ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES::RAJAMPET

(AUTONOMOUS)

www.aitsrajampet.ac.in

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

ACADEMIC REGULATIONS (R17)

AND

COURSE STRUCTURE AND SYLLABI

For the students admitted to

B. Tech., Regular Four Year Degree Programme in CBCS

from the Academic Year 2017-18

and

B. Tech., Lateral Entry Scheme from the Academic Year 2018-19

B. Tech., ELECTRONICS AND COMMUNICATION ENGINEERING

VISION AND MISSION OF THE INSTITUTION

Vision

We impart futuristic technical education and instill high patterns of discipline through our dedicated staff who set global standards, making our students technologically superior and ethically strong, who in turn shall improve the quality of life of the human race.

Mission

Our mission is to educate students from the local and rural areas and from other states so that they become enlightened individuals, improving the living standards of their families, industry and society. We provide individual attention, world class quality of Technical education and take care of character building.

VISION AND MISSION OF THE DEPARTMENT

Vision

To offer educational experiences that makes the students globally competent, socially responsible and bring in answers to ever-ebbing problems in the field of Electronics & Communication Engineering.

Mission

To offer high quality premier education in the field of Electronics & Communication Engineering and to prepare students for professional career and higher studies. To promote excellence in technical research, collaborative activities and positive contributions to society.

PROGRAM EDUCATIONALOBJECTIVES:

The B.Tech. Electronics & Communication Engineering graduates will be able to:

1. Work efficiently as Communication Engineers, including supportive and leadership roles on Multidisciplinary teams
2. Communicate effectively, recognize and incorporate societal needs and constraints in their professional endeavors, and practice their profession with high regard to legal and ethical responsibilities,
3. Engage in life-long learning, such as graduate study, to remain current in their profession and be leaders in our technological society.

PROGRAM OUTCOMES are:

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions
11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments
12. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

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ACADEMIC REGULATIONS

B. Tech, Four Year Degree Programme with CBCS
(For the batches admitted from the academic year 2017-18)
And
B. Tech. Lateral Entry Scheme
(For the batches admitted from the academic year 2018-19)

The following rules and regulations will be applicable for the batches of Four year

B.Tech. degree admitted from the academic year 2017-18 onwards.

1. ADMISSION:

1.1 Admission into First year of Four year B. Tech. Degree programme of study in Engineering:

As per the existing stipulations of Andhra Pradesh State Council of Higher Education (APSCHE), Government of Andhra Pradesh, admissions are made into the first year of four year B. Tech. Degree programme as per the following pattern.

a) Category-A seats will be filled by the Convener, AP-EAMCET.
b) Category-B seats will be filled by the Management as per the norms stipulated by Govt. of Andhra Pradesh.

1.2 Admission into the Second Year of Four year B.Tech. Degree Programme (lateral entry).

As per the existing stipulations of Andhra Pradesh State Council of Higher Education (APSCHE), Government of Andhra Pradesh. Seats will be filled by the Convener, AP-ECET.

2. PROGRAMMES OF STUDY OFFERED BY AITS LEADING TO THE AWARD OF B.TECH DEGREE:

Following are the four year Under Graduate Degree Programmes of study offered in various disciplines at Annamacharya Institute of Technology and Sciences, Rajampet leading to the award of B.Tech. (Bachelor of Technology) Degree:

1. B.Tech. (Computer Science and Engineering)
2. B.Tech. (Electrical and Electronics Engineering)
3. B.Tech. (Electronics and Communication Engineering)
4. B.Tech. (Mechanical Engineering)
5. B.Tech. (Civil Engineering)

And any other programme as approved by the concerned authorities from time to time.

3. ACADEMIC YEAR:

The entire course of study is of four academic years and each year will have **TWO** Semesters (Total **EIGHT** Semesters). The minimum instruction days for each semester shall be 90.

4. COURSE STRUCTURE:

Each programme of study shall consist of:

4.1 General Courses comprising of the following :(5 to 10%)

a) Language / Communication Skills
b) Humanities and Social Sciences : Environmental Science
c) Economics and Accounting
d) Principles of Management

4.2 Basic Science Courses comprising of the following: (15 to 20%)

a) Computer Literacy with Numerical Analysis
b) Mathematics
c) Physics
d) Chemistry

4.3 Basic Engineering Courses comprising of the following (depending on the branch) :(15 to 20%)

a) Engineering Drawing
b) Engineering and IT Workshop
c) Engineering Mechanics
d) Basic Mechanical Engineering
e) Electrical and Electronics Engineering
f) Basic Civil Engineering
g) Computer Programming

4.4 Compulsory Discipline Courses: (30 to 40%)

The lists of professional subjects are chosen as per the suggestions of the experts, to impart broad based knowledge needed in the concerned branch of study.

4.5 Professional subjects - Electives: (10 to 15%)

Electives will be offered to the students to diversify the spectrum of knowledge, based on the interest of the student to broaden his individual skill and knowledge.

4.6 Open Electives: (5 to 10%)

Open subjects will be offered from other technical and / or emerging subject areas

4.7 Project Work, Seminar and /or Internship :(10-15%)

Project Work, Seminar and /or Internship in industry or elsewhere.

4.8 Mandatory Courses:

Environmental Studies, Technical English and professional communication & Soft Skills are included as subjects under mandatory courses but with credit weightage.

4.9 There shall be a subject like comprehensive Mechanical Engineering with 2 hours per week introduced in final year first semester.

4.10 Every programme of study shall be designed to have 42-44 theory courses and **22- 28** laboratory/seminar/comprehensive courses.

4.11 Every programme has included foundation courses to the extent of 30%, programme core and programme elective subjects to the extent of 60%, open electives and mandatory courses to the tune of 10% approximately of the total credits.

4.12 Audit Courses (to be included in **I B.Tech II Semester andIII B.Tech.**

I Semester):

Interested students who want to supplement their knowledge can opt for audit courses namely Gender sensitization, Professional Ethics/Stress Management & Advanced English Communication laboratory and can appear/Pass in Continuous Internal Evaluation and Semester End Examination of these courses will be included in marks memo only when they pass.

4.13 Open Elective:

IV Year I Semester student has to necessarily select a subject from the list of open electives.

4.14 Contact Hours: Depending on the complexity and volume of the course, the number of contact hours per week will be assigned.

5. CREDIT SYSTEM:

Credits are assigned based on the following norms.

	Semester Pattern	
	Period(s) / Week	Credit(s)
Theory	01	01
Practical	**03**	**02**
Comprehensive Course	**02**	**02**
Seminar	**–**	**01**
Final Year Project	12	08

6. EXAMINATION SYSTEM: All components in any programme of study will be evaluated continuously through internal evaluation and an external evaluation component conducted as semester-end examination.

6.1 Distribution of Marks:

S.No.	Description	Marks	Examination and Evaluation	Scheme of Evaluation
1	Theory	70	Semester-End Examination.	The question paper shall be of subjective type with **Five** questions with internal choice to be answered in 180 Minutes duration.
		30	Mid-Examinations of 120 Minutes duration to be evaluated for 20marks. The question paper shall be of subjective type in which four questions with an internal choice are to be answered. Remaining 10 marks is for continuous evaluation which includes weekly/fortnightly class tests, homework assignments, problem solving, group discussions, quiz, seminar, mini-project and other means. The method of allotting these marks will be decided by the teacher dealing that subject in consultation with the Head of the Department. Teacher has to announce the evaluation method in the beginning of the semester.	**Two** MID - Examinations are to be conducted for 20 marks each in a semester. 80% weightage for better performance and 20% for other shall be considered. **MID-I:** After first spell of instructions (I & II-Units). **MID-II:** After second spell of instructions (III, IV&V-Units). The student who has missed both the Mid examinations will be permitted to appear for a substitute examination covering the total syllabus. This substitute examination will be given a weightage of 80%. This is to be conducted before the commencement of end semester exams, can be even outside the working hours, can be even two mid exams a day also.

S.No.	Description	Marks	Examination and Evaluation	Scheme of Evaluation
2	Laboratory or Drawing	70	Semester - End Lab Examination	**For laboratory courses:** **180 minutes** duration – two examiners. For Drawing and /or Design: similar to theory examination.
		30	**20 Marks** for Day to Day evaluation	Performance in laboratory experiments / Drawing practices
			10 Marks for Internal evaluation	Performance of one best out of two tests to be considered.
3	Seminar	100	**Internal Evaluation:** 20 Marks for Report 20 Marks for subject content 40 Marks for presentation 20 Marks for Question and Answers	Continuous evaluation during a semester by the Departmental Committee (DC) consisting of two/three faculty members allotted by Head of the Department.
4	Comprehensive Viva Voce	100	The marks can be allotted based on the performance in viva-voce conducted by Head of the department and two senior faculty members in the department.	
5	Project Work	100	70 Marks for External evaluation	Semester-End Project Viva-Voce Examination by Committee as detailed under 6.2
			30 Marks for Internal evaluation	Continuous evaluation by the DC 15 Marks by DC as detailed under 6.2.1 15 Marks by Supervisor

6.2Project Work Evaluation:

6.2.1 The Internal Evaluation shall be made by the Departmental Committee, on the basis of average of two seminars presented by each student on the topic of his project, the best one to be considered. The presentations shall be evaluated by the Departmental Committee (DC) consisting of Head of the Department, supervisor and a senior faculty member.

6.2.2 The Semester-End Examination (viva-voce) shall be conducted by a Committee consisting of External examiner nominated by the Chief Controller of Examinations, HOD and Supervisor. The evaluation of project work shall be conducted at the end of the IV year II Semester.

6.3Eligibility to appear for the Semester-End examination:

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

6.3.2 Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be granted by the Institute Academic Committee if the reason for shortage is convincing.

6.3.3 Shortage of Attendance below 65% in aggregate shall in no case be condoned.

6.3.4 A stipulated fee shall be payable towards condonation of shortage of attendance to the Institute as per following slab system

1st Slab: Less than 75% attendance but equal to or greater than 70% a normal condonation fee can be collected from the student.

2nd Slab: Less than 70% but equal to or greater than 65%, double the condonation fee can be collected from the student.

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

6.3.6 A student will not be promoted to the next semester unless he satisfies the attendance requirements of the current semester, as applicable.

6.3.7 A student detained due to shortage of attendance, will have to repeat that semester when offered next.

6.4Revaluation / Recounting:

Students shall be permitted to request for recounting/ revaluation of the end theory examination answer scripts within a stipulated period after payment of prescribed fee.

After recounting or revaluation, records are updated with changes if any and the student will be issued a revised memorandum of marks. If there are no changes, the student shall be intimated the same through a letter or a notice.

6.4.1 Challenge valuation

Student can apply challenge valuation by paying stipulated fee. The photo copy of the answer booklet shall be given to the student on notified date.

- If the improvement is 15% of maximum marks or more, the new marks will be awarded to the student. Otherwise there will be no change in the old marks
- If the improvement is 15% of max marks or more 90% of the fee paid will be refunded to the student. If the student's status

changes from fail to pass, 50% of fee will be refunded to the student. Otherwise the student will forfeit the amount which he/she paid.

- No challenge valuation for Laboratory Examination.

Improvement of Marks:

Students are permitted for improvement examinations once for a maximum of four subjects after completion of the study course but before applying for provisional certificate and consolidated marks memo after payment of prescribed fee.

6.5 Readmission of Students:

A student who has satisfied the minimum attendance requirement in any semester may repeat that semester, after obtaining written permission from the Principal and cancelling the previous record of attendance and academic performance (viz; internal evaluation and external evaluation marks) of the semester or year. This facility may be availed by any student at the maximum twice for a 4 year B.Tech, and only once by Lateral Entry student & PG student during the entire course of study.

6.6 Supplementary Examination:

a) All Regular examinations are understood as Regular/Supplementary examinations. The supplementary students have to appear for the supplementary examinations along with their regular examinations conducted at the end of each semester. However, separate supplementary examinations will be conducted for the II-Semester subjects at the end of I-Semester and vice-versa.

b) In case of Seminars and Comprehensive Viva-Voce examinations, supplementary seminar / comprehensive Viva-Voce will be conducted along with the next batch of students if available. If the next batch of students is not available, a separate supplementary examination will be conducted.

6.7 Internship Programme:

The weightage of two credits given for an internship of three weeks duration and more, when a student undergoes internship / industrial training from the Specified Industries / Research Organizations / Universities. In such a case, the student has to submit a report on that internship which will be evaluated by a team of three faculty members (decided by the HOD) of the department for those two credits. Student is given a chance to drop one seminar in place of a successful internship / industrial training.

6.8 Massive Open Online Course (MOOC):

MOOC is one of the courses introduced in IV year I semester. The list of subjects under MOOC will be intimated before commencement of class work.

7. ACADEMIC REQUIREMENTS FOR PROMOTION/ COMPLETION OF B.Tech. PROGRAMME OF STUDY:

The following academic requirements have to be satisfied in addition to the attendance requirements for promotion/ completion of B.Tech. Programme of study.

a. For students admitted into B.Tech. (Four Year) programme:

7.1.1 A student shall be deemed to have satisfied the minimum academic requirements for each theory, practical, drawing subject if he secures not less than 35% of marks in the End Examination and a minimum of 40% of marks in the sum total of the Internal Evaluation and End Examination taken together.

7.1.2 For promotion from I B.Tech.to II B.Tech. a student must satisfy the attendance requirements in I year (two semesters).

7.1.3 A Student shall be promoted from II year to III year, if he fulfills the academic requirements of securing a minimum of **50** credits from I year I and II-Semesters, II year I and II-Semesters examinations conducted till that time.

7.1.4 A student shall be promoted from III year to IV year if he / she fulfill the academic requirements of securing a minimum of **74** credits from I year I and II-Semesters, II year I and II-Semesters and the III year I and II- Semester examinations conducted till that time.

7.1.5 A student shall register for all the subjects and earn all the**195**credits. Marks obtained in all the credits shall be considered for the calculation of the class based on CCPA.

7.1.6 A student who fails to earn all the **195** credits as indicated in the course structure within **eight** academic years from the year of admission shall forfeit his seat in B.Tech. Programme and his admission stands cancelled.

b. **For Lateral Entry Students (batches admitted from 2018-2019):**

7.2.1 Academic requirements for pass in a subject are the same as in 7.1.1 and attendance requirements as in 6.3.

7.2.2 A student shall be promoted from II year to III year if he fulfills the academic requirements of securing a minimum of **22** credits from II year I and II-Semesters examinations conducted till that time.

7.2.3 A student shall be promoted from III year to IV year if he fulfills the academic requirements of securing a minimum of **46** credits from II year I and II-Semesters and the III year I and II-Semester examinations conducted till that time.

7.2.4 A student shall register for all the subjects and earn all **143** credits. Marks obtained in all such credits shall be considered for the calculation of the class based on CCPA.

7.2.5 A student who fails to earn all the **143** credits as indicated in the course structure within **six** academic years from the year of his admission shall forfeit his seat in B.Tech. Programme and his admission stands cancelled.

8. TRANSITORY REGULATIONS:

Students who got detained for want of attendance (or) who have not fulfilled academic requirements (or) who have failed after having undergone the course in earlier regulations (or) have discontinued and wish to continue the course are eligible for admission into the unfinished semester from the date of commencement of class work for the next batch or later batches with the same (or) equivalent subjects as and when subjects are offered and they continue to be in the academic regulations of the batch he is joining later.

9. CREDIT POINT AVERAGE (CPA) AND CUMULATIVE CREDIT POINT AVERAGE (CCPA):

a. For a Semester:

Credit Point Average [CPA] = $\frac{1}{10}\frac{\sum_i C_i T_i}{\sum_i C_i}$

Where C_i= Credits earned for Course i in any semester,

T_i= Total marks obtained for course i in any semester.

b. **For the entire programme**:

Cumulative Credit Point Average [CCPA] = $\frac{1}{10}\frac{\sum_n \sum_i C_{ni} T_{ni}}{\sum_n \sum_i C_{ni}}$

Where *n*= the semester in which such courses were credited

c. **Overall Performance:**

CCPA	Classification of final result
7.0 & above	First class with distinction
6.0 & above but below 7.0	First class
5.0 & above but below 6.0	Second class
4.0 & above but below 5.0	Pass

10. TRANSCRIPTS:

After successful completion of the entire programme of study, a transcript containing performance of all academic years will be issued as a final record. Duplicate transcripts will also be issued, if required, after payment of requisite fee. Partial transcript will also be issued up to any point of study to a student on request.

11. ELIGIBILITY:

A student shall be eligible for the award of B.Tech. Degree if he fulfills all the following conditions:

(i) Registered and successfully completed all the components prescribed in the programme of study to which he is admitted.

(ii) Successfully acquired all **195/143 credits** as specified in the curriculum corresponding to the branch of study within the stipulated time.

(iii) No disciplinary action is pending against him.

12. AWARD OF B.Tech. DEGREE:

a. A student is permitted to select one of the extracurricular / extension activities like NSS / Sports / Games / Cultural activities. A certificate in

one of these activities is a must for the student to become eligible for the award of Provisional Certificate or Degree. It is resolved that a certificate of participation to the extent of 65% attendance is required for the students to become eligible for the award of degree.

b. The B.Tech. Degree will be conferred and awarded by Jawaharlal Nehru Technological University Anantapur, Ananthapuramu on the recommendations of the Principal of Annamacharya Institute of Technology and Sciences, Rajampet.

13. AMENDMENTS TO REGULATIONS:

The chairman, Academic Council of Annamacharya Institute of Technology and Sciences, Rajampet reserves the right to revise, amend, or change the Regulations, Scheme of Examinations, and / or Syllabi or any other policy relevant to the needs of the society or industrial requirements etc., without prior notice.

14. Any legal issues are to be resolved in Rajampet Jurisdiction.

15. GENERAL:

Where the words "he", "him", "his", "himself" occur in the regulations, there include "she", "her", "herself".

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CURRICULUM STRUCTURE

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

Regulations**: R17** Programme Code: **G3**

I Year B. Tech., I Semester

Subject Code	**Subject Name**	Hours / Week			C
		L	T	P	
7GC11	Technical English and Professional communication	4	1	0	4
7GC13	Engineering Physics	3	1	0	3
7GC14	Engineering Mathematics-I	4	1	0	4
7G111	Problem solving techniques and C Programming	3	1	0	3
7G311	Fundamentals of Electrical & Electronics Engineering	4	1	0	4
7GC16	Engineering Physics Lab	--	--	3	2
7G112	Programming in C Lab	--	--	3	2
7G312	Fundamentals of Electrical & Electronics Engineering Lab	--	--	3	2
7G515	Engineering and IT Workshop	--	--	3	2
	Total	**18**	**5**	**12**	**26**

I Year B. Tech., II Semester

Subject Code	**Subject Name**	Hours / Week			C
		L	T	P	
7GC22	Engineering Chemistry	3	1	0	3
7GC24	Engineering Mathematics-II	4	1	0	4
7G121	Data Structures	3	1	0	3
7G321	Electronic Devices and Circuits	4	1	0	4
7G523	Geometrical Drawing	2		5	4
7GC27	ELCS Lab	--	--	4	2
7GC25	Engineering Chemistry Lab	--	--	3	2
7G124	Programming in Data Structures Lab	--	--	3	2
7G322	Electronic Devices and Circuits Lab	--	--	3	2
	Audit Course- Gender Sensitization				
	Total	**16**	**4**	**18**	**26**

Note: L - Lecture; T-Tutorial; P – Practical; C – Credits

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

Regulations: **R17** Programme Code: **G3**

II Year B.Tech. I Semester

Subject Code	Subject Name	Hours / Week			C
		L	T	P	
7GC32	Engineering Mathematics-III	3	1	-	3
7GC31	Environmental Science	3	1	-	3
7G234	Electrical Circuits &Technology	3	1	-	3
7G331	Electronic Circuits	3	1	-	3
7G332	Digital Design	3	1	-	3
7G333	Signals and systems	3	1	-	3
7G337	Seminar – I	-	2	-	1
7G335	Electronic Circuits Lab	-	-	3	2
7G336	Basic Simulation lab	-	-	3	2
7G236	Electrical Circuits & Technology Lab	-	-	3	2
	Student Extension Activities	--	--	1	0
Total		**18**	**8**	**10**	**25**

II Year B. Tech., II Semester

Subject Code	Subject Name	Hours / Week			C
		L	T	P	
7GA41	Managerial Economics and Financial Analysis	3	-	-	3
7GC43	Complex Variables and Special Functions	3	1	-	3
7G341	Random Variables and Random Processes	3	1	-	3
7G342	Pulse and Digital Circuits	3	1	-	3
7G343	Analog Communication	3	1	-	3
7G344	Field Theory and Transmission Lines	3	1	-	3
7GC44	Aptitude and Reasoning Skills	-	2	-	1
7G346	Pulse Circuits Lab	-	-	3	2
7G347	Analog Communication Lab	-	-	3	2
7G348	Digital Design Lab	-	-	3	2
	Student Extension Activities	-	-	1	-
Total		**18**	**7**	**10**	**25**

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ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

Regulations: **R17** Programme Code: **G3**

III Year B.Tech. I Semester

Subject Code	Subject Name	Hours / Week			C
		L	T	P	
7G159	Computer System Architecture	3	1	-	3
7G351	Digital Communications	3	1	-	3
7G352	Control Systems	3	1	-	3
7G353	Analog & Digital Integrated Circuit Applications	3	1	-	3
7G354	Electronic Measurements & Instrumentation	3	1	-	3
7G355	Antennas and Wave Propagation	3	1	-	3
7G35A	Seminar – II	-	2	-	1
7G357	Digital Communication Lab	-	-	3	2
7G358	IC Applications Lab	-	-	3	2
7GC51	Advanced English Communication Skills lab	-	-	3	2
	Total	**18**	**8**	**9**	**25**

III Year B. Tech., II Semester

Subject Code	Subject Name	Hours / Week			C
		L	T	P	
7G361	VLSI Design	3	1	-	3
7G362	Microwave Engineering	3	1	-	3
7G363	Microprocessors and Interfacing	3	1	-	3
7G364	Digital signal processing	3	1	-	3
7G16D	Object Oriented Programming Concepts	3	1	-	3
	Professional Elective-I	3	1	–	3
7G365	Radar Engineering				
7G366	Nano Electronics				
7G367	Data Communication Systems				
7GC62	English for Competitive examinations	-	2	-	1
7G368	Digital Signal Processing Lab	-	-	3	2
7G369	Microprocessors and Interfacing Lab	-	-	3	2
7G16E	Object Oriented Programming Concepts lab	-	-	3	2
	Audit course	2			
	Total	**20**	**8**	**9**	**25**

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ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

Regulations: **R17** Programme Code: **G3**

IV Year B.Tech. I Semester

Subject Code	Subject Name	Hours / Week			C
		L	T	P	
7G17E	Computer Networks	3	1	-	3
7G371	Optical Fiber Communication	3	1	-	3
7G372	Embedded & Real time operating systems	3	1	-	3
	MOOC	3		-	3
Professional Elective-II		3	1	–	3
7G374	Digital Design Through Verilog HDL				
7G17F	Internet of things				
7G375	Satellite Communications				
Open Elective		3	1	–	3
7G378	Microwave and Optical Communication Lab	-	-	3	2
7G379	Embedded Systems Lab	-	-	3	2
7G37A	Mini Project/Industry Internship	-	-	3	2
7G37B	Comprehensive Viva	2	-	-	1
TOTAL		**20**	**5**	**9**	**25**

LIST OF OPEN ELECTIVES SUBJECTS		**Offered By Department of**
7G674	Disaster Management	CE
7G274	System Modelling and Simulation	EEE
7G574	Total Quality Management	ME
7G575	Integrated Product Development	ME
7G376	Industrial Electronics	ECE
7G377	Medical Instrumentation	ECE
7G176	.NET Technologies	CSE
7G175	Cyber Laws	CSE
7GA72	Intellectual Property Rights	MBA
7GA73	Human Resource Management	MBA

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

Regulations: **R17**

IV Year B.Tech. II Semester

Subject Code	**Subject Name**	Hours / Week			C
		L	T	P	
Professional Elective-III		3	1	–	3
7G381	Cellular and Mobile Communications				
7G382	DSP Processors and Architectures				
7G383	Wireless Ad-hoc Networks				
Professional Elective-IV		3	1	–	3
7G384	Wireless Communication & Networks				
7G385	Machine Learning				
7G386	FPGA Architectures & Applications				
Professional Elective-V		3	1	-	3
7G387	Digital Image Processing				
7G388	Network Security				
7G389	ASIC Design				
7G38A	Technical Seminar	-	-	2	1
7G38B	Project work	0	0	12	8
Total		**09**	**3**	**14**	**18**

Note: L - Lecture; T-Tutorial; P – Practical; C – Credits

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES:: RAJAMPET
(AN AUTONOMOUS INSTITUTION)

B.Tech. I Year I Semester

(7GC11) Technical English and Professional Communication
(Common to all Branches)

Course Objectives:

- To improve the language proficiency of the students in English with respect to accuracy and fluency
- To enable the students to acquire comprehension skills to study academic subjects with greater felicity
- To develop English communication skills of the students in formal and informal situations
- To enable the students to gain familiarity with the dynamics of communication, stumbling blocks in communication

Unit I

Sure Outcomes: Technology with a Human Face Grammar: Kinds of Verbs and their Use; Writing: Official Letters; Vocabulary: Synonyms and Antonyms, Prefixes and Suffixes, Idioms and Phrases. Technical Communication: Features; Distinction between General and Technical communication; Language as a tool of communication; Elements of Human Communication

Unit II

Sure Outcomes: Climatic Change and Human Strategy Grammar: Tenses; Writing: Letters of Application; Vocabulary: One-word Substitutes Levels of Communication: Intrapersonal; Interpersonal, Organizational, Mass communication. The Flow of Communication: Downward, Upward, Lateral or Horizontal (Peer group)

Unit III

Sure Outcomes: Emerging Technologies: Solar Energy in Spain Grammar: Types of Sentences: Simple, Compound and Complex; Declarative, Interrogative, Imperative and Exclamatory; Writing: E-mails; Vocabulary: Commonly Confused Words. Non-verbal Communication: Kinesics; Proxemics; Paralinguistic features; Chronemics. Role of Body Language during Presentation, GD and Interview

Unit IV

Sure Outcomes: Water: The Elixir of Life Grammar: Subject-Verb Agreement; Writing: Official Reports, Technical Reports; Vocabulary: English Spelling, Commonly misspelt words. Barriers to Communication: Definition of Noise; Classification of Barriers; overcoming barriers. Listening: Types of Listening; Traits of a Good Listener; Active vs. Passive Listening; Empathetic Listening

Unit V

Sure Outcomes: The Secret of Work Grammar: Active and Passive Voice; Writing: Note-making; Vocabulary: Connotations. The Models of Communication: Linear; Interactive; Transactional; Johari Window; Transactional Analysis. Communicative Styles: Assertive, Aggressive, Passive-aggressive, Submissive, Manipulative.

Text Books:

1. *Sure Outcomes* published by Orient Black Swan (with CD)

2. *Technical Communication*, Principles and Practices, Meenakshi Raman and Sangeeta Sharma, 3rd Edition, Oxford University Press, 2015

The books prescribed serve as students' handbooks. The reader comprises essays which are particularly relevant to the needs of engineering students. The teacher should focus on developing LSRW skills of students while using the prescribed text and exercises. The classes should be interactive. The students should be encouraged to participate in the classroom proceedings and to write short paragraphs and essays. The main aim is to encourage two-way communication in place of one-sided lecture.

Reference Books:

1. Developing Communication Skills, 2/e. by Krishna Mohan & Meera Banerji , Macmillan, 2009
2. Essential Grammar in Use, (with CD), Raymond Murphy, 3/e, Cambridge University Press, 2009
3. English Grammar and Composition, David Grene, Mc Millan India Ltd.
4. Everyday Dialogues in English by Robert J. Dixson, Prentice-Hall of India Ltd., 2006.
5. Basic Communication Skills for Technology, Andrea J Ruthurford, Pearson Education, Asia.
6. English for Technical Communication, Aysha Viswamohan, Tata Mc Graw Hill
7. Communication Skills for Technical Students, Farhathullah, T.M., Orient Blackswan, 2008
8. English for Technical Communication, Vol. 1 & 2, by K. R. Lakshmi Narayanan, Sci tech. Publications.

Course Outcomes:

- Students will increase their vocabulary through the study of word parts, use of context clues, idiomatic expressions, and practice with a dictionary
- Students will exhibit their ability to read, comprehend, organize, and retain written information
- Students will practise the unique qualities of technical writing style, such as sentence conciseness, clarity, accuracy, avoiding ambiguity, using direct order organization, readability, coherence and transitional devices
- Students exhibit effective writing skills and create effective documents in technical communication such as letters, reports and emails
- Students will understand the factors that influence the use of grammar and vocabulary in speech and writing
- Students shall develop professional communication skills, which are necessary for effective collaboration and cooperation with other students
- The student will learn to effectively utilize his body language to communicate in his academic and professional career.

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1									1	3		3
CO2									1	3		3
CO3										2		3
CO4										3		3
CO5										3		2
CO6									3	3		1
CO7									1	2		1

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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B.Tech. I Year I Semester

(7GC13) ENGINEERING PHYSICS
(Common to ECE and EEE)

Course Objectives:

- The mission of Engineering Physics course is to prepare students for careers in Engineering where Physics principles can be applied to the advancement of technology.
- The Engineering Physics course educates the principles of optical science and Engineering necessary to understand optical systems.
- The crystallography, X-ray diffraction of crystals explains how basic structure modulates properties of materials.
- The principles of Quantum mechanics and Electron theory of metals give an idea on basic development of energy in metals.
- The main objective of this course is to provide basic understanding of different Engineering materials such as semiconductors, magnetic, superconductors and nanomaterials.

