GAYATRI VIDYA PARISHAD COLLEGE OF ENGINEERING

(AUTONOMOUS)

MADHURAWADA , VISAKHAPATNAM-530048

AFFILIATED TO JNTU-KAKINADA

COLLEGE OF ENGINEERING
(AUTONOMOUS)

REGULATIONS COURSE STRUCTURE AND SYLLABI OF B.TECH. PROGRAMME

(UNDER AUTONOMOUS STATUS)

FOR 2014-2015 ADMITTED BATCH

ALL BRANCHES ARE ACCREDITED BY **NBA** OF AICTE

ACCREDITED BY **NAAC** WITH **'A'** GRADE WITH A **CGPA** OF **3.47**/4.00

Vision

To evolve into and sustain as a Centre of Excellence in Technological Education and Research with a holistic approach.

Mission

To produce high quality engineering graduates with the requisite theoretical and practical knowledge and social awareness to be able to contribute effectively to the progress of the society through their chosen field of endeavour.

To undertake Research & Development, and extension activities in the fields of Science and Engineering in areas of relevance for immediate application as well as for strengthening or establishing fundamental knowledge.

FOREWORD

It gives immense satisfaction and strength, as two batches successfully completed the B.Tech. programme under the autonomous system. Based on the experiences and insight from the past performance, to catch up the changing trends in higher education, and to make the degree, to be more in tune with the global level requirements, a system of Outcome Based Education is introduced into the curriculum from 2013-14 admitted batch. The new approach is more focused towards learner centric. The expected outcomes are clearly stated, and levels of attainment are measured at each stage.

The experiences of the running of the new system for one year are taken and fine tuning of the system is done in the meetings of the Boards of studies and Academic Council held recently.

I take this opportunity to thank all the members of the Academic Council and the members of the respective Boards of Studies, representatives from the industry, who shared their valuable experiences to further sharpen the focus of the entire programme.

I thank the authorities of the affiliating University, JNTU, Kakinada, for their constant support, encouragement and guidance in successful running of the autonomous system at each step.

I thank the parents, who are giving constant moral support, and the students who are keeping the college flag high at every opportunity.

Finally I thank all the teaching and non-teaching staff for their hard work and dedication with single point focus towards the continuous betterment of the system.

Principal

B.TECH. ACADEMIC REGULATIONS

R 1.0 Qualification for Admission and duration:

R1.1 The selection for category A and B seats shall be as per Govt. of Andhra Pradesh rules.

R1.2 The duration of the programme for the Degree of Bachelor of Technology will be four academic years, with two semesters in each year. However if a student cannot complete within 4 years, he can do so by taking more time but not more than 8 years.

R1.3 The duration of each semester will normally be 20 weeks with 5 days a week. A working day shall have 7 periods each of 50 minutes.

R 2.0 Structure of the Programme:

Semester	No. of Courses per semester Theory + Lab	Credits
I	5 + 4 / 5 + 3 + Professional ethics	45
II	5+3+Professional ethics / 5 + 4	
III	6 + 2	44
IV	6 + 2	
V	6 + 2 / 6 + 2 + IPR	46
VI	4 + 2* + 2 + IPR / 4 + 2* + 2	
VII	Industry oriented Mini Project $ 5 + 1* + 2	45
VIII	1 + 1*+ 1#+ Seminar +Comprehensive viva + Project	
Total:		**180 credits**

*Core Electives, # Open Elective, $ Summer Programme to be carried out after VI semester and assessed in VII semester

i. The curriculum in the first and second semesters shall be common for all the B.Tech. programmes except for department specific courses.

ii. Each course is normally assigned a certain number of credits as follows:

· 3 credits for 4 lecture periods per week and no credits for tutorials.

· 2 credits for 3 laboratory periods per week.

· 2 credits for Industry oriented Mini Project.

· 2 credits for Seminar with 3 periods per week.

· 2 credits for comprehensive viva-voce.

· 8 credits for project work.

iii. Participation in Social Service for a minimum of 32 hours is compulsory.

Participation in extra/co-curricular activities like Sports, Cultural and Literary activities for a minimum of 32 hours is also compulsory.

The activities are monitored and grades are awarded as given below:

EXCELLENT

GOOD

SATISFACTORY

A student shall obtain a minimum of satisfactory grade in both social service and extra / co-curricular activities during the course of study to be eligible for the award of the degree.

R 3.0 Method of Evaluation:

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

R 3.1 Theory:

For all lecture based theory courses, the assessment shall be for 30 marks through internal evaluation and 70 marks through external end-semester examination of three hours duration.

R 3.1 a. Internal evaluation:

The 30 internal marks are awarded as follows

Two tests	20 marks
Four assessments by atleast any two of the following methods	10 marks

Assignment/ Quiz/Term paper/ Tutorial /Surprise test/Open book test/ Seminar/ Case study/Lab activity/projects etc. as notified by the teacher at the beginning of the semester and distributed evenly over the entire semester.

The internal marks for tests (20 marks) shall be computed as, the weighted average of the two tests at 2:1 with the higher score carrying a weightage of 2.

The remaining 10 internal marks shall be computed as the average of marks obtained in the four assessments.

R 3.1 b. External evaluation:

The question paper shall be set externally and valued both internally and externally. A chief examiner appointed for each subject shall monitor the valuation process.

If the difference between the first and second valuations is less than or equal to 10 marks, the better of the two valuations shall be awarded.

If the difference between the first and second valuation is more than 10 marks, the chief examiner shall value the script. The marks given by the chief examiner shall be final for award.

R 3.2 Practical / Drawing:

Practical / drawing shall be evaluated for 100 marks, out of which 50 marks are for external examination and 50 marks are for internal evaluation.

The 50 internal marks are distributed as 25 marks for day-to-day work in two cycles and 25 marks for internal examination. The internal examination shall be conducted by the teacher concerned and another faculty member of the same department once for each cycle of instruction period and average of the two shall be considered for award of marks. A minimum of 50% of maximum marks shall be obtained to earn the corresponding credits.

10 out of 12 to 16 experiments/exercises recommended are to be completed in a semester.

R 3.3 Industry Oriented Mini Project:

The industry oriented mini project shall be carried out during the summer break for a minimum of 4 weeks after the VI Semester and completed before the start of the VII semester. A report has to be submitted at the beginning of the VII semester for assessment by an internal evaluation committee comprising Head of the Department and two faculty of the department including the project Supervisor for 50 marks. A minimum of 50% of maximum marks shall be obtained to earn the corresponding credits.

R 3.4 Seminar:

The seminar shall have two components, one chosen by the student from the course-work without repetition, from the topics taught / studied, and approved by the faculty advisor. The other component is suggested by the advisor and can be a reproduction of the concept in any standard research paper or an extension of concept from earlier course work. A hard copy of the information on seminar topic in the form of a report is to be submitted for evaluation along with presentation. The presentation of the seminar topics shall be made before a committee comprising the Head, seminar advisor and a senior faculty of the department. The two components of the seminar are distributed between two halves of the semester and are evaluated for 50 marks each. The average of the two components shall be taken as the final score. A minimum of 50% of maximum marks shall be obtained to earn the corresponding credits.

R.3.5 Comprehensive viva-voce:

The comprehensive viva-voce will be conducted by a committee comprising Head of the Department, Senior faculty members of the respective department. This is aimed at assessing the student's understanding of various subjects studied during the entire programme of four years. The Comprehensive viva-voce shall be evaluated for 100 marks during VIII semester. A minimum of 50% of maximum marks shall be obtained to earn the corresponding credits.

R 4.0 Project:

The project work shall be spread over the entire VIII semester and of somewhat innovative in nature, with research / industry orientation. A project batch shall comprise of not more than four students. A mid-term evaluation is conducted on the progress by Head of the Department and the supervisor for 40 marks. On completion of the project, a second evaluation is conducted before the report is submitted for another 40 marks. The final evaluation shall be based on the report submitted and a viva-voce examination for 120 marks by an external examiner.

R 5.0 Attendance Requirements:

It is desirable for a candidate to put up 100% attendance in the class in all the subjects. However, a candidate shall be permitted to appear for the end semester examination provided he records a minimum of 75% attendance for each subject in any semester. However, condonation for shortage of attendance may be given on Medical grounds, if a certificate to the extent is submitted to the HOD when the candidate first returns to the classes. Certificates submitted afterwards shall not be entertained on any count. A condonation fee as fixed by the college for those who put in attendance between 65 and 74 per cent shall be charged before the student is permitted to the end examination.

Attendance may also be condoned as per the State Government rules for those who participate in prestigious sports, co- and extra-curricular activities provided their attendance is in the minimum prescribed limits for the purpose and recommended by the concerned authority.

Attendance will be indicated in the marks memo by a letter code as follows:

Grading of Attendance:

90% and above	A	(Very Good)
75% to 89%	B	(Good)
65% to 74%	C	(Satisfactory)
Below 65%	D	(Detained)

A student who gets less than 65% (D Grade) attendance in a maximum of two credit courses in any semester shall not be permitted to take the end semester examination in which he/she falls short.

A student who gets less than 65% (D Grade) attendance in non-credit mandatory courses shall not be permitted to take the end semester examination in which he/she falls short.

His/her registration for those subjects will be treated as cancelled. The student should re-register and repeat those subjects as and when offered next.

R 5.1:

i. A student shall acquire at least C grade in attendance to be eligible to appear for the end-semester examination in the concerned subject.

ii. If a student gets D grade in more than two credit courses in any semester he/she shall be detained and has to repeat the entire semester.

R 6.0 Minimum Academic Requirements:

The following academic requirements shall be met along with the attendance requirements mentioned above to be eligible for the award of the B.Tech. degree.

i. A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory, if he/she secures not less than 25 marks in external end examination, and a minimum of 40 marks on the aggregate of internal evaluation and external examination taken together.

ii. In case of practical / drawing / project, a student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each of them if the student secures a minimum of 50% in the end examination and not less than 50% marks on the aggregate in the internal evaluation and external end examination taken together.

iii. For the non-credit mandatory courses viz., Professional Ethics, Environmental studies and Intellectual Property Rights and Patents, a student shall satisfy minimum attendance requirements on par with the other theory courses and secure a pass in the end semester examinations for which the evaluation shall be totally internal.

iv. A student shall be promoted from IV to V semester, if he / she acquires a minimum of 62 out of 89 credits (70%) up to the end of IV Semester (from I, II, III semesters regular and supplementary examinations & IV semester regular examinations).

v. A student shall be promoted from VI to VII semester, only if he / she fulfills the academic requirements of acquiring a minimum of 94 credits out of 135 credits (70%) up to the end of VI semester (from I to V semesters regular and supplementary examinations & VI semester regular examinations).

vi. Student shall register, put up minimum attendance in all courses including non-credit mandatory courses.

vii. A student shall earn all the 180 credits and secure a pass in non-credit mandatory courses to be eligible for the award of the degree.

viii. Marks obtained only from the credit courses shall be considered for the award of Percentage / Class / Division.

ix. A student who fails to earn 180 credits or secure a pass in non-credit mandatory courses within 8 academic years from the year of his / her admission shall forfeit his / her seat and his / her admission stands cancelled.

R 7.0 Make-up program for defaulters:

A make-up programme in subsequent semesters will be offered outside

the regular time table for the students who got detained due to shortage of attendance in not more than two credit courses and one non-credit mandatory course, if any. However, this facility shall not be extended to those candidates who are detained for want of attendance as per regulations R 5.1.(ii)

i. Make-up programme shall be announced at the beginning of every semester. The announcement of subjects offered for the make-up programme is at the discretion of the Principal. A student shall have to register within the time stipulated in the announcement by paying the prescribed fee.

ii. The number of total contact hours and method of evaluation for any make-up program shall be the same as those for a regular semester.

iii. It is desirable for a candidate to put up 100% attendance in all the subjects registered for the make-up programme. However, 25% concession in attendance may be permitted at the discretion of the principal based on the merits of the individual case under extraneous circumstances with proper evidence. No further condonation of attendance on par with the regular semester shall be permitted.

iv. If a candidate is failed to satisfy the attendance requirement in a course registered during make-up programme, then he has to repeat the course in the subsequent make-up programme when offered next.

v. The method of internal evaluation in the case of make-up programme is same as for the regular B.Tech. programme.

vi. For the courses registered in the make-up programme, the internal marks secured earlier are nullified and internal marks from the latest make-up programme shall be final.

vii. The credits for the courses registered during the make-up programme shall be earned from the end semester examinations following the corresponding regular semester.

viii. A pass in case of non-credit mandatory courses, for the courses registered during the make-up programme shall be secured from

the end semester examinations following the corresponding regular semester.

ix. Attendance and completion of courses during the make-up programme shall be suitably reflected in the consolidated marks memo.

No student can register for more than two credit courses and one non-credit mandatory course for a make-up programme.

Withdrawal from a make-up program after registration will no entitle for any refund of fees.

R 8.0 Supplementary examinations:

Supplementary examinations for the odd semester shall be conducted with the regular examinations of even semester and vice versa, for those who appeared and failed in regular examinations.

R 9.0 Class/Division:

70% and above	:	First Class with distinction
60% and above, but less than 70%	:	First Class
50% and above, but less than 60%	:	Second Class.
40% and above, but less than 50%	:	Pass Class
Less than 40%	:	Fail

R 10.0 General:

i. Where the words 'he', 'him', 'his', occur, they imply 'she', 'her', 'hers', also.

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

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

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

REGULATIONS FOR B.TECH. (LATERAL ENTRY) STUDENTS ADMITTED INTO III SEMESTER (UNDER AUTONOMOUS STREAM)

RL 1.0

1.1 The selection and admission process shall be as per Government of Andhra Pradesh rules through ECET.

1.2 A student admitted to B.Tech. through lateral entry scheme joins the College in the III Semester of the respective 8-Semester program. The duration of the programme is 3 years / 6 semesters. However, if a student can not complete within 3 years, he can do so by taking more time but not more than 6 years / 12 semesters.

1.3 Participation in Social Service for a minimum of 24 hours is compulsory.

Participation in extra/co-curricular activities like Sports, Cultural and Literary activities for a minimum of 24 hours is also compulsory.

The activities are monitored and grades are awarded as given below:

EXCELLENT

GOOD

SATISFACTORY

A student shall obtain a minimum of satisfactory grade in both social service and extra / co-curricular activities during the course of study to be eligible for the award of the degree.

RL 2.0 The attendance requirements shall be same as those admitted into four year regular B.Tech. programme,

RL 3.0 Minimum Academic Requirements:

i. For the non-credit mandatory courses, Environmental studies and Intellectual Property Rights and Patents, a student shall satisfy minimum attendance requirements on par with the

other theory courses and secure a pass in the end semester examinations for which the evaluation shall be totally internal.

ii. A student shall be promoted from VI to VII semester, only if he / she fulfills the academic requirements of a minimum of 63 credits out of 90 credits (70%), upto the end of VI semester (from III to V semesters regular and supplementary examinations & VI semester regular examinations).

iii. To be eligible for the award of B.Tech. degree, a student shall register and satisfy the attendance requirements for all the courses including non-credit mandatory courses, and shall earn 135 credits, and secure a pass in the non-credit mandatory courses.

iv. A student who fails to earn 135 credits, and secure a pass in non-credit mandatory courses within six academic years from the year of his / her admission shall forfeit his / her seat and his / her admission stands cancelled.

RL 4.0 All other regulations are same as those applicable to the students admitted into B.Tech. I-Semester.

RL 5.0 Subjects are identified as exempted / compulsory / pre-requisites by the respective Chairman, Boards of Studies and recommended for study to make-up for any gaps in the curriculum for further study.

The student has to register for compulsory courses, attend the classes and qualify in examination.

The student has to register for the pre-requisite courses, attend the classes for which the evaluation is totally internal.

Compulsory and pre-requisite courses do not carry any credits.

RL 6.0 Marks obtained from the credit courses shall be considered for the award of class / division.

RL7.0 General:

i. Where the words 'he', 'him', 'his', occur, they imply 'she', 'her', 'hers', also.

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

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

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

REVISED TRANSITORY REGULATIONS FOR STUDENTS SEEKING RE-ADMISSION INTO 2013 REGULATIONS

(detained due to shortage of attendance / lack of credits in earlier Regulations)

RT 1.0

1.1 The student has to continue the course work along with the regular students of the respective semester in which the student gets re-admission.

1.2 Substitute / compulsory subjects shall be offered in place of subjects that are already studied earlier. The student has to register for those courses.

1.3 The mode of internal evaluation (i.e., in-course assessments) and external evaluation (i.e., end-semester examinations) shall be on par with the regular students, i.e., the student has to follow the then mode of internal evaluation and the then question paper model for the end-semester examinations along with the regular students of the respective semester in which the student gets re-admission. The marks secured in the internal and external evaluation will be pro-rated in accordance with the regulations under which the student was first admitted.

1.4 For the subjects studied under earlier regulations but failed, the student has to appear, pass and acquire credits from the supplementary examinations as and when conducted. The question paper model shall remain same as that the student appeared under earlier regulations.

1.5 The promotion criteria based on attendance as well as credits shall be in accordance with the regulations under which the student was first admitted.

1.6 To be eligible for the award of the degree, the student shall complete the attendance requirements and appear for the end semester examination in all the courses for 224 credits, including the substitute/compulsory courses as prescribed in

the transitory course structure and shall acquire atleast 216 credits. The exemption of 8 credits is only from the four electives, namely, Elective-I, II, III, and IV.

1.7 All other academic requirements shall be in accordance with the regulations under which the student was first admitted.

1.8 The decision by the Principal is final on any other clarification in this regard.

RT 2.0 General:

2.1 Where the words 'he', 'him', 'his', occur, they imply 'she', 'her', 'hers', also.

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

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

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

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Vision

The vision of Electronics and Communication Engineering Department is to be in the lead to create and develop professional and intellectual human capital in electronics and communication engineering and applications in order to foster the technological, economic and social enrichment of the state and the nation and to contribute to global village connectivity

Mission

- To play professional role to create, develop, organize and manage complex technologies and products, contribute to the betterment of society and evolve better quality of living in a world increasingly influenced by scientific and technological innovation.
- To provide students of E & C Engineering an environment of academic freedom that will ensure the exchange of ideas and the dissemination of knowledge in this discipline.
- To Recognize as a place that encourages research excellence and diversity in thought and endeavor in multidisciplinary applications

Programme Educational Objectives

The graduate will be able to

PEO 1 Pursue successful careers or higher studies in Electronics and Communication engineering with morals and ethics through their strong foundation in mathematics, science and engineering.

PEO 2 Analyze and design appropriate solutions for socially relevant problems by using current engineering techniques and tools.

PEO 3 Engage in professional development through effective communication, team work and lifelong learning.

Programme Outcomes

Graduates at the end of the programme will be able to :

PO 1 Apply the knowledge of mathematics, science, engineering fundamentals to solve complex electronics and communication engineering problems.

PO 2 Identify, formulate and analyze problems related to electronics and communication engineering and substantiate the conclusions using the first principles of sciences and engineering.

PO 3 Design solutions for electronics and communication engineering problems and design system components and processes that meet the specified needs with appropriate consideration for public health and safety.

PO 4 Perform analysis and interpretation of data by using research methods such as design of experiments to synthesize the information and to provide valid conclusions.

PO 5 Select and apply appropriate techniques from the available resources and modern electronics and communication engineering and software tools, and will be able to predict and model complex engineering activities with an understanding of the practical limitations.

PO 6 Carry out their professional practice in electronics and communication engineering by appropriately considering and weighing the issues related to society and culture and the consequent responsibilities.

PO 7 Understand the impact of the professional engineering solutions on environmental safety and legal issues.

PO 8 Transform into responsible citizens by resorting to professional ethics and norms of the engineering practice.

PO 9 Function effectively in individual capacity as well as a member in diverse teams and in multidisciplinary streams.

PO 10 Communicate effectively on complex engineering activities with the engineering community and society, and will be able to prepare reports and make presentations effectively.

PO 11 Demonstrate knowledge and understanding of the engineering and management principles and apply the same while managing projects in multidisciplinary environments.

PO 12 Engage themselves in independent and life-long learning in the broadest context of technological change while continuing professional practice in their specialized areas of electronics and communication engineering

COURSE STRUCTURE

SEMESTER - I

Code	COURSE TITLE	L	T	P	C
13BM1101	Mathematics-I	4	1	0	3
13BP1101	Physics	4	0	0	3
13CT1102	Computer Programming through C	4	0	0	3
13ME1102	Engineering Mechanics	4	1	0	3
13EE1101	Basic Network Analysis	4	0	0	3
13BP1102	Physics Lab	0	0	3	2
13CT1103	Computer Programming Lab	0	0	3	2
13ME1103	Engineering Drawing	1	0	3	3
13MT1101	Engineering Workshop	0	0	3	2
TOTAL		**21**	**2**	**12**	**24**

SEMESTER - II

Code	COURSE TITLE	L	T	P	C
13HE1101	English	4	0	0	3
13BM1102	Mathematics-II	4	1	0	3
13BC1101	Chemistry	4	0	0	3
13EC1101	Electronic Devices	4	1	0	3
13EE1144	Electrical Technology	4	0	0	3
13HE1102	English Language Lab	0	0	3	2
13BC1103	Chemistry Lab	0	0	3	2
13EC1102	Electronic Devices Lab	0	0	3	2
13NM1101	Professional Ethics	2	0	0	0
TOTAL		**22**	**2**	**9**	**21**

SEMESTER - III

Code	COURSE TITLE	L	T	P	C
13BM1104	Special functions and complex variables	4	1	0	3
13HM1101	Managerial Economics and Financial Accounting	4	0	0	3
13EC1103	Electronic Circuits	4	0	0	3
13EC1104	Signals and Systems	4	1	0	3
13EC1105	Switching Theory and Logic Design	4	0	0	3
13EC1106	Pulse and Digital circuits	4	0	0	3
13EC1107	Electronic Circuits Lab	0	0	3	2
13EE1145	Electrical Technology Lab	0	0	3	2
13NM1102	Environmental Studies	2	0	0	0
TOTAL		**27**	**2**	**6**	**22**

SEMESTER - IV

Code	COURSE TITLE	L	T	P	C
13BM1107	Random variables and Numerical Methods	4	1	0	3
13EC1108	Digital IC Applications	4	1	0	3
13EC1109	Analog Communications	4	0	0	3
13EC1110	Linear IC applications	4	0	0	3
13EC1111	EM Waves and Transmission Lines	4	0	0	3
13CT1105	Computer Organization	4	0	0	3
13EC1112	Pulse and Integrated Circuits lab	0	0	3	2
13EC1113	Analog Communications Lab	0	0	3	2
TOTAL		**24**	**2**	**6**	**22**

SEMESTER - V

Code	COURSE TITLE	L	T	P	C
13EE1104	Network Analysis and Synthesis	4	1	0	3
13EE1105	Control Systems	4	1	0	3
13EC1114	Digital Communications	4	0	0	3
13EC1115	Microprocessors and Microcontrollers	4	0	0	3
13EC1116	Antennas and Wave propagation	4	0	0	3
13EC1117	VLSI Design	4	0	0	3
13EC1118	Digital Communication Lab	0	0	3	2
13EC1119	VLSI Design Lab	0	0	3	2
13NM1103	Intellectual Property rights and Patents	2	0	0	0
TOTAL		**26**	**2**	**6**	**22**

SEMESTER - VI

Code	COURSE TITLE	L	T	P	C
13HM1102	Management Science	4	0	0	3
13EC1120	Electronic Measurements and Instrumentation	4	1	0	3
13EC1121	Microwave Engineering	4	0	0	3
13EC1122	Digital Signal Processing	4	1	0	3
	ELECTIVE- I	4	0	0	3
13EC1123	Information Theory and Coding				
13CT1106	Data Structures				
13EC1124	Microcontrollers and Applications				
	ELECTIVE-II	4	0	0	3
13EC1125	Digital IC Design				
13CT1111	Object Oriented Programming Through JAVA				
13EC1126	Data Communications				
13EC1127	Microprocessor and Microcontroller Lab	0	0	3	2
13ES11BC	Basic Computations Lab	0	0	3	2
13HE1103	Technical Communication and Soft Skills Lab	0	0	3	2
	TOTAL	**24**	**2**	**9**	**24**

SEMESTER - VII

Code	COURSE TITLE	L	T	P	C
13EC1128	TV & Satellite Communications	4	1	0	3
13EC1129	Radar Engineering	4	1	0	3
13EC1130	Optical Communications	4	0	0	3
13EC1131	Digital Image Processing	4	0	0	3
13CT1124	Computer Networks	4	0	0	3
	ELECTIVE-III	4	0	0	3
13EC1132	Digital Design Through Verilog				
13EC1133	Embedded Systems				
13EC1134	Electromagnetic Interference and Compatibility				
13EC1135	Microwave and Optical Communication Lab	0	0	3	2
13EC1136	Digital Signal Processing Lab	0	0	3	2
13EC11MP	Industry Oriented Mini Project	0	0	0	2
	TOTAL	**24**	**2**	**6**	**24**

SEMESTER - VIII

Code	COURSE TITLE	L	T	P	C
13EC1137	Wireless Communications	4	0	0	3
	ELECTIVE-IV	4	0	0	3
13EC1138	DSP Processors & Architecture				
13EC1139	Real Time Operating Systems				
13EE1113	Power Electronics				
	OPEN ELECTIVE	4	0	0	3
13EC11SM	SEMINAR	0	0	3	2
13EC11CV	COMPREHENSIVE VIVA	0	0	0	2
13EC11PW	PROJECT WORK	0	0	12	8
	TOTAL	**12**	**0**	**15**	**21**

LIST OF OPEN ELECTIVES

CODE	COURSE TITLE	OFFERING DEPARTMENT
13CH1128	Design and Analysis of Experiments*	Chemical Engineering
13CE1155	Green Buildings and Infrastructure	Civil Engineering
13CE1156	Disaster Management	Civil Engineering
13CS1113	E-Commerce	Computer Science and Engineering
13CT1132	Software Project Management*	Computer Science and Engineering
13EC1140	Bio-Medical Instrumentation	Electronics and Communications Engineering
13EE1138	Electrical Safety Management	Electrical and Electronics Engineering
13EE1139	Reliability Evaluation of Engineering Systems	Electrical and Electronics Engineering
13EE1140	Design Concepts for Engineers	Electrical and Electronics Engineering
13EE1141	Special Electrical Machines for Industrial Applications	Electrical and Electronics Engineering
13IT1113	Neural Networks	InformationTechnology
13IT1114	Biometrics	InformationTechnology
13ME1143	Renewable Sources Of Energy*	Mechanical Engineering
13ME1153	Project Management*	Mechanical Engineering
13BP1103	Nano Technology	Physics
13HM 1104	Entrepreneurship and Small Business Management	Management Studies
13HM 1105	Financial Management	Management Studies
13HM 1106	Indian and International Business Environment	Management Studies

*These courses can be taken by the students of respective departments if they are not offered /opted earlier in the structure.

NOTES

SYLLABI FOR I SEMESTER

MATHEMATICS-I
(Common to all Branches)

Course Code: 13BM1101

L	T	P	C
4	1	0	3

Pre requisites:

- Basic formulae of differentiation, product rule, and quotient rule.
- Basic Integration formulae, integration by parts, definite integrals and properties.
- Basic concept of partial differentiation.

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1 Develop the ability to solve linear differential equations of first and higher order and use the knowledge gain to certain engineering problems.

CO 2 Appraise the Laplace transform technique and use it to solve various engineering problems.

CO 3 Apply the techniques of multivariable differential calculus to determine extrema and series expansions etc., of functions of several variables.

CO 4 Extend the concept of integration to two and three dimensions and support it through applications in engineering mechanics.

CO 5 Generalize calculus to vector functions and interpret vector integral theorems.

UNIT-I **(12 Lectures)**

ORDINARY DIFFERENTIAL EQUATIONS:

Linear equations of first order, Bernoulli differential equation, Linear differential equations of higher order with constant coefficients, Method of Variation of parameters, Linear differential equations with

variable coefficients (Cauchy's homogeneous linear equation, Legendre's linear equation).

APPLICATIONS OF LINEAR DIFFERENTIAL EQUATIONS:

Orthogonal trajectories, Models on R-L-C circuits, Newton's law of cooling.
(11.9, 11.10, 13.1—13.7, 13.8(1), 13.9, 12.3, 12.5, 12.6)

UNIT-II (12 Lectures)

LAPLACE TRANSFORMS:

Laplace transform of elementary functions, properties, Transforms of periodic functions, Transforms of derivatives and integrals, Multiplication by t^n, division by t, evolution of integrals by Laplace transforms.

INVERSE TRANSFORM:

Introduction, Finding inverse transforms by the method of partial fractions, other methods of finding Inverse Transform, Convolution theorem, Unit step function, and Unit impulse function.

APPLICATION OF LAPLACE TRANSFORMS:

Initial and Boundary Value Problems.
(21.1-21.5, 21.7-21.15, 21.17, 21.18

UNIT-III (12 Lectures)

PARTIAL DIFFERENTIATION:

Total derivative, change of variables, Jacobians, Tangent Plane and Normal to the Surface, Taylor's theorem for functions of two variables.

