ACADEMIC REGULATIONS

COURSE STRUCTURE

AND

DETAILED SYLLABUS

ELECTRONICS AND COMMUNICATION ENGINEERING

FOR

B.TECH FOUR YEAR DEGREE COURSE

(Applicable for the batch admitted during 2012-2013)

G.NARAYANAMMA INSTITUTE OF TECHNOLOGY & SCIENCE

AUTONOMOUS OF JNTUH (FOR WOMEN)

SHAIKPET, HYDERABAD – 500 008. A.P.

ACADEMIC REGULATIONS GN-R-12 FOR B.TECH. REGULAR COURSE

(Effective for the students admitted into I year from the Academic Year **2012-2013** and onwards)

1. Award of B.Tech. Degree

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

i. **Pursued a course of study for not less than four academic years and not more than eight academic years.**

ii. Registered for **200 credits** and secured **200 credits**

2. Students, who fail to fulfill all the academic requirements for the award of the degree within eight academic years from the year of their admission, shall forfeit their seat in B.Tech course.

3. Courses of study

The following courses of study are offered at present for specialization for the

B. Tech. Course:

Branch Code	Branch
02	Electrical and Electronics Engineering
04	Electronics and Communication Engineering
05	Computer Science and Engineering.
12	Information Technology
17	Electronics and Telematics Engineering.
22	Instrumentation and Control Engineering.

4. Distribution and Weightage of Marks

i. The performance of a student in each semester shall be evaluated subject –wise with a maximum of 100 marks for theory and 75 marks for practical subject. In addition, Industry oriented mini-project, seminar, comprehensive viva and project work shall be evaluated for 50, 50 , 100 and 200 marks respectively.

ii. For theory subjects the distribution shall be 25 marks for Internal Evaluation and 75 marks for the End-Examination.

iii. For theory subjects, during the semester there shall be 2 midterm examinations. Each mid term examination consists of Part-A(Objective Type) for 5 marks and Part-B(subjective paper) for 15 marks with a duration of 2 Hrs. Assignment carries 5 marks.

Subjective paper shall contain 5 questions(Covering all the units) of which student has to answer 3 questions each 5 marks

FOR THE 2012 ADMITTED BATCH ONLY

Students performance in both the mid exams will be considered for evaluating the internal marks. For the best scored mid weightage of 75 % , and for the other 25 % weightage will be given.

FOR THE 2013 ADMITTED BATCH

Students performance in both the mid exams will be considered for evaluating the internal marks. Average performance of the two mids will be considered for evaluating internal marks.

$$\text{Average Performance} = \frac{(X1 + X2)}{2}$$

X1= First Mid Marks, X2 = Second Mid Marks

The first mid term examination shall be conducted for 50 % of the syllabus and the second mid term examination shall be conducted for the remaining 50 % of the syllabus.

iv. For practical subjects there shall be a continuous evaluation during the semester for 25 sessional marks and 50 end examination marks. Out of the 25 marks for internal, day-to-day work in the laboratory shall be evaluated for 15 marks and internal examination for practical shall be evaluated for 10 marks conducted by the concerned laboratory teacher. The end examination shall be conducted with external examiner and laboratory teacher. The external examiner shall be appointed from the panel of examiners as decided by BOS.

v. For the Engineering Drawing subject the distribution shall be 25 marks for internal evaluation (15 marks for day-to-day work and 10 marks for internal tests) and 75 marks for end examination. Two internal tests will be conducted and Students performance in both the mid exams will be considered for evaluating the internal marks. For the best scored mid weightage of 75 % , and for the other 25 % weightage will be given

vi. There shall be an industry-oriented mini-Project, in collaboration with an industry of their specialization, to be taken up during the vacation after III year II Semester examination. However, the mini project and its report shall be evaluated in IV year I Semester. The industry oriented mini project shall be submitted in report form and should be presented before the committee, which shall be evaluated for 50 marks. The committee consists of head of the department, the supervisor of mini project and a senior faculty member of the department. There shall be no internal marks for industry oriented mini project.

vii. There shall be a seminar presentation in IV year II Semester. For the seminar, the student shall collect the information on

a specialized topic and prepare a technical report, showing his understanding over the topic, and submit to the department, which shall be evaluated by the Departmental committee consisting of Head of the department, seminar supervisor and a senior faculty member. The seminar report shall be evaluated for 50 marks. There shall be no external examination for seminar.

viii. There shall be a Comprehensive Viva-Voce in IV year II semester. The Comprehensive Viva-Voce will be conducted by a Committee consisting of (i) Head of the Department (ii) two Senior Faculty members of the Department. The Comprehensive Viva-Voce is aimed to assess the students' understanding in various subjects he / she studied during the B.Tech course of study. The Comprehensive Viva-Voce is evaluated for 100 marks by the Committee. There are no internal marks for the Comprehensive viva-voce.

ix. Out of a total of 200 marks for the project work, 100 marks shall be for Internal Evaluation and 100 marks for the End Semester Examination. The End Semester Examination (viva-voce) shall be conducted by the committee consists of External examiner, HOD, the supervisor of the major project and a senior faculty of the dept. The topics for industry oriented mini project, seminar and project work shall be different from each other. The evaluation of project work shall be conducted at the end of the IV year II Semester. Out of the 100 marks for Internal evaluation 50 marks will be awarded by the supervisor, 50 marks will be awarded by the committee constituted by HOD shall be on the basis of two seminars given by each student on the topic of her project.