Unit-I

PHYSICAL OPTICS, LASERS AND FIBRE OPTICS:

Physical Optics: Interference (review) Interference in thin films by reflection – Newton's Rings –Fraunhofer diffraction and grating-spectrum.

Lasers: Introduction - Characteristics of laser – Spontaneous and stimulated emission of Radiation– Einstein's coefficients - Population inversion – Ruby laser - He-Ne laser – Semiconductor laser - Applications of lasers.

Fiber optics: Introduction– Construction and working principle of optical fiber –Numerical aperture and acceptance angle – Types of optical fibers – Optical fiber communication system – Applications of optical fibers in sensors and medicine.

Unit-II

CRYSTALLOGRAPHY AND ULTRASONICS:

Crystallography: Introduction – Space lattice –Unit cell – Lattice parameters – Bravias lattice –Crystal systems – Packing fractions of SC, BCC and FCC - Directions and planes in crystals – Miller indices – Interplanar spacing in cubic crystals – X-ray diffraction - Bragg's law – Powder method of diffraction.

Ultrasonic: Introduction – Production of ultrasonic by piezoelectric method – Properties and detection – Applications in non-destructive testing.

Unit-III

QUANTUM MECHANICS AND FREE ELECTRON THEORY:

Quantum Mechanics: Introduction to matter waves – de' Broglie hypothesis - Heisenberg's uncertainty principle - Schrodinger's time independent wave equation – Significance of wave function - Particle in a one dimensional infinite potential well.

Free electron theory: Classical free electron theory –- Sources of electrical resistance – Equation for electrical conductivity - Quantum free electron theory – Fermi-Dirac distribution – Kronig - Penny model (qualitative) – Classification of solids into conductors, semiconductors and insulators.

Unit-IV

SEMICONDUCTORS AND SUPERCONDUCTORS:

Semiconductors: Introduction – Intrinsic and extrinsic semiconductors – Drift &diffusion currents and Einstein's equation – Hall Effect - Direct and indirect band gap semiconductors – Working principle of p-n junction diode, LED and photodiode.

Superconductors: Introduction –Properties of superconductors - Meissner effect – Type I and type II superconductors – Flux quantization – BCS theory(qualitative) -ac and dc Josephson effects- High T_c Superconductors - Applications of superconductors.

Unit-V

MAGNETIC MATERIALS AND NANOMATERIALS:

Magnetic materials: Introduction and basic definitions – Origin of magnetic moments – Bohr magneton – Classification of magnetic materials into dia, para, ferro, antiferro and ferri magnetic materials – Hysteresis - Soft and hard magnetic materials and applications.

***Nanomaterials*:** Introduction - Significance of nanoscale –Basic principles of nano materials (Surface area and quantum confinement) – Physical properties: optical, thermal, mechanical and magnetic properties –Synthesis of nanomaterials: ball mill, chemical vapour deposition, sol-gel methods – structure and properties of CNT - Applications of nanomaterials.

Text Books:

1) Engineering Physics –K. Thyagarajan, II Edition,MacGraw Hill Publishers, 2013.
2) Engineering physics –P.K.palanisamy, 2nd Edition,Scitech publisher, 2013.

Reference Books:

1. Engineering physics – S. ManiNaidu, I Edition,Pearson Education, 2012.
2. Engineering Physics – D K Pandey, S. Chaturvedi, I Edition,Cengage Learning, 2012.
3. Engineering Physics – Gaur and Gupta Dhanapati, 7thEdition,RaiPublishers , 1992.
4. Engineering Physics – M. Arumugam, II Edition, Anuradha Publications, 1997.
5. Text book of Nanoscience and Technology:B S Murthy, P.Shankar, Baldev Raj B BRath, James Murday, I Edition,University Press, 2012.
6. Engineering physics – M.N. Avadhanulu and P.G. KrshiSagar, Chand and Co, Revised Edi 2013.

Course Outcomes:

- Students gain knowledge about basic concepts of optics, fiber optics, and lasers.
- Students will be able to identify different types of crystal structures that occur in materials and understand production and application of Ultrasonics.
- The student exhibits knowledge of the roots and founding principles of Quantum Mechanics and band theory of solids.
- Students develop an understanding of the basic principles underlying the semiconductor and superconductors.
- Students become familiar with the general properties of magnetic materials and nanomaterials.

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES

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

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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B.Tech. I Year I Semester

(7GC14) ENGINEERING MATHEMATICS – I
(Common to all branches)

Course Objectives:

- The subject gives the knowledge about matrices and applications to solve linear equations.
- The course intends to provide an overview of Eigen values and Eigen vectors which occur in Physical and engineering problems.
- To understand the differential equations of first order with their applications.
- To provide an overview of differential equations of second and higher order with their applications
- To understand the concepts of mean value theorems and functions of several variables

UnitI

Real Matrices: Types - definitions - Elementary transformations – Rank – Echelon form – Consistency-Solution of Linear System of Homogenous and Non Homogeneous equations.

Eigen Values & Eigen Vectors: Eigen Values, Eigen vectors – Properties, Cayley – Hamilton Theorem.

Unit II

Diagonalization of matrix - Quadratic form and complex matrices: Reduction of quadratic form to canonical form - nature - Linear Transformation –Orthogonal Transformation.

Complex Matrices - Hermitian, Skew-Hermitian, Unitary matrices- Eigen Values, Eigen vectors – Properties.

Unit-III

Differential equations of first order and first degree: Linear and Bernoulli equations. Applications to Newton's law of cooling, law of natural growth and decay, orthogonal trajectories.

Unit-IV

Non-homogeneous linear differential equations of second and higher order with constant coefficients with RHS term of the type e^{ax}, sin*ax*/cos*ax*, polynomials in x, $e^{ax}\sin ax / e^{ax}\cos ax / e^{ax}x^n$, *xsin ax/x cosax*, method of variation of parameters. Applications to oscillatory electrical circuits.

Unit-V

Rolle's Theorem – Lagrange's Mean Value Theorem (without proof).Functions of several variables – Partial differentiation- Chain rule-Jacobian – Maxima and Minima of functions of two variables, Lagrangian method of Multipliers with three variables only.

Text Book:

Higher Engineering Mathematics, B.S.Grewal, 43rd Edition, Khanna publishers, 2014.

Reference Books:

1. Advanced Engineering Mathematics, EriwinKreyszig, 9th edition, Wiley International edition.
2. Engineering Mathematics, H.K.Dass and Verma Rama, S. Chand, 2007.
3. Engineering Mathematics, Pal and Bhunia, First edition, Oxford University,2015.
4. Higher Engineering Mathematics, B.V. Ramana, Tata McGraw Hill Publishing Company limited, 2006.
5. Higher Engineering Mathematics, John Bird 7th Edition, Routledge-Taylor and Francis Group London, 2014.

Course Outcomes:

- Students will be able to apply this knowledge to solve linear equations.
- Student will understand the concept of modeling or translating a physical or any other.
- Students will be able to solve first order differential equations and their applications.
- Students will learn the usage of higher order differential equations that are applied to real world problems.
- Students will exhibit an ability to identify, formulates, and solve the problems on functions of several variables.

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES

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

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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I Year B. Tech., I Semester

(7G111)PROBLEM SOLVING TECHNIQUES AND C PROGRAMMING

(Common to ALL branches)

Course Objectives:

- Introduction to computer peripherals, Software development.
- Describe when and how to use the C statement and to Write, Compile and Debug basic C programs using an IDE
- Write and debug programs using an IDE and the principles of designing
- Structured programs when and how to use the appropriate statements available in the C language
- Write basic C programs using, Selection statements, Repetitive statements, Functions, Pointers, Arrays and Strings
- Implementation of C applications for data structures, Sorting and Searching.

Unit– I

Introduction to Computer Problem Solving: Introduction to Computer Systems, Computer Environments, Computer Languages, Introduction to Problem Solving Aspect, Top- down Design, Implementation of Algorithms, Flow Charts, SDLC.

Unit– II

Introduction to C Language: Structure of a C Language program, Creating and Running C programs, Keywords, Identifiers, Data Types, typedef, enumerated Types variables, constants, input/output. Operators and Expressions, precedence and associatively, Type Conversions, Bitwise Operators. Example programs for each topic.

Unit– III

C Program Statements, Selection and Decision making Statements-two way selection –if…else statements, multi way selection-switch statements. Loop Control Statements-concept of a loop, Loops in C-while loop, do…while loop, for loop, Other Related Statements -break, continue, goto. Example programs for each topic.

Unit– IV

ARRAYS: Declaring and Referencing Arrays, Array Subscripts, Using for Loops for Sequential Access, Multidimensional Arrays.

Strings: String Basics, String Library Functions, Array of Strings. Example programs for each topic.

Unit– V

Functions: Library Functions in C, User defined Functions,-declaration, definition, calling of function, types of User defined functions, Parameter passing methods-pass by value, pass by reference, Scope, Storage Classes - Auto, Register, Static, Extern, Scope rules, Type Qualifiers, Recursion -

Recursive Functions, Preprocessor Commands. Using Array Elements as Function Arguments. Example programs for each topic.

Text Books:

1. C Programming and Data Structures.B.AForouzan,R. F.Gilberg,Cengage learning, Indian edition.
2. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A. AnandaRao, Pearson Education.
3. C and Data Structures, E.Balaguruswamy, Tata McGraw Hill.
4. How to Solve it By Computer, R.G.Dromey,PHI.

Reference Books:

1. C and Data Structures, A snapshot oriented treatise with live engineering examples, Dr. N.B.Venkateswarlu, Dr. E.V.Prasad, S. Chand.
2. LET US C, YeswanthKanitkar, Ninth Edition, BPB Publication.

Course Outcomes:

After completion of the course student will be able to

- Understand the importance of the software development process and System development tools.
- Understand general principles of C programming language and able to write simple program in C.
- Able to develop programs based on arrays and functions.

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES

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

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES:: RAJAMPET

(AN AUTONOMOUS INSTITUTION)

B.Tech. I Year I Semester

(7G311) FUNDAMENTALS OF ELECTRICAL & ELECTRONICS ENGINEERING

(**Common to EEE and ECE**)

Course Objectives:

The Course aims to provide the students with the ability

- To learn the basic fundamentals of circuit components, circuit laws and network theorems.
- To understand the concepts of semiconductor diode and its applications.
- To understand the basic concepts of Bipolar Junction transistor.

Unit-I: CIRCUIT ELEMENTS: - Sources: Voltage and Current Sources, Resistors-Types- resistance color coding-potentiometer-types, Capacitors-types-uses of capacitors, Inductors-types, Ohm's Law-R, L, C Voltage, Current, Power & Energy, Multimeter, CRO, Function Generator.

Unit-II: NETWORK THEOREMS (D.C. Excitation only):- Ohm's law, Kirchhoff laws-network reduction techniques-series, parallel, series parallel circuits-source transformations. Thevenin'sTheorem- Norton's Theorem-Superposition Theorem-maximum power transfer theorem.

UNIT-III : SEMICONDUCTOR DIODEs : Energy Band Diagram of Semiconductors(Intrinsic & Extrinsic), PN Diode, Drift & Diffusion currents, V-I Characteristics of PN Junction Diode (Ideal, Simplified and Piece-wise, Practical), Temperature Dependency, Transition and Diffusion Capacitances, Breakdown Mechanisms in semiconductor diodes, Zener diode characteristics & Zener diode acts as a regulator.

UNIT-IV: DIODE APPLICATIONS: Half Wave and Full Wave Rectifiers – General Filter Considerations – Capacitor Filter – RC Filter, Choke Filter, LC Filter, π-Filter.

UNIT-V: INTRODUCTION OF BJT: Transistor constructions – types. Transistor operation in CB, CE and CC configurations and their Characteristics.

TextBooks:

1. "Electronic Devices and Circuits" David A Bell, Fifth Edition, 2008, Oxford University Press.
2. "Circuits & Network Analysis & Synthesis", Sudhakar. A & Shyam mohan S Palli, 4th Edition, Tata McGraw Hill, 2010.
3. Engineering basics: Electrical, Electronics and computer Engineering" , T.Thyagarajan, New Age International, 2007
4. Electronic devices and circuits by G K.Mithal.

Reference Books:

1. "Electronic Devices and Circuits" J. Millman and Halkias, 1991 edition, 2008, TMH.
2. "Electronic Devices and Circuit Theory" Robert L.Boylestad and Louis Nashelsky, 9th edition, PHI.
3. "Electronic Principles" Albert Malvino, David J Bates, MGH, SIE 2007.
4. "Micro Electronic Circuits" Sedra and Smith, Oxford University Press.

Course Outcomes:

Upon completion of the course students will

- Have the knowledge to analyze the basic circuit elements.
- Have the knowledge of semiconductor diode and its applications.
- Understand the basic concepts of Bipolar Junction Transistor.

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES

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

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES:: RAJAMPET
(AN AUTONOMOUS INSTITUTION)

B.Tech. I Year I Semester

(7GC16) ENGINEERING PHYSICS LAB
(Common to ECE and EEE)

Course Objectives:

- The student will able to handle and understanding of different apparatus to perform experiments.
- The student will learn practical measurement of different physical quantities.
- The student will able to characterize the materials and their properties.
- The student allows learning practical experience of theory conceptual values.

LIST OF EXPERIMENTS

Any 10 of the following experiments have to be performed

1. Determination of wavelengths of various colors of mercury spectrum using diffraction grating in normal incidence method
2. Determination of dispersive power of the prism
3. Determination of thickness of thin object by wedge method
4. Determination of radius of curvature of lens by Newton's Rings
5. Laser : Diffraction due to single slit
6. Laser : Diffraction due to double slit
7. Laser: Determination of wavelength using diffraction grating
8. Determination of Numerical aperture of an optical fiber
9. Meldi's experiment: Determination of the frequency of tuning fork
10. Determination of particle size by using laser.
11. Energy gap of a material using p-n junction diode
12. Hall effect : Determination of mobility of charge carriers in semiconductor
13. B-H curve : Hysteresis loss.
14. Magnetic field along the axis of a current carrying coil – Stewart and Gee's method.
15. Determination of rigidity modulus –Torsional pendulum

Manual cum Record:

Prepared by Engineering Physics Faculty Members of Annamacharya Institute of Technology and Sciences.

Reference Books:

1. Engineering Physics Practicals – Dr. B. SrinivasaRao V.K.V. Krishna K.S Rudramamba
2. Engineering Practical Physics – S.L Kakani& Shubra Kakani

C**ourse Outcomes:**

- Students will understand the characteristics and behavior of various materials
- Students will be able to understand the applications of optics using basic fundamentals of physics

- Students will exhibit an ability to use techniques and skills associated with modern engineering tools such as lasers and fiber optics
- Students will be able to measure properties of a semiconductor and magnetic materials

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES

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

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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I Year B. Tech., I Semester

(7G112)PROGRAMMING IN C LAB

(Common to all branches)

Course Objectives:

- To make the student learn a programming language.
- To teach the student to write programs in C to solve the problems.
- To introduce the student to simple linear data structures such as lists, stacks, queues.

Recommended Systems/Software Requirements:

Intel based desktop PC with ANSI C/ TURBO C Compiler and Supporting Editors

Exercise l:

Minimum of 4 programs on Data types, Variables, Constants and Input and Output.

Exercise 2:

Minimum of 4 programs on each Operator, Expressions and Type Conversions.

Exercise 3:

Minimum of 4 programs on Conditional Statements [two way and multipath].

Exercise 4:

Minimum of 4 programs on each Loop Control Statements[for, while and do-While]

Exercise 5:

Minimum of 4 programs on Unconditioned JUMP Statements- break, continue, Goto.

Exercise 6:

Minimum of 4 programs on Declaring Arrays, Referencing Arrays, Array Subscripts. Using for loop for sequential Access.

Exercise 7:

Minimum of 4 programs on Multidimensional Arrays.

Exercise 8:

Minimum of 4 programs on String Basics, String Library Functions and Array of Strings.

Exercise 9:

Minimum of 4 programs on simple user defined functions, Parameter passing methods- pass by value, pass by reference.

Exercise 10:

Minimum of 4 programs on Storage classes- Auto, Register, Static and Extern

Exercise 11:

Minimum of 4 programs on Recursive Functions, Preprocessor commands.

Exercise 12:

Minimum of 4 programs on using Array Elements as Function Arguments.

Course outcomes:

After Completion of the course student should able to

7.1.1 Know concepts in problem solving.
7.1.2 To do programming in C language
7.1.3 To write diversified solutions using C language

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

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES:: RAJAMPET
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B.Tech. I Year I Semester

(7G312) FUNDAMENTALS OF ELECTRICAL & ELECTRONICS ENGINEERING LAB

(Common to EEE & ECE)

Course Objectives:

The Course aims to provide the students with the ability

- To determine the characteristics of semiconductor diode.
- To perform various rectifier circuits in practical approach.
- To perform input and output characteristics of BJT for various configurations.

Perform the following Experiments

1. Identification, Specifications, Testing of R, L, C Components (Color Codes), Potentiometers, Switches (SPDT, DPDT, and DIP), Coils, Gang Condensers, Relays, Bread Boards, PCBs, Diodes, BJTs.
2. Study and operation of
   - Multi-meters (Analog and Digital)
   - Function Generator
   - Regulated Power Supplies
   - CRO
3. Verification of Kirchhoff's Voltage and Current Law
4. Forward and Reverse Bias Characteristics of PN junction Diode.
5. V-I Characteristics of Zener Diode
6. Half Wave Rectifier with and without filter.
7. Full Wave (Center trapped) Rectifier with and without filter.
8. Full Wave (Bridge) Rectifier with and without filter.
9. Zener Diode as a Voltage Regulator
10. Input and Output Characteristics of Transistor CB Characteristics.
11. Input and Output Characteristics of Transistor CE Characteristics.
12. Input and Output Characteristics of Transistor CC Characteristics.

Course Outcomes:

Upon completion of the course students will be

- Able to determine the parameters like cut-in voltage , resistances and breakdown voltage of semiconductor diode
- Able to design DC power supply circuits using rectifiers and filters
- Able to choose the desired configuration for specified applications.

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES

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

ANNAMACHARYAINSTITUTE OF TECHNOLOGY & SCIENCES:: RAJAMPET
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I Year B.Tech. I Semester

(7G515) ENGINEERING & IT WORKSHOP
(Common to EEE, CSE, IT, ECE)

Course Objectives for Engineering Workshop:

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

Course Objectives for IT Workshop:

- To provide Technical training to the students on Productivity tools like Word processors, Spreadsheets, Presentations
- To make the students know about the internal parts of a computer, assembling a computer from the parts, preparing a computer by installing the operating system
- To learn about Networking of computers and use Internet facility for Browsing and Searching.

Engineering Workshop:

1. **TRADES FOR EXERCISES:**
   b. **Carpentry shop**– Two joints (exercises) involving tenon and mortising,groove and tongue: Making middle lap T joint, cross lap joint, mortise and tenon T joint, Bridle T joint from out of 300 x 40 x 25 mm soft wood stock
   c. **Sheet metal shop**– Two jobs (exercises) from: Tray, cylinder, hopper or funnel from out of 22 or 20 gauge G.I. sheet.
   d. **House-wiring**– Two jobs (exercises) from: wiring for ceiling rose and two lamps (bulbs) with independent switch controls with or without looping, wiring for stair case lamp, wiring for a water pump with single phase starter.
2. **TRADES FOR DEMONSTRATION:**
   a. Plumbing
   b.Fitting

Apart from the above the shop rooms should display charts, layouts, figures, circuits, hand tools, hand machines, models of jobs, materials with names such as different woods, wood faults, Plastics, steels, meters, gauges, equipment, CD or DVD displays, First aid, shop safety etc. (though they may not be used for the exercises but they give valuable information to the student).

In the class work or in the examination knowledge of all shop practices may be stressed upon rather than skill acquired in making the job.

Reference Books:

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

IT Workshop:

Preparing your Computer

Task 1: Learn about Computer: Identify the internal parts of a computer, and its peripherals. Represent the same in the form of diagrams including Block diagram of a computer. Write specifications for each part of a computer including peripherals and specification of Desktop computer. Submit it in the form of a report.

Task 2: Assembling a Computer: Disassemble and assemble the PC back to working condition. Students should be able to trouble shoot the computer and identify working and non-working parts. Student should identify the problem correctly by various methods available (eg: beeps). Students should record the process of assembling and trouble shooting a computer.

Task 3: Install Operating system: Student should install Linux on the computer. Student may install another operating system (including proprietary software) and make the system dual boot or multi boot. Students should record the entire installation process.

Task 4: Operating system features: Students should record the various features that are supported by the operating system(s) installed. They have to submit a report on it. Students should be able to access CD/DVD drives, write CD/DVDs, access pen drives, print files, etc. Students should install new application software and record the installation process.

Networking and Internet

Task 5: Networking: Students should connect two computers directly using a cable or wireless connectivity and share information. Students should connect two or more computers using switch/hub and share information. Crimpling activity, logical configuration etc should be done by the student. The entire process has to be documented.

Task 6: Browsing Internet: Student should access the Internet for Browsing. Students should search the Internet for required information. Students should be able to create e-mail account and send email. They should get acquaintance with applications like Facebook, skype etc. If Intranet mailing facility is available in the organization, then students should share the information using it. If the operating system supports sending messages to multiple users

(LINUX supports it) in the same network, then it should be done by the student. Students are expected to submit the information about different browsers available, their features, search process using different natural languages, and creating e-mail account.

Task 7: Antivirus: Students should download freely available Antivirus software, install it and use it to check for threats to the computer being used. Students should submit information about the features of the antivirus used, installation process, about virus definitions, virus engine etc.

Productivity tools

Task 8: Word Processor: Students should be able to create documents using the word processor tool. Some of the tasks that are to be performed are inserting and deleting the characters, words and lines, Alignment of the lines, Inserting header and Footer, changing the font, changing the colour, including images and tables in the word file, making page setup, copy and paste block of text, images, tables, linking the images which are present in other directory, formatting paragraphs, spell checking, etc. Students should be able to prepare project cover pages, content sheet and chapter pages at the end of the task using the features studied. Students should submit a user manual of the word processor considered.

Task 9: Spreadsheet: Students should be able to create, open, save the application documents and format them as per the requirement. Some of the tasks that may be practiced are Managing the worksheet environment, creating cell data, inserting and deleting cell data, format cells, adjust the cell size, applying formulas and functions, preparing charts, sorting cells. Students should submit a user manual of the Spreadsheet application considered.

Task 10: Presentations: creating, opening, saving and running the presentations, selecting the style for slides, formatting the slides with different fonts, colours, creating charts and tables, inserting and deleting text, graphics and animations, bulleting and numbering, hyperlinking, running the slide show, setting the timing for slide show. Students should submit a user manual of the Presentation tool considered.

Optional Tasks:

Task 11: Laboratory Equipment: Students may submit a report on specifications of various equipment that may be used by them for the laboratories in their curriculum starting from I B.Tech to IV. B.Tech. It can vary from department to department. Students can refer to their syllabus books, consult staff members of the concerned department or refer websites. The following is a sample list. Instructors may make modifications to the list to suit the department concerned.

- Desktop computer
- Server computer
- Switch (computer science related)
- Microprocessor kit
- Micro controller kit

- Lathe machine
- Generators
- Construction material
- Air conditioner
- UPS and Inverter
- RO system
- Electrical Rectifier
- CRO
- Function Generator
- Microwave benches

Task 12: Software: Students may submit a report on specifications of various software that may be used by them for the laboratories in their curriculum starting from I B. Tech., to IV. B.Tech., The software may be proprietary software or Free and Open source software. It can vary from department to department. Students can refer to their syllabus books, consult staff members of the concerned department or refer websites. The following is a sample list. Instructors may make modifications to the list to suit the department concerned.

- Desktop operating system
- Server operating system
- Antivirus software
- MATLAB
- CAD/CAM software
- AUTOCAD

Reference Books:

1. Introduction to Computers, Peter Norton, Mc Graw Hill
2. MOS study guide for word, Excel, Powerpoint& Outlook Exams", Joan Lambert, Joyce Cox, PHI.
3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
4. Networking your computers and devices, Rusen, PHI
5. Trouble shooting, Maintaining & Repairing PCs", Bigelows, TMH

Course outcomes for Engineering Workshop:

- An ability to identify and apply suitable tools for manufacturing of components in workshop trades of Carpentry & Tin smithy.
- An ability to identify and use hand tools for electrical wiring and give power supply to domestic installations.

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES

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

Course outcomes for IT Workshop:

- Disassemble and Assemble a Personal Computer and prepare the computer ready to use.
- Prepare the Documents using Word processors
- Prepare Slide presentations using the presentation tool
- Interconnect two or more computers for information sharing
- Access the Internet and Browse it to obtain the required information
- Install single or dual operating systems on computer

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES

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

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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B.Tech. I Year II Semester

(7GC22) ENGINEERING CHEMISTRY
(Common to ECE and EEE)

Course Objectives:

- The course main aim is to impart in-depth knowledge of the subject and highlight the role of chemistry in the field of engineering.
- The course is framed to strengthen the fundamentals of chemistry and then build an interface of theoretical concepts with their Industrial/engineering applications.
- The lucid explanation of the topics will help students understand the fundamental concepts and apply them to design engineering materials and solve problems related to them. An attempt has been made to logically correlate the topic with its application.
- The extension of fundamentals of electrochemistry to energy storage devices such as commercial batteries and fuel cells.
- The student will understand the concepts of chemistry in respect of Electrochemical cells, fuel cells, mechanism of corrosion and factors to influence, polymers with their applications, analytical methods, engineering materials and water chemistry.

Unit-I

WATER TREATMENT: Impurities in water, Hardness of water and its units, Disadvantages of hard water, Estimation of hardness by EDTA method, Numerical problems on hardness, Estimation of dissolved oxygen and alkalinity in water. Water treatment for domestic purpose. Disinfection - Definition, Kinds of disinfectants (Bleaching powder & Ozone) Break point chlorination.

Industrial Use of water, Boiler troubles-Priming and foaming, Scale & Sludge, Caustic Embrittlement and Boiler Corrosion.

Treatment of Boiler Feed water: Internal Treatment- Colloidal, Phosphate, Carbonate, Calgon and sodium aluminate conditioning. External Treatment- Zeolite Process, Ion-Exchange process, Desalination of brackish water by Reverse Osmosis

Unit-II

ELECTROCHEMISTRY: Basic concepts-Nernst equation, Galvanic cell, Standard Reduction Potential (SRP), numerical calculations on EMF. Batteries: types of batteries, primary batteries-Dry cell, Secondary batteries-Ni-Cd, Lithium Ion Batteries. Fuels cells-Hydrogen-Oxygen fuel cell & Methanol-Oxygen fuel cell.

Conductometry-basic concepts, conductance, molar and equivalent conductance, measurement of conductometric titration, Types of conductometric titrations-strong acid Vs. strong base, weak acid Vs. strong base, strong acid Vs. weak base and weak acid Vs. weak base.

CORROSION: Definition & Types - dry & wet Corrosions, Electrochemical theory of corrosion, concentration cell corrosion, galvanic corrosion, factors affecting the corrosion, Prevention: Anodic and Cathodic protection, Electroplating -Nickel, copper & Electrolessplating-Nickel.

Unit-III

POLYMERS: Introduction to polymers, Types of Polymerization: Addition, Condensation & Co-polymerization (without mechanism). Plastics-Thermoplastics and Thermosetting Plastics: Preparation, properties and applications of Bakelite, Nylon-6, PVC and PE.

Natural Rubber: Processing of natural rubber, vulcanization and compounding of rubber. Elastomers: Preparation, properties and Engineering applications of Buna-S, Buna-N and polyurethane rubbers.

Conducting polymers: Synthesis, mechanism & applications of Polyacetylene

Inorganic Polymers: Introduction, Silicones, Polyphosphazenes and poly dispersive Index

Unit-IV

FUEL TECHNOLOGY: Classification of Fuels, Calorific Value – Units, its determination using Bomb calorimeter, Numerical Problems on calorific value and Combustion Solid Fuels - Coke: Manufacture of Coke by Otto Hoffmann's by product oven.

Liquid Fuels: Petroleum: Refining of Petroleum, Synthetic Petrol: Bergius Processes, Fischer Tropsch's synthesis. Gasoline: Knocking, Octane Number. Diesel - Cetane number.

Gaseous Fuels: Origin, Production and uses of Natural gas, Water Gas and Biogas. Flue Gas analysis by Orsat's apparatus

Unit-V

CHEMISTRY OF ENGINEERING MATERIALS: Cement: Composition & manufacture of Portland cement, Setting and Hardening (Hydration and Hydrolysis) Refractories: Definition, classification with suitable examples, properties - Refractoriness, RUL, Dimensional Stability, Porosity and Thermal spalling and Applications of refractory materials

Lubricants: Definition, classification, mechanism of lubrication and properties of lubricants - Viscosity, viscosity index, flash and fire point, cloud and pour point, mechanical strength, neutralizing number and Aniline point, applications of lubricants.

Text Books:

1. Engineering Chemistry by K.N Jayaveera, G.V Subba Reddy and C. Ramachandraiah, McGraw Hill Higher Education, New Delhi, 1st edition, 2013.
2. A Text Book of Engineering Chemistry, Jain and Jain, DhanapathRai Publishing Company, New Delhi, 17th Edition, 2013.