APPLICATIONS OF PARTIAL DIFFERENTIATION:

Maxima and Minima of functions of two variables, Lagrange method of undetermined multipliers.
(5.5 – 5.9, 5.11, 5.12)

UNIT-IV (12 Lectures)

MULTIPLE INTEGRALS:

Introduction to Non-Cartesian Coordinates, Double integrals, Change of order of integration, Double integral in polar co-ordinates, Triple

integrals, Change of variables in double integrals, Change of variables in triple integrals. Simple Applications of Multiple Integrals**:** Area enclosed by plane curves, Volumes of solids.
(8.19, 8.21, 7.1, 7.7)

UNIT-V (12 Lectures)

VECTOR DIFFERENTIATION:

Differentiation of vectors, curves in space, velocity, acceleration, Scalar and Vector point functions. Gradient of a scalar field and directional derivatives- Divergence and curl of a Vector field and it's physical interpretation.

VECTOR INTEGRATION:

Line integral, Circulation, work done, surface and volume integrals.

Vector integral theorems: Green's, Stoke's and Gauss Divergence theorems (without proofs) and related problems.
(8.1- 8.16)

TEXT BOOK:

Dr.B.S.Grewal *"Higher Engineering Mathematics"*, 42nd Edition, Khanna Publishers, 2012.

REFERENCES:

1. Kreyszig E, "*Advanced Engineering Mathematics*", 8th Edition, John Wiley, Singapore, 2001.
2. Greenberg M D, "*Advanced Engineering Mathematics*", 2nd Edition, Pearson Education, Singapore, Indian Print, 2003.
3. Peter V. O'Neil, "*Advanced Engineering Mathematics*", 7th Edition, Cengage Learning, 2011.

PHYSICS

(Common to all Branches)

Course Code: 13BP1101

L	T	P	C
4	0	0	3

Course Outcomes:

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

CO 1 Interpolate the knowledge of elastic and acoustic response of materials for various applications.

CO 2 Summarize the basic theories of electrostatics and dielectrics to solve a variety of problems.

CO 3 Convert the knowledge of basic principles of electromagnetism to design electrical and electronic devices.

CO 4 Resolve the discrepancies in classical estimates through quantum principles and classify the solids.

CO 5 Realize the principles of optics in designing optical devices.

UNIT-I **(10 Lectures)**

ELASTIC PROPERTIES OF MATERIALS & ARCHITECTURAL ACOUSTICS:

Introduction – classification of stress, strain and Hooke's law – Elastic behavior of materials – Poisson's ratio and relationship between modulus of elasticity – Twisting couple on a solid shaft – bending of beams – bending moment - Y by cantilever – Uniform bending - Reverberation and reverberation time – absorption coefficient – Sabine's law (quantitative treatment) – Factors affecting the acoustics of buildings and their remedies – Acoustical design of a hall.

UNIT-II **(15 Lectures)**

ELECTROSTATICS AND DIELECTRICS:

Vectors - unit vectors - Gradient of a scalar field – divergence & curl

of a vector field – Coulombs law - Electric flux - Gauss law in electrostatics – differential form of Gauss law – derivation of Coulombs law from Gauss Law – Applications of Gauss Law (Electric Field due to a solid charged sphere and thin sheet of charge) - Gauss law in dielectric medium - Dipole - Electric displacement vector - Dielectric permittivity and susceptibility- Dielectric constant and dielectric polarization in materials - Types of polarizabilities - Electronic polarizability derivation - Internal fields in solids and Claussius - Mosotti equation - frequency dependence of dielectric constant - Dielectric loss - Dielectric Strength and dielectric breakdown - important dielectric materials in electrical engineering.

UNIT-III (10 Lectures)

ELECTROMAGNETICS:

Biot-Savart Law - Magnetic flux – Magnetic scalar potential - Magnetic Vector Potential - Ampere's law – Force and torque on a magnetic dipole due to external magnetic field, Magnetization - Bound volume and surface current densities - auxiliary field H (Ampere's law in magnetized materials) - Magnetic susceptibility and permeability - Force on charged particle under electric and magnetic fields - Faraday's law of electromagnetic induction - Self and mutual Inductances - Displacement current density - Maxwell's equations – Physical Significance of Maxwell's equations.

UNIT-IV (10 Lectures)

WAVE MECHANICS & BAND THEORY OF SOLIDS:

Introduction to wave mechanics – wave particle duality – de-Broglie matter waves – Wave function characteristics and significance – Schrodinger's time independent wave equation – particle in one dimensional rigid box - Fermi-Dirac distribution function – Fermi level - Effect of temperature on Fermi function - Bloch theorem (Qualitative), Kronig - Penny model (Qualitative treatment) – Concept of effective mass, Origin of energy band formation in solids – Classification of materials into conductors, semi-conductors and insulators based on number of effective electrons.

UNIT-V (15 Lectures)

OPTICS & LASERS

Introduction to optics – Interference phenomenon - interference through thin films in reflected light – Newton's rings – determination of wave length of a source – Diffraction due to single slit – intensity pattern discussion – Diffraction grating – Resolving Power of grating (qualitative) - Polarization – Law of Malus - Brewster's law – double refraction – Nicol prism - Basic principle of a LASER – Induced absorption, spontaneous and stimulated emissions – Einstein's coefficients – Population inversion – Ruby laser, CO_2 laser and Semiconductor laser – Laser Applications – Introduction to optical fibers – Classification of fibers on the basis of refractive index profile – Acceptance angle and numerical aperture definitions and expression for Numerical aperture – Applications relating to communication and sensors (force and temperature).

TEXT BOOKS:

1. D.J. Griffiths, *"Introduction to Electrodynamics"*, 3rd Edition, PHI (EEE series), 2009.
2. M.N. Avadhanulu, P.G. Kshirasagar, *"A Text book of Engineering Physics"*, 10th Edition, S. Chand & Company Limited, 2013.
3. V. Rajendran, *"Engineering Physics"*. 2011 Edition, TMH Publishing Company, 2011.

REFERENCES:

1. A.J. Dekker, *"Electrical Engineering Materials"*, 1st Edition, Macmillan Publishers, 2007.
2. C. Kittel, *"Introduction to Solid State Physics"*, John Wiley Publishers, 2007.
3. M.N.Sadiku, *"Elements of Electromagnetics"*, 4th Edition, Oxford University Press, 2007.
4. V. Raghavan, *"Materials Science"*, 5th Edition, PHI Publishers, 2007.

5. R.K. Gaur, S.L. Gupta, *"Engineering Physics"*, 8th Edition, Dhanapat Rai Publishers, 2003.

6. P.K. Palanisamy, *"Applied Physics"*, 2nd Edition, Scitech Publishers, 2010.

7. M. R. Srinivasan, *"Engineering Physics"*, New Age Publishers, 2012.

COMPUTER PROGRAMMING THROUGH C

(Common to all Branches)

Course Code : 13CT1102

L	T	P	C
4	0	0	3

Course Outcomes:

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

CO 1 Design Algorithms and draw Flowcharts.

CO 2 Develop Programs using functions.

CO 3 Develop Programs for Arrays and String manipulations.

CO 4 Use pointers in programs.

CO 5 Discuss structures, unions, files.

UNIT-I **(12 Lectures)**

Introduction to Computers , Algorithm/ Pseudo code, Flow chart, Program Development steps, Basic structure of C Program, Input and Output statements (printf() & scanf()), A Simple C Program, Identifiers, Basic data types and sizes, Constants, Variables, Operators, Type Conversion, Expression Evaluation, Precedence & Associativity of operators.

CONTROL STATEMENTS:

If, switch, for, while and do- while statements, break, continue and goto statements.Sample programs covering all the above topics.

UNIT-II **(12 Lectures)**

FUNCTIONS:

Definition, Advantages, types of functions- user defined and standard library functions, categories of functions, scope rules, recursion, storage classes. Sample programs covering all the above topics.

UNIT-III (12 Lectures)

ARRAYS:

Introduction to arrays, one dimentional arrays: Definition, Declaration, Initialization, Accessing & storing the elements, two dimentional arrays: Definition, Declaration, Initialization, Accessing & storing the elements, C Pre processors.

STRINGS:

String- Declaration, Initialization, pointers and strings, standard library string functions, array of pointers to strings. Sample programs covering all the above topics.

UNIT-IV (12 Lectures)

POINTERS:

Definition, Declaration of Pointer variables, the & and * operators, Pointer Expressions, Char, int, and float pointers, Pointer arithmetic, Passing addresses to functions, Functions returning pointers, Pointers & Arrays: Passing array elements to functions, pointer to pointer, array of pointers, Dynamic memory allocation functions, Sample programs covering all the above topics

UNIT-V (12 Lectures)

STRUCTURES & UNIONS:

Structures: Definition, Initialization, Accessing structures, nested structures, array of structures, additional features of structures, self referential structures, unions, type-def, bit fields, enum data type.

FILES:

Concept of a file, Text and Binary files, file I/O operations, Command line arguments. (Let Us C, Yashwant Kanetkar)

Sample programs covering all the above topics.

TEXT BOOKS:

1. B.A Forouzan and R.F. Gilberg, *"Computer science, A structured programming approach using C"*, 3rd Edition, Cengage Learning.

2. Yashwant Kanetkar, *"Let Us C"*, 12th Edition, BPB Publications, 2012.

3. Yashwant Kanetkar, *"Understanding pointers in C"*, 4th Edition, BPB Publications, 2009.

REFERENCES:

1. N. B. Venkateswarlu, E.V. Prasad, *"C & Data Structures"*, 1st Edition, S. Chand Publications, 2010.

2. K.R.Venugopal, S.R.Prasad, *"Mastering C"*, 1st Edition, TMH, 2007.

ENGINEERING MECHANICS

(Common to all Branches)

Course Code: 13ME1102

L	T	P	C
4	1	0	3

Course Outcomes:

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

CO 1 Convert a given physical problem into a suitable force system, Draw the Free Body Diagrams and find the resultant force.

CO 2 Solve problems involving static and kinetic friction.

CO 3 Identify the centroid of a given plane area and find its area/ mass moment of inertia.

CO 4 Calculate the displacement, velocity and acceleration of a body subjected to rectilinear, curvilinear translation, fixed axis rotation.

CO 5 Apply the work-energy principle to particles and connected systems.

UNIT-I (13 Lectures)

RESULTANTS OF FORCE SYSTEM:

Parallelogram law, forces and components, resultant of coplanar concurrent forces, components of forces in space, moment of force, principle of moments, coplanar applications, couples, resultant of any force system (coplanar concurrent cases only).

Equilibrium of force systems: Free body diagram, equations of equilibrium, equilibrium of planar systems, further discussion of planar equilibrium.

UNIT-II (09 Lectures)

FRICTION:

Theory of friction, angle of friction, laws of friction, static friction,

kinetic friction, friction in bodies moving up or down on an inclined plane, wedge friction, screw friction and screw jack.

UNIT-III (14 Lectures)

CENTROIDS AND CENTERS OF GRAVITY:

Center of gravity of flat plate, centroids of areas and lines, importance of centroids of areas and lines, importance of centroids and moments of area, centroids determined by integration, centroids of composite figures, theorem of Pappus, center of gravity of bodies.

MOMENT OF INERTIA:

Definition of moment of inertia, polar moment of inertia, radius of gyration, parallel axis theorem, moments of inertia by integration, moments of inertia for composite areas.

UNIT-IV (12 Lectures)

MASS MOMENT OF INERTIA:

Introduction, radius of gyration, parallel axis theorem, mass moments of inertia by integration, moments of inertia of composite bodies.

KINEMATICS AND KINETICS OF A PARTICLE:

Motion of a particle, rectilinear motion, rectangular components of curvilinear motion, normal and tangential components of acceleration, radial and transverse components, cylindrical coordinates, translation-analysis as a particle, further discussion of particle kinematics.

UNIT-V (10 Lectures)

KINEMATICS AND KINETICS OF A BODY UNDERGOING FIXED AXIS ROTATION:

Types of rigid-body motion, angular motion-fixed axis rotation, application of kinematic equations, kinetics of fixed axis rotation.

WORK-ENERGY METHOD:

Work-energy equation for translation, interpretation and computation of work, work-energy applied to particle motion, power, efficiency, applied to fixed-axis rotation, work-energy applied to connected systems, work-energy method.

TEXT BOOK:

Vijaya Kumar Reddy K and Suresh Kumar J(Adapters), "*Singer`s Engineering Mechanics : Statics and Dynamics*", Third edition (SI Units), BS Publications, Hyderabad, 2011.

REFERENCES :

1. Timoshenko S.P and Young DH, Rao and Pytel, "*Engineering Mechanics*", fourth edition, McGraw Hill international editions, 2013.
2. Hibbeler RC, " *Engineering Mechanics : Statics"*, low price edition, Pearson Education,2000.
3. Hibbeler RC, "*Engineering Mechanics : Dynamics"*, low price edition, Pearson Education,2000.
4. Tayal AK "*Engineering Mechanics: Statics and Dynamics*", Thirteenth edition, Umesh Publications, Delhi, 2005.

BASIC NETWORK ANALYSIS

(Common to ECE & EEE)

Course Code:13EE1101

L	T	P	C
4	0	0	3

Pre requisites: Mathematics.

Course Outcomes:

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

CO 1 Distinguish between various laws and theorems and apply to solve a network.

CO 2 Analyze the behavior of Capacitors, Inductors and mutual inductors subjected to different excitations and also transient behavior of RL & RC circuits with and without inputs.

CO 3 Compute transients in RLC circuit with DC excitation and also analyze sinusoidal steady state response with phasor concepts.

CO 4 Analyze the power and energy relations with notions of Active and Reactive powers, also to make a frequency response analysis (resonance).

CO 5 Analyze three phase circuits under balanced and unbalanced conditions.

UNIT-I **(12 Lectures)**

BASIC COMPONENTS AND ELECTRIC CIRCUITS :

Introduction, units and scales, charge, current, voltage and power; Voltage and current sources - Independent and dependent sources; Networks and circuits; Ohm's Laws, power absorption, conductance; Voltage and Current Laws: Nodes, paths, loops and branches, Kirchoff's current law, Kirchoff's voltage law; The single loop circuit; The single-node-pair circuit; series and parallel connected sources; Resistors in series and parallel; Voltage and current division. Circuit

Analysis: Nodal Analysis, Super node; Mesh analysis, super mesh; Nodal Vs Mesh analysis – a comparison; Linearity and superposition, The superposition principle; Source transformations; Thevenin and Norton equivalent circuits; Maximum Power Transfer Theorem; Reciprocity theorem; Delta-wye conversion.

UNIT-II (12 Lectures)

CAPACITORS, INDUCTORS AND BASIC RL & RC CIRCUITS:

Capacitor, Integral Voltage-current relationship, energy stored in a capacitor; The inductor, integral voltage-current relationship, energy stored in an inductor; Inductance and Capacitance combinations-inductors in series and parallel; Capacitors in series and parallel; Magnetically Coupled circuits – Mutual inductance - coefficient of mutual inductance, dot convention, combined mutual and self-induced voltages, Energy considerations, the coupling coefficient. Basic RL and RC circuits: The source free RL circuit – A direct approach, an alternate approach, a more general solution approach; Properties of the exponential response; The source free RC Circuit; A more general perspective – General RL circuits, distinction between 0^+ and 0^- General RC circuits; The unit-step function, Physical sources and the unit step function, the rectangular pulse function; Driven RL circuits – Natural and Forced response, determination of the complete response; Driven RC circuits.

UNIT-III (12 Lectures)

THE RLC CIRCUIT AND SINUSOIDAL STEADY-STATE ANALYSIS:

The source free parallel RLC circuit – obtaining the differential equation, solution to the differential equation; Overdamped, critically damped and the underdamped cases; The source free series RLC circuit – the complete response of the series RLC circuit; The lossless LC circuit. Characteristics of sinusoids, The Phasors – Phasor relationships for R,L and C; Kirchoff's laws using phasors; Impedance – series and parallel combinations; Admittance; Nodal and Mesh Analysis; Superposition, Thevenin's and Norton's theorems, Source transformations; Phasor diagrams. Parallel Resonance – Resonant

frequency, band width and quality factor; Series Resonance – Resonant frequency, band width and quality factor, Locus diagrams in RL and RC circuits.

UNIT-IV (12 Lectures)

AC CIRCUIT POWER ANALYSIS:

Introduction, Instantaneous Power, Power due to sinusoidal excitation, Average Power – Average power for periodic waveforms, average power in the sinusoidal steady state, Average power absorbed by an ideal resistor and purely reactive elements; Maximum Power Transfer; Effective values of current and voltage – effective value of a periodic waveforms, use of effective value to compute average power, effective value with multiple frequency circuits; Apparent Power and Power Factor; Complex Power – Power Triangle and Power Measurement.

UNIT-V (12 Lectures)

SINGLE PHASE AND THREE PHASE CIRCUITS:

Introduction, Balanced three phase voltages, Balanced Wye-Wye connection, Balanced Wye-Delta connection, Balanced Delta-Delta connection, Balanced Delta-Wye connection, power in a balanced system, Un-balanced Three phase system.

TEXT BOOKS:

1. William H.Hayt, Jr., Jack E.Kemmerly and Steven M.Durbin, *"Engineering Circuit Analysis"*, 7th Edition, McGraw Hill Publications, 2007. (Unit-I to Unit-IV).
2. Charles K. Alexander and Mathew N.O.Sadiku, *"Fundamentals of Electric Circuits"*, 4th Edition, McGraw Hill Publications, 2009. (Unit-V).

REFERENCES:

1. M.E.Van Valkenberg, *"Network Analysis"*, Prentice Hall of India, New Delhi.
2. Russell M.Kerchner, *"Alternating-current circuits"*, 4th Edition, John Wiley and sons, 1960.

PHYSICS LAB

(Common to all Branches)

Course Code: 13BP1102

L	T	P	C
0	0	3	2

Course Outcomes:

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

CO 1 Demonstrate the elastic response of loaded beams; estimate the frequency of a vibrating system using standing wave pattern.

CO 2 Familiarize with CRO; assess the resonant frequency and quality factor of electrical oscillations.

CO 3 Estimate the strength of the magnetic field due to a current carrying coil.

CO 4 Interpolate some of the physical parameters based on optical phenomena.

CO 5 Realize explicit knowledge on the working and performance of photocells.

ANY TEN OF THE FOLLOWING 15 EXPERIMENTS

ERROR ANALYSIS AND GRAPH DRAWING (LECTURE - DEMO)

1. Bending of beams – Elliptical and Hyperbolic fringes - Determination of 'Y'.
2. Torsional pendulum - comparison of rigidity modulii of various wires.
3. Melde's experiment – determination of frequency of electrically maintained tuning fork.
4. Determination of wavelength of laser light using diffraction through a graded scale.
5. Particle size determination using He-Ne laser (Lycopodium powder).

6. Diffraction grating – determination of wavelengths of spectral lines of Mercury spectrum by minimum deviation method.
7. Spectrometer – determination of dispersive power of the material of a prism.
8. Polarization of light – verification of Malu's law and to determine the Brewster's Angle for glass.
9. Determination of Planck's constant.
10. Solar cell characteristics – I-V characteristics, measurement of efficiency and Fill factor.
11. Stewart – Gee apparatus – study of variation of magnetic field along the axis of circular current carrying loop.
12. LCR series and parallel resonance circuit to study the frequency response.
13. Familiarity of CRO – Lissajjou's figures - determination of time period, voltage, frequency and phase of a wave.
14. Newton's Rings- determination of wavelength of the source/ radius of curvature of given convex lens.
15. Optical fibres- determination of Numerical aperture, acceptance angle and bending losses.

COMPUTER PROGRAMMING LAB
(Common to All Branches)

Course Code : 13CT1103

L	T	P	C
0	0	3	2

Course Outcomes:

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

CO 1 Use RAPTOR tool in program development.

CO 2 Program mathematical operations using control statements.

CO 3 Develop Programs for Arrays and String manipulations.

CO 4 Implement Programs using functions, pointers, structures and unions.

CO 5 Implement Programs for File I/O operations.

LIST OF PROGRAMS:

1. Demonstration of RAPTOR Tool to generate flowcharts by considering simple algorithms. Generation of flow charts to solve problems such as Temperature Conversion, Swapping of Two numbers etc. using RAPTOR Tool.
2. Write C Programs to solve problems such as Student Grading, Income Tax Calculation, and Largest of three Numbers etc., which expose students to various categories of IF Statements. Generate flowcharts using RAPTOR Tool.
3. a) Write a C program to find the roots of a quadratic equation.

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

4. a) 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 (m/sec.) and acceleration (m/sec^2). 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'.

b) Write a C program to determine whether a given number is an Armstrong or not.

(If the sum of the cubes of digits in the number is equal to the original number, then the number is called Armstrong number. Eg: 371 is Armstrong number ($3^3+7^3+1^3= 371$))

5. 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.

6. a) Write a C program to calculate the following sum:

Sum=$1-x^2/2! +x^4/4!-x^6/6! +x^8/8! -x^{10}/10!$

b) Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.

7. a) Write a C program to generate Pascal's Triangle.

b) Write a C program to construct a Pyramid of Numbers.

8. Write C programs that use both recursive and non-recursive functions for the following

a) To find the factorial of a given integer.

b) To find the GCD (greatest common divisor) of two given integers.

9. a) Write a C function to read in two numbers, x and n, and then compute the sum of this geometric progression:

   $1+x+x^2+x^3+\ldots\ldots\ldots\ldots + x^n$. Also perform error checking by considering negative values for n and also check for illegal values of x.

   b) Write a C function to read in two numbers, x and n (no. of terms), and then compute sin(x) and cos(x).

10. a) Write a C program to find the largest and smallest number in a list of integers.

    b) Write a C program to perform Matrix Addition & Matrix Multiplication.

    c) Write a C program to compute Transpose of a Matrix.

11. a) Write a C program to exchange value of two integers using call by value and call by reference.

    b) Write C programs to demonstrate the use of Pointers.

12. Write user defined string handling functions to implement the following standard library functions: strlen(), strcpy(), strcat(), strrev(), strcmp().

13. a) Write a C program that displays the position/ index in the string S where the string T begins, or –1 if S doesn't contain T.

    c) Write a C program to determine whether a given string is Palindrome or not.

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

    a) To insert a sub-string in to given main string from a given position.

    b) To delete n Characters from a given position in a given string.

    c) To replace a character of string either from beginning or ending or at a specified location.

15. a) Write a C program to find the two's complement of a binary number.

b) Write a C program to convert a Roman numeral to its decimal equivalent.

16. Write a C program that uses functions to perform the following operations using Structures:

a) Reading a complex number.

b) Writing a complex number.

c) Addition of two complex numbers.

d) Multiplication of two complex numbers.

17. a) Write a C program which copies one file to another.

b) Write a C program to count the number of characters, lines, words, tabs and spaces in a given file.

ENGINEERING DRAWING

(Common to all Branches)

Course Code:13ME1103

L	T	P	C
1	0	3	3

Course Outcomes:

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

CO 1 Draw geometrical constructions, conics and cycloidal curves

CO 2 Draw projections of lines

CO 3 Draw projections of planes

CO 4 Draw projection of solids

CO 5 Draw isometric views

LIST OF EXERCISES

1. Introduction to engineering drawing & basics of geometrical construction
2. Construction of parabola, ellipse, hyperbola- general method
3. Cycloid, epicycloids, hypocycloid, involutes of circle and square
4. Projections of points
5. Projections of lines inclined to one plane
6. Projections of lines inclined to both the planes
7. Projections of planes inclined to one plane
8. Projections of planes inclined to both the planes
9. Projections of solids in simple positions
10. Projections of solids inclined to both the planes
11. Isometric views

TEXT BOOK:

N.D. Bhatt and V.M. Panchal, *"Engineering Drawing"*, Charotar Publication House, 49th Edition, 2008.

ENGINEERING WORKSHOP

(Common to all Branches)

Course Code :13MT1101

L	T	P	C
0	0	3	2

Course Outcomes:

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

CO 1 Identify components of computer, components in CPU and demonstrate the assembly and disassembly of personal computer, troubleshooting and install MS Windows, Linux.

CO 2 Create word documents, spreadsheets and power point presentations.

CO 3 Create basic animations using adobe flash.

CO 4 Prepare the wooden pieces into lap, mortise and tennon joints. Prepare different forms of fit on metal pieces and identify different types of patterns used for mould preparations providing necessary allowances.

CO 5 Identify different types of tools used in black smithy and tin smithy. Prepare the models by solid metals and sheet form metals and discuss the types of welding processes and equipments for preparing welded joints.

COMPULSORY EXERCISES:

1. Identification of the peripherals of a computer, components in a CPU and its function – Block diagram of the CPU along with the configuration of each peripheral. Disassembly and assembly of a personal computer.
2. Installation of MS windows on the personal computer.
3. One lamp controlled by a one-way switch and (b) Two-way switching for stair-case lamp.

ANY NINE EXPERIMENTS FROM THE FOLLOWING:

Carpentry: Making a Cross-half lap joint using wooden pieces.

Carpentry: Making a Mortise and Tenon joint using wooden pieces.

Fitting: Preparation of a V-fit between mild steel flat pieces.

Fitting: Preparation of a Square-fit between mild steel flat pieces.

Foundry: Preparation of a sand mould using a single piece pattern

Foundry: Preparation of a sand mould using a split piece pattern.

Tin-Smithy: Preparation of a sheet metal pipe-joint using tin-smithy tools.

Tin-Smithy: Preparation of a sheet metal funnel using tin-smithy tools.

Welding: Making a Lap joint through arc welding.

Lathe Machine: Demonstration of turning related activities on Lathe machine.

Black smithy: Demonstration of Plumbing trade.

Plumbing: Demonstration of plumbing trade.

Operating System: Changing Boot Device Priority, Installation of Linux, putting passwords, Enabling and disabling external devices, Connectivity Boot Camp.

Hands on Exposure on Linux shell commands: Using man, info commands for finding information about commands. Using file processing commands (ls, cp, mv, ln, mkdir, rmdir, chmod etc..), Using text processing commands (grep, egrep, sed etc…), Using disk utility commands, mount commands (du, df, mount etc..), Vi-Editor.

MS-Word: Using Ms-Word, creating project abstract, creating newsletter, creating feedback form.

MS- Excel: Excel orientation, creating scheduler, calculating CGPA, Performance Analysis.

MS-PowerPoint: PPT Orientation, Slide Layouts, Custom Animation, Hyperlinks, inserting Images, Clip Art, Audio, Video, Objects, Tables, Charts.

System tools, Hardware Troubleshooting, Software Troubleshooting and Installations of Anti Virus.

Multimedia Flash (Adobe)

a. Introduction to Flash interface

b. Introducing the tools

c. Putting text into Flash

d. Smoothen/straighten drawings

e. Animation Part 1: Using layers, key frames and motion tweening

f. Animation Part 2: Shape tweening, motion guide and frame by frame animation

NOTES

SYLLABI FOR II SEMESTER

ENGLISH

(Common to all Branches)

Course Code: 13HE1101

L	T	P	C
4	0	0	3

Course Outcomes:

The Students will be able to

CO 1 Read and answer questions (orally and in writing) based on passages.

CO 2 Identify and use selective vocabulary to enrich their writing.

CO 3 Discuss and evaluate textual and authentic materials

CO 4 Analyse facts, ideas and compose them as instructed.

CO 5 Write notes, summaries, and essays in descriptive and narrative modes.

SYLLABUS

UNIT-I **(13 Lectures)**

1. Story of Insects (English Today)
2. Bringing up Boys & Girls (Academic Encounters)
3. The Lunatic, the Lover and the Poet (The Siren's Song)
4. Vocabulary Building: Prefixes, Suffixes, One-Word Substitutes etc.

UNIT-II **(14 Lectures)**

1. Unity of Minds (English Today)
2. On His Blindness (The Siren's Song)
3. Cultural Variation & Change (Academic Encounters)
4. Grammar: Tenses & Concord

UNIT-III **(11 Lectures)**

1. Three Years She Grew in Sun and Shower (The Siren's Song)
2. Advertising in the Media (Academic Encounters)
3. Grammar: Articles & Prepositions
4. Paragraph Writing; Technical Description-Process, Object

UNIT-IV **(12 Lectures)**

1. A Special Kind of Blessing (English Today)
2. Techniques of Solving Crimes (Academic Encounters)
3. La Belle Dame Sans Merci (The Siren's Song)
4. Précis writing &Letter Writing

UNIT-V **(10 Lectures)**

1. I Have A Dream (English Today)
2. Because I Could not Stop for Death (The Siren's Song)
3. Writing: Note Taking & Note Making ,Essay writing
4. Grammar: Simple, Compound & Complex Sentences

TEXTBOOKS:

1. Kristine Brown & Susan Hood, *"Academic Encounters: Life in Society Reading, Study Skills, Writing, London"*, Cambridge University Press/ Foundation Books, 2006.
2. K Durga Bhavani, G. K. Subbarayuydu, C. Vijayasree, D. Prema Kumari & Y. L. Srinivas, *"English Today: A Course in Reading and Writing"*, Foundation Books, 2005.
3. David Murdoch, The Siren's Song, "*An Anthology of British and American Verse"*, Madras, Orient Longman, 1993.

