ACADEMIC REGULATIONS

COURSE STRUCTURE

AND

DETAILED SYLLABUS

ELECTRONICS & COMMUNICATIONS ENGINEERING

For

B.Tech. FOUR YEAR DEGREE COURSE

(Applicable for the batches admitted from 2018-19)

BONAM VENKATA CHALAMAYYA ENGINEERING COLLEGE (AUTONOMOUS)

(Approved by AICTE with PIO/Foreign National Status, New Delhi, Permanently Affiliated to JNTUK, Kakinada)

(Accredited by National Board of Accreditation & NAAC with 'A' Grade)

ODALAREVU – 533 210, Allavaram Mandal, East Godavari District, Andhra Pradesh

Academic Regulations (R18) for B.Tech. (Regular)

Applicable for the students of B.Tech. (Regular) from the Academic Year 2018-19 onwards

1. Award of B. Tech. Degree

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

(i) A student shall be declared eligible for the award of the B. Tech Degree, if he pursues a course of study in not less than four and not more than eight academic years

(ii) The candidate shall register for 165 credits and secure all the 165 credits.

2. Courses of study

The following courses of study are offered at present as specializations for the B. Tech. Courses with English as medium of Instruction.

S.No	Branch
1.	Civil Engineering
2.	Electrical and Electronics Engineering
3.	Mechanical Engineering
4.	Electronics and Communication Engineering
5.	Computer Science and Engineering

3. Distribution and Weightage of Marks

(i) The performance of a student in each semester shall be evaluated subject – wise with a maximum of 100 marks for theory subject and 75 marks for practical subject. The project work shall be evaluated for 200 marks.

(ii) For theory subjects the distribution shall be 40 marks for Internal Evaluation and 60 marks for the End - Examinations.

(iii) For theory subjects, during the semester there shall be 2 tests. The weightage of internal marks for 40 consists of Descriptive – 20, Assignment and attendance -10 Objective -10 (with 20 questions with a weightage of ½ Mark each). The objective examination is for 30 minutes duration. The subjective examination is for 90 minutes duration conducted for 30 marks and reduced to 20. Each subjective type test question paper shall contain 3 questions and all questions need to be answered. The Objective examination conducted for 10 marks and subjective examination conducted for 20 marks are to be added to the assignment and attendance marks of 10 for finalizing internal marks for 40.

Internal Marks can be calculated with 80% weightage for best of the two Mid examinations and 20% weightage for other Mid Exam. As the syllabus

is framed for 6 units, the 1st mid examination (both Objective and Subjective) is conducted in 1-3 units and second test in 4-6 units of each subject in a semester.

(iv) The end semester examination is conducted covering the topics of all Units for 60 marks. End Exam Paper: Part-A 1st Question is mandatory covering the entire syllabus which contains six 2 marks questions (one question from each unit) for 12 marks and in Part-B 4 Questions out of 6 Questions (one question from each unit) are to be answered with each carrying 12 marks. Part-A & Part-B put together gives for 60 marks.

(v) For practical subjects there shall be continuous evaluation during the semester for 25 internal marks and 50 end examination marks. The internal 25 marks shall be awarded as follows: day to day work -10 marks, Record -5 marks and the remaining 10 marks to be awarded by conducting an internal laboratory test. The end examination shall be conducted by the teacher concerned and external examiner.

(vi) For the subject having design and / or drawing, (such as Engineering Graphics, Engineering Drawing, Machine Drawing) and estimation, the distribution shall be 40 marks for internal evaluation (20 marks for day – to – day work, and 20 marks for internal tests) and 60 marks for end examination. There shall be two internal tests in a Semester and the Marks for 20 can be calculated with 80% weightage for best of the two tests and 20% weightage for other test and these are to be added to the marks obtained in day to day work.

(vii) For the seminar, each student has to be evaluated based on the presentation of any latest topic with report of 10-15 pages and a PowerPoint presentation of min 10 slides. The student shall collect the information on a specialized topic and prepare a technical report, showing his understanding over the topic, and submit to the department, which shall be evaluated by the Departmental committee consisting of Head of the department, seminar supervisor and a senior faculty member. The seminar report shall be evaluated for 50 marks. There shall be no external examination for seminar.

(viii) Industrial / Technical Training / Mini-Project shall be evaluated for a total of 75 marks for the assessment of the training report and viva-voce examination, conducted by a panel of examiners appointed by the college.

(ix) Out of a total of 200 marks for the project work, 80 marks shall be for Internal Evaluation and 120 marks for the End Semester Examination. The End Semester Examination (Viva – Voce) shall be conducted by the committee. The committee consists of an external examiner, Head of the Department and Supervisor of the Project. The evaluation of project work shall be conducted at the end of the IV year. The Internal Evaluation shall be on the basis of two seminars given by each student on the topic of his project and evaluated by an internal committee.

(x) Mandatory Non-Credit Courses:

a) A student is required to take up mandatory Non-Credit courses, Marks are awarded based on the day-to-day participation and performance in the activities organized under each event. A student is required to score 40 marks out of 100 marks despite putting up a minimum of 50% attendance to be declared satisfactory in each mandatory non-credit course. The B.Tech degree shall only be awarded if a student gets satisfactory grade in all mandatory non-credit courses and besides acquiring 165 credits of the B.Tech degree course.

b) A student whose shortage of attendance is condoned in the case of credit courses in that semester shall also be eligible for condoning shortage of attendance up to 10% in the case of mandatory non-credit courses also.

c) A student has to repeat the course if he does not get satisfactory grade in each non-credit course for getting the degree awarded.

(xi) MOOCs (Massive Open Online Courses): Students can pursue 20% of the courses online through MOOCs as per AICTE (Credit Framework for Online Learning Courses through SWAYAM) Regulation, 2016

(xii) Revaluation:

a) Students can submit the applications for revaluation, along with the prescribed fee receipt for revaluation of his answer script(s) of theory course(s) as per the notification issued by the Controller of Examinations.

b) The Controller of Examinations shall arrange for revaluation of such answer script(s).

c) An external examiner, other than the first examiner, shall revaluate the answer script(s).

d) If the variation in marks of two evaluations is less than 15% of total marks, the best mark of two evaluations shall be taken into consideration. If the variation in marks of two evaluations is more than 15% of total marks, there shall be third evaluation by an examiner other than the first two examiners. The best marks of two evaluations (which are nearer) shall be taken into consideration.

4. Attendance Requirements

(i) A student is eligible to write the University examinations if he acquires a minimum of 75% of attendance in aggregate of all the subjects.

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

(iii) Shortage of Attendance below 65% in aggregate shall not be condoned.

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

(v) Students whose shortage of attendance is not condoned in any semester are not eligible to write their end semester examination of that class.

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

(vii) A student will be promoted to the next semester if he satisfies the (i) attendance requirement of the present semester and (ii) minimum required credits.

(viii) If any candidate fulfils the attendance requirement in the present semester, he shall not be eligible for readmission into the same class.

5. Minimum Academic Requirements

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item no.4.

(i) A student is deemed to have satisfied the minimum academic requirements if he has earned the credits allotted to each theory/practical design/drawing subject/project by securing not less than 35% of marks in the end semester exam, and minimum 40% of marks in the sum total of the internal marks and end semester examination marks.

(ii) A student shall be promoted from first year to second year if he fulfils the minimum attendance requirement.

(iii) A student will be promoted from II year to III year if he fulfils the academic requirement of 40% of the credits up to either II year I semester or II year II semester from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in II year II semester.

(iv) A student shall be promoted from III year to IV year if he fulfils the academic requirements of 40% of the credits up to either III year I semester or III year II semester from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in III year II semester.

(v) A student shall register and put up minimum attendance in all 165 credits and earn all 165 credits.

6. Course Pattern

(i) The entire course of study is for four academic years, all the years are on semester pattern.

(ii) A student eligible to appear for the end semester examination in a subject, but absent from it or has failed in the end semester examination, may write the exam in that subject when conducted next.

(iii) When a student is detained for lack of credits / shortage of attendance, he may be re-admitted into the same semester / year in which he has been detained. However, the academic regulations under which he was first admitted shall continue to be applicable to him.

7. CGPA

Marks Range Theory (Max – 100)	Marks Range Lab (Max – 75)	Letter Grade	Level	Grade Point
≥ 90	≥ 67	O	Outstanding	10
≥80 to <90	≥60 to <67	S	Excellent	9
≥70 to <80	≥52 to <60	A	Very Good	8
≥60 to <70	≥45 to <52	B	Good	7
≥50 to <60	≥37 to <45	C	Fair	6
≥40 to <50	≥30 to <37	D	Satisfactory	5
<40	<30	F	Fail	0
			Absent	0

- **Computation of SGPA**

  The following procedure is to be adopted to compute the Semester Grade Point Average. (SGPA) and Cumulative Grade Point Average (CGPA):

  The SGPA is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student, i.e.,

  $$SGPA\ (Si) = \sum(Ci \times Gi) / \sum Ci$$

  Where Ci is the number of credits of the i^{th} course and Gi is the grade point scored by the student in the i^{th} course.

- **Computation of CGPA**

  The CGPA is also calculated in the same manner taking into account all the courses undergone by a student over all the semester of a programme, i.e.,

  $$CGPA = \sum (Ci \times Si) / \sum Ci$$

  Where Si is the SGPA of the i^{th} semester and Ci is the total number of credits in that semester.

- The SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.
- Equivalent Percentage = (CGPA – 0.75) x 10

8. Award of Class

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

Class Awarded	CGPA to be secured	From the CGPA secured

First Class with Distinction	≥ 7.75	from 165 Credits.
First Class	≥ 6.75	
Second Class	≥ 5.75 to < 6.75	
Pass Class	≥ 4.75 to < 5.75	

9. Minimum Instruction Days

The minimum instruction days for each semester shall be 90 working days.

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

11. There shall be no transfer from one college/stream to another within the Constituent Colleges and Units of Jawaharlal Nehru Technological University Kakinada.

12. Withholding of Results

If the student has not paid the dues, if any, to the university or if any case of indiscipline is pending against him, the result of the student will be withheld. His degree will be withheld in such cases.

13. Transitory Regulations

(i) Discontinued or detained candidates are eligible for readmission as and when next offered.

(ii) The readmitted students will be governed by the regulations under which the candidate has been admitted.

(iii) a) In case of transferred students from other Universities, the credits shall be transferred to BVCEC as per the academic regulations and course structure of the BVCEC.

b) Transfer candidates (from non-autonomous college affiliated to JNTUK):

A student who is following JNTUK curriculum, transferred from other college to this college in second year first semester or subsequent semesters shall join with the autonomous batch in the appropriate semester. Such candidates shall be required to pass in all the courses in the program prescribed by the Board of Studies concerned for that batch of students from that semester onwards to be eligible for the award of degree. However, exemption will be given in the courses of the semester(s) of the batch which he had passed earlier and substitute subjects are offered in their place as decided by the Board of Studies. The student has to clear all his backlog subjects up to previous semester by appearing for the supplementary examinations conducted by JNTUK for the award of degree. The total number of credits to be secured for the award of the degree will be the sum of the credits upto previous semester under JNTUK regulations and the credits prescribed for the semester in which a candidate joined after transfer and

subsequent semesters under the autonomous stream. The class will be awarded based on the academic performance of a student in the autonomous pattern.

c) Transfer candidates (from an autonomous college affiliated to JNTUK):

A student who has secured the required credits up to previous semesters as per the regulations of other autonomous institutions shall also be permitted to be transferred to this college. A student who is transferred from the other autonomous colleges to this college in second year first semester or subsequent semesters shall join with the autonomous batch in the appropriate semester. Such candidates shall be required to pass in all the courses in the program prescribed by the Board of Studies concerned for that batch of students from that semester onwards to be eligible for the award of degree. However, exemption will be given in the courses of the semester(s) of the batch which he had passed earlier and substitute subjects are offered in their place as decided by the Board of Studies. The total number of credits to be secured for the award of the degree will be the sum of the credits up to previous semester as per the regulations of the college from which he is transferred and the credits prescribed for the semester in which a candidate joined after transfer and subsequent semesters under the autonomous stream. The class will be awarded based on the academic performance of a student in the autonomous pattern.

14. Entrepreneurship:

(i) Gap Year - concept of Student Entrepreneur in Residence: Outstanding students who wish to pursue entrepreneurship full time can take a break of one year, after the first year with prior approval from the Principal. This may be extended to two years at the most and these two years would not be counted for the time for the maximum time for graduation. The Gap Year facility may be given to ensure syllabus continuity at the time of rejoining after an appraisal process by an incubator where the student is attached.

(ii) Student's entrepreneurs working on a Start-up idea from first year of college may be permitted to convert their Start-up project as their final year project towards degree completion. Mentors assigned by Incubators established may be allowed to conduct Viva Voce. Project reports certified by the Incubators may be considered for the award of credits.

(iii) Students may be permitted to undertake their Industrial Seminar / Lecture, Project Seminar and Industrial Visit at Technology Business Incubators where required facilities are being setup and subject to adherence to evaluation procedures of Institution by the mentors.

(iv) Provision for grace marks and attendance may be given on case to case basis upto 5% and 20% respectively in every semester for student Start-up

teams which have at least one woman as a cofounder, approved by competent authorities. Such grant is at the discretion of the Principal

15. General

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

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

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

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

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ACADEMIC REGULATIONS FOR B. TECH. (LATERAL ENTRY SCHEME)

Applicable for the students admitted into II year B.Tech. from the Academic Year 2019-20 onwards

1. Award of B. Tech. Degree

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

(i) A student shall be declared eligible for the award of the B. Tech Degree, if he pursues a course of study in not less than three academic years and not more than six academic years.

(ii) The candidate shall register for 125 credits and secure all the 125 credits.

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

3. Promotion Rule

(i) A student shall be promoted from second year to third year if he fulfils the minimum attendance requirement.

(ii) A student shall be promoted from III year to IV year if he fulfils the academic requirements of 40% of the credits up to either III year I semester or III year II semester from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in III year II semester.

4. Award of Class

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

Class Awarded	CGPA to be secured	
First Class with Distinction	≥ 7.75 with no subject failures	From the CGPA secured from 125 Credits from II Year to IV Year
First Class	≥ 6.75 with subject failures	
Second Class	≥ 5.75 to < 6.75	
Pass Class	≥ 4.75 to < 5.75	

The marks obtained in the internal evaluation and the end semester examination shall be shown separately in the marks memorandum.

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

MALPRACTICES RULES

DISCIPLINARY ACTION FOR / IMPROPER CONDUCT IN EXAMINATIONS

S.No	Nature of Malpractices/Improper conduct	Punishment
1. a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination).	Expulsion from the examination hall and cancellation of the performance in that subject only.
b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled.
3.	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and

		forfeits the seat. The performance of the original candidate, who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.
4.	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters	Cancellation of the performance

	to the examiners or writes to the examiner requesting him to award pass marks.	in that subject.
6.	Refuses to obey the orders of the Chief Superintendent/Assistant Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with

		forfeiture of seat.
8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.
9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them.
10.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year.

11.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year examinations.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the University for further action to award suitable punishment.	

Course Structure

I B.Tech. – I Semester

S.No.	Course Code	Subjects	L	T	P	C
1	**18HS1T01**	English-1	2			2
2	**18BS1T01**	Linear Algebra & Calculus	2	1	0	3
3	**18BS1T02**	Differential Equations and Numerical Methods	2	1		3
4	**18ES1T06**	Programming for problem solving-I	2			3
5	**18ES1L04**	Manufacturing Practices Lab	1		2	3
6	**18BS1T05**	Semiconductor Physics and Devices	2	1		3
7	**18ES1L05**	Programming for problem solving-I Lab			2	1
8	**18BS1L01**	Semiconductor Physics and Devices Lab			2	1
9	**18HS1M01**	Induction Training	2			0
					Total credits:	19

I B.Tech. – II Semester

S.No.	Course Code	Subjects	L	T	P	C
1	**18HS2T02**	English-II	2			2
2	**18BS2T03**	Transforms and Complex Variables	2	1		3
3	**18ES2T02**	Network Analysis	2	1		3
4	**18BS2T08**	Applied Chemistry	2	1		3
5	**18ES2T07**	Programming for problem solving-II	2			3
6	**18ES2T05**	Engineering Drawing	1	0	2	3
7	**18HS2L01**	English - Communication Skills Lab			2	1
8	**18BS2L04**	Applied Chemistry Lab			2	1
9	**18ES2L06**	Programming for problem solving-II Lab			2	1
10	**18ES2L02**	Network Analysis Lab			2	1
11	**18HS2M02**	Indian Constitution	2			0
					Total credits:	21

II B.Tech. – I Semester

S.No.	Course Code	Subjects	L	T	P	C
1	**18EC3T01**	Electronic Devices and Circuits	3			3
2	**18EC3T02**	Digital System Design – I	3			3
3	**18EC3T03**	Signals and Systems	2	1		3
4	**18CS3T09**	Object Oriented Programming	3			3
5	**18EC3T04**	Random Variables and Stochastic Process	2	1		3
6	**18EE3T04**	Electrical Technology	3			3
7	**18EC3L01**	Electronic Devices and Circuits Lab			3	1.5
8	**18EE3L01**	Electrical Technology Lab			3	1.5
10	**18CS3L05**	Object Oriented Programming Lab			2	1
11	**18BS3M03**	Environmental Science	1			0
					Total credits:	**22**

II B.Tech. – II Semester

S.No.	Course Code	Subjects	L	T	P	C
1	**18EC4T06**	Electronic Circuit Analysis	3			3
2	**18EC4T07**	Control Systems	2	1		3
3	**18EC4T08**	Electromagnetic Waves and Transmission Lines	2	1		3
4	**18EC4T09**	Analog Communications	3			3
5	**18EC4T10**	Pulse and Digital Circuits	3			3
6	**18HS4T03**	Managerial Economics & Financial Analysis	3			3
7	**18EC4L02**	Electronic Circuit Analysis Lab			3	1.5
8	**18EC4L03**	Analog Communications Lab			3	1.5
9	**18HS4M04**	Essence of Indian Traditional Knowledge	1			0
					Total credits:	**21**

III B.Tech. – I Semester

S.No.	Course Code	Subjects	L	T	P	C
1	**18EC5T11**	Micro Processors and Architectures	3			3
2	**18EC5T12**	Linear IC Applications	3			3
3	**18EC5T13**	Digital System Design - II	3			3
4	**18HS5T04**	Management Science	3			3
5	**18EC5T14**	Antenna and Wave Propagation	2	1		3
6	**18EC5L05**	Pulse and Digital Circuits Lab			3	1.5
7	**18EC5L06**	IC Applications Lab			3	1.5
8	**18EC5L07**	Digital System Design Lab			3	1.5
9	**18HS5M05**	Foreign Languages	1			0
10	**18EC5C01**	Certification Course			2	1
11	**18EC5M06**	Industrial Visit				0
					Total credits:	**20.5**

III B.Tech. – II Semester

S.No.	Course Code	Subjects	L	T	P	C
1	**18EC6T16**	Embedded Systems	3			3
2	**18EC6T17**	VLSI Design	3			3
3	**18EC6T18**	Digital Signal Processing	2	1		3
4	**18EC6T19**	Digital Communications	3			3
5	**OPEN ELECTIVE**		3			3
	18CS6E06	**Python Programming**				
	18ME6E06	Industrial Robotics				
	18EE6E03	Power Electronics				
	18EC6E01	Information Theory and Coding				
	18EC6E02	Bio-Medical Instrumentation				
	18EC6E03	Artificial Neural Networks				
6	**18EC6L08**	**Digital Signal Processing Lab**			3	1.5

7	**18EC6L09**	VLSI Design Lab			3	1.5
8	**18EC6L10**	Digital Communications Lab			3	1.5
9	**18EC6S01**	Technical Seminar			2	1
10	**18EC6M07**	Internship				0
				Total credits:		**20.5**

IV B.Tech. – I Semester

S.No.	Course Code	Subjects	L	T	P	C
1	**18EC7T21**	Micro Wave Engineering	3			3
2	**18EC7T22**	**Internet of Things**	3			3
3	**18EC7T23**	**Electronic Measurements and Instrumentation**	3			3
4	**18EC7T24**	Optical Communications	3			3
5	**Elective I**		3			3
	18EC7D01	Electronic Switching Systems				
	18EC7D02	Radar Engineering				
	18EC7D03	System Design through Verilog				
	18EC7D04	Electromagnetic Interference(EMI) / Electromagnetic Compatibility (EMC)				
6	**Elective II**		3			3
	18EC7D05	Satellite Communications				
	18EC7D06	Analog IC Design				
	18EC7D07	Network security & Cryptography				
	18EC7D08	Micro Electro - Mechanical Systems				
	18EC7D09	**Digital TV / Display devices**				
7	**18EC7L11**	Micro Wave Engineering & Optical Communication Lab			3	1.5
8	**18EC7L12**	**Embedded Systems & IoT Lab**			3	1.5
9	**18EC7P01**	Lab oriented Mini Project			4	2
				Total credits:		**23**

IV B.Tech. – II Semester

S.No.	Course Code	Subjects	L	T	P	C
1	**18EC8T25**	Cellular Mobile Communications	3			3
2	**18EC8T26**	**Digital Image Processing.**	3			3
3	**18EC8T27**	Computer Networks.	3			3
4	**Elective III**		3			3
	18EC8D11	**Wireless Sensor Networks**				
	18EC8D12	DSP Processors & Architectures				
	18EC8D13	Digital IC Design				
	18EC8D14	FPGA Architectures				
	18CS8D10	**Machine Learning**				
5	**18EC8P02**	Project				6
6	**18HS8M08**	Professional Ethics And Human Values				0
					Total credits:	**18**

I Year - I Semester

18HS1T01 – ENGLISH – I

L	T	P	C
2			2

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training the students to acquire communicative competence, the syllabus has been designed to develop linguistic and communicative competence of the students of Engineering.

As far as the detailed textbooks are concerned, the focus should be on the skills of listening, speaking, reading and writing. The non-detailed textbooks are meant for extensive reading for pleasure and profit.

Thus the stress in the syllabus is primarily on the development of communicative skills and fostering of ideas.

Course Objectives:

COB 1: To improve the language proficiency of the students in English with emphasis on LSRW skills.
COB 2: To enable the students to study and comprehend the prescribed lessons and subjects more effectively relating to their theoretical and practical components.
COB 3: To develop the communication skills of the students in both formal and informal situations.
COB 4: To appraise the learner how Gandhi spent a period of three years in London as a student.
COB 5: To make the learners rediscover India as a land of knowledge.
COB 6: To discuss how scientific point of view seeks to arrive at the truth without being biased by emotion.
COB 7: To inform the learner that all men are in peril.
COB 8: To make the students understand the importance of work

LISTENING SKILLS:

Objectives:

1. To enable the students to appreciate the role of listening skill and improve their pronunciation.
2. To enable the students to comprehend the speech of people belonging to different backgrounds and regions.
3. To enable the students to listen for general content, to fill up information and for specific information.

SPEAKING SKILLS:

Objectives:

1. To make the students aware of the importance of speaking for their personal and professional communication.
2. To enable the students to express themselves fluently and accurately in social

and professional success.

3. To help the students describe objects, situations and people.
4. To make the students participate in group activities like role-plays, discussions and debates.
5. To make the students participate in just a minute talks.

READING SKILLS:

Objectives:

1. To enable the students to comprehend a text through silent reading.
2. To enable the students to guess the meanings of words, messages and inferences of texts in given contexts.
3. To enable the students to skim and scan a text.
4. To enable the students to identify the topic sentence.
5. To enable the students to identify discourse features.
6. To enable the students to make intensive and extensive reading.

WRITING SKILLS:

Objectives:

1. To make the students understand that writing is an exact formal skills.
2. To enable the students to write sentences, paragraphs, e-mails and essays.
3. To make the students identify and use appropriate vocabulary.
4. To enable the students to narrate and describe.
5. To enable the students to write coherently and cohesively.

Course Outcomes:

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

CO 1: Summarize how Gandhi grew in introspection.

CO 2: Explain the conditions to achieve a higher quality of life, strength and sovereignty of a developed nation.

CO 3: Identify the scientific attitude to solve many problems which we find difficult to tackle.

CO 4: To think clearly and logically and write clearly and logically.

CO 5: Identify that all men can come together and avert the peril.

CO 6: Interpret humorous texts and use of words for irony.

CO 7: Rephrase coherent writing in political, social and religious background

CO 8: Demonstrate writing and basic concepts of grammar skills.

Methodology:

1. The class is to be learner-centred where the learners are to read the texts to get a comprehensive idea of those texts on their own with the help of the peer group and the teacher.
2. Integrated skill development methodology has to be adopted with focus on individual language skills as per the tasks/exercise.
3. The tasks/exercises at the end of each unit should be completed by the learners only and the teacher intervention is permitted as per the complexity of the task/exercise.
4. The teacher is expected to use supplementary material wherever necessary and also generate activities/tasks as per the requirement.

5. The teacher is permitted to use lecture method when a completely new concept is introduced in the class.

Recommended Topics:

UNIT-I:

1. IN LONDON: M.K.GANDHI (Detailed)
2. AN IDEAL FAMILY (Non-Detailed)

UNIT-II:

1. THE KNOWLEDGE SOCIETY- APJ ABDUL KALAM (Detailed)
2. WAR (Non-Detailed)

UNIT-III:

1. THE SCIENTIFIC POINT OF VIEW- J.B.S. HALDANE (Detailed)
2. THE VERGER (Non-Detailed)

UNIT-IV:

1. PRINCIPLES OF GOOD WRITING –L.A HILL (Detailed)
2. THE SCARECROW (Non-Detailed)

UNIT-V:

1. MAN'S PERIL-BERTRAND RUSSELL (Detailed)
2. A VILLAGE LOST TO THE NATION (Non-Detailed)

UNIT-VI:

1. LUCK—MARK TWAIN (Detailed)
2. MARTIN LUTHER KING AND AFRICA(Non-Detailed)

Textbooks:

Detailed Text Book: 'English Essentials' by Ravindra Publications.

Non Detailed Text Book : Panorama- A course on Reading by Oxford University Press Pvt. Ltd. Publishers.

I Year - I Semester

18BS1T01 Linear Algebra & Calculus

L	T	P	C
2	1		3

Course Objectives:

COB 1: To equip the students with the necessary mathematical skills and techniques those are essential for an engineering course.

COB 2: To help the students acquire a necessary base to develop analytical and design skills**:**

Course Outcomes:

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

CO 1: Find rank of the given matrix and is able to find the solution of given system of linear equations.

CO 2: Finds eigen values, eigen vectors and is able to understand their applications.

CO 3: Understand methods of solving differential equations of first order and first degree and is able to apply on physical applications.

CO 4: Understand methods of solving higher order differential equations and is able to apply on physical applications.

CO 5: Understand vector differentiation Gradient- Divergence- Curl and their physical Problems

CO 6: Apply Green's, Gauss, Stokes Theorem To Calculate Line Surface and Volume integral

UNIT I:- Matrices and Linear systems of equations

Rank of a Matrix-Echelon form-Normal form – Solution of linear systems – Gauss elimination - Gauss Jordon- Gauss Seidal methods-Solutions of homogenous equations.

Applications: Finding the current in electrical circuits.

UNIT II:- Eigen values - Eigen vectors

Eigen values - Eigen vectors– Properties – Cayley-Hamilton theorem(statement only) - Inverse and powers of a matrix by using Cayley-Hamilton theorem-Diagonalization.

Applications: Free vibration of a two-mass system

Unit III:- Differential equations of first order and first degree

Linear-Bernoulli-Exact-Reducible to exact differential equations

Applications: - Newton's Law of cooling-Law of natural growth and decay-Orthogonal trajectories

Unit IV:-Linear differential equations of higher order

Non-homogeneous equations of higher order with constant coefficients with RHS term of the type e^{ax},
$\sin ax, \cos ax, polynomials\ in\ x, e^{ax}V(x), xV(x)$- Method of Variation of parameters.

Applications: LCR circuit,.

UNIT V:- Vector Differentiation

Gradient- Divergence- Curl - Laplacian and second order operators -Vector identities.

Applications: Equation of continuity, potential surfaces

UNIT VI :- Vector Integration

Line integral, potential function, surface and volume integrals, vector integral theorems: greens-Gauss divergence-stokes theorem (statements only) and related problems.

Applications: work done by force.

Text Books:

1. **B.S.GREWAL,** Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.
2. **N.P.Bali**, Engineering Mathematics, Lakshmi Publications.

Reference Books:

1. **Dr T K V Iyengar**, Engineering Mathematics, S. chand Publications
2. **ERWIN KREYSZIG,** Advanced Engineering Mathematics, 10th Edition, Wiley-India
3. **DAVID KINCAID, WARD CHENEY**, Numerical Analysis-Mathematics of Scientific Computing, 3rdEdition, Universities Press.
4. **DEAN G. DUFFY,** Advanced engineering mathematics with MATLAB, CRC Press

I Year - I Semester

18BS1T02 Differential Equations and Numerical Methods	L	T	P	C
	2	1		3

Course Objectives:

COB 1: To equip the students with the necessary mathematical skills and techniques those are essential for an engineering course.

COB 2: To help the students acquire a necessary base to develop analytical and design skills.

Course Outcomes:

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

CO 1: Understand numerical methods of solving given equation.

CO 2: find value of function and able to find integral value using numerical methods

CO 3: solve ordinary differential equations by using numerical methods

CO 4: understand partial differentiation and able to apply in finding maxima and minima

CO 5: understand partial differential equations and find their solutions.