5. Attendance Requirements:

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

ii. **Shortage of Attendance below 65% in aggregate shall in <u>NO</u> case be condoned** .

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

iv. A student will not be promoted to the next semester unless he satisfies the attendance requirement of the present semester / I year, as applicable. They may seek re-admission for that semester / I year when offered next.

v. Students whose shortage of attendance is not condoned in any semester / I year are not eligible to take their end examination of that class and their registration shall stand cancelled.

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

6. Minimum Academic Requirements:

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item no.**5**

i. A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory or practical design or drawing subject or project 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.

ii. A student shall be promoted from II to III year only if he fulfils the academic requirement **of 36** credits from **TWO** regular and **ONE** supplementary examinations of I year I Semester, and **ONE** regular and **ONE** supplementary examination of I Year II Semester, and **ONE** regular

examination of II year I semester irrespective of whether the candidate takes the examination or not.

iii. A student shall be promoted from third year to fourth year only if he fulfils the academic requirements of total **60 c**redits from the following examinations, whether the candidate takes the examinations or not.

a. Three regular and two supplementary examinations of I year I Semester.

b. Two regular and two supplementary examinations of I year II Semester

c. Two regular and one supplementary examinations of II year I semester.

d. One regular and one supplementary examinations of II year II semester.

e. One regular examination of III year I semester.

iv. A student shall register and put up minimum attendance in all 200 credits and earn the 200 credits. Marks obtained in all 200 credits shall be considered for the calculation of percentage of marks.

v. Students who fail to earn 200 credits as indicated in the course structure within eight academic years from the year of their admission shall forfeit their seat in B.Tech course and their admission shall stand cancelled.

7. Course pattern:

i. The entire course of study is of four academic years. All the I,II,III and IV years are on semester pattern.

ii. A student eligible to appear for the end examination in a subject, but absent at it or has failed in the end examination may appear for that subject at the supplementary examination.

8. Award of Class:

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

Class Awarded	% of marks to be secured	
First Class with Distinction	70% and above	From the aggregate marks secured for the best 200 Credits.
First Class	Below 70% but not less than 60%	
Second Class	Below 60% but not less than 50%	
Pass Class	Below 50% but not less than 40%	

(The marks in internal evaluation and end examination shall be shown separately in the marks memorandum)

9. Minimum Instruction Days:

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

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

11. General:

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

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

iii. In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the PRINCIPAL/DIRECTOR is final.

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

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

(Effective for the students getting admitted into II year from the Academic Year 2013-2014 and onwards)

1. The Students have to acquire 150 credits from II to IV year of B.Tech. Program (Regular) for the award of the degree.

Register for **150** credits and secure **150** credits.

2. Students, who fail to fulfil the requirement for the award of the degree in 6 consecutive academic years from the year of admission, shall forfeit their seat.

3. The same attendance regulations are to be adopted as that of B. Tech. (Regular).

4. Promotion Rule:

A student shall be promoted from third year to fourth year only if he fulfils the academic requirements of 36 **credits from the examinations.**

a. Two regular and one supplementary examinations of II year I semester.

b. One regular and one supplementary examinations of II year II semester.

c. One regular examination of III year I semester.

5. Award of Class:

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

First Class with Distinction	70% and above	From the aggregate marks secured for 150 Credits. (i.e. II year to IV year)
First Class	Below 70% but not less than 60%	
Second Class	Below 60% but not less than 50%	
Pass Class	Below 50% but not less than 40%	

MALPRACTICES RULES

DISCIPLINARY ACTION FOR / IMPROPER CONDUCT IN EXAMINATIONS

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

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

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

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

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

G. NARAYANAMMA INSTITUTE OF TECHNOLOGY & SCIENCE
(FOR WOMEN), AUTONOMOUS
Batch (ELECTRONICS & COMMUNICATION ENGINEERING)
BATCH ADMITTED FROM 2012

I Year I Semester

Code	Subject	L	T/P/D	C
120004	English	4		3
120007	Mathematics-I	4	1	4
120501	Computer Programming	4	1	4
120008	Engineering Physics	4	1	4
120003	Engineering Drawing	2	4	3
120502	Computer Programming Lab		3	2
120005	English Lab		3	2
120009	Engineering Physics Lab		3	2
Total		18	16	24