Reference Books:

1. A Text book of Engineering Chemistry by S.S Dhara, S.S Umare, S. Chand Publications, New Delhi, 14th Edition, 2014.
2. Engineering Chemistry by K.B Chandra Sekhar, UN. Das and Sujatha Mishra, SCITECH, Publications India Pvt. Limited, Chennai, 2nd Edition, 2012.
3. Concepts of Engineering Chemistry- AshimaSrivastava and N.N. Jahnavi, Acme Learning Pvt Ltd, First Edition, 2013.
4. Text Book of Engineering Chemistry, Shashichawla, DhanapathRai& Co Publications, New Delhi, 4th Edition, 2014.
5. Engineering Chemistry, K. SeshaMaheswaramma and MrudulaChugh, Pearson Education, First Edition, 2013.

Course Outcomes:

- The students will be able to understand the basic concepts of water analysis methods which help them in solving problems related to water treatment methods.
- The students will be able to understand the basic principles of conductometry, batteries & fuel cells, and extends the knowledge to solve problems of corrosion.
- The students will be able to synthesize and differentiate different types of polymers.
- The students will be able to derive/ manufacture different types of fuels and elucidate their properties
- The students will be able to manufacture cement, understand the basic concepts of refractories, lubricants and elucidate their properties

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES

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

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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B.Tech. I Year II Semester

(7GC24) ENGINEERING MATHEMATICS II
(Common to all branches)

Course Objectives:

- To apply this knowledge to evaluate the Multiple Integrals in real life situations.
- To introduce the concepts of Laplace transforms.
- To apply the knowledge of Inverse Laplace transforms for engineering problems.
- To provide the concept of vector differentiation and integration.
- To apply the knowledge of Green's theorem, Stroke's theorem and Gauss divergence theorem.

Unit-I

Curve Tracing – Cartesian and Polar curves

Multiple integrals: Double integral – Evaluation - Change of Variables - Change of order of integration- Triple integral - Evaluation.

Unit-II

Laplace transforms of standard functions– First shifting Theorem, Change of scale property, Multiplication by t^n, division by t, Transforms of derivatives and integrals – Second shifting theorem– Laplace transform of Periodic functions.

Unit-III

Inverse Laplace transforms – Convolution theorem. Application of Laplace transforms to ordinary differential equations of first and second order.

Unit-IV

Vector Calculus: Scalar and vector point functions, Gradient, Divergence, Curl ,Properties, Del applied twice to point functions, Line integral - Area, Surface and volume integrals.

Unit-V

Vector integral theorems: Green's theorem–Stroke's theorem-Gauss's Divergence Theorem (without proofs) and their applications.

Text Book:

Higher Engineering Mathematics, B.S.Grewal, Khanna publishers-43rdEdition (2014)

Reference Books:

1. Advanced Engineering Mathematics, EriwinKreyszig, 9 th edition, Wiley International edition.

2. Engineering Mathematics, H.K.Dass and Verma Rama, S. Chand, 2007.

3. Engineering Mathematics, Pal and Bhunia, First edition, Oxford University, 2015.

4. Higher Engineering Mathematics, B.V. Ramana, Tata McGraw Hill Publishing Company Limited, 2006.

5. Higher Engineering Mathematics, John Bird 7th Edition, Routledge-Taylor and Francis Group London, 2014.

Course Outcomes:

- Student will understand the applications of Curve tracing and Multiple integration
- Student will exhibit the Knowledge of Laplace transforms.
- Student will exhibit the Knowledge of Inverse Laplace transforms and solve the ordinary differential equations with given initial boundary conditions in engineering subjects
- Student will be able to analyze the Vector differentiation and Integration in various domains.
- Student understands the applications of Vector Integral theorems.

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES

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

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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I Year B. Tech., II Semester

(7G121) DATA STRUCTURES
(Common to ALL branches)

Course Objectives:

- Structured programs when and how to use the appropriate statements available in the C language
- Write basic C programs using, Selection statements, Repetitive statements, Functions, Pointers, Arrays and Strings
- Implementation of C applications for data structures, sorting and searching.

Unit– I

Pointers - Introduction, Features of Pointers, Pointer Declaration and Definition, Void Pointers, pointers for inter function communication, Pointers to Pointers, Pointer Applications: arrays and pointers, pointer arithmetic, Dynamic Memory Allocation, Pointers to Functions, pointer to void and command line arguments.

Unit– II

Structures – Definition, initialization, accessing structures, nested structures, array of structures, structures and functions. Pointers and Structures.Unions. Sample programs

Files: Introduction to Streams and Files, Standard library input / output functions, formatted input / output functions, character input/output functions; Text verses binary Streams, Standard library functions for files. File examples.

Searching and Sorting - Exchange (Bubble) Sort, Selection Sort, Quick Sort, Insertion Sort, Merge Sort, Searching- Linear and Binary Search Methods.

Unit– III

Data Structures: Overview of Data Structure. **Stack:** Representation of a Stack, Operation on a Stack, Implementation of a Stack using Arrays and Pointers, Representation of Arithmetic Expressions, Infix, Prefix, and Postfix Notations, Evaluation of Postfix Expression, Recursion.

Queues: Representation of Queue, Insertion, Deletion, Searching Operations, Circular Queues.

Unit– IV

Linked List: Singly Linked List, Linked List with and without header, Insertion, Deletion and Searching Operations.

Doubly Linked List: Insertion, Deletion and Searching Operations.

Circular Linked List: Insertion, Deletion and Searching Operations.

Unit– V

Trees: Introduction to Trees, Binary Trees, creation of binary tree, Operations on Binary Tree. Introduction to Binary Search Tree, Operations on Binary Search Trees.

Graphs: Defining graph, basic terminology, graph representation.

Text Books:

1. C Programming and DataStructures.B.AForouzan,R. F.Gilberg,Cengage learning, Indian edition.
2. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A. AnandaRao, Pearson Education.
3. Data Structures and Algorithms: Concepts, Techniques and ApplicationsG.A.V. Pai.

Reference Books:

1. C and Data Structures, A snapshot oriented treatise with live engineering examples, Dr. N.B.Venkateswarlu, Dr. E.V.Prasad, S. Chand.
2. LET US C, YeswanthKanitkar, Ninth Edition, BPB Publication.

Course Outcomes:

- Understand the purpose of pointers for parameter passing, referencing and dereferencing and understands the concepts of structures, unions and File management.
- Understand what and how to design data structure programs usingC programming language.
- Understand how to solve applications like searching and sorting using C Programming language.

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES

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

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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I Year B. Tech. II Semester

(7G321) ELECTRONIC DEVICES AND CIRCUITS
(Common to EEE & ECE)

Course Objectives:

The Course aims to provide the students with the ability

- To understand the concepts of biasing and stabilization in BJT.
- To understand the concepts of FET, MOSFET and their biasing techniques.
- To analyze the parameters like band width, gain and impedances for single stage amplifier circuits.
- To understand the small signal analysis of FET Amplifiers.
- To understand the working principles of special purpose electronic devices.

Unit-I

BIASING & STABILITY: Overview of BJT Configurations, Transistor Amplifying Action – Load Line Analysis of AC & DC – Operating Point. Types of Biasing: Fixed Bias – Emitter Bias – Emitter Feedback Bias - Collector to Base bias – Voltage Divider Bias. Bias Stability: Need for Stabilization – Stabilization Factors (s,S',S'') – Stability Factors for Voltage Divider Bias - Thermal Stability and Thermal Runaway – Heat Sinks**.**

Unit-II

FIELD EFFECT TRANSISTORS & ITS BIASING: - Construction of JFETs – Transfer Characteristics – FET Biasing: Fixed Bias Configuration – Self Bias Configuration – Voltage Divider Biasing – Construction and Characteristics of MOSFETs – Depletion type MOSFETs – Enhancement type MOSFETs – Biasing in MOSFETs.

Unit-III

SINGLE STAGE AMPLIFIERS: Single Stage Transistor Amplifier-How Transistor Amplifies- Graphical Demonstration of Transistor Amplifier-Practical Circuit of Transistor Amplifier-Phase Reversal- D.C. and A.C. Equivalent Circuits- Load line Analysis- A.C. emitter resistance-Formula for A.C. emitter resistance-Voltage gain in terms of A.C. emitter Resistance-Voltage gain-Classification of Amplifiers-Amplifier equivalent circuit-Equivalent circuit with signal source-Input impedance of and amplifier.

Unit-IV

FET AMPLIFIERS: Small signal model of JFET and MOSFET – Common source and common Drain amplifiers using FET**.**

Unit-V

SPECIAL PURPOSE ELECTRONIC DEVICES: Varactor Diode, Tunnel Diode, LED, PIN Diode, Schottky Diode, SCR, UJT, Photodiode, Phototransistor.

Text Books:

1. "Electronic Devices and Circuits" David A Bell, Fifth Edition, 2008, Oxford University Press.
2. "Electronic Devices and Circuits" J. Millman and Halkias, 1991 edition, 2008, TMH.

Reference Books:

1. "Electronic Devices and Circuit Theory" Robert L.Boylestad and Louis Nashelsky, 9th edition, PHI.
2. "Principles of Electronics", V.K.Mehta, S.Chand Publications 2004
3. "Integrated Electronics, Analog and Digital Circuits and Systems" J. Millman and Halkias, TMH.
4. "Micro Electronic Circuits" Sedra and Smith, Oxford University Press.

Course Outcomes:

Upon completion of the course students will be

- Able to understand Biasing and Stabilization conditions of BJT.
- Able to understand Biasing and Stabilization conditions of FET.
- Able to design the amplifiers circuits under given requirements.
- Able to understand the Small signal model of FET.
- Able to have the knowledge and usage of special purpose electronic devices in various applications.

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES

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

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES:: RAJAMPET
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B.Tech. I Year II Semester

(7G523) GEOMETRICAL DRAWING

(Common to EEE, ECE)

Course Objectives:

- To enable the students with various concepts like Dimensioning, Conventions and standards related to working drawing in order to become professionally efficient.
- To introduce fundamental concepts of curves used in engineering,
- To impart and inculcate proper understanding of the theory of projections, projection of points, lines, planes and solids.
- To improve the visualization skills of the student.
- To prepare the student for future engineering positions.

UNIT-I INTRODUCTION: Lettering –Geometrical constructions - Construction of polygons by General method

CONICS: Ellipse, Parabola and Hyperbola (General method only).

Special Methods: Ellipse - Concentric Circles method, Oblong method & Arcsof Circles method - Drawing tangent& normal to the conics.

CYCLOIDAL CURVES: Cycloid, Epi-cycloid, Hypo-cycloid (simple problems) - Drawing tangent & normal to the cycloidal curves.

UNIT - II PROJECTIONS OF POINTS & LINES:

Projections of points - Projections of lines inclined to one reference plane, Projections of lines inclined to both reference planes.

UNIT - III PROJECTIONS OF PLANES: Projection of planes inclined to one reference plane - and inclined to both the reference planes.

UNIT - IV PROJECTIONS OF SOLIDS: Cylinder, Cone, Prism and Pyramid - Axis Inclined to one reference plane, Axis inclined to both the reference planes.

UNIT - V ISOMETRIC PROJECTIONS: Projections of Lines, Planes and Simple Solids – Prism, Pyramid, Cylinder and Cone in simple positions only.

CONVERSION OF VIEWS: Conversions of Orthographic views into Isometric views and Conversion of Isometric views to Orthographic views.

Text Book:

1. Engineering Drawing by N.D.Bhatt

Reference Books:

1. Engineering Graphics by K.L. Narayana& P. Kannayya
2. Engineering Drawing and graphics by Venugopal/ New age
3. Engineering Drawing by Johle / TMI

Course Outcomes:

- Students will be able to know and understand the conventions and the methods of Geometrical Drawing with proper dimensions and annotations for two-dimensional engineering drawings.
- Able to understand the application of industry standards and techniques applied in Geometrical Drawing.
- Comprehend general projection theory, with an emphasis on the use of orthographic projection to represent three-dimensional objects in two-dimensional views.
- Can employ 3D pictorial sketching to aid in the visualization process and to efficiently communicate ideas graphically.
- Students will be able to improve their visualization skills, analyze a drawing and bring out any inconsistencies to put forth inferences graphically.

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES

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

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B. Tech. I Year II Semester

(7GC27) ENGLISH LANGUAGE COMMUNICATION SKILLS LAB (CE, ME, ECE, EEE)

Course Objectives:

- To expose the students to a varied blend of self-instructional, learner-friendly modes of language learning
- To train students to use language effectively in everyday conversations
- To enable the students understand rudiments of public speaking skills and acquire presentation skills
- To equip the students with better pronunciation through emphasis on individual speech sounds, accent and intonation

SYLLABUS:

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

1. **Introduction to the Sounds of English- Vowels, Diphthongs & Consonants**
2. **Introduction to Stress and Intonation**
3. **Situational Dialogues**
4. **Telephone Skills**
5. **Describing Objects / Situation / People**
6. **Oral Presentations**
7. **Information Transfer**

Manual cum Record, prepared by the Faculty Members of English of the college will be used by Students.

Minimum Requirement:

The English Language Lab shall have two parts:

- **The Computer aided Language Lab** for 60 students with 60 systems, one master console, LAN facility and English language software for self-study by learners.
- **The Communication Skills Lab** with movable chairs and audio-visual aids with a P.A System, a T. V. an LCD projector, a digital stereo –audio & video system and camcorder etc.

Suggested Software:

Sky Pronunciation Suite

Clarity Pronunciation Power – Part I

Learning to Speak English - 4 CDs

Course Outcomes:

- Students will learn about the significance of pronunciation, accent and intonation and will attempt to neutralize their accent
- Students will be able to express themselves in social and professional contexts fluently
- Students will be able to converse over phone confidently and clearly in English
- The student will be able to describe people, objects and situations using adjectives
- Students will enhance their public speaking skills and make technical presentations confidently
- Students will analyze and interpret data from graphs/pie charts.

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES

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

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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B.Tech. I Year II Semester

(7GC25) ENGINEERING CHEMISTRY LAB
(Common to ECE and EEE)

Course Objectives:

- The student will learn practical understanding of the redox reaction.
- The student will learn the preparation and properties of synthetic polymers and other material that would provide sufficient impetus to engineer these to suit diverse applications.
- The student will also learn the hygiene aspects of water would be in a position to design methods to produce potable water using modern technology.

LIST OF EXPERIMENTS

Any 10 of the following experiments has to be performed

VOLUMETRIC ANALYSIS

Redox Titrations

1. Estimation of iron (II) using Diphenylamine indicator (Dichrometry – Internal indicator method)

Water analysis

2. Determination of total hardness of water by EDTA method
3. Estimation of calcium hardness using murexide indicator
4. Estimation of Dissolved Oxygen by Winkler's method
5. Determination of Alkalinity of Water.

Iodometry

6. Determination of Copper by Iodometry

INSTRUMENTATION

Colorimetry

7. Estimation of Iron in Cement by Colorimetry.

Conductometry

8. Conductometric titration of mixture of acids Vs strong base (Neutralization titration)
9. Determination of pH of various water samples.

Fuel analysis

10. Determination of Calorific Value of fuel by using Bomb Calorimeter

Lubricants

11. Determination of Viscosity of oils using Redwood Viscometer I
12. Determination of Viscosity of oils using Redwood Viscometer II
13. Determination of Flash and fire points of Lubricants

PREPARATION OF POLYMERS

14. Preparation of Bakelite
15. Preparation of Thiokol rubber

Manual cum Record: Prepared by the Faculty Members of Engineering Chemistry of the college will be used by Students.

Reference Books:

1. Vogel's Text book of Quantitative Chemical Analysis, J. Mendham et al, Pearson Education, Sixth Edition, 2012.
2. Chemistry Practical – Lab Manual by K.B.ChandraSekhar, G.V. Subba Reddy and K.N.Jayaveera, SM Publications, Hyderabad, 3rd Edition, 2012.

Course Outcomes:

- Students will understand the concept of redox systems
- Students will exhibit skills to handle the analytical methods with confidence
- Students will be able to acquire the operating principles and the reaction mechanisms of the instruments
- Students will be able apply his knowledge on the basic principles of batteries.

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES

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

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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I Year B. Tech., II Semester

(7G124) PROGRAMMING IN DATA STRUCTURES LAB
(Common to CIVIL, EEE, ECE and ME)

Course Objectives:

- To make the student learn a programming language.
- To teach the student to write programs in C to solve the problems.
- To introduce the student to simple linear data structures such as lists, stacks, queues.

Recommended Systems/Software Requirements:

Intel based desktop PC with ANSI C/ TURBO C Compiler and Supporting Editors

Exercise 1 : Minimum of 3 Programs on pointer basics.

Exercise 2 : Minimum of 3 Programs on Pointers applications.

Exercise 3 : Minimum of 3 programs on structures and unions

Exercise 4 : Minimum of 3 programs on basic File operations.

Exercise 5 : Minimum of 3 programs on searching and sorting techniques.

Exercise 6 : Implementation of Stack and perform all Stack operations using
i) Arrays ii) Pointers

Exercise 7 : Implementation of Queue and perform all Queue operations using
i) Arrays ii) Pointers

Exercise 8 : Implement Circular Queue (its operations) using
i) Arrays ii) Pointers

Exercise 9 : Implementation of Single Linked List and its operations using
i) Arrays ii) Pointers

Exercise 10 : Implementation of Double Linked List and its operations using
i) Arrays ii) Pointers

Exercise 11 : Implementation of Circular Linked List and its operations using
i) Arrays ii) Pointers

Exercise 12 : C program that uses Stack operations to perform the following:
i) Converting infix expression into postfix expression
ii) Evaluating the postfix expression

Exercise 13 : Implement Binary Tree using Double Linked List and its operations.

Course Outcomes:

- Student will be able to choose appropriate data structure as applied to specified problem definition.
- Student will be able to handle operations like searching, insertion, deletion, traversing mechanism etc. on various data structures.
- Students will be able to use linear and non-linear data structures like stacks, queues, linked list etc.

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES

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

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES:: RAJAMPET
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B.Tech. I Year II Semester

(7G322) ELECTRONIC DEVICES AND CIRCUITS LAB

(Common to ECE & EEE)

Course Objectives:

The Course aims to provide the student with the ability

- To determine characteristics of JFET, MOSFET, SCR and UJT.
- To determine parameters like gain, impedances and band width of BJT and FET amplifier circuits.

Perform the following Experiments:

1. Identification, Specifications and Testing of Active Devices, Low power JFETs, MOSFETs, Photodiode, Phototransistor, LEDs, SCR and UJT.
2. JFET Characteristics.
3. MOSFET Characteristics
4. Frequency response of CE Amplifier.
5. Frequency response of CB Amplifier.
6. Frequency response of CC Amplifier.
7. Frequency response of Common Source FET Amplifier.
8. V-I Characteristics of LED.
9. SCR Characteristics.
10. UJT Characteristics.
11. Photodiode and Phototransistor Characteristics
12. Soldering Practice.

Course Outcomes:

Upon completion of the course students

- Able to gain the knowledge and practical usage of JFET, MOSFET and some special electronic devices.
- Able to design the amplifier circuits under given requirements.

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES

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

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES::RAJAMPET
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B.Tech. I Year II Semester

GENDER SENSITIZATION

(Audit Course)

Course Objectives:

- To develop students' sensibility with regard to issues of gender in contemporary India.
- To provide a critical perspective on the socialization of men and women.
- To introduce students to information about some key biological aspects of genders.
- To expose the students to debates on the politics and economics of work.
- To help students reflect critically on gender violence.
- To expose students to more egalitarian interactions between men and women.

Unit - I: UNDERSTANDING GENDER:

Gender: Why should we study it? (Towards a world of Equals: Unit-1)

Socialization: Making Women, Making Men (Towards a world of Equals: Unit-2)

Introduction, Preparing for Womanhood, Growing up Male, First lessons in Caste, Different Masculinities. Just relationships: Being together as Equals (Towards a World of Equals: Unit-12) Mary Kom and other. Love and Acid just do not mix, Love Letters, Mothers and Fathers,

UNIT-II: GENDER AND BIOLOGY:

Missing Women: Sex Selection and its consequences (Towards a world of Equals: Unit-4) Declining Sex Ratio, Demographic Consequences. Gender Spectrum: Beyond the Binary (Towards a World of Equals: Unit-10) Two or Many? Struggles with Discrimination. Additional Reading: Our Bodies, Our Health (Towards a World of Equals: Unit-13)

UNIT-III: GENDER AND LABOUR:

Housework: The invisible labour (Towards a world of Equals: Unit-3) "My Mother doesn't Work". "Share the Loads". Women's Work: Its politics and Economics (Towards a world of Equals: Unit-7). Fact and Fiction, Unrecognized and Unaccounted work.

UNIT-IV: ISSUES OF VIOLENCE:

Sexual Harassment: Say No! (Towards a World of Equals: Unit-6). Sexual Harassment, not Eve-teasing-Coping with Every day Harassment. Domestic Violence: Speaking out (Towards a World of Equals: Unit-8). Is Home is safe place?-When women unite [film], Rebuilding Lives. Thinking about Sexual Violence (Towards a World of Equals: Unit-11).Blaming the victim-"I Fought for my life……"

UNIT-V: GENDER STUDIES:

Knowledge: Through the Lens of Gender (Towards aWorld ofEquals-Unit-5)

Point of View. Gender and the Structure of Knowledge.
Who's History? Questions for Historians and Others (Towards a World Equals: Unit-9) Reclaiming a Past. Writing other Histories.

Text Book: "Towards a world of equals: A Bilingual Textbook on gender", A. Suneeta, Uma Bhrugubanda, Duggirala Vasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and SuiseTharu.

Note: Since it is interdisciplinary Course, Resource Person can be drawn from the fields of English Literature or Sociology or Political Science or any other qualified faculty who has expertise in this field.

Reference Books:

1. Sen, Amartya. "More than one Million Women are missing." New York Review of Books 37.20(20 December1990).print
2. Tripi Lahiri, By the Numbers: Where Indian Women Work, Women's Studies Journal(14 November2012)<http://blogs.wsj.com/Indiareal time/2012/11/14/by-the- numbers-where-Indian-Women-work/>
3. K. Satyanarayana and Susie Tharu (Ed.) Steal Nibs Are Sprouting: New Dalit Writing From South India, Dossier 2:Telugu and Kannada
4. Vimala. "vantillu (the kitchen)". Women writingin India: 600 BC to thepresent volumeII; The20th century. Ed. Susie Tharu and K.Lalita. Delhi: Oxford university press, 1995, 599-601.
5. Shatrughna, veena etal. women's work and its impact on child health and nutrition, Hyderabad, national institute of nutrition, Indian council of medical research. 1993.
6. Gautam, Liela and Gita Ramaswamy. "A'Conversation' between a Daughter and a Mother". Broadsheet on contemporary Politics, special issue on sexuality and harassment; Gender politics on campus today, Ed. Madhumeeta Sinha and Asma Rasheed. Hyderabad: Anveshi Research center for women's Studies, 2014.
7. Abdulali Sohaila. "I fought for my life….and won". Available onlineat: http://www.thealternative.in/lifestyle/i-fought-for-my-lifeand-won-sohaila-abdulal/
8. VirginiaWoolf. ARoom of one's own. Oxford; Black swan. 1992.

Course Outcomes:

- Students will have developed a better understanding of important issues related to gender in contemporary India.
- Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
- Students will attain a clear grasp of how gender discrimination works

in our society and how to counter it.

- Students will acquire insight into the gendered division of labour and its relation to politics and economics.
- Men and women students and professionals will be better equipped to work and live together as equals.
- Students will develop a sense of appreciation of women in all walks of life.
- Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the text book will empower students to understand and respond to gender violence in a mature way.

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II B.Tech. I Semester

7GC32 - ENGINEERING MATHEMATICS-III
(Common to all Branches)

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Course objectives:

- The subject gives the knowledge about the solution of algebraic and transcendental equations and to solve differential equations by numerical methods.
- The course intends to provide an over view about interpolation, numerical differentiation and integration.
- The course explains the concept of curve fitting and partial differential equations.
- The course provides an opportunity to learn how to solve Fourier series and Fourier integral transforms in all engineering fields.

UNIT - I

Solution of algebraic and Transcendental Equations-Bisection Method-Method of false Position-Newton-Raphson method.

Numerical solutions of ordinary differential Equations-Taylor's Series-Euler's methods–Runge-Kutta fourth order Method-Milne's predictor-corrector method. (Without proofs)

UNIT-II

Interpolation - Introduction – Forward Differences – Backward Differences – Newton's forward and backward difference interpolation formulae – Lagrange's Interpolation formula.

Numerical Differentiation - Numerical Integration – Trapezoidal rule – Simpson's 1/3 Rule – Simpson's 3/8 Rule.

UNIT-III

Curve fitting: Fitting a straight line-second degree parabola-Exponential curve –power curve by the method of least squares.

Partial differential equations: Formation of partial differential equations by eliminating arbitrary constants and arbitrary functions-solutions of linear equation–Nonlinear equation by Charpit's method-Method of separation of variables.

UNIT-IV

Fourier series: Determination of Fourier coefficients-Fourier series of even and odd functions-Fourier series in an arbitrary interval-half range Fourier sine and cosine expansions.

UNIT-V

Fourier Integrals and Fourier transforms: Fourier Integral theorem-Fourier Transforms-Fourier sine transform - Fourier Cosine Transform-Properties-Inverse Transforms -Finite Fourier sine and Cosine Transforms.

Text Books:

Higher Engineering Mathematics, B. S. Grewal, 42nd edition, Khanna Publishers, New Delhi.

References:

1. Advanced Engineering Mathematics, Erwin Kreyszig, 8th edition, New Age International (Pvt.) Limited.
2. A text book of Engineering Mathematics, B. V. Ramana, Tata McGraw Hill.
3. Mathematical Methods, T. K. V. Iyengar, B. Krishna Gandhi and Others, S. Chand & Company.

Course Outcomes:

Student will be able to

1. Apply the knowledge of numerical methods to solve algebraic, transcendental and ordinary differential equations.
2. Improve the ability of data analysis in numerical differentiation and integration with the help of interpolation.
3. Derive the equations of various curves by the method of least squares to assess the relation between them and to solve partial differential equations.
4. Derive Fourier series for the given periodic function in any arbitrary intervals.
5. Apply the knowledge of Fourier integrals and Fourier transforms to solve differential equations.

Mapping of Cos and POs:

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	3	-	-	-	3	-	-	-	-	-	-	2
2	3	3	-	2	-	-	-	-	-	-	-	1
3	3	-	-	3	2	-	-	-	-	-	-	2
4	3	2	-	-	-	-	-	-	-	-	-	2
5	3	2	-	-	2	-	-	-	-	-	-	3

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II B.Tech. I Semester

7GC31 - ENVIRONMENTAL SCIENCE
(Common to EEE and ECE)

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2 1 0

Course Objectives:

- To enable student to know about the importance of environment.
- To train the student to use different methods to conserve natural resources.
- To enable the student to learn about the concept of ecosystem and biodiversity and its conservation.
- To make student to study about different types of pollutions.
- To enable the student to understand the social issues and human population issues related to environment.

UNIT-I

Introduction to Environment: Definition, Multidisciplinary nature of environmental studies, Scope & Importance of environmental studies, Need for public awareness, People in environment, Institutions in environment.

UNIT-II

Renewable & Non-renewable natural resources:

Forest resources: Use, deforestation, dams & their effects on forest & tribal people, Water resources: Use, Water cycle, floods, drought, conflicts over water. Mineral resources: Use, environmental effects of extracting mineral resources. Food resources: Impacts of over grazing, traditional agriculture and modern agriculture Energy resources: Renewable and non – renewable energy resources, use of alternate energy resources Land resources: Land degradation, soil erosion, Role of an individual in the conservation of natural resources.

UNIT-III

Ecosystems: Producers, consumers & decomposers, Food chains, food webs & ecological pyramids, Bio-geochemical cycles-Oxygen cycle, Carbon cycle and Nitrogen cycle. Types, characteristic features, structure and function of the following ecosystems: (a) Forest ecosystems (b) Grass land ecosystems (c) Desert ecosystems (d) Aquatic ecosystems (lakes, rivers, oceans, estuaries)

Biodiversity and Its Conservation: Definition, Values of biodiversity: consumptive value, productive value, social value, ethical value, aesthetic value & option value, Hot spots of biodiversity, Threats to biodiversity: habitat loss, poaching of wild life, Conservation of biodiversity: In-situ & Ex-situ conservation

UNIT-IV

Environmental Pollution: Definition, causes, effects & control measures of: Air pollution, Water pollution, Soil pollution, Noise pollution, Thermal pollution, Marine pollution, nuclear hazards.

UNIT-V

Social Issues and the Environment: Rain water harvesting, Environmental ethics: Issues & possible solutions, Global warming, Acid rain, Ozone layer depletion, Environment protection Act, Air (Prevention & Control of Pollution) Act, Water (Prevention & Control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act.

Human Population and the Environment: Population explosion, Family Welfare Program, Environment & human health - Human Rights (in relation to environment) - Value Education (environmental values), HIV/AIDS, Field work-Visit to a local area to document environmental assets.

Text Books:

1. Text book of Environmental Studies for Undergraduate Courses by Erach Bharucha, University Grants Commission, University press, New Delhi, 2004.
2. Perspectives in Environmental Studies, Anubha Kaushik and C.P. kaushik, Fifth edition, New Age International Publishers, 2016.