CO 6 : To Identify and solve Different Types of P.D.E

Unit I:- Solution of Algebraic and Transcendental Equations

Introduction- Bisection method – Method of false position – Iteration method – Newton- Raphson method (One variable).

Unit II:- Interpolation and Numerical Integration

Introduction- Errors in polynomial interpolation – Finite differences- Forward differences- Backward differences –Central differences – Symbolic relations and separation of symbols - Differences of a polynomial-Newton's formulae for interpolation – Interpolation with unequal intervals - Lagrange's interpolation formula-Trapezoidal rule- Simpson's 1/3rd and 3/8th rule.

Unit III:- Numerical solution of Ordinary Differential Equations

Solution of ordinary differential equations by Taylor's series-Picard Method of successive approximations-Euler's method - Runge-Kutta method (second and fourth order).

UNIT IV:- Partial differentiation

Function-Euler's theorem-Total derivative-Chain rule-Generalized Mean value theorem Introduction- Homogeneous for single variable (without proof)-Taylor's and Mc Laurent's series expansion of functions of two variables– Functional dependence- Jacobian.

Applications: Maxima and Minima of functions of two variables without constraints.

Unit V:- Partial Differential Equations- I

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

Unit VI:- Partial Differential Equations- II

Second and higher order linear equations-Solution to homogenous and non-homogeneous equations- separation of variables method.

Text Books:

1. **B.S.GREWAL,** Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.
2. **N.P.Bali**, Engineering Mathematics, Lakshmi Publications.
3 **Dr T K V Iyengar**, Engineering Mathematics, S. chand Publications

Reference Books:

1. **ERWIN KREYSZIG,** Advanced Engineering Mathematics, 10th Edition, Wiley-India
2. **V.RAVINDRANATH and P.VIJAYALAKSHMI,** Mathematical Methods, Himalaya Publishing House.
3. **DEAN G. DUFFY,** Advanced engineering mathematics with MATLAB, CRC Press
4. **DAVID KINCAID, WARD CHENEY**, Numerical Analysis-Mathematics of Scientific Computing, 3rd Edition, Universities Press.

I Year - I Semester

18ES1T06 Programming for problem solving-I

L	T	P	C
2			3

Course Outcomes:

- To formulate simple algorithms for arithmetic and logical problems and Translate the algorithms to programs (in C language)
- To test and execute the programs and correct syntax and logical errors
- To implement conditional branching, iteration and recursion
- To decompose a problem into functions and synthesize a complete program using divide and conquer approach
- To use arrays, pointers and structures to formulate algorithms and programs
- To apply programming to solve matrix addition and multiplication problems and searching and sorting problems.

UNIT-I:

Introduction to C Programming- History, evolution of C**,** The Software Development Process, Development of C Algorithms.

C Tokens, The main() Function, I/O Function, Data Types**,** Operators, evaluation of Expression, Variable , Declarations and Initializations. Operator Precedence and Associativity.

Assignment - Implicit Type Conversions, Explicit Type Conversions (Casts), Assignment Variations, Mathematical Library Functions, Interactive Input, Formatted Output, Format Modifiers.

UNIT -II:

Flow of Control

Selection: if-else Statement, nested if, examples, Multi-way selection: switch, else-if, examples. **Repetition**: Basic Loop Structures, Pretest and Posttest Loops, Counter-Controlled and Condition-Controlled Loops, The while Statement, The for Statement, Nested Loops, The do-while Statement.

UNIT-III

Arrays & Strings

Arrays:

One-Dimensional Arrays, Input and Output of Array Values, Array Initialization, Arrays as Function Arguments,

Two-Dimensional Arrays, Matrices, Larger Dimensional Arrays, basics of searching and sorting.

Strings: String Fundamentals, String Input and Output, String Processing, Library Functions

UNIT-IV:

Function and Parameter Declarations, Returning a Value, Functions with Empty Parameter Lists, Variable Scope, Variable Storage Class, Local Variable Storage Classes, Global Variable Storage Classes, Pass by Reference, Passing Addresses to a Function, Storing Addresses, Using Addresses.

Case Study: Swapping Values, Recursion - Mathematical Recursion, Recursion versus Iteration.

UNIT-V:

Pointers

Pointers: Concept of a Pointer, Initialization of pointer variables, pointers as function arguments, passing by address, address arithmetic, character pointers and functions, pointers to pointers, Dynamic memory management functions, command line arguments.

UNIT-VI:

Structures: Derived types, Structures declaration, Initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions,

Self referential structures.

Unions, declaration, Initialization of Unions, difference between Structures and Unions-memory allocations, type def, bit-fields.

Data Files: Declaring, Opening, and Closing File Streams, Reading from and Writing to Text Files, Random File Access

Outcomes:

Text Books:

1.The C programming Language, Dennis Richie and Brian Kernighan, Pearson Education.
2.Pointers in C by Yaswant Kanetkar.
3.C Programming-A Problem Solving Approach, Forouzan, Gilberg, Cengage

Reference Books:

1.Programming with C, Balguruswamy.
2.Programming in C, Reema Thareja, OXFORD.
3.C by Example, Noel Kalicharan, Cambridge.

I Year - I Semester

18ES1L04 Manufacturing Practices Lab

L	T	P	C
1		2	3

Course Objectives

COB 1: To demonstrate the usage of different hand operated power tools

COB 2: To gain a good basic working knowledge required for the production of various engineering products

COB3: To provide hands on experience about use of different engineering materials, tools, equipments and processes those are common in the engineering field w.r.t. carpentry, Fitting, black smithy, tin smithy and wiring connections in house wiring

COB 4: To have practical exposure to various welding and joining processes.

COB 5: To know the application of various machines for manufacturing product by machining processes

.COB 6: To know and identify various electronic elements and their uses and troubleshooting methods.

Course outcomes:

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

CO1: Understand basic hardware and software tools through practical exposure.

CO2: Identify the various tools required to do the jobs in the fitting trade

CO3: Make wiring connections using different house wiring elements and study the electronic elements.

CO4 : Choose various machining methods and machines for metal removal.

CO5: Perform various joining methods like welding , soldering and Brazing.

CO6: Identify the black smithy and tin smithy tools used in practice and their uses in doing different jobs.

Part – I Manufacturing Practices Theory

Unit – I

Casting - Basic concepts of sand casting, different casting methods

Forming- Basic concepts of Hot working and cold working; Different forming methods like rolling ,forging, extrusion and sheet metal

Unit - II

Machining methods: Basic concepts of lathe, Drilling, Shaping, Slotting, and grinding machines; Basic concepts of CNC

Joining : Basic concepts of Welding (arc welding , gas welding and Gas cutting), soldering, brazing.

Plastic Injection moulding methods: Types of plastics and fabrication methods i.e. Injection moulding, Blow moulding

Unit – III

Fitting : Various hand tools, power tools used in fitting and various operations.

Carpentry : Hand tools, power tools used in carpentry, various joints and operations

Electrical & Electronics:

Elements of house wiring, concepts of single and three phase power supply; concept of transistor, resistor, capacitor; active devices like diodes, Op-amps, timer IC

Component testing, trouble shooting, spice soft ware.

Text Books:

(i) Elements of Workshop Technology , Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K. , Vol. I and Vol. II, Media promoters and publishers private limited, Mumbai.

(ii) Manufacturing Engineering and Technology, Kalpakjian S. And Steven S. Schmid, Pearson Education India Edition,

Reference Books:

(iii) Manufacturing Technology 1, Gowri P. Hariharan and A. Suresh Babu" Pearson Education,

(iv) Processes and Materials of Manufacture, Roy A. Lindberg, Prentice Hall India.

(v) Manufacturing Technology , Vol. I & Vol. II ,Rao P.N.,Tata McGrawHill House.

Part - II : <u>Manufacturing Practice lab</u>

Fitting 1.V-Fit

2.Square-Fit

3.Half round fit

Tin smithy	1.Cylinder
	2.Open scoop
	3.Square box
Carpentry	1.cross-lap joint
	2.T-lap
	3.Dovetail joint
Black smithy	1.Round rod to Square
	2.S-Hook
	3.Round rod to flat ring
Welding	1. Butt joint
	2. Lap joint
	3. T-Joint
Machine shop	1.Plain turning
	2. Drilling a hole on MS plate
	3. Key way cutting on a shaft
Electrical	
(House wiring)	1. Parallel/series connection of two bulbs
	2. Light controlled by two way switches.
	3. Florescent lamp
Electronics	1.Component testing
	2. Trouble shooting basic problems of PCB s
	3. Studying component behavior using SPICE software

I Year - I Semester

18BS1T05 Semiconductor Physics and Devices

L	T	P	C
2	1		3

Objective

The objective of this course is to develop scientific temper and analytical capability through learning physical concepts and their applications in science and technology. Comprehension of some basic semiconductor concepts which will enable the students to logically solve engineering problems.

Course Outcomes:

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

CO 1: To understand the basic concepts of Quantum Theory.

CO 2: To apply the knowledge of Quantum mechanics to solids

CO3: Aims to equip to understand the concepts of Semiconductor through crystal structures.

CO 4: Realize the principles of carrier concentration in semiconductors.

CO 5: Summarize the basic theories of semiconductors to junction theory

CO 6: To comprehend the basic concepts of semiconductor physics and apply the same to electronic devices.

Unit I

Introduction to Quantum Mechanics

Introduction to Quantum mechanics, Dual nature matter, Debroglie Wavelength, Phase and Group velocity, Uncertainty principle, Wavefunction, Time-dependent and time independent, Schrodinger equation for Free-particle and one dimensional problem.

Unit II

Quantum Theory of Solids

Free electron theory of metals, Quantum free electron theory, Occupation probability, Fermi level, density of states, Bloch's theorem for particles in a periodic potential, Kronig-Penney model and origin of energy bands, Effective mass of electron.

UNIT III

Fundamental Concepts of Semiconductors

Introduction, Crystal Structure, lattice, basis, 2D representation of Lattice, Bravais lattice, seven crystal system, packing fraction for SC, BCC, FCC, miller indices-directions-planes, X-ray diffraction-Braggs Law, Common semiconductor crystal structures.

UNIT IV

Semiconductor Physics

Intrinsic and extrinsic semiconductors, Direct and indirect semiconductors, Dependence of Fermi level on carrier-concentration and temperature (equilibrium carrier statistics), Carrier generation and recombination, Carrier transport: diffusion and drift, Hall Effect.

UNIT V

Semiconductor Junction Theory

p-n junction diode: working, forward bias, reverse bias, I-V characteristics of p-n diode, Zener diode: working, I-V characteristics of Zener diode, Application of Zener diode-Voltage Stabilizer, Application of p-n diode: Half and Full wave rectifier.

UNIT VI

Special Purpose Semiconductor Diodes

Tunnel diode, photo diode, solar cell, LED, PIN Diode, Principle, working and Applications for all devices

Textbooks:

1. Semiconductor devices and circuits by Aloke K Dutta, Publisher: Oxford University Press

2. Pillai, S. O., Solid State Physics,5th edition, New Age International (P) Ltd., New Delhi,
2004

3. J. Singh, Semiconductor Optoelectronics: Physics and Technology, McGraw-Hill Inc. (1995).

I Year - I Semester

18ES1L05 Programming for problem solving-I Lab

L	T	P	C
		2	1

COURSE OBJECTIVES:

Exercise - 1

a) Demonstrate basic Linux command to write C program , compile and Run
b) Write a program to print your details
c) Write a program for addition, subtraction, multiplication and division

Exercise - 2

a) Write a C Program to convert Celsius to Fahrenheit and vice versa
b) Calculate simple and compound Interest

Exercise - 3 Control Flow - I

a) Write a C Program to Find Whether the Given Year is a Leap Year or not.
b) Write a C Program to decide a number is even or odd

Exercise – 4 Control Flow - II

a) Write a C Program to Find Whether the Given Number is
Prime Number
Armstrong Number
b) Write a C program to print Floyd Triangle
c) Write a C Program to print Pascal Triangle

Exercise – 5 Control Flow - III

a) Write a C Program to make a simple Calculator to Add, Subtract, Multiply or Divide Using switch…case
b) Write a C Program to grade a student based on his percentage.

Exercise – 6 Functions

a) Write a C Program demonstrating of parameter passing in Functions and returning values.
b) Write a C Program illustrating Fibonacci, Factorial with Recursion without Recursion
c) Write a C Program FOR Towers of Hanoi

Exercise – 7 Arrays

Demonstration of arrays
a) Search-Linear.
b) Sorting-Bubble, Selection.
c) Operations on Matrix.

Exercise – 8 Strings

a) Implementation of string manipulation operations **with** library function.
i) Copy ,
ii) concatenate
iii) length

iv) compare

b) Implementation of string manipulation operations **without** library function.

i) copy
ii) concatenate
iii) length
iv) compare

Exercise – 9 Arrays and Pointers

a) Write a C Program to Access Elements of an Array Using Pointer
b) Write a C Program to find the sum of numbers with arrays and pointers

Exercises - 10 Structures

a) Write a C Program to Store Information of a Book Using Structure
b) Write a C Program to Store Information Using Structures with Dynamically Memory Allocation
c) Write a C Program to Add Two Complex Numbers by Passing Structure to a Function

Exercise – 11 Unions

a) Write a C Program to print the student details by using Unions
b) Write a C Program to demonstrate bit fields

Exercise – 12 Dynamic Memory Allocations

a) Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using malloc () function.

b) Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using calloc () function. Understand the difference between the above two programs

Exercise -13 Files

a) Write a C programming code to open a file and to print it contents on screen.
b) Write a C program to copy files

Exercise - 14 Files Continued

a) Write a C program merges two files and stores their contents in another file.
b) Write a C program to delete a file.

PBS

1.Write a C Program to convert decimal to binary and hex (using switch call function the function)
2.Write a C program using self referential structures

I Year - I Semester

18BS1L01 Semiconductor Physics and Devices Lab

L	T	P	C
		2	1

Objective: Training field oriented Engineering graduates to handle instruments and their design

methods to improve the accuracy of measurements.

Outcome: Physics lab curriculum gives fundamental understanding of design of an instrument with

targeted accuracy for physical measurements.

LIST OF EXPERIMENTS:

1. Study of I/V Characteristics of p - n diode.
2. I/V characteristics of Zener diode.
3. Energy Band gap of a Semiconductor p - n junction.
4. Determination of Planck's constant using photocell.
5. Study of LED I/V Characteristics
6. I/V characteristics of Photodiode.
7. To measure R_L Vs Ripple factor and R_L Vs Regulation of Full-Wave Rectifier with filter and without filter.
8. To measure R_L Vs Ripple factor and R_L Vs Regulation of Half-Wave Rectifier with filter and without filter.
9. To calibrate time base of the Cathode Ray Oscilloscope and frequency of the unknown source.
10. Thermistor

I Year - II Semester

		L	T	P	C
1818HS2T02	**English-II**	**2**			**2**

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training the students to acquire communicative competence, the syllabus has been designed to develop linguistic and communicative competence of the students of Engineering.

As far as the detailed Textbooks are concerned, the focus should be on the skills of listening, speaking, reading and writing. The non-detailed Textbooks are meant for extensive reading for pleasure and profit.

Thus the stress in the syllabus is primarily on the development of communicative skills and fostering of ideas.

Course Objectives:

COB 1: To improve the language proficiency of the students in English with emphasis on LSRW skills.
COB 2: To enable the students to study and comprehend the prescribed lessons and subjects more effectively relating to their theoretical and practical components.
COB 3: To develop the communication skills of the students in both formal and informal situations.
COB 4: To make the learner understand how modern life has been shaped by Technology.
COB 5: To inspire the learners by inventions and contributions of great achievers.

LISTENING SKILLS:
Objectives:

1 To enable the students to appreciate the role of listening skill and improve their pronunciation.
2 To enable the students to comprehend the speech of people belonging to different backgrounds and regions.
3 To enable the students to listen for general content, to fill up information and for specific information.

SPEAKING SKILLS:
Objectives:

1 To make the students aware of the importance of speaking for their personal and professional communication.
2 To enable the students to express themselves fluently and accurately in social

and professional success.

3 To help the students describe objects, situations and people.
4 To make the students participate in group activities like role-plays, discussions and debates.
5 To make the students participate in Just a Minute talks.

READING SKILLS:
Objectives:

1 To enable the students to comprehend a text through silent reading.
2 To enable the students to guess the meanings of words, messages and inferences of texts in given contexts.
3 To enable the students to skim and scan a text.
4 To enable the students to identify the topic sentence.
5 To enable the students to identify discourse features.
6 To enable the students to make intensive and extensive reading.

WRITING SKILLS:
Objectives:

1 To make the students understand that writing is an exact formal skills.
2 To enable the students to write sentences and paragraphs.
3 To make the students identify and use appropriate vocabulary.
4 To enable the students capable of note-making.
5 To make the students to write formal and informal letters.
6 To enable the students to write CV
7 To enable the students to write technical reports.

Course Outcomes:

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

CO 1: Emphasizes that the ultimate aim of Education is to enhance wisdom.
CO 2: Promote peaceful co-existence and universal harmony among people and society.
CO 3: Imparts the students to manage different cultural shocks due to globalization.
CO 4: States the need to re examine its traditions when they are out dated.
CO 5: Explain several inputs to protect environment for the sustainability of the future generations.
CO 6: Describe the characteristic traits of renowned scientists who contributed enormously to the scientific advancement of India.
CO 7: Demonstrate writing and basic concepts of grammar skills.

Methodology:

1 The class is to be learner-centred where the learners are to read the texts to get a comprehensive idea of those texts on their own with the help of the peer group and the teacher.
2 Integrated skill development methodology has to be adopted with focus on individual language skills as per the tasks/exercise.
3 The tasks/exercises at the end of each unit should be completed by the learners only and the teacher intervention is permitted as per the complexity of the task/exercise.
4 The teacher is expected to use supplementary material wherever necessary and also generate activities/tasks as per the requirement.
5 The teacher is permitted to use lecture method when a completely new concept is introduced in the class.

Recommended Topics:

UNIT-I:

1. THE GREATEST RESOURCE- EDUCATION (Detailed)
2. G.D. NAIDU (Non-Detail)

UNIT-II:

1. A DILEMMA-A LAYMAN LOOKS AT SCIENCE (Detailed)
2. G.R. GOPINATH (Non-Detail)

UNIT-III:

1. CULTURAL SHOCK: ADJUSTMENT TO NEW ENVIRONMENTS (Detailed)
2. SUDHA MURTHY (Non-Detail)

UNIT-IV:

1. THE LOTTERY (Detailed)
2. J.C. BOSE (Non-Detail)

UNIT-V:

1. THE HEALTH THREATS OF CLIMATE CHANGE (Detailed)
2. HOMI JEHANGIR BHABHA (Non-Detail)

UNIT-VI:

1. THE CHIEF SOFTWARE ARCHITECT
2. VIKRAM SARABHAI (Non-Detail)

Prescribed Text Books:

Detailed Text Book: 'English Encounters' by Maruthi Publications.

Non Detailed Text Book: 'Trail Blazers' by Orient Black Swan Pvt. Ltd. Publishers

I Year - II Semester

18BS2T03 Transforms and Complex Variables

L	T	P	C
2	1		3

Course Objectives:

COB 1: To equip the students with the necessary mathematical skills and techniques those are essential for an engineering course.

COB 2: To help the students acquire a necessary base to develop analytical and design skills.

Course Outcomes:

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

CO 1: Understand properties and different shifting theorems of Laplace transforms .

CO 2: Solve given ordinary differential equation using given initial conditions.

CO 3: Understand and will find Fourier series of given function.

CO 4: Understand Fourier Transforms for given function.

CO 5: Understand complex functions of complex variables and will be able to find analytic Function.

CO 6: Find definite integral of given complex function using Cauchy's theorem and residues.

UNIT I:- Laplace transforms

Laplace transforms of standard functions-Shifting theorems - Transforms of derivatives and integrals – Unit step function –Dirac's delta function

UNIT II:- Inverse Laplace transforms

Inverse Laplace transforms of standard functions-Shifting theorems - Transforms of derivatives and integrals-Convolution theorem (with out proof).

Applications: Solving ordinary differential equations (initial value problems) using Laplace transforms

Unit III:- Fourier Series

Introduction-Periodic functions-Fourier series of-Periodic function-Dirichlet's conditions-Even and odd functions-Change of Interval-Half range sine and cosine series.

Unit IV:- Fourier Transforms

Fourier integral theorem (without proof)-Fourier sine and cosine integrals-sine and cosine transforms-properties-inverse transforms-Finite Fourier transforms.

Unit-V:- Complex variable and Differentiation

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**.**

Unit-VI: Complex variables and Integration

Line integral of a complex function, Cauchy's theorem (only statement) -Cauchy's Integral Formula Taylor's series, McLaren's series expansion, Laurent's series-Zeros of an analytic function- types of Singularities-pole of order m, simple pole- Residues, Residue theorem, Calculation of residues, Residue at a pole of order m

Text Books:

1. **B.S.GREWAL,** Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.
2. **N.P.Bali**, Engineering Mathematics, Lakshmi Publications.

Reference Books:

1. **DEAN G. DUFFY,** Advanced engineering mathematics with MATLAB, CRC Press
2. **V.RAVINDRANATH and P.VIJAYALAKSHMI,** Mathematical Methods, Himalaya Publishing House.
3. **ERWIN KREYSZIG,** Advanced Engineering Mathematics, 10th Edition, Wiley-India
4. **DAVID KINCAID, WARD CHENEY**, Numerical Analysis-Mathematics of Scientific Computing, 3rd Edition, Universities Press.

I Year - II Semester

18ES2T02 Network Analysis

L	T	P	C
2	1		3

Course Outcomes:

1. gain the knowledge on basic network elements.
2. will analyze the RLC circuits behavior in detailed.
3. analyze the performance of periodic waveforms.
4. gain the knowledge in characteristics of two port network parameters (Z, Y, ABCD, h & g).
5. analyze the filter design concepts in real world applications.

UNIT – I

Introduction to Electrical Circuits : Network elements classification, Electric charge and current, Electric energy and potential, Resistance parameter – series and parallel combination, Inductance parameter – series and parallel combination, Capacitance parameter – series and parallel combination. Energy sources: Ideal, Non-ideal, Independent and dependent sources, Source transformation, Kirchoff's laws, Mesh analysis and Nodal analysis problem solving with resistances only including dependent sources also. (Text Books: 1,2,3, Reference Books: 3)

A.C Fundamentals and Network Topology: Definitions of terms associated with periodic functions: Time period, Angular velocity and frequency, RMS value, Average value, Form factor and peak factor- problem solving, Phase angle, Phasor representation, Addition and subtraction of phasors, mathematical representation of sinusoidal quantities, explanation with relevant theory, problem solving. Principal of Duality with examples. **Network Topology:** Definitions of branch, node, tree, planar, non-planar graph, incidence matrix, basic tie set schedule, basic cut set schedule. (Text Books: 2,3, Reference Books: 3)

UNIT – II

Steady State Analysis of A.C Circuits : Response to sinusoidal excitation - pure resistance, pure inductance, pure capacitance, impedance concept, phase angle, series R-L, R-C, R-L-C circuits problem solving. Complex impedance and phasor notation for R-L, R-C, R-L-C problem solving using mesh and nodal analysis, Star-Delta conversion, problem solving. (Text Books: 1,2, Reference Books: 3)

UNIT – III

Coupled Circuits : Coupled Circuits: Self inductance, Mutual inductance, Coefficient of coupling, analysis of coupled circuits, Natural current, Dot rule of coupled circuits, Conductively coupled equivalent circuits-problem solving.

Resonance: Introduction, Definition of Q, Series resonance, Bandwidth of series resonance, Parallel resonance,

Condition for maximum impedance, current in anti resonance, Bandwidth of parallel resonance, general caseresistance present in both branches, anti resonance at all frequencies. (Text Books:2,3, Reference Books: 3)

UNIT – IV

Network Theorems: Thevinin's, Norton's, Milliman's, Reciprocity, Compensation, Substitution, Superposition, Max Power Transfer, Tellegens- problem solving using dependent sources also. (Text Books: 1,2,3, Reference Books: 2)

UNIT – V

Two-port networks : Relationship of two port networks, Z-parameters, Y-parameters, Transmission line parameters, h-parameters, Inverse h-parameters, Inverse Transmission line parameters, Relationship between parameter sets, Parallel connection of two port networks, Cascading of two port networks, series connection of two port networks, problem solving including dependent sources also. (Text Books: 1,2, Reference Books: 1,3)

UNIT – VI

Transients : First order differential equations, Definition of time constants, R-L circuit, R C circuit with DC excitation, Evaluating initial conditions procedure, second order differential equations, homogeneous, nonhomogenous, problem solving using R-L-C elements with DC excitation and AC excitation, Response as related to s-plane rotation of roots. Solutions using Laplace transform method. (Text Books: 1,2,3, Reference Books: 1,3)

TEXT BOOKS:

1. Network Analysis – ME Van Valkenburg, Prentice Hall of India, 3rd Edition, 2000.
2. Network Analysis by K.Satya Prasad and S Sivanagaraju, Cengage Learning
3. Electric Circuit Analysis by Hayt and Kimmarle, TMH

REFERENCES:

1. Network lines and Fields by John. D. Ryder 2nd edition, Asia publishing house.
2. Basic Circuit Analysis by DR Cunninghan, Jaico Publishers.
3. Network Analysis and Filter Design by Chadha, Umesh Publications.

I Year - II Semester

18BS2T08 Applied Chemistry

L	T	P	C
2	1		3

Course objectives

- Recognize the relative energies of bonding and anti bonding molecular orbital's and crystal field stabilization energy.
- Understand the basic principles of spectroscopy where electromagnetic radiation interacts with chemical substances
- Recognize and draw structural isomers, stereoisomer's including enantiomers and diastereomers.
- Understand structure and chemical transformations of organic molecules

COURSE OUTCOMES

- Analyse microscopic chemistry in terms of atomic and molecular orbital's
- Distinguish the range of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques
- Explain about batteries
- Rationalize bulk properties and processes using thermodynamic considerations
- Apply basic concepts of stereochemistry
- List major chemical reactions that are used in the synthesis of molecules

UNIT –I

Atomic and molecular structure

LCAO method-molecular orbital theory- bonding in homo nuclear diatomic molecules

Introduction to coordination compounds –crystal field theory and energy level diagram for transition metals ions and their magnetic properties-factors effecting crystal field splitting

UNIT –II

Spectroscopic techniques and applications

UV: introduction-electronic energy levels-electronic transitions-absorption laws-chromospheres and auxochrome – bath chromic shift-hypsochromic shift-hyper chromic shift-hypo chromic shft

IR: introduction-basic theory-selection rule s- absorption of infrared radiation and molecular vibrations

NMR: introduction-spin active nuclei behave as nuclear magnets-energy absorption and resonance – relaxation phenomenon-common used nmr solvents –chemical shift – factors influencing the chemical shift shielding and deshielding

UNIT –III

Electrochemistry

Conductance -specific conductance-equivalent conductance-molar conductance-effect of dilution on conductance-classification of electrolytes –galvanic cells-reversible and irreversible cells-single electrode potential-electro chemical series and uses of their series-standard electrodes (hydrogen and calomel electrodes)- batteries: Ni- Cd cells and Ni metal hydride cells

UNIT –IV

Chemical equilibrium

First law of thermodynamics-statement- definition of internal energy and enthalpy. Heat capacities and their relationship-joule Thomson coefficient. Calculation if ‘w’ ‘q’ ‘du’ and ‘dh’ for the expansion of perfet gas under isothermal and adiabatic conditions for reversible processes

UNIT –V

Stereo chemistry

Structural isomerism-stereochemistry- conformational isomerism-configurationally isomerism-geometrical isomerism- optical isomerism: enantiomers -diastereomers

UNIT -VI

Organic reactions and synthesis of a drugs molecule

Organic reactions: introductions to reactions involving –substitution-addition- elimination
Synthesis of a drugs molecule: preparation and uses of –paracetmol -ibuprofen

Standard books:

(i) Engineering chemistry by Jain and Jain: **Dhanpat Rai** publicating co
(ii) Unified chemistry by **O.P Agarwal** vol-i
(iii) Unified chemistry by **O.P Agarwal** vol-ii
(iv) Unified chemistry by **O.P Agarwal** vol-iii

Reference books:

(i) University chemistry by **B.H. Mahan**
(ii) Principal and applications by **M.J. Sienko And R.A.Plane**
(iii) Physical chemistry by **P.W.Atkins**
(iv) Fundamentals of molecular spectroscopy by **C.N.Banwell**
(v) Organic chemistry: structure and function by **K.P.C.Volhardt And N.E Schore** 5^{th} edition

I Year - II Semester

18ES2T07 Programming for problem solving-II

L	T	P	C
2			3

Course Outcomes

1. The student will able to analyze the algorithms and justify the correctness.

2. For a given Search problem (Linear Search and Binary Search) student will able to implement it.

3. For a given problem of Stacks, Queues and linked list student will able to implement it and analyze the same to determine the time and computation complexity.

4. Student will able to write an algorithm Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort and compare their performance in term of Space and Time complexity.

5. Student will able to implement tree traversal algorithms and determine the time and computation complexity.

6. Student will able to implement Graph traversal algorithms and determine the time and computation complexity.

UNIT I:

Data structure-Definition, types of data structures

Recursion: Definition, Design Methodology and Implementation of recursive algorithms, Linear and binary recursion, recursive algorithms for factorial function, GAD computation, Fibonacci sequence, Towers of Hanoi, Tail recursion List Searches using Linear Search, Binary Search, Fibonacci Search

Sorting Techniques: Basic concepts, Sorting by:

Insertion sort, selection-heap sort, exchange-bubble sort, quick sort, distribution-radix sort and merging--merge sort Algorithms.

