further study should they be interested and to work in the field.

UNIT- I : DIGITAL IMAGE FUNDAMENTALS

Digital Image fundamentals, Components of Digital Image Processing, Sampling and Quantization, Relationship between pixels.

IMAGE TRANSFORMS: 2-D FFT, Properties, Walsh transform, Hadamard Transform, Discrete Cosine Transform, Haar Transform, Slant Transform, Hotelling Transform.

UNIT- II : IMAGE ENHANCEMENT(SPATIAL DOMAIN)

Introduction, Image Enhancement in Spatial domain, Enhancement through point operation, Types of point operation, Histogram manipulation, Linear and nonlinear gray level Transformation, Local or neighborhood operation, Median filter, Spatial domain High-pass filtering.

IMAGE ENHANCEMENT(FREQUENCY DOMAIN)

Filtering in Frequency domain, Obtaining frequency domain filters from spatial filters, Generating filters directly in the frequency domain, Low pass (Smoothing) and High pass (Sharpening) filters in frequency domain.

UNIT- III : IMAGE RESTORATION

Degradation model, Algebraic approach to restoration, Inverse filtering, Least mean square filters, Constrained Least Squares Restoration, Interactive Restoration.

UNIT- IV : IMAGE SEGMENTATION

Detection of discontinuities, Edge linking and boundary detection, Thresholding, Region oriented segmentation.

MORPHOLOGICAL IMAGE PROCESSING: Dilation and Erosion; Dilation, Structuring Element Decomposition, Erosion, Combining Dilation and Erosion, Opening and Closing, The Hit or Miss Transformation.

UNIT- V : IMAGE COMPRESSION

Redundancies and their removal methods, Fidelity criteria, Image compression models, Huffman and Arithmetic Coding, Error free compression, Lossy compression, Lossy and Lossless Predictive Coding, Transform based Compression, JPEG 2000 Standards.

TEXT BOOKS:

1. Digital Image Processing – Rafael C. Gonzalez, Rechard E. Woods, 3rd edition. Pearson, 2008
2. Digital Image Processing – S. Jayaraman, S Esakkirajan, T Veerakumar- TMH, 2010

REFERENCE BOOKS:

1. Digital Image Processing using MATLAB – Rafael C. Gonzalez, Richard E woods and Steven L. Eddings, 2nd Edition, TMH, 2010.
2. Fundamentals of Digital Image Processing – A. K. Jain, PHI, 1989.
3. Digital Image processing and Computer vision – Somka, Hlavac, Boyle Cengage learning (Indian edition) 2008.
4. Introductory Computer vision Imaging Techniques and Solutions – Adrian low, 2008, 2nd Edition.
5. Introduction to Image Processing & Analysis – John C. Russ, J. Christian Russ, CRC press, 2010.

Course outcomes:

Upon successfully completing the course , the student should:

- Have an appreciation of the fundamentals of digital image processing including the topics of filtering, transforms and morphology, and image analysis and compression.
- Be able to implement basic image processing algorithms in MATLAB.
- Have the skill base necessary to further explore advance the topics of digital image processing.
- Be in a position to make a positive professional contribution in the field of digital image processing.
- At the end of course the student should have a clear impression of the breadth and practical scope of digital image processing and have arrived at a level of understanding that is the foundation for most of the work currently underway in this field.

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1004)ADVANCED ENGLISH COMMUNICATION SKILLS LAB

VII - SEMESTER

L	T	P	C
0	0	3	2

Introduction

The introduction of the English Language Lab is considered essential at 3rd year level. At this stage the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalised context.

Objectives:

This Lab focuses on using computer-aided multimedia instruction for language development to meet the following targets:

- To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
- Further, they would be required to communicate their ideas relevantly and coherently in writing.

LEARNING OUTCOMES

- Gather ideas and information, to organise ideas relevantly and coherently.
- Engage in debates.
- Participate in group discussions.
- Face interviews.
- Write project/research reports/technical reports.
- Make oral presentations.
- Write formal letters.
- Transfer information from non-verbal to verbal texts and vice versa.
- To take part in social and professional communication.

Syllabus:

The following course content is prescribed for the Advanced Communication Skills Lab:

1. **Functional English** –

- Starting a conversation
- Responding appropriately and relevantly
- Using the right body language
- Role play in different situations.