References:

1. Environmental Studies, Benny Joseph, Second edition, McGraw Hill Education (India) Private Limited, 2013.
2. Environmental Studies from Crisis to Cure, R. Rajagopalan, Oxford University Press, 2015.
3. Environmental studies: A Text Book for Undergraduates, Dr.K. Mukkanti, S. Chand and Company Ltd, 2010.
4. Ecology, Environmental Science and Conservation, J.S. Singh, S.P. Singh and S.R. Gupta, S. Chand and Company Ltd, 2014.
5. A textbook of Environmental Studies, Shashi Chawla, Tata McGraw Hill Education India, 2012.

Course Outcomes:

1. The student will understand the importance of environment.
2. The student develops critical thinking to conserve natural resources.
3. The student will understand the concept of ecosystem and biodiversity and its conservation.
4. The student knows about different types of pollutions, their sources, effects and control measures.
5. The student will apply the knowledge to solve the social issues and human population issues related to environment.

Mapping of Cos and POs:

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	1	1	-	-	-	1	3	-	-	-	-	3
2	1	1	-	-	-	3	3	-	-	-	-	3
3	1	1	-	-	-	-	3	-	-	-	-	3
4	2	2	-	-	-	3	3	-	-	-	-	3
5	3	3	-	-	-	3	3	-	-	-	-	3

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II B.Tech. I Semester

7G234 - ELECTRICAL CIRCUITS &TECHNOLOGY

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Course Objectives:

- To impart the knowledge about the basic concepts of circuit analysis and Transient Response.
- To inculcate the understanding about AC circuits and resonance.
- To understand the concepts of two port networks.
- To understand the working of various Electrical Machines.

UNIT-I

BASIC ELECTRICAL CIRCUITS: Network Reduction Techniques, Star &Delta transformations, Source Transformation, Nodal & Mesh Analysis, Super Node & Super Mesh Concepts - Problems.

TRANSIENT ANALYSIS: Transient Response of RL, RC & RLC Series Circuits for DC Excitation using differential equation approach.

UNIT-II

FUNDAMENTALS OF AC CIRCUITS & RESONANCE: Advantages of AC Supply, Types of Wave Forms, Importance of Sinusoidal Wave Forms, Cycle, Time Period, Frequency & Amplitude, Determination of Average & RMS Value, Form Factor & Peak Factor for different Alternating Wave Form.

RESONANCE: Resonant frequency, Band Width & Q-Factor for Series and Parallel RLC Network only.

UNIT-III

TWO PORT NETWORKS: Impedance, Admittance, Hybrid, Transmission (ABCD) Parameters, Conversion of one Parameter to another Parameter, Conditions for Reciprocity & Symmetry, Inter connection of Two Port Networks in Series, Parallel and Cascaded Configurations , Problems.

UNIT-IV

D.C MACHINES:

DC Generator: Constructional Features, Principle of operation, EMF Equation, Types, Magnetization Characteristics, Applications.

DC Motor: Principle of operation, Back EMF, Torque Equation, Characteristics of DC Shunt Motor, Losses & Efficiency, Testing - Brake Test & Swinburne's Test - Speed control of DC shunt Motor, Applications.

UNIT-V

AC MACHINES

Single Phase Transformer*:* Principle of operation, Types, Constructional Features, EMF equation, Losses, Efficiency & Regulation, OC & SC Tests and Pre-Determination of Efficiency & Regulation.

Three Phase Induction Motor: Principle of operation, Torque equation, Torque-slip characteristics, Brake test on three phase induction motor.

Text Books:

1. *Network Analysis* by A. Sudhakar & Shyam Mohan S.Pillai, Tata Mc Graw Hill, 3rd Edition, New Delhi, 2009.
2. A. Chakrabarti. *Circuit Theory*. 6th edition, Dhanpat Rai & Co, New Delhi, 2014.
3. *A Text book of Electrical Technology* by B.L.Theraja & A.K.Theraja, Vol-II, S.Chand & Company, New Delhi, 2010.

References:

1. *Introduction to Electrical Engineering* by M.S. Naidu & S. Kamakshaiah, Tata Mc Graw Hill, New Delhi, 2008.
2. *Basic Electrical Engineering* by T.K. Nagasarkar & M.S. Sukhija, Oxford University Press, New Delhi, 2005.

Course Outcomes:

1. Analyze the Basic concepts of Electrical Circuits and Transient Phenomenon.
2. Analyze the concepts of 1-Φ AC circuits and Resonance.
3. Analyze the phenomenon of two port networks.
4. Able to understand the construction, working and testing of DC-Machines and their applications
5. Able to know principle of operation and calculate the Efficiency and Regulation of transformer.
6. Able to understand the principle and characteristics of three phase induction motor.

Mapping of COs and POs:

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	3	3									2	3
2	3	2	3								2	2
3	3	2	2	2	1							
4	3		3	2			2		2		2	
5	2	2										
6	2	2										

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II B.Tech. I Semester

7G331 - ELECTRONIC CIRCUITS

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Course Objectives:

The course aims to provide the student with the ability

- To analyze and design the transistor amplifiers, feedback and tuned amplifiers.
- To design of oscillators.

UNIT -I

SMALL SIGNAL ANALYSIS OF AMPLIFIERS:- Small Signal model of BJT – h-parameter model of BJT – Analysis of CB, CE and CC configurations using h-parameters – simplified hybrid model – miller's theorem – dual of miller's theorem – Analysis of Cascaded Transistor Amplifiers, RC Coupled amplifier, Frequency response of RC Coupled, Direct coupled and Transformer coupled amplifiers.

UNIT -II

BJT Frequency Response: General frequency considerations, Low and high frequency response of BJT amplifier, Effect of coupling and Bypass capacitors, Hybrid- π transistor model and its Parameters, CE short circuit current gain, Current gain with resistive load, Gain Bandwidth product.

UNIT - III

Feedback Amplifiers: concept of Feedback, Classification of feedback amplifiers, Transfer Gain with feedback, General characteristics of negative feedback amplifiers. Voltage series, voltage shunt, current series, and current shunt feedback amplifiers with discrete components (Topologies).

UNIT - IV

Oscillators: Condition for oscillations. Oscillator Types, Frequency and amplitude stability of oscillators, generalized analysis of LC oscillators- Hartley and Colpitts oscillators, RC-phase shift, Wien Bridge and Crystal Oscillators.

UNIT -V

Large Signal and Small Signal Single Tuned Amplifiers:

Direct coupled and Transformer Coupled Class A power Amplifiers, Efficiency of Class A power amplifier, Class B Push-pull and Complementary Symmetry power Amplifiers, phase inverter, Max Power dissipation per Transistor. Introduction to tuned amplifiers, Q-Factor, Analysis of Small Signal Single Tuned Amplifier–Capacitive coupled.

Text Books:

1. J. Millman and C.C. Halkias- Integrated Electronics, Mc Graw-Hill, 1972.

2. Robert T. Paynter- Introductory Electronic Devices and Circuits, Pearson Education, 7th Edition.

References:

1. Robert L. Boylestad and Louis Nashelsky, Electronic Devices and Circuits Theory, Pearson/Prentice Hall, 9th Edition, 2006.
2. Donald A. Neumann- Electronic Circuit Analysis and Design, Mc Graw Hill.

Course Outcomes:

Upon completion of the course, student can

1. Analyze the single stage and multistage amplifiers using h-parameter model at low frequencies.
2. Understand the concept and analysis of BJT amplifier circuits at High frequencies using Hybrid- π model.
3. Design the feedback amplifiers and oscillators.
4. Design and analyze large signal and tuned amplifiers.

Mapping of COs and POs:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	2	2	2			2		1			1	
2	2	2	2			2		1			1	
3	2	2	2			2		1			1	
4	2	2	1			2		1			1	

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II B.Tech. I Semester

7G332 - DIGITAL DESIGN

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Course Objectives:

The course aims to provide the student with the ability

- To get the knowledge on Number Systems and codes.
- To gain the knowledge on Boolean algebra.
- To acquire the knowledge of various circuits in Digital design.

UNIT-I

NUMBERSYSTEMS, CODES & BOOLEAN ALGEBRA: Philosophy of number systems – r, (r-1)'s complement, representation of negative numbers, binary arithmetic, binary codes, error detecting & error correcting codes, hamming codes.

Boolean algebra: Fundamental postulates of Boolean algebra, Basic theorems and properties, digital logic gates, properties of XOR gate, universal gates.

UNIT-II

SWITCHING FUNCTIONS AND THEIR MINIMIZATION: Switching Functions-Canonical and Standard forms, algebraic simplification using Boolean theorems, two level & Multilevel Realization of Boolean Functions using Universal Gates.

Minimization: K-Map methods, Prime implicants, don't care combinations, Minimal SOP and POS forms, Tabular Method, Prime-Implicants chart, simplification rules.

UNIT-III

COMBINATIONAL LOGIC DESIGN & PROGRAMMABLE

LOGIC DEVICES: Design using conventional logic gates-Binary Adders, Subtractors, Ripple Adder, carry Look Ahead adder, Magnitude comparator, Encoder, Decoder, Multiplexer, De-Multiplexer, Code converters.

PLD's: ROM, PROM, PLA, PAL, and Realization of Switching functions using PLD's. Comparison between PLA, PAL, ROM.

UNIT-IV

SEQUENTIAL CIRCUITS : Classification of sequential circuits (Synchronous, Asynchronous, Pulse mode, Level mode with examples),Basic flip-flops, Triggering and excitation tables, flip flop conversions, Steps in synchronous sequential circuit design, Design of modulo-N Synchronous counters – up/down counter, ring counter, Johnson counter, Design of modulo-N Asynchronous counter.

UNIT-V

FSM MINIMIZATION AND ASM CHARTS: Finite state machine-capabilities and limitations, Mealy and Moore models and their conversions-Sequence detector, Serial binary adder. Minimization of completely specified sequential machines-Partition techniques. Salient features of the ASM chart, Simple examples**.**

Text Books:

1. Morris Mano, *Digital Design*. Prentice Hall India, 3rd Ed.
2. ZVI Kohavi and Niraj K. Jha Switching& Finite Automata theory. Tata McGraw Hill, 3 rd Ed.

References:

1. Charles H. Roth, *Fundamentals of Logic Design*. Thomson Publications, 2004, 5th Ed.
2. Fletcher, *an Engineering Approach to Digital Design*. Prentice Hall India. Anand Kumar, *Switching Theory and Logic Design*. Prentice Hall India, 2008.

Course Outcomes:

Upon completion of the course, students can

1. Understand different number systems conversions & Binary codes
2. Simplify Boolean functions& realize them using digital logic gates.
3. design various combinational & sequential circuits
4. Understand the Minimization techniques of Finite State Machine & the elements of ASM chart.

Mapping of COs and POs:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	2		2		2			1			2	
2	2	2	2			1		1			2	
3	2	2	2			1		1			2	
4	2	2	2			1		1			2	

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II B.Tech. I Semester

(7G333)SIGNALS AND SYSTEMS

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3 1 0

Course Objectives:

The course aims to provide the student with the ability

- To do analysis of signals & systems (continuous and discrete) using time domain & frequency domain methods.
- To acquire practical knowledge on various transform techniques in the analysis of signals and systems.
- To acquire the knowledge of LTI Systems and Sampling Concepts.
- To study the various convolution in communication systems

UNIT-I

INTRODUCTION TO SIGNALS AND SYSTEMS : Continuous time Signal and Discrete time Signals, Elementary Continuous and Discrete time signals, Basic Operations on Signals, Classification of Signals, Concept of Systems, Representation of Fourier series, Dirichlet's conditions, Trigonometric Fourier series and Exponential Fourier series, Fourier spectrum, Gibbs Phenomenon, properties of Fourier series,

UNIT-II

FOURIER TRANSFORMS: Deriving Fourier transform from Fourier series, Fourier transform of standard signals, properties of Fourier transforms, Fourier transform of periodic signals, Introduction to Hilbert Transform.

UNIT-III

LTI SYSTEMS AND SAMPLING : LTI systems, Properties & Transfer function, Filter Characteristics, Distortion less Transmission through a system, signal and system bandwidth, Ideal filter characteristics, Causality and Paley-Wiener Criterion, Relationship between Bandwidth and Rise Time.

Sampling theorem – Graphical and analytical proof for Band Limited Signals, effect of under sampling – Aliasing Sampling Techniques, data Reconstruction, Sampling of Band pass signals

UNIT-IV

CONVOLUTION AND CORRELATION:

Convolution: Concept of convolution in time domain and frequency domain, Graphical representation of convolution, Convolution property of Fourier transforms.

Correlation: Cross correlation and auto correlation of functions, properties of correlation function, Energy density spectrum, Parseval's theorem, Power density spectrum, Relation between auto correlation function and energy/power spectral density function. Relation between convolution and correlation

UNIT-V

LAPLACE TRANSFORMS AND Z–TRANSFORMS: Laplace Transforms- Introduction, Region of Convergence, L.T's of some commonly used signals, Properties, Inverse Laplace Transforms.

Z-Transforms- Relation between DTFT and Z-Transform, Region of Convergence, Z-transforms of common sequences, Properties, Inverse Z-Transform.

Text Books:

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

References:

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

Course Outcomes:

Upon completion of the course, students can

1. Understand signal representation methods and operation on signals.
2. Have the knowledge to obtain Fourier series and Fourier Transforms
3. Learn LTI Systems and Sampling Concepts.
4. Understand the convolution and correlation of signals.
5. Understand different transforms (Laplace & Z) and their responses with different types of signals.

Mapping of COs and POs:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	3	1										
2	3	3		3								
3				3	1							
4	3											
5	3	3	1									

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II B.Tech. I Semester

(7G335)ELECTRONIC CIRCUITS LAB

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Course Objectives:

- Aims to make students be able to design electronic circuits.
- To understand the Analysis of transistor based amplifiers.
- The student will construct and analyze voltage regulator circuits.
- To understand the circuit configuration and the principle operation of Oscillators.

Design and Simulation* of following experiments and also verify in Hardware Laboratory (minimum 6 of the following):

1. Common Emitter amplifier
2. Common Source FET amplifier
3. Two Stage RC- Coupled Amplifier
4. Feedback amplifier (Current Series & Voltage Series).
5. RC Phase Shift Oscillator
6. Wien Bridge Oscillator
7. Hartley/ Colpitts Oscillator.
8. Class A/B Power Amplifier
9. Series Voltage Regulator
10. Shunt Voltage Regulator

*** Multisim OR PSPICE OR Equivalent Simulation Software.**

Course Outcomes: Upon completion of the course, students will

1. Have the ability to analyse and design single and multistage amplifiers.
2. Determine the efficiencies of power amplifiers.
3. Design different Oscillators.
4. Be able to analyse all the circuits using simulation software and Hardware.

Mapping of COs and POs:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	2	3	2			1					2	
2	2	3	2			1					2	
3	2	2	2			1					2	
4	2	3				1					2	

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET

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II B.Tech. I Semester

(7G336) BASIC SIMULATION LAB

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***Write Programs and Simulate using MATLAB/SCI LAB/Any Equivalent Software of the following Experiments.**

Course Objectives:

- To analyse the characteristics of various signals and systems using simulation softwares.
- To enable the students to know about different transforms with respective waveform generations
- To acquire the knowledge of systems and sampling through simulations.
- To study the convolution and correlation concepts with the help of experimentation

List of Experiments:

1. Basic Operations on Matrices.
2. Generation of Various Signals and Sequences (Periodic and Aperiodic), such as UNIT impulse, UNIT step, square, saw tooth, triangular, sinusoidal, ramp, sinc.
3. Observations on signals and sequences such as addition, multiplication, scaling, shifting, folding, computation of energy and average power.
4. Finding the even and odd parts of signal/ sequence and real and imaginary parts of signal.
5. Gibbs phenomenon.
6. Finding the Fourier transform Phase spectrum.
7. Sampling theorem verification.
8. Verification of linearity and time invariance properties of a discrete system.
9. Computation of UNIT sample, UNIT step and sinusoidal responses of the given LTI system and verifying its physical reliability and stability properties.
10. Convolution between signals and sequences.
11. Autocorrelation and cross correlation between signals and sequences.
12. Verification of winer-khinchine relations
13. Waveform synthesis using Laplace Transform
14. Locating the zeros and poles and plotting the pole Z-plane for the given transfer function.

Course Outcomes:

Upon the completion of course the students will be able

1. To understand fundamentals of Signals and systems and operations through simulation.
2. To understand the transforms on various signals practically
3. To acquire knowledge on the Systems and sampling concepts
4. To have the knowledge of Convolution and Correlation theories with the help of Laboratory simulations

Mapping of COs and POs:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	3	3	1		1							
2		3		3								
3	3	3										
4		3			3							

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II B.Tech. I Semester

(7G236)ELECTRICAL CIRCUITS & TECHNOLOGY LAB

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Course Objectives:

- To conduct testing and experimental procedure on DC Machines.
- To find the performance Characteristics of three Phase induction motor.
- To test the single phase transformer to know the performance.
- To analyze the operation characteristics of electrical machines under different loading conditions.
- To analyze different electrical circuit theorems.

ANY TEN EXPERIMENTS FROM THE FOLLOWING:

PART - A:

1. Verification of Superposition & Reciprocity Theorems.
2. Verification of Thevenin's & Norton's Equivalent Theorems.
3. Verification of Maximum Power Transfer Theorem for DC Excitation.
4. Series & Parallel Resonance - Determination of Resonant frequency, Bandwidth & Q-factor.
5. Two Port Network Parameters - Z &Y Parameters.
6. Time response of First Order RL & RC network for Periodic Non-Sinusoidal inputs - Determination of Time Constant & Steady State Error.

PART - B:

1. Magnetization Characteristics of D.C Shunt Generator. Determination of Critical Field Resistance & Critical Speed.
2. Brake Test on D.C Shunt Motor. Determination of Performance Characteristics.
3. Swinburne's Test on D.C Shunt Machine (Pre-determination of Efficiency of a given D.C Shunt machine working as Motor & Generator).
4. O.C & S.C Tests on 1-Φ Transformer (Pre-determination of Efficiency & Regulation at given P.F & Determination of Equivalent Circuit).
5. Speed Control of D.C Shunt Motor by Armature control & Field Control Methods.
6. Brake Test on Three Phase Induction Motor. Determination of Performance Characteristics.

Course Outcomes:

1. Ability to conduct testing and experimental procedure on DC Machines.
2. Ability to find the performance Characteristics of three Phase induction motor.
3. Ability to test the single phase transformer to know the performance.

4. The capability to analyze the operation characteristics of electrical machines under different loading conditions.
5. Able to analyze different electrical circuit theorems.

Mapping of COs and POs:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	1		3		2				2			
2	1		3		2							
3	1		3		2							
4	1		3		2							
5	2		3		2							2

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II B. Tech. II Semester

(7GA41)MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

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Course Objectives:

- The course aims to provide a view of managerial problems.
- The course aims to provide the accounting and financial concepts

UNIT-I

Introduction to Managerial Economics Managerial Economics: Meaning and Nature, Definition, Scope, relationship with other areas.

Demand Analysis: Definition and types of Demand, Demand Determinants, Law of Demand and its exceptions, Measurement and Significance of Elasticity of Demand, Demand forecasting methods.

UNIT-II

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

Cost Analysis: Cost concepts, Determinants of cost, cost-output relationship in short run and Long run.

Break-even Analysis (BEA) - Objectives, Assumptions, Importance, Graphical representation, Limitations, simple numerical problems.

UNIT -III

Market Structure and forms of Business Organizations Markets: Perfect, Monopoly, Monopolistic and Oligopoly Markets. Price-output determination in perfect competition and monopoly in long run and short run.

Forms of Business Organizations: Definition, Forms of Business Organizations-**Private Sector**-sole proprietary ship, Partnership, Joint Hindu family business, co-operative societies, joint stock companies.

Public Sector- Departmental organizations, public corporations, government companies**.** Joint Sector.

UNIT-IV

Capital and Capital Budgeting Capital: Definition of Capital and its significance, Types of Capital, Sources of Raising Capital.

Capital budgeting: Definition**,** Nature and scope of capital budgeting, features of capital budgeting, Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR) and Net Present Value Method (simple problems)

UNIT-V

Introduction to Financial Accounting and Analysis Financial Accounting Definition, Book Keeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments).

Financial Analysis, Definition of Financial Analysis, Ratios and its significance- types- liquidity Ratios, turnover Ratios - solvency Ratios and profitability ratios.

Text Books:

1. Gupta: Managerial Economics, TMH, 2009.
2. Varshney & Maheswari: Managerial Economics, Sultan Chand, 2003.
3. Mehta P.L., Managerial Economics-Analysis, Problems, Cases, S Chand and Sons, New Delhi, 2001.
4. M.E.Thukaram Rao., Accounting for Managers, New Age International Publishers.
5. T.S, Reddy and Y.Hari Prasad Reddy, Accounting and Financial Management, Margham Publications.

References:

1. Ambrish Gupta, Financial Accounting for Management, Pearson Education, New Delhi.
2. H. Craig Peterson & W. Cris Lewis, Managerial Economics, PHI, 4th Ed.
3. Suma Damodaran, Managerial Economics, Oxford University Press.
4. Lipsey & Chrystel, Economics, Oxford University Press.
5. S. A. Siddiqui & A. S. Siddiqui, Managerial Economics & Financial Analysis, New age International Space Publications.

Course Outcomes:

1. The student can able to apply principles of economics to managerial decisions.
2. Student can understand the relationship between demand and its determinants and assess the future demand.
3. The course provides information related to production, cost, profit etc.
4. The course provides a basic insight into types of markets and forms of business organizations.
5. The student can familiarized with Accounting Data and Financial Statements that can be useful for interpreting the financial information.

Mapping of COs and POs:

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	-	3	-	3	2	-	-	2	2	-	3	1
2	-	3	-	3	2	2	-	2	1	-	3	1
3	-	2	-	2	2	1	-	2	1	-	3	1
4	-	3	-	3	2	-	-	2	1	-	3	1
5	-	3	-	3	3	2	-	1	1	-	3	1

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II B. Tech. II Semester

(7GC43)COMPLEX VARIABLES AND SPECIAL FUNCTIONS
(ECE and EEE)

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Course Objectives:

- The course aims to provide the student with the ability **t**o understand the complex variables and their functions.
- The course provides the student with an opportunity to apply the knowledge to evaluate the complex integrals in real life situations.
- The course offers knowledge to solve the problems of complex integration by evaluation of residue and residue theorem.
- The course explains Rouches theorem and Argument principle to determination of zeros of complex functions.
- The course enables the students solve the problems of bilinear transformation by Cross ratio.

UNIT I

Beta and Gamma Functions: Beta and Gamma functions their properties – Evaluation of improper integrals using Beta and Gamma functions.

Complex variables: Exponential, trigonometric, hyperbolic functions and their properties – General power z^c (c is complex), principal value.

UNIT II

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

UNIT III

Complex Integration: Line integral – Evaluation along a path and by indefinite integration – Cauchy's integral theorem – Cauchy's integral formula – Generalized integral formula (without proof).

Complex power series: Radius of convergence – Expansion in Taylor's series, Maclaurin's series and Laurent series (with out proof).

UNIT IV

Residues: Singular point – Isolated singular point – Pole of order m – Essential singularity. Residue – Evaluation of residues – Residue theorem. Evaluation of integrals of the types $\int_{-\infty}^{\infty} f(x)dx \quad and \quad \int_{0}^{2\pi} f(\cos\theta, \sin\theta)d\theta$.

Determination of zeros: Argument principle-Rouche's theorem

UNIT V

Conformal mapping: Definition – Translation, rotation, and inversion –- Transformation by e^z, $\ln z$, z^2, z^n, $\sin z$, $\cos z$ .Bilinear transformation -Fixed points – Cross ratio – Determination of bilinear transformation mapping for three given points.

Prescribed Text Books:

Higher Engineering Mathematics, B. S. Grewal, 43rd edition, Khanna Publishers, New Delhi, 2014.

Reference Books:

7. Advanced Engineering Mathematics, Erwin Kreyszig, 8th Edition, New Age International (Pvt.) Limited.
8. A text book of Engineering Mathematics, B. V. Ramana, Tata McGraw Hill.
9. Mathematics - II, T. K. V. Iyengar, B. Krishna Gandhi and Others, S. Chand & Company.
10. Mathematics - III, E. Keshav Reddy and Rukmangadachari, Pearson Education.
11. A text book of Engineering Mathematics, N.P.Bali, Laxmi publications.

Course Outcomes: Student will be able to

1. Understand the properties of beta and gamma functions
2. Have the knowledge on functions of a complex variable
3. Understand the concepts of exponential, trigonometric, hyperbolic functions and their properties.
4. Have the knowledge of complex integration and apply it to solve complex integrals of different type**.**
5. Learn about conformal mapping**.**

Mapping of COs and POs:

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	3	-	-	-	3	-	-	-	-	-	-	2
2	3	3	-	2	-	-	-	-	-	-	-	1
3	3	-	-	3	2	-	-	-	-	-	-	2
4	3	2	-	-	-	-	-	-	-	-	-	2
5	3	2	-	-	2	-	-	-	-	-	-	3

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II B. Tech. II Semester

(7G341)RANDOM VARIABLES AND RANDOM PROCESSES

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Course Objectives:

The course aims to provide the student with the ability

- To understand the basics of Probability and its Theorems
- To gain the knowledge on random variables and related operations
- To understand random processes those are useful in probability estimations

UNIT-I

PROBABILITY AND RANDOM VARIABLES: Probability introduced through sets and relative frequency, Joint and Conditional Probability, Total Probability, Bayes Theorem, Independent Events, Random Variable Concept, Distribution and Density functions, Binomial, Poisson, Uniform, Gaussian, Exponential, Rayleigh, and Conditional Distribution & Conditional Density Functions.

UNIT-II

OPERATIONS ON ONE RANDOM VARIABLE: Expectation, Moments: moments about the origin, Central Moments, Variance and Skew, Chebyshev's Inequality, Functions that give moments.

UNIT-III

MULTIPLE RANDOM VARIABLES: Vector Random Variables, Joint Distribution Function and its Properties Joint Density and its properties, Conditional Distribution and Density, Statistical Independence, Sum of Two Random Variables, Sum of Several Random Variables, Central Limit Theorem, Expected Value of a Function of Random Variables, Joint Characteristic Functions, Jointly Gaussian Random Variables.

UNIT-IV

RANDOM PROCESSES – TEMPORAL CHARACTERISTICS: The Random Process Concept, Stationarity and independence: Distribution and Density Functions, Statistical Independence, First-Order Stationary Processes, Second- Order and Wide-Sense Stationarity, N-Order and Strict-Sense Stationarity, Time Averages and Ergodicity, Mean-Ergodic Processes, Correlation-Ergodic Processes. Autocorrelation Function and Its Properties, Cross-Correlation Function and Its Properties, Covariance Functions, Discrete Time processes and sequences.

UNIT-V

RANDOM PROCESSES – SPECTRAL CHARACTERISTICS: The Power Spectrum: Properties, Relationship between Power Spectrum and

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

Text Books:

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

References:

1. Probability and Random Processes with Application to Signal Processing – Henry Stark and John W. Woods, Pearson Education, 3rd Edition.
2. Probability Methods of Signal and System Analysis. George R. Cooper, Clave D. MC Gillem, Oxford, 3rd Edition, 1999.

Course Outcomes:

Upon completion of the course, students will be able to

1. Understand the concept of Probability and types of random variables.
2. Learn the possible operations on random variables with real time examples.
3. Understand the concept of random processes
4. analyze the random processes based on their characteristics

Mapping of Cos and POs:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1		3	3	3	1	1	1	1				
2		3		3	3	2	2	1				
3	3	2	1	1	1							
4	1	1	2	3	3	3						

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II B. Tech. II Semester

(7G342) PULSE AND DIGITAL CIRCUITS

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Course Objectives:

The course aims to provide the student with the ability

- To study various wave shaping circuits and their applications.
- To study and acquire knowledge on different circuits that produce non-sinusoidal waveforms
- To study various voltage time base generators, Logic gates etc.

UNIT-I

LINEAR WAVE SHAPING High pass & low pass RC circuits, their response for sinusoidal, step, pulse, square, ramp and Exponential inputs. High pass RC network as differentiator, Low pass RC network as integrator, attenuators, ringing circuit.

UNIT-II

SWITCHING CHARACTERISTICS & NON-LINEAR WAVE SHAPING:

Switching Characteristics of Devices: Diode as a switch, Diode Switching Times, Transistor as a Switch, transistor-switching times

Non-Linear Wave Shaping: Diode clippers, Transistor clippers, clipping at two independent levels, Comparators, clamping operation, clamping circuit taking source and diode resistance into account, Clamping circuit theorem, practical clamping circuits, effect of diode characteristics on clamping voltage.

UNIT-III

MULTIVIBRATORS

Design and analysis of Bi-stable, Monostable & Astable Multivibrator with BJT. Schmitt trigger circuit, Symmetrical & Un Symmetrical Triggering of Bi-stable Multivibrator, Monostable Multivibrator.

UNIT-IV

TIME BASE GENERATORS: Voltage time base generators: General features of a time base signal, methods of generating time base waveform, Principle and working of Miller and Bootstrap time base generators.

Current time base generators: Simple current sweep circuit, linearity correction through driving waveform.

UNIT-V

SAMPLING GATES, LOGIC GATES AND LOGIC FAMILIES

Sampling Gates: Basic operation and principle of Sampling gates, uni-directional diode sampling gate, Bi-Directional diode & Transistor sampling gates, four diode sampling gate and their applications.

Realization of AND,OR,NOT gates using diodes and transistors, Inhibit operation, classification of logic families, DTL, RTL, DCTL,TTL, and CMOS logic families, comparison of logic families.