UNIT II:

Stacks and Queues: Basic Stack Operations, Representation of a Stack using Arrays, Stack Applications: Reversing list, Factorial Calculation, Infix to postfix Transformation, Evaluating Arithmetic Expressions.

Queues: Basic Queues Operations, Representation of a Queue using array, Implementation of Queue Operations using Stack, Queues.

Applications of Queues-Round robin Algorithm, Circular Queues, Priority Queues

UNIT III:

Linked Lists: Introduction, single linked list, representation of a linked list in memory, Operations on a single linked list, Reversing a single linked list, applications of single linked list to represent polynomial expressions and sparse matrix manipulation, Advantages and disadvantages of single linked list, Double linked list, Circular linked list.

UNIT IV:

Trees: Basic tree concepts, Binary Trees: Properties, Representation of Binary Trees using arrays and linked lists, operations on a Binary tree, Binary Tree Traversals (recursive), Creation of binary tree from inorder , preorder and postorder traversals

UNIT-V:

Advanced concepts of Trees: Tree Traversal using stack (non recursive), Threaded Binary Trees. Binary search tree, Basic concepts, BST operations: insertion, deletion, balanced binary trees–need, basics and applications in computer science (No operations).

UNIT VI:

Graphs: Basic concepts, Representations of Graphs: using Linked list and adjacency matrix, Graph algorithms Graph Traversals (BFS&DFS), applications: Dijkstra's shortest path, Transitive closure, Minimum Spanning Tree using Prim's Algorithm, warshall's Algorithm (Algorithemic Concepts Only, No Programs required).

TEXTBOOKS:

1. Data Structure with C, Seymour Lipschutz, TMH
2. DataStructures,2/e, Richard F, Gilberg, Forouzan, Aengage
3. C & Data structures 5th Edn by Balagurusamy
4. Data Structures using C, Reema Thareja, Oxford

I Year - II Semester

18ES2T05 Engineering Drawing

L	T	P	C
1		2	3

Course Objectives:

COB1: To provide basic concepts in engineering drawing
COB2: To impart knowledge about standard principles of orthographic projections of objects
COB3: To visualize and represent the pictorial views with proper dimensioning and scaling

Course Outcomes:

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

CO1: Construct polygons and engineering curves
CO2: Draw orthographic projections of points and lines inclined to one reference plane
CO3: Draw projections lines inclined to both the reference planes and traces
CO4: Draw projections of planes
CO5: Draw projections of solids
CO6: Convert the isometric views to orthographic views and vice-versa

UNIT I

Objective: To introduce the students to use drawing instruments and to draw polygons, Engg. curves and scales.
Lines, Lettering and Dimensioning: Types of lines, Lettering, Dimensioning
Polygons: Constructing regular polygons by general methods, inscribing and describing polygons on circles.
Curves: Parabola, Ellipse and Hyperbola by general methods, cycloids, involutes, tangents & normals for the curves.

UNIT II

Objective: To introduce orthographic projections, projections of points & Line inclined one plane
Orthographic Projections: Horizontal plane, vertical plane, profile plane, importance of reference lines, projections of points in various quadrants, projections of line inclined to one plane,

UNIT III

Objective: The objective is to make the students draw the projections of line inclined to both the reference planes and traces.
Projections of Line inclined to both the planes: Line inclined to both the reference planes, determination of true lengths, angles of inclination and traces - HT, VT

UNIT-IV

Objective: The objective is to make the students draw the projections of the various types of Planes in different simple positions and inclined to one plane and both the planes.
Projections of planes: Regular planes perpendicular / parallel to one plane and inclined to the other reference plane; inclined to both the reference planes.

UNIT V

Objective: The objective is to make the students draw the projections of the various types of solids in different simple positions and inclined to one plane.

Projections of Solids – Prisms, Pyramids, Cones and Cylinders with the axis inclined to both the planes.

UNIT VI

Objective: The objective is to represent the object in 3D view through isometric views and convert the isometric view to orthographic view and vice versa.

Principles of Isometric Projections - Isometric Scale – Isometric Views – Conventions – Isometric Views of Lines, Plane Figures, Simple Solids, Conversion of Isometric Views to Orthographic Views and Vice-versa

TEXT BOOKS:

1. Engineering Drawing by N.D. Butt, Charotar Publications
2. Engineering Drawing by Agarwal & Agarwal, Tata McGraw Hill Publishers

REFERENCE BOOKS:

1. Engineering Drawing, K. Venugopal, V. Prabhu Raja and G. Sreekanjana, New Age International Publications

2. Engineering Drawing, K.L.Narayana & P. Kannaiah, SciTech Publishers.

3. Engineering Drawing, Dhananjay V. Jolhe, Tata McGraw Hill Publishers

4. Engineering Graphics for Degree, K.C. John, PHI Publishers.

I Year - II Semester

18HS2L01 English - Communication Skills Lab

L	T	P	C
		2	1

Course Objectives:

COB 1: To facilitate computer-aided multi-media instruction enabling individualized and independent language learning.

COB 2: To sensitize the students to the nuances of English speech sounds, word accent and intonation.

COB 3: To improve the fluency in spoken English and neutralize mother tongue Influence.

COB 4: To train students to use language appropriately

Course Outcomes:

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

CO 1: Demonstrate nuances of language through audio-visual experience and Group activities.

CO 2: Identify accent for intelligibility.

CO 3 Make use of effective delivery strategies to select ,compile and synthesize information for an oral presentations.

CO 4: Demonstrate in Mock Interviews, Mock Discussion and Public Speaking.

CO 5: Identify communicative competency to respond to others in different situations.

PRACTICE 1:

The Sounds of English

PRACTICE 2:

Body Language

PRACTICE 3:

Debating

PRACTICE 4:

Group Discussion

PRACTICE 5:

Presentations

PRACTICE 6:

Interviews and Telephonic Interviews

Prescribed Text Books: Interact English Lab Manual for Undergraduate Students by Orient Black Swan Pvt. Ltd. Publishers

Reference Books:

1. Strengthen your Communication Skills by Dr.M.Hari Prasad, Dr.Salivendra J.Raju and Dr.G.Suvarna Lakshmi, Maruthi Publications.
2. English for Professionals by Prof Eliah, B.S Publications, Hyderabad.
3. A practical Course in effective English speaking skills, PHI
4. Spring Board to Success, Orient Black Swan
5. Cornerstone, developing soft skills, Pearson Education.

I Year - II Semester

18BS2L04 Applied Chemistry Lab

L	T	P	C
		2	1

COURSE OBJECTIVES : the purpose of the titration is the detection of the equivalence point at which chemically equivalent amount of the reactants have been mixed

Course Outcomes: the students entering into the professional course have practically v**ery** little exposure to lab classes. The experiments introduce volumetric analysis; redox titrations with different indicators; EDTA titrations; then they are exposed to a few instrumental methods of chemical analysis. Thus at the end of the lab course, the student is exposed to different methods of chemical analysis and use of some commonly employed instruments. They thus acquire some experimental skills.

1. Introduction to Chemistry laboratory – Molarity, Normality, Primary, secondary standard

solutions, Volumetric titrations, Quantitative analysis, Qualitative analysis, etc

2. Trial experiment - Determination of HCl using standard Na2CO3 solution.

3. Determination of alkalinity of a sample containing Na2CO3 and NaOH.

4. Determination of KMnO4 using standard Oxalic acid solution.

5. Determination of Ferrous iron using standard K2Cr2O7 solution.

6. Determination of Copper using standard K2Cr2O7 solution.

7. Determination of temporary and permanent hardness of water using standard EDTA solution.

8. Determination of Copper using standard EDTA solution.

9. Determination of Iron by a Colorimetric method using thiocynate as reagent.

10. Determination of pH of the given sample solution using pH meter.

11. Conductometric titration between strong acid and strong base.

12. Conductometric titration between strong acid and weak base.

13. Potentiometric titration between strong acid and strong base.

14. Potentiometric titration between strong acid and weak base.

15. Determination of Zinc using standard EDTA solution.

16. Determination of Vitamin – C.

I Year - II Semester

18ES2L06 Programming for problem solving-II Lab

L	T	P	C
		2	1

Exercise1:

Write recursive program which computes the n^{th} Fibonacci number, for appropriate values of n. Analyze behavior of the program obtain the frequency count of the statement for various values of n.

Exercise2:

1. Write recursive program for the following
2. Write recursive and non recursive C program for calculation of Factorial of an integer
3. Write recursive and non recursive C program for calculation of GCD(n, m)
4. Write recursive and non recursive C program for Towers of Hanoi: N disks are to be transferred from peg S to peg D with Peg I as the intermediate peg.

Exercise3:

1. Write C program that use both recursive and non recursive functions to perform Linear search for a Key value in a given list.
2. Write C program that use both recursive and non recursive functions to perform Binary search for a Key value in a given list.
3. Write C program that use both recursive and non recursive functions to perform Fibonacci search for a Key value in a given list.

Exercise4:

1. Write C program that implement Bubble sort, to sort a given list of integers in ascending order
2. Write C program that implement Quick sort, to sort a given list of integers in ascending order
3. Write C program that implement Insertion sort, to sort a given list of integers in ascending order

Exercise5:

1. Write C program that implement heap sort ,to sort a given list of integers in ascending order
2. Write C program that implement radix sort, to sort a given list of integers in ascending order
3. Write C program that implement merge sort, to sort a given list of integers in ascending order

Exercise6:

1. Write C program that implement stack(its operations)using arrays
2. Write C program that implement stack(its operations)using Linked list

Exercise7:

1. Write a C program that usesStackoperationstoAonvertinfixexpressionintopostfixexpression
2. Write C program that implement Queue (its operations) using arrays.
3. Write C program that implement Queue(its operations)using linked lists

Exercise8:

1. Write a C program that uses functions to create a singly linked list
2. Write a C program that uses functions to perform insertion operation on a singly linked list
3. Write a C program that uses functions to perform deletion operation on a singly linked list

Exercise9:

1. Adding two large integers which are represented in linked list fashion.
2. Write a C program to reverse elements of a single linked list.
3. Write a C program to store a polynomial expression in memory using linked list
4. Write a C program to representation the given sparse matrix using arrays.
5. Write a C program to representation the given sparse matrix using linked list

Exercise10:

1. Write a C program to Create a Binary Tree of integers
2. Write a recursive C program for traversing a binary tree in preorder, in order and post order.

3. Write a non recursive C program for traversing a binary tree in preorder, in order and post order.
4. Program to check balance property of a tree.

Exercise11:

1. Write a C program to create a BST
2. Write a C program to insert an ode in to a BST.
3. Write a C program to delete an ode from a BST.

I Year - II Semester

18ES2L02 Network Analysis Lab

L	T	P	C
		2	1

Learning Objectives:

- .To determine resonance frequency, Q-factor of RLC network.
- .To analysis time response of first orders RC/RL network for non-sinusoidal inputs.
- .To estimate parameters of two port networks
- .To understand the concept network theorems in network reduction of electrical networks.

Course Outcomes:

- .Able to analyse RLC circuits and understand resonant frequency and Q-factor.
- .Able to determine first order RC/RL networks of periodic non- sinusoidal waveforms.
- .Able to apply network theorems to analyze the electrical network.

Any Ten experiments are to be conducted

1. Determination of Form Factor for a given periodic waveform
2. Deter mination of Self, Mutual Inductances and Coefficient of coupling
3. Series Resonance – Timing, Resonant frequency, Bandwidth and Q-factor determination for RLC network.
4. Parallel Resonance – Timing, Resonant frequency, Bandwidth and Q-factor determination for RLC network.
5. Experimental determination of Thevenin's and Norton's equivalent circuits
6. Verification of Reciprocity theorem.
7. Verification of Compensation Theorem
8. Verification of Superposition theorem
9. Verification of maximum power transfer theorem.
10. Two port network parameters – Z-Y Parameters
11. Two port network parameters – transmission and Hybrid Parameters
12. Time response of first order RC/RL network for periodic non-sinusoidal inputs – time constant and steady state error determination.

I Year - II Semester

18HS2M02 Indian Constitution

L	T	P	C
2			0

Unit	Title	Details of Topic
Unit I	**Introduction**	Constitution' meaning of the term,, Indian Constitution: Sources and constitutional history, Features: Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy
Unit II	**Union Government and its Administration**	Structure of the Indian Union: Federalism, Centre- State relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha
Unit III	**State Government and its Administration**	Governor: Role and Position, CM and Council of ministers, State Secretariat: Organisation, Structure and Functions
Unit IV	**Local Administration**	District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation, Pachayati raj: Introduction, PRI: Zila Pachayat, Elected officials and their roles, CEO Zila Pachayat: Position and role, Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy
Unit V	**Election Commission**	Election Commission: Role and Functioning, Chief Election Commissioner and Election Commissioners, State Election Commission: Role and Functioning, Institute and Bodies for the welfare of SC/ST/OBC and women

Books Recommended:

1. 'Indian Polity' by Laxmikanth
2. 'Indian Administration' by Subhash Kashyap
3. 'Indian Constitution' by D.D. Basu
4. 'Indian Administration' by Avasti and Avasti

II Year - I Semester

L	T	P	C
3	0	0	3

18EC3T01- ELECTRONIC DEVICES AND CIRCUITS

COURSE OUTCOMES

After going through this course the student will be able to

1. Explore the semiconductors and PN Junction diode.
2. Use of special diodes in electronic circuits.
3. Explore the modes of operation, Analyze and design semiconductor devices such as rectifiers and filters.
4. Explore the modes of operation of BJT, FET, other transistors and their applications.
5. Analyze BJT, FET biasing and its thermal stability.
6. Analyze and Design of BJT, FET using hybrid small signal models (h-parameters).

UNIT-I

Semi Conductor Physics: Insulators, Semi conductors and Metals classification using energy band diagrams, mobility and conductivity, electrons and holes in intrinsic semi conductors, extrinsic semi conductors, drift and diffusion, charge densities in semiconductors, Fermi Dirac function, Fermi level in intrinsic and extrinsic Semiconductors.

Junction Diode characteristics: PN-junction diode, Open circuited p-n junction, Biased p-n junction, current components in PN junction Diode, Law of junction, diode current equation, V-I Characteristics, temperature dependence on V-I characteristics, Diode resistance, Diode capacitance, energy band diagram of PN junction Diode.

UNIT-II

Special Semiconductor Diodes: Break down mechanisms, Construction, Operation and characteristics of Zener diode, Photo diode, Varactor diode, LED, LASER, LCD, Solar cell, PIN, Tunnel diode, DIAC, TRIAC, SCR, UJT.

UNIT III

Rectifiers: Basic Rectifier setup, circuits-operation, input and output waveforms, characteristics of half wave, full wave and bridge rectifier.

Filters: Inductor filter, Capacitor filter, L- section filter, Π- section filter, Multiple L- section and multiple Π section filter, comparison of various filter circuits.

UNIT IV

TRANSISTOR CHARACTERISTICS

BJT: Junction transistor, transistor current components, transistor equation, transistor configurations and characteristics, punch through/ reach through, typical transistor junction voltages.

FET: FET types, construction, operation, characteristics, parameters, MOSFET-types, construction, operation, characteristics, comparison between JFET and MOSFET.

UNIT V

Transistor Biasing and Thermal Stabilization : Transistor as an Amplifier**,** Need for biasing, operating point, load line analysis, BJT biasing methods, concept of stability, fixed bias, collector to base bias, self bias, Stabilization against variations in V_{BE}, Ic, and β, Stability factors, Bias compensation, Thermal runaway, Thermal stability**.**

FET Biasing: Methods and stabilization.

UNIT VI

SMALL SIGNAL LOW FREQUENCY TRANSISTOR AMPLIFIER MODELS

BJT: Two port network, Transistor hybrid model, determination of h- parameters, conversion of h-parameters, generalized analysis of transistor amplifier model using h-parameters, Analysis of CB, CE and CC amplifiers using exact and approximate analysis, Comparison of transistor amplifiers.

FET: Generalized analysis of small signal models, Analysis of CG, CS and CD amplifiers, comparison of FET amplifiers.

TEXT BOOKS

1. Electronic Devices and Circuits- J.Millman and C.C.Halkias, Tata Mc Graw Hill- Second Edition.
2. Electronic Devices and Circuits- B.P Singh, Rekha Singh, Pearson Publications, Second Edition.
3. Electronic Devices and Circuits- David A.Bell, Oxford University Press, Fifth Edition.

REFERENCES

1. Integrated Electronics- J. Millman and C.C. Halkias, Tata Mc Graw- Hill, 2009.
2. Electronic Devices and Circuits Theory – Robert L.Boylestad and Louis Nashelsky, Pearson/Prentice Hall, Tenth Edition.
3. Microelectronic Circuits- Sedra A.S. and K.C. Smith, Oxford University Press, Sixth Edition.

II Year - I Semester

L	T	P	C
3	0	0	3

18EC3T02 - DIGITAL SYSTEM DESIGN – I

COURSE OUTCOMES

After going through this course the student will be able to

1. Manipulate numeric information in different forms, e.g. different bases, signed integers, various codes such as ASCII, Gray, and BCD. Convert a number from one number system to its equivalent in of the other number system.
2. Deploy simple Boolean expressions using the theorems and postulates of Boolean algebra and to minimize combinational functions.
3. Design and analyze combinational circuits using combinational logic functions/ building blocks.
4. Design and Analyze different PLD's from Boolean expressions.
5. Design and Analyze sequential circuits using sequential logic functions/building blocks.
6. Apply different models of Finite State Machines for design of sequential circuits.

UNIT I

Review of Number systems & Codes: Representation of numbers of different radix, conversion from one radix to another radix, r-1's complements and r's complements of signed numbers-problem solving. 4 bit codes- BCD, Excess-3, 2421, 8-4-2-1 etc. Basic logic operations -NOT, OR, AND, Universal building blocks, EX-OR, EX-NOR - Gates, Standard SOP and POS Forms, Gray code, error detection & error correction codes (parity checking-even parity, odd parity, Hamming code), Stuck at faults, NAND-NAND and NOR-NOR realizations.

UNIT II

Minimization Techniques: Boolean theorems, principle of complements, duality, De-morgan theorems, minimization of logic functions using Boolean theorems, minimization of Switching functions using K-Map up to 6 variables, tabular minimization, problem solving (code-converters using K-Map etc..).

UNIT III

Combinational Logic Circuits I: Design of Half adder, half subtractor, full adder, full subtractor, applications of full adder, 4-bit binary subtractor, adder-subtractor circuits, BCD adder circuit, Excess 3 adder circuit, look-a-head adder circuit, Design of decoder, demultiplexer, 7 segment decoder, higher order demultiplexing, encoder, multiplexer, higher order multiplexing, realization of Boolean functions using decoders and multiplexers, priority encoder, 4-bit digital comparator.

UNIT IV

Combinational Logic Circuits II: PROM, PAL, PLA-Basics structures, realization of Boolean function with PLDs, programming tables of PLDs, merits & demerits of PROM, PAL, PLA comparison, realization of Boolean functions using PROM, PAL, PLA, programming tables of PROM, PAL, PLA.

UNIT V

Sequential Circuits I: Classification of sequential circuits (synchronous and asynchronous), basic flip-flops, truth tables and excitation tables (NAND RS latch, nor RS latch, RS flip-flop, JK flip-flop,

T flip-flop, D flip-flop with reset and clear terminals). Conversion from one flip-flop to another flip-flop, Design of ripple counters, synchronous counters, Johnson counter, ring counter. Design of registers - Buffer register, control buffer register, shift register, bi-directional shift register, universal shift register.

UNIT VI

Sequential Circuits II: Finite state machine; Analysis of clocked sequential circuits, state diagrams, state tables, reduction of state tables and state assignment, design procedures. Realization of circuits using various flip-flops. Melay to Moore conversion and vice-versa.

TEXT BOOKS:

1.Switching Theory and Logic Design by Hill and Peterson Mc-Graw Hill TMH edition.
2.Switching and finite automata theory by ZVI kohavi, 2nd edition.
3.Digital Design by Mano PHI.

REFERENCES:

1.Micro electronics by Milliman MH edition.
2.Modern Digital Electronics by RP Jain, TMH.
3.Fundamentals of Logic Design by Charles H. Roth Jr, Jaico Publishers.

II Year - I Semester

L	T	P	C
2	1	0	3

18EC3T03 - SIGNALS AND SYSTEMS

COURSE OUTCOMES

After going through this course the student will be able to

1. Discuss basic signals and its operations, understand the Concept of orthgonality.
2. Evaluate Fourier series and Fourier Transform, apply for different signals.
3. Understand Sampling theorem to convert continuous-time signals to discrete-time signal and reconstruct back.
4. Understand the relationships among the various representations of LTI system.
5. Evaluate and analyze continuous-time signals and systems using Laplace transforms.
6. Evaluate and analyze discrete-time signals and systems using Z transforms.

UNIT I

INTRODUCTION

Definition of Signals and Systems, Classification of Signals, Classification of Systems. Operations on signals: time-shifting, time-scaling, amplitude-shifting, amplitude-scaling. Problems on classification and characteristics of Signals and Systems. Complex exponential and sinusoidal signals, Singularity functions and related functions: impulse function, step function, signum function and ramp function. The analogy between vectors and signals, orthogonal signal space, Signal approximation using orthogonal functions, Mean square error, closed or complete set of orthogonal functions, Orthogonality in complex functions.

UNIT II

FOURIER SERIES AND FOURIER TRANSFORM

Fourier series representation of continuous time periodic signals, properties of Fourier series, Dirichlet's conditions, Trigonometric Fourier series and Exponential Fourier series, Complex Fourier spectrum, Deriving Fourier transform from Fourier series, Fourier transform of arbitrary signal, Fourier transform of standard signals, Fourier transform of periodic signals, properties of Fourier transforms, Fourier transforms involving impulse function and Signum function. Introduction to Hilbert Transform.

UNIT III

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

UNIT IV

ANALYSIS OF LINEAR SYSTEMS: Linear system, impulse response, Response of a linear system, linear time invariant (LTI) system, linear time variant (LTV) system, Concept of convolution in time domain and frequency domain, Graphical representation of convolution. Transfer function of a LTI system. Filter characteristics of linear systems. Distortion less transmission through a system, Signal bandwidth, system bandwidth, Ideal LPF, HPF and BPF characteristics, Causality and Poly-Wiener criterion for physical realization, relationship between bandwidth and rise time.

UNIT V

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

UNIT VI

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

TEXT BOOKS:

1.Signals, Systems & Communications - B.P. Lathi, BS Publications, 2003.

2.Signals and Systems - A.V. Oppenheim, A.S. Willsky and S.H. Nawab, PHI, 2nd Edn.

3.Signals & Systems - Simon Haykin and Van Veen, Wiley, 2nd Edition.

REFERENCE BOOKS:

1.Signals & Systems - A. Anand Kumar, PHI Learning, 2012.

2.Fundamentals of Signals and Systems- Michel J. Robert, MGH International Edition, 2008.

3.Signals and Systems with MATLAB® Applications – Steven T. Karris, 2nd Ed

II Year - I Semester

L	T	P	C
3	0	0	3

18CS3T09 – OBJECT ORIENTED PROGRAMMING

COURSE OUTCOMES

After going through this course the student will be able to

1. Understand Java programming concepts and utilize Java Graphical User Interface in Program writing.
2. Write, compile, execute and troubleshoot Java programming for networking concepts.
3. Build Java Application for distributed environment.
4. Design and Develop multi-tier applications.
5. Identify and Analyze Enterprise applications.

UNIT I

Introduction to OOP, procedural programming language and object oriented language, principles of OOP, applications of OOP, history of java, java features, JDK, JVM, program structure. Variables, primitive data types, identifiers, literals, operators, expressions, precedence rules and associatively, primitive type conversion and casting, flow of control.

UNIT II

Arrays, command line arguments, Classes and objects, class declaration, creating objects, methods, constructors and constructor overloading, garbage collector, importance of static keyword and examples, this keyword, nested classes.

UNIT III

Inheritance, types of inheritance, super keyword, final keyword, overriding and abstract class. Interfaces.

UNIT IV

Creating the packages, using packages, importance of CLASSPATH and java.lang package. Exception handling, importance of try, catch, throw, throws and finally block, user defined exceptions, Assertions.

UNIT V

Multithreading, introduction, thread life cycle, creation of threads, thread priorities, thread synchronization, communication between threads. Reading data from files and writing data to files, random access file.

UNIT VI

Applet class, Applet structure, Applet life cycle, sample Applet programs, Introduction to JAVA FX. Event handling: event delegation model, sources of event, Event Listeners, adapter classes, inner classes.

TEXT BOOKS:

1. The complete Reference Java, 8th edition, Herbert Schildt, TMH.
2. Programming in JAVA, Sachin Malhotra, SaurabhChoudary, Oxford.
3. Introduction to java programming, 7th edition by Y Daniel Liang, Pearson.

REFERENCE BOOKS:

1.Swing: Introduction, JFrame, JApplet, JPanel, Componets in Swings, Layout Managers in
2.Swings, JList and JScrollPane, Split Pane, JTabbedPane, JTree, JTable, Dialog Box.
3.Introduction to java programming, 7th edition by E Balaguruswami, Pearson.

II Year - I Semester

18EC3T04 - RANDOM VARIABLES AND STOCHASTIC PROCESS

L	T	P	C
2	1	0	3

COURSE OUTCOMES

After going through this course the student will be able to

1. Explore Random variables, their distribution and density functions.
2. Analyze the characteristic and moment generating functions using expected value of random variables.
3. Understand multi distribution function and apply transformations using multiple/ Gaussian random variables.
4. Analyze the temporal characteristics of random processes in time domain.
5. Analyze the spectral characteristics of Random processes in frequency domain.
6. Evaluate linear systems with random inputs and apply modelling using various noise sources.

UNIT I

Probability : Probability Definition, Axioms of probability, Joint probability, Conditional probability, Total probability, Bayes' theorem, Independent events.

Random Variables: Definition of a Random Variable, Conditions for a Function to be a Random Variable, Discrete, Continuous and Mixed Random Variables, Distribution and Density functions, Properties, Binomial, Poisson, Uniform, Gaussian, Exponential, Rayleigh, Conditional Distribution and Density, Properties.

UNIT II

Operations on one Random Variable : Introduction, Expected Value of a Random Variable, Function of a Random Variable, Moments about the Origin, Central Moments, Variance and Skew, Characteristic Function, Transformations of a Random Variable - Monotonic Transformations for a Continuous Random Variable, Non-monotonic Transformations of Continuous Random Variable.

Multiple Random Variables: Vector Random Variables, Joint Distribution Function, Properties of Joint Distribution, Marginal Distribution Functions, Conditional Distribution and Density, Statistical Independence.

UNIT III

Operations on Multiple Random Variables: Sum of Two Random Variables, Sum of Several Random Variables, Central Limit Theorem: Unequal Distribution, Equal Distributions. Joint Moments about the Origin, Joint Central Moments, Joint Characteristic Functions, Jointly Gaussian Random Variables: Two Random Variables case, N-Random Variables case, Properties, Transformations of Multiple Random Variables, Linear Transformations of Gaussian Random Variables.

UNIT IV

Random Processes - Temporal Characteristics: The Random Process Concept, Classification of Processes, Deterministic and Nondeterministic Processes, Distribution and Density Functions, Concept of Stationarity and Statistical Independence. First-Order Stationary Processes, Second-Order and Wide-Sense Stationarity, N^{th}-order and Strict-Sense Stationarity, Time Averages and Ergodicity, Autocorrelation Function and its Properties, Cross-Correlation Function and its

Properties, Covariance Functions, Gaussian Random Processes, Poisson Random Process, Pure Birth process, Renewal Process, Markov Chain and transition probabilities.

UNIT V

Random Processes – Spectral Characteristics: The Power Spectrum: Properties, Weiner-Khinchine Relationship. The Cross-Power Density Spectrum, Properties, Relationship between Cross-Power Spectrum and Cross-Correlation Function.

UNIT VI

LINEAR SYSTEMS WITH RANDOM INPUTS

Random Signal Response of Linear Systems: System Response – Convolution, Mean and Mean-squared Value of System Response, Autocorrelation Function of Response, Cross-Correlation Functions of Input and Output. Spectral Characteristics of System Response: Power Density Spectrum of Response, Cross-Power Density Spectra of Input and Output, Band pass, Band-Limited and Narrowband Processes- Properties.

Modelling of Noise Sources: Resistive (Thermal) Noise Source, Arbitrary Noise Sources, Effective Noise Temperature, Average Noise Figure, Average Noise Figure of cascaded networks.

TEXT BOOKS:

1. Probability, Random Variables & Random Signal Principles - Peyton Z. Peebles, TMH, 4th Edition, 2001.
2. Probability, Random Variables and Stochastic Processes - Athanasios Papoulis and S.Unnikrisha, PHI, 4th Edition, 2002.
3. Probability Theory and Stochastic Processes – B. Prabhakara Rao, Oxford University Press.

REFERENCES:

1. Probabilistic Methods of Signal & System Analysis, George R.Cooper, Clave D. Mc Gillem, Oxford, 3rd Edition, 1999.

II Year - I Semester

L	T	P	C
2	1	0	3

18EE3T04 – ELECTRICAL TECHNOLOGY

COURSE OUTCOMES

1. Able to understand the principles of electro mechanical energy conversion.
2. Able to explain the operation of DC generator and analyze the characteristics of DC generator.
3. Able to explain the principle of operation of DC motor and analyze their characteristics. Acquire the skills to analyze the starting and speed control methods of DC motors.
4. Capability to develop equivalent circuit and evaluate performance of transformers.
5. Ability to analyze speed – torque characteristics of induction motor and understand starting methods of induction motor.
6. Capability to understand the operation of various special machines.