2. **Vocabulary building**

- Synonyms and antonyms,
- Word roots,
- One-word substitutes,
- Prefixes and suffixes,
- Study of word origin,
- Analogy,

- Idioms and phrases verbs**.**

3. Group Discussion –

- Dynamics of group discussion,
- Intervention,
- Summarizing,
- Modulation of voice,
- Body language,
- relevance, f
- Fluency and coherence.

4. Interview skills –

- Concept and process,
- Pre-interview planning,
- Opening strategies,
- Answering strategies,
- Interview through tele and video-conferencing.

5. Resume and technical report writing –

- Structure and presentation,
- Planning,
- Defining the career objective,
- Projecting ones strengths and skill-sets,
- Summary, formats and styles,
- letter-writing.
- **Reading comprehension** – reading for facts, guessing meanings from context, scanning, skimming, inferring meaning and critical reading.

Minimum Requirement:

The English Language Lab shall have:

- The Computer aided Language Lab for 60 students with 60 systems,
- One master console, LAN facility and English language software for self- study by learners.
- The Communication Skills Lab with movable chairs and audio-visual aids with a P.A System, a T. V., a digital stereo –audio & video system and camcorder etc.
- System Requirement (Hardware component):
- Computer network with Lan with minimum 60 multimedia systems with the following specifications:
  P – IV Processor
  d) Speed – 2.8 GHZ
  e) RAM – 512 MB Minimum
  f) Hard Disk – 80 GB
  Headphones of High quality

Suggested Software:

The software consisting of the prescribed topics elaborated above should be procured and used.

Suggested Software:

- Clarity Pronunciation Power – part II
- Oxford Advanced Learner's Compass, 7th Edition
- DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.
- Lingua TOEFL CBT Insider, by Dreamtech
- TOEFL & GRE(KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
- The following software from 'train2success.com'

    - ✓ Preparing for being Interviewed,
    - ✓ Positive Thinking,
    - ✓ Interviewing Skills,
    - ✓ Telephone Skills,
    - ✓ Time Management
    - ✓ Team Building,
    - ✓ Decision making

Distribution and Weight age Of Marks English Language Laboratory Practical Examination:

- The practical examinations for the English Language Laboratory shall be conducted as per the University norms prescribed for the core engineering practical sessions.
- For the Language lab sessions, there shall be a continuous evaluation during the year for **25** sessional marks and **50** year-end Examination marks. Of the **25** marks, **15** marks shall be awarded for day-to-day work and **10** marks to be awarded by conducting Internal Lab Test(s). The year- end Examination shall be conducted by the teacher concerned with the help of another member of the staff of the same department of the same institution.

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1431) E-CAD AND VLSI LAB

VII - SEMESTER

L	T	P	C
0	0	3	2

Course objective

The objective of the course is to

- Give exposure to different steps involved in the fabrication of ICs using MOS transistors, CMOS/BICMOS transistors and passive components
- Explain electrical properties of MOS and BICMOS devices to analyze the behavior of inverters designed with various loads.
- Provide concept to design different types of logic gates using CMOS inverter and analyze their transfer characteristics.
- Provide design concepts to design building blocks of data path of any system using gates.
- Understand basic programmable logic devices and testing of CMOS circuits.

List of Experiments

Design and implementation of the following CMOS digital/analog circuits using Cadence/Mentor Graphics/Synopsys/GEDA/Equivalent CAD tools .The design shall include Gate-level design ,Transistor-level design, Hierarchical design, Verilog HDL/VHDL design ,Logic synthesis ,Simulation and verification, Scaling of CMOS inverter for different technologies, study of secondary effects(temperature ,power supply and process corners),circuit optimization with respect to area, performance and/or power, Layout Extraction of parasitic and back annotation ,modifications in circuit parameters and layout consumption ,DC/transient analysis, verification of layouts(DRC,LVS)

E-CAD programs:

Programming can be done using any compiler. Down load the programs on FPGA/CPLD boards and performance testing may be done using pattern generator (32 channels) and logic analyzer apart from verification by simulation with any of the front end tools

1. HDL code to realize all the logic gates
2. Design of 2-to-4 decoder
3. Design of 8-to-3 encoder (with out and with parity)
4. Design of 8-to-1 multiplexer
5. Design of 4 bit binary to gray converter
6. Design of Multiplexer/ Demultiplexer, comparator
7. Design of Full adder using 3 modeling styles
8. Design of flip plops :SR,D,JK,T
9. Design of 4-bit binary, BCD counters (synchronous/asynchronous reset) or any sequence counter
10. Finite state Machine Design