REFERENCES:

1. Alec Fisher, *"Critical Thinking An Introduction"*, New Delhi: CUP, First South Asian Edition, 2011.
2. Bikram K. Das, Kalyani Samantray, Rath Nayak, Susmita Pani & Saveeta Mohanty, "*An Introduction to Professional English and Soft Skills"*, New Delhi, Foundation Books, 2009.

3. *"Regional Institute of English, English for Engineers"*, New Delhi, Foundation Books, 2006.

4. Sharon J.Gerson, Steven M.Gerson, *"Technical Writing"*, New Delhi, Pearson education, 2007.

SUGGESTED READING:

Stories of humour, adventure, mystery and autobiographies of eminent scientists.

MATHEMATICS-II

(Common to all Branches)

Course Code:13BM1102

L	T	P	C
4	1	0	3

Pre requisites:

- Basic formulae of differentiation and integrations.
- Basic terminology and elementary operations on Matrices.
- Basic concept of partial differentiation.

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1 Solve the linear system of equations analytically and compute Eigen values and eigenvectors of a square matrix.

CO 2 Solve linear system of equations numerically and compute eigen values and eigenvectors of a square matrix.

CO 3 Discuss and demonstrate difference equations to discrete systems.

CO 4 Calculate Fourier series and Fourier transforms for certain functions.

CO 5 Classify and solve partial differential equations and apply it to heat flow and wave propagation problems.

UNIT-I **(12 Lectures)**

MATRICES:

Rank, Normal form, Echelon form, Consistency and Solution of system of simultaneous linear homogeneous and non-homogeneous equations. Finding eigenvalues and eigen vectors, properties, Cayley-Hamilton theorem, computing inverse and powers of a matrix by applying Cayley-Hamilton theorem, Diagonalisation of matrix.
(2.7, 2.10, 2.13 -2.16)

UNIT-II (12 Lectures)

NUMERICAL METHODS IN LINEAR ALGEBRA:

Solution of linear simultaneous equations: LU decomposition, Jacobi iteration and Gauss-Seidel methods. Determination of eigenvalues and eigen vectors by iteration (Rayleigh's Power Method) .

(28.5, 28.6(3), 28.7(1)(2), 28.9)

UNIT-III (12 Lectures)

DIFFERENCE EQUATIONS AND APPLICATIONS:

Difference operators (forward, backward and shift operators), Introduction to difference equation, formation of difference equation, Linear difference equations and it's complete solution. Rules for finding the complementary function and complete integral, Deflection of a loaded string.

(29.1, 29.4, 31.1 - 31.6, 31.8)

UNIT-IV (12 Lectures)

FOURIER SERIES:

Euler's formulae, Dirichlet's Conditions for a Fourier expansion, functions having points of discontinuities, Change of interval, even and odd functions, half range series, wave forms.

FOURIER TRANSFORMS :

Fourier integral theorem, Fourier transform and inverse Fourier transform, Fourier sine and cosine integrals. – Fourier sine and cosine transforms – properties of Fourier Transforms – Finite Fourier transforms.

(10.1 – 10.9, 22.1 – 22.5)

UNIT-V (12 Lectures)

PARTIAL DIFFERENTIAL EQUATIONS:

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – solutions of first order linear (Lagrange) equation and nonlinear first order (standard type) equations.

APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS:

Method of separation of variables, Classification of second order

linear Partial Differential Equations. Solutions of one dimensional heat equation, wave equation and two-dimensional Laplace's equation under initial and boundary conditions. (17.1 – 17.3, 17.5, 17.6, 18.1-18.7)

TEXT BOOK:

Dr.B.S.Grewal *"Higher Engineering Mathematics"*, 42nd Edition, Khanna Publishers, 2012.

REFERENCES:

1. Kreyszig E, "*Advanced Engineering Mathematics*", 8th Edition, John Wiley, Singapore, 2001.
2. Greenberg M D, "*Advanced Engineering Mathematics*", 2nd Edition, Pearson Education, Singapore, Indian Print, 2003.
3. Peter V. O'Neil, "*Advanced Engineering Mathematics*", 7th Edition, Cengage Learning, 2011.

CHEMISTRY

(Common to all Branches)

Course Code: 13BC1101

L	T	P	C
4	0	0	3

Course Outcomes :

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

CO 1 Recall the principles, explain the working and design of energy storage devises.

CO 2 Extend the principles involved in corrosion to predict and control the corrosion in real life system.

CO 3 Classify the polymers and can apply to specific purposes.

CO 4 Analyze and determine the water quality and prescribe the remedial measures for domestic as well as industrial usage.

CO 5 Recite, explain and classify the characteristics of various engineering materials and explain their functioning.

UNIT-I **(10 Lectures)**

ELECTROCHEMICAL CELLS:

Electrode potential, Nernst equation, EMF of electrochemical cell, Reference electrodes-Standard hydrogen electrode, calomel electrode. Electrochemical series, Concentration cell, Construction of glass electrode, determination of P^H of given solution using glass electrode

Batteries-Primary cell-Dry or Leclanche cell, alkaline battery; secondary cells (storage batteries or accumulators) – Lead-acid Accumulator, Nickel-cadmium battery, Lithium ion battery (LIB) and redox flow battery.

Fuel cells - hydrogen - oxygen fuel cell, phosphoric acid fuel cell, solid oxide fuel cells

UNIT-II (12 Lectures)

CORROSION AND ITS CONTROL:

Introduction - Direct chemical corrosion and electrochemical corrosion and its mechanisms, Types of electrochemical corrosion-Differential aeration corrosion, galvanic corrosion, concentration cell corrosion, pitting corrosion and stress corrosion, Galvanic series, passivity, factors influencing corrosion.

Corrosion control-proper designing, cathodic protection-sacrificial anodic protection and impressed current cathodic protection, modifying the environment and use of inhibitors.

Protective coatings- Anodic and cathodic coatings, Hot dipping-Galvanizing and Tinning, Metal cladding, Electroplating, Electroless plating, cementation or diffusion coatings.

UNIT-III (10 Lectures)

POLYMER TECHNOLOGY:

Polymerization, classification, degree of polymerization, functionality and tacticity of polymer, Types of polymerization addition and condensation polymerization, Mechanism of addition polymerization, Condensation polymerization, Preparation, properties and uses of polythene, PVC, Teflon, nylons-6,6, Polyester, Bakelite and Silicones.

Plastics- Thermo plastics and thermosetting plastics, compounding of plastics.

Elastomers-Natural and synthetic rubbers, Manufacture, properties and applications of natural rubber-vulcanization, compounding of rubber, Synthetic rubbers-Preparation, properties and applications of Buna-S and Buna-N.

UNIT-IV (12 Lectures)

WATER TECHNOLOGY:

Introduction-characteristics imparted by impurities, hardness of water –Temporary and permanent hardness- units, Determination of hardness by EDTA method, Disadvantages of hard water, Chemical aspects of scale and sludge formation in boilers, caustic embrittlement,boiler corrosion, priming and foaming, Municipal water treatment-

sedimentation, coagulation, and filtration, Desalination of brackish water, Water softening methods- lime -soda method, zeolite method and ion exchange process.

UNIT-V: (16 Lectures)

ENGINEERING MATERIALS:

Fuels- classification, characteristics of fuel, calorific value – determination of calorific value by Bomb calorimeter and Junkers gas calorimeter, theoretical calculation of calorific value, Types and Analysis of coal - Proximate and ultimate analysis of coal, Manufacture of coke- Petroleum: classification based on sources of petroleum, Refining of petroleum, Knocking, octane value, cetane value, Cracking -thermal cracking and catalytic cracking-fixed bed & moving bed catalytic cracking, reforming.

Cement: Classification of cement, chemical composition, functions of ingredients in Portland cement, Manufacture of Portland cement-raw materials, setting and hardening of Portland cement.

Refractories- Classification and properties of refractories, Failures of refractory materials.

Lubricants-friction, lubrication, functions of lubricants, mechanism of lubrication-thick film, thin film and extreme pressure lubrication, types of lubricants- solid, semisolid and liquid lubricants and their properties.

TEXT BOOKS:

1. Jain& Jain, *"A text book of Engineering Chemistry"*, 15th Edition, Dhanapat Roy publishing company, 2010.
2. Sasichawla, *"Engineering Chemistry"*, 3rd Edition, Dhanapat Roy publishing company, 2004.

REFERENCES:

1, S.S. Dara, *"A Text book of Engineering Chemistry"*, 11th Edition, S.Chand & Co, 2006.
2. C. Parameswara Murthy, C.V. Agarwal and Andhra Naidu, *"A Text Book of Engineering Chemistry"*, 1st Edition, B.S. Publications, 2006.

ELECTRONIC DEVICES

Course Code:13EC1101

L	T	P	C
4	1	0	3

Pre requisites: Physics

Course Outcomes:

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

CO 1 Comprehend the concepts of semiconductors.

CO 2 Analyze the characteristics of Semiconductor Devices like Diode.

CO 3 Apply diode concepts for power supplies.

CO 4 Comprehend active device characteristics like bipolar junction transistors.

CO 5 Distinguish various active devices like JFET, MOSFET, Negative resistance devices.

UNIT-I (10 Lectures)

ENERGY BANDS AND CHARGE CARRIERS IN SEMICONDUCTORS:

Direct & Indirect Semiconductor, Variation of energy bands with alloy composition, Electrons and holes, Effective mass, Intrinsic and Extrinsic material, Fermi level, carrier concentrations at equilibrium, temperature dependence of carrier concentrations, compensation and space charge neutrality, conductivity, mobility, hall effect. Steady state carrier generation, diffusion, diffusion length, drift of carriers, continuity equation.

UNIT-II (15 Lectures)

JUNCTION DIODE:

The Contact potential, Equilibrium Fermi levels, space charges at a junction, qualitative and quantitative description of current flow at

a junction, carrier injection, majority and minority carrier current. Zener & Avalanche Breakdown, time variation of stored charge, diode switching times, capacitance of PN Junction region, Ohmic contacts,V-I characteristics of diode, small signal model of diode, temperature dependence of diode, Zener diode - characteristics, Schottky diode, Tunnel diode.

UNIT-III (11 Lectures)

RECTIFIERS AND FILTERS :

Introduction to power supply, Half-wave rectifier, full-wave rectifier, Bridge rectifier, harmonic components in a rectifier circuit, inductor filter, capacitor filter, L- Section filters, multiple L- section filter, p filter, comparison of various filter circuits, Zener diode as voltage regulator, Silicon controlled rectifier(SCR).

UNIT-IV (12 Lectures)

BIPOLAR JUNCTION TRANSISTOR :

Junction transistor, transistor current components, transistor as an amplifier & switch, input and output characteristics of transistor in CB, CE, CC configurations, á , â and ã relationship, transistor switching times.

UNIT-V (12 Lectures)

FIELD EFFECT TRANSISTOR:

JFET- Construction, Drain & Transfer Characteristics, Pinch off voltage, FET small signal model, Voltage variable resistor, MOSFET characteristics- Enhancement and Depletion Type, Negative resistance, UJT characteristics and applications.

TEXT BOOKS:

1. Millman Jacob Halkias C Christos: "*Electronic Devices and Circuits*", 2nd Edition, Tata McGraw-Hill Publications, 2007.
2. B.G. Streetman: "*Solid State Electronic Devices*", 5th Edition, Prentice Hall of India Publications, 2002.
3. Boylestad.Robert: "*Electronic Devices and Circuits Theory*" PHI publications, 10th Edition, 2008.

REFERENCES:

1. B.Visweswara Rao, K.Bhaskarram Murthy, K.Raja Rajeswari, P.Chalam Raju Pantulu "*Electronic Devices and Circuits*," Pearson Publications, 2nd Edition, 2009.
2. Raju GSN, "*Electronic Devices and Circuits*": IK International Publishing House, 1st Edition, 2006.
3. Lal Kishore, "*Electronic Devices & Circuits"* Vol. I," BSP publications, 2nd Edition, 2005.

ELECTRICAL TECHNOLOGY

Course Code: 13EE1144

L	T	P	C
4	0	0	3

Pre requisites: Mathematics and Networks.

Course Outcomes:

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

CO 1 Describe the operation and constructional features of DC Machines and analyze its characteristics.

CO 2 Describe the operation and constructional features of Transformer with phasor diagram.

CO 3 Describe the operation and constructional features of Induction Motor and stepper Motor.

CO 4 Explain the operation of Synchronous Machines and Analyze the Synchronous Impedance method.

CO 5 Explain the working principle and operation of various Measuring Instruments.

UNIT-I (12 Lectures)

DC MACHINES:

Principle of operation of DC Machines- EMF equation – Types of generators – Magnetization and load characteristics of DC generators. DC Motors – Types of DC Motors – Characteristics of DC motors – 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 (12 Lectures)

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 (12 Lectures)

INDUCTION MOTORS:

3-Phase: Principle of operation of Three-phase Induction motors – Slip ring and Squirrel cage motors – Torque equation-Slip-Torque characteristics – Efficiency calculation – Starting methods. Single Phase: Principle of operation - Shaded pole motors – Capacitor motors, AC servomotor, AC tachometers, Synchros, Stepper Motors – Characteristics.

UNIT-IV (12 Lectures)

SYNCHRONOUS MACHINES:

Constructional features – Principle of operation – Types - EMF Equation – Distribution and Coil span factors – Armature parameters-armature resistance-synchronous reactance-phasor diagram-unity power factor-lagging power factor –leading power factor-Predetermination of regulation by Synchronous Impedance Method – OC and SC tests-principle of operation of synchronous motors.

UNIT-V (12 Lectures)

ELECTRICAL INSTRUMENTS:

Types of instruments (Indicating, integrating, Recording)- Basic Principles of indicating instruments – Moving Coil and Moving iron Instruments (Ammeters and Voltmeters) wattmeters and energy meters.

TEXT BOOKS:

1. M.S Naidu and S. Kamakshaiah, *"Introduction to Electrical Engineering"*, *Tata McGraw Hill* Publication, 4th Edition, 2011.

2. Vincent Del Toro, *"Electrical Engineering Fundamentals"*, PHI Publishers 5th Edition, 2009.

REFERENCES:

1. V.K Mehta *"Principles of Electrical Engineering"* S.Cand Publications, 5th Edition, 2005.
2. I.J. Nagrath and D.P Kothari *"Theory and Problems of Basic Electrical Engineering"* PHI Publications, 4th Edition, 2009.
3. David V. Kerns, JR. J. David Irwin, *"Essentials of Electrical and Computer Engineering"*, TMH Education Pvt. Ltd, 3rd Editions, 2008.

ENGLISH LANGUAGE LAB
(Common to all Branches)

Course Code : 13HE1102

L	T	P	C
0	0	3	2

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.

Course Outcomes :

The Students will be able to:

CO 1 Distinguish and use spoken English and respond appropriately.

CO 2 Use language in formal and informal contexts.

CO 3 Demonstrate oral skills in debates and group discussions.

CO 4 Show fluency in speech

CO 5 Identify the sounds of English and use stress and intonation in connected speech

SYLLABUS:

The following course content is prescribed for the English Language Laboratory sessions:

1. Introduction to the Sounds of English- Vowels, Diphthongs & Consonants.
2. Introduction to Stress and Intonation.
3. Listening for Comprehension
4. Situational Dialogues.
5. Oral Presentations- Prepared & Extempore
6. 'Just A Minute' Sessions (JAM)
7. Telephonic communication
8. Group Discussions

9. Debate
10. Team Presentations (PPTs).
11. Reference Skills

REFERENCES:

1. E. Suresh Kumar , P. Sreehari, *"A Handbook for English Language Laboratories"*, Foundation Books, Revised Edition 2010.
2. Simon Sweeny, *"English for Business Communication"*, CUP, 2nd Edition, 2003.
3. Daniel Jones, English Pronouncing Dictionary with CD, 17th Edition, 2006.
4. T. Balasubramanian, *"A Text book of English Phonetics for Indian Students"*, 2nd Edition, Trinity Press/Lakshmi Publications, 2013..
5. Jeremy Comfort, Pamela Rogerson, Trish Stott & Derek Utley, *"Speaking Effectively : Developing Speaking Skills for Business English"*, Cambridge University Press, First South Asian Edition,2002.Reprint 2011.
6. T Samson, *"Innovate With English"*, New Delhi: Foundation Books, 2010.
7. Meenakshi Raman & Sangeeta Sharma, *"Technical Communication Principles & Practice"*, 2nd Edition, New Delhi: OUP, 2012.
8. E. Suresh Kumar, P. Sreehari, J. Savithri, "English for Success", New Delhi, Foundation Books, 2012.

CHEMISTRY LAB
(Common to all Branches)

Course Code: 13BC1103

L	T	P	C
0	0	3	2

Course Outcomes:

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

CO 1 Determine the metal ions by titrimetry

CO 2 Analyze various water quality parameters

CO 3 Determine the metal ions by reduction technique

CO 4 Apply instrumental methods to determine the characteristics of lubricants and fuels

CO 5 Determine the concentration of metal ions by potentiometry and spectrophotometry.

LIST OF EXPERIMENTS :

1. Determination of ferrous iron.
2. Determination of ferric iron.
3. Determination of total hardness of water.
4. Determination of carbonate and bicarbonate of water.
5. Determination of dissolved oxygen.
6. Determination of available chlorine in bleaching powder.
7. Determination of zinc by potassium ferrocyanide.
8. Determination of copper by EDTA method
9. Determination of calcium by permanganate.
10. Determination of iron-II by potentiometric method.
11. Determination of viscosity of lubricant by viscometer.
12. Determination of flash and fire points of lubricant.

13. Determination of percentage residue of carbon in oils.

14. Determination of calorific value of solid fuels.

15. Determination of fluoride by spectrophotometric method.

16. Determination of iron in cement by spectrophotometric method.

REFERENCE:

A.I.Vogel, *"A Text book of quantitive chemical analysis"*, 6th Edition, Pearson Education, Pvt. Ltd., 2002.

ELECTRONIC DEVICES LAB

Course Code: 13EC1102

L	T	P	C
0	0	3	2

Course Outcomes

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

CO 1 Outline the concepts of various electronic components and devices.

CO 2 Determine the static and dynamic resistances of various semiconductor diodes.

CO 3 Determine the characteristics of BJT and compute h-parameters.

CO 4 Determine the characteristics of FETs and compute amplification factor and verify theoretically.

CO 5 Design regulated DC power supply.

LIST OF EXPERIMENTS:

1. PN Junction Diode Characteristics
2. Zener Diode Characteristics
3. Voltage Regulator using Zener Diode
4. Rectifiers without Filters(Full wave & Half wave)
5. Rectifiers with Filters(Full wave & Half wave)
6. Bipolar Junction Transistor- CB Characteristics
7. Bipolar Junction Transistor - CE Characteristics
8. Bipolar Junction Transistor - CC Characteristics
9. Transistor as a switch
10. JFET Characteristics

11. MOSFET Characteristics
12. UJT Characteristics
13. LED Characteristics
14. SCR Characteristics

PROFESSIONAL ETHICS

(Common to all Branches)

Course Code: 13NM1101

L	T	P	C
2	0	0	0

Course Outcomes:

On successful completion of the course, the student should be able to

CO 1 Explain how to deal with complex situations arising out of interaction with people (Parents, friends and Co-professionals) in making the work environment congenial, encouraging and loving.

CO 2 Discriminate when he is forced through certain undesirable and ambiguous situations either in his day to day life as a student and as a professional in his career.

CO 3 Identify the basic tenets of leadership and to become a worthy professional.

CO 4 Relate codes of different professional bodies.

CO 5 Excellent job satisfaction.

UNIT-I (6 Lectures)

BASIC HUMAN VALUES:

'Be a Human First and then one can become a good Professional'; so the basic Human Values-Truth, Right Conduct (Righteousness), Love, Non-violence and Peace, Humility and character. What is ethics? Core areas of ethics: Social ethics, personal ethics Integrity and Trustworthiness, Honesty, Loyalty, Courage, Prudence, Confidence, Confidentiality.

Character: definition, 'A bundle of Virtues and weaknesses of Head and Heart- the resulting individuality of a person from the balance sheet of 'good' and 'bad qualities' is his/her character.

TRAITS OF GOOD CHARACTER:

Honesty and integrity, sense of duties and obligations to one's own profession, Adherence to truth and principles, excellent team work with a good rapport with the subordinates and colleagues, self-discipline, Responsibilities and accountability, self-lessness. Unity in thought, word and deed (Case studies relating to these aspects can be drawn from history & epics or from one's own experience)

Human values as practiced in the Indian societal context-past and present. (Examples drawn from any standard scriptures and many other sources available may be illustrated, debated and discussed).

Spirit of Nationalism and Patriotism with examples from 'struggle for Freedom' (Case studies in the lives of Mahatma Gandhi & His team who strived for Freedom from the British, Scientists and Engineers like Bhaha, Sarabhai, Dhavan, Abdul J Kalam, and Benjamin Franklin, Martin Luther King, or any renowned personalities)

UNIT-II (6 Lectures)

What is a profession? Who is a Professional? Special criteria to meet the definition of professional, criteria to be a 'professional engineer (Pages 24-36) of Mike W Martin and Roland Schinzinger)

The 5 Ds (Discipline, Devotion, Dedication, Discrimination and Determination) against 3 Ps (Pay-Prospects and Promotion)

Personal ethics-Social ethics and professional ethics – are they different-How would you distinguish? –A debate

General and Applied ethics, Relationship between these two in day-to-day functioning of an Engineering Professional- (Pages 10-12 of Mike W Martin and Roland Schinzinger)

PROFESSIONAL AND ENGINEERING ETHICS:

Why Engineering ethics? Moral issues encountered by professional engineers during their day-to-day operations both at home and office/ workplace- Moral problems that frequently arise in ones Profession, (case studies from Chapter 1 pages 2-9, analysis of the case studies on pages 13 &14)

MORAL AUTONOMY:

Moral integrity and social and professional behavior. Different theories proposed under moral autonomy-Kohlberg's and Gilligan's Theory. Heinz's Dilemma- Motive behind aggression (16-23 Pages)

LEADERSHIP IN PROFESSIONALISM:

Characteristics of a Leader? Case studies and examples (Leadership by Dr M L Chibber)

UNIT-III (6 Lectures)

Religion and Ethics and Morals-Debate and discussion- Spirituality, social consciousness and ethics

THEORY ABOUT MORALITY:

Virtue ethics, Utilitarianism, Duty ethics, Right ethics based on the concepts of Virtues and vices, most good for most people, Duties to respect for persons, Human rights respectively (pages 53-61, Study Questions for analysis and discussion on pages 60 &61)

Engineering Profession as a social responsibility, His responsibility and accountability while dealing with public issues such as safety, risk, hazards, Risk Analysis and assessment-a brief discussion (risk assessment problem on Page (Chapter 4, specified topics and Case studies)

(Present the case studies on Challenger space shuttle(97), Chernobyl (173), Bhopal tragedy (299), Titanic disaster (p 83), SLV-3, the Indian Space Shuttle (Wings of Fire) recent nuclear holocaust in Japan recent floods and other man-made and natural calamities or accidents we come across frequently in our society)

Environmental ethics (304-308) & Computer ethics 319-323328-330) (All Pages from Mike W Martin and Roland Schinzinger)

UNIT-IV (6 Lectures)

RESPONSIBILITIES AND RIGHTS OF ENGINEERS:

Collegiality (Ones attitude) towards other engineers working in the same Organization or outside) and Loyalty (to the Employer), obligation of Loyalty and misguided loyalty, Respect for authority

and its limitations, Bootlegging, Collective bargaining, Commitments and Convictions (APJ Abdul Kalam's "Wings of Fire") Confidentiality while changing jobs, Conflicts of interests, Gifts, bribes, kickbacks -case studies related, Occupational Crime and industrial espionage

Whistle blowing and moral guide line (case studies), Discrimination, preferential treatment and harassment Rights of Engineers (page 284-286)

Selected topics from Ch 5 and 6 and case studies on pages 200-201,

UNIT-V **(6 Lectures)**

Engineers as Managers and leaders promoting ethical climate (350-358)

–Ethics in Engineering by Mike W Martin and Roland Schinzinger)

Why a code of Ethics for professional Engineers? ('A code of ethics is not something you post on the Bulletin board; it is something you live every day in your life and career)

Code of ethics for Engineers, Organizational Culture, and Guidelines for use with the Fundamental canons of ethics; (pages 142-162 Indian Culture and Professional Ethics by P S R Murty and 399-414 0f Mike W Martin and Roland Schinzinger)

PROFESSIONAL BODIES:

IEEE, IETE, IE, ASME, ASCE, ABET, NSPE, ISTE Etc…

{** Any topic can be discussed and debated with known live examples and illustrations we find in our day-to-day -living circumstances.}

TEXT BOOKS :

1. Mike W Martin and Ronald Schinzinger : *"Ethics in Engineering"*, 3rd Edition, Tata McGraw Hill Education Pvt. Ltd., 2003.
2. P S R Murthy : *"Indian Culture, Values and Professional Ethics"*, 2nd Edition, B S Publications, Hyderabad. 2013.

REFERENCES:

1. M. Govindarajan, S Natarajan and V.S. Senthil Kumar : *"Engineering Ethics and Human Values"*, 1st Edition, PHI Publications , 2013.
2. A. Alavudden, R. Kalil Rahaman & M . Jayakumaran : *"Professional Ethics & Human Values"*, 1st Edition, University Science Press (An Imprint of Laxmi Publications Pvt Ltd., Chennai, Bangalore. 2008.
3. Lieunt Gen Dr. M. L. Chibber : *"Leadership-Education in Human Values"*, Sri Sathya Sai Books and Publications Trust, Prasantinilayam, 1st Edition, 2009.
4. Kalam A P J : *"Wings of Fire"*, Universities Press Publications, 2013.
5. Charles B. Fleddermann : *"Engineering Ethics"*, 4th Edition, PHI, 2012.

SYLLABI FOR III SEMESTER

SPECIAL FUNCTIONS AND COMPLEX VARIABLES

(Common to ECE & EEE)

Course Code:13BM1104

L	T	P	C
4	1	0	3

Pre requisites

- Basic Knowledge in evaluation of definite integrals.
- Calculus of functions of real variables.

Course Outcomes:

At the end of the course student will be able to

CO 1 Compute improper integrals using beta and gamma functions and discuss the properties of the Legendre polynomial.

CO 2 Discuss various properties of the Bessel's function.

CO 3 Examine continuity and analyticity of various complex valued functions.

CO 4 Determine Taylor's and Laurent's series of a complex function and use resedue theorem to evaluate certain real definite integrals.

CO 5 Transform various regions using conformal mappings.

UNIT-I (12 Lectures)

SPECIAL FUNCTIONS-1:

(Beta, Gamma and Legendre functions)

Beta-function, Gamma function, Relation between Beta and Gamma functions, Series solution of Legendre's equation, Legendre's function, Rodrigue's formula, Legendre polynomials, Generating function, Recurrence formulae , Orthogonality of Legendre Polynomials, Fourier-Legendre expansion of $f(x)$. (7.14 - 7.16, 16.13 - 16.17)

UNIT-II (12 Lectures)

SPECIAL FUNCTIONS-2

(Bessel function)

Bessel's equation, Bessel's function, Recurrence formulae for Bessel function $J_n(x)$, Expansions for J_0 and J_1, value of $J_{\frac{1}{2}}(x)$, Generating function for $J_n(x)$, Orthogonality of Bessel's function, The Strum-Liouville problem: Eigen Values, Eigen functions and Orthogonality of eigen functions.

(16.5-16.9, 16.10, 16.19)

UNIT-III (12 Lectures)

FUNCTIONS OF A COMPLEX VARIABLE :

Complex function , Real and Imaginary parts of Complex function, Limit, Continuity and Derivative of complex function, Cauchy-Riemann equations, Analytic function, entire function, singular point, conjugate function, C-R equations in polar form, Harmonic functions, Milne-Thomson method, Simple applications to flow problems, Line integral of a complex function, Cauchy's theorem(only statement), Cauchy's Integral Formula.

(19.7, 19.12, 20.2-20.6, 20.12-20.14)

UNIT-IV (12 Lectures)

SERIES OF COMPLEX TERMS AND RESIDUES:

Absolutely convergent and uniformly convergent series of complex terms, Radius of convergence, Taylor'series, Maclaurin's series expansion, Laurent's series. Zeros of an analytic function, Singularity, Isolated singularity, Removable singularity, Essential singularity, pole of order m, simple pole, Residues, Residue theorem, Calculation of residues, Residue at a pole of order m, Evaluation of real definite integrals: Integration around the unit circle, Integration around semi circle, Indenting the contours having poles on the real axis.

(20.16-20.19, 20.20(a),(b),(d))

UNIT-V (12 Lectures)

CONFORMAL TRANSFORMATION :

Standard transformations: Translation, Magnification and rotation, Inversion and reflection, Bilinear transformation, Properties, Conformal transformation, critical point, fixed points of a transformation, Special Conformal transformations: (20.8-20.10)

TEXT BOOK:

Dr. B.S.Grewal, *"Higher Engineering Mathematics"*, 42nd edition, Khanna publishers, 2012.