Text books:

1. J. Millman and H. Taub, "Pulse, Digital and Switching Waveforms", McGraw-Hill, second edition, 2007.
2. Anand Kumar, "Pulse and Digital Circuits", PHI, 2005.Second Edition.

References:

1. Fundamentals of pulse and digital circuits-Ronald j. Tocci, third edition, 2008.
2. Solid state pulse circuits-David A. Bell, 4th Edition, 2002 PHI.

Course Outcomes:

Upon completion of the course, student can

1. Design and analyze linear and non-linear wave shaping circuits.
2. Design and analyze different multivibrator circuits.
3. identify and differentiate various time base generators
4. Understand the operation and realization of different sampling_gates and logic families.

Mapping of Cos and POs:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	1	3			1							
2		3			1				1			
3	3			3		3						
4	3										2	

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II B. Tech. II Semester

7G343 - ANALOG COMMUNICATION

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Course Objectives*:*

The course aims to provide the student with the ability

- To introduce the concepts of Analog communication systems.
- To equip students with various issues related to analogue communication such as modulation, demodulation, transmitters and receivers, noise performance and pulse analog modulation techniques.

UNIT-I

AMPLITUDE MODULATION: Introduction to communication system, Need for modulation, Types of Modulation, Amplitude Modulation-single tone modulation, power relations in AM waves, Generation and Detection of AM Waves, Double side band suppressed carrier modulation, Generation and Detection of DSB-SC Modulated waves, SSB Modulation, Generation and Detection of AM-SSB Modulated waves, vestigial side band modulation, Generation and Detection of VSB waves.

UNIT-II

ANGLE MODULATION: Basic concepts, Frequency Modulation, Single tone frequency modulation, Narrow band FM, Wide band FM, Transmission bandwidth of FM Wave, Generation of FM Waves, and Detection of FM Waves: Comparison of FM & AM.

UNIT-III

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, SNR Calculation, Pre-emphasis & de-emphasis.

UNIT-IV

TRANSMITTERS & RECEIVERS: Introduction, Classification of Transmitter, AM Transmitter, FM Transmitter, Variable reactance type and phase modulated FM Transmitter, frequency stability in FM Transmitter, Receiver Types, Characteristics of Receiver, TRF receiver, Super-heterodyne receiver-RF section and Characteristics, Frequency changing and tracking, Intermediate frequency, AGC, FM Receiver.

UNIT-V

PULSE ANALOG MODULATION: Multiplexing-TDM, FDM, Types of Pulse modulation, PAM-Single polarity PAM, double polarity PAM, PWM-Generation & demodulation of PWM, PPM-Generation and demodulation of PPM.

Text Books:

1. Simon Haykin, John Wiley - Principles of Communication Systems , 2nd Ed.,
2. George Kennedy and Bernard Davis - Electronics & Communication System , TMH 2004

References:

1. H Taub & D. Schilling, Gautam Sahe - Principles of Communication Systems, TMH, 2007 3rd Edition.
2. John G. Proakis, Masood Salehi - Fundamentals of Communication Systems PEA, 2006.

Course Outcomes*: upon completion of the course, students can*

1. Gain the knowledge of components of analog communication system.
2. Learn the need of Modulation and Application in real time.
3. Gain the knowledge of Different Modulation Techniques and their Generation & Detection methods.
4. To evaluate the performance of analog communications in the presence of noise.
5. Design radio Transmitters, Receivers & applications in real life
6. Gain the knowledge of analog pulse communication systems.

Mapping of COs and POs:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	1	1						2			3	
2	1		2					2			3	
3	1		1					2			3	
5	1		1					2			2	
5	1							2			2	

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II B. Tech. II Semester

7G344 - FIELD THEORY AND TRANSMISSION LINES

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Course Objectives:

The course aims to provide the student with the ability

- To understand the Concepts of Vectors and Co-ordinate Systems
- To learn the concepts of Electric and Magnetic Fields with their corresponding equations.
- To know the importance of Maxwell's equations in differential and integral forms.
- To acquire a knowledge of wave propagation with its different characteristics.
- To acquire a knowledge on transmission lines & their characteristics.

UNIT-I

VECTOR ANALYSIS AND INTRODUCTION TO ELECTROSTATICS: Introduction to Vector Algebra, Coordinate systems and Transformation, Vector Calculus**.** Introduction to Electrostatic Fields, Coulomb's Law, Electric Field Intensity, Fields due to continuous Charge Distributions, Electric Flux Density, Gauss's Law and Applications, Electric Potential, Relations Between E and V-Maxwell's Equations, Energy Density.

UNIT-II

ELECTROSTATIC FIELDS

Introduction to electrical fields in material space- Convection and Conduction Currents, Conductors, Polarization in Dielectrics, Dielectric Constant and strength, Linear, Isotropic and Homogeneous Dielectrics, Continuity Equation and Relaxation Time, Resistance and Capacitance.

UNIT-III

MAGNETOSTATIC FIELDS AND MAXWELL'S EQUATIONS. : Introduction to magnetic fields, Biot-Savart Law, Ampere's Circuital Law and Applications, Magnetic Flux Density, Maxwell's Equations for Static EM Fields, Magnetic Scalar and Vector Potentials, Forces due to Magnetic fields, Magnetic Energy. Introduction to Maxwell's equations, Faraday's Law, Transformer and Motional EMFs, Maxwell's Equations in Final Forms.

UNIT-IV

EM WAVE PROPAGATION AND CHARACTERISTICS: Introduction, Waves in general, Wave propagation in Lossy Dielectrics, Plane waves in Lossless Dielectrics, Plane Waves in Free space, Plane waves in Good conductors. Poynting Vector and Poynting Theorem, Reflection of a Plane Wave at Normal inicdence.

UNIT-V

TRANSMISSION LINES : Types, Primary & Secondary Constants, Transmission Line Equations, Expressions for Characteristic Impedance &Propagation Constant, wavelength, Phase and Group Velocities, Infinite Line Concepts, Input Impedance Relations , Standing waves in SC & OC lines, Reflection Coefficient,Line Distortion, Condition for Distortion less &lossless lines, Condition for minimum attenuation, Loading concept& its types, Smith Chart – Properties and Applications.

Text Books:

1. Elements of Electromagnetics – 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. Transmission Lines and Networks – Umesh Sinha, Satya Prakashan (Tech.India Publications), New Delhi.

References:

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

Course Outcomes:

Upon completion of the course, students can

1. Understand the vector analysis-vector algebra and vector calculus, co-ordinate systems, transformation
2. Understand the Magneto static fields in free space & also in material space.
3. Learned the usage of Maxwell's equations in differential and integral final forms in electromagnetic fields.
4. Able to analyze and apply EM wave propagation characteristics on different mediums.
5. Able to identify different transmission lines and their relations.

Mapping of COs and POs:

COs	PROGRAM OUTCOMES											
	1	2	3	4	5	6	7	8	9	10	11	12
1	3	3		2		2						
2	3	1		2		2			2			
3	2			3		1			2	2		
4	3	3	2	1		1	2	1	2			
5	2	3	2	2		2	1	1	2		1	

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II B. Tech. II Semester

7GC44 - APTITUDE AND REASONING SKILLS

(Common to ECE, EEE and ME)

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Course Objectives:

- To equip students with aptitude and reasoning skills in order to help them succeed in competitive exams.
- To help students improve their knowledge of quantitative and reasoning skills, which in turn helps them comprehend and solve various mathematical problems in professional life.

UNIT I

Quantitative Aptitude 1: Number Systems- HCF and LCM -Square Roots and Cube Roots-Averages-Problems on ages-Allegations-Percentages-Profit and loss - Mensuration-Area, Volume and Surface Areas- Permutation and Combination-Decimal Fractions-Simplification.

UNIT II

Reasoning 1: Directions-Blood Relations-Problems on Cubes-Series and Sequences- Odd man out- Coding and Decoding.

UNIT III

Quantitative Aptitude 2: Ratio and Proposition and variation-Inequalities-Time and Work-Time and Distance-Pipes and Cisterns -Simple interest and Compound-interest-Calendar-Clocks-True Discount, Banker's Discounts-Data Interpretation, Tabulation, Bar Graphs, Pie charts, Line Graphs

UNIT IV

Reasoning 2: Data Sufficiency-Logical deductions-Arrangements and Combinations-Groups and Teams-Puzzles.

Text Books:

1. R.S. Agarwal, Quantitative Aptitude, S. Chand Publishers, New Delhi, 2005.
2. R.S.Agarwal, Verbal and Non-Verbal Reasoning, S.Chand Publishers, New Delhi, 1998.
3. Shakuntala Devi, Puzzles to Puzzle you, Orient Paper Backs Publishers(OPB), New Delhi, 2005.

References:

1. Arun Sharma, How to Prepare for Quantitative Aptitude, TMH Publishers, New Delhi, 2003.
2. Sharon Weiner-Green, Irn K.Wolf, Barron's GRE, Galgotia Publications, New Delhi, 2006.
3. Shakuntala Devi, More Puzzles, OPB, New Delhi, 2006.
4. Ravi Narula, Brain Teasers, Jaico Publishing House, New Delhi, 2005.

5. George J Summers, Puzzles and Teasers, Jaico Publishing House, Mumbai, 2005

Course Outcomes:

1. The student will be able to apply the knowledge of general mathematical models discussed to solve a variety of problems pertaining to Quantitative functions
2. The Student will be able to read between the lines and understand various mathematical and reasoning concepts, puzzles, charts and interpret their logic.

Mapping of Cos and POs:

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	3	-	-	-	-	-	-	-	-	-	-	2
2	2	-	-	-	-	3	-	-	-	-	-	1

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II B. Tech. II Semester

7GC346 - PULSE CIRCUITS LAB

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Course Objectives:

- To generate Different types of non-sinusoidal signals.
- To learn about Multivibrators.
- To know about sampling gates and their uses.
- To obtain Basics of digital logic families.

Perform following experiments

1. Linear wave shaping. (RC Integrator and Differentiator)
2. Non Linear wave shaping – Clippers.
3. Non Linear wave shaping – Clampers.
4. Transistor as a switch.
5. Astable Multivibrator.
6. Monostable Multivibrator.
7. Bi-stable Multivibrator.
8. Schmitt Trigger.
9. Bootstrap sweep circuit.
10. UJT Relaxation Oscillator
11. Sampling Gates.
12. Study of Logic Gates & some applications.

Course Outcomes:

Upon completion of the course, students will

1. Design wave shaping circuits
2. Design circuits to generate various types of signals.
3. Design various digital circuits based on the application and specifications.

Mapping of COs and POs:

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	**3**	**3**	**3**	**2**		**1**		**2**	**1**	**2**		**1**
2	**3**	**3**	**2**	**1**		**1**		**1**	**1**	**1**		**1**
3	**3**	**2**	**3**	**3**		**1**		**1**	**2**	**1**		**1**

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET

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II B. Tech. II Semester

7G347 - ANALOG COMMUNICATION LAB

L T P
0 0 3

Course Objectives:

- To provide a real time environment about different Analog modulation and demodulation methods
- To analyse the available circuits behaviour in Analog communication through hardware as well as software environment

Design and Simulation* of following experiments and also verify in Hardware Laboratory (minimum 6 of the following)

1. Amplitude Modulation& Demodulation
2. SSB Modulation and demodulation
3. DSB-SC Modulation and Demodulation
4. Frequency Modulation & Demodulation
5. Characteristics of Mixer
6. Pre-Emphasis and De- Emphasis
7. Pulse Amplitude Modulation& Demodulation
8. Pulse Width Modulation& Demodulation
9. Pulse Position Modulation& Demodulation

*** Multisim OR Pspice OR Equivalent Simulation Software.**

Course Outcomes:

Upon the completion of the course the students will be able

1. To design circuits of different Analog modulation schemes
2. To understand the working mechanism of modulation methods.
3. To analyze practical behaviour of different elements available in Analog communication system such as filters and mixers.
4. To analyse the working of communication methods using both hardware and software.

Mapping of COs and POs:

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	1	1						2			3	
2	1	2	2					2			3	
3	1	2	2					3			3	
4	1	2	1					2			2	

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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II B. Tech. II Semester

7G348 - DIGITAL DESIN LAB

L T P
0 0 3

Course Objectives:

- To Design different types of Combinational Logic Circuits.
- To learn about Flip-Flops and their Conversions.
- To Design Mod-N Synchronous and Shift Register Counters.

List of Experiments:

1. Logic Gates
2. Realization of AND, OR,NOT,EX-OR,EXNOR functions using universal Gates
3. Applications of logic gates –ADDER, SUBTRACTORS
4. 2-bit Magnitude comparator
5. Decoders
6. Multiplexes
7. Boolean function realization using Decoder and Mux
8. Code converters (Binary to Gray & Gray to Binary)
9. Flip-Flops
10. Flip –Flop Conversions
11. Design of MOD-N synchronous counter
12. Shift register counters (Ring & Twisted Ring Counters)

Course Outcomes:

Upon completion of the course, students will

1. Design different types of Combinational Logic Circuits.
2. Learn about Various Flip- Flops and their Conversions.
3. Design various Mod-N Synchronous and Shift Register Counters.

Mapping of COs and POs:

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	1	2		2		2			1			2
2	2	2	2	2			1		1			2
3	3	2	2	2			1		1			2

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET

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B. Tech. III Year I Semester

(7G159) COMPUTER SYSTEM ARCHITECTURE

Course Objectives*:*

The course aims to provide the student with the ability

- To make the students understand the structure and of various functional modules
- To understand the techniques that computers use to communicate with I/O devices
- To study the concepts of pipelining and the basic characteristics of multiprocessors

Unit-I

BASIC STRUCTURE OF COMPUTERS: Computer types, Functional units, Basic operational concepts, Bus structures, Software, performance, multiprocessors and multi computers. Data types, Complements, Data representation: Fixed point and floating point representations, Error detection codes.

Unit-II

REGISTER TRANSFER LANGUAGE AND MICRO-PERATIONS: Register transfer language, register transfer, Bus and memory transfer, Arithmetic Micro Operations, logic micro operations, shift micro operations, arithmetic logic shift unit, Instruction codes, Computer registers computer instructions-Instruction cycle, memory-reference instructions, input-output and interrupt.

Unit-III

CENTRALPROCESSINGUNIT and COMPUTER ARITHMETIC: Stack organization, Instruction formats, Addressing modes, data transfer and manipulation, Program control, reduced instruction set computer.

COMPUTER ARITHMETIC: Addition and subtraction, multiplication algorithms, Division algorithms

MICRO PROGRAMMED CONTROL: Control memory, Address sequencing, and micro program example.

Unit-IV:

THE MEMORY SYSTEM & INPUT-OUTPUT ORGANIZATION: Memory hierarchy, Main memory, Auxiliary memory, Associative memory, Cache memory, virtual memory, memory management hardware.

INPUT-OUTPUT ORGANIZATION: Peripheral devices, input-output interface, Priority Interrupt, Direct Memory Access, Input-output processor (IOP).

Unit-V:

PIPELINE AND VECTOR PROCESSING: Parallel processing, pipelining, Arithmetic pipeline, Instruction Pipeline, RISC pipeline vector processing, Array Processing.

Multi Processors: Characteristics of multiprocessors, interconnection structures, Inter processor Arbitration.

Text Books:

1. M.Moris Mano, *Computer System Architecture*, PHI, III Edition, 2006.
2. Car Hamacher, ZvonkoVranesic, SafwatZaky, Car Hamacher, ZvonkoVranesic, SafwatZaky, *Computer Organization*, Mc.GrawHill Edition, 2002.

Reference Books:

1. William Stallings, *Computer Organization and Architecture*, PHI, Seventh Edition, 2006.
2. John P.Hayes, *Computer Architecture and Organization*, Mc Graw Hill International editions, 1998.

Course Outcomes:

Upon completion of the course, students will be

- Able to use memory and I/O devices effectively
- Able to explore the hardware requirements for cache memory and virtual memory
- Able to understand pipelining and multiprocessors

Course	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO12	PSO1	PSO2	PSO3
CO1	-	3	2	-	-	1	-	3	2	-	-	2	3	3	2
CO2	-	-	-	-	3	1	1	2	3		1	-	3	2	1
CO3	-	2	2	-	1	-	-	-	2	-	-	-	2	3	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY&SCIENCES:: RAJAMPET

(AN AUTONOMOUS INSTITUTION)

B. Tech. III Year I Semester

(7G351)DIGITAL COMMUNICATION

Course Objectives*:*

The course aims to provide the student with the ability

- To understand and apply different digital modulation Techniques
- To learn and design various coding and detection techniques

Unit-I

PULSE DIGITAL MODULATION: Elements of digital communication system, advantages of digital communication systems, Elements of PCM, Bandwidth requirements of PCM, Noise in PCM Systems, Differential PCM systems (DPCM), Delta modulation systems, Adaptive delta modulation, comparison of PCM and DM systems,

Unit-II

DIGITAL CARRIER MODULATION SCHEMES: Introduction, Binary ASK Signaling Scheme-Generation and detection methods, Binary FSK Signaling Scheme-Generation and detection methods, Binary PSK Signaling Scheme-Generation and detection methods, DPSK and DEPSK, Introduction to M-ary Signaling , Comparison of Digital Modulation Schemes.

Unit-III

INFORMATION THEORY AND SOURCE CODING: Unit of information, Entropy, Rate of information, Joint and conditional entropy, Mutual information, Channel capacity, Shannon theorem, Shanon –Hartley theorem- Trade-off between Bandwidth and S/N.

Unit-IV

ERROR CONTROL CODING-I: Introduction, Classification of Codes, Shanon-Fano coding, Huffman coding, Lempel-Ziv Code.

Linear block codes: Introduction, Matrix description of Linear Block codes, Error detection and error correction capabilities of linear block codes, Syndrome Calculation.

Unit-V

ERROR CONTROL CODING-II: Binary cyclic codes: Algebraic structure, encoding of cyclic codes, syndrome calculation

Convolution Codes: Introduction, Encoder for convolution codes, State diagram, Tree diagram and Trellis diagram

Text Books:

1. K.Sam shanmugam - Digital and Analog communication Systems, Wiley, 2010.
2. R.P.Singh & S.D.Sapre - Communication Systems Analog & Digital, TMH, 2008.

Reference Books:

1. Simon Haykin - Digital Communications, Wiley, 2006.
2. John Proakis - Digital Communications, TMH, 1983.

Course Outcomes*:*

Upon completion of the course, students can

- understand different Modulation techniques, design of digital communication systems based on these modulation techniques in real time
- be able to use source coding techniques and channel coding techniques in communications systems and Design Different error control Codes
- To design basic digital communication systems for applications in real time.

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	2					3	2	2	3	3	1
CO2	3	3	2	2	2					3	2	2	3	3	1
CO3	3	2	2	2	2			1		3	2	2	3	3	1

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B. Tech. III Year I Semester

(7G352) CONTROL SYSTEMS

Course Objectives*:*

The course aims to provide the student with the ability

- To understand the basic concepts of systems and their stability
- To apply the knowledge to design an efficient compensator to meet desired specifications.

Unit-I

INTRODUCTION & TRANSFER FUNCTION REPRESENTATION:

Concepts of Control Systems-Classification- Open Loop and closed loop control systems and their differences-Examples- Feed-Back Characteristics, Effects of feedback-Mathematical models. Transfer function, Block Diagram representation - Block diagram algebra, Signal Flow graph and Mason's gain formula.

Unit-II

TIME RESPONSE ANALYSIS & STABILITY ANALYSIS IN S-DOMAIN:

Types of test signals, Type and Order of systems, Time Response of first and second order system, Time domain specifications- and– steady state error – static error constants. .

Concepts of stability: Routh-Hurwitz stability criterion, Root Locus Technique-Root locus concept - construction of root loci-effects of adding poles and zeros to G(s) H(s) on the root loci.

Unit-III: STABILITY ANALYSIS IN FREQUENCY DOMAIN: Introduction, Frequency domain specifications-Bode diagrams-Determination of Frequency domain specifications from the Bode Diagram-Phase margin and Gain margin-Stability Analysis from Bode Plots. Polar Plots, Nyquist stability criterion–simple problems.

Unit-IV

DESIGN AND COMPENSATION OF CONTROL SYSTEMS

Introduction to Compensation networks – Lag, Lead, Lead-Lag controllers Design in Frequency Domain–Effects of PI, PD & PID controllers.

Unit-V

STATE SPACE ANALYSIS OF CONTINUOUS SYSTEMS Concepts of state, state variables and state model-derivation of state model for physical systems Diagonalization- State transition Matrix and its properties – Solution of linear state equation – Concepts of controllability and observability.

Text Books:

1. I. J. Nagrath and M. Gopal, *Control Systems Engineering*, 2nd edition, New Age International (P) Limited, Publishers.

2. Xavier .S.P.Eugune, Joseph Cyril Babu, *Principles of control systems*, S.Chand &Company.

Reference Books:

1. Katsuhiko Ogata, *Modern Control Engineering*, 3rd edition, Prentice Hall of India Pvt. Ltd., 1998.
2. NISE, *Control Systems Engg*, 3rd Edition, John wiley.
3. Richard C. Dorf, Robert H. Bishop, *Modern control systems*, 11th edition, Pearson education, 2007.
4. Graham Goodwin**,** Stefan Graebe and Mario Salgado, *Control System Design*, prentice hall.

Course Outcomes:

Upon completion of the course, students will

- understand the basic principles of systems and their mathematical representations
- Know the type and order of the systems and their time domain specifications.
- Gain the knowledge on stability and analyze it using different techniques
- Design compensators and controllers for various systems
- Know the mathematical approach for determining the stability of the control system, controllability and observability.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**	**PSO1**	**PSO2**	**PSO3**
CO1	3	2	1					2		2		2	2	3	
CO2	3	2							2	2			3	2	
CO3	3	3						1	2			2	3	2	
CO4		3	3									2	3	3	
CO5	3	3							3			3	3	2	

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET

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B. Tech. III Year I Semester

(7G353)ANALOG & DIGITAL INTEGRATED CIRCUITS

Course Objectives*:*

The course aims to provide the student with the ability

- To understand the basic concepts of Linear integrated circuits.
- To apply the knowledge to design Digital Integrated circuits.
- To learn the Hardware description language (VHDL) to design digital circuits.

Unit-I

Operational amplifiers: Basic Information of Op-amp, Ideal op-amp, Internal Circuit, Dc & AC Characteristics

Applications: Basic op-amp applications, Instrumentation amplifier, Ac amplifier, V-I Converter and I-V Converter, Log & Anti Log amplifier, Multiplier and Divider, Differentiator and Integrator. Comparator and applications, Astable & Monostable multivibrator, Triangular wave generator, RC active filters Introduction to Voltage Regulators, Features of 723 Regulator, and Three Terminal Voltage Regulators.

Unit-II

IC 555 Timer: Fundamental Block diagram, Monostable, Astable operation & Schmitt Trigger

PLL: Basic Principe and Operation of individual Blocks, Monolithic PLL, PLL applications.

D-A and A-D Converters: Basic DAC techniques, Different types of DACs-Weighted resistor DAC, R-2R ladder DAC, Inverted R-2R DAC, Different Types of ADCs - Parallel Comparator Type ADC, Counter Type ADC, Successive Approximation ADC and Dual Slope ADC,

Unit-III

CMOS Logic, CMOS steady State Electrical behavior, CMOS Dynamic Electrical Behavior, CMOS Logic families, Bipolar Logic, TTL logic, TTL families, ECL.

VHDL Hardware Description Logic: Design Flow, Program simulators, Types & constraints, Functions and Procedures, Libraries or Packages, Structural design, Elements, Dataflow design elements, Behavioral Logic elements, Time Dimension & simulation, Synthesis.

Unit-IV

Combinational Circuits & IC'S: Decoders, Encoders, Three state Devices, Multiplexers, EX-OR gates, Parity Circuits, Comparators, adders, Subtractors, ALUs and Combinational Multiplexers, VHDL programs.

Unit-V

Sequential circuits & IC'S: Latches and Flip Flops: Counters, Shift Registers, Design Methodology, Impediments to synchronous Design, VHDL programs

Text Books:

1. Ramakanth A. Gayakwad - Op-Amps & Linear ICs, 3rd edition, PHI, 2001.
2. D. Roy Chowdhury - Linear Integrated Circuits , New Age International (p) Ltd, 4th Edition, 2010.
3. John F. Wakerly- Digital Design Principles & Practices, PHI/ Pearson Education Asia, 3rd Ed., 2005
4. J.Bhaskar-VHDL primer, PHI/ Pearson Education Asia, 3rd Ed., 2003.

Reference Books:

1. David A. Bell - Operational Amplifiers & Linear ICs, 2nd edition, Oxford University Press, 2010.
2. Charles H. Roth Jr- Digital System Design Using VHDL, PWS Publications, 2nd edition, 2008.
3. Kenneth L Short – VHDL for Engineers, Pearson Education 2009.

Course Outcomes:

Upon completion of the course, students will

- Understand the basic principles of analog integrated circuits.
- Be able to design combinational and sequential circuits using programming language.
- Be able to design combinational and sequential circuits using ICs.

	PO_1	**PO_2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO_{11}**	**PO12**	**PSO1**	**PSO 2**	**PSO3**
CO1	3	3						3			3		3	3	
CO2	3										3		3	3	
CO3	3	3	3					3			3		3	3	

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET

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B. Tech. III Year II Semester

(7G354)ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

Course Objectives:

The course aims to provide the student with the ability

- To know the instrument usage for a particular application.
- To understand the internal structure of all instruments that are used in measuring parameters related to electronic based systems.

Unit- I

MEASUREMENT ERRORS AND MEASURING INSTRUMENTS Errors in Measurement, Accuracy, Precision, Resolution. Basics of statistical analysis, D'Arsonval galvanometer, PMMC mechanism. DC Ammeter. DC voltmeter. Series Ohmmeter, shunt Ohmmeter. Volt-Ohm-Milliammeter. Digital voltmeters (DVMs): Ramp type & dual slope integrator, Digital Multimeter.

Unit-II

SIGNAL GENERATORS & ANALYZERS Audio frequency signal generation, the Sine-wave generator, frequency-Synthesized signal generator, frequency divider generator, signal generator modulation, Sweep frequency generator, pulse and square wave generators. Function generator. Wave analyzers, Harmonic distortion analyzers, Spectrum Analyzers. Simple Frequency counter.

Unit-III

OSCILLOSCOPES Oscilloscope block diagram, Cathode Ray Tube, deflection amplifiers, waveform display, oscilloscope time base, dual trace oscilloscope, and oscilloscope controls. Measurement of voltage, frequency and phase. Pulse measurements, oscilloscope probes, display of device characteristics, X-Y and Z displays, oscilloscope specifications and performance. Delayed-Time-Base oscilloscopes, Analog storage oscilloscope, Sampling oscilloscopes, digital storage oscilloscopes, DSO applications.

Unit-IV

BRIDGES Wheatstone bridge guarded Wheatstone bridge, Kelvin Bridge, AC bridges and their application, Maxwell's bridge, Hays Bridge. Schering Bridge. Wein Bridge. Q-meter.

Unit-V

TRANSDUCERS Classification of transducers, selecting a transducer, strain gauges, displacement transducers. Temperature Measurements. Data Acquisition System, strip chart recorders and X-Y recorder.

Text Books:

1. Electronic Instrumentation and Measurements, second edition – David A. Bell, Eastern Economy Edition, PHI.
2. Modern Electronic Instrumentation and Measurement Techniques – A.D. Helfrick and W.D. Cooper, PEARSON Education.

References Books

1. Electronic instrumentation, second edition - H.S.Kalsi, Tata McGraw Hill, 2004.
2. A Course in electrical and electronic measurements and instrumentation- A.K.Sawhney., DhanpatRai & Co publishers.

Course Outcomes*:*

Upon completion of the course, student can

- Understand the principles of measurements with different basic meters and calculate all the parameters related to measurements.
- Understand about different types of signal generators and Signal analyzers.
- Understand the basic features of oscilloscope and its internal structure and different types.
- Design different types of bridges for signal conditioning purpose.
- Understand about different types of transducers and advancements in Instrumentation.

Course	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO12	PSO1	PSO2	PSO3
CO1	3	3	3		3							3	3	3	
CO2	3				3							3	3		
CO3	3	3	3		3							3	3	3	
CO4	3	3	3		3							3	3	3	
CO5	3				3							3	3		

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET

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B. Tech. III Year I Semester

(7G355) ANTENNAS AND WAVE PROPAGATION

Course Objectives*:*

The course aims to provide the student with the ability

- To understand the concepts of Antennas and their family
- To analyze and design different antennas for various applications.
- To understand Concepts of Various Wave Propagation methods

Unit-I

INTRODUCTION: Introduction, Basic Antenna Parameters ,Patterns, Beam Area, Radiation Intensity, Beam Efficiency, Directivity and Gain, Directivity and Resolution, Antenna Apertures, Effective Height, Fields from Oscillating dipole, Antenna Field Zones.

Radiation from Small Electric Dipole, Quarter wave Monopole and Half wave Dipole – Current Distributions, Evaluation of Field Components, Antenna Theorems – Reciprocity Theorem.

Unit-II

ANTENNA ARRAYS : Point Source , Power Patterns, Field Patterns, Phase Patterns , Arrays of two isotropic point sources-Different cases, Non-isotropic point Sources, Principle of Pattern Multiplication , N element Uniform Linear Arrays – Broadside, End fire Arrays, EFA with Increased Directivity, Binomial Arrays, Arrays with Parasitic Elements, Folded Dipoles & their characteristics, Yagi - Uda Arrays.