VLSI programs

1. Introduction to layout design rules
2. Layout, physical verification, placement & route for complex design, static timing analysis ,IR drop analysis and crosstalk analysis of the following

. Basic logic gates
. CMOS inverter
. CMOS NOR/NAND gates
. CMOS XOR and MUX gates
. CMOS 1-bit full adder
. static/Dynamic logic circuit (register cell)
. latch
. pass transistor
3. Layout of any combinational circuit (complex CMOS logic gates)-learning about data paths
4. introduction to SPICE simulation and coding of NMOS/CMOS circuit
5. SPICE simulation of basic analog circuits : Inverter/Differential amplifier
6. Analog Circuit simulation (AC analysis)-CS & CD amplifier
7. system level design using PLL
Note: Any SIX of the above experiments from each part are to be conducted (Total 12)

Course Outcomes:
Upon successfully completing the course, the student should be able to:

- Acquire qualitative knowledge about the fabrication process of integrated circuit using MOS transistors.
- Choose an appropriate inverter depending on specifications required for a circuit
- Draw the layout of any logic circuit which helps to understand and estimate parasitic of any logic circuit
- Design different types of logic gates using CMOS inverter and analyze their transfer characteristics
- Provide design concepts required to design building blocks of data path using gates.
- Design simple memories using MOS transistors and can understand Design of large memories.
- Design simple logic circuit using PLA, PAL, FPGA and CPLD Design simple logic circuit using PLA, PAL, FPGA and CPLD
- Understand different types of faults that can occur in a system and learn the concept of testing and adding extra hardware to improve testability of system

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1432) CELLULAR AND MOBILE COMMUNICATIONS

VIII - SEMESTER

L	T	P	C
4	0	0	4

Course Objective:

The Course Objectives are:

- To provide the students with an understanding of Cellular concepts, frequency reuse, hand-off strategies.
- To enable the students to analyze and understand wireless and mobile cellular communication systems over a stochastic fading channel.
- To provide the student with and understanding of co-channel and non-co-channel interference.
- To give the student an understanding of cell coverage for signal and traffic, diversity techniques and mobile antennas.
- To give the student an understanding of frequency management, channel assignment and types of hand-off.

UNIT - I:

Introduction to Cellular Mobile Radio Systems: Limitations of conventional telephone systems, Basic cellular mobile systems, First, second, third and fourth generation cellular wireless systems, Uniqueness of mobile radio environment- Fading-Time dispersion parameters, coherence bandwidth, Doppler spread and coherence time.

Fundamentals of Cellular Radio System Design: Concept of Frequency Reuse, Co- Channel Interference, Co-Channel Interference Reduction Factor, Desired C/ I from a Normal Case in an Omni Directional Antenna System, System Capacity, Trunking and Grade of Service, Improving Coverage and Capacity in Cellular Systems – Cell Splitting, Sectoring, Microcell Zone Concept.

UNIT - II: Co–Channel Interference: Measurement of real time Co–Channel Interference, Design of Antenna System, Antenna Parameters and their Effects, Diversity Techniques–Space Diversity, Polarization Diversity, Frequency Diversity and Time Diversity.

Non–Co–Channel Interference: Adjacent Channel Interference, Near end far end interference, Cross talk, Effects on coverage and interference by power decrease, Antenna height decrease, Effects of cell site components.

UNIT - III:

Cell Coverage for Signal and Traffic: Signal reflection 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, Path loss from a point to point prediction model in different conditions merits of Lee model.

Cell Site and Mobile Antennas: Space diversity antennas, Umbrella pattern antennas, and Minimum separation of cell site antennas, mobile antennas.

UNIT - IV:

Frequency Management and Channel Assignment: Numbering and grouping, Set up access and paging channels, Channel assignments to cell sites and mobile UNITs, Channel sharing and borrowing, Sectorization, Overlaid cells, Nonfixed channel assignment.

UNIT - V:

Handoffs and Dropped Calls: Handoff initiation, Types of handoff, Delaying handoff, Advantages of handoff, Power difference handoff, Forced handoff, Mobile assisted and soft handoff, Intersystem handoff, Introduction to dropped call rates and their evaluation.