I Year II Semester

Code	Subject	L	T/P/D	C
120015	Mathematics –II	4	1	4
120016	Mathematics –III	4	1	4
120206	Electrical Circuits	4	1	4
120010	Engineering Chemistry	4		4
120503	Data Structures	4	1	4
120011	Engineering Chemistry lab		3	2
120205	Electrical Circuits Lab		3	2
120504	Data Structures Lab		3	2
		20	13	26

II Year I Semester

Code	Subject	L	T/P/D	C
120020	Mathematics-IV	4	1	4
120213	Principles of Electrical Engineering	3	1	3
120403	Electronic Devices and circuits	4	1	4
120406	Signals & Systems	4	1	4
120405	Probability Theory & Stochastic processes	4	1	4
120402	Electrical Engineering Lab		3	2
120404	Electronic Devices and circuits Lab		3	2
120401	Basic Simulation Lab		3	2
Total:33+3(T)=36		19	14	25

II Year II Semester

Code	Subject	L	T/P/D	C
120021	Environmental Studies	3	1	3
120409	Electronic Circuit Analysis	4	1	4
121707	Pulse and Digital Circuits	4	1	4
121709	Switching Theory & Logic Design	3	1	3
120408	Electro Magnetic theory& Transmission Lines	4	1	4
120407	Control Systems	3	1	3
120410	Electronic Circuit Analysis Lab		3	2
120411	Pulse and Digital Circuits Lab		3	2
Total: 33+3(T)=36		21	12	25

III Year I Semester

Code	Subject	L	T/P/D	C
120022	Managerial Economics & Financial Analysis	3	1	4
120415	Computer Organization	4	1	4
120414	Antennas & Wave Propagation	4	1	4
120416	IC Applications	3	1	3
120413	Analog Communications	3	1	3
121712	Digital Signal Processing	4	1	4
120412	Advanced English Communication Skills Lab		3	2
120417	IC Applications Lab		3	2
Total: 33+3(T)=36		21	12	26

III Year II Semester

Code	Subject	L	T/P/D	C
120023	Management Science	3	1	4
120424	VLSI Design	4	1	4
120419	Digital communications	4	1	3
121718	Microprocessors & Microcontrollers	4	1	4
Open Elective		4	1	3
120423	Operating Systems			
120422	Object Oriented Programming			
120025	Nano technology			
120421	Microprocessors & Microcontrollers Lab		3	2
120420	Digital Signal Processing Lab		3	2
120418	Analog Communications Lab		3	2
Total:33+3(T)=36		19	14	24

IV Year I Semester

Code	Subject	L	T/P/D	C
120431	Electronic Measurements & Instrumentation	3	1	4
120435	Microwave Engineering	4	1	4
120426	Computer Networks	4	1	3
120425	Cellular & Mobile Communications	3	1	3
Elective –I		4	1	3
120433	EMI / EMC			
120429	DSP processors & Architectures			
120428	Digital Image processing			
120427	Digital Design Through Verilog HDL			
Elective-II		3	1	3
120438	Optical Communications			
120432	Embedded Systems			
120439	Television Engineering			
120437	Multimedia and Signal coding			
120434	Industry Oriented Mini Project		-	2
120430	e-CAD & VLSI Lab		3	2
120436	Microwave Engineering & Digital Communication Lab		3	2
Total:33+3(Mini Project)=36		21	12	26

IV Year II Semester

Code	Subject	L	T/P/D	C
Elective-III		4	1	4
121741	Telecommunication Switching Systems Networks			
121739	Satellite Communications			
120448	Spread Spectrum Communications			
120441	Artificial Neural Networks			
Elective-IV		4	1	3
121733	Internetworking			
120446	Radar Systems			
120442	Biomedical Instrumentation			
121736	Network Security			
Elective-V		4	1	3
121738	RF Circuit Design			
121743	Wireless Communications & Networks			
120440	Adaptive Signal Processing			
120445	Patten Recognition			
120447	Seminar		-	2
120444	Major Project		10	10
120443	Comprehensive Viva		-	2
Total: 25		12	13	24

ENGLISH

I Year - I Sem.	L	T/P/D	C
	4	/-/-	4

Objectives

a. To improve the language proficiency of the students in English with emphasis on LSRW skills.
b. To equip the students to cope the academic subjects with greater facility through the theoretical and practical components of the English syllabi.
c. To develop the study skills and communication skills in formal and informal situations.