Unit-III

ANTENNAS AND THEIR CHARACTERISTICS : Helical Antennas: Helical Geometry, Helix modes, Horn Antennas – Introduction, Optimum Horns, Rectangular Horn antenna, Reflector Antennas: Flat Sheet and Corner Reflectors. Paraboloidal Reflectors – Geometry, characteristics, Spill Over, Back Lobes, Aperture Blocking, Cassegrain Feeds, Lens Antennas – Geometry, Dielectric Lenses and Zoning.

Unit-IV

GROUND WAVE PROPAGATION : Introduction to wave propagation-Definition and Broad Categorization, Classification of Electromagnetic waves based on Modes of propagation, Different modes of Wave Propagation Ground Wave Propagation–Introduction, Plane earth reflection, Space wave and surface wave, Transition between surface and space wave, Tilt of Wave front due to ground losses, Impact of Imperfect Earth, Reduction factor and numerical Distance, Earth's Behavior at different frequencies, Electrical Properties of earth, Curved earth reflection.

Unit-V

SPACE WAVE PROPAGATION and SKY WAVE PROPAGATION

Introduction, Effect of imperfection of Earth, Effects due to - curvature of earth, interference zone, Shadowing of hills and buildings, Absorption by Atmospheric phenomena, Variation of field strength with Height, Super refraction, Scattering Phenomena, Tropospheric propagation, Fading.

Structural details of Ionosphere, Wave propagation mechanism, Refraction and reflection of Sky waves by Ionosphere, Ray path, Critical Frequency, MUF, LUF, OF, Virtual Height and Skip Distance, Relation between MUF and Skip distance, Impact of Solar activity, Multi hop propagation, Take-off angle, Energy loss in Ionosphere and Sky wave signal strength.

Text Books:

1. John D. Kraus, Ronald J. Marhefka and Ahmad S Khan – "Antennas and Wave Propagation" TMH, 4e, Special Indian Edition 2010.
2. E.C. Jordan and K.G. Balmain - Electromagnetic Waves and Radiating Systems, PHI, 2nd ed., 2000

Reference Books:

1. K.D.Prasad - Antenna and wave propagation, Khanna Publications
2. Balanis- Antenna Theory

Course Outcomes*:*

Upon completion of the course, students can have

- Knowledge on different basic concepts related to antennas and different antenna parameters mathematically
- An ability to design BSA, EFA etc... Antenna arrays. Parasitic arrays and Yagi-Uda antenna.
- Ability to design and implement the utilization of Helical and VHF and UHF antennas.
- An Ability to analyze the propagation of wave and different parameters and Knowledge on all the layers of atmosphere and the nature of different propagation mechanisms.

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

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET

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B. Tech. III Year B.Tech. I Semester

(7G357) DIGITAL COMMUNICATION LAB

Course Objectives:

- The course aims to provide a real time experience for different digital modulation and demodulation schemes
- To simulate and analyse the digital modulation schemes

Design and Simulation* of following experiments and also verify in Hardware Laboratory (minimum 6 of the following)

1. Sampling Theorem
2. Pulse Code Modulation and Demodulation
3. DPCM Modulation and Demodulation
4. Delta Modulation
5. Time Division Multiplexing
6. FSK Modulation and Demodulation
7. PSK Modulation and Demodulation
8. DPSK Modulation & Demodulation

*** Multisim OR Matlab OR Equivalent Simulation Software.**

Course Outcomes:

After completion of the course the students will be able

- To experience real time behaviour of different digital modulation schemes
- To understand the working principles of Modulation and demodulation
- To simulate and analyse the digital modulation schemes.

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO12	PSO1	PSO2	PSO3
CO1	2	3	3		2	2				3		3	3	3	1
CO2					2	2				3		3	3	3	1
CO3	2	3	3	1	2	2				3		3	3	3	1

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B. Tech. III Year I Semester

(7G358) IC APPLICATIONS LAB

Course Objectives:

- To verify the applications of Op-amp and timers
- To use CAD tools for development of complex digital logic circuits
- To Simulate and analyse with hardware description language

Part A (IC Application Lab – Minimum 5):

1. OP AMP Applications – Adder & Subtractor Circuits.
2. Active Filter Applications – LPF, HPF (first order).
3. Function Generator using OP AMPs.
4. IC 555 Timer – Monostable and Astable Operation Circuit.
5. IC 566 – VCO Applications.
6. Voltage Regulator using IC 723.
7. 4 bit DAC using OP AMP.

Part B (ECAD Lab – Minimum 7):

Design and simulation of simple combinational circuits and sequential circuits using ICs and also implementation of the same on FPGA boards for verification. (Adders, Subtractors, encoders, decoders, multiplexers, comparator, Flip flops, counters and registers etc.)

Course Outcomes:

Upon the completion of course student will be

- Able to verify applications of Op-amp
- Able to verify applications of Timer
- Able to use computer-aided design tools for development of ~~complex~~ simple digital logic circuits.
- Able to simulate and analyse the design with hardware description languages.

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	3	1	1	1	1			3	3	
CO2	2	2	2	2	2	2	2	2	2	2			3	3	
CO3	2		3	3	3	3	2	3	3	3	3	3	3	3	
CO4	3		3	3	3	3	2	3	3	3	3	3	3	3	
CO5	3		3	3	3	3	2	3	3	3	3	3	3	3	

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET

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B. Tech. III Year II Semester

(7GC51) Advanced English Communication Skills Lab

(ECE)

Résumé Preparation – structure, formats and styles – planning - defining career objective - projecting one's strengths and skills - creative self-marketing–sample resumes - cover letter

Interview Skills- concept and process - pre-interview planning – preparation - body language - answering strategies – frequently asked questions

Group Discussion –communicating views and opinions – discussing – intervening – agreeing and disagreeing –asking for and giving clarification - substantiating - providing solution on any given topic across a cross-section of individuals - modulation of voice and clarity - body language – case study

Oral Presentations (Individual & Team) – collection of data from various sources –planning, preparation and practice – attention-gathering strategies - transitions – handling questions from audience

Listening Comprehension – listening for understanding - responding relevantly

Learning Resources: AECS Lab Manual prepared by Dept of HS, AITS Rajampet

Course Outcomes: Student will be able to

- express himself fluently in social and professional contexts
- enhance his skills of making a presentation confidently
- learn how to face Interviews confidently, to participate in meetings effectively
- Face CBTs with greater felicity.

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

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET

(AN AUTONOMOUS INSTITUTION)

B. Tech. III Year II Semester

(7G361)VLSI DESIGN

Course Objectives:

The course aims to provide the student with the ability

- To acquire knowledge of fabrication process involved in MOS Devices.
- To understand the basic electrical properties of MOS devices and VLSI Circuit Design Processes
- To get the knowledge on design methods and testing techniques.

Unit-I

Introduction to IC technology- VLSI design flow, MOS, PMOS, NMOS, CMOS and BI-CMOS fabrication processing technologies - oxidation, Photolithography, diffusion, Ion implantation, metallization , Encapsulation, probe testing, integrated resistors and capacitors. Introduction to Fin FET technology

BASIC ELECTRICAL PROPERTIES OF MOS AND BICMOS CIRCUITS: Basic electrical properties of MOS and BI-CMOS circuits: I_{ds}-V_{ds} relationships, MOS transistor threshold voltage, g_m, g_{ds}, figure of merit (ω_o), pass transistor, NMOS inverter, various pull-ups, CMOS inverter analysis and design, BI-CMOS inverters

Unit-II

VLSI CIRCUIT DESIGN PROCESSES: MOS layers, stick diagrams, design rules and lay out, 2µm CMOS design rules for wires, contacts and transistors layout diagrams for NMOS and CMOS inverters, Logic gates and Other Complex Gates, scaling of MOS circuits, limitations of scaling.

Unit-III

GATE LEVEL DESIGN Switch logic, alternate gate circuits, basic circuit concepts, sheet resistance R_S and its concept applied to MOS Transistors, area capacitance and its calculations, Inverter delays, driving large capacitive loads, wiring capacitances.

Unit-IV

SUBSYSTEM AND SEMICONDUCTOR IC DESIGN: shifters, adders, multipliers, parity generators, comparators, zero/one detectors, counters, high density memory elements, Field Programmable Gate Arrays, Complex Programmable Logic Devices, standard cell based Designs.

Unit-V

DESIGN METHODS AND TESTING:

Design methods, design capture tools, design verification tools, Test principles, Need for testing, design strategies for test, chip level test techniques, system-level test techniques, Layout Design for Improved Testability.

Text Books:

1. Kamran Eshraghian, Eshraghian Douglas and A. pucknell - Essentials of VLSI circuits and systems, PHI, 2005 Edition.
2. Weste and Eshraghian - Principles of CMOS VLSI design, Pearson Education, 1999.

Reference Books:

1. John P.Uyemura, John Wiley - Introduction to VLSI circuits and systems, 2003.
2. John M. Rabaey - Digital Integrated circuits, PHI, ECE, 1997.
3. Jerry G. Fossum, Vishal P. Trivedi - Fundamentals of Ultra-Thin-Body MOSFETs and FinFETs, Cambridge University Press, 2013.

Course Outcomes*:*

Upon completion of the course, students can

- Understand different IC technologies and their fabrication process.
- Analyze the basic electrical properties of MOS transistor and design of CMOS and Bi-CMOS inverters.
- Be able to understand the VLSI design process.
- Be able to design the gate level and sub system modules.
- Be able to knowledge on design methods and testing techniques

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO12	PSO1	PSO2	PSO3
CO1	3	3	3		3	3	2		2		2	2	2	2	3
CO2	3	3	3	1	2	2	2	1	2	2	1	2	2	2	2
CO3	3	3	3	2	3			2			3	2	2	2	2
CO4	2	3	3	1	2			1	2	2	2		2	2	3
CO5	2	3	3					1	3				3	2	2

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET

(AN AUTONOMOUS INSTITUTION)

B. Tech. III Year II Semester

(7G362) MICROWAVE ENGINEERING

Course Objectives:

The course aims to provide the student with the ability

- To understand EM Wave theory at microwave frequencies,
- To learn about various microwave components: microwave tubes, microwave devices along with measurements.

Unit- I

INTRODUCTION TO MICROWAVE ENGINEERING & WAVE GUIDES: Introduction to Microwave engineering, Microwave Spectrum and Bands, Advantages & Applications of Microwaves. Wave guides- Types, Rectangular Waveguides – TE/TM mode analysis, Expressions for Fields, Characteristic Equation and Cut-off Frequencies, Filter Characteristics, Dominant and Degenerate Modes. Mode Characteristics – Phase and Group Velocities, Wavelengths and Impedance Relations, Impossibility of TEM mode, Power Transmission and Power Losses in Rectangular Guide.

Unit- II

CIRCULAR WAVEGUIDES: Propagation of TE & TM waves, Nature of Fields, Characteristic Equation, TM modes, Dominant and Degenerate Modes, Attenuation, Advantages and Applications. Cavity Resonators– Introduction, Rectangular and Cylindrical Cavities, Dominant Modes and Resonant Frequencies, Q factor and Coupling Coefficients.

Unit- III

MICROWAVE COMPONENTS

Waveguide Microwave Junctions Formulation and Properties of S-Matrix, Microwave T-Junctions-H-Plane, E-Plane, Magic Tee and its Applications. Directional Couplers-Two Hole, Wave guide Irises- Posts & Tuning screws, Coupling Probes and loops, Waveguide Terminations, Phase Shifters and Microwave attenuators, Ferrite Devices-Faraday Rotation Microwave devices-Gyrator, Isolator, Circulator

Unit-IV

MICROWAVESOURCES-KLYSTRONS, TWT's, AGNETRONS Limitations and Losses of conventional tubes, Microwave tubes– classifications, Two Cavity Klystrons – Structure, Reentrant Cavities, Velocity Modulation Process and Applegate Diagram, Bunching Process, Expressions for output Power and Efficiency. Reflex Klystrons – Structure, Applegate Diagram and Principle of working, Mathematical Theory of Bunching, Power Output, Efficiency, Electronic Admittance. TWT's-Construction, Principle and working Operation, Mathematical Analysis, Performance and Applications. Magnetron-Introduction, Cavity Magnetron, Mathematical Analysis, Sustained oscillations, Mode jumping, Frequency Pushing and pulling, Performance Characteristics and Applications.

Unit-V

MICROWAVE SOLID STATE DEVICES & MEASUREMENTS Introduction, TED's, Gunn Effect Diodes (GaAs), RWH Theory-Differential Negative Resistance, Two Valley Model Theory, Modes of Operation. Avalanche Transit Time devices- Introduction, IMPATT and TRAPATT Diodes -Structure, Principle of Operation, Power output and Efficiency. Microwave Measurements-Description of Microwave Bench–Different Blocks and their Features, Precautions; Microwave Power Measurement – Bolometer Method. Measurement of Attenuation, Frequency, VSWR, Cavity Q, Impedance Measurements

Text Books:

1. Samuel Y. Liao, PHI- Microwave Devices and Circuits, 3rd Edition, 2003.
2. Microwave and Radar Engineering, M Kulkarni– Umesh Publications, 1998.

Reference Books:

1. R.E. Collin - Foundations for Microwave Engineering, IECE Press, John Wiley, 2nd Edition, 2002.
2. Herbert J. Reich, J.G. Skolnik, P.F. Ordung and H.L. Krauss - Microwave Principles, CBS Publishers and Distributors, New Delhi, 2004.

Course Outcomes:

Upon completion of the course, students will

- Ability to solve the wave equations.
- Learn the construction and operation of microwave devices, components, sources and detectors
- Study about the various measurements of microwave parameters

Course	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO12	PSO1	PSO2	PSO3
CO1	1	3	3	1						2			-	3	
CO2		3	3							2	1			3	
CO3		3	3		1									3	1

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET

(AN AUTONOMOUS INSTITUTION)

B. Tech. III Year II Semester

(7G363)MICROPROCESSORS & INTERFACING

Course Objectives*:*

The course aims to provide the student with the ability

- To know the basic concepts of first 16 bit general purpose microprocessor
- To learn the programming and Interfacing Concepts of Microprocessors.

Unit -I

8086 ARCHITECTURE & PROGRAMMING: Overview of 8085 processor architecture**,** Architecture of 8086 microprocessor, Register organization, Memory organization, Machine language instruction formats of 8086. Addressing modes of 8086, Instruction set of 8086, Assembler directives, Assembly language programs involving logical, branch and call instructions, sorting, evaluation of arithmetic expressions, string manipulation. Procedure and Macros.

Unit –II: MEMORY INTERFACING

Pin diagram of 8086-Minimum mode and maximum mode of operation, Timing diagrams. I/O Interfacing methods – I/O mapped I/O, Memory mapped I/O. Basic structure of SRAM and DRAM cell, Memory interfacing to 8086 (static RAM and EPROM). Need for DMA, Architecture of 8257 and interfacing with 8086.

Unit –III: I/O INTERFACING

Interfacing I/O ports – latches and buffers. 8255 PPI-Architecture, various modes of operation and interfacing to 8086. Seven segment Displays, stepper motor, D/A, A/D converter interfacing.

PROGRAMMABLE INTERRUPT CONTROLLER (8259): Data transfer methods-Programmed I/O, interrupt driven I/O. Interrupt structure of 8086, Vector interrupt table. Interrupt service routines. 8259 PIC architecture and interfacing, cascading of interrupt controller. Simple programs.

Unit- IV

PROGRAMMABLE INTERVAL TIMER/COUNTER (8253) Architecture of 8253 programmable interval timer/counter, mode of operations, interfacing with 8086.

COMMUNICATION INTERFACE: Asynchronous and synchronous data transfer schemes. Necessity of communication interfaces, 8251 USART architecture and interfacing, RS-232C. TTL to RS232C and RS232C to TTL conversion. Sample program of serial data transfer.

Unit -V

ADVANCED MICROPROCESSORS Introduction to 80286, salient features of 80386, Real and protected mode segmentation and paging, salient features of Pentium and Pentium pro processors.

Text Books:

1. Advanced microprocessor and peripherals-A.K. Ray and K.M.Bhurchandi, 2nd edition, TMH, 2000.
2. Microprocessors and Interfacing- Douglas V.Hall, 2nd edition, 2007.

Reference Books:

1. The 8086 and 8088 Microprocessors- Walter A. Triebel, Avtar Singh, PHI, 4th Edition, 2003.
2. Micro computer system 8066/8088 family Architecture, programming and Design-By Liu and GA Gibson, PHI, 2nd Ed.
3. Intel 8086/8088 microprocessor architecture, programming, design and interfacing, Bhupendra singh chabra, Dhanpatrai publications.

Course Outcomes:

Upon completion of the course, students can

- Know the Architectural features and programming of 8086.
- Be able to Interface various Intel devices with 8086.
- Understand the Interrupt structure of 8086 and servicing the interrupts using interrupt controller.
- Know the Salient features of advanced microprocessors.

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	2	2	-	-	1	-	-	-	3	2	-
CO2	2	3	-	-	3	-	-	-	-	-	-	-	2	3	-
CO3	3	-	-	-	-	-	-	-	-	-	-	-	1	1	-
CO4	3	-	-	-	2	-	-	-	-	-	-	1	2	2	2

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET

(AN AUTONOMOUS INSTITUTION)

B. Tech. III Year II Semester

(7G364)DIGITAL SIGNAL PROCESSING

Course Objectives*:*

The course aims to provide the student with the ability

- To understand application of Discrete Fourier series and Transforms
- To learn design techniques and applications of Digital signal processing

Unit- I

INTRODUCTION AND DISCRETE FOURIER SERIES Discrete time signals, LTI systems, stability and causality, Solution of linear constant coefficient difference equations. 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.

Unit- II

FAST FOURIER TRANSFORMS: Fast Fourier transforms (FFT)-Radix2 decimation in time and decimation in frequency FFT algorithms, inverse FFT, FFT for composite N.

Unit- III

IIR AND FIR DIGITAL FILTERS: Analog filter approximations-Butterworth and chebyshev, design of digital filters from analog filters, design examples: analog-digital transformations, Basics of Z-Transforms, IIR Structures- Direct form–I, Direct form- II, Transposed Structure, and Cascade form.

Design of FIR digital filters using window techniques, frequency sampling technique, comparison of IIR and FIR filters,

Unit- IV

MULTIRATE DIGITAL SIGNAL PROCESSING FUNDAMENTALS:

Introduction, Decimation by a factor D, Interpolation by a factor I, Sampling rate conversion by a rational factor I/D, Filter Design and Implementation for Sampling rate conversion, Multistage implementation of Sampling rate conversion.

Unit -V

APPLICATIONS OF DIGITAL SIGNAL PROCESSING:

Spectral analysis of non-stationary Signals, Musical Sound processing, signal Compression, Oversampling A/D Converter, Oversampling D/A Converter.

Text Books:

1. Digital signal processing, principles, Algorithms and applications: John G. Proakis, Dimitris G. Manolakis, Pearson Education/PHI, 4th ed., 2007.
2. Digital signal processing , A computer base approach- Sanjit K Mitra, Tata McGraw Hill, 3rd edition, 2009.

Reference Books:

1. Digital signal processing: Andreas Antoniou, TATA McGraw Hill, 2006.
2. Discrete Time Signal Processing-A.V. Oppenheim and R.W. Schaffer, 2nd ed., PHI.
3. Digital Signal Processing- P.Ramesh Babu, 4th Ed. SciTech Publications.

Course Outcomes*:*

Upon completion of the course, students will

1. Understand the types of discrete time signals & systems and analyze using Fourier series and Fourier transforms.
2. Know the basics of digital filters and design using different techniques**.**
3. Understand the concepts of decimation and interpolation**.**
4. know the applications in Real life

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO_{10}	PO_{11}	PO_{12}	PSO1	PSO2	PSO3
CO1	2	3											3		
CO2	2	3	3	3							3	2	3	3	
CO3		3	3	3	2						3		3	3	
CO4			3	3	2	1					3	2	3	3	1

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET

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B. Tech. III Year II Semester

(7G16D) OBJECT ORIENTED PROGRAMMING CONCEPTS

COURSE OBJECTIVES:

1. The Student will able to understand the Basics object-oriented programming concepts
2. The Student will able to understand and apply the object oriented concept like Classes and Objects, encapsulation, Inheritance, Polymorphisms in c++
3. The Student will able to understand java environment and its features
4. The Student will able to understand and apply the object oriented concept like Classes and Objects, encapsulation, Inheritance, Interface, Polymorphisms in java.

COURSE OUTCOMES:

1. Ability to Understand and apply fundamentals of object-oriented programming features through Java Programming Language.
2. Ability to apply and analyze reusability concepts like Inheritance, interfaces and packages in real time applications developed using C++.
3. Ability to understand OOP environment and its features
4. Ability to acquire knowledge on multithreading, exception handling and apply the same in developing real time java based applications.
5. Ability to understand and apply the Collection framework.

UNIT I:

INTRODUCTION: Introduction to structure programming - Object-oriented paradigm, elements of object oriented programming – Merits and demerits of OO methodology - Data types - loops - pointers –arrays – structures – functions – Classes – Objects- Constructor and destructor

UNIT II:

Overloading-Operator overloading – function overloading - **Inheritance** – Types of Inheritance- virtual base class - friend function - Polymorphism – this pointer – virtual functions-pure virtual function- Input / Output streams - **Files** streams — manipulators – Templates

UNIT III:

Introduction to Java –Java vs. C++ - data types – operators – Decision making - branching - loops - classes – objects-arrays- methods – scope - string handling.

UNIT IV:

Inheritance-Types **Packages** – API packages – creating packages – adding class to package - interfaces - **Exception handling**- predefined and user defined.

UNIT V:

Multithreaded programming –creating threads- extending the thread class- life cycle of threads- **Applet Programming** – applet life cycle-creating executable applet – passing parameters to applets - Streams in Java.

TEXT BOOKS

1. E.Balaguruswamy, “Object Oriented Programming with C++”,(4th Edition), Tata McGraw Hill Publications Limited, 2008 (Unit I & II)

2. E. Balaguruswamy, “Programming with Java- A Primer ” (3rd Edition), Tata McGraw Hill Publications Limited, 2007. (Unit III,IV,V)

3. Patrick naughton , “The Java Handbook “,Tata McGraw Hill Publications Limited, 2006.(Unit III,IV,V)

REFERENCE BOOKS

1. K.R.Venugopal, Rajkumar Buyya, T.Ravishankar, "Mastering C++", TMH, 2003

2. Robert Lafore – “OBJECT ORIENTED PROGRAMMING IN Turbo C++”, Waite Group; 3rd edition (December 1998)

3. Bruce Eckel, “Thinking in Java”, (4th Edition) Prentice Hall PTR, 2006

4. Herbert Schildt, "the Java 2 : Complete Reference", Fourth edition, Tata McGraw Hill Publications Limited, 2002.

CO-PO Mapping:

Course Outcomes	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO12	PSO_1	PSO_2
CO1	3		3			3					3	3	3	3
CO2	3		3			3					3	3	3	3
CO3	3		3			3					3	3	3	3
CO4	3		3			3	1				3	3	3	3
CO5	3											3	3	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET

(AN AUTONOMOUS INSTITUTION)

B. Tech. III Year II Semester

(7G365)RADAR ENGINEERING

(Professional Elective – I)

Course Objectives:

- To achieve an understanding of the fundamental design and operation of modern radar systems and a working knowledge of the mathematical tools used in analysis of radar systems problems.
- The emphasis is on physical principles and on modern radar systems for both civilian and defense applications

Unit -I

RADAR PRINCIPLES

Introduction, The simple form of Radar Equation, Radar Block Diagram and Operation, Radar Frequencies, Applications of radar, Prediction of Range Performance, Minimum Detectable Signal, Receiver Noise, Signal-to-noise Ratio, Integration of Radar Pulses, Radar Cross Section of Targets (sphere, cone-sphere), Transmitter Power, PRF and Range Ambiguities, System losses

Unit- II

CW AND FREQUENCY MODULATED RADAR

Doppler Effect, CW Radar – Block Diagram, Isolation between Transmitter and Receiver, Intermediate-frequency Receiver, Receiver Bandwidth , Applications of CW radar, FM-CW Radar-Range and Doppler Measurement, Block Diagram 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, and Transversal filters, Staggered PRFs. Range Gated Doppler Filters, Limitations to MTI Performance.

Unit- IV

TRACKING RADAR

Tracking with Radar, Sequential lobing, Conical Scan, Monopulse Tracking Radar – Amplitude Comparison Monopulse (one and two coordinates), Phase Comparison Monopulse, Tracking in Range, Acquisition, and Comparison of Trackers.

Unit -V

DETECTION OF RADAR SIGNALS IN NOISE

Introduction, Matched Filter Receiver–derivation of the matched filter characteristic, The matched filter and the Correlation Function, Efficiency of Non-matched Filters, Matched Filter with Non-white Noise, Correlation Detection.

Radar Displays & Duplexers: Noise Figure, Noise figure of networks in cascade, Noise Temperature, Radar Displays – types, Duplexers – Branch type and Balanced type, Circulators as Duplexers.

Text Book:

Introduction to Radar Systems – Merrill I. Skolnik, TMH Special Indian Edition, 2nd Edition, 2007.

Reference Book:

Radar Principles – Peebles, Jr., P.Z.Wiley, New York, 1998.

Course Outcomes*:*

Upon completion of the course, students can

- Understand the essential principles of operation and fundamentals of radar systems
- To gain in-depth knowledge about the different types of RADARS and their operations.
- Identify the various RADAR systems in existence; specify their applications and limitations, and explain the principles of how they work.
- Need for signal detection in RADAR and various detection techniques
- Ability to know the various technologies used in the design of RADAR systems such as duplexers, displays etc

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

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET

(AN AUTONOMOUS INSTITUTION)

B. Tech. III Year II Semester

(7G366)NANO ELECTRONICS

(Professional Elective – I)

Course Objectives:

The course aims to provide the student with the ability

- To learn the fundamentals of Nano electronics.
- To understand the applications and limitation of ICs.

Unit-I

INTRODUCTION Nano- The beginning – Electron Microscopies – Scanning probe Microscopies – Optical Microscopies for Nano science and technology – Other kinds of microscopies. Synthesis and purification of nanotubes - transport, mechanical properties and applications.

Unit-II

MODELS OF SEMICONDUCTOR QUANTUM WELLS, QUANTUM WIRES, AND QUANTUM DOTS Semiconductor Hetero structures and quantum wells – Quantum wires and nanowires – Quantum dots and Nano particles – Fabrication Techniques for Nanostructures: Lithography, Nano imprint lithography – split-gate technology, self-assembly.

Unit-III

QUANTUM ELECTRONICS Quantum Electronic Devices – Short channel MOS Transistor, split-gate transistor, Electron-wave transistor, Electron-spin transistor, quantum cellular automata, quantum dot array.

Unit-IV

TUNNELING DEVICES Tunneling effect and Tunneling diode, three terminal RTDs Technology of RTD. Digital circuit design based on RTDS: basic logic circuits.

SINGLE ELECTRON TRANSISTOR (SET) Principle of SET – Coulomb blockade, performance of SET, technology SET circuit design – wiring and drivers, logic and memory circuits, SET adder. Comparison between FET and SET circuit design.

Unit-V

LIMITS OF INTEGRATED ELECTRONICS Energy supply and heat dissipation – Parameter spread as limiting effect – Limits due to thermal particle motion – The Debye length – Reliability as limiting factor – Physical limits. Nano systems as information processing machines – system design and its interfaces – Evolutionary Hardware – Requirements of Nano systems.

Text Books:

1. T. Pradeep, ‘Nano: The Essentials”, TMH Edition (2008)
2. K. Goser, P. Glosekotter, J. Dienstuhl, ‘Nanoelectronics and Nano systems’, Springer Edition (2004)

Reference Book:

George W. Hanson, 'Fundamentals of Nano electronics', Pearson Education (2009).

Course Outcomes:

Upon completion of the course, students can

1. Learn the basics of microscopy's and applications
2. Knows the fundamentals of Quantum electronics
3. Understands the basics of Tunneling devices and SETs
4. Acquire the knowledge on limitations of ICs.

Course	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO12	PSO1	PSO2	PSO3
CO1	1	1	2	2	3	1	1	2	2	1	3	2	2	1	2
CO2	2	2	2	1	3	2	2	3	3	3	3	2	2	3	2
CO3	2	2	3	3	3	2	2	2	2	1	3	1	2	2	2
CO4	2	3	3	3	3	3	2	3	3	3	3	3	3	3	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY&SCIENCES:: RAJAMPET

(AN AUTONOMOUS INSTITUTION)

B.Tech. III Year II-Semester

(7G367) DATA COMMUNICATION SYSTEMS

(Professional Elective – I)

Course Objectives:

The course aims to provide the student with the ability

- To have a detailed study of various analog and digital modulation and demodulation techniques
- To have a thorough knowledge of various multiplexing schemes and Data communication protocols
- To know about the standards and mechanisms of telephone systems.

Unit I

INTRODUCTION TO DATA COMMUNICATIONS AND NETWORKING: Standards Organizations for Data Communications, Layered Network Architecture, Open Systems Interconnection, Data Communications Circuits, Serial and parallel Data Transmission, Data communications Networks, Alternate Protocol Suites.

SIGNALS, NOISE, MODULATION, AND DEMODULATION: Signal Analysis, Electrical Noise and Signal-to-Noise Ratio, Analog Modulation Systems, Information Capacity, Bits, Bit Rate, Baud, and M-ary Encoding, Digital Modulation.