TEXT BOOKS:

1. Mobile Cellular Telecommunications – W. C. Y. Lee, McGraw Hill, 2nd Edn.. 1989.
2. Wireless Communications – Theodore, S. Rapport, Pearson education. 2nd edn.. 2002.
3. Mobile Cellular Communication – Gottapu Sashi Bhushana Rao, Pearson, 2012.

REFERENCE BOOKS:

1. Principles of Mobile Communications – Gordon L. Stuber, Springer International, 2nd edn.. 2001.
2. Modern Wireless Communications – Simon Haykin, Michael Mohar, Perason Education,2005.
3. Wireless Communications Theory and Techniques – Asrar U. H. Sheikh, Springer,2004.
4. Wireless Communications and Networking, Vijay Garg, Elsevier Publications,2007.
5. Wireless Communications – Andrea Goldsmith, Cambridge University Press,2005.

Course Outcomes:

By the end of the course, the student will be able to analyze and design wireless and mobile cellular systems.

- The student will be able to understand impairments due to multi path fading channel.
- The student will be able to understand the fundamental techniques to overcome the different fading effects.
- The student will be able to understand co-channel, non-co-channel interferences.
- The student will be able familiar with cell coverage for signal and traffic, diversity techniques and mobile antennas.
- The student will have an understanding of frequency management, channel assignment and types of handoff.

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1433) RADAR SYSTEMS
(ELECTIVE III)

VIII - SEMESTER

L	T	P	C
4	0	0	4

- **Course objectives:**

The objectives of the course are:

- To understand basic functioning of a Radar.
- To understand various technologies involved in the design of Radar transmitters and receivers.
- To learn various Radars like Pulse, CW, MTI, Doppler and tracking Radars and their comparison.

UNIT- I :

Basic of Radar : Introduction, Maximum Unambiguous Range, Simple form of Radar Equation, Radar Block Diagram and Operation, Radar Frequencies and Applications. Predication of range performance, Minimum Detectable Single, Receiver Noise, Modified Range Equation Illustrative Problems.

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

UNIT -II

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

UNIT- III

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

UNIT- IV

Tracking Radar : Tracking with Radar, Conical Scan, Monopulse Tracking Radar – Amplitude Comparison Monopulse, Phase Comparison Monopulse. Tracking in Range, Acquisition and Scanning Patterns.

UNIT V

Detection of Radar Signals in Noise : Introduction, Matched Filter Receiver – Response Characteristics and Derivation, Correlation Function and Cross-correlation Receiver

Radar Receivers – Noise Figure and Noise Temperature. Displays – types. Duplexers – Branch type and Balanced type, Circulators as Duplexers. Introduction to Phased Array Antennas – Basic Concepts. Radiation Pattern, Beam Steering and Beam Width changes.

TEXT BOOKS:

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

REFERENCE BOOKS:

1. Introduction to Radar Systems – Merrill I. Skolnik, THIRD EDITION, Tata McGraw-Hill, 2001.
2. Radar : Principles, Technology. Application-Byron Edde , Pearson Education, 2004
3. Radar Principles- Peebles, Jr., P.Z., Wiley, New York, 1998.

Course Outcomes

On completion of this course, it is expected that the student will be able to:

1. Understand basics of Pulse Radar, Radar Applications, Radar Range and various terminology associate with the Radar.
2. Understand principle of operation of Continuous wave Radar, limitations and its applications.
3. Understand principle of operation of MTI Radar, its parameters, limitations and applications.
4. Understand principle operation of tracking radar and different error determination methods, parameters associate with them.
5. Understand functioning of various sub systems of Radars, antenna arrays and their basic parameters.
6. Understand functioning of matched and non -matched filters, correlation receivers in maximization of Signal to Noise ratio.

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1541) NETWORK SECURITY
(ELECTIVE III)

VIII - SEMESTER

L	T	P	C
4	0	0	4

Objectives

- Explain the objectives of information security
- Explain the importance and application of each of confidentiality, integrity, authentication and availability
- To understand various cryptographic algorithms
- To understand the basic categories of threats to computers and networks
- Describe public key cryptosystem
- Describe the enhancement made to IPV4 by IPSec
- Understand intrusions and intrusion detection
- Discuss the fundamental ideas of public key cryptography
- Generate and distribute a PGP key pair and use the PGP package to send an encrypted email message.
- Discuss web security and firewalls

UNIT- I:

Attacks on Computers and Computer Security: Introduction to Information Security, the need for security, Security approaches, Principles of Security, Types of Security attacks, Security Services, Security Mechanisms, A model for Network Security.