Syllabus

Unit – I

1. Chapter entitled *Heaven's Gate* from "Enjoying Everyday English", Published by Sangam Books, Hyderabad.
2. Chapters 1-6 from Wings of Fire: An Autobiography, APJ. Abdul Kalam with Arun Tiwari, University Press.
3. Grammar : Nouns, Pronouns, Articles, Prepositions and Conjunctions
4. Vocabulary : Usage of Dictionary – *to identify meaning, pronunciation and usage of a word.*
5. Writing : Paragraphs and Descriptions

Unit – II

1. Chapter entitled *The Connoisseur* from "Enjoying Everyday English", Published by Sangam Books, Hyderabad.
2. Chapters 7-12 from Wings of Fire: An Autobiography, APJ. Abdul Kalam with Arun Tiwari, University Press.
3. Grammar : Adjectives and Adverbials
4. Vocabulary : Words often confused – *Homophones, Homonyms and Homographs*
5. Writing : Summarising and Note-making

Unit – III

1. Chapter entitled *The Cuddalore Experience* from "Enjoying Everyday English", Published by Sangam Books, Hyderabad.

2. Chapters 13 - 18 from Wings of Fire: An Autobiography, APJ. Abdul Kalam with Arun Tiwari, University Press.
3. Grammar : Tenses and Concord
4. Vocabulary : Word Formation and Word Origins - *Prefixes and Suffixes.*
5. Writing : Official correspondence – *Memorandums, reports, letters and e-mails*

Unit – IV

1. Chapter entitled *Odds Against Us* from "Enjoying Everyday English", Published by Sangam Books, Hyderabad.
2. Chapters 19 - 24 from Wings of Fire: An Autobiography, APJ. Abdul Kalam with Arun Tiwari, University Press.
3. Grammar : Interrogative Sentences and Question Tags
4. Vocabulary : One word substitutes and analogies
5. Writing : Covering letter and Resume writing

Unit – V

Engineering Ethics, Values and Professionalism – *Senses of Engineering Ethics, Variety of Moral issues, Professions and Professionalism, Assessment of Safety and Risk, Collegiality and Loyalty, Respect for Authority, Professional Rights, Computer ethics, Moral leadership, Corporate Code of Conduct.*

Text Books/Books Prescribed

1. "Enjoying Everyday English", Published by Sangam Books, Hyderabad.
2. "Wings of Fire : An Autobiography" APJ. Abdul Kalam with Arun Tiwari, University Press.
3. "Learn Correct English: A Book of Grammar, Usage and Composition" by Shiv K.Kumar and Hemalatha Nagarajan, Published by Pearson.

For General Reading

The Diary of a Young Girl by *Anne Frank*
Short stories by *O'Henry*
Swami and his Friends by *R.K.Narayan*
How I taught my grand mother to read by *Sudha Murthy*
Brave New World by *H.G.Wells*

REFERENCES :

1. **Objective English**, Edgar Thorpe & Showick Thorpe, Pearson Education.
2. **Murphy's English Grammar** with CD, Murphy, Cambridge University Press.
3. **ABC of Common Errors**, Nigel D Turton, Mac Millan Publishers.
4. **Engineering Ethics** (Second Edition) Charles B.Fleddermann, Pearson Education.
5. **Professional Ethics**, Jayshree Suresh & B.S.Raghavan, S.Chand & Company Ltd.

MATHEMATICS – I

I Year - I Sem.	**L**	**T/P/D**	**C**
	4	**1/-/-**	**4**

Objective : The objective of this course is to understand the concepts of calculus of single and several variables.

UNIT – I: Sequences and Series

Basic definitions of Sequences and Series – Convergences and Divergence – Ratio test – Comparison test – Integral test – Cauchy's Root test – Raabe's test – Absolute and Conditional Convergence.

Mean Value Theorems: Rolle's Theorem – Lagrange's Mean Value Theorem – Cauchy's Mean Value Theorem – Generalized Mean Value theorem. (All theorems without proof)

UNIT – II: Functions of Several Variables

Functions of Several Variables: Functional Dependence - Jacobian- Maxima and Minima of functions of two variables with constraints and without constraints.

Radius of Curvature - Centre and Circle of Curvature – Evolutes and Involutes- Envelopes. (All concepts in Cartesian Coordinates)

UNIT – III: Differential Equations of First Order and First Degree & Applications

Overview of Differential Equations - Exact, Linear and Bernoulli - Applications to Newton's Law of cooling, Law of Natural Growth and Decay - Orthogonal Trajectories.

UNIT – IV: Vector Calculus

Vector Calculus: Gradient – Divergence - Curl and Related Properties – Directional Derivatives & Angle between the Surfaces - Gradient, Divergence, and Curl in Cylindrical and Spherical Coordinate systems.

UNIT – V: Multiple Integrals and Vector Integral Theorems

Multiple integrals: Double and Triple Integrals – Change of Order of Integration- change of variables.

Line integral – Work done – Surface Integral - Flux of a Vector Valued Function.

Vector Integral Theorems: Green's, Stoke's and Gauss's Divergence Theorems (Statement & their Verification).