REFERENCES:

1. Kreyszig E, *"Advanced Engineering Mathematics"*, 8th Edition. John Wiley, Singapore, 2001.
2. Glyn James, *"Advanced Modern Engineering Mathematics"*, 3rd edition, Pearson, 2004.

MANAGERIAL ECONOMICS AND FINANCIAL ACCOUNTING

Course Code : 13HM1101

L	T	P	C
4	0	0	3

Course Outcomes :

At the end of the course a students should be able to

CO 1 Apply the Managerial Economic concepts for decision making and forward planning and identify factors influencing Law of demand and exceptions to Law of demand and use different Forecasting methods for predicting demand for various products and services.

CO 2 Assess the functional relationship between Production and factors of Production, and identify the various economies of scale attached with large scale production, list out various costs associated with production and to compute Breakeven point and to illustrate the various uses of breakeven analysis.

CO 3 Analyze the impact of environment on business.

CO 4 Apply the principles of accounting at the time of maintaining the books of accounts.

CO 5 Prepare final accounts and apply various techniques for assessing the financial position of the business concern.

UNIT-I (12 Lectures)

INTRODUCTION TO MANAGERIAL ECONOMICS & DEMAND:

Definition, Nature and Scope of Managerial Economics, Factors influencing managerial decision making process

Demand Analysis: Definition-types of demand - Demand Determinants, Law of Demand and its exceptions.

Elasticity of Demand: Definition, Types, Significance of Elasticity

of Demand. Demand Forecasting: definition, methods of demand forecasting (survey methods, statistical methods, expert opinion method, test marketing, controlled experiments, judgmental approach to demand forecasting)

UNIT-II (12 Lectures)

THEORY OF PRODUCTION AND COST ANALYSIS:

Production Function – Isoquants and Isocosts, MRTS, Least Cost Combination of Inputs, Cobb-Douglas Production function, Laws of Returns, Internal and External Economies of Scale.

Cost Analysis: Types of Cost, Break-Even Analysis (BEA)- Determination of Break-Even Point (Simple numerical problems) - Managerial Significance and limitations of BEA.

UNIT-III (10 Lectures)

BUSINESS & ENVIRONMENT:

Features of Business Organization, Features, Advantages & limitations of Sole Proprietorship, Partnership, and Joint Stock Company, Steps for formation and Registration of the company- Internal and External factors affecting business environment (PESTLE analysis)- Impact of environment on business.

UNIT-IV (12 Lectures)

INTRODUCTION TO FINANCIAL ACCOUNTING:

Accounting Principles, Concepts & conventions, Double-Entry Book Keeping, Journal, Ledger, Trial Balance

UNIT-V (18 Lectures)

PREPARATION AND ANALYSIS OF FINANCIAL STATEMENTS:

Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments) - Financial statement Analysis (Comparative and Common Size Statements)- Ratio analysis (Liquidity Ratios, Activity ratios, Solvency and Profitability ratios)

TEXTBOOKS :

1 A R Aryasri, *"Managerial Economics and Financial Analysis"*, 2nd Edition, TMH, 2009

2 S A Siddiqui & A. S. Siddiqui, *"Managerial Economics & Financial Analysis"*, 1st Edition, New Age Publishers, 2005.

3 P Venkata Rao, J.V.Prabhakar Rao *"Managerial Economics and Financial Analysis"*, 1st Edition, Maruti Publications, 2012.

4 R.L.Varshney & K.L Maheswari, *"Managerial Economics"*, 5th Edition, S.Chand Publishers, 2005.

REFERENCES :

1 D N Dwivedi, *"Managerial Economics"*, 8th Edition, PHI, 2010.

2 S P Jain & KL Narang, *"Cost and Management Accounting"*, 3rd Edition Kalyani Publishers, 2004.

3 P.K.Sharma & Shashi K. Gupta, *"Management Accounting Principles and Practice"*, 1st Edition, Kalyani Publishers, 2004.

ELECTRONIC CIRCUITS

Course Code: 13EC1103

L	T	P	C
4	0	0	3

Pre requisites: Electronic Devices, Basic Network Analysis.

Course Outcomes :

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

CO 1 Illustrate various biasing techniques for a transistor and perform DC analysis.

CO 2 Comprehend design concepts of small signal, large signal models and high frequency hybrid-model circuits.

CO 3 Analyze multistage amplifiers and design for frequency response.

CO 4 Identify the various concepts of feedback amplifiers, oscillators and stability criteria.

CO 5 Design and analyze power and tuned amplifiers.

UNIT-I (10 lectures)

BIASING AND STABILIZATION:

BJT biasing, DC equivalent model, Transistor as an amplifier, criteria for fixing operating point, methods of bias stabilization, Thermal runaway, Thermal stability, Compensation Techniques, Biasing of JFET and MOSFET.

UNIT-II (15 lectures)

TRANSISTOR SMALL SIGNAL MODEL:

Hybrid parameter representation of BJT, Analysis of single stage amplifier using h-parameters: A_V, A_I, R_i, R_o (CB, CE & CC configurations), Small signal model of FET and MOSFET (CG, CD & CS configurations).

Hybrid Common Emitter Transconductance Model, Determination of Hybrid- Conductances, Variation of h- Parameters with $|I_C|$, $|V_{CE}|$ and Temperature,Relation between the Parameters f_α, f_β and f_γ ,Current Gain with Resistance Load, CE Short Circuit Current Gain.

UNIT-III (10 lectures)

MULTI STAGE AMPLIFIERS:

Concept of Multi Stage Amplifiers: Methods of Inter Stage Coupling, n–Stage Cascaded Amplifiers, Miller's Theorem, Frequency Effects, Cascode Configuration, Darlington pair, Frequency response of RC Coupled Amplifiers using BJT, Gain Bandwidth Product.

UNIT-IV (15 lectures)

FEEDBACK AMPLIFIERS & OSCILLATORS:

Concept of feedback, Classification of feedback amplifiers, General characteristics of negative feedback amplifiers, Effect of feedback on Amplifier characteristics, Analysis of negative feedback amplifiers. Barkhausen's criteria, Hartley and Colpitt's Oscillators, RC-phase shift and Wien-bridge oscillators, Frequency and Amplitude stability of oscillators, Crystal oscillators.

UNIT-V (10 lectures)

POWER AMPLIFIERS & TUNED AMPLIFIERS:

Introduction to power amplifiers and its classification, Distortion in amplifiers, Class-A Power Amplifier, Transformer Coupled Audio Amplifier, Class B Push Pull Amplifiers, Complimentary Symmetry Circuits, Class AB power amplifier, Class C Power Amplifier, Heat Sinks.

Single Tuned Capacitive Coupled Amplifier, Single Tuned Transformer Coupled or Inductively Coupled Amplifier, CE Double Tuned Amplifier, Stagger Tuned amplifiers, Applications of tuned amplifiers.

TEXT BOOKS:

1. J.Millman and C.C.Halkias, "Electronic Devices and Circuits" 2nd Edition, Tata McGraw Hill, 2007.

2. R.L. Boylestad and Louis Nashelsky, “Electronic Devices and Circuits”, Pearson/Prentice Hall, 10th Edition, 2008.

REFERENCES:

1. T.F. Bogart Jr., J.S.Beasley and G.Rico, “Electronic Devices and Circuits”, Pearson Education, 6th edition, 2004.
2. S.Salivahanan, N.Suresh Kumar, A.Vallavaraj “Electronic Devices and Circuits”, 2nd Edition, TMH, 2007.
3. B. Visvesvara Rao, K. Raja Rajeswari, P.Chalam Raju Pantulu, K.Bhaskara Rama Murty, “Electronic circuit analysis”, Pearson Education, 2012.

SIGNALS AND SYSTEMS

Course Code: 13EC1104

L	T	P	C
4	1	0	3

Course Outcomes:

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

CO 1 Classify various signals and systems and analyze their properties.

CO 2 Transform signals in time domain to frequency domain using Fourier series and Fourier transform.

CO 3 Analyze filter characteristics and properties of linear time variant and invariant systems.

CO 4 Interpret signals and analyze system response using convolution integral.

CO 5 Analyze Continuous time signals using Laplace Transforms in the complex frequency plane and discrete time systems using Z-Transforms.

UNIT-I (12 lectures)

SIGNALS-SYSTEMS ANALYSIS:

Elementary signals, Classification of signals, Basic operations on signals, System definition, Systems Classification and Testing.

Analogy between vectors and signals, orthogonal signal space, Signal approximation using orthogonal functions, Mean square error, Orthogonality in complex functions.

UNIT-II (14 lectures)

FOURIER SERIES & FOURIER TRANSFORMS:

Review of Fourier series, Representation of Continuous time periodic signals using Fourier series, Dirichlet's conditions, Properties of

Fourier series, Trigonometric Fourier series and Exponential Fourier series.

Fourier transform from Fourier series, Dirichlet's conditions, Fourier transform of standard and arbitrary signals, Fourier transform of periodic signals, Properties of Fourier transforms. Inverse Fourier Transforms.

UNIT-III (10 Lectures)

SIGNAL TRANSMISSION THROUGH LINEAR SYSTEMS:

System impulse response, Response of a linear system, Linear time variant and invariant system, Transfer function of a LTI system, Properties of LTI system, Causality, Filter characteristics of linear systems - Ideal LPF, HPF and BPF characteristics. Distortionless transmission through a system, Signal bandwidth, System bandwidth, relationship between bandwidth and rise time.

UNIT-IV (10 lectures)

CONVOLUTION AND CORRELATION OF SIGNALS:

Concept of convolution in time domain and frequency domain, Graphical representation of convolution, Convolution properties, Cross correlation and Auto correlation of functions, properties of correlation function, Energy density spectrum, Power density spectrum, Parseval's theorem, Relation between auto correlation function and energy/ power spectral density function, comparison between ESD and PSD.

UNIT-V (14 lectures)

LAPLACE AND Z–TRANSFORM :

Review of Laplace transforms, Concept of region of convergence (ROC), constraints on ROC for various classes of signals, Properties of Laplace transforms, Inverse Laplace transform.

Concept of Z- Transform, Distinction between Laplace, Fourier and Z transforms, Region of convergence in Z-Transform, constraints on ROC for various classes of signals, Properties of Z-transforms, Inverse Z-transform.

TEXT BOOKS:

1. B.P. Lathi, *"Signals, Systems & Communications"* BSPublications, 5th Reprint, 2008.
2. A.V. Oppenheim, A.S. Willsky and S.H.Nawab, *"Signals and Systems",* PHI, 2ndEdition, 1997.
3. K.Raja Rajeswari, B.Visvesvara Rao, *"Signals & Systems"* –1st Edition, PHI, 2009.

REFERENCES:

1. Simon Haykin and Van Veen, *"Signals & Systems",* Wiley, 2ndEdition, 2002.
2. Anand Kumar, *"Signals & Systems"* –2nd Edition, PHI, 2012.
3. D. Ganesh Rao, *"Signals & Systems",* Pearson Publications, 2011.
4. Charles L.Phillips, John M. Parr, Eve A. Riskin, *"Signals, Systems, and Transforms",* Pearson Publications, 4th Edition.

SWITCHING THEORY AND LOGIC DESIGN
(Common to ECE, EEE, CSE, IT)

Course code: 13EC1105

L	T	P	C
4	0	0	3

Course Outcomes:

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

CO 1 Convert one number system to other.

CO 2 Implement logic circuits and simplify logic expressions.

CO 3 Design Combinational logic circuits through expressions.

CO 4 Illustrate the concept of sequential logic design, analyze the operation of flip-flap and design various types of sequential circuits.

CO 5 Differentiate Mealy & Moore models and Simplify and Design Sequential machines.

UNIT-I (10 Lectures)

NUMBER SYSTEMS & CODES:

Introduction to number systems, Complement representation of negative numbers, binary arithmetic, binary codes, Error detecting & correcting codes.

UNIT-II (15 Lectures)

BOOLEAN ALGEBRA AND SWITCHING FUNCTION:

Fundamental postulates of Boolean algebra, Basic theorems and properties, switching functions, Simplification of Boolean equations, Digital logic gates, properties of XOR gates, universal gates - NAND/ NOR realizations. K-map method, Prime implicants, don't care combinations, Minimal SOP and POS forms, Tabular Method, Prime –Implicant chart, simplification rules.

UNIT-III (13 Lectures)

COMBINATIONAL LOGIC DESIGN:

Adders, Subtractor, Multiplexer, De-Multiplexer, MUX Realization

of switching functions, Encoder, Decoder, Parity bit generator, Code-converters, Basic PLD's-ROM, PROM, PLA, PAL Realizations.

UNIT-IV (13 Lectures)

SEQUENTIAL CIRCUITS:

Classification of sequential circuits (Synchronous, Asynchronous, Pulse mode, Level mode with examples) Latches and Flip-flops-Triggering and excitation tables, registers, shift registers, Steps in synchronous sequential circuit design, synchronous counters, ripple counters, Design of modulo-N Ring & Shift counters, Serial binary adder, sequence detector.

UNIT-V (9 Lectures)

FINITE STATE MACHINES:

Finite state machine-capabilities and limitations, Mealy and Moore models-minimization of completely specified sequential machines, Partition techniques, incompletely specified sequential machines using merger 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. Morris Mano, *"Digital Design"* PHI, 3rd Edition, 2006.
2. Anand Kumar, *"Switching Theory and Logic Design"* PHI,2008

REFERENCES:

1. Zvi Kohavi, *"Switching & Finite Automata Theory"* TMH, 2nd Edition
2. R.P.Jain. *"Modern Digital Electronics"*, 4th Edition, TMH, 2009.
3. John M. Yarbrough, *"Digital Logic Applications and Design"* Thomson Publications, 2006.
4. Charles H. Roth, *"Fundamentals of Logic Design"* Thomson Publications, 5th Edition, 2004.

PULSE AND DIGITAL CIRCUITS
(Common to ECE, EEE)

Course Code: 13EC1106

L	T	P	C
4	0	0	3

Pre requisites:

Electronic devices Circuits, Basics of Mathematics, Physics

Course Outcomes:

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

CO 1 Illustrate linear and non-linear wave shaping circuits.

CO 2 Design & analyze various Multivibrators.

CO 3 Comprehend the concepts of Voltage and Current time base generators.

CO 4 Comprehend the concepts of Synchronization and Frequency Division.

CO 5 Describe the functionality of Sampling Gates and design of Logic Gates using Discrete Components.

UNIT-I **(15 Lectures)**

LINEAR AND NON-LINEAR WAVESHAPING :

Lowpass & Highpass RC circuits, Response for sinusoidal, step, pulse, square and ramp inputs, RC network as differentiator and integrator,Ringing circuit. Diode clippers, Transistor clippers, Emitter coupled clipper, clamping circuits, clamping circuit theorem.

UNIT-II **(15 lectures)**

MULTIVIBRATORS:

Classification of Multivibrators, Bistable multivibrator, commutating capacitors, triggering binary-symmetrical &unsymmetrical triggering, Schmitt Trigger circuit. Monostable multivibrators- collector coupled, emitter coupled, Triggering monostable. Astable Multivibrators - collector coupled and emitter coupled using transistors.

UNIT-III (12 Lectures)

TIMEBASEGENERATORS:

General features of a timebase signal, methods of generating time base wave form, Miller and Boots trap time base generators basic principles, Transistor Miller time base generator, transistor Bootstrap time base generator, Current time base generators.

UNIT-IV (10 Lectures)

SYNCHRONIZATION AND FREQUENCY DIVISION:

Principle of Synchronization, Frequency divisionin sweep circuit, Astable relaxation circuits, Monostable relaxation circuits, Synchronization of a sweep circuit with symmetrical signal, Sine wave frequency division with a sweep circuit.

UNIT-V (8 Lectures)

SAMPLING GATES:

Basic operating principles of sampling gates, Unidirectionaland Bi-directional sampling gates, Reduction of pedestal in gate circuits, Applications of sampling gates.

Logic Gates: Logic gates usingDiodes, resistors and transistor- RTL, DTL.

TEXT BOOKS:

1. J.Millman and H. Taub, *"Pulse,Digital and Switching Waveforms"* McGraw-Hill, 2008.
2. A.Anand Kumar, *"Pulse and Digital Circuits"* PHI, 2nd Ed., 2005.

REFERENCES:

1. David A. Bell, "*Solid State Pulse circuits*"PHI,4th Edn.,2002
2. L.Strauss, *"Wave Generation andShaping"*Literary Licensing, LLC, 2012
3. Venkata Rao K,Rama Sudha K, Manmadha Rao G. "*Pulse and Digital Circuits",* Pearson Education India, 2010

ELECTRONIC CIRCUITS LAB

Course Code: 13EC1107

L	T	P	C
0	0	3	2

Course Outcomes:

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

CO 1 Outline the concepts of various electronic components and devices.

CO 2 Determine the frequency response of BJT and JFETs amplifiers.

CO 3 Verify different configurations of feedback amplifiers and measure A_V,A_I,R_I,R_O

CO 4 Design and analyze RC,LC oscillator circuits.

CO 5 Compute bandwidth and impedances of various amplifiers.

LIST OF EXPERIMENTS

1. CE Amplifier.
2. CC Amplifier (Emitter Follower).
3. Two stage R-C coupled Amplifier.
4. Feedback amplifier (Current Series).
5. Feedback amplifier (Voltage Series).
6. Feedback amplifier (Current Shunt).
7. Feedback amplifier (Voltage Shunt)
8. FET amplifier (Common Source)
9. Wien Bridge Oscillator
10. RC Phase Shift Oscillator
11. Colpitts Oscillator.
12. Class A Power Amplifier (Transformerless)
13. Class B Complementary Symmetry Amplifier
14. Voltage Digital IC Applications Series and Shunt Regulator

ELECTRICAL TECHNOLOGY LAB

Course Code: 13EE1145

L	T	P	C
0	0	3	2

Course Outcomes :

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

CO 1 Solve the Network problems using Network Theorems.

CO 2 Analyze the Networks using Periodic and Non Periodic inputs.

CO 3 Evaluate the performance of DC Machines.

CO 4 Evaluate the Performance of Transformers.

CO 5 Evaluate the performance AC Machines.

PART-A

1. Verification of Kirchhoff's laws.
2. Verification of Superposition and Reciprocity Theorems.
3. Experimental determination of Thevenin's Equivalent circuits and verification by Direct Test.
4. Verification of Maximum Power Transfer Theorem
5. Series Resonance – Resonant frequency, Bandwidth and Q-factor determination for RLC Network.
6. Time response of first order R-L and R-C network for periodic Non-sinusoidal inputs – time constant and steady state error determination.

PART-B

1. Magnetization characteristics of D.C. Shunt generator. Determination of Critical Field Resistance and Critical Speed.
2. Swinburne's Test on DC Shunt Machine.
3. Brake test on DC Shunt Motor.

4. OC & SC tests on Single-phase transformer.
5. Brake test on 3-Phase Induction Motor.
6. Regulation of Alternator by Synchronous Impedance Method.

ENVIRONMENTAL STUDIES
(Common to all Branches)

Course Code: 13NM1102

L	T	P	C
2	0	0	0

Course Outcomes:

On successful completion of the course, the student should be able to

CO 1 Identify the various resources available and explain their conservation techniques.

CO 2 Classify, describe and explain the concepts of ecosystem, biodiversity and their conservation.

CO 3 Categorize and explain different types of pollution and their control methods.

CO 4 Identify the different social issues caused due to today's development and also describe the relevant Acts.

CO 5 Assess the effects of population and its growth on environment and human health.

UNIT-I **(8 Lectures)**

MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES & NATURAL RESOURCES

Definition, Scope and Importance – Need for Public Awareness. Renewable and non-renewable resources– Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems -Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. - Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. – Energy resources: Growing energy needs, renewable and

non-renewable energy sources use of alternate energy sources. Case studies. Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

UNIT-II (7 Lectures)

ECOSYSTEMS, BIODIVERSITY AND ITS CONSERVATION:

Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession. - Food chains, food webs and ecological pyramids. - Introduction, types, characteristic features, structure and function of the following ecosystem: a. Forest ecosystem b. Grassland ecosystem c. Desert ecosystem d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

Definition: genetic, species and ecosystem diversity.- Bio-geographical classification of India - Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values - . Biodiversity at global, National and local levels. - . India as a mega diversity nation - Hot-sports of biodiversity - Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts. - Endangered and endemic species of India Conservation of biodiversity: In-situ and Exsitu conservation of biodiversity.

UNIT-III (7 Lectures)

ENVIRONMENTAL POLLUTION:

Definition, Cause, effects and control measures of a) Air pollution b) Water pollution c) Soil pollution d) Marine pollution e) Noise pollution f) Thermal pollution g) Nuclear hazards.

SOLID WASTE MANAGEMENT:

Causes, effects and control measures of urban and industrial wastes. – Role of an individual in prevention of pollution. - Pollution case studies. - Disaster management: floods, earthquake, cyclone and landslides.

UNIT-IV (6 Lectures)

SOCIAL ISSUES AND THE ENVIRONMENT:

From Unsustainable to Sustainable development -Urban problems

related to energy -Water conservation, rain water harvesting, and watershed management -Resettlement and rehabilitation of people; its problems and concerns. Case Studies Environmental ethics: Issues and possible solutions. -Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies. -Wasteland reclamation. -Consumerism and waste products. – Environment.

Protection Act. -Air (Prevention and Control of Pollution) Act. -Water (Prevention and control of Pollution)

Act -Wildlife Protection Act -Forest Conservation Act -Issues involved in enforcement of environmental legislation. -Public awareness.

UNIT-V (8 Lectures)

HUMAN POPULATION AND THE ENVIRONMENT:

Population growth, variation among nations. Population explosion -Family Welfare Programme. -Environment and human health. -Human Rights. -Value Education. -HIV/AIDS. -Women and Child Welfare. -Role of information Technology in Environment and human health. – Case Studies.

FIELD WORK:

Visit to a local area to document environmental assets

River /forest grassland/hill/mountain -Visit to a local polluted site-

Urban/ Rural/industrial/ Agricultural Study of common plants, insects, birds. - Study of simple ecosystems-pond, river, hill slopes, etc.

TEXT BOOKS:

1. Bharucha. E., "*Textbook of Environmental Studies for Undergraduate Courses*", University Press, 2005.
2. Rajagopalan. R., "*Environmental Studies*", Oxford University Press, 2005.

REFERENCE:

AnjiReddy. M., "*Textbook of Environmental Sciences and Technology*", BS Publications, 2010.

SYLLABI FOR IV SEMESTER

RANDOM VARIABLES AND NUMERICAL METHODS

(Common to ECE, EEE)

Course Code: 13BM1107

L	T	P	C
4	1	0	3

Pre requisites:

- Fundamentals of Set theory.
- Basic concepts of Probability.
- Basic concepts of calculus.

Course Outcomes:

At the end of the Course, Student will be able to

CO 1 Explain various concepts of discrete and continuous random variables.

CO 2 Determine joint distribution function and density function of multiple random variables.

CO 3 Examine the properties of Joint Gaussian Random Variables and classify random processes.

CO 4 Determine numerical solution of algebraic and transcendental equations and discuss different difference operators.

CO 5 Use interpolation techniques for data analysis, develop and apply numerical integration techniques and numerically solve initial value problems.

UNIT-I **(12 Lectures)**

The Random Variable Concept, Discrete, Continuous, Mixed random variable distribution function, Density function, The Gaussian Random variable, Conditional distribution and density Function, Expected value, Conditional expected value, Moments, Moments about the

origin, Central moments,Variance and Skew, Chebychev's inequality, Markov's inequality. Monotonic and Non monotonic transformations of a continuous random variable, Transformations of a discrete random variable.
(2.1 to 2.4, 2.6, 3.1, 3.2,3.4 of Text book [1])

UNIT-II **(12 Lectures)**

Vector random variables, Joint distribution and its properties, Joint density and its properties, Conditional distribution and density statistical independence distribution and density of a sum of random variables, Central limit theorem (without proof). Expected value of a function of random variables, Joint moments about the origin, Joint central moments.
(4.1 to 4.7, 5.1 of Text book [1])

UNIT-III **(12 Lectures)**

Jointly Gaussian random variables-two random variables, Jointly gaussian random variables-N Random variables. Transformations of multiple random variables- One function, Transformations of multiple random variables- multiple functions, Linear transformation of Gaussian random variables. The Random process concept-classification of processes. Deterministic and Nondeterministic processes.
(5.3 to 5.5, 6.1 of Text book [1])

UNIT-IV **(12 Lectures)**

Introduction to Numerical Methods, Solution of algebraic and transcendental equations-Bisection method, Method of false position Newton's method.

Finite differences-Forward differences, Backward differences, Central differences, Differences of a polynomial, Other Difference operators – Shift operator, Average operator, Relations between the operators, Newton's interpolation formulae - Newton's forward interpolation formula Newton's backward interpolation formula.
(28.1 to 28.3, 29.1 to 29.5, 29.6 of Text book [2])

UNIT-V (12 Lectures)

INTERPOLATION WITH UNEQUAL INTERVALS:

Lagrange interpolation, Divided differences, Newton's divided difference formula, Inverse interpolation. Numerical Integration-Trapezoidal, Simpson's one-third and Simpson's three-eighth rules.

NUMERICAL SOLUTIONS OF ORDINARY DIFFERENTIAL EQUATIONS:

Euler's Method, Modified Euler's Method, Runge-Kutta method of order 4.

(29.9 - 29.13, 30.4, 30.6-30.8, 32.4, 32.5, 32.7 of Text book [2])

TEXT BOOKS:

1. Peyton Z . Peebles, Jr., "Probability, Random Variables and Random Signal Principles", Fourth Edition, TMH, 2002.
2. Dr.B.S.Grewal "Higher Engineering Mathematics", 42nd Edition, Khanna Publishers, 2012.

REFERENCES:

1. Athanasios Papoulis and S.Unnikrishna Pillai, *"Probability, Random variables and Stochastic processes"*, 4th Edition, PHI, 2002.
2. M.K.Jain, S.R.K.Iyengar and R.K.Jain, *"Numerical Methods form scientific and Engineering Computation"*, 4th Edition, New age International Publishers, 2003.
3. S. S. Sastry, *"Introductory Methods of Numerical Analysis"*, 4th Edition, Prentice Hall India Pvt., Limited, 2005.

DIGITAL IC APPLICATIONS

Course Code: 13EC1108

L	T	P	C
4	1	0	3

Pre requisites:

Electronics Devices and Circuits, Switching Theory and Logic Design.

Course Outcomes:

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

CO 1 Outline the concepts of different logic families.

CO 2 Analyze CMOS steady state and dynamic electrical behavior.

CO 3 Comprehend concepts of VHDL.

CO 4 Design and model combinational and sequential logic circuits using VHDL.

CO 5 Discuss internal structure, Read and Write timing operations of Memories.

UNIT-I (12 Lectures)

LOGIC FAMILIES:

Introduction to logic families, RTL, DCTL, DTL, TTL, Schottky TTL and Emitter coupled logic, HTL, IIL,NMOS, PMOS, CMOS logic, Comparison of logic families.

UNIT-II (12 Lectures)

CMOS INTERFACING :

CMOS steady state and dynamic electrical behavior, CMOS logic families, CMOS/TTL interfacing, low voltage CMOS logic and interfacing, Familiarity with standard 74xx and CMOS 40xx series ICs—specifications.

UNIT-III (10 Lectures)

INTRODUCTION TO VHDL:

Program structure, data types and constants, operators, data flow

design elements, behavioral design elements, Structural design elements, functions and procedures, libraries and packages, simulation and synthesis.

UNIT-IV (16 Lectures)

COMBINATIONAL AND SEQUENTIAL LOGIC DESIGN:

Decoders, encoders, three state devices, multiplexers and demultiplexers, Code Converters, Parity circuits, comparators, Adders & subtractors, Basic Concepts of ALUs, Combinational multipliers, Barrel shifter, floating-point encoder, dual priority encoder. Latches and flip-flops, PLDs,counters, shift register, and VHDL models of above ICs.

UNIT-V (10 Lectures)

MEMORIE:

ROM - Internal structure, 2D-decoding commercial types, timing and applications.

Static RAM - Internal structure, SRAM timing, standard SRAMS, synchronous SRAMS. Dynamic RAM - Internal structure, timing, synchronous DRAMs.

TEXT BOOKS:

1. John F.Wakerly, "Digital Design Principles & Practices", PHI/ Pearson Education Asia, 3rd Ed., 2005.
2. J.Bhasker , "VHDL Primer", Pearson Education / PHI, 3rd Edition, 1999.

REFERENCES:

1. Charles H. Roth Jr., "Digital System Design Using VHDL" PWS Publications, 2008.
2. Alan B. Marcovitz , "Introduction to Logic Design", TMH, 2nd Edition,2005.
3. Stephen Brown and Zvonko Vramesic., "Fundamentals of Digital Logic with VHDL Design"McGraw Hill, 2nd Edn.,2007.
4. R.P.Jain , "Modern Digital Electronics", Mc Graw Hill, 4th Edition, 2010.

ANALOG COMMUNICATIONS

Course Code:13EC1109

L	T	P	C
4	0	0	3

Pre requisites: Signals & systems, probability.