Unit II

METALLIC CABLE TRANSMISSION MEDIA: Metallic Transmission Lines, Transverse Electromagnetic Waves, Characteristics of Electromagnetic Waves

OPTICAL FIBER TRANSMISSION MEDIA: Advantages of Optical Fiber cables, Disadvantages of Optical Fiber Cables, Electromagnetic spectrum, Optical Fiber Communications System Block Diagram, Optical Fiber construction, Propagation of Light Through an Optical fiber Cable, Optical Fiber Modes and Classifications, Optical Fiber Comparison, Losses in Optical Fiber Cables, Light sources, Light Detectors, Lasers.

Unit III

DIGITAL TRANSMISSION: Pulse Modulation, Pulse code Modulation, Dynamic Range, and Signal Voltage to- Quantization Noise Voltage Ratio, Linear Versus Nonlinear PCM Codes, Companding, PCM Line Speed, Delta Modulation PCM and Differential PCM.

MULTIPLEXING AND T CARRIERS: Time- Division Multiplexing, T1 Digital Carrier System, Digital Line Encoding, T Carrier systems, Frequency- Division Multiplexing, Wavelength- Division Multiplexing, Synchronous Optical Network.

Unit IV

WIRELESS COMMUNICATIONS SYSTEMS: Electromagnetic Polarization, Electromagnetic Radiation, Optical Properties of Radio Waves,

Terrestrial Propagation of Electromagnetic Waves, Skip Distance, Free-Space Path Loss, Microwave Communications Systems, Satellite Communications Systems.

Unit V

TELEPHONE INSTRUMENTS AND SIGNALS: The Subscriber Loop, Standard Telephone Set, Basic Telephone Call Procedures, Call Progress Tones and Signals, Cordless Telephones, Caller ID, Electronic Telephones, Paging systems.

CELLULAR TELEPHONE SYSTEMS: First- Generation Analog Cellular Telephone, Personal Communications system, Second-Generation Cellular Telephone Systems, N-AMPS, Digital Cellular Telephone, Interim Standard, Global system for Mobile Communications.

TEXT BOOKS:

1. Introduction to Data Communications and Networking, Wayne Tomasi, Pearson Education.
2. Data Communications and Networking, Behrouz A Forouzan, Fourth Edition.TMH.

Reference Books:

1. Data and Computer communications, 8/e, William Stallings, PHI.
2. Computer Communications and Networking Technologies, Gallow, Second Edition Thomson
3. Computer Networking and Internet, Fred Halsll, Lingana Gouda Kulkarni, Fifth Edition, Pearson Education.

Course Outcomes

- Knowledge of working of basic communication systems.
- Ability to evaluate alternative models of communication system design.
- Knowledge of Multiplexing Schemes.
- Ability to identify basic blocks of Telephone Systems.

CO-PO Mapping:

Course Outcomes	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO12	PSO1	PSO2	PSO3
CO1		3	2	3		2	2	3	2	2	2		3	2	2
CO2		3	2	3		2	2	3	2	2	2		3	2	2
CO3		3	2	3		2	2	3	2	2	2		3	2	2
CO4		3	2	3		2	2	3	2	2	2		3	2	2

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET

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B. Tech. III Year II Semester

(7GC62) English for Competitive Examinations

(EEE, ECE & ME)

UNIT I: Vocabulary: Synonyms – Antonyms – Analogy – Words often confused, One-word substitutions – Idioms and Phrases – Homonyms – Spellings (6 contact hours)

UNIT II: Comprehension Ability: Reading comprehension – Cloze tests (6 contact hours)

UNIT III: Correct English Usage: Articles – Prepositions – Tenses – Voice – Error spotting and correcting – Sentence improvement (7 contact hours)

UNIT IV: Logic-based English Language: Rearrangement of jumbled words and jumbled sentences – word pairs – sentence completion (6 contact hours)

Note: For every two contact hours, one practice test containing objective questions on related concepts will be conducted and answers will be explained thoroughly by the trainer. At the end of the semester, a minimum of 10 papers will have been practiced by students.

As regular method of external assessment is not found suitable, 100 marks will be awarded for internal examinations (30 marks from the average of two Internal Mid Exams and 70 for Internal End Exam)

References:

1. R. S. Agarwal, "Objective English", S. Chand Publishers
2. Hari Prasad, "Objective English for Competitive Exams", TMH
3. Collins Cobuild, "English Guides: Confusable Words"

Course Outcomes: Student will

- achieve proficiency in English synonyms, antonyms, idiomatic expressions and, accuracy in English spelling
- apply active reading strategies in order to comprehend, critically analyze and make inferences and predictions based on information in the text
- apply his/her knowledge of articles, prepositions, tenses and voice correct errors or improve sentences
- Form meaningful sentences/passages out of the scrambled words/sentences.

Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	-	-	-	2	-	3
CO2	-	-	-	-	-	-	-	-	-	-	-	3
CO3										3		3
CO4	-	-	-	-	-	-	-	-	-	-	-	1

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET

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III Year B. Tech. II Semester

(7G368)DIGITAL SIGNAL PROCESSING LAB

Course Objectives:

The course aims to enable the students to learn and design the concepts of MATLAB in signal processing applications**.**

LIST OF EXPERIMENTS

1. To verify the stability and causality of LTI Systems.
2. To Identify Fourier series & Fourier transform of Continuous and Discrete signals.
3. To verify linear convolution.
4. To verify the circular convolution.
5. N-point FFT algorithm
6. MATLAB program to find frequency response of analog LP/HP filters.
7. To Design Butterworth (LP/HP)
8. To Design IIR filter by Impulse Invariant/Bi-Linear Transformation
9. To design FIR filter (LP/HP) using windowing technique

a) Using rectangular window

b) Using triangular window

c) Using Kaiser window

10. To compute power density spectrum of a sequence.
11. Decimation by a factor D
12. Interpolation by a Factor *L*

Course Outcomes:

Upon the completion of course student will be

1. Able to write MATLAB programs.
2. Able to understand the operations on signals.
3. Able to understand and design different filters.

Course	PO1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO_{12}	PSO_1	PSO_2	PSO_3
CO1				1	3		2					3		3	
CO2	2	2			3		2					3	2	3	
CO3	2	2			3							3	2	3	

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B. Tech. III Year II Semester

(7G369)MICRO PROCESSORS & INTERFACING LAB

Course Objectives:

- To learn Assembly Language programming.
- To understand programmable peripheral devices and their Interfacing.

1. Arithmetic operations.
2. Signed Arithmetic operations.
3. ASCII – arithmetic operations.
4. Addition of two BCD numbers(4-digits each)
5. Logical Operations
   a) Code conversion.
   b) Identify the parity (even/Odd) of a given byte/word.
6. String Operations
   a) Relocate a string of N words/bytes.
   b) Reverse String.
   c) Length of the String
   d) String Insertion
   e) String Deletion
   f) Scanning a byte/ word.
7. Sorting using near procedure
8. Interfacing with 8255 PPI
   a) DAC Interfacing:
      i. PWM generation in BSR mode
      ii. Triangular, sinusoidal and square wave generation in I/O mode.
   b) Stepper Motor Interfacing: Rotation in Clock wise and Anti-clock wise direction.
9. 8259 – Interrupt Controller.
10. 8251 - USART Interfacing

Course Outcomes:

Upon the completion of course student will be

- Able to write Assembly Language programs.
- Able to understand the operations and applications of microprocessors
- Able to understand programmable peripheral devices and their Interfacing.

Course	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	2	2	-	-	1	-	-	-	3	2	-
CO2	2	3	-	-	3	-	-	-	-	-	-	-	2	3	-
CO3	3	-	-	-	-	-	-	-	-	-	-	-	1	1	-
CO4	3	-	-	-	2	-	-	-	-	-	-	1	2	2	2

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B. Tech. III Year II Semester

(7G16E) Object Oriented Programming Concepts LAB

Course Objectives:

- Understand fundamentals of programming such as variables, conditional and iterative execution, methods, etc.
- Understand fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.
- Be aware of the important topics and principles of software development.
- Have the ability to write a computer program to solve specified problems.
- Be able to use the Java SDK environment to create, debug and run simple Java programs

PROGRAMS IN C++ / JAVA

1. Classes and objects, Constructor and Destructors.
2. Function Overloading.
3. Inheritance.
4. Operator overloading.
5. Friend function, Templates.
6. Simple Java applications - Handling Strings in java.
7. Simple Package creation - Developing user defined packages in Java.
8. Interfaces in JAVA.
9. Threading and Multithreading (Simple Experiments).
10. Exception Handling Mechanism in Java - Handling pre - defined exceptions – Handling user-defined exceptions.
11. Applets creations.

Course Outcomes:

1. Design and implement the programs to demonstrate classes, objects.
2. Demonstrate and implement the principles of inheritance, polymorphism, constructor overloading, and method overloading
3. Understanding the use of packages, creation of packages, importing the packages.
4. Implementation of multithread programming, Thread Priority, Exception Handling and Creation of own Exceptions.
5. Implement and demonstrate Simple Applet, Applet Communication.

CO-PO Mapping:

Course Outcomes	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO12	PSO_1	PSO_2
CO1	3		3			3					3	3	3	3
CO2	3		3			3					3	3	3	3
CO3	3		3			3					3	3	3	3
CO4	3		3			3	1				3	3	3	3
CO5	3											3	3	3

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IV Year B.Tech. ECE-I Semester

(7G17E)COMPUTER NETWORKS

Course Objectives:

- Resource sharing is the main objective of the computer network.
- The Other objective is to provide the high Reliability.
- By using computer networks we can save money.
- Computer Networks will provide means to increase system performance as the work load increases.
- Computer network help people who live or work apart to report together.
- Only authorized user can access resource in a computer network.

UNIT-I

INTRODUCTION: Network Hardware, Network software, Reference Models-OSI, TCP/IP,

PHYSICAL LAYER: Guided Transmission, Wireless Transmission, public switched telephone networks-structure of the telephone system.

UNIT II

DATA LINK LAYER: Design issues, error detection and correction, Elementary data link Protocol, Sliding Window protocols

MEDIUM ACCESS SUB LAYER: The Channel Allocation Problem, Multiple access protocols, IEEE 802.X Standard Ethernet

UNIT III

NETWORK LAYER: Network layer Design issues, Routing Algorithms-shortest path routing, Flooding, Hierarchical routing, Broad cast, Multi cast, distance vector routing, Congestion Control Algorithms. Quality of Service, the Network layer in the internet-the IP-protocol, IP-addresses, IPV6.

UNIT IV

TRANSPORT LAYER: Transport Services, Elements of Transport protocols, Simple Transport Protocol, The Internet Transport Protocols-TCP and UDP protocols.

UNIT V

APPLICATION LAYER: Domain Name System, Electronic Mail, The World Wide Web **Cryptography**, Symmetric-Key Algorithms, Public-Key Algorithms

TEXT BOOKS:

1. Andrew S Tanenbaum, *Computer Networks*. Pearson Education/PHI, 4th Ed.

REFERENCE BOOKS :

1. Behrouz A. Forouzan,*Data Communications and Networking*. TMH, 3rd Ed.
2. S.Keshav, *An Engineering Approach to Computer Networks*. Pearson Education, 2nd Ed.
3. W.A. Shay, *Understanding communications and Networks*. Thomson, 3rd Ed.

Course Outcomes:

- Students will able to learn the use of Networks and different reference models.
- Ability to understand about the different types of Transmission media in the physical layer.
- Students can learn about the design issues and channel allocation problem in the data link layer.
- Students can know about how to route the packets using routing algorithms and familiar with IP addresses.
- Students will able to learn about different transport layer issues.
- Students will be familiar with various application layer issues.

CO-PO Mapping:

Course	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO12	PSO1	PSO2	PSO3
CO1	3	3		2					3			3			2
CO2		3			2			2		3				2	
CO3	3				2							3			
CO4				2			2			3					3
CO5		2			3			3			2			3	
CO6			3			3			2			3			

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B. Tech. IV Year I Semester

(7G371)OPTICAL COMMUNICATION

Course Objectives:

The course aims to provide the student with the ability

- To understand different Optical fibers with its structures and materials.
- To know different Optical sources and detectors.
- To understand the losses and different power link mechanisms of optical fibers.

Unit-I

Optical waveguides and materials Introduction to fiber optic cables, Historical Development, The General System, Advantages of Optical Fiber Communications, Ray Theory transmission, Electromagnetic mode theory for Optical Propagation, Cylindrical Fiber. Single mode fibers, fiber materials.

Unit-II

Optical sources: Light Emitting Diodes (LEDs): LED Structures, Light Source Materials, Quantum efficiency and LED Power, Modulation of LED. LASER Diodes- Laser Diode Modes and Threshold Conditions, Laser Diode Rate Equations, External Quantum Efficiencies.

Unit-III

Optical detectors Physical principles of photo diodes, photo detector noise, detector response time, avalanche multiplication noise, structures for InGaAs APDs, temperature effect on avalanche gain, comparisons of photo detectors.

Unit-IV

Fiber Losses and Power Coupling Attenuation, Fiber Bend Loss, Dispersion, Chromatic dispersion, Intermodal dispersion, Overall fiber dispersion, Polarization, Fiber alignment and joint loss.

Source to Fiber Power Launching, Lensing schemes for Coupling Improvement, fiber-to-fiber Joints, semiconductor optical amplifiers.

Unit-V

Optical links Point to point links, Over-view of analog links, carrier to noise ratio, multichannel transmission techniques, RF over fiber, radio over fiber links.

WDM Concepts and components: Over-view, WDM, Necessity , Principles, Types of WDM

Text Books:

1. Optical fiber communications- Gerdkeiser, McGraw Hill International Edition, 3 rdEdition, 2010.
2. Optical fiber communications-John M. Senior, PHI, 3rd Edition, 2010.

Reference Books:

Fiber-optic communication systems, Third edition,Govind P.Agrawal,The Institute of optics university of Rochester, Rochester, Ny,WILEY Inter science, A John wiley & sons, INC., Publication.

Course Outcomes:

Upon completion of the course, students can

- understand historical developments of OFC and different types of OFC
- Analyze the transmission of optical signal in fibers
- be able to design the constructional features of OFC and optical sources.
- be able to design the optical links and analyze different applications.

Course	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO_{12}	PSO1	PSO2	PSO3
CO1	1		3				1					1			
CO2		1		3	3										
CO3			3	3	3										
CO4			3	3	3					1					

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B. Tech. IV Year I Semester

(7G372) EMBEDDED & REAL TIME OPERATING SYSTEMS

Course Objectives:

The course aims to provide the student with the ability

- To understand concepts of embedded systems.
- To apply the knowledge acquired on the design considerations

Unit -I

MICROCONTROLLER & INTERFACING 8051:

Introduction, Architecture, Register Organization, Internal and External Memory, Pin diagram, I/O port structure, Addressing modes, Instruction Set, simple programs. On-Chip Peripherals-8051 Interrupt Structure, Timer/Counter features, modes and programming. MSP 430 Low power Micro Controller (A Quantitative study only).Applications- Interfacing with switches, display – LED, seven segment display, LCD. Keyboard interfacing, D/A and A/D interfacing, Stepper motor interfacing, Handling External Interrupts, serial communications.

Unit- II

INTRODUCTION TO EMBEDDED SYSTEMS:

Embedded System – Definition, Application Areas, and Categories. Overview of embedded system architecture, specialities: reliability, performance, power consumption cost, size, user interface, software upgradation capability, recent trends: processor, power, memory, operating system, communication interface, programming languages, development tools, programmable hardware.

Unit -III

ARCHITECTURE OF EMBEDDED SYSTEMS Hardware Architecture – CPU, Memory, Clock Circuitry, Watch dog Timer/Reset Circuitry, chip select, I/O devices, Debug Port, Communication Interfaces, Power supply Unit. Software Architecture – Services provided by an operating System, Architecture and categories of Embedded Operating Systems, Application Software, Communication software, Process of generating Executable image, Development/Testing tools.

Unit -IV

COMMUNICATION INTERFACES Need for Communication interface, RS232/UART, RS 422/RS 485, USB, Infrared, IECE 1394 fire wire, IECE 802.11, Blue tooth, I2C and CAN Bus.

Unit-V

REAL TIME OPERATING SYSTEM Architecture of Kernel, Tasks and Task Scheduler, Interrupt Service Routines, Inter process Communication– Semaphores, mutex, message queues, mailboxes, pipes, signals, event registers and timers. Priority Inversion Problem. Off the Shelf Operating

Systems, Embedded Operating Systems, Real Time Operating Systems, And Handheld Operating Systems.

Text Books:

1. Embedded/ Real Time Systems, K.V.K.K. Prasad, Dreamtech press.
2. The 8051 Microcontroller, Kenneth J Ayala, 3rd edition, Thomson Press.

Reference Books:

1. Computers and Components, Wayne Wolf, Elsevier.
2. Embedded Systems, Raj Kamal, TMH. 2nd edition.2008.

Course Outcomes:

Upon completion of the course, students will

- Understand basic concepts to design embedded applications.
- Understand different programming models and their suitable application areas.
- Analyze the operation of I/O ports and different communication protocols.
- Design different embedded applications.

Course	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	2			1		2		1	2	3		
CO2	3						2		1			2	2		
CO3	2	3	2	1		2	1		2		2	1		2	
CO4	2	3	3	2	2	1		1	2			2			3

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B. Tech. IV Year I Semester

(7G374) DIGITAL DESIGN THROUGH VERILOG HDL
(PROFESSIONAL ELECTIVE-II)

Course Objectives:

The course aims to provide the student with the ability

- To understand the basics of Verilog
- To make the students renown to basics, syntax and semantics of new programming language

Unit-I

INTRODUCTION TO VERILOG: Verilog as HDL, Levels of design description, concurrency, simulation and synthesis, functional verification, test benches.

LANGUAGE CONSTRUCTS AND CONVENTIONS: Introduction, keywords, identifiers, whitespace characters, comments, numbers, strings, logic values, strengths, 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

SWITCH LEVEL MODELLING: Introduction, basic transistor switches, CMOS switch, Bidirectional gates, time delays with switch primitives, instantiations with strengths and delays, strength contention with trireg nets

Unit-III

MODELLING AT DATAFLOW LEVEL: Introduction, continuous assignment structures, delays and continuous assignments, assignment to vectors, operators.

BEHAVIORAL MODELLING: Introduction, operations and assignments, functional Bifurcation, initial construct, always construct, examples, assignments with delays, wait construct, multiple always blocks, designs at behavioral level, blocking and non-blocking assignments, the case statement, simulation flow, 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

FUNCTIONS, TASKS, AND USER-DEFINED PRIMITIVES: Introduction, Function, Tasks, User- Defined Primitives (UDP)

SYSTEM TASKS, FUNCTIONS AND COMPILER DIRECTIVES: Introduction, parameters, path delays, module parameters, system tasks and

functions, file –based tasks and Functions, Compiler Directives, FSM Design (Moore and Mealy Machines).

Unit-V

DIGITAL DESIGN WITH SM CHARTS: State Machine Charts, Derivation of SM Charts, Realization of SM Charts, Implementation of the Dice Game, Alternative realizations for SM Charts using Microprogramming, Linked State Machines, Static RAM Memory, UART Design.

DESIGNING WITH PROGRAMMABLE GATE ARRAYS AND COMPLEX PROGRAMMABLE LOGIC DEVICES: Xilinx 3000 Series FPGAs, Designing with FPGAs, Using a One-Hot State Assignment, Altera Complex Programmable Logic Devices (CPLDs), Altera FLEX 10K Series CPLDs.

Text Books:

1. Design through Verilog HDL – T.R. Padmanabhan and B. Bala Tripura Sundari, WSE, IECE Press, 2004.
2. A Verilog Primier – J. Bhasker, BSP, 2003.
3. Digital System Design Using VHDL – Charles.H.Roth.Jr

Reference Books:

1. Fundamentals of Logic Design with Verilog – Stephen. Brown and Zvonko Vranesic, TMH, 2005.
2. Advanced Digital Design with Verilog HDL – Michael D. Ciletti, PHI, 2005.

Course Outcomes:

Upon completion of the course, students will

- Understand, design, simulate and synthesize computer hardware using Verilog HDL
- Be able to rapidly design combinational and sequential logic
- Be able to use different Verilog programming constructs in digital system design
- gain knowledge in implementing state machines using FPGAs
- Gain ability to Design CPLDs & PGAs.

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO12	PSO1	PSO2	PSO3
CO1		3	3			2		3	2		3	2	3	3	2
CO2	2	3	3			3		3	2		3	2	3	3	2
CO3			3			1		2			2	1	3	2	
CO4	2	3	3			1		2	2		2	2	3	3	
C05	1	3	3			1		3	3		3	2	3	3	2

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IV Year B. Tech., I Semester

(7G17F) INTERNET OF THINGS

(Professional Elective-II)

Course Objectives:

- To understand the terminology, technology and its applications of IoT.
- To know the concept of M2M (machine to machine) with necessary protocols.
- To memorize the software platforms which are used for developing the applications.
- To learn the concepts of python programming language which is used to develop the IoT projects.
- To know the hardware platforms which is necessary to develop the IoT applications.

Course Outcomes:

After completion of the course student will be able to

- Understand the vision of IoT from a global context.
- Identify the difference between IoT and M2M communication.
- Determine the usage of 6LoWPAN and select the appropriate network protocols for IoT project.
- Create the IoT experiments with the help of Python programs.
- Design the IoT applications using Raspberry Pi kit..

Unit– I

Introduction to Internet of Things: Introduction to Internet of Things, History of IoT, Physical Design of IoT, Logical Design of IoT, IoT Enabling Technologies, IoT Levels & Deployment Templates, Applications of IoT.

Unit– II

IoT and M2M: Introduction, M2M, Difference between IoT and M2M, SDN and NFV for IoT.

IoT Platforms Design Methodology: Introduction, IoT Design Methodology.

Unit– III

The Wireless Embedded Internet: Introduction to 6LoWPAN**,**The 6LoWPAN Architecture ,The Basic 6LoWPAN Format, Addressing, MQ telemetry transport for sensor networks (MQTT-S), ZigBee compact application protocol, Contiki and uIPv6, Wireless RFID Infrastructure.

Unit– IV

IoT Systems-Logical Design Using Python: Introduction, Installing Python, Python Data Types and Data Structures, Control Flow, Functions, Modules, Packages and File Handling.

Unit– V

IoT Physical Devices and Endpoints: What is an IoT Device, Exemplary Device: Raspberry Pi, About the Board, Linux on Raspberry Pi, Raspberry Pi Interfaces, Programming Raspberry Pi with Python, Other IoT Devices.

Text Books:

1. Internet of Things, A Hands-On Approach, Arshdeep Bahga, Vijay Madisetti, University Press, 2015.
2. LoWPAN: The WirelessEmbedded Internet, Zach Shelby and Carsten Bormann, Wiley publications, first edition,2009.(Unit III).

Reference Books:

1. The Internet of Things Connecting Objects to the Web, HakimaChaouchi, Wiley publications,2010.
2. Designing the Internet of Things, Adrian McEwen, Hakim Cassimally, Wiley 2014.
3. Enterprise IoT, A Definitive Handbook by Naveen Balani.

CO-PO Mapping:

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

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B. Tech. IV Year I Semester

(7G375) SATELLITE COMMUNICATIONS

(PROFESSIONAL ELECTIVE – II)

Course Objectives:

The course aims to provide the student with the ability

- To understand concepts of Satellite Engineering and applications
- To design basic Satellite links and solve the problems of budgeting, speed, modulation and multiple access schemes.

Unit-I INTRODUCTION & ORBITAL MECHANICS:

Origin of satellite communications, Historical background, basic concepts of satellite communications, frequency allocations for satellite services, applications, future trends of satellite communications.

Orbital Mechanics look angle determination, orbital perturbations, orbit determination, launches and launch vehicles, orbital effects in communication systems performance.

Unit-II SATELLITE SUBSYSTEMS:

Attitude and orbital 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, uplink design, design of satellite links for specified C/N, system design example. Basic concepts of Multiple access, Time Division multiple access (TDMA) frame structure, examples. Satellite switched TDMA onboard processing,

Unit-IV EARTH STATION TECHNOLOGY, LEO AND GEO-STATIONARY SATELLITE SYSTEMS:

Introduction, transmitters, receivers, Antennas, tracking systems, terrestrial interface, primary power test methods. Orbit consideration, coverage and frequency considerations, delay and throughput considerations, system considerations, operational NGSO constellation designs.

Unit-V SATELLITE NAVIGATION & 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-Timothi Pratt, Charles Bostian and Jeremy Allnutt, WSE, Wiley publications, 2nd Edition, 2003.

2. Satellite communications Engineering-Wilbur L.Prichard, Robert A. Nelson & Henry G.Suyderhoud, 2nd Edition, Pearson Publications, 2003.

Reference Books:

1. Satellite communications: Design principles-M. Richharia, BS publications, 2nd Edition, 2003.
2. Satellite communications-D.C.Agarwal, Khanna publications, 5th Ed.
3. Fundamentals of Satellite communications-K.N.Rajarao, PHI, 2004.
4. Satellite communications-Dennis Roddy, McGraw Hill, 2nd Edition, 1996.

Course Outcomes:

Upon the completion of course the students will

- Visualize the architecture of satellite system and its operation by means of speed and range.
- apply this knowledge for the analysis and design of basic satellite links by means of budget, modulation and multiple access schemes
- Learn the satellite navigation and global positioning system

Course	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO12	PSO1	PSO2	PSO3
CO1	3	2	2										3	2	1
CO2	3	3	3	3		2	1						3	2	
CO3	3	3	3	3			2	2	3	3			2		2

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IV Year B. Tech. I Semester

(7G376) INDUSTRIAL ELECTRONICS
(OPEN ELECTIVE)

Course Objectives:

- To get an overview of different types of power semi-conductor devices and their switching characteristics.
- To understand the operation, characteristics and performance parameters of controlled rectifiers.
- To study the characteristics of DC and AC drives
- To learn the different modulation techniques of pulse width modulated inverters and to understand the harmonic reduction methods.

Unit-I

POWER DEVICES: Power diode – Power transistor – Power MOSFET – SCR – TRIAC – GTO – IGBT – MCT – Protection of power devices.

Unit-II

CONVERTERS: Introduction to half wave, full wave and bridge rectifiers – Single phase and three phase – Half controlled and fully controlled converters – Dual converters – Introduction to cyclo converters and ac controllers.

Unit-III

INVERTER AND HOPPER: Voltage, current and load commutation – Voltage Source Inverter (VSI) – Series and Parallel inverter – Bridge inverters – Single and three phase – Voltage control using PWM – Current Source Inverter (CSI) – Choppers – Step up and step down choppers – Chopper classification – Class A, B, C, D, E – AC choppers.

Unit-IV

DC AND AC DRIVES : Steady state characteristic of dc motors – Control of DC motor using converters and choppers – Regenerative and dynamic braking – Closed loop control scheme – Speed-torque characteristic of induction motor – Static stator voltage control – V/f control – Static rotor resistance control – Slip power recovery scheme – Self-control of synchronous motor.

Unit-V

OTHER APPLICATIONS: Electronic timers – Digital counters – Voltage regulators – Online and offline ups – Switched mode power supply – Principle and application of induction and dielectric heating.

TEXT BOOK:

G. K. Mithal, "Industrial Electronics", Khanna Publishers, Delhi, 2000.

Reference Books:

1. M. H. Rashid, “power Electronics Circuits, Devices and Application”, PHI, 3rd edition, 2004.
2. G. M. Chute and R. D. Chute, “Electronics in Industry”, McGraw Hill Ltd, Tokyo, 1995.
3. F. D. Petruzulla, “Industrial Electronics”, McGraw Hill, Singapore, 1996.

Course Outcomes:

The students are able to acquire

- Knowledge on different power devices and inverters
- Understand the concepts of DC and AC drives.
- Knowledge on different applications of Industrial electronics

Course Outcomes	**PO_1**	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO12**
CO1	2	2	3	3	2							
CO2	2	2	2		2							
CO3	2		2		2					2		

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET

(AN AUTONOMOUS INSTITUTION)

IV Year B. Tech. I Semester

(7G377) MEDICAL INSTRUMENTATION

(OPEN ELECTIVE)

Course Objectives:

The course aims to provide the student with the ability

- To learn the fundamentals of Electro neurogram and Blood Pressure.
- To understand the applications of Blood flow measurement and Pulse Oximeter.

Unit-I

GENERAL INTRODUCTION: The cell, body fluids, Musculoskeletal system, respiratory system, gastrointestinal system, Nervous system, endocrine system and circulatory system. Origin of Bio potentials: electrical activity of Excitable cells: the resting state, The active state, Volume conductor fields, Functional organization of the peripheral nervous system: Reflex are & Junctional transmission.

Unit-II

THE ELECTRONEUROGRAM (ENG): The H-Reflex, The Electromyogram (EMG), The Electrocardiogram (ECG), heart and the circulatory system, Electro conduction system of the heart and heart problems, ECG waveform and Physical significance of its wave features, Electrical behavior of cardiac cells, The standard lead system, The ECG preamplifier, DC ECG Amplier, Defibrillator protection circuit, Electro surgery Unit filtering, Functional blocks of ECG system, Multichannel physiological monitoring system, Common problems encountered and remedial techniques.

Unit-III

BLOOD PRESSURE: indirect measurement of blood pressure, korotkoff sounds, auscultatory method using sphygmo manometer, Oscillometric and ultrasonic non invasive pressure measurement, Direct measurement of blood pressure H2O manometers, electronic manometry, Pressure transducers,. Pressure amplifier designs, Systolic, diastolic mean detector circuits

Unit-IV

BLOOD FLOW AND VOLUME MEASUREMENT: indicator dilution methods, Transit time flow meter, DC flow meter, Electromagnetic flow meter AC electromagnetic flow meter, Quadrature suppression flow meter, Ultrasonic flow meter, Continuous-wave Doppler flow meter, Electric impedance plethysmography, chamber plethysmography, Photo plethysmography.