TEXT BOOKS:

1. Advanced Engineering Mathematics by **Dr. S.R.K. Iyengar & Others**, Narosa, Publications.
2. Advanced Engineering Mathematics by **E.Kreyszig**, Wiley Publications.
3. Higher Engineering Mathematics by **B.S.Grewal**, Khanna Publications.

REFERENCES:

1. Engineering Mathematics – I by T.K. V. Iyengar, B. Krishna Gandhi & Others, S. Chand Publications.
2. A Text Book of Engineering Mathematics – 1 by B.V. Ramana, Tata MCGraw Hill Publications.
3. Engineering Mathematics- I by Dr. Shahnaz Bathul, PHI learning Pvt. Ltd. (In Press)

COMPUTER PROGRAMMING

I Year - I Sem.	L	T/P/D	C
	4	1/-/-	4

UNIT - I

INTRODUCTION TO COMPUTERS: Introduction to computers, computer systems, computing environments, computer languages, creating and running programs, software development method, algorithms, pseudo code, flow charts, applying the software development method.

INTRODUCTION TO C LANGUAGE: Basic structures of C language, C tokens, data types and sizes, declaration of variables, assigning values.

OPERATORS AND EXPRESSIONS: Statements, arithmetic, relational and logical operators, increment and decrement operators, conditional operator, bitwise operators, type conversions, expressions and evaluation, input and output statements, Header files, C preprocessor, Programming examples. .

UNIT - II

CONTROL STATEMENTS: Conditional and control statements, programming examples..

FUNCTIONS: Defining and accessing, parameter passing, function prototypes, user defined functions, recursive functions , programming examples.

Storage Classes, Scope rules, programming example.

ARRAYS: Defining and processing, one dimensional and two dimensional arrays, initialization, passing arrays to a function, multi dimensional arrays, command line arguments.

UNIT - III

STRINGS: Defining and operations on strings, string variables declaration, reading, writing.
Passing strings as parameters , string handling functions.

POINTERS: Basic Concepts, pointer to pointer, passing pointers to a function, operations on pointers, pointer
arithmetic, pointers and arrays, arrays of pointers, function pointers, dynamic memory allocation.

UNIT - IV

STRUCTURES AND UNIONS: Structure definition, initializing, assigning values, passing of structures as arguments, arrays of structures, pointers

to structures, self reference to structures, unions, typedef ,enumerated, bit fields, programming examples.

UNIT - V

CONSOLE AND FILE I/O: File, types of files, file vs. console, file structure, file attributes, file operations, standard I/O, formatted I/O, programming examples.

TEXT BOOKS:

1. B. A. Fouruzan and R. F. Gilberg (2006), Computer Science: A structured programming approach using C, 3rd Edition, Thomson Publications, New Delhi.
2. Yashawanth Kanethkar (2008), Let us C, 8th Edition, Jones & Bartlett Publishers, India.

REFERENCE BOOKS:

1. Herbert Schildt (2000), C: The Complete Reference, 4th Edition, New Delhi, Osborne Mc Graw Hill.
2. B. W. Kerninghan and Dennis M. Ritche (1988), The C Programming Language, 2nd Edition, Prentice Hall
3. Software Series, India.
4. Stephen G.Kochan (2004), Programming in C, 3rd Edition, Pearson Education Private Limited

ENGINEERING PHYSICS

I Year - I Sem.	**L**	**T/P/D**	**C**
	4	**1/-/-**	**4**

Objectives: This course imparts students, the basic knowledge of the electromagnetic properties, and optical properties which form the requirement for understanding and applying principles of physics for electronic, electrical and communicational engineering. This also enhances the classical to Quantum mechanical

UNIT-I

1. **Solids and Crystallography:** Classification of bonding in solids. Calculation of Cohesive Energy. (2 Periods)

Space Lattice, Unit Cell, Lattice Parameters, Crystal Systems, Miller Indices, Crystal Planes and Directions, Inter Planar Spacing of Orthogonal Crystal Systems, Atomic Radius, Co-ordination Number and Packing Factor of SC, BCC, FCC. X-ray diffraction by powder method.

(4 Periods)

2. **Defects in Crystals**: Point Defects: Vacancies, Substitution, Interstitial, Frenkel and Schottky Defects; Equilibrium concentration of point defects (vacancies, Frenkel and Schottky defects.) (4 Periods)

UNIT-II

3. **Elements of Statistical Mechanics**: Distinguishable and indistinguishable paticles. Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac Statistics (Qualitative Treatment), Fermi-Dirac Distribution function and its variation with temperature. Planck's Law of Black Body Radiation and derivation of Wien's Law, Rayleigh-Jeans law from Planck's law.