UNIT I

Electromechanical Energy Conversion:

Introduction to S.I units – Principles of electromechanical energy conversion – forces and torque in a magnetic field systems-energy balance – single excited machine – magnetic forces– co-energy – multi excited magnetic field system.

UNIT II

DC Generators: Principle of operation and construction of DC generators - EMF equation – types of generators – magnetization and load characteristics of DC generators.

UNIT III

DC Motors : Principle of operation and construction of DC Motors – types of DC Motors – Characteristics of DC motors – basic starting methods for DC shunt motor – losses and efficiency – Swinburne's test – speed control of DC shunt motor – flux and Armature voltage control methods.

UNIT IV

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 - regulation of transformer – OC and SC tests – predetermination of efficiency and regulation.

UNIT V

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

UNIT VI

Special Machines: Principle of operation and construction - single phase induction motor - shaded pole motors – capacitor motors and AC servomotor.

TEXT BOOKS:

1. Principles of Electrical Machines by V.K. Mehta & Rohit Mehta, S.Chand publications.
2. Theory & performance of Electrical Machines by J.B.Guptha, S.K.Kataria & Sons.

REFERENCE BOOKS:

1. Basic Electrical Engineering by M.S.Naidu and S.Kamakshiah,TMH Publications.
2. Fundamentals of Electrical Engineering by Rajendra Prasad, PHI Publications, 2nd edition.
3. Basic Electrical Engineering by Nagsarkar, Sukhija, Oxford Publications, 2nd edition.

II Year - I Semester

18EC3L01 - ELECTRONIC DEVICES AND CIRCUITS LAB

L	T	P	C
0	0	3	1.5

PART A: Electronic Workshop Practice

1. Identification, Specifications, Testing of R, L, C Components (Colour Codes), Potentiometers, Coils, Gang Condensers, Relays, Bread Boards.
2. Identification, Specifications and Testing of active devices, Diodes, BJTs, JFETs, LEDs, LCDs, SCR, UJT.
3. Soldering Practice- Simple circuits using active and passive components.
4. Study and operation of Ammeters, Voltmeters, Transformers, Analog and Digital Multimeter, Function Generator, Regulated Power Supply and CRO.

PART B: List of Experiments

1. P-N Junction Diode Characteristics.

   Part A: Germanium Diode (Forward bias& Reverse bias).

   Part B: Silicon Diode (Forward Bias only).

2. Zener Diode Characteristics.

   Part A: V-I Characteristics.

   Part B: Zener Diode as Voltage Regulator.

3. Rectifiers

   Part A: Half-wave Rectifier.

   Part B: Full-wave Rectifier (with C, LC, π-filter).

4. BJT Characteristics and h-Parameter calculations (CE Configuration).

   Part A: Input Characteristics.

   Part B: Output Characteristics.

5. BJT Characteristics and h-Parameter calculations (CB Configuration).

   Part A: Input Characteristics.

   Part B: Output Characteristics.

6. FET Characteristics and h-Parameter calculations (CS Configuration).

   Part A: Drain Characteristics.

   Part B: Transfer Characteristics.

7. SCR Characteristics.

8. UJT Characteristics.

9. BJT-CE Amplifier.

10. Emitter Follower-CC Amplifier.

11. FET-CS Amplifier.

Equipment required for Laboratory

1.Boxes (DLB, DRB and DCB).
2.Ammeters (Analog / Digital).
3.Voltmeters (Analog / Digital).
4.Active & Passive Electronic Components.
5.Regulated Power supplies.
6.Analog/Digital Storage Oscilloscopes.
7.Analog/Digital Function Generators.
8.Digital Multimeter.

II Year - I Semester

18EE3L01 – ELECTRICAL TECHNOLOGY LAB

L	T	P	C
0	0	3	1.5

The following experiments are to be conducted:

1.Magnetization characteristics of D.C. Shunt generator. Determination of critical field resistance

2. Speed control of D.C. Shunt motor by Armature & flux control methods

3. Brake test on DC shunt motor. Determination of performance characteristics.

4. OC & SC tests on Single-phase transformer (Predetermination of efficiency and regulation at given power factors and determination of equivalent circuit).

5. Brake test on 3-phase Induction motor (performance characteristics).

6. Regulation of alternator by synchronous impedance method

7. Swinburne's test on D.C. Shunt machine (Predetermination of efficiency of a given D.C.Shunt machine working as motor and generator).

8. Load test on DC shunt generator

9. Load test on DC series generator

10. Hopkinson's test on DC shunt machines. Predetermination of efficiency.

II Year - I Semester

18CS3L05 – OBJECT ORIENTED PROGRAMMING LAB

L	T	P	C
0	0	3	1.5

Exercise - 1 (Basics)

a) Write a JAVA program to display default value of all primitive data type of JAVA
b) Write a case study on **public static void main (250 words)**

Exercise - 2 (Operations, Expressions, Control-flow, Strings)

a) Write a JAVA program to search for an element in a given list of elements using binary search mechanism.
b) Write a JAVA program using StringBuffer to delete, remove character.

Exercise - 3 (Class, Objects)

a) Write a JAVA program to implement class mechanism. – Create a class, methods and invoke them inside main method.
b) Write a JAVA program to implement constructor.

Exercise - 4 (Methods)

a) Write a JAVA program to implement constructor overloading.
b) Write a JAVA program implement method overloading.

Exercise - 5 (Inheritance)

a) Write a JAVA program to implement multi level Inheritance.
b) Write a java program for abstract class to find areas of different shapes.

Exercise - 6 (Inheritance - Continued)

a) Write a JAVA program give example for "super" keyword.
b) Write a JAVA program to implement Interface. What kind of Inheritance can be achieved?

Exercise - 7 (Exception)

a) Write a JAVA program that describes exception handling mechanism.
b) Write a JAVA program Illustrating Multiple catch clauses.
c) Write a JAVA program that implements Runtime polymorphism.

Exercise – 8 (User defined Exception)

a) Write a JAVA program to Illustrate try, catch.
b) Write a JAVA program to Illustrate finally.
c) Write a JAVA program for creation of User Defined Exception.

Exercise – 9 (Threads)

a) Write a JAVA program that creates threads by extending Thread class. First thread display "Good Morning "every 1 second, the second thread displays "Hello "every 2 seconds and the third display "Welcome" every 3 seconds (Repeat the same by implementing Runnable).

b) Write a program illustrating **isAlive** and **join ().**
c) Write a Program illustrating Daemon Threads.
d) Write a JAVA program Producer Consumer Problem

II Year - I Semester

L	T	P	C
1	0	0	0

18HS3T01 – ENVIRONMENTAL STUDIES

UNIT 1:

The Multidisciplinary nature of environmental studies Definition, scope and importance.

A. Eco Systems
   a) Concept of an eco system
   b) Structure and function of an eco system.
   c) Producers, consumers, decomposers.
   d) Ecological succession.
   e) Food chains, food webs and
   f) Ecological pyramids.

B. Structure and function of the following eco systems:
   a) Forest ecosystem
   b) Grass land ecosystem

UNIT 2: NATURAL RESOURCES

Renewable and non renewable resources:

A. Natural resources and associated problems
   a) Forest resources
   b) Water resources
   c) Mineral Resources
   d) Food Resources
   e) Energy Resource
   f) Land Resources

B. Role of individual in conservation of natural resources.

UNIT 3: BIODIVERSITY AND ITS CONSERVATION

- Introduction-Definition: genetics, species and ecosystem diversity.
- Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values
- India as a mega diversity nation.
- Hot-spots of biodiversity.
- Threats to biodiversity: habitats loss, poaching of wild life, man wildlife conflicts.
- Endangered and endemic spaces of India.
- Conservation of biodiversity: in-situ and ex-situ conservation of biodiversity.

UNIT 4: ENVIRONMENTAL POLLUTION

Definition Causes, 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 and case studies.

UNIT 5: SOCIAL ISSUES AND THE ENVIRONMENT

- Water conservation, rain water harvesting
- Resettlement and rehabilitation of people- its problems and concerns- case studies
- Climate change, global warming, acid rain, ozone layer depletion, case studies.
- 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
- Population growth

FIELD WORK

Visit to a local area to document environment assets river / forest / grassland / hill / mountain. Visit to a local polluted site-urban/rural/industrial/agricultural. Study of common plants, insects, birds. Study of simple ecosystems-pond, river.

TEXT BOOKS:

1.Textbook of Environmental studies, Erach Bharucha, UGC

2.Fundamental concepts in Environmental Studies, D D Mishra, S Chand & Co Ltd

II Year - II Semester

L	T	P	C
3	0	0	3

18EC4T06 - ELECTRONIC CIRCUIT ANALYSIS

COURSE OUTCOMES

After going through this course the student will be able to

1. Analysis of small signal high frequency BJT, FET transistor amplifiers using hybrid-π model.
2. Analysis of cascaded RC coupled BJT, FET amplifiers and different types of the coupled amplifiers with its frequency response.
3. Analysis of the different types of feedback amplifiers with its frequency response.
4. Understand the condition for Oscillations in Oscillators and derive the expression for frequency of oscillation.
5. Understand power amplifiers and its efficiency.
6. Analyse tuned amplifiers, its bandwidth and stability.

UNIT I

SMALL SIGNAL HIGH FREQUENCY TRANSISTOR AMPLIFIER MODELS

BJT: Transistor at high frequencies, Hybrid-π common emitter transistor model, Hybrid-π conductances, Hybrid-π capacitances, validity of hybrid-π model, determination of high-frequency parameters in terms of low- frequency parameters, CE short circuit current gain, current gain with resistive load, cut-off frequencies, frequency response and gain bandwidth product.

FET: Analysis of common Source and common drain Amplifier circuits at high frequencies.

UNIT II

Multistage Amplifiers: Classification of amplifiers, methods of coupling, cascaded transistor amplifier and its analysis, analysis of two stage RC coupled amplifier, high input resistance transistor amplifier circuits and their analysis-Darlington pair amplifier, Cascode amplifier, Boot-strap emitter follower.

UNIT III

Feedback Amplifiers: Feedback principle and concept, types of feedback, classification of amplifiers, feedback topologies, Characteristics of negative feedback amplifiers, Generalized analysis of feedback amplifiers, Performance comparison of feedback amplifiers, Method of analysis of feedback amplifiers.

UNIT IV

Oscillators: Oscillator principle, condition for oscillations, types of oscillators, RC-phase shift and Wein bridge oscillators with BJT and FET and their analysis, Generalized analysis of LC Oscillators, Hartley and Colpitt's oscillators with BJT and FET and their analysis, Crystal oscillators, Frequency and amplitude stability of oscillators.

UNIT-V

Power Amplifiers: Classification of amplifiers, Class A power Amplifiers and their analysis, Harmonic Distortions, Class B Push-pull amplifiers and their analysis, Complementary symmetry push pull amplifier, Class AB power amplifier, Class-C power amplifier, Thermal stability and Heat sinks, Advanced power amplifiers (Class- D, S & E) Distortion in amplifiers.

UNIT-VI

Tuned Amplifiers: Introduction, Q-Factor, small signal tuned amplifier, capacitance single tuned amplifier, double tuned amplifiers, effect of cascading single tuned amplifiers on band width, effect of cascading double tuned amplifiers on band width, staggered tuned amplifiers, stability of tuned amplifiers, wideband amplifiers.

TEXT BOOKS:

1. Integrated Electronics- J. Millman and C.C.Halkias, Tata Mc Graw- Hill, 1972.
2. Electronic Circuit Analysis - B.V.Rao,K.R.Rajeswari,P.C.R.Pantulu,K.B.R.Murthy, Pearson Publications.
3. Electronic Devices and Circuits Theory- Robert L.Boylestad and Louis Nashelsky, Pearson/Prentice Hall, Tenth Edition.

REFERENCES:

1. Microelectronic Circuits-Sedra A.S. and K.C. Smith, Oxford University Press, Sixth Edition.
2. Electronic Circuit Analysis and Design- Donald A. Neaman, Mc Graw Hill.
3. Electronic Circuit Analysis - Salivahanan, N.Suresh Kumar, A. Vallavaraj, TATA McGraw Hill, Second Edition.

II Year - II Semester

L	T	P	C
2	1	0	3

18EC4T07 - CONTROL SYSTEMS

COURSE OUTCOMES

After going through this course the student will be able to

1. Develop mathematical modelling of the Control System.
2. Analyze the system in time domain.
3. Study the stability of a system in Time domain.
4. Analyze the system in frequency domain.
5. Design a system in time and Frequency domain.
6. List various methods of classical control system.

UNIT I

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

Transfer Functions: Mathematical modelling of Mechanical (translation and rotational), Electrical systems (DC Servomotor and AC Servomotor). Mechanical-Electrical analogies, Block Diagram reduction technique and Signal flow graphs.

UNIT II

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

UNIT III

Stability Analysis in S-domain: The concept of stability, Routh's stability criterion, qualitative stability and conditional stability, limitations of Routh's stability.

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

UNIT IV

Frequency response analysis: Introduction, frequency domain specifications of second order systems, Correlation between time and frequency response, Bode Plots, Phase margin and Gain margin Stability Analysis, Polar Plots, Nyquist Stability Criterion

UNIT V

Introduction to Design: Design problem, Preliminary consideration of classical design, Compensation techniques – Lag, Lead, Lead-Lag, Controllers, Realization of basic Compensators, Cascade compensation in time domain and frequency domain, Tuning of PID Controllers.

UNIT VI

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

TEXT BOOKS:

1.Automatic Control Systems- B C kuo, 9th Edition, PHI, 2014.

2.Control Systems Engineering- J.Nagrath and M.Gopal, New Age Publishers, 2009.

3.Modern Control Engineering- Katsuhiko Ogata, 5th Edition, PHI, 2015.

REFERENCES:

1.Problems and Solutions of Control Systems with Essential Theory- A.K.Jairath, 2012.

2.Control Systems Engineering- Norman Nise, 6th Edition, John Wiley, 2011.

3.Control Systems- Nagoor Kani, 2nd Edition, RBA Publications, 2013.

II Year - II Semester

18EC4T08 - ELECTROMAGNETIC WAVES AND TRANSMISSION LINES

L	T	P	C
2	1	0	3

COURSE OUTCOMES

After going through this course the student will be able to

1. Understand time varying Maxwell's equations and their applications in Electromagnetic problems
2. Analyse the relationship between time varying electric and magnetic field and Electromotive force
3. Analyse basic Transmission line parameters in Phasor domain
4. Describe the propagation of Electromagnetic waves in Vacuum using Maxwell's equations.
5. Understand wave propagation in Dielectrics and lossy media
6. Demonstrate the reflection and refraction of waves at boundaries
7. Describe the basic waveguide operations and parameters.

UNIT I

Review of coordinate systems

Electro Statics: Coulomb's Law, Electric Field Intensity Electric Flux Density, Gauss Law and Applications, Electric Potential, Maxwell's Two Equations for Electrostatic Fields, Energy Density, Illustrative Problems. Convection and Conduction Currents, Dielectric Constant, Continuity Equation, Relaxation Time, Poisson's and Laplace's Equations, Illustrative Problems.

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

UNIT II

Maxwell's Equations (Time Varying Fields): Faraday's Law and Transformer emf, Inconsistency of Ampere's Law and Displacement Current Density, Maxwell's Equations in Different Forms and Word Statements.

Conditions at Boundary Surface: Dielectric-Dielectric and Dielectric-Conductor Interfaces. Related Problems.

UNIT III

EM Wave Characteristics - I: Wave Equations for Conducting and Perfect Dielectric Media, Uniform Plane Waves – Definition, Relations between E & H. Sinusoidal Variations, Wave Propagation in Lossless and Conducting Media. Conductors & Dielectrics – Characterization. Wave Propagation in Good Conductors and Good Dielectrics, Polarization, Skin Depth and Surface Impedance, Poynting Vector and Poynting Theorem, Applications. Power Loss in a Plane Conductor, Related Problems.

UNIT IV

EM Wave Characteristics - II: Reflection and Refraction of Plane Waves – Normal and Oblique Incidence (for both Perfect Conductor and Perfect Dielectrics), Brewster Angle, Critical Angle and Total Internal Reflection, Related Problems. Introduction to Guided waves and propagation components.

UNIT VI

Transmission Lines - I: Different Types, Transmission Line parameters and Equations, Expressions for Characteristic Impedance, Propagation Constant, Phase and Group Velocities, Infinite Line Concepts, Input Impedance of transmission lines, Loss less /Low Loss Characterization. Distortion – Condition for Distortion less and Minimum Attenuation, Loading – different Types, Related Problems.

UNIT VI

Transmission Lines - II: SC and OC Lines, UHF Lines as Circuit Elements, Reflection Coefficient, VSWR, Impedance Transformations-$\lambda/4$, $\lambda/2$, $\lambda/8$ Lines. Losses in transmission lines. Smith Chart– Configuration and Applications, Single and Double Stub Matching, Related Problems.

TEXT BOOKS:

1. Elements of Electromagnetic – Matthew N.O. Sadiku, Oxford Univ. Press, 3rd ed., 2001.
2. Electromagnetic Waves and Radiating Systems – E.C. Jordan and K.G. Balmain, PHI, 2nd Edition, 2000.
3. Electromagnetic Fields and Wave Theory –GSN Raju, Pearson Education 2006.

REFERENCES:

1. Engineering Electromagnetics – Nathan Ida, Springer (India) Pvt. Ltd., New Delhi, 2nd edition, 2005.
2. Engineering Electromagnetics – William H. Hayt Jr. and John A. Buck, TMH, 7th edition, 2006.
3. Networks, lines and fields – John D Ryder, 2nd Edition, 1999 PHI

II Year - II Semester

L	T	P	C
3	0	0	3

18EC4T09 - ANALOG COMMUNICATIONS

COURSE OUTCOMES

After going through this course the student will be able to

1. Understand an analog communication system.
2. Analyse time domain and frequency domain equations for all forms of amplitude modulation Schemes.
3. design a communication system to generate frequency modulated signal and to detect the modulating signal from it
4. Analyse and Calculate noise frequency components in AM, DSB, SSB and angle modulation systems.
5. Understand AM and FM Transmission and Reception.
6. Explain Pulse Modulation Techniques-PAM,PWM,PPM

UNIT I

Amplitude Modulation: Introduction to communication system, Need for modulation, Frequency Division Multiplexing , Amplitude Modulation - Definition, Time domain and frequency domain description, single tone modulation, power relations in AM waves, Generation of AM waves, square law Modulator, Switching modulator, Detection of AM Waves; Square law detector, Envelope detector.

UNIT II

DSB Modulation: Double side band suppressed carrier modulators, time domain and frequency domain description, Generation of DSBSC Waves, Balanced Modulators, Ring Modulator, Coherent detection of DSB-SC Modulated waves, COSTAS Loop. Frequency domain description.

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

UNIT III

Angle Modulation: Basic concepts, Frequency Modulation- Single tone frequency modulation, Spectrum Analysis of Sinusoidal FM Wave, Narrow band FM, Wide band FM, Transmission bandwidth of FM Wave - Generation of FM Waves, Direct FM, Detection of FM Waves: Balanced Frequency discriminator, Zero crossing detector, Phase locked loop, Comparison of FM & AM.

UNIT IV

Noise: Noise in Analog communication System, Noise in DSB & SSB System, Noise in AM System, Noise in Angle Modulation System, Threshold effect in Angle Modulation System, Pre-emphasis & de-emphasis.

UNIT V

Transmitters: Radio Transmitter – Classification of Transmitter, AM Transmitter, Effect of feedback on performance of AM Transmitter, FM Transmitter – Variable reactance type and phase modulated FM Transmitter, frequency stability in FM Transmitter.

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

UNIT VI

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

TEXT BOOKS:

1. Principles of Communication Systems – H Taub & D. Schilling, Gautam Sahe, TMH, 2007 3rd Edition.
2. Communication Systems – B.P. Lathi, BS Publication, 2006.
3. Principles of Communication Systems - Simon Haykin, John Wiley, 2nd Ed

REFERENCES:

1. Electronics & Communication System – George Kennedy and Bernard Davis, TMH 2004. Communication Systems– R.P. Singh, SP Sapre, Second Edition TMH, 2007.
2. Fundamentals of Communication Systems - John G. Proakis, Masond, Salehi PEA, 2006.
3. Analog Communication Systems -Sanjay Sharma, SK Publications.

II Year - II Semester

L	T	P	C
3	0	0	3

18EC4T10 - PULSE AND DIGITAL CIRCUITS

COURSE OUTCOMES

After going through this course the student will be able to

1. Design the circuits for generating desired wave shapes for different applications.
2. Design series and shunt clipping circuits and verify the clamping circuit theorem.
3. Determine the switching characteristics of a diode, transistor.
4. Understand the working principle of various multivibrators.
5. Explain various time base generators and their operation, the methods of frequency synchronization and division in other relaxation circuits.
6. Understand the working principle of various sampling gates, Realization of logic gates using various logic families.

UNIT I

Linear Wave Shaping: High pass, low pass RC circuits, their response for sinusoidal, step, pulse, square and ramp inputs. RC network as differentiator and integrator, attenuators, its applications in CRO probe, RL and RLC circuits and their response for step input, Ringing circuit.

UNIT II

Non-Linear Wave Shaping : Diode clippers, Transistor clippers, Clipping at two independent levels, Transfer characteristics of clippers, Emitter coupled clipper, Comparators, Applications of voltage comparators, Clamping operation, Clamping circuits using diode with different inputs, Clamping circuit theorem, Practical clamping circuits, Effect of diode characteristics on clamping voltage, Transfer characteristics of clampers.

UNIT III

Switching Characteristics Of Devices : Diode as a switch, Piecewise linear diode characteristics, Transistor as a switch, Break down voltage consideration of transistor, Saturation parameters of Transistor and their variation with temperature, Design of transistor switch, Transistor switching times.

UNIT IV

Multivibrators

Bistable Multivibrator: Analysis and Design of Fixed Bias, Self Bias Bistable Multivibrator, Collector catching Diodes, Commutating Capacitors, Methods of Triggering using RC network & Diode, Emitter Coupled Bistable Multivibrator (Schmitt trigger).

Monostable Multivibrator: Analysis and Design of Collector Coupled Monostable Multivibrator, Triggering method of a Monostable Multivibrator, Application of Monostable Multivibrator as a Voltage to Time Converter.

Astable Multivibrator: Analysis and Design of Collector Coupled Astable Multivibrator, Application of Astable Multivibrator as a Voltage to Frequency Converter.

UNIT V

Voltage Time Base Generators : General features of a time base signal, methods of generating time base waveform, Miller and Bootstrap time base generators – basic principles, Transistor miller time base generator, Transistor Bootstrap time base generator.

Synchronization and Frequency Division: Principles of Synchronization, Frequency division in sweep circuit, Astable relaxation circuits, Monostable relaxation circuits, Synchronization of a sweep circuit with symmetrical signals.

UNIT VI

Sampling Gates & Logic Gates: Basic operating principles of sampling gates, Unidirectional and Bi- directional sampling gates, Reduction of pedestal in gate circuits, Applications of sampling gates. AND, OR gates using Diodes, NAND, NOR using RTL, DTL, TTL, ECL.

TEXT BOOKS:

1.Pulse, Digital and Switching Waveforms - J. Millman and H. Taub, McGraw-Hill, 1991.
2.Solid State Pulse circuits - David A. Bell, PHI, 4th Edition, 2002.
3.Pulse and Digital Circuits – A. Anand Kumar, PHI, 2005.

REFERENCES:

1.Pulse, Digital Circuits and Computer Fundamentals - R.Venkataraman.
2.Pulse & Digital Circuits- Venkata Rao, K.Ramasudha, K.Manmadha Rao, G. Pearson, 2010.
3.Wave Generation and Shaping - L. Strauss.

II Year - II Semester

18EC4L02 - ELECTRONIC CIRCUITS ANALYSIS LAB

L	T	P	C
0	0	3	1.5

Note: The students are required to design the electronic circuit and they have to perform the simulation using Multisim/ Pspice/Equivalent Licensed simulation software tool. Further they are required to verify the result using necessary hardware in the hardware laboratory.

PART A: ***Any Ten Experiments from following***

1.Voltage-Series Feedback Amplifier.
2.Current-Shunt Feedback Amplifier.
3.RC Phase Shift/Wien Bridge Oscillator.
4.Hartley/Colpitt's Oscillator.
5.Two Stage RC Coupled Amplifier.
6.Darlington Pair Amplifier.
7.Bootstrapped Emitter Follower.
8.Class A Series-fed Power Amplifier.
9.Transformer-coupled Class A Power Amplifier.
10. Class B Push-Pull Power Amplifier.
11. Complementary Symmetry Class B Push-Pull Power Amplifier.
12. Single Tuned Voltage Amplifier.
13. Double Tuned Voltage Amplifier.

Equipment required for Laboratory

Software:

1.Multisim / Spice/Equivalent Licensed simulation software tool.
2.Computer Systems with required specifications.

Hardware:

1.Regulated Power supplies.
2.Analog/Digital Storage Oscilloscopes.
3.Analog/Digital Function Generators.
4.Digital Multimeters.
5.Decade Résistance Boxes/Rheostats.
6.Decade Capacitance Boxes.
7.Ammeters (Analog or Digital).
8.Voltmeters (Analog or Digital) & Active & Passive Electronic Components.

II Year - II Semester

L	T	P	C
0	0	3	1.5

18EC4L03 - ANALOG COMMUNICATIONS LAB

PART A: Any nine experiments from the following

1.Verification of Sampling Theorem.
2.Amplitude Modulation & Demodulation
3.AM - DSB SC - Modulation & Demodulation.
4.Frequency Modulation & Demodulation.
5.Pre-emphasis & De-emphasis.
6.Spectrum Analysis of Modulated signal using Spectrum Analyzer.
7.Diode Detector.
8.AGC Circuits.
9.Pulse Amplitude Modulation – Modulation & Demodulation.
10. PWM, PPM - Modulation & Demodulation.
11. Phase Locked loop (PLL).
12. Design of FM receiver (90.4 MHz).

PART B: Any three experiments from the following using MATLAB Software

1.Amplitude Modulation – Modulation & Demodulation.
2.AM - DSB SC -. Modulation & Demodulation.
3.Frequency Modulation – Modulation. & Demodulation.
4.Pulse Amplitude Modulation – Modulation & Demodulation.
5.PWM, PPM - Modulation & Demodulation.

Equipment required for Laboratory

Software:

1.Simulations software (MATLAB).
2.Computer Systems with required specifications.

Hardware:

1.Regulated Power supplies.
2.Analog/Digital Storage Oscilloscopes.
3.Analog/Digital Function Generators.
4.Components.
5.Multimeters.
6.Spectrum Analyser.

III YEAR - I SEMESTER				
18EC5T11-MICRO PROCESSORS AND ARCHITECTURES	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

COURSE OBJECTIVES:

The student will

1. Understand the basic computer architecture, memory, I/O organization.
2. Understand concepts of microprocessor, different addressing modes and programming of 8086.
3. Understand interfacing of 8086, with memory and other peripherals.
4. Study the features of 8051 Microcontroller, its instruction set and also other controllers.

COURSE OUTCOMES:

At the end of this course the student can able to

1. Recall basic functional units, operational concepts and types of a computer.
2. Interpret various memory hierarchy, I/O devices and 8085 architecture.
3. Understand the architecture of 8086 microprocessor.
4. Develop an assembly language program for specified application
5. Interface different external peripheral devices with microprocessors.
6. Distinguish the Microprocessor and Micro controller.

UNIT-I

Basic Computer Architecture: Introduction, Basic Structure of computer, Functional units, Basic operational concepts, Bus structures, Central Processing Unit (CPU), Data types, Complements, Data Representation- Fixed Point Representation, Floating – Point Representation.

UNIT-II

The memory system - Memory hierarchy, Main memory, Auxiliary memory.
Input-Output Organization - Peripheral devices, Input-Output Interface.
8085 architecture: Functional diagram, addressing modes, instruction set, programming.

UNIT-III

8086 architecture: Functional diagram, Register organization, memory segmentation, Memory addresses, physical memory organization, Signal descriptions of 8086-common function signals, timing diagrams, Interrupts of 8086.

UNIT-IV

Instruction set and assembly language programming of 8086: Instruction formats. Addressing modes, instruction set and assembler directives. Macros, Simple programs involving logical, branch and call instructions. Sorting, evaluating arithmetic expressions, string manipulations.

UNIT-V

8086 Interfacing: 8255 PPI, various modes of operation and interfacing to 8086, interfacing of led, seven segment displays, key board, LCD display. Stepper motor interfacing, D/A &A/D converter. Memory interfacing to 8086.

UNIT-VI

8051 Microcontroller: Overview of 8051 microcontroller, Architecture, I/O ports, Memory organization, addressing modes and instruction set of 8051.Simple programs. Programming Timer

interrupts, programming external hardware interrupts, Programming the serial communication interrupts, Programming 8051 timers and counters.

TEXT BOOKS:

1.Computer System Architecture – M.Moris Mano, IIIrd Edition, PHI /Pearson, 2006.

2.A.K.Ray, K.M.Bhurchandi, ”Advanced Microprocessors and Peripherals”, Tata McGraw Hill Publications, 2000.

3.Ajay V Deshmukh,”Microcontrollers”, TATA McGraw Hill publications, 2012.