UNIT- II:

Symmetric Key Ciphers: Block cipher principles, DES, AES, Blowfish, Differential and linear cryptanalysis, Block cipher modes of operations, RC4, location and placement of encryption function, key distribution

Asymmetric key Ciphers: Principles of public key cryptosystems, key distribution, RSA, Diffie-Hellman key exchange,

UNIT- III:

Message Authentication Algorithms and Hash Functions: Authentication Requirements, Functions, Message Authentication Codes, Hash Functions, Secure Hash Functions, HMAC, Digital Signatures,

Authentication Applications: Kerberos, X.509 authentication Services, Public key Infrastructure,

UNIT- IV:

E-Mail-Security: Pretty Good Privacy, S/MIME

IP Security: IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security payload, Combining Security associations, Key management.

UNIT- V:

Web Security: Web Security Considerations, Secure Socket Layer and Transport layer Security, Secure Electronic transaction,

Intruders, Virus & Firewall: Intruders, intrusion detection, Virus and virus related threats, Firewall design principles, Types of firewalls password management.

TEXTBOOKS:

1. Cryptography and Network Security : William Stallings, Pearson Education, 4th Edition
2. Cryptography and Network Security : Atul Kahate, Mc Graw Hill, 2nd Edition

REFERENCES:

1. Cryptography and Network Security: C.K.Shyamala, N. Harani, Dr.T.R. Padmanabhan, Wiley India, 1st Edition.
2. Cryptography and Network Security: Forouzan Mukhopadhyay, Mc Graw Hill, 2nd Edition
3. Information Security, Principles and Practice: mark stamp, Wiley India.
4. Principles of Computer Security: WM.Arthur Conklin, Greg White, TMH
5. Introduction to Network Security: Neal Krawetz, CENGAGE Learning
6. Network Security and Cryptography: Bernard Menezes CENGAGE Learning

Outcomes

- Student will be able to understand basic cryptographic algorithms, message and web authentication and security issues
- Ability to identify information system requirements for both of them such as client and server
- Ability to understand the current legal issues towards information security

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1434) DSP PROCESSORS & ARCHITECHTURES
(ELECTIVE III)

VIII - SEMESTER

L	T	P	C
4	0	0	4

The **objectives** of the course are:

- To recall digital transform techniques.
- To introduce architectural features of programmable DSP Processors of TI and Analog Devices.
- To give practical examples of DSP Processor architectures for better understanding.
- To develop the programming knowledge using Instruction set of DSP Processors.
- To understand interfacing techniques to memory and I/O devices.

UNIT-I:

Introduction to Digital Signal Processing: Introduction, A Digital signal-processing system, The sampling process, Discrete time sequences. Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT), Linear time-invariant systems, Digital filters, Decimation and interpolation.

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

UNIT-II:

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

UNIT-III:

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, On-Chip Peripherals, Interrupts of TMS320C54XX processors, Pipeline Operation of TMS320C54XX Processors.

UNIT-IV:

Analog Devices Family of DSP Devices: Analog devices family of dsp devices- ALU and MAC Block diagram, Shifter Instruction, Base Architecture of ADSP 2100, ADSP-2181 high performance processor.

Introduction to Blackfin Processor- The Blackfin Processor, Introduction to Micro signal Architecture, Overview of Hardware processing UNITs and Register files, Address Arithmetic UNIT, Control UNIT, Bus Architecture and Memory, Basic peripherals.

UNIT-V:

Interfacing Memory and I/O Peripherals to Programmable DSPDevices:

Memory space organization, External bus interfacing signals, Memory interface, Parallel I/O interface, Programmed I/O, Interrupts and I/O, Direct memory access (DMA).