Course Outcomes:

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

CO 1 Comprehend the performance of Amplitude modulation and demodulation techniques.

CO 2 Analyze AM and FM transmitters and receivers.

CO 3 Examine the performance of Angle modulation and demodulation techniques.

CO 4 Explain sampling and examine the performance of pulse modulation and demodulation techniques.

CO 5 Evaluate the effect of noise in Analog modulation systems.

UNIT-I (12 Lectures)

AMPLITUDE MODULATION:

Introduction to Communication system, Need for modulation. Amplitude Modulation - single tone and multi-tone modulation, spectral analysis, power and bandwidth relations, Generation: Square law modulator, switching modulator. Detection: Square law detector, Envelope detector.

DSB-SC MODULATION:

Spectral analysis, Generation: Balanced Modulator, Ring Modulator. Detection: Coherent detection, Costas Loop. Quadrature-Carrier Multiplexing.

UNIT-II (12 Lectures)

SINGLE SIDE BAND MODULATION :

Time and Frequency domain description, power and bandwidth relations, Generation: Frequency and Phase discrimination method.

Demodulation: Synchronous detection. Vestigial sideband modulation, transmission bandwidth, Comparison of AM Techniques.

AM TRANSMITTERS AND RECEIVERS:

AM Transmitters - low level and high level modulation, Tuned radio frequency receiver, Superhetrodyne Receiver.

UNIT-III (14 Lectures)

ANGLE MODULATION:

Phase and Frequency Modulation: Spectral Analysis of Sinusoidal FM and PM signals, Narrow band FM, Wideband FM, Transmission bandwidth,Pre-emphasis &De-emphasis. FM Transmitters - Direct and Armstrong type FM Modulators, FM Receiver block description, FM Demodulators, Threshold effect, Amplitude Limiting, Automatic Gain Control, Comparison of PM, FM & AM.

UNIT-IV (10 Lectures)

PULSE MODULATION:

Sampling theorem, sampling techniques, Time Division Multiplexing, Types of Pulse modulation, PAM – Natural sampled and Flat Top sampled, PWM and PPM Generation and Demodulation.

UNIT-V (12 Lectures)

NOISE:

Noise sources, Thermal noise, Noise Figure and Noise Temperature, Average Noise Figure and Effective Noise Temperature of cascaded networks, Noise in communication Systems: Noise in AM System, Noise in DSB and SSB Systems, Noise in Angle Modulation Systems.

TEXT BOOKS:

1. H Taub & D. Schilling, "*Principles of Communication Systems*", Gautam Sahe, TMH, 3rd Edition, 2007.
2. Simon Haykin, "*Communication Systems*", John Wiley and Sons, 2nd Edition, 2010.

REFERENCES:

1. R.P. Singh, S.D Sapre, "*Communication Systems*", 2nd Edition, TMH, 2007.

2. John G. Proakis, Masond, Salehi, "*Fundamentals of Communication Systems*", PTR, 2004.
3. B.P. Lathi, *"Communication Systems",* BS Publication, 2006.
4. George Kennedy and Bernard Davis, *"Electronics & Communication System",* TMH, 1999.

LINEAR IC APPLICATIONS

Course Code: 13EC1110

L	T	P	C
4	0	0	3

Pre requisites:

Electronic Circuits, Basic Network Analysis, Pulse and Digital Circuits

Course Outcomes:

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

CO 1 Perform DC & AC analysis of differential amplifiers and characteristics of Op-Amps.

CO 2 Design and analyze linear & non-linear circuits using Op-Amp.

CO 3 Illustrate various Filter and Oscillator circuits.

CO 4 Design Timers and PLL Applications.

CO 5 Illustrate various ADC, DAC Converters and Voltage Regulators.

UNIT-I (12 Lectures)

OPERATIONAL AMPLIFIERS:

Differential Amplifier- DC and AC analysis**.**Integrated circuits-Types, Classification of IC,Package Types and temperature ranges. Op-Amp Block Diagram, Characteristics of OP-Amps, ideal and practical Op-Amp specifications. DC and AC characteristics: 741 op-amp & its features, Op-Amp parameters & their measurements- Input & Output Offset voltages & currents, slew rate, CMRR, PSRR, Drift, Frequency Compensation techniques.

UNIT-II (14 Lectures)

APPLICATIONS OF OP- AMPS:

Inverting and Non-inverting amplifier, Integrator and differentiator,

Difference amplifier, Instrumentation amplifier, Voltage to current and current to Voltage converters ,Comparators,Schmitt Trigger, Multivibrators, Triangular and Square wave generators, Log and Anti log amplifiers.

VOLTAGE REGULATORS:

IC723 voltage regulator, three terminal regulators (78XX and &79XX)

UNIT-III (12 Lectures)

ACTIVE FILTERS AND OSCILLATORS:

Butter worth filters– 1st order LPF, HPF filters, Band pass, Band reject and All pass filters, Oscillators –RC and Wien bridge oscillators, VCO (566).

UNIT–IV (14 Lectures)

TIMERS & PHASE LOCKED LOOPS:

Introduction to 555 timer,functional diagram, Monostable and Astable operations and applications, 555 timer as Schmitt Trigger. PLL - introduction, block schematic, 565 PLL, Applications of PLL – frequency multiplication, frequency translation, AM, FM & FSK demodulators.

UNIT-V (8 Lectures)

D/A& A/D CONVERTERS:

Introduction, basic DAC techniques, weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, and IC 1408 DAC, Different types of ADCs - parallel comparator type ADC, counter type ADC, successive approximation ADC and dual slope ADC. DAC and ADC Specifications, IC AD574 (12 bit ADC).

TEXT BOOKS:

1. Ramakanth A. Gayakwad, *"Op-Amps & Linear ICs"*, 4th Edition, PHI, 2002.
2. D. Roy Chowdhury , *"Linear Integrated Circuits"*, New Age International (p) Ltd, 2nd Edition,2003.

REFERENCES:

1. Sergio Franco, *"Design with Operational Amplifiers & Analog Integrated Circuits"*, McGraw Hill, 1988.
2. R.F.Coughlin & Fredrick Driscoll, *"Operational Amplifiers & Linear Integrated Circuits"*, PHI, 5th Edition, 1998.
3. Millman, *"Micro Electronics"*, McGraw Hill, 1988.
4. C.G. Clayton, *"Operational Amplifiers"*, 5th Edition, Newnes Publishers, 2003.

EM WAVES AND TRANSMISSION LINES

Course Code: 13EC1111

L	T	P	C
4	0	0	3

Course Outcomes:

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

CO 1 Comprehend the behavior of electric fields due to static charge distributions

CO 2 Comprehend the behavior of magnetic fields due to current distribution.

CO 3 Specify the "constitutive relations" for fields and understand why they are required.

CO 4 Describe the propagation characteristics of electromagnetic waves.

CO 5 Design of transmission lines at high frequencies.

UNIT-I (13 Lectures)

ELECTROSTATICS :

Coulomb's Law, Electric Fields due to Different Charge Distributions, Gauss Law and Applications, Electrostatic Potential and Equipotential surfaces, Energy Density, Poisson's and Laplace's Equations; Capacitance – Parallel Plate, Coaxial, Spherical Capacitors, Method of Images. Convection and Conduction currents, Continuity Equation, Relaxation Time, Joules Law, Analogy between D and J.

UNIT-II (13 Lectures)

MAGNETOSTATICS:

Biot-Savart's Law, Ampere's Circuital Law and Applications, Magnetic Scalar and Vector Potentials,Forces due to Magnetic Fields, Ampere's Force Law, Inductances and Magnetic Energy.

UNIT-III (8 Lectures)

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 time domain and phasor domain, Boundary Conditions.

UNIT-IV (12 Lectures)

PLANE WAVE PROPAGATION:

Helmhotz Equations- Wave Equations for Conducting and Perfect Dielectric Media. Uniform Plane Waves, Uniform Plane Wave Propagation in Lossless and Lossy Media. Conductors & Dielectrics – Characterization, Polarization, Behavior of plane waves at the interface of two media: 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.

UNIT-V (14 Lectures)

TRANSMISSION LINES:

Transmission Line parameters and equations, Primary & Secondary Constants, Expressions for Characteristic Impedance, Propagation Constant, Phase and Group Velocities, Infinite Line Concepts, Input Impedance Relations, SC and OC Lines, Reflection Coefficient, VSWR, UHF Lines as Circuit Elements; ë/4, ë/2, ë/8 Lines – Impedance Transformations. Smith Chart – Configuration and Applications, Single and Double Stub Matching.

TEXT BOOKS:

1. Matthew N.O. Sadiku, *"Elements of Electromagnetics"*, Oxford Univ. Press, 3rd Ed., 2001.
2. G.S.N. Raju, *"Electromagnetic Field Theory and Transmission Lines"*, Pearson Edn., 2005.
3. G. Sasi Bhushana Rao, *"Electromagnetic Field Theory and Transmission Lines"*, Wiley India Pvt. Ltd, 2012.

REFERENCES:

1. E.C. Jordan and K.G. Balmain, *"Electromagnetic Waves and Radiating Systems"*, PHI, 2ndEd., 2000.
2. Nathan Ida, *"Engineering Electromagnetics"*, Springer (India) Pvt. Ltd., New Delhi, 2nd ed., 2005.
3. John D. Ryder, *"Networks, Lines and Fields"*, PHI, 2nd Edition., 1999.
4. William H. Hayt Jr. and John A. Buck, *"Engineering Electromagnetics"*, TMH, 7th Edition, 2006.
5. Umesh Sinha, *"Transmission Lines and Networks"*, Satya Prakashan (Tech. India Publications), New Delhi, 2001.

COMPUTER ORGANIZATION

(Common to CSE, ECE, EEE, IT)

Course Code : 13CT1105

L	T	P	C
4	0	0	3

Course Outcomes:

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

CO 1 Discuss basic structure and organization of computers.

CO 2 Explain register transfer and micro operations.

CO 3 Apply fixed and floating point arithmetic algorithms.

CO 4 Discuss memory and input/output organizations

CO 5 Explain pipeline and vector processing.

UNIT-I: (12 Lectures)

BASIC STRUCTURE OF COMPUTERS:

Organization and Architecture, Structure and Function, Computer Components, Computer Function, Bus Interconnection, Processor Organization, Register Organization.

BASIC COMPUTER ORGANIZATION AND DESIGN:

Instruction codes, Computer instructions, Memory reference instructions, Instruction Cycle.

CENTRAL PROCESSING UNIT:

Stack organization, instruction formats, addressing modes, data transfer and manipulation, program control, RISC.

UNIT-II (12 Lectures)

REGISTER TRANSFER AND MICRO OPERATIONS:

Register transfer language, Register transfer, Bus and Memory transfers, Arithmetic Micro operations, Logic Micro operations, Shift Micro operations, Arithmetic Logic Shift Unit.

MICRO PROGRAMMED CONTROL:

Control Memory, Address Sequencing, Micro Program examples, Design of control unit, Hardwired control..

UNIT-III (12 Lectures)

COMPUTER ARITHMETIC:

Data representation- Fixed point representation, Floating point representation, Addition and Subtraction, Multiplication Algorithms, Division Algorithms, Floating-point Representations, Floating-point Arithmetic Operations, Decimal Arithmetic Units, Decimal Arithmetic Operations.

UNIT-IV (12 Lectures)

MEMORY ORGANIZATION:

Memory system overview, Memory Hierarchy, Semi-conductor Main Memory, Cache Memory principle, Elements of cache design, Virtual Memory, Magnetic Disk, Optical Memory, Magnetic Tape, RAID.

INPUT- OUTPUT:

External Devices, I/O modules, Interrupts, Programmed I/O, Interrupt-driven I/O, Direct Memory Access, I/O Channels and Processors, PCI.

Asynchronous Data Transfer, Priority Interrupt, Serial Communication.

UNIT-V (12 Lectures)

PIPELINE AND VECTOR PROCESSING:

Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline, Vector Processing, Array Processors.

MULTI PROCESSORS:

Multiprocessors and Multi computers, Characteristics of Multi-processors, Multiple Processor Organizations, Symmetric Multi-Processors, Cache Coherence, Clusters, Non Uniform Memory Access (NUMA).

TEXT BOOKS:

1. William Stallings, *Computer Organization and Architecture*, 8th Edition, Pearson Education, 2010.
2. M.Moris Mano, *Computer Systems Architecture*, 3rd Edition, Pearson Education, 2007.

REFERENCES:

1. John D. Carpinelli, *Computer Systems Organization and Architecture*, 3rd Edition, Pearson Education, 2001.
2. Carl Hamacher, Zvonks Vranesic, SafeaZak , *Computer Organization* , 5th Edition, TMH,2011.

WEB REFERENCES:

http://nptel.iitm.ac.in/video.php?subjectId=106106092

PULSE AND INTEGRATED CIRCUITS LAB
(Common to ECE & EEE)

Course Code:13EC1112

L	T	P	C
0	0	3	2

Pre-requisites : Pulse and digital circuts, linear IC applications.

Course Outcomes:

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

CO 1 Design Linear and Non Linear wave shaping circuits.

CO 2 Design multivibrators using discrete components.

CO 3 Design multivibrators using timer ICs.

CO 4 Design Voltage Regulator using IC723

CO 5 Design of 4-bit D/A converter & A/D converter.

LIST OF EXPERIMENTS:

1. Linear wave shaping.
2. Non Linear wave shaping – Clippers and Clampers.
3. Astable multivibrator.
4. Monostable multivibrator.
5. Schmitt Trigger.
6. Bootstrap sweep circuit.
7. Integrator, differentiator, Band Pass and Band stop filters using IC 741.
8. Function Generator using IC 741.
9. Astable and Monostable multivibrator using 555 Timer.
10. PLL Using IC 565.
11. Voltage regulator using IC 723.

12. Study of Logic Gates using discrete components.
13. 4-bit D/A converter & A/D converter
14. Quadrature Oscillator

ANALOG COMMUNICATIONS LAB

Course Code: 13EC1113

L	T	P	C
0	0	3	2

Pre requisites: Analog communications

Course Outcomes:

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

CO 1 Design and verify linear modulation& demodulation systems using simulation and hardware.

CO 2 Design and verify non-linear modulation & demodulation systems using simulation and hardware.

CO 3 Demonstrate the characteristics of various functional blocks of Receiver.

CO 4 Analyze signal degradation in the channel at high frequencies through Pre-emphasis and De-emphasis.

CO 5 Demonstrate Frequency domain signal Analysis using Spectrum analyzer.

LIST OF EXPERIMENTS:

1. Amplitude modulation and demodulation.
2. DSB-SC Modulation using Balanced Modulator.
3. SSB-SC modulation and demodulation.
4. Frequency modulation and demodulation.
5. Characteristics of mixer.
6. Pre-emphasis and de-emphasis.
7. Phase locked loop.
8. Synchronous detector.
9. Squelch Circuit.

10. Frequency Synthesizer.
11. AGC Characteristics.
12. Spectral analysis of AM, DSB-SC, SSB-SC using spectrum analyzer.
13. Spectral analysis of FM using spectrum analyzer.
14. MATLAB Simulation of

(i) AM & DSB-SC Modulation and Demodulation.

(ii) SSB-SC Modulation and Demodulation

(iii) Frequency Modulation and Demodulation

NOTES

SYLLABI FOR V SEMESTER

NETWORK ANALYSIS AND SYNTHESIS

(Common to ECE, EEE)

Course Code:13EE1104

L	T	P	C
4	1	0	3

Pre requisites:

Knowledge of Mathematics and Basic Network Analysis.

Course Outcomes:

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

CO 1 Solve the Network problems using Graph theory, acquire the knowledge of Network Topology and Duality in Electrical Networks.

CO 2 Analyze the Networks using Differential Equation Approach and acquire the knowledge of RLC- Series & Parallel circuits, for different Excitations.

CO 3 Evaluate the Networks using Laplace Transforms Approach.

CO 4 Analyze the Network functions, Two Port Networks and Ladder Networks.

CO 5 Design and Evaluate the LC, RC & RL Networks using Foster's and Cauer Forms.

UNIT-I **(12 Lectures)**

NETWORK TOPOLOGY:

Linear Graphs in Electrical Networks, Basic Definitions, Incidence, Loop and cut-set matrices, Fundamental Loop and Fundamental Cut-Set Matrices, Graph Theoretic version of KCL and KVL, Loop Impedance and Node Admittance Matrices, Duality in Electrical Networks.

UNIT-II (12 Lectures)

NETWORK ANALYSIS - I (DIFFERENTIAL EQUATION APPROACH):

Network elements, Initial and final conditions (Constant flux linkage and Charge theorems), Step and Impulse response of RC & RL Circuits (Concept of time constant), Solution of RLC- Series & Parallel circuits for the step and impulse excitations, Analysis of Transformer (Mutual Inductance).

UNIT-III (12 Lectures)

NETWORK ANALYSIS USING LAPLACE TRANSFORMS:

The Transformed Circuit, Thevenin's and Norton's Theorems, The system function (with poles and zeros), the step and impulse responses, the convolution Integral, The Duhamel Superposition Integral.

UNIT-IV (12 Lectures)

NETWORK ANALYSIS – II (TWO- PORTS) :

Network functions, Two Port Networks: Z, Y, h and T (ABCD) Parameters, Relationship between Two Port parameters, Transfer function using two port parameters, inter connection of two port networks, Analysis of Ladder networks.

UNIT-V (12 Lectures)

SYNTHESIS OF NETWORKS:

Causality and stability, Hurwitz polynomials, Positive Real Functions, Elementary Synthesis procedure, Properties of LC immittance functions, Synthesis of LC driving point function by Foster's and Cauer Forms, Properties of RC & RL driving Point Function, Synthesis of RC & RL functions Foster's and Cauer Forms.

TEXT BOOKS:

1. N.C. Jagan and C. Lakshmi Narayana, *"Network Analysis"*, B.S. Publications, 2nd Edition, 2008. (Unit-I).
2. Franklin F.Kuo, *"Network Analysis and Synthesis"*, Wiley International, 5th Edition, 2012. (Unit-II to Unit-V).

REFERENCES:

1. M.E. Van Valkenburg, *"Network Analysis"*, Prentice Hall of India Pvt. Ltd., 2000.
2. M.E. Van Valkenburg, *"Introduction to Modern Network Synthesis"*, Wiley Eastern Limited, 1993.
3. Charles K. Alexander, Mathew N.O Sadiku, *"Fundamentals of Electric Circuits"* TMH Education Pvt. Ltd, 3rd Editions, 2008.

CONTROL SYSTEMS
(Common to EEE, ECE)

Course Code:13EE1105

L	T	P	C
4	1	0	3

Pre requisites: Mathematics and Networks.

Course Outcomes:

CO 1 Operate and troubleshoot open loop and closed loop control systems. Use transfer functions to predict the correct operation of control systems. Measure and evaluate the performance of basic open loop and closed loop control systems.

CO 2 Identify the basic elements and structures of feedback control systems.

CO 3 Construct and recognize the properties of root-locus for feedback control systems with a single variable parameter.

CO 4 Specify control system performance in the frequency-domain in terms of gain and phase margins, and design compensators to achieve the desired performance.

CO 5 Analyze control systems using state-space methods.

UNIT-I **(12 Lectures)**

MATHEMATICAL MODELING AND TRANSFER FUNCTION REPRESENTATION:

Introduction: Basic concept of simple control system – open loop – closed loop control systems. Effect of feedback on overall gain – stability sensitivity and external noise. Types of feedback control systems – Liner time invariant, time variant systems and non linear control systems

Mathematical models and Transfer functions of Physical systems: Differential equations – impulse response and transfer functions – translational and rotational mechanical systems. Transfer functions

and open loop and closed loop systems. Block diagram representation of control systems – block diagram algebra – signal flow graph – Mason's gain formula

Components of control systems: DC servo motor – AC servo motor – synchro transmitter & receiver.

UNIT-II (12 Lectures)

TIME DOMAIN ANALYSIS AND STABILITY:

Time domain analysis: Standard test signals – step, ramp, parabolic and impulse response function – characteristic polynomial and characteristic equations of feedback systems – transient response of first order and second order systems to standard test signals. Time domain specifications - steady state response – steady state error and error constants. Effect of adding poles and zeros on over shoot, rise time, band width – dominant poles of transfer functions.

Stability analysis in the complex plane: Absolute, relative, conditional, bounded input –bounded output, zero input stability, conditions for stability, Routh –Hurwitz criterion.

UNIT-III (12 Lectures)

FREQUENCY DOMAIN ANALYSIS:

Introduction – correlation between time and frequency responses – polar plots – Bode plots – Nyquist stability criterion – Nyquist plots. Assessment of relative stability using Nyquist criterion – closed loop frequency response.

UNIT-IV (12 LECTURES)

ROOT LOCUS AND COMPENSATION TECHNIQUES:

Root locus Technique: Introduction – Construction of Root Loci

Introduction to Compensation Techniques- Lead, Lag, Lead Lag and Lag Lead,

Controllers- P, I, D, PD, PI, PID.

UNIT-V (12 Lectures)

STATE SPACE ANALYSIS:

Concepts of state, state variables and state models – diagonalisation

– solution of state equations – state models for LTI systems- State Transition Matrix and its properties. Concepts of Controllability and Observability.

TEXT BOOKS:

1. I.J.Nagrath & M Gopal, *"Control Systems Engineering"*, 5th Edition, New Age International.2012.
2. Norman S.Nise, *"Control Systems Engineering"*, 4th Edition, Wiley & Sons, 2009.

REFERENCES:

1. B.C. Kuo,"Automatic control systems", 7th edition, PHI, 2004.
2. M.Gopal,"Control Systems Principles and Design", 4th Edition, TMH, 2012.
3. K. Ogata, "Modern Control Engineering", 4th Edition, PHI, 2002.

DIGITAL COMMUNICATIONS

Course Code: 13EC1114

L	T	P	C
4	0	0	3

Prerequisites: Communication system basics

Course Outcomes:

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

CO 1 Comprehend Pulse Code Modulation and Delta Modulation.

CO 2 Explain the Modulation and Demodulation methods of the Digital Modulation.

CO 3 Evaluate the Error performance of Digital Modulation schemes.

CO 4 Comprehend the efficiency of Source Coding Techniques.

CO 5 Comprehend error detection and correction codes.

UNIT-I (14 Lectures)

PULSE DIGITAL MODULATION:

Elements of digital communication systems, advantages of digital communication systems, Elements of PCM: Sampling, Quantization & Coding, Quantization error, Companding in PCM systems. Differential PCM systems (DPCM).

DELTA MODULATION:

Delta modulation**,** adaptive delta modulation, comparison of PCM and DM systems, noise in PCM and DM systems, Line coding.

UNIT-II (12 Lectures)

DIGITAL CARRIER MODULATION TECHNIQUES:

Introduction, ASK, FSK, PSK, DPSK, QPSK, M-ary PSK, ASK, FSK, similarity of BFSK and BPSK.

UNIT-III (10 Lectures)

DIGITAL DATA TRANSMISSION:

Baseband signal receiver, probability of error, the optimum filter, matched filter, probability of error using matched filter, coherent reception, non-coherent detection of FSK, calculation of error probability of ASK, BPSK, BFSK,QPSK.

UNIT-IV (12 Lectures)

INFORMATION THEORY:

Discrete messages, concept of amount of information and its properties, Average information, Entropy and its properties. Information rate, joint and conditional entropy and its properties, Mutual information and its properties

SOURCE CODING:

Introduction, Advantages, Shannon's theorem, Shanon-Fano coding, Huffman coding, efficiency calculations, channel capacity of discrete and analog Channels, capacity of a Gaussian channel, bandwidth – S/N trade off.

UNIT-V (12 Lectures)

ERROR CONTROLLING TECHNIQUES:

Forward Error control codes (FEC), Automatic repeat request codes (ARQ), Linear Block Codes, Error detection and error Correction, capabilities of Linear block codes, cyclic codes, Convolution Codes, Comparison between Linear codes and convolution codes.

TEXT BOOKS:

1. Simon Haykin, "*Digital communications*" John Wiley, 1st edn.2005.
2. W. Tomasi, *"Advanced Electronic Communications Systems"*, PHI. 4th edition.

REFERENCES:

1. H. Taub and D. Schilling, *"Principles of Communication Systems"*, TMH, 3rd ed. 2003.ssss

2. John Proakis, Masoud Salehi *"Digital Communications"*, TMH, 5th ed., 2008.
3. R.Singh and S.Sapre, *"Communication Systems-Analog & Digital"*, TMH, 2nd ed., 2004.
4. B.P.Lathi, *"Modern Analog and Digital Communication"*, Oxford reprint, 3rd edition, 2004.
5. Bernard Sklar and Pabitra Kumar Ray, "*Digial Communications – Fundamentals and Applications"*, Pearson, 2nd Ed., 2001.

MICROPROCESSORS AND MICROCONTROLLERS

Course Code: 13EC1115

L	T	P	C
4	0	0	3

Pre requisites: Digital Logic Design, Computer Organization

Course Outcomes:

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

CO 1 Explain the Architecture of 8086 Microprocessor

CO 2 Develop Programming skills in assembly language for 8086Microprocessor

CO 3 Describe the interfacing techniques of various peripherals to Microprocessor

CO 4 Design serial data communication and DMA.

CO 5 Explain the architecture of 8051

UNIT-I (10 Lectures)

INTEL 8086 MICROPROCESSOR:

8086 internal architecture, addressing modes, pin diagram, Minimum mode and maximum mode of operation, timing diagrams, Memory interfacing to 8086 (Static RAM & EPROM), 8086 interrupts and interrupt responses

UNIT-II (14 Lectures)

8086 PROGRAMMING:

Instruction set of 8086, assembler directives, program development Steps, constructing the machine course Codes for 8086 instructions, writing programs for use with an assembler, writing and using procedures and assembler macros.

UNIT-III (11 Lectures)

PROGRAMMABLE DEVICES AND INTERFACING OF I/O:

Priority interrupt controller Intel 8259A, programmable peripheral interface 8255A, Interfacing of A/D and D/A converters to 8086 microprocessor, interfacing microprocessor to keyboard, 7-segment display unit, stepper motor.

UNIT-IV (11 Lectures)

USART, KEYBOARD/ DISPLAY CONTROLLER AND DMA INTERFACING:

Serial data transfer scheme, asynchronous and synchronous data transfer schemes, serial I/O 8251 USART architecture and interfacing, Sample program of serial data transfer, Need for DMA, 8257 DMA controller, 8279 keyboard/display controller.

UNIT-V (14 Lectures)

8051 MICRO CONTROLLER:

Overview of 8051 family, Pin description of the 8051, 256-byte on-chip RAM, 8051 flag bits and PSW register, 8051 register banks and stack, instruction set, Programming 8051 timers, counter programming, Basics of serial communication, 8051 serial port programming in Assembly language.

TEXT BOOKS:

1. A.K.Ray and K.M.Bhurchandi, "*Advanced Microprocessors and Peripherals*", 2nd Edn, TMH, 2006.
2. Mazidi and Mazidi, *"The 8051 Microcontroller and Embedded Systems"*, 2nd Edn, PHI, 2004.

REFERENCES:

1. Barry B. Brey, *"The Intel Microprocessors-Architecture, Programming & Interfacing"*, 6th Edn., Pearson Education, 2004.
2. Liu and GA Gibson, *"Micro Computer System 8086/8088 Family Architecture, Programming and Design"*, 2nd Edn., PHI, 2006.

3. Douglas V. Hall, *"Micro Processors & Interfacing"*, 2nd Edn., 2007.

4. Raj Kamal *"Microcontrollers Architecture, Programming, Interfacing and System Design",* 1st Edn., Pearson Education, 2005.

ANTENNAS AND WAVE PROPAGATION

Course Code: 13EC1116

L	T	P	C
4	0	0	3

Pre requisites: EM waves and Transmission lines.

Course Outcomes:

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

CO 1 Identify the importance of various antenna parameters.

CO 2 Use Maxwell's equations to calculate fields from dynamic charge and current distributions.

CO 3 Comprehend VHF, UHF, Microwave antennas and their Design.

CO 4 Design array antenna systems from specifications.

CO 5 Comprehend various modes of radio wave propagation.

UNIT-I (15 Lectures)

ANTENNA BASICS:

Introduction, Radiation Mechanism, Antenna Parameters-Radiation Patterns, Patterns in Principle Planes, Main Lobe and Side Lobes, Beam widths, Beam Area, Radiation Intensity, Beam Efficiency, Directivity, Gain and Resolution, Antenna Apertures, Aperture Efficiency, Effective Height, Antenna Theorems- Applicability and Proofs for equivalence of directional characteristics.

RADIATION FROM WIRES:

Retarded Potentials, Small Electric Dipole, Quarter wave Monopole and Half wave Dipole Radiation characteristics

UNIT-II (10 Lectures)

ANTENNA ARRAYS:

Two element array, Principle of Pattern Multiplication, N element

Uniform Linear Arrays - Broadside, End fire Arrays, EFA with Increased directivity, Binomial Arrays, Methods of Array synthesis-Tchebyscheff Distribution and Fourier Transform Method.