REFERENCES:

1.Computer Organization and Architecture – William Stallings Sixth Edition, Pearson/PHI

2.Microprocessors and Microcontrollers-Architecture, Programming and System Design by Krishna Kant, PHI Learning Private Limited, Second Edition, 2014.

3.Microprocessors and Microcontrollers by N.Senthil Kumar, M.Saravanan and S.Jeevananthan, Oxford University Press, Seventh Impression 2013.

III YEAR - I SEMESTER				
18EC5T12 - LINEAR IC APPLICATIONS	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

COURSE OBJECTIVES:

The student will

1.Outline basic op-amp principles
2.Compare linear and non-linear applications of op-amp
3.Study and understand different types of ADSs and DACs
4.Design applications of operational amplifiers and analog integrated circuits.

COURSE OUTCOMES

At the end of this course the student can able to

1.Capable of identifying the differential amplifier with different configurations.
2.Gain adequate knowledge on structure of op-amp and its characteristics
3.Able to design linear and non-linear applications.
4.Understand the concepts of active filter.
5.Experience the knowledge on how a 555 timer used for different applications.
6.Gains adequate knowledge on analog to digital and digital to analog using OP-AMP.

UNIT I

Integrated Circuits: Differential Amplifier- DC and AC analysis of Dual input Balanced output Configuration, Properties of other differential amplifier configuration (Dual Input Unbalanced Output, Single Ended Input – Balanced/ Unbalanced Output), DC Coupling and Cascade Differential Amplifier Stages, Level translator.

UNIT II

Characteristics of OP-AMP: Integrated circuits-Types, Classification, Package Types and Temperature ranges, Power supplies, Op-amp Block Diagram, ideal and practical Op-amp Specifications, DC and AC characteristics, 741 op-amp & its features, Op-Amp parameters & Measurement, Input & Out put Off set voltages & currents, slew rate, CMRR, PSRR, drift, Frequency Compensation techniques.

UNIT III

Linear and Non-Linear Applications of OP-AMP: Inverting and Non-inverting amplifier, Integrator and differentiator, Difference amplifier, Instrumentation amplifier, AC amplifier, V to I, I to V converters, Buffers. Non- Linear function generation, Comparators, Multivibrators, Triangular and Square wave generators, Log and Anti log Amplifiers, Precision rectifiers, RC Phase shift/wien bridge oscillator.

UNIT IV

Filters: Comparison between Passive and Active networks, Design & Analysis of Butterworth active filters - 1st order, 2nd order LPF, HPF filters. Band pass, Band reject and all pass filters, Sample & Hold circuits.

UNIT V

Timers and Phase Locked Loops: Introduction to 555 timer, functional diagram, Monostable and Astable operations and applications, Schmitt Trigger; PLL - introduction, block schematic, principles and description of individual blocks, 565 PLL, Applications of PLL – frequency multiplication, frequency translation, AM, FM & FSK demodulators. Applications of VCO.

UNIT VI

Digital to Analog and Analog to Digital Converters: Introduction, basic DAC techniques, weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, and Monolithic DAC, Different types of ADCs – parallel Comparator type ADC, counter type ADC, successive approximation ADC and dual slope ADC.DAC and ADC Specifications.

TEXT BOOKS:

1. Linear Integrated Circuits – D.Roy Choudhury, New Age International (p) Ltd, 2nd Edition,2003.
2. Op-Amps & Linear ICs - Ramakanth A. Gayakwad, PHI, 1987.
3. Operational Amplifiers–C.G. Clayton, Butterworth & Company Publ. Ltd./Elsevier, 1971

REFERENCES:

1. Operational Amplifiers & Linear Integrated Circuits –Sanjay Sharma ;SK Kataria &Sons;2nd Edition,2010
2. Design with Operational Amplifiers & Analog Integrated Circuits – Sergio Franco, McGraw Hill, 1988.
3. OP AMPS and Linear Integrated Circuits concepts and Applications, James M Fiore, Cenage Learning India Ltd.

III YEAR - I SEMESTER				
18EC5T13 - DIGITAL SYSTEM DESIGN – II	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

COURSE OBJECTIVES:

The student will

1. Get familiarized with Digital Logic Families
2. Study Integrated circuits for all digital operational designs like adder, subtractor, multipliers, multiplexers, registers, counters, flip flops, encoders, decoders and memory elements like RAM and ROM.
3. Use Computer-Aided Design Tool (VHDL) For Development of Complex Digital Logic circuits.
4. Design and Prototype with Standard Cell Technology and Programmable Logic.

COURSE OUTCOMES:

At the end of this course the student can able to

1. Understand the structure of commercially available digital integrated circuit families.
2. Learn the IEEE Standard 1076 Hardware Description Language (VHDL).
3. Model complex digital systems at several levels of abstractions, behavioural, structural, simulation, synthesis.
4. Analyze and design basic digital circuits with combinatorial circuits using VHDL tool.
5. Analyze and design basic digital circuits of sequential logic circuits using VHDL tool.
6. Understand the IEEE Standard of Hardware Description Language Verilog.

UNIT I

Digital Logic Families and Interfacing: Introduction to logic families, CMOS logic, CMOS steady state and dynamic electrical behaviour, CMOS logic families. Bipolar logic, transistor-transistor logic, TTL families, Emitter coupled logic, Comparison of different logic families & interfacing of TTL.

UNIT II

Introduction to VHDL: History of VHDL, Design flow, program structure, levels of abstraction. Elements of VHDL: Data types, data objects, operators and identifiers. Packages, Libraries and Bindings, Subprograms. VHDL Programming using structural and data flow modelling.

UNIT III

Behavioural Modelling: Process statement, variable assignment statement, signal assignment statement, wait statement , if statement, case statement ,null statement, loop statement, exit statement, next statement ,assertion statement, more on signal assignment statement ,Inertial Delay Model, Transport Delay Model ,Creating Signal Waveforms, Signal Drivers, Other Sequential Statements, Multiple Processes. Logic Synthesis, inside a logic Synthesizer.

UNIT IV

Combinational Logic Design: Adders, Subtractors, Ripple Adder, Look Ahead Carry Generator, ALU, Decoders, encoders, multiplexers and demultiplexers, Barrel Shifter, Simple Floating-Point Encoder, Dual Priority Encoder, comparator, Cascading Comparators. Design considerations of the above combinational logic circuits with relevant Digital ICs, modelling of above ICs using VHDL.

UNIT V

Sequential Logic Design: SSI Latches and flip flops Design of Modulus N Synchronous Counters, Shift Registers, Universal Shift Registers, Design considerations of the above sequential logic circuits with relevant Digital ICs, modelling of above ICs using VHDL.

Synchronous and Asynchronous Sequential Circuits: Basic design steps: State diagram, state table, and state assignment, derivation of next state and output expressions. Mealy and Moore type FSM for serial adder, VHDL code for the serial adder.

UNIT VI

Introduction to HDL (Verilog): Levels of Design Description, Program Structure, Module, Test Bench, Compiler Directives, Simulation and Synthesis Tools, Language Constructs and conventions. Types of Modelling: Switch Level Modelling, Modelling at Dataflow Level: Introduction, Continuous Assignment Structure, Delays and Continuous Assignments, Assignment to Vectors, Operators Illustration of above modelling examples.

TEXT BOOKS:

1. Digital Design Principles & Practices – John F. Wakerly, Pearson Education Asia, 3rd Edition.
2. VHDL Primer – J. Bhasker, Pearson Education, 3rd Edition.
3. Verilog Digital System Design - Zainalabdien Navabi, TMH, 2nd Edition.

REFERENCES:

1. Fundamentals of Digital Logic with VHDL Design- Stephen Brown, ZvonkoVranesic, McGraw Hill, 3rd Edition.
2. Verilog HDL - Samir Palnitkar, Pearson Education, 2nd Edition.
3. Designing with TTL Integrated Circuits: Robert L / John R Morries & Miller.

III YEAR - I SEMESTER				
18EC5T14 - ANTENNA AND WAVE PROPAGATION	**L**	**T**	**P**	**C**
	2	**1**	**0**	**3**

COURSE OBJECTIVES:

The student will

1. Know basic terminology and concepts of Antennas in the Antenna Design Process
2. Analyse Electric and Magnetic Field Emission.
3. Get knowledge on Antenna operation and Types as well as their usage in real time field.
4. Learn propagation of the waves at different Frequencies through different Layers in the existing Layered free space environment structure.

COURSE OUTCOMES

At the end of this course the student can able to

1. Understand the basic concepts of radiation mechanism in free space and the antenna parameters.
2. Investigate the characteristics of thin linear Wire antennas and small loop antennas
3. Design of array of antennas for various specifications and applications
4. Introduce the working principles of various types of antennas.
5. Discuss the major applications of antennas and how antennas are employed to meet electronic system requirements
6. Understand the concepts of radio wave propagation in the atmosphere

UNIT I

Antenna Fundamentals: Introduction, Radiation Mechanism – single wire, 2 wire, dipoles, Current Distribution on a thin wire antenna. Antenna Parameters - Radiation Patterns, Patterns in Principal Planes, Main Lobe and Side Lobes, Beam widths, Polarization, 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.

UNIT II

Thin Linear Wire Antennas: Retarded Potentials, Radiation from Small Electric Dipole, Quarter wave Monopole and Half wave Dipole – Current Distributions, Evaluation of Field Components, Power Radiated, Radiation Resistance, Beam widths, Directivity, Effective Area and Effective Height. Loop Antennas: Small Loops - Field Components, Comparison of far fields of small loop and short dipole, D and Rr relations for small loops.

UNIT III

Antenna Arrays: 2 element arrays – different cases, Principle of Pattern Multiplication, N element Uniform Linear Arrays – Broadside, End-fire Arrays, EFA with Increased Directivity, Derivation of their characteristics and comparison; Concept of Scanning Arrays. Directivity Relations (no derivations).

Binomial Arrays, Effects of Uniform and Non-uniform Amplitude Distributions, Design Relations. Arrays with Parasitic Elements, Yagi-Uda Arrays, Folded Dipoles and their characteristics.

UNIT IV

Non-Resonant Radiators: Introduction, Long wire antennas – basic concepts, V-antennas and Rhombic antennas, Broadband Antennas: Helical Antennas – Significance, Geometry, basic properties; Design considerations for monofilar helical antennas in Axial Mode and Normal Modes (Qualitative Treatment). Microstrip Antennas-Introduction, Features, Advantages and Limitations Rectangular Patch Antennas –Geometry and Parameters, Impact of different parameters on characteristics.

UNIT V

VHF, UHF and Microwave Antennas: Reflector Antennas: Flat Sheet and Corner Reflectors. Paraboloidal Reflectors – Geometry, characteristics, types of feeds, F/D Ratio, Spill Over, Back Lobes, Aperture Blocking, Off-set Feeds, Cassegrain Feeds. Horn Antennas – Types, Optimum Horns, Design Characteristics of Pyramidal Horns; Lens Antennas (Qualitative treatment only).

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

UNIT VI

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 and Skip Distance – Calculations for flat and spherical earth cases, Optimum Frequency, LUHF, 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 and Tropospheric scattering.

TEXT BOOKS

1. Antennas and Wave propagation– John D. Kraus and Ronald J. Marhefka, 4th Edition, TMH.
2. Electromagnetic Waves and Radiating Systems – E.C. Jordan and K.G. Balmain, PHI, 2nd Edition.
3. Antennas and Wave Propagation - G.S.N Raju, "", 1st Edn Pearson Education, 2004.

REFERENCES

1. Antenna Theory - C.A. Balanis, John Wiley and Sons, 2nd Edition.
2. Antennas and Wave Propagation – K.D. Prasad, Satya Prakashan, Tech India Publications.
3. Antennas for All Applications – John D. Kraus and Ronald J. Marhefka, 3rd Edition, TMH.

III YEAR - I SEMESTER				
18EC5L05 - PULSE AND DIGITAL CIRCUITS LAB	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1.5**

Minimum Twelve experiments to be conducted:

1.Linear wave shaping (RC Integrator & RC differentiator).
2.Non Linear wave shaping – Clippers.
3.Non Linear wave shaping – Clampers.
4.Transistor as a switch.
5.Study of Logic Gates and applications.
6.Study of Flip-Flops and applications
7.Half adder & Full adder.
8.Sampling Gates.
9.Astable Multivibrator.
10. Monostable Multivibrator.
11. Bistable Multivibrator.
12. Schmitt Trigger.
13. UJT Relaxation Oscillator.
14. Bootstrap sweep circuit.
15. Constant Current Sweep Generator using BJT.

Equipment required:

1.RPS - 0 - 30 V
2.CRO - 0 - 20 M Hz
3.Function Generator - 0 - 1 M Hz
4.RF Generator - 0 - 1000 M Hz/0 - 100 M Hz
5.Multimeters.
6.Lab Experimental kits (optional).
7.Components.

III YEAR - I SEMESTER				
18EC5L06 - IC APPLICATIONS LAB	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1.5**

Minimum Twelve Experiments to be conducted:

1. Study of ICs - IC 741, IC 555, IC 565, IC 566, IC 1496 - Functioning, Parameters and Specifications.
2. OP-AMP Applications- Adder, Subtractor, Comparator Circuits.
3. Integrator and Differentiator Circuits using IC -741.
4. Active Filter Applications - LPF, HPF(first order).
5. Active Filter Applications - BPF, Band Reject (Wideband) and Notch Filter.
6. IC 741 Oscillation Circuits - Phase Shift and Wien Bridge Oscillator.
7. Function Generator using OP AMPs.
8. IC 555 Timer - Monostable Operation Circuit.
9. IC 555 Timer - Astable Operation Circuit.
10. Schmitt Trigger Circuit - using IC 741 AND IC 555.
11. IC 565 - PLL Applications.
12. IC 566 - VCO Applications.
13. Voltage Regulator using IC 723.
14. Three Terminal Voltage Regulators - 7805, 7809, 7912.
15. 4-bit DAC using OP AMP.

Equipment required:

1. RPS.
2. CRO.
3. Function Generator.
4. Multi Meters.
5. IC Trainer Kits (optional)
6. Bread Boards.
7. Components - IC741, IC555, IC565, IC1496, IC723, 7805, 7809, 7912 and other essential components
8. Analog IC Tester

III YEAR - I SEMESTER				
18EC5L07- DIGITAL SYSTEM DESIGN LAB	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1.5**

The students are required to design and draw the internal logical structure of the following Digital Integrated Circuits and to develop VHDL/Verilog HDL Source code, perform simulation using relevant simulator and analyze the obtained simulation results using necessary synthesizer.

List of Experiments:

Minimum of Ten Experiments has to be performed

1. Realization of Logic Gates
2. Design of Full Adder using 3 modelling systems
3. 3 to 8 Decoder -74LS138
4. 8 to 3 Encoder (with and without parity)
5. 8 x 1 Multiplexer-74LS151 and 2x4 De-multiplexer-74LS155
6. 4- Bit comparator-74LS85
7. T Flip-Flop, D Flip-Flop-74XX74
8. Decade counter -74XX90
9. Universal shift register-74194/195
10. 8-bit serial in-parallel out and parallel in-serial out
11. 4*4 Multiplier
12. ALU Design.
13. Design a Ring counter using a 4-bit shift register.
14. Fast In & Fast Out (FIFO)
15. LED Seven Segment Display –IC74XX49

Equipment required for laboratories:

1. Xilinx Vivado software / Equivalent Industry Standard Software and Hardware.
2. Personal computer system with necessary software to run the programs and Implement.
3. Xilinx FPGA- spartran-II--100K ,TQ-144, XILINX CPLD- VCR3064XL..VQ 100, Altera max acex FPGA/cpld Vertex-E FPGA.

III YEAR - II SEMESTER				
18EC6T16- EMBEDDED SYSTEMS	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

COURSE OBJECTIVES:

The student will

1. Understand the building blocks of typical embedded system and different memory technology and memory types.
2. Learn the characteristics of an embedded system, quality attributes of embedded systems, application specific and domain specific embedded system,
3. Understand the concepts of c versus embedded c and compiler versus cross-compiler.
4. Learn about the integrated development environment, software utility tool. Also learn about quality assurance and testing of the design, testing on host machine, simulators.

OUTCOMES:

At the end of this course the student can able to:

1. Understand the basic concepts of an embedded system and able to know an embedded system design
2. Approach to perform a specific function.
3. The hardware components required for an embedded system and the design approach of an embedded hardware.
4. The various embedded firmware design approaches on embedded environment.
5. Understand how to integrate hardware and firmware of an embedded system using real time operating system.
6. Explain the different software tools for embedded testing.

UNIT I

Introduction: Definition, history of embedded systems, classification of embedded systems, major application areas of embedded systems, purpose of embedded systems, the typical embedded system-core of the embedded system, Memory, Sensors and Actuators, Communication Interface, Embedded firmware, Characteristics of an embedded system, Quality attributes of embedded systems, Application-specific and Domain-Specific examples of an embedded system.

UNIT II

Embedded Hardware Design: Analog and digital electronic components, I/O types and examples, Serial communication devices, Parallel device ports, Wireless devices, Timer and counting devices, Watchdog timer, Real-time clock.

UNIT III

Embedded Firmware Design: Embedded Firmware design approaches, Embedded Firmware development languages, ISR concept, Interrupt sources, Interrupt servicing mechanism, Multiple interrupts, DMA, Device driver programming, Concepts of C versus Embedded C and Compiler versus Cross-compiler.

UNIT-IV

Real Time Operating System: Operating system basics, Types of operating systems, Kernal, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling, Threads, Processes and Scheduling, Task communication, Task synchronization, Device Drivers.

Hardware Software Co-Design: Fundamental Issues in Hardware Software Co-Design, Computational models in embedded design, Hardware software Trade-offs, Integration of Hardware and Firmware, ICE.

UNIT V

Embedded System Development: The integrated development environment, Types of files generated on cross-compilation, Deassembler / Decompiler, Simulators, Emulators and Debugging, Target hardware debugging, Boundary Scan, Embedded Software development process and tools.

UNIT VI

Embedded System Testing And Case Studies: The main software utility tool, CAD and the hardware, Translation tools-Pre-processors, Interpreters, Compilers and Linkers, Debugging tools, Quality assurance and testing of the design, Testing on host machine, Simulators, Laboratory Tools. Case studies- Processor design approach of an embedded system –Power PC Processor based and Micro Blaze Processor based embedded system design

TEXT BOOKS:

1.Embedded Systems Architecture - By Tammy Noergaard, Elsevier Publications.
2.Embedded Systems – Shibu, K.V-Tata McGraw Hill Education Private Limited.

REFERENCES:

1.Embedded System Design - Frank Vahid, Tony Givargis, John Wiley Publications, 2013.
2.Embedded Systems - Lyla B.Das-Pearson Publications, 2013.
3.Embedded Systems: Architecture, Programming and Design - Rajkamal, TMH Publications, Second Edition, 2008.

III YEAR - II SEMESTER				
18EC6T17- VLSI DESIGN	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

COURSE OBJECTIVES:

The student will

1. Learn the various fabrication steps of IC and come across basic electrical properties of MOSFET.
2. Apply CMOS technology-specific layout rules in the placement and routing of transistors and interconnect and to verify the functionality, timing, power and parasitic effects.
3. Understand the Scaling of MOS Circuits.
4. Learn concepts and techniques of modern integrated circuit design and testing (CMOS VLSI).

COURSE OUTCOMES

At the end of this course the student can able to

1. Demonstrate the fabrication steps of various MOS technologies
2. Evaluate electrical properties of MOS transistors.
3. Construct layouts using MOS technology-specific layout and scaling rules.
4. Estimate the parasitic of MOS circuits
5. Illustrate the design prospects of various subsystems
6. Analyze various trade-offs and techniques for testability

UNIT I

Introduction To MOS Technology: Evolution of VLSI, Moore's Law, Basic MOS transistors, enhancement and depletion modes of transistor action, MOS and related VLSI technology, NMOS, CMOS, BICMOS, IC production process, Comparison between CMOS and Bipolar technologies.

UNIT II

Basic Electrical Properties of MOS and BI-CMOS Circuits: IDS versus VDS Relationship, aspects of MOS transistor threshold voltage, MOS trans conductance and output conductance, MOS transistor figure of merit, pass transistor, MOS inverter ,determination of pull–up to pull- down ratio for nMOS inverter driven by another nMOS inverter and for an nMOS inverter driven through one or more pass transistors, alternative forms of pull –up, the CMOS inverter, MOS transistor circuit model, Bi-CMOS inverter, latch –up in CMOS circuits and Bi-CMOS latch up susceptibility.

UNIT III

MOS and Bi-CMOS Circuit Design Processes: VLSI design flow, MOS layers, stick diagrams, design rules and Layout- wires and vias, Lambda based design rules. 2µ meter, 1.2µ meter design rules,(Future Trends- 45nm Technology) double metal double poly CMOS rules. Layout diagrams of Universal gates.

UNIT IV

Scaling of MOS Circuits: Scaling models, Scaling factors for device parameters, Limitations of Scaling.

Basic Circuit Concepts: Sheet Resistance, Sheet Resistance concepts applied to MOS transistors and inverters, Area capacitance of layers, standard unit of capacitance some area capacitance calculations, delay unit, inverter delays, driving large capacitive loads, wiring capacitances, choice of

layers. Introduction to switch logic, gate logic, other forms of CMOS logic-Domino logic, Pseudo logic, Diode logic, Transmission Gate, Introduction to FINFET.

UNIT V

FPGA Design: FPGA design flow, Basic FPGA architecture, FPGA Technologies, FPGA families-Altera Flex 8000FPGA, Altera Flex 10FPGA, Xilinx XC4000 series FPGA, Xilinx Vertex FPGA. Case studies: FPGA Implementation of Half adder and full adder.

Introduction to synthesis: Logic synthesis, RTL synthesis, High level Synthesis.

UNIT-VI

Design for Testability: Need for testing, Fault types and Models-Stuck-at-faults, Boolean difference method, Controllability and Observability, Ad Hoc Testable Design Techniques, LFSR, Scan Based Techniques and Built-In Self Test techniques.

TEXT BOOKS

1.Essential of VLSI Circuits and systems - Kamran Eshraghian, Douglas A.Pucknell, Sholeh Eshraghian, PHI, 2005.

2.Principles of CMOS VLSI Design - Neil H.Weste, John Wiely, 2006 Edition.

3.CMOS Digital Integrated Circuits Analysis and Design - Sung-Mo Kang, Yusuf Leblebici, TMH Education, 2003.

REFERENCE BOOKS

1.Introduction to VLSI Circuits and systems - John P. UyemuraJhon Wiely, 2005 Edition.

2.Modern VLSI Design, Wayne Wolf - PHI, 4th Edition.

3.Fundamentals of Logic Design- Charles H. Roth Jr, Larry L Kinney,Sixth Edition, Cengage Learning.

III YEAR - II SEMESTER				
18EC6T18- DIGITAL SIGNAL PROCESSING	**L**	**T**	**P**	**C**
	2	**1**	**0**	**3**

COURSE OBJECTIVES:

The student will

1. Define and use Discrete Fourier Transforms (DFTS).
2. Use Z-Transform for Realization of Digital Filters.
3. Design And Implement Digital IIR and FIR Filters.
4. Study the Architecture of DSP Processor and use of DSP Algorithms for Real World Application.

COURSE OUTCOMES

At the end of this course the student can able to

1. Analyze discrete times signals in the time domain and frequency domain.
2. Analyze DFT and FFT transform domain techniques and their significance.
3. Analyze the Z-transform and their significance
4. Design and realize IIR and FIR .
5. Learn the need of Multirate Processing
6. Know the concepts of DSP Processors

UNIT I

Introduction to Digital Signal Processing: Discrete time signals & sequences, linear shift invariant systems, stability, and causality. Linear constant coefficient difference equations. Frequency domain representation of discrete time signals (DTFT) and systems.

UNIT II

Discrete Fourier series & Fourier transforms: Properties of discrete Fourier series, DFS representation of periodic sequences, Discrete Fourier transforms: Properties of DFT, linear convolution of sequences using DFT, Computation of DFT, Fast Fourier transforms (FFT) - Radix-2 decimation in time and decimation in frequency FFT Algorithms, Inverse FFT.

UNIT III

Realization of Digital Filters: Review of Z-transforms, Applications of Z – transforms, solution of difference equations – digital filters, Block diagram representation of linear constant-coefficient difference equations, Basic structures of IIR systems, Transposed forms, Basic structures of FIR systems, System function.

UNIT IV

IIR & FIR Digital Filters: Analog filter approximations – Butter worth and Chebyshev, Design of IIR Digital filters from analog filters, Design Examples, Analog-Digital transformations characteristics of FIR Digital Filters, frequency response. Design of FIR Digital Filters using Window Techniques, Frequency Sampling technique, Comparison of IIR & FIR filters.

UNIT V

Multirate Digital Signal Processing: Decimation, interpolation, sampling rate conversion, Implementation of sampling rate conversion.

UNIT VI

Introduction to DSP Processors: Introduction to programmable DSPs: Multiplier and Multiplier Accumulator (MAC), Modified Bus Structures and Memory Access schemes in DSPs Multiple access memory, multiport memory, VLIW architecture, Pipelining, Special addressing modes, On-Chip Peripherals. Architecture of TMS 320C5X- Introduction, Bus Structure, Central Arithmetic Logic Unit, Auxiliary Register, Index Register, Block Move Address Register, Parallel Logic Unit, Memory mapped registers, program controller, some flags in the status registers, On-chip registers, On-chip peripherals, Introduction to Software defined radio.

TEXT BOOKS:

1. Digital Signal Processing, Principles, Algorithms, and Applications - John G.Proakis, Dimitris G.Manolakis, Pearson Education / PHI, 2007.
2. Discrete Time Signal Processing – A.V.Oppenheim and R.W. Schaffer,PHI.
3. Digital Signal Processing - A Nagoor Kani, TATA McGraw Hill, 2012.
4. Digital Signal Processors – Architecture, Programming and Applications, B.Venkataramani, M.Bhaskar, TATA McGraw Hill, 2002.

REFERENCES:

1. Digital Signal Processing: Andreas Antoniou, TATA McGraw Hill , 2006
2. Digital Signal Processing – K Raja Rajeswari, I.K. International Publishing House.
3. Fundamentals of Digital Signal Processing using Matlab – Robert J. Schilling, Sandra L. Harris,Thomson, 2007.

III YEAR - II SEMESTER				
18EC6T19- DIGITAL COMMUNICATIONS	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

COURSE OBJECTIVES:

The student will

1. Understand pulse digital modulation systems such as PCM, DPCM and DM.
2. Understand various digital modulation techniques and able to analyze various systems for their performance in terms of probability of error.
3. Study the concept of entropy and need for source coding.
4. Study Block codes, cyclic codes and convolution codes.

COURSE OUTCOMES:

At the end of this course the student can able to

1. Understand the basic building blocks of Digital Communication Systems.
2. Gets adequate knowledge on Digital modulation coding techniques.
3. Understand the fundamentals of digital modulation keying techniques.
4. Determine the probability of error for various digital modulation schemes..
5. Understand the basics of information theory and source coding techniques.
6. Determine the errors present in the data using Linear block codes and Convolution codes.

UNIT I

Elements of Digital Communication Systems: Block Diagram of Digital Communication Systems, Digital Representation of Analog Signal, Advantages of Digital Communication Systems, Sampling Theorem, Types of Sampling. Introduction to Baseband Sampling. Quantization Noise, Uniform and Non Uniform Quantization and Companding.

UNIT II

Waveform Coding Techniques: PCM Generation and Reconstruction, DPCM, Adaptive DPCM, DM and Adaptive DM, Noise in PCM and DM. Comparison of PCM, DPCM, DM and ADM. SNR of PCM and DM.

UNIT III

Digital Band-Pass Modulation Techniques: Binary Amplitude-Shift Keying, Phase-Shift Keying, Frequency-Shift Keying, Summary of Three Binary Signaling Schemes, Non coherent Digital Modulation Schemes, DPSK,DEPSK, QPSK,M-ary PSK, ASK, FSK Digital Modulation Schemes, Comparison of digital carrier modulation schemes. Duo-binary Encoding.

UNIT IV

Base band digital data transmission, error probability, matched filter, correlation receiver, coherent and non-coherent ASK, FSK, PSK, DPSK and QPSK, and error probability. Need for MSK.

UNIT V

Information Theory and Coding: Discrete messages, concept of amount of information and its properties, Average information, Entropy and its properties, Information rate, Mutual information and its properties. Source coding- Huffman coding, Shannan fano coding; channel coding.

UNIT VI

Linear Block Codes: Introduction, Matrix representation, error detection and correction capabilities of linear block codes, Binary cyclic codes. Syndrome calculation**.**

Convolution Codes: Introduction, Encoding of convolutional codes, time domain approach, transform domain approach, Graphical approach. State, Tree, Trellis diagram decoding using Vitirbi algorithm.

TEXT BOOKS

1.Communications system, S. Haykin, Wiley, 4 edition 2009.

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

3.Principles of Communication Systems – H. Taub and D. Schilling, TMH, 2003.

REFERENCES:

1.Electronic communication systems - Wayne Tomasi, 5 edition, Pearson

2.Communication Systems - Analog and Digital, R.P.Singh, S.Sapre, McGraw-Hill Education, 2012

3.Analog and Digital Communications by Martin S Roden.

III YEAR - II SEMESTER				
18CS6E06- PYTHON PROGRAMMING	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

COURSE OBJECTIVES:

The student will

1.Acquire programming skills in core Python.
2.Acquire Object Oriented Skills in Python.
3.Develop the skill of designing Graphical user Interfaces in Python.
4.Develop the ability to write database applications in Python.