(5 Periods)

4. Principles of Quantum Mechanics**:** Waves and Particles, de Broglie Hypothesis , Matter Waves, Davisson and Germer Experiment **,** Heisenberg's Uncertatinty Principle (Qualitative Treatment), Schrodinger's Time Independent Wave Equation - Physical Significance of the Wave Function. Particle in One Dimensional Potential Box.
(5 Periods)

UNIT-III

5. **Band Theory of Solids**: Behavior of Electron in a periodic Potential using Bloch solution. Kronig-Penny Model (Qualitative Treatment), Origin of Energy Bands in Solids, Classification of Materials into Conductors, Semi Conductors & Insulators, Concept of Effective Mass of an Electron.
(5 Periods)

6. **Semiconductor Physics**: Fermi Levels in Intrinsic and Extrinsic Semiconductors, Carrier Concentration in Intrinsic and Extrinsic Semiconductors. Drift and diffusion current in semiconductors (Qualitative Treatment) and Equation of Continuity, Direct & Indirect Band Gap Semiconductors, Hall Effect and its applications.
(7 Periods)

UNIT-IV

7. **Dielectric Properties**: Definition of Electric Dipole, Dipole Moment, Dielectric Constant, Polarizability, Electric Susceptibility, Displacement Vector. Electronic, Ionic and Orientation Polarizations and Calculation of Polarizabilities for Electronic and Ionic poarisations. Internal Field in solids , Clausius - Mossotti Equation, Piezo-electricity and Ferro- electricity, examples and applications.
(7 Periods)

8**.** **Magnetic Properties**: Definition of Permeability, Field Intensity, Magnetic Field Induction, Magnetization, Magnetic Susceptibility, Origin of Magnetic Moment, Bohr Magneton, Domain Theory of Ferro Magnetism, Hysteresis Curve, Soft and Hard Magnetic Materials, Properties of Anti-Ferro and Ferri Magnetic Materials, Ferrites and their Applications.Perfect diamagnetism in super condectors(Meissner effect), Magnetic Levitation (8 Periods)

UNIT-V

9. **Lasers**: Characteristics of Lasers, Spontaneous and Stimulated Emission of Radiation, Meta-stable State, Population Inversion, Lasing Action, Einstein's Coefficients and Relation between them, Ruby Laser, Helium-Neon Laser, Semiconductor Diode Laser, Applications of Lasers (LASER Cooling & ablation).
(6 Periods)

10. **Fiber Optics**: Principle of Optical Fiber, Acceptance Angle and Acceptance Cone, Numerical Aperture, Types of Optical Fibers (Step index and graded index fibers) and Refractive Index Profiles, Attenuation in Optical Fibers, Application of Optical Fibers (Engineering, Medical and Scientific fields). (3 Periods)

11. **Nanotechnology**: Origin of Nanotechnology, Nano Scale, Surface to Volume Ratio, Quantum Confinement, Bottom-up Fabrication: Sol-gel, Top-down Fabrication: Chemical Vapour Deposition, Characterization (XRD&TEM) and Applications.

(4 Periods)

TEXT BOOKS:

1. Applied Physics - P.K.Palanisamy (SciTech Publications (India) Pvt. Ltd., Fifth Print 2008).

2. Applied Physics - S.O. Pillai & Sivakami (New Age International (P) Ltd., Second Edition 2008).

3. Applied Physics - T. Bhima Shankaram & G. Prasad (B.S. Publications, Third Edition 2008).

4.Concepts of Modern Physics –Aurther Beiser . et.al.

REFERENCES:

1. Solid State Physics - M. Armugam (Anuradha Publications).

2. Modern Physics - R. Murugeshan & K. Siva Prasath - S. Chand & Co. (for Statistical Mechanics).

3. Physics and Chemistry of Materials-Gersten, FW Smirth

4 . Material Science and Engineerin -Raghavan

5. Nanotechnology - M.Ratner & D. Ratner (Pearson Ed.).

6. Introduction to Solid State Physics - C. Kittel (Wiley Eastern).

ENGINEERING DRAWING

I Year -I Sem.	**L**	**T/P/D**	**C**
	2	**-/ -/ 4**	**3**

CHAPTER 1 . Principles of Engineering Graphics and their Significance- Drawing Instrument and their Use- Conventions in Drawing-Lettering- Curves used in engineering Practice and Constructions. Conic sections- Ellipse, Parabola and Hyperbola. Construction of Cycloid, Epi-cycloid and Hypocycloid

CHAPTER 2. Principle of orthographic projections –Conventions-First angle and Third angle projections, Projections of Points and Lines. (Excluding traces of a line)

CHAPTER 3. Projections of regular planes inclined to both the planes.

CHAPTER 4. Projections of regular Solids inclined to both the planes.

CHAPTER 5. Principles of Isometric Projection- Isometric Scale-Isometric Views- Conventions- Isometric Views of Lines, Plane Figures, Simple and compound Solids. Conversion of Isometric Views to Orthographic Views

Text Book : Engineering Drawing by N.D.Bhatt

COMPUTER PROGRAMMING LAB

I Year I – Sem.	L	T/P/D	C
	0	-/3/-	2

Recommended Systems/Software Requirements:

Intel based desktop PC 'gcc' Compiler for CSE and IT branches, 'ANSI C' Complier for other branches.