TEXT BOOKS:

1. Digital Signal Processing-Avtar Singh and S.Srinivasan, Thomson Publications, 2004
2. A Practical Approach To Digital Signal Processing- K. Padmanabhan, R. Vijayarajeswaran, Ananthi. S, New Age International, 2006/2009.
3. Embedded Signal Processing with the Micro Signal Architecture Publisher: Woon- Seng Gan, Sen M. Kuo, Wiley-IEEE Press, 2007

REFERENCES:

1. Digital Signal Processors, Architecture, Programming and Applications- B. Venkata Ramani and M. Bhaskar,2002, TMH.
2. Digital Signal Processing- Jonatham Stein, 2005, John Wiley.
3. DSP Processor Fundamentals, Architectures & Features- Lapsley etal.S.Chand & Co.
4. Digital Signal Processing Applications Using the ADSP-2010 Family by The Applications Engineering Staff of Analog Devices, DSP Division, Edited by Army Mar, PHI
5. The Scientist and Engineer's Guide to digital Signal Processing by Steven W. Smith, Ph.D., California Technical Publishing, ISBN 0-9660176-3-3, 1997

Course Outcomes:

Upon Completion of the course, the student

- Be able to distinguish between the architectural features of general purpose processors and DSP Processors
- Understand the architectures of TMS320C54xx and ADSP2100 DSP devices.
- Be able to write simple assembly language programs using instruction set of TMS320C54xx
- Can interface various devices to DSP Processors.

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1435) WIRELESS COMMUNICATIONS & NETWORKS
(ELECTIVE IV)

VIII - SEMESTER

L	T	P	C
4	0	0	4

Course Objectives:

The course objectives are:

- To provide the students with the fundamental treatment about many practical and theoretical concepts that forms basic of wireless communications.
- To equip the students with various kinds of wireless networks and its operations.
- To prepare students to understand the concept of frequency reuse ,and be able to apply it in the design of mobile cellular system.
- To prepare students to understand various modulation schemes and multiple access techniques that are used in wireless communications,
- To provide an analytical perspective on the design and analysis of the traditional and emerging wireless networks, and to discuss the nature of, and solution methods to, the fundamental problems in wireless networking.
- To train students to understand the architecture and operation of various wireless wide area networks such as GSM, IS-95, GPRS and SMS.
- To train students to understand wireless LAN architectures and operation.
- To prepare students to understand the emerging technique OFDM and its importance in the wireless communications.

UNIT- I : THE CELLULAR CONCEPT-SYSTEM DESIGN FUNDAMENTALS

Introduction, Frequency reuse, channel assignment strategies. Handoff Strategies-Prioritizing Handoffs, Practical Handoff considerations, Interference and system capacity-Co channel Interference and system capacity, Channel planning for wireless Systems, Adjacent Channel interference , Power control for Reducing interference, Trunking and grade off service, improving coverage & capacity in Cellular Systems-cell splitting,

UNIT- II : MOBILE RADIO PROPAGATION: LARGE-SCALE PATH LOSS

Introduction to Radio wave Propagation, Free Space Propagation Model, Relating Power to Electric Field, The Three Basic Propagation Mechanisms, Reflection-Reflection from Dielectrics, Brewster Angle Reflection from perfect conductors, Ground Reflection (Two-Ray) Model, Diffraction-Fresnet Zone Geometry, Knife-edge Diffraction, Scattering, Outdoor Propagation Models- Longley-Ryce Model, Okumura Model, Hata Model, PCS Extension to Hata Model, Walfisch and Bertoni Model, Wideband PCS Microcell Model, Indoor Propagation Models-Partition losses (Same Floor), Partition losses between Floors, Log-distance path loss model, Ericsson Multiple Breakpoint Model, Attenuation Factor Model, Signal penetration into buildings, Ry Tracing and Site Specific Modeling.

UNIT- III : MOBILE RADIO PROPAGATION: SMALL- SCALE FADING AND MULTIPATH

Small Scale Multipath propagation –Factors influencing small scale fading, Doppler shift, Impulse Response Model of a multipath channel- Relationship between Bandwidth and Received power, Small-Scale Multipath Measurements-Direct RF Pulse System, Spread Spectrum Sliding Correlator Channel Sounding, Frequency Domain Channels Sounding, Parameters of Mobile Multipath Channels-Time Dispersion Parameters, Coherence Bandwidth, Doppler Spread and Coherence Time, Types of Small-Scale Fading-Fading effects Due to Multipath Time Delay Spread, Flat Fading, Frequency selective fading, Fading effects Due to Doppler Spread-Fast fading,slow fading, Stastical Models for multipath Fading Channels-Clarke's model for flat fading,spectral shape due to Doppler spread in Clarke's model, Simulation of Clarke and Gans Fading Model, Level crossing and fading statstics, Two-ray Rayleigh Fading Model.