COURSE OUTCOMES:

At the end of this course the student can able to

1.Understand the basics of python.

2.Know variable types and basic operators.

3.Learn to apply looping and control statements.

4.Know about numbers, strings, lists, tuples, dictionary, exceptions.

5.Understand functions, classes and objects.

6.Understand Files I/O.

UNIT I

Overview: History of Python, Python Feature, Installing Python, Setting up PATH, Setting path at Unix/Linux, Setting path at Windows, Python Environment Variables, Running Python

Basic Syntax: First Python Program, Python Identifiers, Python Keywords, Lines and Indentation, Multi-Line Statements, Quotation in Python

UNIT II

Variable Types: Assigning Values to Variables, Multiple Assignment, Standard Data Types, Data Type Conversion.

Basic Operators: Types of Operators, Python Arithmetic Operators, Python Comparison Operators, Python Assignment Operators, Python Bitwise Operators, Python Logical Operators, Python Membership Operators, Python Identity Operators, Python Operators Precedence

UNIT III

Decision Making: If Statement, If…else Statement, The *elif* Statement

Loops: While Loop, the Infinite Loop, Using else Statement with Loops, For Loop, Iterating by Sequence Index, Using else Statement with Loops, Nested Loops.

Loop Control Statements: Break Statement, Continue Statement, Pass Statement

UNIT IV

Numbers, Strings, Lists, Tuples, Dictionary

Exceptions: What is Exception?, Handling an Exception, The *except* Clause with No Exceptions, The *except* Clause with Multiple Exceptions, The try-finally Clause, Argument of an Exception, Raising an Exception, User-Defined Exceptions

UNIT V

Functions: Defining a Function, Calling a Function, Passing by Reference versus Passing by Value, Function Arguments, Required Arguments, Keyword Arguments, Default Arguments, Variable Length Arguments, The Anonymous Functions, The return Statement, Scope of Variables, Global vs. Local variables

Classes and Objects: Overview of OOP Terminology, Creating Classes, Creating Instance Objects, Accessing Attributes, Built-In Class Attributes, Destroying Objects (Garbage Collection), Class Inheritance**.**

UNIT VI

Files I/O: Printing to the Screen, Reading Keyboard Input, The raw_input Function ,The input Function ,Opening and Closing Files ,The open Function, The file Object Attributes ,The close() Method ,Reading and Writing Files ,The write() Method, The read() Method, File Positions, Renaming and Deleting Files, The rename() Method, The remove() Method, Directories in Python, The mkdir() Method ,The *chdir()* Method, The *getcwd()* Method, The *rmdir()* Method ,File and Directory Related Methods

TEXT BOOKS:

1. Fundamentals of Python: First Programs Author: Kenneth Lambert, Publisher: Course Technology, Cengage Learning, 2012 , ISBN-13: 978-1-111-82270-5
2. Starting Out with Python plus My Programming Lab with Pearson e Text --Access Card Package (3rd Edition) Tony Gaddis ISBN-13: 978-0133862256"
3. Dawson, Michael. Python Programming for the Absolute Beginner (3rd ed). Boston, MA: Course Technology, 2010.
4. Python Programming by Reema Thereja 1st Edition by OXFORD

REFERENCE BOOK:

1. Dive into Python, Mike.
2. Learning Python, 4th Edition by Mark Lutz.
3. Programming Python, 4th Edition by Mark Lutz.

III YEAR – II SEMESTER				
18EC6E01- INFORMATION THEORY AND CODING	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

COURSE OBJECTIVES:

The student will

1. Define and apply the basic concepts of information theory (entropy, channel capacity etc.)
2. Learn the principles and applications of information theory in communication systems
3. Study various data compression methods and describe the most common such methods
4. Understand the theoretical framework upon which error-control codes are built

COURSE OUTCOMES:

At the end of this course the student can able to

1. Understand the basic concepts of information theory and entropy.
2. Determine the capacity of various channels.
3. Understand the concept of AEP.
4. Explain various source coding techniques.
5. Understand the design and analysis of coding/decoding scheme for digital Communication application.
6. Explain various convolution codes.

UNIT I

Information theory: Concept of amount of information - units, Entropy -marginal, conditional and joint entropies - relation among entropies Mutual information, information rate, channel capacity, redundancy and efficiency of channels. Chain Rules, Data-Processing Inequality, Fano's Inequality

UNIT II

Discrete channels: Symmetric channels, Binary Symmetric Channel, Binary Erasure Channel, Cascaded channels, repetition of symbols, Binary unsymmetric channel, and Shannon theorem.

Continuous channels: Capacity of band limited Gaussian channels, Shannon-Hartley theorem, Trade off between band width and signal to noise ratio, Capacity of a channel with infinite band width, Optimum modulation system.

UNIT III

Typical Sequences and Asymptotic Equipartition Property: Asymptotic Equipartition Property Theorem, Consequences of the AEP: Data Compression, High-Probability Sets and the Typical Set.

UNIT IV

Source Coding: Encoding techniques, Purpose of encoding, Instantaneous codes, Construction of instantaneous codes, Kraft's inequality, Coding efficiency and redundancy, Noiseless coding theorem. Construction of basic source codes: - Shannon-Fano algorithm, Huffman coding, Arithmetic coding, ZIP coding.

UNIT V

Codes for Error Detection and Correction: Parity check coding, Linear block codes, Error detecting and correcting capabilities, Generator and Parity check matrices, Standard array and Syndrome decoding, Hamming codes, Encoding and decoding of systematic and unsystematic codes. Cyclic codes: - Generator polynomial, Generator and Parity check matrices, Encoding of cyclic

codes, Syndrome computation and error detection, Decoding of cyclic codes, BCH codes, RS codes, Burst error correction.

UNIT VI

Convolution codes: Encoding- State, Tree and Trellis diagrams, Maximum likelihood decoding of convolution codes –Viterbi algorithm, Sequential decoding – Stack algorithm.

Interleaving techniques: Block and convolution interleaving, Coding and interleaving applied to CD digital audio system -CIRC encoding and decoding, interpolation and muting.

ARQ - Types of ARQ, Performance of ARQ, Probability of error and throughput.

TEXT BOOKS:

1. Information Theory, Coding and Cryptography - Ranjan Bose, 2nd Edition, Tata McGraw Hill, New Delhi, 2008
2. Communication Systems - Simon Haykin, John Wiley & Sons. Pvt. Ltd.
3. Digital Communications Fundamentals and Applications - Bernard Sklar, Prentice Hall, 2/e, 2001

REFERENCES:

1. Principles of Communication Systems - Taub & Schilling, Tata McGraw-Hill
2. Principles of Digital Communication - Das, Mullick & Chatterjee, Wiley Eastern Ltd.
3. Error Control Coding Fundamentals and Applications - Shu Lin & Daniel J. Costello Jr, Prentice Hall Inc.

III YEAR - II SEMESTER				
18EC6E02- BIO-MEDICAL INSTRUMENTATION	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

COURSE OBJECTIVES:

The student will

1. Make the Students Understand the Basic Concepts of Biomedical Engineering.
2. Introduce an Fundamentals of Transducers as Applicable to Physiology
3. Explore the Human Body Parameter Measurements Setups.
4. Give Basic Ideas about how Lasers are used in Bio Medical Field.

COURSE OUTCOMES:

At the end of this course the student can able to

1. Understand the importance in the Development of Biomedical Instrumentation.
2. Know about the Transducer types, potentials and Electrodes used in Biomedical Applications.
3. Know about Measuring and Monitoring Instruments in different aspects of living body
4. Know about Modern Imaging systems like X-ray and Digital Radiography.
5. Understand the operations of Different Lasers used in Biomedical Applications.
6. Understand the clear idea about the Pacemakers and the use of computers in Biomedical Applications.

UNIT-I

Introduction to Biomedical Instrumentation: The Age of Biomedical Engineering, Development of Biomedical instrumentation, Biometrics, Introduction to the Man-Instrument System, Components of the Man-Instrument System, Physiological Systems of the Body, Problems Encountered in Measuring a Living System, Some Conclusions.

UNIT-II

Basic Transducer principles: The Transducer and Transduction Principles, Active Transducers, Passive Transducers, Transducers for Biomedical Applications

Sources of Bioelectric Potentials: Resting and Action Potentials, Propagation of Action Potentials, the Bioelectric Potentials.

Electrodes: Electrode Theory, Bio potential Electrodes, Biochemical Transducers.

UNIT-III

Instrumentation for sensory measurements and the study of behaviour : Psychophysiological Measurements, Instruments for Testing Motor Responses, Instrumentation for Sensory Measurements, Instrumentation for the Experimental Analysis of Behaviour, Biofeedback Instrumentation.

Biotelemetry: Introduction to Biotelemetry, Physiological Parameters Adaptable to Biotelemetry, the Components of a Biotelemetry System, Implantable Units, Applications of Telemetry in Patient Care.

UNIT-IV

X-ray and Digital Radiography Instrumentation: Basis of Diagnostic Radiology, Nature of X-rays, Production of X-rays, X-ray Machine, Visualization of X-rays, Dental X-ray Machines, Portable and Mobile X-ray Units, Physical Parameters for X-ray Detectors, Digital Radiography.

UNIT-V

Laser applications in Biomedical Fields: The Laser , Pulsed Ruby Laser, Nd-YAG Laser, Helium-Neon Laser, Argon Laser, CO2 Laser, Excimer Lasers, Semiconductor Lasers, Laser Safety.

UNIT-VI

Cardiac Pacemakers: Need for Cardiac Pacemaker, External Pacemakers, Implantable Pacemakers, Recent Developments in Implantable Pacemakers, Pacing System Analyser.

The Computer in Biomedical Instrumentation: The Digital Computer, Microprocessors, Interfacing the Computer with Medical Instrumentation and Other Equipment, Biomedical Computer Applications.

TEXT BOOKS:

1.Handbook of Biomedical Instrumentation –Technology and Application By R.S. Khandpur Published by TaTa McGraw-Hill-2nd Edition.

2.Biomedical Instrumentation and Measurements-by Leslie Cromwell published by Prentice-Hall-2nd Edition.

3.Biomedical Engineering and Design Handbook vol1-Fundamentals-by Myer Kutz published by McGraw-Hill-2nd Edition.

REFFERENCES

1.Principles of Biomedical Engineering-by Sundararajan Published by Artech House.

2.Medical Instrumentation –Application and Design by john G.webster Published by John Wiley and sons.

3.A Textbook of Medical Instruments by S.Ananthi Published by A New Age International Limited.

III YEAR - II SEMESTER				
18EC6E03- ARTIFICIAL NEURAL NETWORKS	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

COURSE OBJECTIVES:

The student will

1. Understand the biological neural network and to model equivalent neuron models.
2. Get knowledge about ANN for Pattern Recognition.
3. Understand the issues of various feed forward and feedback neural networks.
4. Understand the architectures, applications of Neural Networks

COURSE OUTCOMES

After completion of the course, student can be able to:

1. Able to understand the concept of Artificial Neural Networks , Characteristics, Models of Neuron, Learning Rules, Learning Methods, Stability and Convergence
2. Able to understand the basics of Pattern Recognition and Feed forward Neural Networks
3. Able to understand and analyse the basics of Feedback neural networks and Boltzmann machine.
4. Able to understand the Analysis of Feedback layer for different output functions, Pattern Clustering and Mapping networks
5. Able to understand the architecture of various pattern recognition tasks.
6. Able to understand the applications of neural networks

UNIT-I

Basics of Artificial Neural Networks Introduction: Biological Neural Networks, Characteristics of Neural Networks, Models of Neuron, Topology, Basic Learning Rules Activation and Synaptic Dynamics: Activation Dynamic Models, Synaptic Dynamic Models, Learning Methods, Stability & Convergence, Recall in Neural Networks

UNIT-II

Functional Units of ANN for Pattern Recognition Tasks: Pattern Recognition problem Basic Fundamental Units, Pattern Recognition Tasks by the Functional Units Feed forward Neural Networks: Analysis of Pattern Association Networks, Analysis of Pattern Classification Networks, Analysis of Pattern Mapping Networks

UNIT-III

Feedback Neural Networks: Analysis of linear auto adaptive feed forward networks, Analysis of pattern storage Networks, Stochastic Networks & Stimulated Annealing, Boltzmann machine

UNIT-IV

Competitive Learning Neural Networks: Components of a Competitive Learning Network, Analysis of Feedback layer for Different Output Functions, Analysis of Pattern Clustering Networks and Analysis of Feature Mapping Network

UNIT-V

Architectures for Complex Pattern Recognition Tasks: Associative memory, Pattern mapping Stability – Plasticity dilemma: ART, temporal patterns, Pattern visibility: Neocognitron

UNIT-VI

Applications of Neural Networks: Pattern classification, Associative memories, Optimization, Applications in Image Processing, Applications in decision making, Introduction to Deep Learning.

TEXT BOOKS:

1.B.Yagnanarayana "Artificial Neural Networks", PHI.

2.Fundamentals of Artificial Neural Networks by Mohamad Hassoun.

3.Neural Networks and Deep Learning by Aggarwal, Charu C.

REFERENCE BOOKS:

1.Laurene Fausett ,"Fundamentals of Neural Networks", Pearson Education

Simon Haykin , "Neural Networks", Second Edition

IV YEAR - I SEMESTER				
18EC6L08 - DIGITAL SIGNAL PROCESSING LAB	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1.5**

Minimum Twelve Experiments to be conducted:

Part: 1 (Signals)

1.Generation of discrete time signals for discrete signals

2.To verify the Linear Convolution

a) Using MATLAB

b) Using Code Composer Studio(CCS)

3.To verify the Circular Convolution for discrete signals

a) Using MATLAB

b) Using Code Composer Studio(CCS)

4.To Find the addition of Sinusoidal Signals

5.To verify Fast Fourier Transform(FFT)

a) Using MATLAB

b) Using Code Composer Studio(CCS)

6.Transfer Function Stability Analysis: using pole-zero plot, Bode plot, Nyquist plot.

Part: 2 (Filters)

7.Frequency Response of IIR low pass Butterworth Filter

8.Frequency Response of IIR high pass Butterworth Filter

9.Frequency Response of IIR low pass Chebyshev Filter

10. Frequency Response of IIR high pass Chebyshev Filter

11. Frequency Response of FIR low pass Filter using Rectangle Window

12. Frequency Response of FIR low pass Filter using Triangle Window

Part: 3 (Image Processing)

13. An image processing in a false contouring system

14. To generate the histogram equalization to the image

15. Compute the edge of an image using spatial filters.

III YEAR - II SEMESTER				
18EC6L09- VLSI DESIGN LAB	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1.5**

List of Experiments:

Students are required to do any Ten Experiments

1.Design and Implementation of an Universal Gates
2.Design and Implementation of an Inverter
3.Design and Implementation of an XOR Gate
4.Design and Implementation of XNOR Gate
5.Design and Implementation of Full Adder
6.Design and Implementation of Full Subtractor
7.Design and Implementation of 3 to 8 Decoder.
8.Design and Implementation of 4 X 1 Multiplexer.
9.Design and Implementation of RS-Latch
10. Design and Implementation of D-Latch
11. Design and Implementation of static RAM cell
12. Design and Implementation of Differential Amplifier.

SOFTWARE REQUIRED:

1.Mentor Graphics Software / Equivalent Industry Standard Software.
2.Personal computer system with necessary software to run the programs and to implement.

Note: The students are required to design the schematic diagrams using CMOS logic and to draw the layout diagrams to perform the above experiments using 130nm technology with the Industry standard EDA Tools

III YEAR - II SEMESTER				
18EC6L10- DIGITAL COMMUNICATIONS LAB	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1.5**

Minimum Twelve Experiments to be conducted:

1.PCM Generation and Detection.
2.Differential pulse code modulation.
3.Delta Modulation.
4.Adaptive Delta Modulation.
5.Time Division Multiplexing and De-Multiplexing.
6.Amplitude Shift Keying: Generation and Detection.
7.Phase Shift Keying: Generation and Detection.
8.Frequency Shift Keying: Generation and Detection.
9.DPSK: Generation and Detection.
10. QPSK: Generation and Detection.
11. Companding.
12. Source Encoder and Decoder.
13. Linear Block Code- Encoder and Decoder.
14. Binary Cyclic Code- Encoder and Decoder.
15. Convolution Code- Encoder and Decoder.

EXPERIMENT REQUIRED FOR LABORATORIES:

1.RPS - 0 - 30 V.
2.CRO - 0 - 20 M Hz.
3.Function Generator - 0 - 1 M Hz.
4.RF Generator - 0 - 1000 M Hz/0 - 100 M Hz.
5.Multimeters.
6.Lab Experimental kits for Digital Communication.
7.Components.

IV YEAR - I SEMESTER				
18EC7T21- MICRO WAVE ENGINEERING	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

COURSE OBJECTIVES:

The student will

1. Understand fundamental electrical characteristics of waveguides and transmission lines through electromagnetic field analysis.
2. Understand the basic properties of Polarization and Ferrite materials composition in the case of waveguide components.
3. Understand the multiport junction concept for splitting the microwave energy in a desired direction.
4. Understand the function, design, and integration of the major microwave components like oscillator, modulator, power amplifier, filter, and mixer in building a Microwave test bench setup for measurements.

OUTCOMES:

After going through this course the student will be able to

1. Explore rectangular waveguides and transmission lines through electromagnetic field analysis.
2. Analyze electromagnetic field components of circular waveguides, microstrip lines and cavity resonators
3. Differentiate between M-type and O-type tubes
4. Determine the characteristics of slow wave structures.
5. Analyze and apply methods to determine circuit properties of passive or active microwave devices.
6. Distinguish various solid state devices, calculate device efficiency, and measure various microwave parameters using a Microwave workbench.

UNIT I

Microwave Transmission Lines: Introduction, Microwave Spectrum and Bands, Applications of Microwaves, Safety in microwaves. Rectangular Waveguides – TE/TM mode analysis, Expressions for Fields, Characteristic Equation and Cut-off Frequencies, Filter Characteristics, Dominant and Degenerate Modes, Sketches of TE and TM mode fields in the cross-section, Mode Characteristics – Phase and Group Velocities, Wavelengths and Impedance Relations; Power Transmission and Power Losses in Rectangular Guide, Impossibility of TEM mode.

UNIT II

Circular Waveguides: Introduction, Nature of Fields, Characteristic Equation, Dominant and Degenerate Modes. Cavity Resonators– Introduction, Rectangular and Cylindrical Cavities, Dominant Modes and Resonant Frequencies, Q factor and Coupling Coefficients, Excitation techniques- waveguides and cavities.

Microstrip Lines: Introduction, Zo Relations, Effective Dielectric Constant, Losses, Q factor.

UNIT III

Microwave Tubes: Limitations and Losses of conventional tubes at microwave frequencies. Re-entrant Cavities, Microwave tubes – O type and M type classifications. O-type tubes : 2 Cavity Klystrons – Structure, Velocity Modulation Process and Applegate Diagram, Bunching Process and

Small Signal Theory –Expressions for o/p Power and Efficiency, Applications, Reflex Klystrons – Structure, Applegate Diagram and Principle of working, Mathematical Theory of Bunching, Power Output, Efficiency, Electronic Admittance; Oscillating Modes and o/p Characteristics, Electronic and Mechanical Tuning, Applications.

UNIT IV

Helix TWTS: Significance, Types and Characteristics of Slow Wave Structures; Structure of TWT and Suppression of Oscillations, Nature of the four Propagation Constants (Qualitative treatment).
M-type Tubes introduction, Cross-field effects, Magnetrons – Different Types, 8-Cavity Cylindrical Travelling Wave Magnetron – Hull Cut-off Condition, Modes of Resonance and PI-Mode Operation, Separation of PI-Mode, o/p characteristics.

UNIT V

Waveguide Components and Applications - I : Coupling Mechanisms – Probe, Loop, Aperture types. Waveguide Discontinuities – Waveguide irises, Tuning Screws and Posts, Matched Loads. Waveguide Attenuators – Resistive Card, Rotary Vane types; Waveguide Phase Shifters – Dielectric, Rotary Vane types. Scattering Matrix– Significance, Formulation and Properties. S-Matrix Calculations for – 2 port Junction, E-plane and H-plane Tees, Magic Tee, Hybrid Ring; Directional Couplers – 2Hole, Bethe Hole types, Ferrite Components–Faraday Rotation, S-Matrix Calculations for Gyrator, Isolator, Circulator, Related Problems.

UNIT VI

Microwave Solid State Devices: Introduction, Classification, Applications. TEDs – Introduction, Gunn Diode – Principle, RWH Theory, Characteristics, Basic Modes of Operation, Oscillation Modes. Avalanche Transit Time Devices – Introduction, IMPATT and TRAPATT Diodes – Principle of Operation and Characteristics.
Microwave Measurements: Description of Microwave Bench – Different Blocks and their Features, Precautions; Network Analyser, Microwave Power Measurement – Bolometer Method. Measurement of Attenuation, Frequency, Qfactor, Phase shift, VSWR, Impedance Measurement.

TEXT BOOKS:

1.Microwave Devices and Circuits – Samuel Y. Liao, PHI, 3rd Edition,1994.
2.Foundations for Microwave Engineering – R.E. Collin, IEEE Press, John Wiley, 2nd Edition, 2002
3.Microwave and Radar Engineering – G Sasibhushana Rao Pearson

REFERENCES:

1.Microwave Principles – Herbert J. Reich, J.G. Skalnik, P.F. Ordung and H.L. Krauss, CBS Publishers and Distributors, New Delhi, 2004
2.Microwave Engineering- Annapurna Das and Sisir K.Das, Mc Graw Hill Education, 3rd Edition.
3.Microwave and Radar Engineering-M.Kulkarni, Umesh Publications, 3rd Edition.
4.Microwave Engineering – G S N Raju , I K International

IV YEAR - I SEMESTER				
18EC7T22- INTERNET OF THINGS	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

COURSE OBJECTIVES:

The student will

1.Describe IOT is and how it works today.
2.Recognise the factors that contributed to the emergence of IOT.
3.Use real IOT protocols for communication.
4.Transfer IOT data to the cloud and in between cloud providers.

COURSE OUTCOMES

At the end of this course the student can able to

1.Understand the concept of Internet of things.
2.Understand Business Models for Business Processes in the Internet of Things.
3.Understand web connectivity and Web Communication protocols.
4.Analyze basic protocols in wireless sensor network.
5.Understand Data Acquiring, Organizing and Analytics in Business processes.
6.Understand Data Collection, Storage and Computing Using a Cloud Platform.

UNIT I

The Internet of Things: An Overview of Internet of things, Internet of Things Technology, behind IoTs Sources of the IoTs, M2M Communication, Examples of IoTs, Design Principles For Connected Devices.

UNIT II

Business Models for Business Processes in the Internet of Things, IoT/M2M systems LAYERS AND designs standardizations ,Modified OSI Stack for the IoT/M2M Systems ,ETSI M2M domains and High-level capabilities ,Communication Technologies, Data Enrichment and Consolidation and Device Management Gateway Ease of designing and affordability

UNIT III

Design Principles for the Web Connectivity for connected-Devices, Web Communication protocols for Connected Devices, Message Communication protocols for Connected Devices, Web Connectivity for connected-Devices.

UNIT IV

Internet Connectivity Principles, Internet connectivity, Application Layer Protocols: HTTP, HTTPS, FTP, Telnet.

UNIT V

Data Acquiring, Organizing and Analytics in IoT/M2M, Applications/Services/Business Processes, IOT/M2M Data Acquiring and Storage, Business Models for Business Processes in the Internet Of Things, Organizing Data, Transactions, Business Processes, Integration and Enterprise Systems.

UNIT VI

Data Collection, Storage and Computing Using a Cloud Platform for IoT/M2M Applications/Services, Data Collection, Storage and Computing Using cloud platform Everything as

a service and Cloud Service Models, IOT cloud-based services using the Xively (Pachube/COSM), Nimbits and other platforms Sensor, Participatory Sensing, Actuator, Radio Frequency Identification, and Wireless, Sensor Network Technology, Sensors Technology ,Sensing the World.

TEXTBOOKS:

1. Internet of Things: Architecture, Design Principles And Applications, Rajkamal, McGraw Hill Higher Education
2. Internet of Things, A.Bahgya and V.Madisetti, Univesity Press, 2015

REFERNCE BOOKS:

1. Designing the Internet of Things, Adrian McEwen and Hakim Cassimally, Wiley
2. Getting Started with the Internet of Things CunoPfister , Oreilly

IV YEAR - II SEMESTER				
18EC7T23- ELECTRONIC MEASUREMENTS AND INSTRUMENTATION	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

COURSE OBJECTIVES:

The student will

1. Introduce The Fundamentals Of Electronics Instruments And Measurement
2. Providing an In-Depth Understanding of Measurement Errors, Bridge Measurements, Digital Storage Oscilloscope, Function Generator And Analyzer, Display Devices, Data Acquisition Systems And Transducers.
3. Address The Underlying Concepts And Methods Behind Electronics Measurements.

COURSE OUTCOMES:

At the end of this course the student can able to

1. Select the instrument to be used based on the requirement.
2. Analyze the different signal generators and wave analyzers.
3. Understand the design of Oscilloscopes for different applications.
4. Understand the design of bridges for different applications.
5. Identify the different transducers for measurement of different parameters.
6. Understand the measurement of different physical parameters.

UNIT I

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- Multi-range, Range extension/Solid state and differential voltmeters, AC voltmeters- multi range, range extension, shunt. Thermocouple type RF ammeter, Ohmmeters series type, shunt type, Multimeter for Voltage, Current and resistance measurements.

UNIT II

Signal Generator- fixed and variable, AF oscillators, Standard and AF sine and square wave signal generators, Function Generators, Square pulse, Random noise, sweep, Arbitrary waveform. Wave Analyzers, Harmonic Distortion Analyzers, Spectrum Analyzers, Digital Fourier Analyzers.

UNIT III

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 frequency measurement, standard specifications of CRO, probes for CRO- Active & Passive, attenuator type.

UNIT IV

AC Bridges Measurement of inductance- Maxwell's bridge, Anderson bridge. Measurement of capacitance -Schearing Bridge. Wheat stone bridge. Wien Bridge, Errors and precautions in using bridges. Q-meter.

UNIT V

Transducers- active & passive transducers : Resistance, Capacitance, inductance; Strain gauges, LVDT, Piezo Electric transducers, Resistance Thermometers, Thermocouples, Thermistors, Sensistors.

UNIT VI

Measurement of physical parameters force, pressure, velocity, humidity, moisture, speed, proximity and displacement. Data acquisition systems.

TEXTBOOKS:

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

REFERENCES:

1. Electronic Test Instruments, Analog and Digital Measurements - Robert A.Witte, Pearson Education, 2nd Ed., 2004.
2. Electronic Measurements & Instrumentations by K. Lal Kishore, Pearson Education - 2005.
3. Electronic Measurements & Instrumentations by UA Bakshi, AV Bakshi, Technical Publications, 2009.

IV YEAR - I SEMESTER				
18EC7T24- OPTICAL COMMUNICATIONS	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

COURSE OBJECTIVES:

The student will

1. Understand the functionality of each of the components that comprise a fiber- optic communication system
2. Learn properties of optical fiber that affect the performance of a communication link and types of fiber materials with their properties and the losses occur in fibers.
3. Analyze the operation of LEDs, laser diodes, and PIN photo detectors (spectral properties, bandwidth, and circuits) and apply in optical systems.
4. Analyze and design optical communication systems.

COURSE OUTCOMES:

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

1. Choose the optical cables for better communication with minimum losses
2. Understand and analyze the constructional parameters of optical fibres.
3. Estimate the losses due to attenuation, absorption, scattering and bending.
4. Compare various optical detectors and choose suitable one for different applications
5. Design an optical system.
6. Understand the design of optical systems and WDM.

UNIT I

Overview of optical fiber communication - Historical development, The general system, advantages of optical fiber communications. Optical fiber wave guides- Introduction, Ray theory transmission, Total Internal Reflection, Acceptance angle, Numerical Aperture, Skew rays, Cylindrical fibers- Modes, V-number, Mode coupling, Step Index fibers, Graded Index fibers, Single mode fibers- Cut off wavelength, Mode Field Diameter.

UNIT II

Fiber materials - Glass, Halide, Active glass, Chalgenide glass, Plastic optical fibers.

Signal distortion in optical fibers-Attenuation, Absorption, Scattering and Bending losses, Core and Cladding losses, Information capacity determination, Group delay, Types of Dispersion:- Material dispersion, Wave-guide dispersion, Polarization-Mode dispersion, Intermodal dispersion, Pulse broadening.

UNIT III

Optical fiber Connectors- Connector types, Single mode fiber connectors, Connector return loss, Fiber Splicing-Splicing techniques, Splicing single mode fibers, Fiber alignment and joint loss- Multimode fiber joints, single mode fiber joints.

UNIT IV

Optical sources- LEDs, Structures, Materials, Quantum efficiency, Power, Modulation, Power bandwidth product. Injection Laser Diodes- Modes, Threshold conditions, External quantum efficiency, Laser diode rate equations, Resonant frequencies, Reliability of LED&ILD.

Optical detectors- Physical principles of PIN and APD, Detector response time, Temperature effect on Avalanche gain, Comparison of Photo detectors, Related problems.

UNIT V

Source to fiber power launching - Output patterns, Power coupling, Power launching, Equilibrium Numerical Aperture, Laser diode to fiber coupling. Optical receiver operation- Fundamental receiver operation, Digital signal transmission, error sources, Receiver configuration, Digital receiver performance, Probability of Error, Quantum limit, Analog receivers.