Unit-V

PULSE OXIMETR: Principles of Operation, Absorption Spectrum, Sensor design, Pulse oximeter, Therapeutic and Prosthetic Devices. Cardiac Pacemakers: Lead wires and electrodes, Synchronous Pacemakers, rate

responsive pacemaking, Defibrillators, cardioverters, Electrosurgical-unit, Therapeutic applications of laser, Lithotripsy Haemodialysis.

TEXT BOOKS:

1. John G Webster, Medical Instrumentation: Application and Design , John Wiley,3rd Ed. 2012.
2. Joseph J. Carr & John M. Brown , Introduction to biomedical Equipment Technology, 4th Ed., Prentice Hall India, 2001

Course Outcomes:

Upon completion of the course, students can

- Learn the basics of Human being Bio potentials and Electro neurogram related devices
- Know the fundamentals of Blood pressure, flow and volume measurement and the concepts of Pulse Oximeter

Course	**PO_1**	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO1	2	2	2	2	3	2						2
CO2	2	2	2	2	3	2						2

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B. Tech. IV Year I Semester

(7G378)MICROWAVE & OPTICAL COMMUNICATIONS LAB

Course Objectives:

- To analyse the characteristics of various microwave components using microwave test bench.
- To enable the students to know about optical fiber communication and its applications.

Minimum Twelve Experiments to be conducted:

Part – A (Any 7 Experiments):

1. Reflex Klystron Characteristics.
2. Gunn Diode Characteristics.
3. Attenuation Measurement.
4. Directional Coupler Characteristics.
5. VSWR Measurement.
6. Impedance Measurement.
7. Waveguide parameters measurement.
8. Scattering parameters of Directional Coupler.
9. Scattering parameters of Magic Tee.

Part – B (Any 5 Experiments):

1. Characterization of LED.
2. Characterization of Laser Diode.
3. Intensity modulation of Laser output through an optical fiber.
4. Measurement of Data rate for Digital Optical link.
5. Measurement of NA.
6. Measurement of losses for Analog Optical link.
7. Radiation Pattern Measurement of Antennas (at least two antennas).

Course Outcomes:

- Upon the completion of course the students will be able
- To understand applications and testing of microwave components.
- To understand the connections regarding various microwave components
- To acquire knowledge on the various applications of optical Fiber communications

Course	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO12	PSO1	PSO2	PSO3
CO1	2	2	3		1		3			2			2	3	
CO2	2	2	3				3						2	3	
CO3			3				3			2				3	1

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET

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B. Tech. IV Year I Semester

(7G379)EMBEDDED SYSTEMS LAB

Course Objectives:

- To learn the interfacing concepts of embedded systems.
- To develop Embedded Applications.

Minimum Eight Experiments to be conducted

1. Switch and LED Interfacing
2. LCD Interfacing
3. Serial Transmission
4. Serial Reception
5. Key Pad Interfacing
6. Analog Interfacing
7. Sorting RTOS
8. Elevator Interfacing
9. Seven segment Display
10. Door Sensor Buzzer
11. GSM Interfacing.

Course Outcomes:

Upon the completion of course the student will be able to

- To design real time Embedded systems
- To understand the applications of embedded systems through experimentations.

Course	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO12	PSO1	PSO2	PSO3
CO1		1	3	2	2				2		1	2		2	
CO2	3	2	2	3	2		2	1	2		2	2	3		2

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B. Tech. IV Year II Semester

(7G381)CELLULAR & MOBILE COMMUNICATIONS

(PROFESSIONAL ELECTIVE-III)

Course Objectives:

The course aims to provide the student with the ability

- To make the student explore in a cellular communication field
- To understand concepts of Cellular Communications design and types of interferences

Unit-I

CELLULAR MOBILE SYSTEMS Introduction to Cellular Mobile system, performance criteria, 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 channels, Co-channel Interference Reduction Factor, desired C/I from a normal case in a Omni directional Antenna system, Cell splitting, consideration of the components of cellular system.

Unit- II

INTERFERENCE Introduction to Co-channel interference, real time co-channel interference, Co-channel measurement, design of Antenna system, Antenna parameters and their effects, diversity receiver, non-co-channel interference types-SINAD, adjacent channel interference, cross talk.

Unit -III

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

Cell site and mobile antennas: Sum and difference patterns and their synthesis, Omni directional antennas, directional antennas for interference reduction, space diversity antennas, umbrella pattern antennas, minimum separation of cell site antennas, high gain antennas.

Unit- IV

FREQUENCY MANAGEMENT AND CHANNEL ASSIGNMENT Numbering and grouping, setup access and paging channels channel assignments to cell sites and mobile units, channel sharing and borrowing, sectorization, overlaid cells, non fixed channel assignment.

Unit- V

HANDOFF Handoff, dropped calls and cell splitting, types of handoff, handoff invitation, delaying handoff, forced handoff, mobile assigned

handoff. Intersystem handoff, cell splitting, micro cells, vehicle locating methods, dropped call rates and their evaluation.

Digital cellular networks: GSM architecture, GSM channels, multiplex access scheme, TDMA, CDMA.

Text Books:

1. Mobile cellular telecommunications-W .C. Y. Lee, Tata Mc-Graw Hill, 2nd Edition, 2006.
2. Wireless communications-Theodore. S. Rappaport, Pearson Education, 2nd Edn. 2002.

References Books:

1. Principles of Mobile communications-Gordon L. Stuber, Springer International 2nd Edition, 2007.
2. Wireless and Mobile Communications-Lee Mc Graw Hills, 3rd Edition, 2006.

Course Outcomes:

Upon completion of the course, students will

- Understand fundamentals of cellular system design, coverage and interference
- Understand different types of non-co channel interference
- Understand cell coverage in different traffic and their effects over different terrains
- Acquire knowledge on numbering of radio channels, channel sharing and borrowing
- Understand concept of handoffs &dropped calls

Course	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO12	PSO1	PSO2	PSO3
CO1	3	3	3		3						3		3	1	1
CO2	3	3	3		3						3		1	2	1
CO3	3	3	3		3						3		2	2	1
CO4	3	2	3					3			3		3	2	2
CO5	3	2	2	2				2		1	1		2	2	2

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B. Tech. IV Year II Semester

(7G382) DSP PROCESSORS & ARCHITECTURES
(PROFESSIONAL ELECTIVE-III)

Course Objectives:

The course aims to provide the student with the ability

- To understand of the programmable DSP processors and their applications.
- To acquire the knowledge of terminology and concepts of architectures , implementation and algorithms of DSP processors

Unit-I

INTORODUCTION TO PROGRAMMABLE DSPs: Multiplier & Multiplier accumulator, Modified bus structures & memory access schemes in P – DSPs, Multiple access memory, Multi ported memory, VLIW architecture, Pipelining, Special addressing modes in P–DSPs, On chip peripherals. Number formats for signals and coefficients in DSP systems, Dynamic Range and Precision, Sources of error in DSP implementations, A/D Conversion errors, DSP Computational errors, D/A Conversion Errors, Compensating filter.

Unit-II

ARCHITECTURES FOR PROGRAMMABLE DSP DEVICES: Basic Architectural features, DSP Computational Building Blocks, Bus Architecture and Memory, Data Addressing Capabilities, Address Generation Unit, Programmability and Program Execution, Speed Issues, Features for External interfacing.

Unit-III

PROGRAMMABLE DIGITAL SIGNAL PROCESSORS: Commercial Digital signal-processing Devices, Data Addressing modes of TMS320C54XX DSPs, Data Addressing modes of TMS320C54XX Processors, Memory space of TMS320C54XX Processors, Program Control, TMS320C54XX instructions and Programming, On-Chip Peripherals, Interrupts of TMS320C54XX processors, Pipeline Operation of TMS320C54XX Processors.

IMPLEMENTATION UNIT V-IMPLEMENTATIONS OF BASIC DSP ALGORITHMS: The Q-notation, FIR Filters, IIR Filters, Interpolation Filters, Decimation Filters, PID Controller, Adaptive Filters, 2-D Signal Processing.

Unit-IV

FFT ALGORITHMS: An FFT Algorithm for DFT Computation, A Butterfly Computation, Overflow and scaling, Bit-Reversed index generation, An 8-Point FFT implementation on the TMS320C54XX, Computation of the signal spectrum. Memory space organization, External bus interfacing signals, Memory interface, Parallel I/O interface, Programmed I/O, Interrupts and I/O,

Direct memory access (DMA). A Multichannel buffered serial port (McBSP), McBSP Programming, a CODEC interface circuit, CODEC programming, A CODEC-DSP interface example.

Unit-V

RECENT TRENDS IN DSP SYSTEM DESIGN: An over-view of the application nodes on DSP systems, An over-view of open multimedia applications platform (OMAP), An Introduction to FPGA, Design flow for an FPGA based system design, Cad tools for FPGA based system design, soft core processors, FPGA based DSP system design, New algorithms for Implementation of filters in VLSI, Distributed arithmetic algorithm, Case studies, Comparison of the performances of the systems designed using FPGAs and digital signals processors.

Text Books:

1. Avtar Singh and S. Srinivasan, *Digital Signal Processing,* Thomson Publications, 2004.
2. B. Venkata Ramani and M. Bhaskar, *Digital Signal Processors, Architecture, Programming and Applications,* TMH, 2004.

Reference Book:

1. Jonathan Stein, *Digital Signal Processing*, John Wiley, 2005.
2. Lapsley et al. S. Chand & Co, *DSP Processor Fundamentals, Architectures & Features*, 2000.

Course Outcomes:

Upon completion of the course, students can

- Understand concepts of programmable DSPs and their architectures
- Have the knowledge to identify and apply the algorithms
- Design and formulate the implementations of algorithms

Course	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO12	PSO1	PSO2	PSO3
CO1	3	3	3		3						3	2	2	2	
CO2	3	3	3		3						3	2	2	2	
CO3	3	3	3		3						3	2	2	2	

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B. Tech. IV Year II Semester

(7G383) Wireless Ad-hoc Networks

(PROFESSIONAL ELECTIVE-III)

Course Objectives:

- Upon completion of the course the student will be able to
- Describe the unique issues in ad-hoc/sensor networks.
- Describe current technology trends for the implementation and deployment of wireless ad-hoc/sensor networks.
- Discuss the challenges in designing MAC, routing and transport protocols for wireless ad-hoc/sensor networks.
- Discuss the challenges in designing routing and transport protocols for wireless Ad-hoc/sensor networks.
- Comprehend the various sensor network Platforms, tools and applications.

UNIT-I

INTRODUCTION: Introduction of ad-hoc/sensor networks, Key definitions of ad-hoc/sensor networks - Advantages of ad-hoc/sensor networks - Unique constraints and challenges Driving Applications. Electromagnetic spectrum- Radio propagation mechanism- characteristics

of the wireless channel Adhoc Wireless Networks – Heterogeneity in Mobile Devices – Wireless Sensor Networks – Traffic Profiles – Types of Adhoc Mobile Communications – Types of Mobile Host Movements – Challenges Facing Adhoc Mobile Networks – Adhoc Wireless Internet. Ad-Hoc wireless networks Introductions to lan, wan, man, pan architectures and applications.

UNIT-II

END TO END DELIVERY AND SECURITY: Transport layer: Issues in designing- Transport layer classification, adhoc transport Protocols, Security issues in adhoc networks: issues and challenges, network security attacks, secure routing protocols Ad-Hoc wireless networks Introductions to local area networks, wide area networks, man, pan architectures and applications.

UNIT-III

MEDIA ACCESS CONTROL (MAC) PROTOCOLS: Media Access Control (MAC) Protocols Introduction - Issues in Designing a MAC Protocol for Ad Hoc Wireless Networks – Classifications of MAC Protocol. MACAW – FAMA – BTMA – DPRMA – Real-Time MAC protocol – Multichannel Protocols – Power Aware MAC.

UNIT-IV

ROUTING PROTOCOLS: Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks – Classifications of Routing Protocols -Table-driven protocols – DSDV – WRP – CGSR – On-Demand protocols – DSR – AODV –

TORA – LAR – ABR – Zone Routing Protocol – Power Aware Routing protocols

UNIT-V

NETWORKING SENSORS AND APPLICATIONS: Unique features, Deployment of ad-hoc/sensor network -Sensor tasking and control Transport layer and security protocols,

SENSOR NETWORK PLATFORMS AND TOOLS: Berkley Motes - Sensor network programming challenges – Embedded Operating System Simulators,

Applications: Applications of Ad-Hoc/Sensor Network and Future Directions. Ultra wide band radio communication- Wireless fidelity systems.

TEXT BOOKS:

[1] Holger Karl and Andreas Willig, "*Protocols and Architectures for Wireless Sensor Networks*", WILEY lectures and applications (ISBN: 0-470-09510-5).

[2] C. Siva Ram Murthy and B. S. Manoj, "*Ad Hoc Wireless Networks: Architectures and Protocols*", Prentice Hall, 2004.

REFERENCE BOOKS:

[1] Feng Zhao and Leonidas J. Guibas, "*Wireless Sensor Networks: An Information Processing Approach*" (Morgan Kaufmann, 2004).

[2] Stefano Basagni, Marco Conti, Silvia Giordano and Ivan stojmenovic, "*Mobile ad hoc Networking*", Wiley-IEEE press, 2004.

[3] Mohammad Ilyas, "*The handbook of adhoc wireless networks*", CRC press, 2002.

[4] T. Camp, J. Boleng, and V. Davies "*A Survey of Mobility Models for Ad Hoc Network Research*," Wireless Commun. and Mobile Comp., Special Issue on Mobile Ad Hoc Networking Research, Trends and Applications, vol. 2, no. 5, 2002, pp. 483–502.

Course Outcomes:

Understanding the unique issues in ad-hoc/sensor networks.

- Learning current technology trends for the implementation and deployment of wireless ad-hoc/sensor networks.
- Discuss the challenges in designing MAC, routing and transport protocols for wireless ad-hoc/sensor networks.
- Comprehend the various sensor network Platforms, tools and applications.

CO-PO mapping:

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO12	PSO1	PSO2	PSO3
CO1	3	2	3		2	1				2		1	3	1	1
CO2	2	1	3	1		1				2		1	3	1	1
CO3	2	1		2	3	2				1		1	2	1	1

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B. Tech. IV Year II Semester

(7G384)WIRELESS COMMUNICATIONS & NETWORKS

(PROFESSIONAL ELECTIVE-IV)

Course Objectives:

The course aims to provide the student with the ability

- To Gain knowledge and experience with regard to wireless communication engineering including multiple access techniques.
- To Identify and understand wireless communication network and their evaluation.

Unit-I

INTRODUCTION TO WIRELESS COMMUNICATIONS AND MULTIPLE ACCESS TECHNIQUES: Evolution of mobile radio communications, examples of Wireless Communication systems, comparison of common Wireless Communication systems, **Multiple access techniques:** Introduction, FDMA, TDMA, Spread Spectrum, Multiple Access, SDMA, Packet radio, Packet radio protocols, CSMA protocols, Reservation protocols.

Unit-II

WIRELESS NETWORKING AND DATA SERVICES: Wireless Networking: Difference between wireless and fixed telephone networks, Development of wireless networks, Traffic routing in wireless networks.

Data Services: Data services, CCS, BISDN and ATM, SiganalingSystemNo7

Unit-III

MOBILE IP AND WIRELESS ACCESS PROTOCOL: Mobile IP: Mobile IP Operation of mobile IP, Co-located address, Registration, Tunneling.

WAP: WAP Architecture, overview, WML scripts, WAP service, WAP session protocol.

Unit-IV

WIRELESS LAN TECHNOLOGY AND BLUETOOTH: Wireless LAN: Infrared LANs, Spread spectrum LANs, Narrow bank microwave LANs, IEEE802.11 Protocol architecture and services.

Bluetooth: Overview, Radio specification, Base band specification, Links manager specification, Logical link control and adaptation protocol.

Unit-V

MOBILE DATA NETWORKS AND HIPER LAN: Mobile Data Networks: GPRS and higher data rates, Short messaging service in GSM, **HIPER LAN:** HIPERLAN-1.

Text Books:

1. Wireless Communications, Principles, Practice – Theodore S. Rappaport, PHI, 2nd Ed., 2002.
2. Wireless Communication and Networking – William Stallings, PHI, 2003.
3. Principles of Wireless Networks – KavehPahLaven and P. Krishna Murthy, Pearson Education, 2002.

Reference Books:

1. Wireless Digital Communications – KamiloFeher, PHI, 1999.

Course Outcomes:

Upon completion of the course, students can

- Understand the effective bandwidth utilization to accommodate large number of mobile users by using various accessing techniques
- Analyze networking considerations, practical networking approaches with mobile data services.
- Analyze the protocols used in wireless LAN technologies.
- be able to identify mobile data and advanced wireless networks and their applications in real time.

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO12	PSO1	PSO2	PSO3
CO1	1											2			
CO2	1	2	2	2		1				1		2	1	2	
CO3	1	2	2	2		1				1		2	1	2	
CO4	1	2								1		2			

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B. Tech. IV Year II Semester

(7G385) Machine Learning

(PROFESSIONAL ELECTIVE – IV)

Course Objectives:

- To be able to formulate machine learning problems corresponding to different applications.
- To understand a range of machine learning algorithms along with their strengths and weaknesses.
- To understand the basic theory underlying machine learning.

UNIT — I

Introduction: An illustrative learning task, and a few approaches to it. What is known from algorithms/ Theory, Experiment? Biology. Psychology.

Concept Learning: Version spaces. Inductive Bias. Active queries. Mistake bound/ PAC model. Basic results. Overview of Issues regarding data sources, success criteria.

UNIT -II

Decision Tree Learning: – Minimum Description Length Principle. Occam's razor. Learning with active queries Neural Network Learning: Perceptions and gradient descent back propagation.

UNIT —III

Sample Complexity and Over fitting: Errors in estimating means. Cross Validation and jackknifing VC dimension. Irrelevant features: Multiplicative rules for weight tuning. Bayesian Approaches: The basics Expectation Maximization. Hidden Markov Models.

U**NIT—IV**

Instance-based Techniques: Lazy vs. eager generalization. K nearest neighbor, case. Based reasoning.

UNIT—V

Genetic Algorithms: Different search methods for induction. Explanation. Based Learning: using prior knowledge to reduce sample complexity.

TEXT BOOKS

1. Tom Michel, Machine Learning. Mc Graw Hill. 1997
2. Trevor Hus tie, Robert Tibshirani & Jerome Friedman. The Elements of Statically Learning, Springer Veriag 2001

REFERENCE BOOKS

1. Machine Learning Methods on the Environmental Science, Neural Network, William W Hsieh Cambridge University Press.
2. Richard o Duda, Peter E. Hart and David G. Stork, & pattern Classification, John Wiley & Sons Inc,2001
3. Chris Bishop, Neural Network for, Pattern Recognition, Oxford University Press. 1995

Course Outcomes

- Ability to understand the basic concepts such decision tree and neural networks.
- Ability to formulate machine learning techniques to respective problems.
- Apply machine learning algorithms to solve problems of moderate complexity.

CO-PO Mapping:

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO12	PSO1	PSO2	PSO3
CO1	3	1								1		1	2	1	1
CO2	1	3		2		1						1	1	3	2
CO3	1	2		2	1							1	2	2	3

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B. Tech. IV Year II Semester

(7G386) FPGA ARCHITECTURES & APPLICATIONS

(PROFESSIONAL ELECTIVE – IV)

Course Objectives:

1. Familiarization of various complex programmable Logic devices of different families.
2. To study Field programmable gate arrays and realization techniques
3. To study different case studies using one hot design methods.

Unit-I

PROGRAMMABLE LOGIC: ROM, PLA, PAL, PLD, PGA – Features, Programming and Applications using Complex Programmable Logic Devices Altera Series – Max 5000/7000 Series and Altera FLEX Logic – 10000 Series CPLD, AMD's – CPLD (Mach 1 To 5); Cypres FLASH 370 Device Technology, Lattice Plsi's Architectures – 3000 Series – Speed Performance and in System Programmability.

Unit-II

FPGA: Field Programmable Gate Arrays – Programming technologies, Logic Blocks, Routing Architecture, Design Flow, Technology Mapping for Fpgas.

Unit-III

COMMERCIAL FPGA'S: Xilinx XC4000 & ALTERA's FLEX 8000/10000 FPGAs: AT & T – ORCA's (Optimized Reconfigurable Cell Array): ACTEL's – ACT-1,2,3 and Their Speed Performance.

Unit-IV

REALIZATION OF STATE MACHINE: Top down Design – State Transition Table, State Assignments for FPGAs. Problem of Initial State Assignment for One Hot Encoding. Charts with a PAL. Alternative Realization for State Machine Chart using Microprogramming. Linked State Machines. One – Hot State Machine, Petrinets for State Machines – Basic Concepts, Properties. Extended Petrinets for Parallel Controllers. Finite State Machine – Ex: Traffic Light Controller, Implementation of Petrinet Description

Unit-V

FSM ARCHITECTURES AND SYSTEMS LEVEL DESIGN: Architectures Centered around Non-Registered PLDs. State Machine Designs Centered around Shift Registers. One – Hot Design Method. Use of ASMs in One – Hot Design. Application of One – Hot Method. System Level Design – Controller, Data Path and Functional Partition

Text Books:

1. P.K.Chan & S. Mourad, Digital Design Using Field Programmable Gate Array, jPrentice Hall (Pte), 1994.

2. S.Trimberger, Edr., Field Programmable Gate Array Technology, Kluwer Academic Publicatgions,1994.
3. J. Old Field, R.Dorf, Field Programmable Gate Arrays, John Wiley & Sons, Newyork, 1995.
4. S.Brown, R.Francis, J.Rose, Z.Vransic, Field Programmable Gate Array, Kluwer Pubin, 1992.
5. Richard F. Tinder, Engineering Digital Design, Second Edition, Academic Press.

Course Outcomes

- Able to gain knowledge about PLDs, FPGA design architectures.
- Able to understand different types of arrays.
- FSM and different FSM techniques like petrinets and different case studies

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

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B. Tech. IV Year II Semester

(7G387) DIGITAL IMAGE PROCESSING

(PROFESSIONAL ELECTIVE – IV)

Course Objectives:

The course aims to provide the student with the ability

- To understand the Digital Image Processing methods and their applications.
- To acquire the knowledge of terminology and concepts used for representation and processing of Images.

Unit- I

DIGITAL IMAGE FUNDAMENTALS – Image Sensing and acquisition, Image Sampling and Quantization, Some basic Relationship between pixels. An Introduction to mathematical tools used in Image Processing, 2-D DFT, Properties. Walsh transforms, Hadamard Transform.

Unit-II

IMAGE ENHANCEMENT: Some basic Intensity Transformation functions, Histogram Processing, Smoothing and Sharpening spatial filters , Image Smoothing and sharpening using Frequency domain filters

Unit-III

IMAGE RESTORATION: A model of the Image degradation, Noise models, Restoration in the presence of Noise only, Estimating the degradation function, Inverse filtering, Wiener filtering.

Unit-IV

COLOUR IMAGE PROCESSING: Color Models, Pseudo Color Image Processing, Basics of Full Color Image Processing.

Unit-V

IMAGE SEGMENTATION & COMPRESSION: Point, Line and Edge Detection, Thresholding – Global and Optimum Global, Region based segmentation, Coding Redundancy, Spatial and temporal Redundancy, Image Compression Models

Text Books:

1. Digital Image processing – R.C. Gonzalez & R.E. Woods, Addison Wesley/ Pearson education, 3rd Edition.
2. Digital Image processing – R.C. Gonzalez & R.E. Woods, Addison Wesley/ Pearson education, 2nd Edition, 2002.

Reference Books :

1. Fundamentals of Digital Image processing – A.K.Jain , PHI.
2. Digital Image processing using MAT LAB – Rafael C. Gonzalez, Richard E Woods and Steven L. Edition, PEA, 2004.

Course Outcomes:

Upon completion of the course, students can

- Understand how images are acquired, sampled, quantized and represented in digital form
- Understand transform-domain representation of images (Fourier, Walsh etc.,), how images are enhanced and segmented to improve perception
- Have the knowledge to identify and apply the algorithms to compress and restore the images.
- Analyse the images in different formats such as binary, grey shade and color with respect to different areas.
- Design and formulate image processing methods with respect to real time problems

Course	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	1	3	3				3		3	3	3	3
CO2	3	3	3	1	3	3				3		3	3	3	3
CO3	3	3	3	1	3	3				3		3	3	3	3
CO4	3	3	3	1	3	3				3		3	3	3	3
CO5	3	3	3	1	3	3				3		3	3	3	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET

(AN AUTONOMOUS INSTITUTION))

B. Tech. IV Year II Semester

(7G388) NETWORK SECURITY

(PROFESSIONAL ELECTIVE – IV)

Course Objectives:

Students are able to:

- To understand the network security threats, security services, and counters measures.
- To learn the fundamentals of cryptography and its application to network security.
- To acquire background knowledge on well-known network security protocols such as IPSec, SSL, and SET.
- To understand the vulnerability analysis of network security.
- To acquire background on Digital Signature, authentication, firewalls, intrusion detection techniques.

Course Outcomes

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

- Identify the network security threats and determine efforts to counter them.
- Design and develop a code for relevant cryptographic algorithms.
- Understand the functions of Kerberos, X.509.
- Understand the requirements of SMTP.
- Prevent the intruders from accessing the system.

UNIT I

Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security, Internet Standards and RFCs, Buffer overflow & format string vulnerabilities

UNIT-II

Conventional Encryption Principles, Conventional encryption algorithms, cipher block modes of operation, location of encryption devices, key distribution. Approaches of Message Authentication, Secure Hash Functions and HMAC, Public key cryptography principles, Public key cryptography algorithms, Digital signatures, digital Certificates, Certificate Authority and key management

UNIT-III

Kerberos, X.509 Directory Authentication Service, Email privacy: Pretty Good Privacy (PGP) and S/MIME.

UNIT-IV

IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management.

Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET).

UNIT-V

Basic concepts of SNMP, Intruders, Intrusion Detection Systems, Viruses and related threats, Firewall Design principles, Trusted Systems.

TEXT BOOKS:

1. Network Security Essentials (Applications and Standards) by William Stallings, Pearson, Third Edition.
2. Hack Proofing your network, Russell, Dreamtech, Second edition.

REFERENCE BOOKS

1. Cryptography and Network Security, Second Edition, Behrouz Forouzan

CO-PO mapping:

Course Outcomes	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO12	PSO_1	PSO_2
CO1	3	-	3	-	-	3	2	-	-	3	-	3	3	-
CO2	3	2	-	-	-	3	-	-	-	-	-	3	-	2
CO3	3	2	3	-	-	-	-	-	-	3	-	3	-	-
CO4	3	-	3	-	-	-	-	-	-	-	-	3	3	2
CO5	3	-	-	-	-	3	2	-	-	3	-	-	3	-

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B. Tech. IV Year II Semester

(7G389) ASIC DESIGN

(PROFESSIONAL ELECTIVE – IV)

COURSE OBJECTIVES:

- To understand ASIC Design flow ,ASICs Design styles and Issues, ASICs Design Techniques and ASIC Construction
- To analyze the Performance of ASICs
- To apply appropriate techniques, resources and tools to engineering activities for appropriate Solution to develop ASICs

UNIT I

ASIC DESIGN STYLES: Introduction – categories-Gate arrays-Standard cells-Cell based ASICs-Mixed mode and analogue ASICs – PLDs.

UNIT II

ASICS – PROGRAMMABLE LOGIC DEVICES: Overview – PAL –based PLDs: Structures; PAL Characteristics – FPGAs: Introduction, selected families – design outline.

ASICS –DESIGN ISSUES: Design methodologies and design tools – design for testability – economies.

UNIT III

ASICS- CHARACTERISTICS AND PERFORMANCE: design styles, gate arrays, standard cell -based ASICs, Mixed mode and analogue ASICs.

UNIT IV

ASICS-DESIGN TECHNIQUES: Overview- Design flow and methodology-Hardware description languages-simulation and checking-commercial design tools- FPGA Design tools: XILINX, ALTERA

LOGIC SYNTHESIS, SIMULATION AND TESTING: Verilog and logic synthesis -VHDL and logic synthesis - types of simulation -boundary scan test - fault simulation- automatic test pattern generation.

UNIT V

ASIC CONSTRUCTION: Floor planning, placement and routing system partition.

FPGA PARTITIONING: Partitioning Methods-Floor Planning- Placement-Physical Design Flow-Global Routing-Detailed Routing –Special Routing-Circuit Extraction-DRC.

TEXT BOOKS:

1. L.J.Herbst,"Integrated circuit engineering", OXFORD SCIENCE Publications, 1996.

REFERENCES:

1. M.J.S.Smith,"Application - Specific integrated circuits", Addison-Wesley Longman Inc 1997.

COURSE OUTCOMES:

- Demonstrate in-depth knowledge in ASIC Design flow, ASICs Design styles and Issues, ASICs Design Techniques. ASIC Construction.
- Analyze the characteristics and Performance of ASICs and judge independently the best suited device for conducting research in ASIC design.
- Solve problems of Design issues, simulation and Testing of ASICs.
- Apply appropriate techniques, resources and tools to engineering activities for appropriate Solution to develop ASICs.

CO-PO Mapping:

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