UNIT – IV : EQUALIZATION AND DIVERSITY

Introduction, Fundamentals of Equalization, Training A Generic Adaptive Equalizer, Equalizers in a communication Receiver, Linear Equalizers, Non-linear Equalization-Decision Feedback Equalization (DFE), Maximum Likelihood Sequence Estimation (MLSE) Equalizer, Algorithms for adaptive equalization-Zero Forcing Algorithm, Least Mean Square Algorithm, Recursive least squares algorithm. Diversity Techniques-Derivation of selection Diversity improvement, Derivation of Maximal Ratio Combining improvement, Practical Space Diversity Consideration-Selection Diversity, Feedback or Scanning Diversity, Maximal Ratio Combining, Equal Gain Combining, Polarization Diversity, Frequency Diversity, Time Diversity, RAKE Receiver.

UNIT –V : WIRELESS NETWORKS

Introduction to wireless Networks, Advantages and disadvantages of Wireless Local Area Networks, WLAN Topologies, WLAN Standard IEEE 802.11, IEEE 802.11 Medium Access Control, Comparison of IEEE 802.11 a,b,g and n standards, IEEE 802.16 and its enhancements, Wireless PANs, Hiper Lan, WLL.

TEXT BOOKS:

4. Wireless Communications, Principles, Practice – Theodore, S. Rappaport, 2nd Ed., 2002, PHI
5. Wireless Communications-Andrea Goldsmith,2005 Cambridge University Press.
6. Mobile Cellular Communication – Gottapu Sasibhushana Rao, Pearson Education, 2012.

REFERENCE BOOKS:

7. Principles of wireless Networks - Kaveh Pah Laven and P. Krishnamurthy, 2002, PE.
8. Wireless Digital Communications – Kamilo Feher, 1999,PHI.
9. Wireless Communication and Networking – William Stallings, 2003,PHI
10. Wireless Communication - Upen Dalal, Oxford Univ. Press.
11. Wireless Communications and Networking – Vijay K. Gary, Elsevier.

Course Outcomes:

Upon completion of the course, the student will be able to:

- Understand the principles of Wireless Communications.
- Understand fundamentals of wireless networking.
- Understand cellular system design concepts.
- Analyze various multiple access schemes used in wireless communication.
- Understand wireless wide area networks and their performance analysis.
- Demonstrate wireless local area networks and their specifications.
- Familiar with some of the existing and emerging wireless standards.
- Understand the concept of orthogonal frequency division multiplexing.

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1436)BIOMEDICAL INSTRUMENTASTION
(ELECTIVE IV)

VIII - SEMESTER

L	T	P	C
4	0	0	4

Course Objectives:

The following are the course objectives:

- To study bioamplifier, biosignals and measurement of physiological parameters.
- To know about different bioeletrodes and activities of heart.
- To understand therapeutic and cardiac instrumentation.
- To study EEG and EMG machines, recordings and interpretations.

UNIT-I : COMPONENTS OF MEDICAL INSTRUMENTATION SYSTEM

Bioamplifier, Static and Dynamic Characteristics of Medical Instruments , Biosignals and Characteristics , Problems encountered with Measurements, from Human beings.

Organization of Cell, Derivation of Nernst equation for Membrane Resting Potential Generation of Action Potential , Conduction through Never to Neuromuscular Junction.

UNIT-II : BIO ELECTRODES

Biopotential Electrodes –External Electrodes, Internal Electrodes, Biochemical Electrodes.

Mechanical Function, Electrical Conduction System of the Heart, Cardiac Cycle, Relation between Electrical and Mechanical Activities of the Heart.

UNIT-III : CARDIAC INSTRUMENTATION

Blood Pressure and Blood Flow Measurement, Specification of ECG Machine, Einthoven Triangle , Standard 12-Lead Configurations, Interpretation of ECG waveform with respect to Electro Mechanical Activity of the Heart.

UNIT-IV : Therapeutic Equipment

Pacemaker , Defibrillator, Shortwave Diathermy, Hemodialysis Machine.

Respiratory Instrumentation: Mechanism of Respiration, Spirometry, Pnemuotachograph Ventilators.