UNIT VI

Optical system design - Point-to- point links- Multiplexing, Component choice and considerations, Link power budget, Rise time budget with examples, Line coding in Optical links, WDM, Necessity, Principles, Types of WDM, Measurement of Attenuation and Dispersion, Eye pattern

TEXT BOOKS:

1. Optical Fiber Communications – Gerd Keiser, Mc Graw-Hill International edition, 3rd Edition, 2000.
2. Optical Fiber Communications – John M. Senior, PHI, 2nd Edition, 2002.
3. Text Book on Optical Fiber Communication and its Applications – S.C.Gupta, PHI, 2005.

RERFERENCES:

1. Fiber Optic Communications – D.K. Mynbaev , S.C. Gupta and Lowell L. Scheiner, Pearson Education,2005.
2. Fiber Optic Communication Systems – Govind P. Agarwal , John Wiley, 3rd Ediition, 2004.
3. Fiber Optic Communications – Joseph C. Palais, 4th Edition, Pearson Education, 2004.

IV YEAR - I SEMESTER				
18EC7D01- ELECTRONIC SWITCHING SYSTEMS	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

COURSE OBJECTIVES:

The student will

1.Get knowledge of Basics Switching System ,Cross bar Switching
2.Understand the means of measuring traffic.
3.Understand the implication of the traffic level on system design
4.Understand Integrated Services Digital Network

COURSE OUTCOMES:

At the end of this course the student can able to

1.Understand the main concepts of telecommunication network design
2.Analyze and evaluate fundamental telecommunication traffic models.
3.Understand basic modern signaling system.
4.Solve traditional interconnection switching system design problems.
5.Understand the concept of traffic engineering.
6.To compare telephone network, data network and integrated service digital network.

UNIT I

Introduction

Evolution of Telecommunications, Simple Telephone Communication, Basics of Switching System, Manual Switching System, Major Telecommunication Networks. Crossbar Switching: Principles of Common Control, Touch Tone Dial Telephone, Principles of Crossbar Switching, Crossbar Switch Configurations, Cross point Technology, Crossbar Exchange Organization.

UNIT II

Electronic Space Division Switching

Stored Program Control, Centralized SPC, Distributed SPC, Software Architecture, Application Software, Enhanced Services, Two-Stage Networks, Three-Stage Networks, n- Stage Networks. Time Division Switching: Basic Time Division Space Switching, Basic Time Division Time Switching, Time Multiplexed Space Switching, Time Multiplexed Time Switching, Combination Switching, Three-Stage Combination Switching, n- Stage Combination Switching.

UNIT III

Telephone Networks

Subscriber Loop System, Switching Hierarchy and Routing, Transmission Plan, Transmission Systems, Numbering Plan, Charging Plan, Signalling Techniques, In-channel Signalling, Common Channel Signalling, Cellular Mobile Telephony.

Signalling

Customer Line Signalling, Audio- Frequency Junctions and Trunk Circuits, FDM Carrier Systems, PCM Signalling, Inter- Register Signalling, Common- Channel Signalling Principles, CCITT Signalling System no.6, CCITT Signalling System no.7, Digital Customer Line Signalling.

UNIT IV

Packet Switching

Statistical Multiplexing, Local- Area and Wide- Area Networks, Large-scale Networks, Broadband Networks. Telecommunications Traffic: The Unit of Traffic, Congestion, Traffic Measurement, A Mathematical Model, Lost-call Systems, Queuing Systems.

UNIT V

Switching Networks

Single- Stage Networks, Grading, Link Systems, Grades of service of link systems, Application of Graph Theory to link Systems, Use of Expansion, Call Packing,
Rearrangable Networks, Strict- Sense non-blocking Networks, Sectionalized Switching Networks

UNIT VI

Integrated Services Digital Network

Motivation for ISDN, New Services, Network and Protocol Architecture, Transmission Channels, User- Network Interfaces, Signalling, Numbering and Addressing, Service Characterization, Interworking, ISDN Standards, Expert Systems in ISDN, Broadband ISDN, Voice Data Integration.

TEXT BOOKS

1.Telecommunication Switching Systems and Networks- Thiagarajan Viswanathan, 2000, PHI.
2.Telecommunications Switching, Traffic and Networks- J. E. Flood, 2006, Pearson Education.
3.Digital Telephony - J. Bellamy, 2nd Edition, 2001, John Wiley.

REFERENCES

1.Data Communications and Networks - Achyut S. Godbole, 2004, TMH.
2.Principles of Communication Systems - H. Taub & D. Schilling, 2nd Edition, 2003, TMH.
3.Data Communication & Networking - B. A. Forouzan, 3rd Edition, 2004, TMH.

IV YEAR - I SEMESTER				
18EC7D02- RADAR ENGINEERING	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

COURSE OBJECTIVES:

The student will

1. Get the knowledge of different Antennas systems and communication equipment required for the operation of RADAR.
2. Understand the different parameters of Transmitter and Receiver of RADAR
3. Learn the concept of Doppler Effect to measure parameters of RADAR.
4. Understand different types of RADARS and applications based on the type of Transmitters, Receivers, and their functions.

COURSE OUTCOMES:

At the end of this course the student can able to

1. Derive the radar range equation and to solve some analytical problems.
2. Classify the different types of radars and its applications.
3. Explain the Performance of MTI and Pulse Doppler radars.
4. Differentiate the types of Tracking Radars.
5. Understand the concept of tracking and different tracking techniques.
6. Understand the various components of radar receiver and its performance

UNIT I

Basics of Radar

Introduction, Maximum Unambiguous Range, simple Radar range Equation, Radar Block Diagram and Operation, Radar Frequencies and Applications. Prediction of Range Performance, Minimum Detectable Signal, Receiver Noise, Illustrative Problems.

Radar Equation

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

UNIT II

CW and Frequency Modulated Radar

Doppler Effect, CW Radar – Block Diagram, Isolation between Transmitter and Receiver, Non-zero IF Receiver, Receiver Bandwidth Requirements, Applications of CW radar. Illustrative Problems

FM-CW Radar

Range and Doppler Measurement, Block Diagram and Characteristics, FM-CW altimeter, Multiple Frequency CW Radar.

UNIT III

MTI and Pulse Doppler Radar

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

UNIT IV

Tracking Radar

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

UNIT V

Detection of Radar Signals in Noise

Introduction, Matched Filter Receiver – Response Characteristics and Derivation, Correlation detection and Cross-correlation Receiver, Efficiency of Non-matched Filters, Matched Filter with Non-white Noise, Noise Figure and Noise Temperature.

UNIT VI

Radar Receivers –Displays – types. Duplexers – Branch type and Balanced type, Circulators as Duplexers. Introduction to Phased Array Antennas – Basic Concepts, Radiation Pattern, Beam Steering and Beam Width changes, Series versus parallel feeds, Applications, Advantages and Limitations. Radomes.

TEXT BOOKS:

1. Introduction to Radar Systems – Merrill I. Skolnik, TMH Special Indian Edition, 2nd Ed., 2007.
2. Radar Engineering – GSN Raju, IK International.

REFERENCE BOOKS:

1. Introduction to Radar Systems, 3rd edition – M.I. Skolnik, TMH Ed., 2005
2. Principles of Modern Radar: Basic Principles – Mark A. Richards, James A. Scheer, William A. Holm, Yesdee.
3. Microwave and Radar Engineering - Gottapu Sasibushana Rao.

IV YEAR - I SEMESTER				
18EC7D03- SYSTEM DESIGN THROUGH VERILOG	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

COURSE OBJECTIVES:

The student will

1. Understand the concepts of Verilog Language.
2. Design the digital systems as an activity in a larger systems design context.
3. Inspect how effectively ICs are embedded in package and assembled in PCBs for different application.
4. Design and diagnosis of Combinational and Sequential Logic.

COURSE OUTCOMES:

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

1. Describe Verilog hardware description, languages(HDL).
2. Design digital circuits.
3. Write Behavioural models of digital circuits.
4. Write Register Transfer Level (RTL) models of Digital Circuits.
5. Synthesize RTL models to standard cell libraries and FPGAs
6. Implement RTL models on FPGAs and Testing and Verification

UNIT I

Introduction to Verilog

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

Language Constructs and Conventions:

Introduction, keywords, identifiers, whitespace characters, comments, numbers, strings, logic values, data types, scalars and vectors, parameters, memory, operators, system tasks.

UNIT II

Gate Level Modelling

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

UNIT III

Behavioural Modelling

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

UNIT IV

Dataflow Level and Switch Level Modelling

Introduction, continuous assignment structures, delays and continuous assignments, assignment to vectors, basic transistor switches, CMOS switch, Bidirectional gates and time delays with switch primitives, instantiations with strengths and delays, strength contention with trireg nets.

UNIT V

Synthesis of Combinational and Sequential Logic Using Verilog:

Synthesis of combinational logic: Net list of structured primitives, a set of continuous assignment statements and level sensitive cyclic behaviour with examples, Synthesis of priority structures, exploiting logic don't care conditions. Synthesis of sequential logic with latches: Accidental synthesis of latches and Intentional synthesis of latches, Synthesis of sequential logic with flip-flops, Synthesis of explicit state machines.

UNIT VI

Verilog Models

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

TEXT BOOKS:

1. Design through Verilog HDL – T.R.Padmanabhan and B.Bala Tripura Sundari, WSE, IEEE Press, 2004.
2. Advanced Digital Design with Verilog HDL – Michael D. Ciletti, PHI, 2005.

REFERENCES:

1. Fundamentals of Logic Design with Verilog – Stephen. Brown and Zvonko Vranesic, TMH, 2005.
2. A Verilog Primier – J. Bhasker, BSP, 2003.

IV YEAR - I SEMESTER				
18EC7D04- ELECTROMAGNETIC INTERFERENCE / ELECTROMAGNETIC COMPATIBILITY	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

COURSE OBJECTIVES:

The student will

1. Understand the basics of EMI, EMC.
2. Get knowledge on the EMI coupling mechanism and its mitigation techniques
3. Impart comprehensive insight about the current EMC standards and about various measurement techniques
4. Understand different standards being followed across the world in the fields of EMI/EMC

COURSE OUTCOMES

At the end of this course the student can able to

1. Identify problems associated with EMI and EMC from electronic circuits and systems.
2. Describe the various EMI Coupling Modes
3. Analyze possible EMI prevention techniques such as grounding, shielding, filtering and use of proper coupling mechanisms to improve compatibility of electronic circuits and systems in a given electromagnetic environment.
4. Analyze different EMI Controlling Techniques
5. Describe the EMI measurements.
6. Understand the standard measurement of EMI and EMC.

UNIT I

Sources of EMI

Introduction, Definition of EMI and EMC, Classification, Natural and Man-Made EMI Sources, Switching Transients, Electrostatic Discharge, Nuclear Electromagnetic Pulse and High Power Electromagnetics.

UNIT II

EMI Coupling Modes

Introduction, Shielding Theory - Shielding Effectiveness, The Circuit Approach, The Wave Approach, Aperture Theory, Calculation of Effectiveness of a Conducting Box with an Aperture, **Introduction to Propagation and Cross Talk** – Introduction, Basic Principles, Determination of EM Field from Transmission Lines.

UNIT III

EMI Controlling Techniques – I

Grounding, Principles and Practice of Earthing, Precautions in Earthing, Measurements of Ground Resistance, System Grounding for EMC, Grounding, Shielding.

Shielding, Theory and Effectiveness, Materials, Integrity at Discontinuities, Conductive Coatings, Cable Shielding, Effectiveness Measurements, Electrical Bonding.

UNIT IV

EMI Controlling Techniques - II

Characteristics and Types of Filters – Impedance Mismatch, Lumped Element Low-Pass, High- Pass, Band-Pass and Band-Reject Filters, Power Line Filter Design - Common Mode, Differential Mode, Combined CM and DM Filters, Design Example.

EMC Gaskets – Knitted Wire-Mesh Gaskets, Wire-Screen Gaskets, Oriented Wire Mesh, Conductive Elastomer, Transparent Conductive Windows, Conductive Adhesive, Conductive Grease, Conductive Coatings, Isolation Transformers, Opto-Isolators.

UNIT V

EMI Measurements: Introduction to Open Area Test Site Measurements – Measurement Precautions – Open Area Test Site – Terrain Roughness – NSA – Measurement of Test Site Imperfections – Antenna Factor Measurement – Measurement Errors. Radiated Interference Measurements – Anechoic Chamber – TEM Cell – Reverberating Chamber – Ghz TEM Cell – Comparison of Test Facilities – Measurement Uncertainties Conducted Interference Measurements – Characterization – Conducted EM Noise on Power Supply Lines – Conducted EMI from Equipment – Immunity – Detectors and Measurement – Pulsed EMI Immunity – Electrostatic Discharge.

UNIT VI

EMC standards- National / International

Introduction, Standards for EMI and EMC, MIL-Standards, IEEE/ANSI standards, CISPR/IEC standards, FCC regulations, Euro norms, British Standards, EMI/EMC standards in JAPAN, Conclusions.

TEXT BOOKS:

1.Engineering Electromagnetic Compatibility – V. Prasad Kodali – 2/e – IEEE Press – Wiley India Pvt. Ltd – 2001.

REFERENCES:

1.Introduction to Electromagnetic Compatibility – Clayton R.Paul – John Wiley & Sons, 1992.

2.Electromagnetic Compatibility of Integrated Circuits – Techniques for Low Emission and Susceptibility – Edited by Sonia Ben Dhia, Mohamed Ramdani and Etienne Sicard – Springer, 2006.

3.EMI reduction in Electronic Systems – Mills – J.P – Prentice Hall Inc.

4.Noise Reduction in Electronic Systems – Henry W.Ott, 2nd Edition, Wiley Interscience, 1988.

IV YEAR - I SEMESTER				
18EC7D05- SATELLITE COMMUNICATION	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

COURSE OBJECTIVES:

The student will

1. Introduced to the fundamentals of satellite communication.
2. Understanding how a satellite communication system successfully transfers information from one earth station to another.
3. Expose to examples of applications and tradeoffs that typically occurs in engineering system design.

COURSE OUTCOMES:

At the end of this course the student can able to

1. Understand basic concepts, types, applications and orbital elements of communication satellite systems.
2. Understand various subsystems of communication satellites and their functions.
3. Analyse and design satellite uplink and down links for transmission.
4. Understand concepts of various multiple access techniques used for communication satellites.
5. Understand the concepts of earth station technology and design considerations for LEO,MEO and Geo satellites.
6. Understand the concepts of satellite navigation, architecture and applications of GPS&DGPS.

UNIT I

Introduction: Origin of Satellite Communications, Historical Back-ground, Basic Concepts of Satellite Communications, Frequency allocations for Satellite Services, Applications, Indian space programme – overview, Future Trends of Satellite Communications.

Orbital mechanics and launchers: Orbital Mechanics, Look Angle determination, Orbital perturbations, Orbit determination, launches and launch vehicles, Orbital effects in communication systems performance.

UNIT II

Satellite Subsystem: Attitude and orbit control system, telemetry, tracking, Command and monitoring, power systems, communication subsystems, Satellite antenna Equipment reliability and Space qualification.

UNIT III

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

UNIT IV

Multiple Access: Frequency division multiple access (FDMA) Inter modulation, Calculation of C/N. Time division Multiple Access (TDMA) Frame structure, Examples. Satellite Switched TDMA Onboard processing, DAMA, Code Division Multiple access (CDMA),Spread spectrum transmission and reception.

UNIT V

Earth station Technology: Introduction, Transmitters, Receivers, Antennas, Tracking systems, Terrestrial interface, Primary power test methods.

Low Earth Orbit And Geo-Stationary Satellite Systems: Orbit consideration, coverage and frequency considerations, Delay & Throughput considerations, System considerations, Operational NGSO constellation Designs

UNIT VI

Satellite Navigation and the Global Positioning System: Radio and Satellite Navigation, GPS Position Location principles, GPS Receivers and codes, Satellite signal acquisition, GPS Navigation Message, GPS signal levels, GPS receiver operation, GPS C/A code accuracy, Differential GPS.

TEXT BOOKS:

1. Satellite Communications – Timothy Pratt, Charles Bostian and Jeremy Allnutt, WSE, Wiley Publications, 2nd Edition, 2003.
2. Satellite Communications Engineering – Wilbur L. Pritchard, Robert A Nelson and Henri G.Suyderhoud, 2nd Edition, Pearson Publications, 2003.
3. Fundamentals of Satellite Communications – K.N. Raja Rao, PHI, 2004

REFERENCES :

1. Satellite Communications : Design Principles – M. Richharia, BS Publications, 2nd Edition, 2003.
2. Satellite Communication - D.C Agarwal, Khanna Publications, 5th Ed.
3. Satellite Communications – Dennis Roddy, McGraw Hill, 2nd Edition, 1996.

IV YEAR - I SEMESTER				
18EC7D06- ANALOG IC DESIGN	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

COURSE OBJECTIVES:

The student will

1.Get in-depth understanding of the analog integrated circuit and building blocks

2.Introduced to the basics of MOSFET, its characteristics, second order effects, small signal model of MOSFET.

3.Analyze the small signal analysis and large signal analysis for single stage amplifiers, differential amplifiers, current sources, current mirrors and frequency response of amplifiers.

COURSE OUTCOMES

At the end of this course the student can able to

1.Explain the small- and large-signal models of CMOS transistors.

2.Demonstrate single stage amplifiers with different loads.

3.Design and analyze differential amplifiers.

4.Design and analyze Current Mirror circuits.

5.Analyze Frequency response of amplifiers.

6.Design and implementation of operational amplifiers.

UNIT I

Basic MOS Device Physics

General Considerations, MOSFET as a Switch, MOSFET Structure, MOS Symbols, MOS I/V Characteristics, Threshold Voltage, Derivation of I/V Characteristics, Second-Order Effects, MOS Device Models, MOS Device Layout, MOS Device Capacitances, MOS Small Signal Model, NMOS versus PMOS Devices, Long Channel Devices versus Short Channel Devices.

UNIT II

Single-Stage Amplifiers

Basic Concepts, Common-Source Stage, Common-Source Stage with Resistive Load ,CS Stage with Diode-Connected Load, CS Stage with Current-Source Load, CS Stage with Source Degeneration. Source Follower, Common Gate Stage, Cascode Stage, Folded Cascode Amplifiers.

UNIT III

Differential Amplifiers

Single ended and differential operation. Basic Differential Pair, Qualitative Analysis, Quantitative Analysis, Common-Mode Response, Differential Pair with MOS Loads.

UNIT IV

Passive and Active Current Mirrors

Basic Current Mirrors, Cascode Current Mirrors, Active Current Mirrors, Large-Signal Analysis, Small-Signal Analysis, Common Mode Properties.

UNIT V

Frequency Response of Amplifiers

General Considerations, Miller Effect, Association of Poles with Nodes, Common-Source Stage, Source Followers, Common Gate Stage, Cascode Stage, Differential Pair Feedback General Considerations, Properties of Feedback Circuits, Effect of Loading, Effect of Feedback on Noise.

UNIT VI

Operational Amplifiers

General considerations of Op-Amps, One stage Op-Amps, Two Stage Op-Amps, Gain Boosting, Comparison, Common Mode Feedback, and Input range Limitation, Slew rate, Power Supply rejection Ratio (PSRR).

TEXT BOOKS

1. Analog CMOS Integrated Circuits - Behzad Razavi, 2nd Edition, McGraw Hill, 2017.
2. CMOS Analog Circuit Design - Phillip E. Allen, Douglas R.Holberg, 3rd edition, Oxford University Press, 2013.
3. Analog Integrated Circuit Design - Kenneth Martin, 2nd Edition Wiley Publications, 2013.

REFERENCE BOOKS

1. Analysis and Design of Analog Integrated Circuits - Paul. R. Gray, Paul. R. Hurst, Stephen H. Lewis & R. G. Meyer, 5th Edition, John Wiley Publications, 2010.
2. Microelectronic Circuits - Sedra and Smith, 6th Edition, Oxford Publications, 2013.
3. Fundamentals of Microelectronics - B.Razavi, 2nd Edition, Wiley Publications, 2009.

IV YEAR - I SEMESTER				
18EC7D07- NETWORK SECURITY & CRYPTOGRAPHY	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

COURSE OBJECTIVES:

The student will

1.Understand basics of cryptography and network security.
2.Able to secure a message over insecure channel by various means.
3.Learn about how to maintain the confidentiality, integrity and availability of a data.
4.Understand various protocols for network security to protect against the threats in the networks.

COURSE OUTCOMES:

At the end of this course the student can able to,

1.Understand the concept of information security awareness and its importance.
2.Understand the concepts of secret and public cryptography.
3.Analyze the concept of number theory.
4.To identify different protocols for Security services.
5.Knowledge on Security threats and Counter measures.
6.Familiar with Network Security designs using avaliable secure sollutions. (Such as PGP, SSl, IPsec, etc.,)

UNIT I

Introduction

Basic Principles Security Goals, Cryptographic Attacks, Services and Mechanisms, Mathematics of Cryptography. Classical Techniques: Conventional encryption model, Classical encryption model.

UNIT II

Modern Techniques

Simplified DES, Block cipher principles, Modes of operation, Triple DES, RSA Algorithm, Diffe-Hellman Key exchange. Data Encryption Standard, Advanced Encryption Standard.

UNIT III

Number Theory

Prime and Relatively prime numbers, Modular arithmetic, Fermat's and Euler's theorem, Chineese remainder theorem, Message authentication and hash functions, Security of hash functions and MAC's.

UNIT IV

Data Integrity, Digital Signature Schemes & Key Management Message Integrity and Message Authentication, Cryptographic Hash Functions, Digital Signature, Key Management.

UNIT V

Network Security-I Security at application layer: PGP and S/MIME, Security at the Transport Layer: SSL and TLS

UNIT VI

Network Security-II Security at the Network Layer: IPSec, System Security

TEXT BOOKS:

1.Cryptography and Network Security - Behrouz A Forouzan, Debdeep Mukhopadhyay, 3rd Edition, McGraw Hill.
2.Cryptography and Network Security - William Stallings, 6th Edition, Pearson.
3.Everyday Cryptography - Fundemental Principles and applications, Keith M.Martin, Oxford.

REFERENCE BOOKS:

1.Network Security and Cryptography, Bernard Meneges, Cengage Lerning.
2.Introduction to Computer networks and cyber Security, Chwon Hwa Wu, J David Irwin, CRC Press.
3.Hack Proofing your Network, Russell, Kaminsky, Forest Puppy, Wiley Dream Tech.

IV YEAR - I SEMESTER				
18EC7D08- MICRO ELECTRO – MECHANICAL SYSTEMS	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

COURSE OBJECTIVES:

The student will

1. Get knowledge of semiconductors and solid mechanics to fabricate MEMS devices.
2. Introduced various sensors and actuators
3. Understand applications of MEMS to disciplines beyond Electrical and Mechanical engineering.

COURSE OUTCOMES:

At the end of this course the student can able to

1. Understand the basics of MEMS.
2. Explore about MEMS sensors and Actuators.
3. Explore about Micro-Opto-Electro Mechanical Systems.
4. Explore about Magnetic sensors and Actuators.
5. Study about Micro Fluidic Systems.
6. Study about Chemical and Bio Medical Micro Systems.

UNIT I

Introduction: Definition of MEMS, MEMS history and development, micro machining, lithography principles & methods, structural and sacrificial materials, thin film deposition, impurity doping, etching, surface micro machining, wafer bonding, LIGA.

Mechanical Sensors and Actuators: Principles of sensing and actuation: beam and cantilever, capacitive, piezo electric, strain, pressure, flow, pressure measurement by micro phone, MEMS gyroscopes, shear mode piezo actuator, gripping piezo actuator, Inchworm technology.

UNIT II

Thermal Sensors and Actuators: Thermal energy basics and heat transfer processes, thermisters, thermo devices, thermo couple, micro machined thermo couple probe, peltier effect heat pumps, thermal flow sensors, micro hot plate gas sensors, MEMS thermo vessels, pyro electricity, shape memory alloys (SMA), U-shaped horizontal and vertical electro thermal actuator, thermally activated MEMS relay, micro spring thermal actuator, data storage cantilever.

UNIT III

Micro-Opto-Electro Mechanical Systems: Principle of MOEMS technology, properties of light, light modulators, beam splitter, micro lens, micro mirrors, digital micro mirror device (DMD), light detectors, grating light valve (GLV), optical switch, wave guide and tuning, shear stress measurement.

UNIT IV

Magnetic Sensors and Actuators: Magnetic materials for MEMS and properties, magnetic sensing and detection, magneto resistive sensor, more on hall effect, magneto diodes, magneto transistor, MEMS magnetic sensor, pressure sensor utilizing MOKE, mag MEMS actuators, by directional micro actuator, feedback circuit integrated magnetic actuator, large force reluctance actuator, magnetic probe based storage device.

UNIT V

Micro Fluidic Systems: Applications, considerations on micro scale fluid, fluid actuation methods, dielectro phoresis (DEP), electro wetting, electro thermal flow, thermo capillary effect, electro osmosis flow, opto electro wetting (OEW), tuning using micro fluidics, typical micro fluidic channel, microfluid dispenser, micro needle, molecular gate, micro pumps. RADIO FREQUENCY (RF) **MEMS:** RF based communication systems, RF MEMS, MEMS inductors, varactors, tuner/filter, resonator, clarification of tuner, filter, resonator, MEMS switches, phase shifter.

UNIT VI

Chemical and Bio Medical Micro Systems: Sensing mechanism & principle, membrane-transducer materials, chem.-lab-on-a-chip (CLOC) chemoresistors, chemocapacitors, chemotransistors, electronic nose (E-nose), mass sensitive chemosensors, fluroscence detection, calorimetric spectroscopy.

TEXT BOOKS:

1.MEMS, Nitaigour Premchand Mahalik, TMH Publishing co.
2.Foundation of MEMS, Chang Liu, Prentice Hall Ltd.

REFERENCES:

1.MEMS and NEMS, Sergey Edwrd Lyshevski, CRC Press, Indian Edition.
2.MEMS and Micro Systems: Design and Manufacture, Tai-Ran Hsu, TMH Publishers.
3.Introductory MEMS, Thomas M Adams, Richard A Layton, Springer International Publishers.

IV YEAR - II SEMESTER				
18EC7D09- DIGITAL TV / DISPLAY DEVICES	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

COURSE OBJECTIVES:

The student will

1. Analyse and Synthesis of TV Pictures, Composite Video Signal, Receiver, Picture Tubes And Television Camera Tubes.
2. Examine Color Television Systems With A Greater Emphasis On Television Standards.
3. Extend Basics Of Digital Television And High Definition Television.

COURSE OUTCOMES:

At the end of this course the student can able to

1. Outline the fundamentals of picture transmission
2. Classify different camera and picture tubes depending on their construction.
3. Distinguish between working of Monochrome and Color Television.
4. Examine the working of Digital Television System hardware.
5. Infer the working of LCD, LED and Plasma Screens.
6. Distinguish between Front projection and rear Projection Systems.

UNIT I

Introduction to Television

Picture Transmission, Geometric Form, Aspect Ratio, Flicker, Image Continuity, no of scanning lines, progressive and interlaced scanning, Television systems and Standards, Composite Video Signal : Video signal levels, Need for Synchronization, Details of Horizontal and Vertical Sync Pulses, Equalizing Pulses, VSB Transmission, Complete Channel Bandwidth, Reception of Vestigial Sideband Transmission, Block Schematic study of a typical TV Transmitter.

UNIT II

Camera and Picture Tubes

Camera Tube Types, Principle of working and constructional details of Videocon, Silicon diode array Vidicon and Solid-state Image Scanners, Color Camera, Color Picture Tube-Delta; Picture Tube Specifications.

UNIT III

Monochrome Receivers

Block Schematic and Functional Requirements of a Monochrome Receiver, RF tuner, IF Subsystem, Video Detector, Sound Channel Separation, Sync Separation Circuits, Vertical and Horizontal Deflection Circuits, E.H.T. Generation, Study of Video IF Amplifier.

UNIT IV

Color Television

Principles of Additive and Subtractive Color Mixing, Chromaticity Diagram, Compatibility and Reverse Compatibility, Color Signal Transmission, Bandwidth for Color Signal Transmission, Sub-carrier Modulation of Chroma Signals, Block diagram of Color TV Receiver, NTSC Encoding (Y, I, Q signals), NTSC Decoder.

UNIT V

Digital Television

Digital System Hardware, Signal Quantization and Encoding, Digital Satellite Television, Direct to Home, Digital TV Receiver, Merits of Digital TV Receivers, LCD AND PLASMA SCREENS: LCD Technology, LCD Matrix types and operation, LCD Screens for Television, Plasma and conduction of charge, Plasma TV Screens, LCD color receiver, Plasma Color Receiver, Working Principles of LED TV.

UNIT VI

New Era Projection TV

Direct View and Rear projection Systems. Front Projection Systems, Reflective Projection Systems, digital light Processing (DLP) Projection system, Projection TV for Home Theatres.

TEXT BOOKS:

1. Modern Television Practice, Principles Technology and Servicing - RR Gulati, Third Edition New Age International Publishers.
2. Fundemantals of digital television Transmission - Gerald.Collins PE, Fi.
3. Digital Television Fundementals, 2nd Edition - Michel Robin and Michel Poulin.