Week 1.

a) Write a C program to calculate the following Sum:
Sum=1-x2/2! +x4/4!-x6/6!+x8/8!-x10/10!

b) Write a C program to find the roots of a quadratic equation.

Week 2.

a) Write a C program to find the sum of individual digits of a positive integer.

b) A Fibonacci Sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.

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

Week 3

a) The total distance travelled by vehicle in 't' seconds is given by distance = ut+1/2at2 where 'u' and 'a' are the initial velocity (m/sec.) and acceleration (m/sec2). Write C program to find the distance travelled at regular intervals of time given the values of 'u' and 'a'. The program should provide the flexibility to the user to select his own time intervals and repeat the calculations for different values of 'u' and 'a'.

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

Week 4

a) Write a C program to generate Pascal's triangle.

b) Write a C program to construct a pyramid of numbers.

Week 5

Write a C program to read in two numbers, x and n, and then compute the sum of this geometric progression:
1+x+x2+x3+……+xn
For example: if n is 3 and x is 5, then the program computes 1+5+25+125.
Print x, n, the sum

Perform error checking. For example, the formula does not make sense for negative exponents – if n is less than 0. Have your program print an error message if n<0, then go back and read in the next pair of numbers of without computing the sum. Are any values of x also illegal ? If so, test for them too.

Week 6

Write a C program to implement:
i) Precedence and associativity
ii) Bit Manipulation using switch case

Week 7

Write C programs that use both recursive and non-recursive functions
i) To find the factorial of a given integer.
ii) To find the GCD (greatest common divisor) of two given integers.
iii) To solve Towers of Hanoi problem. (Recursion)

Week 8

a) 2's complement of a number is obtained by scanning it from right to left and complementing all the bits after the first appearance of a 1. Thus 2's complement of 11100 is 00100. Write a C program to find the 2's complement of a binary number.

b) Write a C program that uses functions to perform the following:
i) Addition & Multiplication of 2 matrices
ii) Determinant of matrix and inverse of a matrix

Week 9

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

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

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

b) Write a C program to determine if the given string is a palindrome or not

Week 10

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

b) Write a C program to count the lines, words and characters in a given text.

Week 11

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

i) Reading a complex number
ii) Writing a complex number
iii) Addition of two complex numbers
iv) Multiplication of two complex numbers

(Note: represent complex number using a structure.)

Week 12

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

b) Write a C program to reverse the first n characters in a file.

(Note: The file name and n are specified on the command line.)

ENGLISH LAB

I Year - I Sem.	**L**	**T/P/D**	**C**
		-/3/-	**2**

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

Objectives:

a. To expose the students to a variety of self-instructional, learner-friendly modes of language learning.
b. To enable them to learn better pronunciation through stress on word accent, intonation, and rhythm.
c. To train them to use language effectively to face interviews, group discussions, public speaking.
d. To initiate them into greater use of the computer in resume preparation, report writing, format-making etc.

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 Accent and Rhythm – *Stress and Intonation*
3. Pronouncing words: *Important patterns*
4. Situational Dialogues / Role Play
5. Presentation Skills
6. 'Just A Minute' Sessions (JAM)
7. Descriptions and Narrations
8. Information Transfer
9. Debating Skills
10. Telephonic conversations
11. Group Discussions
12. Interview Skills

Minimum Requirement:

The English Language Lab shall have two parts:

i) **The Computer aided Language Lab** for 30 students with 30 systems, one master console, LAN facility and English language software for self- study by learners.

ii) **The Communication Skills Lab** with movable chairs and audio-visual aids with a P.A System, a Multimedia Projector a digital stereo – audio & video system and camcorder etc.

System Requirement (Hardware component):

Computer network with Lan with minimum 30 multimedia systems with the following specifications:

i) CPU Requirements
a) Duel Core Processor
b) Speed – 2.8 GHZ
c) RAM – 1 GB Minimum
d) Hard Disk – 80 GB Minimum
e) DVD ROM Drive

ii) Headphones of High quality

Suggested Software:

- Cambridge Advanced Learners' English Dictionary with CD.
- Murphy's English Grammar with CD, Cambridge University, Press.
- Pronunciation in Use by *Mark Hancock,* Cambridge University Press.
- Test Your English Vocabulary in Use by Michael Mc Carthy and Felicity O'Dell, Cambridge University Press.
- BBC Speak English

References:

1. **A Practical Course in English Pronunciation**, (with two Audio cassettes) by J. Sethi, Kamlesh Sadanand & D.V. Jindal, Prentice-Hall of India Pvt. Ltd., New Delhi.
2. **A text book of English Phonetics for Indian Students** by T.Balasubramanian (Macmillan).
3. **Speak Well** Published by **Orient Blackswan Private Limited,** 2012.