UNIT-V

Neuro – Muscular Instrumentation: Specification of EEG and EMG Machines, Electrode Placement for EEG and EMG Recording, Interpretation of EEG and EMG.

TEXT BOOKS:

1. Biomedical Instrumentation and Measurements- by Leslie Cromwell, F.J. Weibell, E.A. Pfeiffer, PHI
2. Medical Instrumentation, Application and Design – by John G.Webster, John Wiley.

REFERENCE BOOKS:

1. Principles of Applied Biomedical Instrumentation – by L.A.Geoddes and L.E.Baker, John Wiley and Sons
2. Hand-book of Biomedical Instrumentation- by R.S.Khandpur, McGraw-Hill,2003
3. Biomedical Telemetry – by Mackay, Stuart R., John Wiley.

Course Outcomes:

- At the end of the course, the student will be able to:
- The concept of biomedical instrumentation.
- Understand bioelectrodes and activities of heart.
- Analyse ECG,EEG and EMG recordings for disorder identification.

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(A1437) ELECTRO MAGNETIC INTERFERENCE AND ELECTROMAGNETIC COMPATABILITY
(ELECTIVE-IV)

VIII - SEMESTER

L	T	P	C
4	0	0	4

UNIT – I: SOURCES OF EMI

Definition of EMI and EMC, Classification, Natural and man-made EMI sources, Switching transients, Electrostatic Discharge, Nuclear Electromagnetic pulse and High Power Electromagnetics.

UNIT – II: EMI COUPLING MODES

Penetration–Introduction, Shielding theory – shielding effectiveness, the circuit approach, the wave approach, Aperture theory, Calculation of effectiveness of a conducting box with an aperture. Introduction to propagation and cross talk – Introduction, Basic principles, Determination of EM Field from Transmission Lines.

UNIT – III: EMI CONTROLLING TECHNIQUES

Grounding – Principles and Practice of Earthing, Precautions in Earthing, Measurements of ground resistance, System grounding for EMC, Cable shielding Grounding.

Shielding – Theory and Effectiveness, Materials, Integrity at discontinuities, Conductive coatings, Cable shielding, Effectiveness measurements, Electrical Bonding.

Characteristics and Types of Filters – Impedance Mismatch, Lumped element Low-Pass, High-Pass, Band-Pass and Band-Reject filters, Power Line filter Design – Common mode, Differential mode, Combined CM and DM filters, Design Example.

EMC Gaskets-Knitted Wire-Mesh Gaskets, Wire-Screen Gaskets, Oriented Wire mesh, Conductive Elastomer, Transparent Conductive windows, Conductive Adhesive, Conductive Grease, Conductive Coatings, Isolation transformers, Opto -Isolators.

UNIT-IV: EMI MEASUREMENTS

Introduction to open area test site measurements – Measurement precautions-open area test site-Terrain Roughness – NSA – Measurement of test site imperfections – Antenna factor measurement – Measurement errors, Radiated Interference measurements – Anechoic chamber – TEM cell – Reverberating chamber – GHz TEM cell – Comparison of test facilities – Measurement Uncertainties.Conducted Interference measurements – Characterisation – Conducted EM noise on power supply lines – Conducted EMI from equipment -immUNITy – Detectors and measurement – Pulsed EMI immUNITy – Electrostatic Discharge.

UNIT – V : EMI/EMC Standards

Introduction – Standards for EMI/EMC – MIL – STD 461/462 – IEEE/ANSI Standards – CISPR/IEC Standards – FCC Regulations.

TEXT BOOKS:

1. Engineering Electromagnetic Compatibility – V.Prasad Kodali -2/e – IEEE Press – Wiley India Pvt. Ltd – 2001.
2. Principles and Techniques of Electromagnetic Compatibility – Christos Christopoulos – 2/e – CRC Press (Taylor & Francis Group) – 2007

REFERENCES:

1. Introduction to Electromagnetic Compatibility – Clayton R. Paul – John Wiley & Sons, 1992.
2. Electromagnetic Compatibility of Integrated Circuits – Techniques for low emission and susceptibility – Edited by Sonia Ben Dhia, Mohamed Ramdani and Etienne Sicard – Springer, 2006.
3. EMI reduction in Electronics Systems – Mills -J.P – Prentice Hall Inc.
4. Noise Reduction in Electronic Systems – Henry W.Ott, 2nd Edition, Wiley Interscience, 1998.