UNIT-III (9 Lectures)

HF, VHF AND UHF ANTENNAS:

Traveling wave radiators –basic concepts, Long wire antennas-field strength calculations and patterns, V-antennas, Rhombic Antennas and Design Relations, Small Loop antennas- Concept of short magnetic dipole, Helical Antennas, Yagi-Uda Arrays, Log periodic antennas.

UNIT-IV (11 Lectures)

MICROWAVE ANTENNAS:

Reflector Antennas: Flat Sheet and Corner Reflectors, Paraboloidal Reflectors, Cassegrain Feeds.

Slot antennas-Babinet's principle, Microstrip antennas, Horn antennas, Lens antennas (Qualitative treatment only)

ANTENNA MEASUREMENT THEORY:

Antenna Measurements-Patterns Required, Set Up, Distance Criterion, Directivity and Gain Measurements (Comparison, Absolute and 3 Antenna Methods).

UNIT-V (15 Lectures)

WAVE PROPAGATION:

Concepts of Propagation- frequency ranges and types of propagations. Ground Wave propagation - characteristics, Parameters, Wave Tilt, Flat and Spherical Earth Considerations, Sky Wave Propagation-Formation of Ionospheric Layers and their characteristics, Mechanism of Reflection and Refraction, Critical Frequency, MUF & Skip Distance Calculations for flat and spherical earth cases, Optimum Frequency, Virtual Height, Ionospheric Abnormalities, Ionospheric Absorption, Fundamental Equation for Free-Space Propagation, Basic Transmission Loss Calculations, Space Wave Propagation - Mechanism, LOS and Radio Horizon, Tropospheric Wave Propagation-Radius of Curvature of path, Effective Earth's Radius, Effect of

Earth's Curvature, Field Strength Calculations, M-Curves and Duct Propagation, Tropospheric Scattering.

TEXT BOOKS:

1. G.S.N Raju, *"Antennas and Wave Propagation"*, 1st Edition Pearson Education, 2004.
2. K.D.Prasad, Satya Prakashan, *"Antennas and Wave Propagation",* Tech Publications, 3rd Edition, 2001.

REFERENCES:

1. C.A. Balanis, *"Antenna Theory"*, 3rd Edition, John Wiley & Sons, 2012.
2. E. C. Jordan and K. G. Balmain, *"Electromagnetic Waves and Radiating Systems"*, PHI, 2nd edition, 2000.
3. John D. Kraus and Ronald J. Marhefka, *"Antennas and Wave propagation",* TMH, 4rd Edition, 2010.

VLSI DESIGN

(Common to ECE and EEE)

Course Code: 13EC1117

L	T	P	C
4	0	0	3

Pre requisites: Electronics Devices and Circuits, Switching Theory and Logic Design.

Course Outcomes:

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

CO 1 Distinguish different IC technologies and basic electrical properties of MOS, CMOS and Bi-CMOS circuits.

CO 2 Draw stick diagrams, layout diagrams for logic gates and understand different scaling models.

CO 3 Design subsystem consisting of Combinational and sequential circuits

CO 4 Comprehend CPLD, FPGA architecture and standard cells.

CO 5 Comprehend tools for design and verification.

UNIT-I **(15 Lectures)**

INTRODUCTION TO MOS TECHNOLOGIES:

VLSI Design Flow, Introduction to IC Technology–MOS, PMOS, NMOS, CMOS & Bi-CMOS technologies.

BASIC ELECTRICAL PROPERTIES:

Basic Electrical Properties of MOS and Bi-CMOS Circuits: I_{ds}-V_{ds} relationships, MOS transistor threshold Voltage, g_m, g_{ds}, figure of merit, Pass transistor, NMOS Inverter, Various pull ups, CMOS Inverter analysis and design, Bi-CMOS Inverters.

UNIT-II (12 Lectures)

VLSI CIRCUIT DESIGN PROCESSES:

MOS Layers, Stick Diagrams, Design Rules and Layout, CMOS Design rules for wires, Contacts and Transistors, Layout Diagrams for NMOS and CMOS Inverters and Gates, Scaling of MOS circuits, Limitations of Scaling.

UNIT-III (14 Lectures)

GATE LEVEL DESIGN:

Transmission Gates, Alternate gate circuits, Basic circuit concepts: Sheet Resistance R_S and its concept to MOS, Area Capacitance Units, Calculations, Delays, Driving large Capacitive Loads, Wiring Capacitances, Fan-in and fan-out, Choice of layers.

SUBSYSTEM DESIGN:

Shifters, Adders, ALUs, Multipliers, Parity generators, Comparators, Zero/One Detectors, High Density Memory Elements.

UNIT-IV (9 Lectures)

SEMICONDUCTOR INTEGRATED CIRCUIT DESIGN:

FPGAs (Xilinx 4000series), CPLDs (Xilinx 9500series), Standard Cells, Design Approach.

UNIT-V (10 Lectures)

DESIGN METHODS AND TESTING:

Design methods, Design capture tools, Design Verification Tools, CMOS Testing, Need for testing, Test Principles, Design Strategies for test, Chip level Test Techniques, System-level Test Techniques, Layout Design for Improved Testability.

TEXT BOOKS:

1. Kamran Eshraghian, Eshraghian Dougles and A.Pucknell, *"Essentials of VLSI circuits and systems"*, 3rd Edn, PHI, 2005.
2. Weste and Eshraghian, *"Principles of CMOS VLSI Design"*, Pearson Education, 3rd edn 1999.

REFERENCES:

1. John .P. Uyemura, *"Introduction to VLSI Circuits and Systems"*, John Wiley, 1st Edition. 2009.
2. Sabastian smith, *"Application Specific Integrated Circuits"*, Addison Wesley Publishing Company Incorporated, 2008
3 John F.Wakerly, *"Digital Design Principles & Practices"*, PHI/ Pearson Education Asia, 3rd Edition, 2005.
4. John M. Rabaey, *"Digital Integrated Circuits"*, PHI, EEE, 2*nd* Edition 2003.
5. Wayne Wolf, *"Modern VLSI Design"*, Pearson Education, 3rd Edition, 2008.
6. Behzad Razavi, *"Design of Analog CMOS Integrated Circuits"*, The McGraw Hill, 2001.

DIGITAL COMMUNICATION LAB

Course Code: 13EC1118

L	T	P	C
0	0	3	2

Prerequisites: Digital Communications Theory

Course Outcomes:

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

CO 1 Demonstrate PAM, PWM and PPM.

CO 2 Comprehend the operation of Sampling theorem.

CO 3 Design Pulse Code Modulation and Delta Modulations Schemes.

CO 4 Design ASK, FSK, PSK and DPSK Modulation techniques.

CO 5 Design TDM scheme.

LIST OF EXPERIMENTS:

1. Pulse Amplitude Modulation and Demodulation
2. Pulse Width Modulation and Demodulation
3. Pulse Position Modulation and Demodulation
4. Sampling Theorem
5. Time Division Multiplexing
6. Pulse Code Modulation
7. Delta Modulation
8. Amplitude Shift Keying
9. Frequency Shift Keying
10. Phase Shift Keying
11. Differential Phase Shift Keying
12. Simulation of Pulse Modulation

13. Simulation of Passband modulation Techniques
14. Simulation of Multiplexing Techniques

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

VLSI DESIGN LAB

Course Code: 13EC1119

L	T	P	C
0	0	3	2

Pre requisites:

Digital IC Applications, VLSI Design

Course Outcomes:

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

CO 1 Verify functionality of digital circuits using ICs

CO 2 Outline the concepts of XILINX -ISE Tool

CO 3 Design and verify combinational and sequential circuits using VHDL.

CO 4 Interpret delay and area calculations of digital circuits

CO 5 Develop digital design on FPGA.

LIST OF EXPERIMENTS:

CYCLE-1 (HARDWARE LAB)

1. Design of Combinational circuits
2. Design of 4 to 16 Decoder using 74X138 ICs
3. Design of 8-Bit Comparator using 74X85 ICs
4. Realization of Flip-flops
5. Serial in parallel out Shift Register
6. Decade Counter
7. Design of 16:1 MUX

CYCLE-2(USING XILINX SOFTWARE)

1 4 to 16 Decoder

2 8-Bit Comparator

3 16X 1 Multiplexer

4 Serial in parallel out Shift Register

5 Decade Counter

6 Universal Shift Register

7 Arithmetic & Logic Unit

Note: Any TEN of the above experiments are to be conducted.

INTELLECTUAL PROPERTY RIGHTS AND PATENTS

(Common to all Branches)

Course Code: 13NM1103

L	T	P	C
2	0	0	0

Course Outcomes:

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

CO 1 Examine the legal principles relating to IPR

CO 2 Identify the various policies and procedures related to trademarks.

CO 3 Summarise the principles and subject matter of the copyright law.

CO 4 Outline the various policies and procedures related to patents.

CO 5 Apply transactional law for creating wealth and managing risk.

UNIT-I **(7 Lectures)**

Introduction to intellectual property Act and Law-the evolutionary past-the IPR tool kit- legal tasks in intellectual property law-ethical obligations in Para legal tasks in intellectual property law

UNIT-II **(8 Lectures)**

Introduction to trade mark – Trade mark registration process-Post registration procedures-Trade mark maintenance – transfer of rights-inter party's proceeding – Infringement-Dilution ownership of trade mark-likelihood of confusion – trademark claims- trademark litigations

UNIT-III **(6 Lectures)**

Introduction to copy rights- principles of copyright – subjects matter of copy right- rights afforded by copyright law- copyright ownership-

transfer and duration – right to prepare derivative works- right of distribution- right to perform the work publicity- copyright formalities and registrations

UNIT-IV **(7 Lectures)**

Introduction to patent law- Rights and limitations- Rights under patent law- patent requirements- ownership – transfer- patent application process- patent infringement- patent litigation

UNIT-V **(6 Lectures)**

Introduction to transactional law- creating wealth and managing risk – employment relationship in the Internet and technologic cal sector-contact for internet and technological sector

TEXT BOOKS:

1 Kompal Bansal and Praishit Bansal, "Fundamentals of IPR for Engineers", 1st Edition, BS Publications, 2012.

2 Prabhuddha Ganguli, *"Intellectual Property Rights"*, 1st Edition, TMH, 2012.

REFERENCES:

1 R Radha Krishnan & S Balasubramanian, *"Intellectual Property Rights"*, 1st Edition, Excel Books, 2012.

2 M Ashok Kumar & mohd Iqbal Ali, *"Intellectual Property Rights"*, 2nd Edition, Serial publications, 2011.

SYLLABI FOR VI SEMESTER

MANAGEMENT SCIENCE

(Common to Chemical, CSE, IT, ECE, EEE)

Course Code: 13HM1102

L	T	P	C
4	0	0	3

Course Outcomes :

At the end of the course a student should be able to

CO 1 Develop an understanding of the principles of management and organisation structures and identify the steps involved in decision making process.

CO 2 List out the factors influencing plant location and layout and apply the techniques of quality control and inventory management.

CO 3 Describe the functions of HR management and identify the different leadership styles. Outline the measures to motivate the people in an organization.

CO 4 Identify suitable target market segments and plan effective marketing strategies.

CO 5 Apply the concept to plan a schedule of project and to review with techniques of PERT and CPM.

UNIT-I **(16 Lectures)**

INTRODUCTION TO MANAGEMENT:

Concept-nature and importance of management- functions of management- evolution of management thought- decision making process- designing organization structure- principles of organization – types of organization structure

UNIT-II **(12 Lectures)**

OPERATIONS MANAGEMENT:

Principles and types of plant layout- work study- statistical quality control- control charts(R Chart, P Chart & C Chart- Simple numerical

problems) – materials management- Need for Inventory Control-EOQ, ABC Analysis(Simple numerical Analysis)- Types of Inventory Analysis(HML, SDE, VED, FSN Analysis)

UNIT-III (10 Lectures)

HUMAN RESOURCE MANAGEMENT:

Concept of HRM, HRD and PMIR- Functions of HR Manager-theories of motivation and leadership styles- Job Evaluation and Merit Rating, Welfare measures-statutory and non statutory compliance – grievance handling

UNIT-IV (12 Lectures)

MARKETING MANAGEMENT:

Marketing Management- Functions of Marketing Management-Marketing mix-Market segmentation - Marketing strategies based on product life cycle- Channels of Distribution- Consumer Behavior and marketing research

UNIT-V (14 Lectures)

PROJECT MANAGEMENT:

Project planning and control- Project life cycle- Development of network- Difference between PERT and CPM- Identifying critical path- probability of completing the project within the given time, cost analysis, - project crashing(simple numerical problems)

TEXT BOOKS :

1 Ramanujam Naidu & Sastry, *"Management Science"*, 1st Himalaya Publisher, 2012.

2 Vijaya Kumar & Appa Rao, *"Management Science"*, 1st Cengage Publishers, 2012.

3 AR Aryasri, *"Management Science"*, 4th Edition, Tata McGraw-Hill, 2009.

REFERENCES :

1 O P Khanna, *"Industrial Engineering & Management"*, 2nd Edition, Dhanpat Rai, 2004.

2 Martand Telsang, *"Industrial Engineering & Production Management"*, 2nd Edition, S. Chand & Company, 2008.

ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

Course Code:13EC1120

L	T	P	C
4	1	0	3

Course Outcomes:

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

CO 1 Comprehend concepts and performance characteristics of instruments.

CO 2 Illustrate the functional blocks of CRO.

CO 3 Compare various types of wave analyzers and analyze Digital meters.

CO 4 Design different types of bridge circuits to measure unknown components of R, L, C and Quality factor.

CO 5 Analyze various measuring techniques to measure non-electrical quantities such as pressure, force, temperature, displacement, speed and humidity.

UNIT-I (14 Lectures)

MEASUREMENT SYSTEMS:

Performance characteristics of instruments, Static characteristics, Accuracy, Resolution, Precision, Expected value, Error, Sensitivity. Errors in Measurement, Dynamic Characteristics-speed of response, Fidelity, Lag and Dynamic error, DC Voltmeters, Ammeters- Multi-range, Range extension, AC voltmeters-multi-range, range extension-shunt. Thermocouple type RF ammeter, Ohm meters series type, shunt type, Voltage, Current, Resistance measurement using DMM, Auto zeroing, Auto ranging.

UNIT-II (12 Lectures)

CATHODE RAY OSCILLOSCOPE:

Oscilloscopes CRT features, vertical amplifiers, horizontal deflection

system, sweep, trigger pulse, delay line, sync selector circuits, simple CRO, triggered sweep CRO, Dual beam CRO. Dual trace oscilloscope, sampling oscilloscope, storage oscilloscope, digital readout oscilloscope, digital storage oscilloscope, Lissajous method of phase measurement, standard specifications of CRO, probes for CRO-Active & Passive, attenuator types.

UNIT-III (12 Lectures)

TIME AND FREQUENCY MEASUREMENTS:

Phase and Magnitude Measurement at high frequency using vector voltmeter, Frequency, Time and Period measurements.

ANALYZERS:

Wave Analyzers, Harmonic Distortion Analyzers, Spectrum Analyzer - FFT analyzer, Logic analyzer, Digital signal analyzer, Digital Fourier analyzer.

UNIT-IV (10 Lectures)

BRIDGES:

DC Bridges- Wheatstone bridge, Kelvin's bridge, AC Bridges Measurement of inductance- Maxwell's bridge, Anderson bridge, Measurement of capacitance -Schering Bridge, Wien Bridge, Errors and precautions in using bridges. LCR-Q meter - principle of digital LCR-Q meter, specifications & applications.

UNIT-V (12 Lectures)

TRANSDUCERS:

Transducers- active & passive transducers : Resistance, Capacitance, inductance; Strain gauges, LVDT, Piezoelectric transducers, Acoustic Transducers, Resistance Thermometers, Thermocouples, Measurement of physical parameters: force, humidity, speed.

TEXT BOOKS:

1. H.S.Kalsi, *"Electronic instrumentation"*, 3rd Edition - Tata McGraw Hill, 2010.
2. A.D. Helfrick and W.D. Cooper, *"Modern Electronic Instrumentation and Measurement Techniques"*, PHI, 5th Edition, 2002.

REFERENCES:

1 David A. Bell, *"Electronic Instrumentation & Measurements"* - PHI, 2nd Edition, 2003.

2. Robert A. Witte, *"Electronic Test Instruments, Analog and Digital Measurements"*, Pearson Education, 2nd Ed., 2004.

3. K. Lal Kishore, *"Electronic Measurements & Instrumentations"*, Pearson Education - 1st Edn, 2005.

MICROWAVE ENGINEERING

Course Code:13EC1121

L	T	P	C
4	0	0	3

Pre requisites: Electromagnetic Field Waves and Transmission lines.

Course Educational Objectives:

To familiarize concepts Microwave components, terminology, tubes &Solid state Microwave Devices

Course Outcomes:

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

CO 1 Apply electromagnetic field theory to Rectangular and Circular waveguides.

CO 2 Design different waveguide components, Couplers and phase shifters.

CO 3 Comprehend the design aspects of O-type tubes and M-type tubes and its characteristics.

CO 4 Analyze basic principles and operation of Microwave solid state devices.

CO 5 Infer various microwave parameter measurement.

UNIT-I **(12 Lectures)**

WAVEGUIDES:

Introduction, Microwave Spectrum and Bands, Applications of Microwaves, Guided waves-parallel plane, TE, TM, TEM modes, Rectangular Waveguides, Circular Waveguides, Cavity resonators.

UNIT-II **(12 Lectures)**

MICROWAVE COMPONENTS:

Coupling Mechanisms – Probe, Loop, Aperture types, joints, bends, corners, transitions, twists, irises, Tuning Screws and Posts, Matched Loads, Attenuators and phase shifters.

MICROWAVE JUNCTIONS:

Multiport Junctions – E plane and H plane Tees, Magic Tee, Hybrid Ring; Directional Couplers, Faraday Rotation, Ferrite Devices – Gyrator, Isolator, Circulator, Scattering Matrix, S Matrix Calculations for Multi-port Junctions.

UNIT-III (15 Lectures)

MICROWAVE TUBES:

High frequency limitations of conventional tubes, Reentrant cavities, Klystrons, velocity modulation process, bunching process, output power and beam loading. Multicavity Klystron amplifiers. Applications. Reflex Klystron: Velocity modulation, power output and efficiency, electronic admittance, mode patterns. Slow wave structures, Traveling wave tube, amplification process, wave modes, gain considerations. Principle of operation, Magnetron - types, principle of operation of cylindrical magnetron, cavity magnetron, theory of oscillations, Hartee resonance condition: Pi-mode separation, Backward wave crossed field amplifier.

UNIT-IV (10 Lectures)

MICROWAVE SOLID STATE DEVICES:

Introduction, Classification, Applications, Varactor Diodes, Parametric Amplifiers, PIN Diode, Tunnel Diode –Principle, Characteristics, Applications. TEDs – Introduction, Gunn Diode – Principle, Characteristics, Basic Modes of Operation, Oscillation Modes. Avalanche Transit Time Devices – Introduction, IMPATT and TRAPATT Diodes – Principle of Operation and Characteristics.

UNIT-V (12 Lectures)

MICROWAVE MEASUREMENTS:

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

TEXT BOOKS:

1. Samuel Y. Liao, *"Microwave Devices and Circuits"*, PHI, 3rd Edition, 1996.
2. Peter A. Rizzi, *"Microwave Engineering Passive Circuits"*, PHI, 1999.

REFERENCES:

1. R.E. Collin, *"Foundations for Microwave Engineering"*, IEEE Press, John Wiley, 2nd Edition, 2002.
2. M.Kulkarni, *"Micro Wave and Radar Engineering"*, Umesh Publications, 3rdEdn.,2003
3. Annapurna Das and Sisir K Das, *"Microwave Engineering"*, TMH, 2nd ed., 2008.
4. M.L. Sisodia and G.S.Raghuvanshi, *"Microwave Circuits and Passive Devices"*, Wiley Eastern Ltd., New Age International Publishers Ltd., 1995.

DIGITAL SIGNAL PROCESSING

Course Code: 13EC1122

L	T	P	C
4	1	0	3

Pre requisites: Signals and Systems

Course Outcomes:

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

CO 1 Comprehend the representation of discrete time signals and systems.

CO 2 Describe the basic principles of digital signal processing.

CO 3 Comprehend the Fourier transform for Signal Processing

CO 4 Design and Analyze the Frequency response of FIR and IIR filters.

CO 5 Comprehend the concept of Multirate DSP and applications of DSP.

UNIT-I (12 Lectures)

INTRODUCTION:

Introduction to Digital Signal Processing, Reviewof discrete-time signals and systems, analysis of discrete-time linear time invariant systems, Frequency domain representation of discrete time signals and systems.

DISCRETE CONVOLUTION:

Introduction, Impulse Response and Convolution Sum, Convolution of Infinite sequences, Circular shift and Circular Symmetry, Periodic and Circular Convolution, Methods of obtaining Circular Convolution.

UNIT-II (12 Lectures)

DISCRETE FOURIER SERIES AND DISCRETE TIME FOURIER TRANSFORM:

Introduction, Discrete Fourier Series, Properties of DFS, Introduction

to Discrete time Fourier transform, Inverse DTFT, Properties of DTFT, Relation between Z-Transform and DTFT, Frequency Response of Discrete Time Systems, Transfer Functions.

UNIT-III (14 Lectures)

DISCRETE FOURIER TRANSFORM:

Introduction, Discrete Fourier Transform, Inverse DFT, Properties of DFT, Linear Convolution and Circular Convolution using DFT.

FAST FOURIER TRANSFORM:

Introduction, Fast Fourier Transform, Radix-2 Decimation in time FFT, Radix-2 Decimation in frequency FFT, Inverse FFT.

UNIT-IV (15 Lectures)

DESIGN OF DIGITAL FILTERS:

IIR FILTERS: Introduction, Analog filter approximations – Butterworth and Chebyshev, Design of IIR Digital filters from analog filters by Impulse invariant and bilinear transformation methods, Frequency transformations, Basic structures of IIR Filters.

FIR FILTERS: Introduction, Characteristics of FIR filters with linear phase, Frequency response of linear phase FIR filters, Design of FIR filters using windows (Rectangular, Triangular, Raised Cosine, Hanning, Hamming, Blackman and Kaiser), Comparison of IIR & FIR filters,Basic structures of FIR Filters.

UNIT-V (12 Lectures)

MULTIRATE DIGITAL SIGNAL PROCESSING:

Decimation, interpolation, sampling rate conversion, Implementation of sampling rate conversion.

APPLICATIONS OF DSP: Voice Synthesizers, Vocoders, Image Processing (Qualitative Treatment Only), Radar Signal Processing.

TEXT BOOKS:

1. John G.Proakis, Dimitris G.Manolakis, *"Digital Signal Processing, Principles, Algorithms and Applications"*, Pearson Education / PHI, 4th Edition, 2013.

2. A.V.Oppenheim and R.W.Schaffer, *"Discrete – Time Signal Processing"*, PHI, 4th Edition, 2007

REFERENCES:

1. S.K.Mitra, *"Digital Signal Processing – A practical approach"*, Pearson Education, New Delhi, 2003.
2. M.H.Hayes, *"Digital signal processing: Schaum's Outlines"*, Tata Mc-Graw Hill, 2nd Edition, 2009
3. Robert J.Schilling, Sandra L.Harris, *"Fundamentals of Digital Signal Processing using Matlab"*, Thomson, 2007.
4. Ramesh Babu, *"Digital Signal Processing"*, SCITECH Publications, 4th Edition, 2009.
5. A.Anandkumar, *"Digital Signal Processing"*, PHI, Eastern Economy Edition, 2013.

INFORMATION THEORY AND CODING
(ELECTIVE-I)

Course Code: 13EC1123

L	T	P	C
4	0	0	3

Pre requisites:

Probability Theory, Digital Communications

Course Outcomes:

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

CO 1 Illustrate the channel performance using Information theory.

CO 2 Comprehend various error control code properties.

CO 3 Describe linear block codes for error detection and correction.

CO 4 Comprehend convolution codes and cyclic codes for error detection and correction

CO 5 Design BCH & RS codes for Channel performance improvement.

UNIT-I **(12 Lectures)**

INFORMATION THEORY:

Entropy, Information rate, source coding: Shannon-Fano and Huffman coding techniques, Mutual Information, Channel capacity of Discrete Channel, Shannon- Hartley law, Trade-off between bandwidth and SNR.

UNIT-II **(14 Lectures)**

ERROR CONTROL CODES:

Examples of the use of error control codes, basic notions, coding gain, Characterization of Error control codes performance of error control codes, comparison of uncoded and coded systems.

UNIT-III (12 Lectures)

LINEAR BLOCK CODES:

Linear block codes and their properties, standard arrays, syndromes, weight distribution. Error detection/correction properties, modified linear block codes.

UNIT-IV (12 Lectures)

CONVOLUTION CODES:

Convolution encoders, structural properties of convolution codes, trellis diagrams, viterbi algorithm, and performance analysis.

CYCLIC CODES:

General theory, Shift Register Implementations, Shortened Cyclic codes, CRCs for Error Detection.

UNIT-V (12 Lectures)

BCH AND RS CODES:

Algebraic Description, Frequency Domain Description, Decoding Algorithms for BCH and RS Codes.

TEXT BOOKS:

1. Stephen B.Wicker, *"Error Control Systems for Digital Communication and Storage"*, Prentice Hall, 1995.
2. Kennedy, "Electronic Communication systems", Mc Graw Hill, 4th Edition., 1999.

REFERENCES:

1. John Proakis, *"Digital Communications"*, TMH, 5th Edition 2008.
2. Simon Haykin, *"Communication System"*, Wiley, 2008.

DATA STRUCTURES

(Common to CSE, IT, ECE & EEE)

Course Code : 13CT1106

L	T	P	C
4	0	0	3

Course Outcomes:

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

CO 1 Analyse complexity of algorithms.

CO 2 Apply concepts of linked lists, stacks and queues.

CO 3 Develop programs for searching and sorting.

CO 4 Develop programs using concepts of trees.

CO 5 Apply concepts of graphs

UNIT-I **(12 Lectures)**

ANALYSIS OF ALGORITHMS:

Efficiency of algorithms, apriori analysis, asymptotic notations, time complexity of an algorithm using O notation, polynomial Vs exponential algorithms, average, best and worst case complexities, analyzing recursive programs.

STACKS: Introduction, stack operations, applications.

QUEUES: Introduction, Operations on queues, circular queues, other types of queues, applications.

UNIT-II **(12 Lectures)**

LINKED LISTS:

Introduction, Singly linked lists, circularly linked lists, doubly linked lists, multiple linked lists, applications.

LINKED STACKS AND LINKED QUEUES:

Introduction, operations on linked stacks and linked queues, dynamic

memory management and linked stacks, implementation of linked representations, applications.

UNIT-III (12 Lectures)

SEARCHING:

Introduction, linear search, transpose sequential search, interpolation search, binary search, Fibonacci search.

INTERNAL SORTING:

Introduction, bubble sort, insertion sort, selection sort, merge sort, quick sort.

UNIT-IV (12 Lectures)

TREES AND BINARY TREES:

Introduction, Trees: definition and basic terminologies, representation of trees, binary trees: basic terminologies and types, representation of binary trees, binary tree traversals, threaded binary trees, applications.

BINARY SEARCH TREES AND AVL TREES:

Introduction, binary search trees: definition and operations, AVL Trees: definition and operations, applications.

UNIT-V (12 Lectures)

GRAPHS:

Introduction, definitions and basic terminologies, representations of graphs, graph traversals and applications.

TEXT BOOKS:

1. G A V PAI, *Data Structures and Algorithms, Concepts, Techniques and Applications*, Volume 1, 1st Edition, Tata McGraw-Hill, 2008.
2. Richard F. Gilberg & Behrouz A. Forouzan, *Data Structures, A Pseudo code Approach with C*, 2nd Edition, Cengage Learning India Edition, 2007.

REFERENCES:

1. Langsam ,M. J. Augenstein, A. M. Tanenbaum, *Data structures using C and C++*, 2nd Edition, PHI Education,2008.
2. Sartaj Sahni, Ellis Horowitz ,*Fundamentals of Data Structures in C*, 2nd Edition, Orient blackswan , 2010.

WEB REFERENCES:

http://nptel.iitm.ac.in/video.php?subjectId=106105085

MICROCONTROLLERS AND APPLICATIONS
(ELECTIVE-I)

Course Code: 13EC1124

L	T	P	C
4	0	0	3

Prerequisites:

Requires pre-knowledge of switching theory and logic design, microprocessors and interfacing

Course Outcomes:

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

CO 1 Comprehend the architecture of 8051microcontrollers.

CO 2 Comprehend real time control interrupts & timers.

CO 3 Design interface for peripherals and high power devices.

CO 4 Analyze real time operating system for MCUs & MCU based industrial applications.

CO 5 Comprehend the architecture of 16-bit (8096/80196) & ARM microcontrollers.

UNIT-I **(14 Lectures)**

8051 FAMILY MICROCONTROLLERS INSTRUCTION SET:

Architecture of 8051microcontroller-internal and external memories, Basic assembly language programming – Data transfer instructions –Data and Bit manipulation instructions – Arithmetic instructions – Instructions for Logical operations on the Bytes among the Registers, Internal RAM, and SFRs – Program flow control instructions – Interrupt control flow

UNIT-II **(12 Lectures)**

REAL TIME CONTROL: INTERRUPTS:

Interrupt handling structure of an MCU – Interrupt Latency and

Interrupt deadline – Multiple sources of the interrupts – Non-maskable interrupt sources – Enabling or Disabling of the sources – Polling to determine the Interrupt source and assignment of the priorities among them –Interrupt structure in Intel 8051.