REFERENCES

1. TV and Video Engineering - A M Dhake, 2nd Edition, TMH, 2006
2. Digital Television : A Practical guide for Engineers - Walter Fisher- Springer Science & Business Media
3. Understanding Digital Television by lars-Ingemar Lundstorm Routldge Publishers.

IV YEAR - I SEMESTER				
18EC7L11- MICRO WAVE ENGINEERING & OPTICAL COMMUNICATION LAB	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1.5**

Minimum Twelve Experiments to be conducted:

Part – A (Any 7 Experiments, 10th Experiment compulsory):

1.Reflex Klystron Characteristics.
2.Gunn Diode Characteristics.
3.Wave Guide Characteristics
4.Directional Coupler Characteristics.
5.Attenuation Measurement
6.Scattering parameters of Circulator.
7.Scattering parameters of E-Plane Tee and H- Plane Tee
8.Scattering parameters of Magic Tee.
9.Radiation Pattern of Horn and Parabolic Antennas.
10. Synthesis of Microstip antennas (Rectangular Structure) Using HFSS.

Part – B (Any 4 Experiments) :

1.Characterization of LED.
2.Characterization of Laser Diode.
3.Intensity modulation of Laser output through an optical fiber.
4.Measurement of Data rate for Digital Optical link.
5.Measurement of NA.
6.Measurement of losses for Analog Optical link.

Equipment Required:

1.Regulated Klystron Power Supply, Klystron mount
2.VSWR Meter
3.Micro Ammeter
4.Multi meter
5.CRO
6.GUNN Power Supply, Pin Modulator
7.Crystal Diode detector
8.Micro wave components (Attenuation)
9.Frequency Meter
10. Slotted line carriage
11. Probe detector
12. Wave guide shorts
13. SS Tuner
14. Directional Coupler
15. E, H, Magic Tees
16. Circulators, Isolator
17. Matched Loads
18. Pyramidal Horn and Parabolic Antennas
19. Turntable for Antenna Measurements
20. HFSS Software

21. Fiber Optic Analog Trainer based LED
22. Fiber Optic Analog Trainer based laser
23. Fiber Optic Digital Trainer
24. Fiber cables - (Plastic, Glass)

III YEAR - II SEMESTER				
18EC7L12- EMBEDDED SYSTEMS & IOT LAB	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1.5**

LIST OF EXPERIMENTS

PART-A: 8086 Assembly Language Programming using Assembler Directives (Minimum of 5 Experiments has to be performed)

1.Sorting.
2.Multi-byte addition/subtraction/Multiplication/division.
3.Sum of squares/cubes of a given n-numbers.
4.Factorial of given n-numbers.
5.Processing of strings
6.Conversion programs (BCD to ASCII, BCD to Decimal, Decimal to ASCII, Packed to Unpacked)

PART- B: 8086 interfacing (Minimum of 2 Experiments has to be performed)

1.Stepper motor interface.
2.D/A Interface through Intel 8255.
3.8251 USART.
4.Keyboard and Display Interface through Intel 8279.
5.Generation of waveforms using Intel 8253/8254.

PART- C: 8051 Assembly Language Programs (Minimum of 3 Experiments has to be performed)

1.Finding number of 1's and number of 0's in a given 8-bit number
2.Addition of even numbers from a given array
3.Ascending / descending order
4.Average of n-numbers
5.LCM/GCD of an array

PART-D: (Minimum of 2 Experiments has to be performed)

1.8051 Interfacing
2.Switches and LEDs
3.A/D interface
4.Traffic Light Controller
5.Elevator

PART-E: IoT (Minimum of 2 Experiments has to be performed)

1.To interface motor using relay with Arduino/Raspberry Pi and write a program to turn ON motor when push button is pressed.
2.Write a program on Arduino/Raspberry Pi to subscribe to MQTT broker for temperature data and print it.
3.Write a program to create TCP server on Arduino/Raspberry Pi and respond with humidity data to TCP client when requested.
4.Write a program to create UDP server on Arduino/Raspberry Pi and respond with humidity data to UDP client when requested.

Equipment Required:

1.Regulated Power supplies.
2.Analog /Digital Storage Oscilloscopes.
3.8086 Microprocessor kits.
4.8051 microcontroller kits.
5.ADC module.
6.DAC module.
7.Stepper motor module.
8.Keyboard module.
9.LED, 7-Segemt Units.
10. Digital Multimeters.
11. ROM/RAM Interface module.
12. Bread Board etc.

IV YEAR - II SEMESTER				
18EC8T25- CELLULAR MOBILE COMMUNICATIONS	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

COURSE OBJECTIVES:

The student will

1. Understand the cellular mobile systems and they learn about the mobile radio environment and operation of cellular system.
2. Learn interference and frequency management and about the channel assignment which is to be used in the real world problems.
3. Know how to make a cell splitting and how much amount of hand off takes place.

COURSE OUTCOMES:

At the end of this course the student can able to

1. Explain basics of cellular mobile communication.
2. Describe the co channel interference reduction ,cell coverage for signal and traffic.
3. Classify different Omni directional antennas and bidirectional antennas used for interference reduction.
4. Analyse the frequency management and channel assignment.
5. Define basic types of handoff and dropped calls.
6. Discuss the Digital cellular systems like GSM , CDMA and TDMA and different generations.

UNIT I

Cellular Mobile Radio Systems: Introduction to Cellular Mobile System, uniqueness of mobile radio environment, operation of cellular systems, Hexagonal shaped cells, Analog and Digital Cellular systems.

Elements of Cellular Radio System Design: General description of the problem, Concept of frequency reuse channels, co-channel interference reduction factor, Desired C/I from a normal case in an omni directional antenna system, Handoff mechanism, cell splitting.

UNIT II

Cell Coverage for Signal and Traffic: General introduction, Obtaining the LEE model, propagation over water or flat open area, Foliage loss, Propagation in Near-in distance, Long distance propagation, Obtain path loss from a point to point prediction model-A general approach, Form of a point point model, Computer generation point to point prediction, cell -site antenna heights And signal coverage cells, mobile to mobile propagation.

UNIT III

Cell Site and Mobile Antennas: Equivalent circuits of antennas, the gain and pattern relationship, sum and difference patterns, antennas at cell site, unique situations of cell-Site antennas, mobile antennas

Co-channel Interference Reduction: Co-channel interference, Exploring co-channel interference areas in a system, real time co-channel interference measurement at mobile radio transceiver, design of Omni directional antenna system in the worst case , design of directional antenna system, lowering the antenna height, reduction of co-channel interference by means of notch and tilted antenna pattern, umbrella pattern effect, use of parasitic elements, power control, diversity receiver, designing a system to serve a predefined area that experiences co-channel interference .

UNIT IV

Frequency Management and Channel Assignment: Numbering and grouping, setup access and paging channels, channel assignments to cell sites and mobile units: fixed channel and non-fixed channel assignment, channel sharing and borrowing, overlaid cells.

UNIT V

Handoff Strategies: Concept of Handoff, types of handoff, handoff initiation, delaying handoff, forced handoff, mobile assigned handoff, intersystem handoff, vehicle locating methods, dropped call rates and their evaluation.

UNIT VI

Digital Cellular System: GSM, TDMA,CDMA,FDMA,SDMA, Generations- 1G,2G,3G,4G,5G

TEXTBOOKS:

1.Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2rd Edn., 2006.

2.Principles of Mobile Communications – Gordon L. Stuber, Springer International 2nd Edition, 2007.

3.Mobile Cellular Communication – G Sasibhushana Rao Pearson

REFERENCES:

1.Wireless Communications – Theodore. S. Rapport, Pearson education, 2nd Edn., 2002.

2.Wireless and Mobile Communications – Lee McGraw Hills, 3rd Edition, 2006.

3.Wireless Communication and Networking – Jon W. Mark and Weihua Zhqung, PHI, 2005.

IV YEAR - I SEMESTER				
18EC8T26- DIGITAL IMAGE PROCESSING	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

COURSE OBJECTIVES:

The student will

1.Study the Image Fundamentals and Mathematical Transforms Necessary for Image Processing.
2.Study the Image Enhancement Techniques
3.Study Image Restoration Procedures.
4.Study the Image Compression Procedures.

COURSE OUTCOMES:

At the end of this course the student can able to

1.Become familiar with digital image fundamentals
2.Get exposed to simple image enhancement techniques in Spatial and Frequency domain.
3.Learn concepts of degradation function and restoration techniques.
4.Learn the concepts of different color models and color image processing.
5.Study the image segmentation and representation techniques.
6.Become familiar with image compression and recognition methods

UNIT I

Digital Image Fundamentals: Steps in Digital Image Processing, Components of an image processing system, Elements of Visual Perception, Image Sensing and Acquisition, Image Sampling and Quantization, Relationships between pixels, Introduction to mathematical tools used in image processing, 2D transforms – DFT, DCT, Walsh, Hadamard, Harr, Slant Transforms.

UNIT II

Image Enhancement

Spatial Domain: Gray level transformations – Histogram processing – Basics of Spatial Filtering– Smoothing and Sharpening Spatial Filtering.

Frequency Domain: Introduction to Fourier Transform– Smoothing and Sharpening frequency domain filters – Ideal, Butterworth and Gaussian filters, Homomorphic filtering, Color image enhancement.

UNIT III

Image Restoration: Image Restoration/degradation model, Properties, Noise models, Mean Filters, Order Statistics, Adaptive filters, Band reject Filters, Band pass Filters, Notch Filters, Optimum Notch Filtering, Inverse Filtering, Wiener filtering.

UNIT IV

Color Image Processing: Color fundamentals, color models, pseudo color image processing, basic full color image processing, color transformations, Image segmentation based on color, noise in color images, color image compression.

UNIT V

Image Segmentation: Edge detection, Thresholding, Region based segmentation, Region growing, Region splitting and merging, Morphological processing- erosion and dilation, Segmentation by

morphological watersheds – basic concepts – Dam construction – Watershed segmentation algorithm, Hit-or-Miss transformation. Grey-scale morphology.

UNIT VI

Image Compression and Recognition: Need for data compression, Huffman, Run Length Encoding, Shift codes, Arithmetic coding, JPEG standard, MPEG. Boundary representation, Boundary description, Fourier Descriptor, Regional Descriptors – Topological feature, Texture – Patterns and Pattern classes – Recognition based on matching.

TEXT BOOKS:

1.Digital Image Processing Pearson - Rafael C. Gonzalez, Richard E. Woods, 3rd Edition, 2010.
2.Fundamentals of Digital Image Processing - Anil K. Jain, Pearson, 2002.
3.Digital Image Processing Pearson - Kenneth R. Castleman, 2006.

REFERENCES:

1.Multidimensional Digital Signal Processing - D,E.Dudgeon and RM. Mersereau,Prentice Hall Professional Technical Reference, 1990.
2.Digital Image Processing - William K. Pratt, John Wiley, New York, 2002
3.Image processing, analysis and machine vision - Milan Sonka et al, Brookes/Cole, Vikas Publishing House, 2nd edition, 1999

IV YEAR - I SEMESTER				
18EC8T27- COMPUTER NETWORKS	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

COURSE OBJECTIVES:

The student will

1. Introduce key concepts and principles of computer networks.
2. Use a top-down approach to study the Internet and its protocol stack.
3. Understand the implementation and deployment of communications services in practical networks: including wired and wireless LAN environments.
4. Learn Internet's architecture and protocols will be used as the primary examples to illustrate the fundamental principles of computer networking.

COURSE OUTCOMES:

At the end of this course the student can able to

1. Identifying the network models and identifying different reference models.
2. Identifying hardware components at physical layer
3. Analysing the organization structure and select the most appropriate network architecture and technology.
4. Understands the concepts of internetworking devices and routing techniques.
5. Knowledge on how datagram is transferred and ordered and how connection oriented and connectionless services work.
6. Knowledge on naming services and DNS, SMTP, SNMP, FTP, HTTP protocols

UNIT I

Introduction

Network Topologies WAN, LAN, MAN. Reference models- The OSI Reference Model- the TCP/IP Reference Model - A Comparison of the OSI and TCP/IP Reference Models.

UNIT II

Physical Layer

Guided Transmission Media, Digital Modulation and Multiplexing: Frequency Division Multiplexing, Time Division Multiplexing, Code Division Multiplexing ,Narrow band, broad band ISDN and ATM.

UNIT III

Data Link Layer - Services Provided to the Network Layer – Framing – Error Control – Flow Control, Error Detection and Correction – Error-Correcting Codes – Error Detecting Codes, Elementary Data Link Protocols- A Utopian Simplex Protocol-A Simplex Stop and Wait Protocol for an Error free channel-A Simplex Stop and Wait Protocol for a Noisy Channel, Sliding Window Protocols-A One Bit Sliding Window Protocol-A Protocol Using Go-Back-N- A Protocol Using Selective Repeat

UNIT IV

Medium Access Control Sub layer- The Channel Allocation Problem-Static Channel Allocation-Assumptions for Dynamic Channel Allocation, Multiple Access Protocols-Aloha-Carrier Sense Multiple Access Protocols Collision-Free Protocols-Limited Contention Protocols-Wireless LAN

Protocols, Ethernet-Classic Ethernet Physical Layer-Classic Ethernet MAC Sublayer Protocol-Ethernet Performance-Fast Ethernet Gigabit Ethernet-10-Gigabit Ethernet-Retrospective on Ethernet, Wireless Lans-The 802.11 Architecture and Protocol Stack-The 802.11 Physical Layer-The802.11 MAC Sublayer Protocol

UNIT V

Network Layer

Design Issues – Store and Forward Packet Switching-Services Provided to the Transport layer-Implementation of Connectionless Service-Implementation of Connection Oriented Service Comparison of Virtual Circuit and Datagram Networks, Routing Algorithms-The Optimality principle-Shortest path Algorithm, Congestion Control Algorithms-Approaches to Congestion Control-Traffic Aware Routing Admission Control-Traffic Throttling-Load Shedding.

UNIT VI

Transport Layer – The Internet Transport Protocols: Udp, the Internet Transport Protocols: Tcp
Application Layer –The Domain Name System: The DNS Name Space, Resource Records, Name Servers, Electronic Mail: Architecture and Services, The User Agent, Message Formats, Message Transfer, Final Delivery.

TEXT BOOKS:

1.Computer Networks - Tanenbaum and David J Wetherall, 5th Edition, Pearson Edu, 2010
2.Computer Networks - A Top Down Approach, Behrouz A. Forouzan, Firouz Mosharraf, McGraw Hill Education
3.An Engineering approach to computer Networks - S. Keshav, 2nd Edition, Pearson Edu.

REFERENCE BOOKS:

1.Computer Networks: A Systems Approach - Larry L. Peterson and Bruce S. Davie, 5th Edition, Morgan Kaufmann/ Elsevier, 2011.
2.Introduction to Data communication and Networking - Wayne Tomasi, 1st Edition, Pearson Education India, 2007.
3.Computer Networking, 6th Edition, James F.Kurose, Keith W.

IV YEAR - II SEMESTER				
18EC8D11- WIRELESS SENSOR NETWORKS	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

COURSE OBJECTIVES:

The student will

1.Understand the WSN node Architecture and Network Architecture.
2.Identify the Wireless Sensor Network Platforms.
3.Understand the different protocols of Wireless networks.

COURSE OUTCOMES:

At the end of this course the student can able to

1.It provides an insight into different layers and their design considerations.
2.A thorough knowledge of infrastructure establishment and sensor network platform is provided.
3.Course Outcomes:
4.Students will be able to analyze modelling and simulation of various communication networks
5.Students will be able to generate test and estimate parameters.
6.By the end of the programme, students will apply this knowledge for detection estimation and simulation of various communication networks.

UNIT I

Overview of Wireless Sensor Networks

Key definitions of sensor networks, Advantages of sensor Networks, Unique constraints an challenges, Driving Applications, Enabling Technologies for Wireless Sensor Networks.

Architectures

Single-Node Architecture - Hardware Components, Energy Consumption of Sensor Nodes, Operating Systems and Execution Environments, Network Architecture -Sensor Network Scenarios, Optimization Goals and Figures of Merit, Gateway Concepts.

UNIT II

Networking Technologies

Physical Layer and Transceiver Design Considerations, Personal area networks (PANs)-blue tooth, hidden node and exposed node problem, Topologies of PANs, MANETs, and WANETs.

UNIT III

MAC Protocols for Wireless Sensor Networks

Issues in Designing a MAC protocol for Ad Hoc Wireless Networks, Design goals of a MAC Protocol for Ad Hoc Wireless Networks, Classifications of MAC Protocols, Contention - Based Protocols, Contention - Based Protocols with reservation Mechanisms, Contention – Based MAC Protocols with Scheduling Mechanisms, MAC Protocols that use Directional Antennas, Other MAC Protocols.

UNIT IV

Routing Protocols

Introduction, Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks, Classification of Routing Protocols, Table –Driven Routing Protocols, On – Demand Routing Protocols, Hybrid

Routing Protocols, Routing Protocols with Efficient Flooding Mechanisms, Hierarchical Routing Protocols, Power – Aware Routing Protocols, Proactive Routing

UNIT V

Transport Layer and Security Protocols

Introduction, Issues in Designing a Transport Layer Protocol for Ad Hoc Wireless Networks, Design Goals of a Transport Layer Protocol for Ad Hoc Wireless Networks, Classification of Transport Layer Solutions, TCP Over Ad Hoc Wireless Networks, Other Transport Layer Protocol for Ad Hoc Wireless Networks,

UNIT VI

Security in WSNs

Security in Ad Hoc Wireless Networks, Network Security Requirements, Issues and Challenges in Security Provisioning, Network Security Attacks, Key Management, Secure Routing in Ad Hoc Wireless Networks.

Applications of WSN

S Ultra wide band radio communication, Wireless fidelity systems. Future directions, Home automation, smart metering Applications

TEXT BOOKS:

1. Ad Hoc Wireless Networks: Architectures and Protocols - C. Siva Ram Murthy and B.S.Manoj, 2004, PHI
2. Wireless Ad- hoc and Sensor Networks: Protocols, Performance and Control – Jagannathan Sarangapani, CRC Press
3. Protocols and Architectures for Wireless Sensor Networks - Holger Karl & Andreas Willig, John Wiley, 2005.

REFERENCES:

1. Wireless Sensor Networks- Technology, Protocols, and Applications - Kazem Sohraby, Daniel Minoli, & Taieb Znati, John Wiley, 2007.
2. Wireless Sensor Networks - An Information Processing Approach, Feng Zhao & Leonidas J. Guibas, Elsevier, 2007.
3. Ad- Hoc Mobile Wireless Networks: Protocols & Systems, C.K. Toh,1 ed. Pearson Education.
4. Wireless Sensor Networks - C. S. Raghavendra, Krishna M. Sivalingam, 2004, Springer
5. Wireless Sensor Networks – S Anandamurugan , Lakshmi Publications

IV YEAR - II SEMESTER				
18EC8D12- DSP PROCESSORS AND ARCHITECTURES	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

COURSE OBJECTIVES:

The student will

1.Recall digital transform techniques.

2. Introduce architectural features of programmable DSP Processors and Analog Devices.

3.Learn Interfacing Memory and I/O Peripherals to Programmable DSP Devices for better understanding.

COURSE OUTCOMES

At the end of this course the student can able to

1.Able to gives an over view of entire digital signal processing techniques i.e. convolution, DFT, FFT, IIR, & FIR filters.

2.Able to gives an The fixed and floating point representation, different types of errors introduced during A-D and D-A converter stage

3.outline to introduce the DSP computational building blocks and special types of addressing modes compared to normal microprocessor

4.Able to Execution control of different pipeline programming models

5.Explain the Architectural view about TMS320c54XX

6.Explain the interfacing with PDSP's

UNIT I

Introduction to Digital Signal Processing:

Introduction, a Digital signal-processing system, the sampling process, discrete time sequences. Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT), linear time-invariant systems, Digital filters, Decimation and interpolation. Analysis and design tool for DSP systems, DSP using MATLAB

UNIT II

Computational accuracy in DSP implementations

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

UNIT III

Architectures for Programmable DSP Devices

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

UNIT IV

Execution Control and Pipelining

Hard ware looping, Interrupts, stacks, Relative branch support, Pipelining and performance Pipeline depth, Interlocking, Branching effects, Interrupt effects, Pipeline programming models.

UNIT V

Programmable Digital Signal Processors

Commercial Digital signal-processing Devices, Data Addressing modes of TMS320C54XX DSPs, Data Addressing modes of TMS320C54XX Processors, Memory space of TMS320C54XXProcessors, Program Control, TMS320C54XX Instructions and Programming, On-Chip Peripherals, Interrupts of TMS320C54XX Processors, Pipeline Operation of TMS320C54XX Processors.

UNIT VI

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 Multi channel serial port (McBSP), McBSP Programming, a CODEC Interface circuit, CODEC Programming, A CODEC –DSP Interface examples

TEXT BOOKS

1.Digital Signal Processors, Architecture, and Programming - B.Venkata Ramani and M. Bhaskar, TMH, 2004

2.DSP Implementation using DSP microprocessor with Examples from TMS32C54XX - Avtar Singh, S.Srinivasan, Tamson 2004

REFERENCE BOOKS

1.DSP Processor Fundamentals, Architectures & Features - Lapsley et al., S. Chand & Co, 2000

2.Digital signal processing - Jonathen Stein, John Wiley 2005

IV YEAR - II SEMESTER				
18EC8D13- DIGITAL IC DESIGN	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

COURSE OBJECTIVES:

The student will

1. Understand the MOS Design.
2. Study Combinational MOS Logic Circuits and Sequential MOS Logic Circuits.
3. Design and to develop the Digital Integreated Circuits for different Applications.
4. Understand concepts of Semiconductor Memories, Flash Memory, and RAM array organization.

COURSE OUTCOMES:

At the end of this course the student can able to

1. Understand the concepts of MOS Design.
2. Design and analysis of Combinational and Sequential MOS Circuits.
3. Design Sequential MOS Circuits.
4. Describe the different dynamic logic circuits.
5. Understand the interconnect techniques.
6. Understand the Concepts of Semiconductor Memories, Flash Memory, RAM array organization.

UNIT I

MOS Design: Pseudo NMOS Logic – Inverter, Inverter threshold voltage, Output high voltage, Output Low voltage, Gain at gate threshold voltage, Transient response, Rise time, Fall time, Pseudo NMOS logic gates, Transistor equivalency, CMOS Inverter logic.

UNIT II

Combinational MOS Logic Circuits: MOS logic circuits with NMOS loads, Primitive CMOS logic gates – NOR& NAND gate, Complex Logic circuits design -Realizing Boolean expressions using NMOS gates and CMOS gates ,AOI and OIA gates, CMOS full adder, CMOS transmission gates, Designing with Transmission gates.

UNIT III

Sequential MOS Logic Circuits: Behaviour of bistable elements, SR Latch, Clocked latch and flip flop circuits, CMOS D latch and edge triggered flip-flop.

UNIT IV

Dynamic Logic Circuits: Basic principle, Voltage Bootstrapping, Synchronous dynamic pass transistor circuits, Dynamic CMOS transmission gate logic, High performance Dynamic CMOS circuits.

UNIT V

Interconnect: Capacitive Parasitics, Resistive Parasitics, Inductive Parasitics, Advanced Interconnect Techniques.

UNIT VI

Semiconductor Memories: Memory Types, RAM array organization, DRAM – Types, Operation, Leakage currents in DRAM cell and refresh operation, SRAM operation Leakage currents in SRAM cells, Flash Memory NOR flash and NAND flash.

TEXT BOOKS:

1. Digital Integrated Circuits – A Design Perspective, Jan M. Rabaey, Anantha Chandrakasan, Borivoje Nikolic, 2nd Ed., PHI.
2. Digital Integrated Circuit Design – Ken Martin, Oxford University Press, 2011.

REFERENCES:

1. CMOS Digital Integrated Circuits Analysis and Design – Sung-Mo Kang, Yusuf Leblebici, TMH, 3rd Ed., 2011.
2. CMOS VLSI Design – Neil H.E Weste, David harris, Ayan Banerjee 3rd Edition, Pearson

IV YEAR - II SEMESTER				
18EC8D14- FPGA ARCHITECTURES	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

COURSE OBJECTIVES:

The student will

1.Familiarization of various complex programmable logic devices of different families.
2.Understand Field programmable gate arrays and realization techniques.
3.Understand hot design methods.

COURSE OUTCOMES:

Upon completion of the course, students will be able to

1.Demonstrate various architectures and device technologies of PLDs and CPLDs.
2.Illustrate aspects of FPGA Architectures.
3.Explain SRAM Programmable FPGAs.
4.Explain Anti-Fuse Programmed FPGAs.
5.Build digital circuits using various FPGA classes.
6.Analyze System level Design and their application for Combinational and Sequential Circuits

UNIT I

Introduction to Programmable Logic Devices

Introduction, Simple Programmable Logic Devices - Read Only Memories, Programmable Logic Arrays, Programmable Array Logic, Programmable Logic Devices/Generic Array Logic; Complex Programmable Logic Devices - Architecture of Xilinx Cool Runner XCR3064XL CPLD, CPLD Implementation of a Parallel Adder with Accumulation.

UNIT II

Field Programmable Gate Arrays Classes

FPGA design flow, Basic FPGA architecture, FPGA Programming Technologies, Programmable Logic Block Architectures, Programmable Interconnects, Programmable I/O blocks in FPGAs, Dedicated Specialized Components of FPGAs, and Applications of FPGAs

UNIT III

Essentials and SRAM Programmable FPGA

Introduction, Programming Technology, Device Architecture, The Xilinx XC2000, XC3000 and XC4000 Architectures, FPGA implementation for combinational and sequential circuits with case studies. FPGA debugging using chip scope analyzer with case studies.

UNIT IV

Anti-Fuse Programmed FPGAs

Introduction, Programming Technology, Device Architecture, the Actel ACT1, ACT2 and ACT3 Architectures.

UNIT V

Design Implementations using FPGAs Classes

General Design Issues, Counter Examples, Fine State Machines, Finite State Machines with Data path, UART controller, Key board controller and simple 8-bit microprocessor

UNIT VI

Design Applications for Systems

A Fast Video Controller, A Position Tracker for a Robot Manipulator, A Fast DMA Controller, case studies on image processing methods using System Generator.

TEXT BOOKS:

1. Field Programmable Gate Array Technology - Stephen M. Trimberger, Springer International Edition.
2. Digital Systems Design- Charles H. Roth Jr, Lizy Kurian John, Cengage Learning.
3. Verilog Digital System Design - Z Navabi, 2nd Edition, McGraw Hill.

REFERENCE BOOKS

1. Field Programmable Gate Arrays - John V. Oldfield, Richard C. Dorf, Wiley India.
2. Digital Design Using Field Programmable Gate Arrays - Pak K. Chan/Samiha Mourad, Pearson Low Price Edition.
3. CMOS VLSI Design - A circuits and Systems Perspective, Neil H.E Weste, David Harris, Ayan Banejee, Pearson 2009.

IV YEAR - II SEMESTER				
18CS8D10 - MACHINE LEARNING	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

COURSE OBJECTIVES:

The student will

1. Introduce to the basic concepts and techniques of Machine Learning.
2. Become familiar with regression methods, classification methods, clustering methods.
3. Become familiar with Dimensionality reduction Techniques.

COURSE OUTCOMES:

Upon completion of the course, students will be able to

1. Evaluate and compare the performance or, other qualities, of algorithms for typical learning problems.
2. Design a supervised or unsupervised learning system.
3. Gain knowledge about basic concepts of Machine Learning
4. Identify machine learning techniques suitable for a given problem
5. Solve the problems using various machine learning techniques
6. Apply Dimensionality reduction techniques.

UNIT I

Introduction: Well-posed learning problems, designing a learning system, Perspectives and issues in machine learning. Concept learning and the general to specific ordering – Introduction, A concept learning task, Concept learning as search, Find- S: finding a maximally specific hypothesis, Version spaces and the candidate elimination algorithm, Remarks on version spaces and candidate elimination, Inductive bias.

UNIT II

Linear Regression & Logistic Regression Predicting numeric values: regression - Finding the best fit lines with linear regression, Locally weighted linear regression, Shrinking Coefficients, The bias / Variance tradeoff.

Logistic Regression: Classification with logistic regression and the sigmoid function, using optimization to find the best regression coefficients.

UNIT III

Artificial Neural Networks: Introduction, Neural network representation, Appropriate problems for neural network learning, Perceptions, Multilayer networks and the back propagation algorithm, Remarks on the back propagation algorithm, An illustrative example face recognition, Advanced topics in artificial neural networks.

UNIT IV

Evaluation Hypotheses: Motivation, Estimation hypothesis accuracy, Basics of sampling theory, a general approach for deriving confidence intervals, Difference in error of two hypotheses, Comparing learning algorithms.

UNIT V

Support vector machines & Dimensionality Reduction techniques: Separating data with the maximum margin, finding the maximum margin, efficient optimization with SMO algorithm, speeding up optimization with full platt SMO, Using Kernels for more Complex data.

Dimensionality Reduction techniques: Principal Component analysis, Example.

UNIT VI

Instance-Based Learning: Introduction, k -Nearest Neighbour Learning, Locally Weighted Regression, Radial Basis Functions, Case-Based Reasoning, Remarks on Lazy and Eager Learning.

Genetic Algorithms: Representing Hypotheses, Genetic Operators, Fitness Function and Selection, Illustrative Example.

TEXT BOOKS:

1. Machine Learning, Tom M. Mitchell, MGH
2. Machine Learning in Action, Peter Harington, 2012, Cengage.

REFERENCE BOOKS:

1. Introduction to Machine Learning, Ethem Alpaydin, PHI, 2004