REAL TIME CONTROL: TIMERS:

Programmable Timers in the MCUs – Free running counter and real timecontrol – Interrupt interval and density constraints.

UNIT-III (12 Lectures)

SYSTEMS DESIGN:

Synchronous serial-cum-asynchronous serial communication – ADC Circuit Interfacing – DAC Circuit Interfacing – stepper motor - Digital and Analog Interfacing Methods, Switch, Keypad and Keyboard interfacings – LED and Array of LEDs – LCD interface – Programmable instruments interface using IEEE 488 Bus – Interfacing with the Flash Memory – Interfaces –Interfacing to High Power Devices – Analog input interfacing – Analog output interfacing.

UNIT-IV (10 Lectures)

REAL TIME OPERATING SYSTEM FOR MICRO CONTROLLERS:

Real Time operating system – RTOS of Keil (RTX51) – Use of RTOS in Design – Software development tools for Microcontrollers.

Microcontroller Based Industrial Applications

Optical motor shaft encoders – Industrial control – Industrial process control system – Prototype MCU based Measuring instruments

UNIT-V (12 Lectures)

16/32 - BIT MICROCONTROLLERS:

8096/80196 Family: Hardware – Memory map in Intel 80196 family MCU system – I/O ports – Programmable Timers and High-speed outputs and input captures – Interrupts

ARM 32 Bit MCUs: Introduction to 16/32 Bit processors – ARM architecture and organization – ARM / Thumb programming model – ARM / Thumb instruction set

TEXT BOOKS:

1. Raj Kamal, *"Microcontrollers Architecture, Programming, Interfacing and System Design"*, 2nd Edition, Pearson Education, 2005.
2. Mazidi and Mazidi, *"The 8051 Microcontroller and EmbeddedSystems"*, 4*th* Impression, PHI, 2000.

REFERENCES:

1. Kenneth J. Ayala, *"The 8051 Microcontroller"*, 3rd Edition, Cengage Learning, 2007.
2. A.V. Deshmukh, *"Microcontrollers (Theory & Applications)"*, 6th Reprint, TMH, 2007.
3. John B. Peatman, *"Design with PIC Microcontrollers"*, 2nd Edition, Pearson Education, 2005.

DIGITAL IC DESIGN
(ELECTIVE-II)

Course Code: 13EC1125

L	T	P	C
4	0	0	3

Pre requisites: VLSI Technology, logic design.

Course Outcomes:

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

CO 1 Analyze the depth of designing a Digital IC and use the concept of logical effort for transistor sizing.

CO 2 Design SPICE models of CMOS circuits.

CO 3 Able to make tradeoff between various design entities.

CO 4 Distinguish Static CMOS design and Dynamic CMOS design.

CO 5 Design Logic gates, Flip-flops, Adders, Registers and RAM etc.

UNIT-I **(8 Lectures)**

INTRODUCTION:

Historical Perspective, Issues in Digital Integrated Circuit Design, Quality Metrics of a Digital Design: Cost of an Integrated Circuit, Functionality and Robustness, Performance, Power and Energy Consumption.

UNIT-II **(12 Lectures)**

MOS TRANSISTOR:

The MOS Transistor under Static Conditions, Dynamic Behavior, The Actual MOS Transistor—Some Secondary Effects, SPICE Models for the MOS Transistor, Method of Logical Effort for transistor sizing.

WIRE:

Introduction, A First Glance, Interconnect Parameters - Capacitance, Resistance, and Inductance, Electrical wire models, SPICE wire models.

UNIT-III (11 Lectures)

THE CMOS INVERTER:

Introduction, The Static CMOS Inverter — An Intuitive Perspective, Evaluating the Robustness of the CMOS Inverter: The Static Behavior, Switching Threshold, Noise Margins, Robustness Revisited, Performance of CMOS Inverter: The Dynamic Behavior, Computing the Capacitances, Propagation Delay: First-Order Analysis, Propagation Delay from a Design Perspective, Power, Energy, and Energy-Delay: Dynamic Power Consumption, Static Consumption, Perspective: Technology Scaling and its Impact on the Inverter Metrics.

UNIT-IV (12 Lectures)

DESIGNING COMBINATIONAL LOGIC GATES IN CMOS:

Introduction, Static CMOS Design: Complementary CMOS, Ratioed Logic, Pass-Transistor Logic, Dynamic CMOS Design: Dynamic Logic- Basic Principles, Speed and Power Dissipation of Dynamic Logic, Issues in Dynamic Design, Cascading Dynamic Gates, Perspectives: How to Choose a Logic Style, Designing Logic for Reduced Supply Voltages

UNIT-V (17 Lectures)

DESIGNING SEQUENTIAL LOGIC CIRCUITS:

Introduction, Timing Metrics for Sequential Circuits, Classification of Memory Elements, Static Latches and Registers: The Bistability Principle, Multiplexer-Based Latches Master-Slave Edge-Triggered Register, Low-Voltage Static Latches, Static SR Flip-Flops—Writing Data by Pure Force, Dynamic Latches and Registers: Dynamic Transmission-Gate Edge-triggered Registers ,C^2MOS—A Clock-Skew Insensitive Approach, True Single-Phase Clocked Register (TSPCR).Pipelining: An approach to optimize sequential circuits, Latch- vs. Register-Based Pipelines, NOR - CMOS - A Logic Style for Pipelined Structures, Non-Bistable Sequential Circuits: The Schmitt

Trigger, Monostable Sequential Circuits, Astable Circuits, Perspective: Choosing a Clocking Strategy.

TEXT BOOKS:

1. Jan M. Rabaey, Anantha Chandrakasan, Borivoje Nikolic, *"Digital Integrated Circuits – A design perspective"*, 2nd Edition, PHI, 2003
2. S. M. Kang & Y. Leblebici, *"CMOS Digital Integrated Circuits"*, 3rd Edition, McGraw Hill, 2003.

REFERENCES:

1. Jackson & Hodges, *"Analysis and Design of Digital Integrated circuits"*, 3rd Edition, TMH Publication, 2005.
2. Ken Martin, *"Digital Integrated Circuit Design"*, Oxford Publications, 2001.
3. Sedra and Smith, *"Microelectronic Circuits"*, 5th Edition, Oxford Publications, 2005.

OBJECT ORIENTED PROGRAMMING THROUGH JAVA

(Common to CSE, IT & ECE)

Course Code :13CT1111

L	T	P	C
4	0	0	3

Course Outcomes:

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

CO 1 Discuss about evolution of JAVA.

CO 2 Develop programs using String handling functions.

CO 3 Apply exception handling and multithreading.

CO 4 Design GUI based applications.

CO 5 Integrate event handling in GUI applications.

UNIT-I (12 Lectures)

FUNDAMENTALS OF OBJECT-ORIENTED PROGRAMMING:

Introduction, Object-Oriented Paradigm, Basic concepts of Object-Oriented Programming, Benefits of Object-Oriented Programming, Applications of Object-Oriented Programming

THE HISTORY AND EVOLUTION OF JAVA:

Creation of Java, Java's Bytecode, Java buzzwords, evolution of Java. An overview of Java-Simple Java Program. Date types, variables, automatic type conversion, Arrays, operators,expressions, control statements.

UNIT-II (12 Lectures)

INTRODUCING CLASSES:

Class fundamentals, declaring objects, assigning object reference variables, introducing methods- overloading methods,argument passing,recursion, access control,static keyword, final keyword, using command line arguments, variable length arguments.

Constructors, this keyword, garbage collection, finalize() method.

STRING HANDLING:

String class, String Buffer class, StringBuilder class.

INHERITANCE:

Inheritance basics, using super, creating a multilevel hierarchy, how constructors are called, Method overriding, dynamic method dispatch, using abstract classes, using final with inheritance, the Object class.

UNIT-III (14 Lectures)

PACKAGES AND INTERFACES: Packages, access protection, importing packages, interfaces.

Exploring java.lang package: Wrapper classes, Math class.

Exploring java.util package: Vector, Scanner, Date, Calendar, StringTokenizer, Random.

Exploring java.io package: Byte streams, Character streams, File, Random Access File.

EXCEPTION HANDLING:

Exception-handling fundamentals, Exception types, uncaught exceptions, using try and catch, multiple catch clauses, nested try statements, throw, throws, finally, Java's built-in exceptions, creating your exception subclasses, using exceptions.

MULTITHREADING:

Java thread model, Main thread, creating a thread, creating multiple threads, using is Alive() and join(), thread priorities, synchronization, Interthread communication, suspending, resuming and stopping threads, using multithreading.

UNIT-IV (12 Lectures)

APPLETS:

Applet basics, architecture, skeleton, simple applet display methods, repainting, status window, HTML applet tag, passing parameters to applets.

AWT:

AWT classes, window fundamentals, working with frame windows, creating a frame window in an applet, creating a windowed program, displaying information within a window, working with graphics, working with color, working with fonts, AWT control fundamentals, Labels, using buttons, applying checkboxes, checkboxgroup, choice controls, using lists, scrollbars, textfield, text area, using layout managers, Menu bars and menus, dialog boxes.

UNIT-V (10 Lectures)

EVENT HANDLING:

Two event handling mechanisms, delegation event model, event classes, sources of events, event listeners interfaces, using the delegation event model, adapter classes, inner classes, handling events by extending AWT components.

SWINGS:

Origin of swings, swings built on AWT, two key swing features, MVC architecture, components and containers, swing packages, simple swing application, event handling, painting in swing, JLabel, JTextField, JTabbedPane, JScrollPane,JList,JComboBox,Trees,JTable.

NETWORKING:

Basics,networking classes and interfaces,InetAddress,TCP/IP,URL

TEXT BOOKS:

1. E.Balaguruswamy, *"Programming with Java A Primer"*, 4th Edition, TataMcGraw-Hill, 2009.
2. Herbert Schildt, *"Java The complete reference"*, 8thEdition, McGrawHill, 2011.

REFERENCES:

1 Timothy budd, *"An introduction to object-oriented programming"*, 3rdEdition, Pearson Education, 2009.
2. Y. Daniel Liang, "*Introduction to Java programming*", 9thEdition, Pearson education, 2012.

3. Ivor Horton, *"Beginning Java"*, 7th Edition, Wrox Publications, 2011.
4. Cay.S.Horstmann and Gary Cornell *"Core Java 2, Vol I, Fundamentals"*, 9th Edition, Pearson Education, 2012.
5. Cay.S.Horstmann and Gary Cornell, *"Core Java 2, Vol II, Fundamentals"*, 9th Edition, Pearson Education, 2012.

DATA COMMUNICATIONS
(Elective-II)

Course Code:13EC1126

L	T	P	C
4	0	0	3

Pre requisites: Digital Communications

Course Outcomes:

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

CO 1 Determine Probability of error, ISI and performance in Digital communication systems.

CO 2 Design Error Control Codes for communication applications.

CO 3 Describe digital multiplexing techniques such as TDM, WDM.

CO 4 Design the Communication modems.

CO 5 Distinguish network topologies and comprehend Multimedia applications.

UNIT-I **(12 Lectures)**

MODULATION TECHNIQUES:

Baseband, Baseband pulse shaping, Review of Digital Modulation techniques, Band width efficiency, carrier recovery, clock recovery, Bit recovery, Probability of error, Inter Symbol Interference (ISI), Performance Analysis and Comparison.

UNIT-II **(14 Lectures)**

ERROR CONTROL CODES:

Error detection and correction codes(ARQ, FEC), Character Codes, Bar Codes, Character Synchronization.

PROTOCOLS & FORMATS:

Data Link Protocol Functions, Character and Bit - Oriented Protocols, Transmission Modes, Data Link Protocols- Synchronous & Asynchronous, Synchronous Data Link Control, High Level Data Link Control.

UNIT-III (10 Lectures)

DIGITAL MULTIPLEXING:

Time Division Multiplexing, CODECS, COMBO CHIPS,Line Encoding, Frame Synchronization, Frequency Division Multiplexing ,Wave length Division Multiplexing, T1 Carrier .

UNIT-IV (14 Lectures)

COMMUNICATION EQUIPMENT:

Serial and Parallel Interfaces, Voice Networks and Circuits, Digital Service Unit and Channel Service Unit, LCU, Voice- Band Data Communication Modems, Asynchronous & Synchronous Voice-Band Modems, Modem Synchronization, Cable Modems, Wireless Local loops.

UNIT-V (10 Lectures)

NETWORKS:

Topologies, Ethernet- Traditional, Fast and GIGA bit Ethernet, FDDI Public Data Networks, ISDN, B-ISDN.

MULTI MEDIA:

Digitization of Video and Audio, Compression, Streaming, Stored and Live Video and Audio, Real Time Interactive Video and Audio, VOD.

TEXT BOOKS:

1. Wayne Tomasi, *"Electronic communication systems, fundamentals through advanced"*, Pearson 5th Edition, 2004.
2. William Stallings, *"Data and computer communications"* Pearson Education India, 8th edition 2007.

REFERENCES:

1. N B Chakrabarti, *"An Introduction to The Principles of Digital Communication"*, New Age International, 2007.
2. Behrouz A Forouzan, *"Data Communication & Networking"*, Tata McGraw-Hill Education4thEd., 2007
3. Taub and schilling, *"Principles of Communication Systems"*, 3rd Edition McGraw-Hill, 2008.
4. Simon Haykin, *"Digital Communications"*, Reprint-2009 John Wiley & Sons, 1988.

MICROPROCESSOR AND MICROCONTROLLER LAB

Course Code: 13EC1127

L	T	P	C
0	0	3	2

Pre requisites: Microprocessors and microcontrollers

Course Outcomes:

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

CO 1 Develop assembly language programs for 8086 microprocessor.

CO 2 Develop programs using DOS/BIOS interrupts for reading keyboard and display characters.

CO 3 Develop assembly language programs for 8051 microcontroller.

CO 4 Generate the time delay using timers in 8051 and implement serial communication.

CO 5 Design and interface various peripheral devices to microprocessor/microcontroller.

I. EXPERIMENTS BASED ON 8086 ALP:

1. Programs on Data Transfer Instructions of 8086
2. Programs on Arithmetic and Logical Instructions of 8086
3. Programs on String instructions of 8086
4. Programs on Subroutines of 8086
5. Sorting of an Array
6. DOS/BIOS Programming, reading keyboard (buffered with and without echo) -Display characters

II. MICROCONTROLLER 8051:

7. Reading and Writing data on a parallel port.
8. Timer in different modes.
9. Serial communication implementation.

III. EXPERIMENTS BASED ON INTERFACING

10. DAC Interface-Waveform generation
11. Stepper Motor Control
12. Keyboard Interface
13. ADC Interface
14. LCD Interface

BASIC COMPUTATIONS LAB

Course Code: 13ES11BC

L	T	P	C
0	0	3	2

Course Outcomes :

At the end of the course the student shall be able to
(using MATLAB programming Language)

CO 1 Perform matrix operations.

CO 2 Plot two dimensional, three dimensional graphs and draw inferences.

CO 3 Perform linear and non-linear regression analysis for the given data.

CO 4 Determine steady state, unsteady state solutions of Ordinary differential equations.

CO 5 Compute two and three dimensional integrals and solve unconstrained optimization problems.

LIST OF EXERCISES:

1. Basic MATLAB commands like representing arrays, matrices, reading elements of a matrix, row and columns of matrices, random numbers.
2. Floor, ceil, and fix commands.
3. Eigen values and Eigen vectors of a matrix.
4. Plotting tools for 2 dimensional and 3 dimensional plots, putting legends, texts, using subplot tool for multiple plots.
5. Linear Regression, interpolation and polynomial regression.
6. Non linear regression.
7. Solving non linear algebraic equations.
8. ODE IVP problems using Runge - Kutta method.

9. ODE BVP problems using shooting method.
10. Using quadrature to evaluate integrals (1, 2 and 3 dimensional cases).
11. Symbolic manipulation to evaluate Laplace and Fourier transforms.
12. Finding the minimum of an unconstrained function.

TECHNICAL COMMUNICATION AND SOFT SKILLS LAB

Course Code : 13HE1103

L	T	P	C
0	0	3	2

Introduction:

The introduction of the Advanced English Communication skills Lab is considered essential at B.Tech. 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. The proposed course should be an integrated theory and lab course to enable students to use 'good' English and perform the following:

- Gathering ideas and information: organizing ideas relevantly and coherently
- Engaging in debates
- Participating in group discussions
- Facing interviews
- Writing project proposals / technical reports
- Making oral presentations
- Writing formal letters and essays
- Transferring information from non-verbal to verbal texts and vice versa
- Taking part in social and professional communication

Course Outcomes:

CO 1 Use language fluently, accurately and appropriately in debates and group discussions

CO 2 Use their skills of listening comprehension to communicate effectively in cross-cultural contexts.

CO 3 Distinguish and use new vocabulary.

CO 4 Write resumes, project reports and reviews.

CO 5 Demonstrate interview skills and soft skills learnt.

LIST OF TASKS :

1. Listening comprehension – Achieving ability to comprehend material delivered at relatively fast speed; comprehending spoken material in Standard Indian English, British English, and American English; intelligent listening in situations such as interview in which one is a candidate.
2. Vocabulary building, Creativity, using Advertisements, Case Studies etc.
3. Personality Development: Decision-Making, Problem Solving, Goal Setting, Time Management & Positive Thinking
4. Cross-Cultural Communication : Role-Play/ Non-Verbal Communication.
5. Meetings- making meeting effective, chairing a meeting, decision-making, seeking opinions , interrupting and handling interruptions, clarifications, closure- Agenda, Minute writing
6. Group Discussion – dynamics of group discussion, Lateral thinking, Brainstorming and Negotiation skills
7. Resume writing – CV – structural differences, structure and presentation, planning, defining the career objective
8. Interview Skills – formal & informal interviews,concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele and video-conferencing
9. Writing Skills - Business Communication, Essays for competitive examinations.
10. Technical Report Writing/ Project Proposals – Types of formats and styles, subject matter – organization, clarity, coherence and style, planning, data-collection, tools, analysis.- Feasibility, Progress and Project Reports.

REFERENCES:

1. Simon Sweeny, *"English for Business Communication"*, CUP, First South Asian Edition, 2010.
2. M. Ashraf Rizvi, *"Effective Technical Communication"*, Tata McGraw-Hill Publishing Company Ltd. 2005.
3. Dr A Ramakrishna Rao, Dr G Natanam & Prof SA Sankaranarayanan, *"English Language Communication: A Reader cum Lab Manual"*, Anuradha Publications, Chennai, 2006.
4. Dr. Shalini Verma, *"Body Language- Your Success Mantra"*, S. Chand, 2006.
5. Andrea J. Rutherford, *"Basic Communication Skills for Technology"*, 2nd Edition, Pearson Education, 2007.
6. Sunita Mishra & C. Muralikrishna, *"Communication Skills for Engineers"*, Pearson Education, 2011.
7. Jolene Gear & Robert Gear, *"Cambridge Preparation for the TOEFL Test"*, 4th Edition, CUP, 2006.
8. Meenakshi Raman & Sangeeta Sharma, *"Technical Communication"*, Oxford University Press, 2012.
9. Nick Ceremilla & Elizabeth Lee- Cambridge *"English for the Media"* CUP, 2010.
10. R.C. Sharma, Krishna Mohan, *"Business Correspondence and Report writing"*, 4th Edition, Tata Mcgraw-Hill Publishing Co. Ltd., 2010.
11. DELTA's key to the Next Generation TOEFL Test: *"Advanced Skill Practice,"* New Age International (P) Ltd., Publishers, New Delhi. 2010.
12. Books on TOEFL/GRE/GMAT/CAT by Barron's/ CUP, 2013.
13. IELTS series with CDs by Cambridge University Press, 2011.

NOTES

SYLLABI FOR VII SEMESTER

TV & SATELLITE COMMUNICATIONS

Course Code:13EC1128

L	T	P	C
4	1	0	3

Pre requisites:

Analog Signal Characteristics, Communication Principles, Digital Modulation Techniques, Orbital Mechanics and Geography.

Course Outcomes:

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

CO 1 Explain the basic principles of satellite &T.V.

CO 2 Recap geography with reference to satellite orbits.

CO 3 Comprehend the satellite subsystems.

CO 4 Configure the satellite multiple access techniques.

CO 5 Analyze the existing satellite communication applications.

UNIT-I (12 Lectures)

PRINCIPLES OF TV & BROADCASTING:

Gross Structure, Image Continuity, Scanning, Flicker, Interlaced Scanning, Number Of Scanning Lines, Fine Structure, Tonal Gradation. Video Signal Dimensions, Horizontal Synchronization Details, Vertical Synchronization Details, Scanning Sequence Details, Functions Of Vertical Pulse Train, Channel Bandwidth, Vestigial Side Band Transmission, Bandwidth Allocations For Colour Transmission.

UNIT-II (10 Lectures)

SATELLITE ORBITS:

Kepler's Laws, Newton's Law, Orbital Parameters, Orbital Perturbations, Station Keeping, Geo Stationary And Non Geo-Stationary Orbits, Look Angle Determination, Limits Of Visibility, Eclipse, Sub Satellite Point, Sun Transit Outage, Launching

Procedures, Launch Vehicles And Propulsion.

UNIT-III (14 Lectures)

SPACE SEGMENT AND SATELLITE LINK DESIGN:

Spacecraft Structure, Primary Power, Attitude and Orbit Control, Thermal Control and Propulsion, Communication Payload and Supporting Subsystems, Telemetry,Tracking and Command, Satellite Uplink and Downlink Analysis and Design, Link Budget,E_b/N_oCalculation, Performance Impairments, System Noise, Intermodulation And Interference, Propagation Characteristics And Frequency Considerations- System Reliability And Design Lifetime.

UNIT-IV (12 Lectures)

SATELLITE ACCESS:

Modulation and Multiplexing: Voice, Data, Video, Analog – Digital Transmission Systems, Digital Video Broadcast, Multiple Access: FDMA, TDMA, CDMA, Assignment Methods, Spread Spectrum Communication, Compression – Encryption.

EARTH SEGMENT:

Earth Station Technology— Terrestrial Interface, Transmitter and Receiver, Antenna Systems TVRO, MATV, CATV, Test Equipment Measurements on G/T, C/No, EIRP, Antenna Gain.

UNIT-V (12 Lectures)

SATELLITE APPLICATIONS:

INTELSAT Series, INSAT, VSAT, Mobile satellite services: GSM, GPS, INMARSA, LEO, MEO, Satellite Navigational System. Direct Broadcast satellites (DBS) - Direct to home Broadcast (DTH), Digital audio broadcast (DAB)- World space services, Business TV(BTV), GRAMSAT, Specialized services – E –mail, Video conferencing, Internet.

TEXT BOOKS:

1. R R Gulati, *"Monochrome and Colour Television"*, New Age International, 2007
2. Dennis Roddy, *'Satellite Communication'*, McGraw Hill International, 4th Edition, 2006.

REFERENCES:

1. Bruce R. Elbert, *"The Satellite Communication Applications"* Hand Book, Artech House, London, 1997.
2. Tri T. Ha, *"Digital Satellite Communication"*, IInd Edition, 1990.
3. C. Dharma Raj, *"Satellite Communication",* I.K International Publishing House Pvt. Ltd.
4. Brian Ackroyd, *'World Satellite Communication and earth station Design'*, BSP professional Books, 1990.
5. M. Richharia, *"Satellite Communication Systems-Design Principles"*, Macmillan 2003
6. Wilbur L. Pritchard, Hendri G. Suyderhoud, Robert A. Nelson, *"Satellite Communication Systems Engineering"*, Prentice Hall/Pearson, 2007.

RADAR ENGINEERING

Course Code:13EC1129

L	T	P	C
4	1	0	3

Pre requisites:

Electromagnetic waves and transmission lines, Analog communication,

Course Outcomes:

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

CO 1 Explain different Radar constants, block diagrams, frequencies and simple range equation.

CO 2 Differentiate between basic principles of CW radar and Frequency modulated radars, MTI Principles and its performance.

CO 3 Distinguish between different types of tracking radars and its principles.

CO 4 Synthesize the detection of radar signals in noise.

CO 5 Analyze different display systems, duplexers of radar receivers and phased array radars.

UNIT-I (12 Lectures)

INTRODUCTION:

Nature of Radar, Maximum Unambiguous Range, Radar Waveforms, Simple form of Radar Equation, Radar Block Diagram and Operation, Radar Frequencies and Applications

RADAR EQUATION:

Prediction of Range Performance, Minimum Detectable Signal, Receiver Noise and SNR, Integration of Radar Pulses, Radar Cross Section of Targets (simple targets - sphere, cone-sphere), Transmitter Power, PRF and Range Ambiguities, System Losses.

UNIT-II (14 Lectures)

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, FM-CW Radar, Range and Doppler Measurement, Block Diagram and Characteristics (Approaching/ Receding Targets), FM-CW altimeter, Measurement Errors, Multiple Frequency CW Radar.

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, Non-coherent MTI, MTI versus Pulse Doppler Radar.

UNIT-III (10 Lectures)

TRACKING RADAR:

Tracking with Radar, Sequential Lobing, Conical Scan, Monopulse Tracking Radar – Amplitude Comparison Monopulse (one&two coordinates), Phase Comparison Monopulse, Target Reflection Characteristics and Angular Accuracy, Tracking in Range, Acquisition and Scanning Patterns. Comparison of Trackers.

UNIT-IV (12 Lectures)

DETECTION OF RADAR SIGNALS IN NOISE:

Introduction, Matched Filter Receiver – Response Characteristics and Derivation, Correlation Function and Cross-correlation Receiver, Efficiency of Non-matched Filters, Matched Filter with Non-white Noise.Noise Figure and Noise Temperature.

UNIT-V (12 Lectures)

RADAR RECEIVERS:

Displays – types, Duplexers – Branch type and Balanced type, Circulators as Duplexers.

PHASED ARRAY ANTENNAS

Basic Concepts, Radiation Pattern, Beam Steering and Beam Width changes, Series versus Parallel Feeds, Applications, Advantages and Limitations.

RADAR STUDIES OF ATMOSPHERE:

MST radar, meteor wind radar, other radar studies of the atmosphere

TEXT BOOKS:

1. Merrill I. Skolnik, *"Introduction to Radar Systems"*, 3rd Ed., McGraw-Hill, 2003.
2. Simion. Kingsley, *"Understanding Radar Systems"*, Standard Publishing, 1999.

REFERENCES:

1. Byron. Edde, *"Radar Principles, Technology, Applications"*, Pearson education, 2007.
2. G.Sasi Bhushana Rao, *"Microwave and Radar Engineering"*, Pearson education, 2013.

OPTICAL COMMUNICATIONS

Course Code: 13EC1130

L	T	P	C
4	0	0	3

Pre requisites: Basics of Digital and Analog communications.

Course Outcomes:

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

CO 1 Comprehend fiber Optic Communications and fiber materials.

CO 2 Assess the transmission Characteristics of signals through fibers.

CO 3 Compare and analyze the characteristics of various optical sources and detectors.

CO 4 Design optical links for Analog and Digital optical communication systems and estimate power budget.

CO 5 Measure attenuation and Dispersion of SONET/SDH, WDM and DWDM.

UNIT-I (12 Lectures)

OVERVIEW OF FIBER OPTIC COMMUNICATIONS AND FIBER MATERIALS:

Historical Development, The General System, Advantages of Fiber Optic communications, Total Internal Reflection, Acceptance Angle, Numerical Aperture, Skew rays. Modes, V number, Step index, Graded index Fibers. Cutoff Wave length, Mode Field Diameter, Effective Refractive Index. Glass, Halide, Plastic Optical fibers, Characteristics of Optical Cable.

UNIT-II (12 Lectures)

TRANSMISSION CHARACTERISTICS OF OPTICAL FIBERS AND OPTICAL FIBER CONNECTION:

Attenuation, Material Absorption Losses, Linear Scattering losses- Rayleigh, Mie, Non Linear Scattering losses- SBS, SRS, Fiber Bend losses, Group delay, Dispersion- Intermodal dispersion, Material

dispersion, Waveguide dispersion, Polarization mode dispersion. Fiber Splices – Fusion Splices, Mechanical Splices, Optical Fiber connectors – connector types, Single Mode Fiber Connectors, Connector Return loss. Lensing schemes for coupling improvement

UNIT-III (14 Lectures)

OPTICAL SOURCES AND DETECTORS:

LED structures- Surface Emitter LED, Edge Emitter LED, Quantum Efficiency, LED characteristics- output power, Modulation. Lasers – The Einstein relations, Population Inversion, Threshold condition for Laser oscillation, Laser diode modes, External Quantum Efficiency, Resonant frequencies, Single mode Lasers, modulation of Lasers, Temperature Effects, Reliability considerations of LED and LD

Physical principles of Photodiodes, Detector response tme, Structure of InGaAs APD, Temperature effect on Avalanche Gain, Comparison of Photodetectors

UNIT-IV (12 Lectures)

OPTICAL RECEIVER OPERATION AND SYSTEM DESIGN:

Fundamental receiver operation – Digital signal transmission, Quantum limit, Error sources, Eye diagrams, Point to Point Links –System considerations, Link Power Budget, Rise Time Budget

UNIT-V (10 Lectures)

MEASUREMENTS AND SDH/SONET:

Measurements of Attenuation and Dispersion, Basics of WDM, DWDM, PDH, SDH.

TEXT BOOKS:

1. John M Senior, *"Optical Fiber Communications"*, PHI, 2nd Edition, 2002
2. Gerd Keiser, *"Optical Fiber Communications"*, Mc Graw-Hill International edition, 4th Edition, 2000

REFERENCES:

1. Joseph C.Palias, *"Fiber Optical Communications"* 5th Edition, Pearson Education, 2004

DIGITAL IMAGE PROCESSING

Course Code:13EC1131

L	T	P	C
4	0	0	3

Pre requisites: Signals and Systems, Digital Signal Processing.

Course Outcomes:

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

CO 1 Comprehend fundamentals of Image Processing.

CO 2 Describe various transforms used in image processing.

CO 3 Describe various techniques of image enhancement in the spatial and frequency domain.

CO 4 Comprehend the color image processing and restoration techniques.

CO 5 Analyze the various compression and segmentation techniques.

UNIT-I (12 Lectures)

INTRODUCTION:

Digital image fundamentals, Concept of gray levels, Applications of image processing, Image Sensing and Acquisition, Image Sampling and Quantization, Gray level to binary image conversion, Relationships between pixels.

UNIT-II (12 Lectures)

IMAGE TRANSFORMS:

2-D DFT, Properties, Walsh transform, Hadamard Transform, Discrete Cosine Transform, Haar transform, Slant transform, Hotelling transform, Discrete wavelet transform.

UNIT-III (15 Lectures)

IMAGE ENHANCEMENT IN THE SPATIAL DOMAIN :

Point processing, Histogram processing, Spatial filtering.

IMAGE ENHANCEMENT IN THE FREQUENCY DOMAIN:

Image smoothing, Image sharpening, Homomorphic Filtering.

UNIT-IV (12 Lectures)

COLOR IMAGE PROCESSING:

Color models, Pseudo color image processing, full color image processing.

IMAGE RESTORATION:

Degradation model, Algebraic approach to restoration, Inverse filtering, Least mean square filters, Constrained Least Squares Restoration, Interactive Restoration.

UNIT-V (15 Lectures)

IMAGE COMPRESSION:

Redundancies and their removal methods, Fidelity criteria, Image compression models, Source encoder and decoder, Error free compression, Lossy compression.

IMAGE SEGMENTATION:

Detection of discontinuities, Edge linking and boundary detection, Thresholding, Region oriented segmentation.

TEXT BOOKS:

1. R.C. Gonzalez & R.E. Woods, *"Digital Image processing"* Addison Wesley/ Pearson Prentice Hall, 2nd Education, 2007.
2. Anil K. Jain, *"Fundamentals of Digital Image Processing"*, Pearson Education, 2003.

REFERENCES:

1. Rafael C. Gonzalez, Richard E Woods and Steven L. Eddins, *"Digital Image processing using MAT LAB"* , Pearson Edu., 2004.
2. William K. Pratt, *"Digital Image Processing"*, John Wilely, 3rd Edition, 2004.
3. Jagadeesh Bandi, *"Optimization between Image Quality and Compression Ratio"*, LAP LAMBERT Academic Publishing, Germany, 2012.

COMPUTER NETWORKS

(Common to CSE, IT & ECE)

Course Code :13CT1124

L	T	P	C
4	0	0	3

Course Outcomes:

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

CO 1 Explain Network Models.

CO 2 Compute error detection and correction codes.

CO 3 Discuss routing algorithms.

CO 4 Differentiate TCP and UDP protocols.

CO 5 Explain network security algorithms.

UNIT-I (12 Lectures)

NETWORK MODELS:

Layered Tasks, WAN, LAN, MAN, OSI model, TCP/ IP protocol stack, addressing (Text book 2), Novell Networks Arpanet, Internet.(Text book 1).

PHYSICAL LAYER:

Transmission media: copper, twisted pair, wireless; switching and encoding asynchronous communications; Narrow band ISDN, broad band ISDN and ATM. (Text book 1)

UNIT-II (12 Lectures)

DATA LINK LAYER:

Design issues, framing, error detection and correction, CRC, Elementary data link protocols, Sliding Window Protocol, Slip, HDLC, Internet, and ATM.

MEDIUM ACCESS SUB LAYER:

Random access, Controlled access, Channelization, IEEE 802.X Standards, Ethernet, wireless LANS, Bridges. (Text book 2)

UNIT-III (12 Lectures)

NETWORK LAYER:

Network Layer Design Issues, Routing Algorithms, Internetworking, Network Layer in Internet.(Text book-1)

CONGESTION CONTROL:

General Principles, policies, traffic shaping, flow specifications,

Congestion control in virtual subnets, choke packets, loads shedding, jitter control.(Text book-2)

UNIT-IV (13 Lectures)

TRANSPORT LAYER: Transport Services, Elements of Transport Protocols, Internet Transport Protocols (TCP & UDP); ATM AAL Layer Protocol.(Text book-1)

UNIT-V (11 Lectures)

APPLICATION LAYER:

Network Security, Domain name system, SNMP, Electronic Mail: the World WEB, Multi Media.

TEXT BOOKS:

1. Andrew S Tanenbaum , *"Computer Networks"*, 6th Edition. Pearson Education / PI, 2012.
2. Behrouz A. Forouzan , *"Data Communications and Networking"*, 4th Edition TMH, 2012.

REFERENCES:

1. S.Keshav, *"An Engineering Approach to Computer Networks"*, 2nd Edition, Pearson Education, 2001.
2. William, A. Shay , *"Understanding communications and Networks"*, 3rd Edition, Thomson Publication, 2006

WEB REFERENCES:

1. http://nptel.iitm.ac.in/courses/Webcoursecontents/IIT%20Kharagpur/Computer%20networks/New_index1.html
2. http://nptel.iitm.ac.in/courses/IIT-MADRAS/Computer_Networks/index.php

DIGITAL DESIGN THROUGH VERILOG

(Elective-III)

Course Code:13EC1132

L	T	P	C
4	0	0	3

Pre requisites: Switching Theory and Logic Design.

Course Outcomes:

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

CO 1 Describe the basic concepts of Verilog language.

CO 2 Classify gate level modeling, dataflow level modeling and model digital circuits.

CO 3 Distinguish behavioral level modeling, switch level modeling and model combinational, sequential circuits.

CO 4 Differentiate Functions, Tasks, User defined primitives and design of an RTL models for memories and buses.

CO 5 Identify Xilinx 3000 series FPGAs and Altera FLEX 10K series CPLDs.

UNIT-I **(10 Lectures)**

INTRODUCTION TO VERILOG:

Verilog as HDL, Levels of Design Description, Concurrency, Simulation and Synthesis, Functional Verification, System Tasks, Programming Language Interface (PLI), Module, Simulation and Synthesis Tools, Test Benches.

LANGUAGE CONSTRUCTS AND CONVENTIONS:

Introduction, Keywords, Identifiers, White Space Characters, Comments, Numbers, Strings, Logic Values, Strengths, Data Types, Scalars and Vectors, Parameters, Memory, Operators, System Tasks.

UNIT-II (14 Lectures)

GATE LEVEL MODELING:

Introduction, AND Gate Primitive, Module Structure, Other Gate Primitives, Illustrative Examples, Tri-State Gates, Array of Instances of Primitives, Additional Examples, Design of Flipflops with Gate Primitives, Delays, Strengths and Contention Resolution, Net Types, Design of Basic Circuits.

DATA FLOW LEVEL MODELING:

Introduction, Continuous Assignment Structures, Delays and Continuous Assignments, Assignment to Vectors, Operators.

UNIT-III (14 Lectures)

BEHAVIORAL MODELING:

Introduction, Operations and Assignments, Functional Bifurcation, *Initial* Construct, *Always* Construct, Examples, Assignments with Delays, *Wait* construct, Multiple Always Blocks, Designs at Behavioral Level, Blocking and Non-blocking Assignments, The case statement, Simulation Flow. i*f* and i*f*-else constructs, assign-deassign construct, repeat construct, for loop, the disable construct, whileloop, forever loop, parallel blocks, force-release construct, Event.

SWITCH LEVEL MODELING:

Introduction, Basic Transistor Switches, CMOS Switch, Bi-directional Gates, Time Delays with Switch Primitives, Instantiations with Strengths and Delays, Strength Contention with Tri-reg Nets.

UNIT-IV (12 Lectures)

FUNCTIONS, TASKS, AND U SER-DEFINED PRIMITIVES:

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

SYSTEM TASKS, FUNCTIONS AND COMPILER DIRECTIVES:

Introduction, Parameters, Path Delays, Module Parameters, System Tasks and Functions, File-Based Tasks and Functions, Compiler Directives, Hierarchical Access, General Observations.

VERILOG MODELS FOR MEMORIES AND BUSES:

Static RAM Memory, A simplified 486 Bus Model, UART Design.

UNIT-V (10 Lectures)

DESIGNING WITH FIELD PROGRAMMABLE GATE ARRAYS AND COMPLEX PROGRAMMABLE LOGIC DEVICES:

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

TEXT BOOKS:

1. T.R. Padmanabhan and B. Bala Tripura Sundari, *"Design through Verilog HDL",* WSE, IEEE Press 2008.
2. J. Bhaskar, *"A Verilog Primer"*, BSP, 2nd edition 2003.

REFERENCES:

1. Samir Palnitkar, "Verilog HDL", Pearson Education, 2nd Edition,2003.
2. Thomas and Moorby, *"The Verilog Hardware Description Language"*, kluwer academic publishers, 5th edition, 2002.
3. Stephen Brown and Zvonko Vranesic, *"Fundamentals of Logic Design with Verilog"*, TMH publications, 2007.
4. Charles.H.Roth,Jr., Lizy Kurian John *"Digital System Design using VHDL"* , Thomson, 2nd Edition, 2008

EMBEDDED SYSTEMS
(Elective-III)

Course Code: 13EC1133

L	T	P	C
4	0	0	3

Pre requisites: Digital logic design, computer organization.

Course Outcomes:

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

CO 1 Describe the concepts of embedded system and desktop system and their technology.

CO 2 Explain the General Purpose Processors, ASIP, DSP Processors.

CO 3 Demonstrate advantages of State Machine Models, Communication Protocols and Synchronization techniques.

CO 4 Summarize the serial communication interfacing.

CO 5 Specify different design Technologies of software and hardware design.

UNIT-I **(10 Lectures)**

INTRODUCTION:

Embedded systems overview, design challenge, processor technology, IC technology, Design Technology, Trade-offs. Single purpose processors RT-level combinational logic, sequential logic (RTlevel), custom single purpose processor design (RT-level), optimizing custom single purpose processors.

UNIT-II **(12 Lectures)**

GENERAL PURPOSE PROCESSORS:

Basic architecture, operation, Pipelining, Programmer's view, development environment, Application Specific Instruction-Set Processors (ASIPs) – Micro Controllers and Digital Signal Processors.

UNIT-III (12 Lectures)

STATE MACHINE AND CONCURRENT PROCESS MODELS:

Introduction, Models vs. Languages, finite state machines with data path model (fsmd), using state machines, program state machine model (psm), concurrent process model, concurrent processes, communication among processes, synchronization among processes, implementation, data flow model, real-time systems.

UNIT-IV (12 Lectures)

COMMUNICATION INTERFACE:

Need for communication interfaces, RS232 / UART, RS422 / RS485, USB,Infrared, IEEE 1394 Firewire, Ethernet, IEEE 802.11, Blue tooth.

UNIT-V (14 Lectures)

DESIGN TECHNOLOGY:

Introduction, Automation, Synthesis, Parallel evolution of compilation and synthesis, Logic Synthesis, RT synthesis, Behavioral Synthesis, Systems Synthesis and Hardware/ Software Co-Design, Verification, Hardware/Software co-simulation, Reuse of intellectual property cores.

Text BOOKS:

1. Frank Vahid, Tony D. Givargis, *"Embedded System Design – A Unified Hardware/Software Introduction"* John Wiley, 2002.
2. KVKK Prasad, *"Embedded / Real Time Systems"* Dreamtech Press, 2005.

REFERENCES:

1. Jonathan W. Valvano, *"Embedded Microcomputer Systems"*, 3rd. edition, Cengage Learning, 2011.
2. Lyla B.Das, *"Embedded Systems an Integrated Approach"*, First Impression, Pearson, 2013.

3. David E. Simon, *"An Embedded Software Primer"* Pearson Ed., 2005.
4. Raj Kamal, *"Introduction to Embedded Systems"* TMH, 2002.
5. Sri Ram V Iyer, Pankaj Gupta, "Embedded Real Time Systems Programming" TMH, 2004.

ELECTROMAGNETIC INTERFERENCE AND COMPATIBILITY

(Elective-III)

Course Code: 13EC1134

L	T	P	C
4	0	0	3

Pre requisites: EM Waves & Transmission Lines , Wave Propagation, Antennas.

Course Outcomes:

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

CO 1 Explain the real world EMC design to reduce electromagnetic Interference.

CO 2 Comprehend design aspects of Electronic systems without interference and with compatibility.

CO 3 Compute the radiated and conducted interference measurements.

CO 4 Analyze and design Grounding and Cabling aspects with reference to EMI/EMC standards.

CO 5 Design Components that meet EMI/EMC Standards.

UNIT-I **(12 Lectures)**

INTRODUCTION:

History and concept of EMI, Definitions of EMI/EMC, Electromagnetic environment, Practical experiences and concerns, frequency spectrum conservation, mechanisms of EMI generation, EMI testing, Methods of elimination of EMI and Biological effects of EMI

UNIT-II **(12 Lectures)**

SOURCES OF EMI/EMC:

Sources of Electromagnetic noise, typical noise paths, modes of noise

coupling, designing for EM compatibility, lightening discharge, electro static discharge (ESD), electromagnetic pulse (EMP). Electromagnetic emissions, noise form relays and switches, non-linearity in circuits, passive inter modulation, transients in power supply lines, EMI from power electronic equipment, EMI as combination of radiation and conduction. Open area test sites: OATS measurements, measurement precautions.

UNIT-III (12 Lectures)

RADIATED/CONDUCTED INTERFERENCE MEASUREMENTS:

Anechoic chamber, TEM cell, reverberating chamber, GTEM cell, comparison of test facilities, characterization of conduction currents / voltages, conducted EM noise and power line, conducted EMI from equipment, immunity to conducted EMI, characteristics of EMI filters and power line filter design.

UNIT-IV (14 Lectures)

GROUNDING AND CABLING:

Safety and signal grounds, low and high frequency grounding methods, grounding of amplifiers and cable shields, isolation, neutralizing transformers, shield grounding at high frequencies, digital grounding, types of cables, mechanism of EMI emission / coupling in cables. effectiveness of shielding, near and far fields / impedances, methods of analysis, total loss due to absorption and reflection effects, composite absorption and reflection losses for electric fields / magnetic fields, magnetic materials as a shield, shield discontinuities, slots and holes, seams and joints, conductive gaskets Electrical Bonding, Shape and Material for Bond straps, General Characteristics of good bonds.

UNIT-V (10 Lectures)

COMPONENTS FOR EMI/EMC STANDARDS:

Choice of capacitors, inductors, transformers and resistors, EMC design components National / International EMC standards, military and civilian standards.

TEXT BOOKS:

1. Dr. V.P. Kodali, *"Engineering Electromagnetic Compatibility"*, IEEE Publication, S. Chand & Co. Ltd., New Delhi, 2000.
2. *"Electromagnetic Interference and Compatibility"*, IMPACT series, IIT-Delhi, Modules1-9.

REFERENCES:

1. C.R. Pal, *"Introduction to Electromagnetic Compatibility"*, Ny, John Wiley, 1992.

MICROWAVE AND OPTICAL COMMUNICATION LAB

Course Code: 13EC1135

L	T	P	C
0	0	3	2

Pre requisites: Microwave Engineering and Optical Communications

Course Outcomes:

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

CO 1 Verify characteristics of Reflex Klystron.

CO 2 Analyze various parameters of Waveguide Components.

CO 3 Estimate the power measurements of RF Components such as directional Couplers.

CO 4 Demonstrate characteristics of various optical sources.

CO 5 Measure data Rate, Numerical Aperture and Losses in Optical Link.

LIST OF EXPERIMENTS:

1. To verify Reflex Klystron Characteristics and to determine the frequency and tuning range of reflex klystron.
2. To verify Gunn Diode Characteristics.
3. To analyze the fixed and variable attenuator and plot the micrometer reading Vs attenuation.
4. To determine the coupling factors and directivity of directional coupler.
5. To measure the power distribution of various wave guide Tee i.e. E plane, H plane.
6. To measure the power distribution in Magic Tee.
7. VSWR Measurement and load impedance calculations using Smith chart.

8. Scattering parameters of Circulator.
9. Characterization of LED.
10. Characterization of Laser Diode.
11. Intensity modulation of Laser output through an optical fiber.
12. Measurement of Data rate for Digital Optical link.
13. Measurement of Numerical Aperture of fiber cable.
14. Measurement of losses for Analog Optical link.

DIGITAL SIGNAL PROCESSING LAB

Course Code:13EC1136

L	T	P	C
0	0	3	2

Pre requisites:

Digital Signal Processing Theory, C and MATLAB Programming

Course Outcomes:

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

CO 1 Develop and Implement DSP algorithms in C language with TMS320C6713 floating point Processor.

CO 2 Develop various DSP Algorithms using MATLAB Software package.

CO 3 Analyze and Observe Magnitude and phase characteristics (Frequency response Characteristics) of digital IIR-Butterworth, Chebyshev filters.

CO 4 Analyze and Observe Magnitude and phase characteristics (Frequency response Characteristics) of digital FIR filters using window techniques.

CO 5 Design and Analyze Digital Filters using FDA Tool.

*Note: Any **TEN** of the following experiments are to be conducted.*

LIST OF EXPERIMENTS :

1. To study the features and architecture of DSP chips – TMS 320C6713 DSK.
2. To verify linear convolution between two sequences.
3. To verify the circular convolution between two sequences.
4. To verify correlation and autocorrelation between two sequences.
5. To compute the DFT of a sequence.

6. Implementation of 4-point and 8-point FFT.
7. Implementation of 4-point and 8-point IFFT.
8. To generate various discrete time signals.
9. To generate sum of sinusoidal signals and to find the frequency response.
10. To find the FFT of given 1-D signal and plot.
11. To design IIR Butterworth and Chebyshev filters (LP/HP).
12. To design FIR filter (LP/HP) using windowing technique.
    a) Using rectangular window
    b) Using triangular window
    c) Using hamming window
13. Filter Design and Analysis using FDA Tool.
14. To compute power density spectrum of a sequence.

SYLLABI FOR VIII SEMESTER

WIRELESS COMMUNICATIONS

Course Code:13EC1137

L	T	P	C
4	0	0	3

Pre requisites:

Principles of Analog and Digital Communications

Course Outcomes:

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

CO 1 Comprehend basic principles and standards of mobile communication systems.

CO 2 Comprehend the various methods for enhancing the cellular system capacity.

CO 3 Examine different multiple access techniques.

CO 4 Analyze coding techniques for various wireless applications.

CO 5 Comprehend the wireless and cellular radio application.

UNIT-I **(12 Lectures)**

History of wireless communication, and future trends,Wireless Generations and Standards, Mobile Radio signal propagation, path loss and channel models, Large Scale Path Loss, Small Scale Path Loss - Rayleigh and Rician Fading

UNIT-II **(10 Lectures)**

Cellular Concept and Cellular System Fundamentals,Frequency Reuse, Channel Assignment Strategies,Handoff Strategies, Interference and System Capacity, Trunking andGrade of Service, Improving Coverage & Capacity in Cellular Systems.

UNIT-III **(12 Lectures)**

Analog Modulation Schemes for Wireless Communication. Diversity, Coding and Interleaving, Source and Channel Coding, Speech Coding

for Wireless Communications, Adaptive Equalization, Multipath Propagation, Doppler frequency shift.

UNIT-IV **(14 Lectures)**

Multiplexing and Multiple Access techniques, TDMA,FDMA, ALOHA - Packet Radio, Spread Spectrum-CDMA, Frequency Hopped Spread Spectrum, Inter-Symbol Interference (ISI), ISI mitigation; Equalization, Random Access Protocols

UNIT-V **(12 Lectures)**

Wireless Networking,Third generation systems and advanced topics, Wideband-CDMA, OFDM Principles, Comparision of OFDM and CDMA, WLAN and Bluetooth.

TEXT BOOKS:

1. Theodore S.Rappaport, *"Wireless Communications"* Pearson education, 2nd Edition, 2002.
2. G. Sasibhushana Rao, *"Mobile Cellular Communications"*, Pearson Education, 1st Edition, 2012.

REFERENCES:

1. Tri T. Ha, *"Digital Satellite Communication"*, McGraw-Hill, 2nd Edition, 1990.
2. Sklar, *"Digital Communications: Fundamentals & Applications"*, Pearson Education India, 2nd Edition, 2009

DSP PROCESSORS & ARCHITECTURE
(Elective-IV)

Course Code:13EC1138

L	T	P	C
4	0	0	3

Pre requisites:

Knowledge of signals and systems, convolution methods, digital signal processing concepts must be known.

Course Outcomes :

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

CO 1 Comprehends the concepts of digital signal processing techniques.

CO 2 Design DSP computational building blocks to achieve high speed in DSP processor.

CO 3 Comprehends DSP TMS320C54XX architecture and instructions.

CO 4 Develop DSP algorithms using DSP processor.

CO 5 Interface memory, I/O peripherals and Serial communication Devices to DSP processors.

UNIT-I **(13 lectures)**

INTRODUCTION :

Introduction, 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,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.

UNIT-II (12 lectures)

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, Hardware looping, Interrupts, Stacks, Relative Branch support, Pipelining and Performance, Pipeline Depth, Interlocking, Branching effects, Interrupt effects, Pipeline Programming models.

UNIT-III (11 lectures)

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 (11 lectures)

IMPLEMENTATIONS OF BASIC DSP ALGORITHMS :

The Q-notation, FIR Filters, IIR Filters, Interpolation Filters, Decimation Filters, PID Controller, Adaptive Filters, An FFT Algorithm for DFT Computation, A Butterfly Computation, Overflow and scaling, Bit-Reversed index generation, An 8-Point FFT implementation on the TMS320C54XX, Computation of the signal spectrum.

UNIT-V (13 lectures)

INTERFACING MEMORY AND I/O PERIPHERALS TO PROGRAMMABLE DSP DEVICES:

Memory space organization, External bus interfacing signals, Memory interface, Parallel I/O interface, Programmed I/O, Interrupts and I/O, Direct memory access (DMA).

A Multichannel buffered serial port (McBSP), McBSP Programming, a CODEC interface circuit, CODEC programming, A CODEC-DSP interface example.

TEXT BOOKS:

1. Avtar Singh and S. Srinivasan, *"Digital Signal Processing"* Thomson Publications, 2004.
2. Lapsley et al., *"DSP Processor Fundamentals, Architectures & Features"*, S. Chand & Co, 2000.

REFERENCES:

1. B. Venkata Ramani and M. Bhaskar, *"Digital Signal Processors, Architecture, Programming and Applications"*, TMH, 2004.
2. Jonatham Stein, *"Digital Signal Processing"*, John Wiley, 2000

REAL TIME OPERATING SYSTEMS
(Elective-IV)

Course Code:13EC1139

L	T	P	C
4	0	0	3

Course Outcomes:

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

CO 1 Recall various concepts of Operating Systems.

CO 2 Estimate the necessity of real time operating systems.

CO 3 Illustrate the process management in multithreading model, synchronization mutex.

CO 4 Describe the inter process communication.

CO 5 Analyze the RTOS by specific case studies.

UNIT-I **(10 Lectures)**

INTRODUCTION:

Introduction to Operating System: Computer Hardware Organization, BIOS and Boot Process, Multi-threading concepts, Processes, Threads, Scheduling

UNIT-II **(13 Lectures)**

BASICS OF REAL-TIME CONCEPTS:

Terminology: RTOS concepts and definitions, real-time design issues, examples, Hardware Considerations: logic states, CPU, memory, I/O, Architectures, RTOS building blocks, Real-Time Kernel

UNIT-III **(13 Lectures)**

PROCESS MANAGEMENT:

Concepts, scheduling, IPC, RPC, CPU Scheduling, scheduling criteria, scheduling algorithms Threads: Multi-threading models, threading issues, thread libraries, synchronization Mutex: creating, deleting, prioritizing mutex, mutex internals

UNIT-IV (12 Lectures)

INTER-PROCESS COMMUNICATION:

Messages, Buffers, mailboxes, queues, semaphores, deadlock, priority inversion,

PIPES MEMORY MANAGEMENT:-

Process stack management, run-time buffer size, swapping, overlays, block/page management, replacement algorithms, real-time garbage collection

UNIT-V (12 Lectures)

CASE STUDIES:

Case study Linux POSIX system, RTLinux / RTAI, Windows system, Vxworks, uItron Kernel Design Issues: structure, process states, data structures, inter-task communication mechanism, Linux Scheduling

TEXT BOOKS:

1. J. J Labrosse, *"MicroC/OS-II: The Real –Time Kernel"*, Newnes, 2002.
2. Jane W. S. Liu, *"Real-time systems"*, Prentice Hall, 2000.

REFERENCES:

1. W. Richard Stevens, *"Advanced Programming in the UNIX® Environment"*, 2nd Edition, Pearson Education India, 2011.
2. Philips A. Laplante, *"Real-Time System Design and Analysis"*, 3rd Edition, John Wley& Sons, 2004
3. Doug Abbott, *"Linux for Embedded and Real-Time Applications",* Newnes, 2nd Edition, 2011.

POWER ELECTRONICS

(Common to EEE & ECE)

Course Code:13EE1113

L	T	P	C
4	0	0	3

Pre requisites:

Basic Network Analysis, Electronic Devices and Electronic Circuits

Course Outcomes:

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

CO 1 Distinguish between different types of power semiconductor devices and their characteristics.

CO 2 Analyze Phase controlled converters.

CO 3 Analyze AC voltage controllers and Cycloconverters.

CO 4 Analyze DC -DC Choppers.

CO 5 Analyze DC-AC Inverters.

UNIT-I **(12 Lectures)**

POWER SEMICONDUCTOR DEVICES:

Power BJTs, Power MOSFETs, Power IGBTs, GTOs and their characteristics. Basic principle of operation of SCR, Static characteristics, Two transistor model of SCR, SCR Turn on and SCR turn off characteristics, Comparison of various Power Electronic (PE) - devices.

TRIGGERING CIRCUITS:

Series and parallel connections of Thyristors, di/dt protection, dv/dt protection of SCRs, MOSFET gate drive circuit, BJT base drive circuit, Isolation of gate and base drive, Thyristor firing circuits.

UNIT-II (12 Lectures)

1- PHASE, PHASE- ANGLE CONTROLLED THYRISTOR CONVERTERS:

Principle of phase angle control: Single phase full converter with R-L load, Single phase dual converter, Single phase semi-controlled converter with R-L load.

3- PHASE, PHASE- ANGLE CONTROLLED THYRISTOR CONVERTERS:

Three phase Half wave converter with R-L load, Three phase Full wave converter with R-L load, Three phase dual converter, Three phase semi converter with R-L load.

UNIT-III (12 Lectures)

AC VOLTAGE CONTROLLERS & CYCLO CONVERTERS:

Principle of on-off control, Principle of phase control, Single phase bidirectional controllers with resistive load, Single phase controllers with inductive load, 1-phase / 3-phase cyclo-converters.

UNIT-IV (12 Lectures)

DC-DC CONVERTERS:

Principle of step down chopper, Generation of duty cycle, Step down converters with and without back e.m.f load, Principle of step up chopper, Performance of step down/ up choppers, Converter classifications.

UNIT-V (12 Lectures)

INVERTERS:

Single phase half bridge inverter, Single phase full bridge inverter, Three phase voltage source inverters (180 and 120 degree modes).

VOLTAGE CONTROL TECHNIQUES OF INVERTERS:

Single Pulse Width Modulation, Multiple Pulse-width Modulation, Sinusoidal Pulse width Modulation, Modified Sinusoidal Pulse Width Modulation.

TEXT BOOKS:

M. H. Rashid, *"Power Electronics: Circuits, Devices and Applications"*, Prentice Hall of India 3rd Edition, 2011

REFERENCES:

1. P.C.Sen, *"Power Electronics"*, Tata McGraw-Hill, 1st Edition, 2001.
2. Ned Mohan, Tore M. Undeland, *"Power Electronics - Converters, Applications and Design"*, Wiley India Edition, 3rd Edition.
3. M. D. Singh & K. B. Kanchandhani, *"Power Electronics"*, Tata McGraw – Hill Publishing company, 2nd Edition, 2010.