DISTRIBUTION AND WEIGHTAGE OF MARKS

English Language Laboratory Practical Paper:

1. The practical examinations for the English Language Laboratory shall be conducted as per the norms stipulated for the core engineering practical sessions.

2. For the Language lab sessions, there shall be a continuous evaluation during the semester for 25 sessional marks and 50 year-end Examination marks. Of the 25 marks, 15 marks shall be awarded for day-to-day work and 10 marks to be awarded by conducting Internal Lab Test(s). The year- end Examination shall be conducted by the teacher concerned with an external examiner from the other Universities or colleges.

Engineering Physics Lab

I Year - I Sem.	L	T/P/D	C
	0	- 3 -	2

List of the Experiments

1. Dispersive power of the material of a Prism – Spectrometer.
2. Determination of wavelength of a source – Diffraction Grating (Normal -Incidence).
3. Size of the particle and Quantum Confinement.
4. Time constant of R-C Circuit.
5. Magnetic field along the axis of the current carrying coil- Stewart &Gees'
6. Evaluation of Numerical Aperture
7. Evaluation Bending losses of fibers.
8. Energy gap of a Semiconductor material .
9. Torsional pendulum
10. Laser wavelength determination using Diffraction grating.
11. Dielectric constant.
12. Hall effect –simulation.

TEXT BOOKS:

1. Practical Enginieering Physics by T.Radha Krishna & V. Rajeshwar Rao (VGS Techno Series)
2. Laboratry Manual of Engineering Physics by Dr. Y. Aaprna & Dr. K. Venkateswara RAO (SM Enterprises.)

REFERENCE BOOKS:

1 .Experiments in Engineerin Physics by MN Avadhanlu, AA Dani, PM Polkey - S.C HAND

MATHEMATICS – II

I Year - II Sem.	L	T/P/D	C
	4	1/-/-	4

Objective : The prime objective of this course is to solve linear and nonlinear systems by using the concepts in Matrices and numerical methods.

UNIT – I: Solution for Linear Systems

Real matrices: Symmetric, Skew-Symmetric and Orthogonal - Complex matrices: Hermitian, Skew-Hermitian and Unitary - Elementary Row Transformations – Rank - Echelon form - Normal form - Solutions of Linear Systems: By Rank Concept, LU Decomposition, and Solution of Tridiagonal Systems.

UNIT – II: Linear Transformations

Eigen values, Eigen vectors – Properties – Cayley-Hamilton Theorem (without proof) - Inverse and Powers of a Matrix by Cayley-Hamilton theorem – Diagonolization of matrix - Calculation of Powers of matrix – Modal and Spectral Matrices.

Quadratic forms: Reduction of Quadratic form to Canonical form - Linear Transformation – Orthogonal Transformation – Rank, Index, and Signature – Sylvester's Law of Inertia (without proof).

UNIT – III: Solution of Non- linear Systems & Curve Fitting

Solution of Algebraic and Transcendental Equations: Introduction – The Bisection Method – The Method of False Position – The Iteration Method – Newton-Raphson Method.

Curve fitting: Fitting a Straight line – Second Degree Curve- Exponentional curve - Power Curve by the Method of Least Squares.

UNIT – IV: Interpolation

Introduction - Errors in Polynomial Interpolation – Finite Differences- Forward Differences - Backward Differences – Central Differences – Symbolic Relations and Separation of Symbols - Difference Equations - Differences of a Polynomial - Newton's Formulae for Interpolation – Central Difference Interpolation Formulae: Gauss Central Difference Formulae – Interpolation with Unevenly Spaced Points: Lagrange's Interpolation formula, Newton's Divided Difference Interpolation Formula

UNIT – V: Numerical solution of IVP's in ODE

Numerical Differentiation – Numerical Integration: Simpson's 3/8 Rule, Gaussian Integration.

Numerical Solution of Ordinary Differential equations: Taylor's series Method-Picard's Method of Successive Approximations – Euler's Method, Modified Euler's Method - Runge-Kutta Method – Predictor-Corrector Methods: Adams-Bashforth-Moulton (ABM) Method.

TEXT BOOKS:

1. Advanced Engineering Mathematics by **Dr. S.R.K. Iyengar & Others**, Narosa, Publications.
2. Advanced Engineering Mathematics by **Kreyszig**, Wiley Publications.
3. Higher Engineering Mathematics by **B.S. Grewal**, Khanna Publications.

REFERENCES:

1. Introductory Methods by Numerical Analysis by S.S.Sastry, PHI Learning Pvt. Ltd.
2. Mathematical Methods by B.V.Ramana, Tata McGraw Hill Publications.
3. Mathematical Methods by Dr.Shahnaz Bathul, PHI Learning Pvt, Ltd (in press)

MATHEMATICS – III

I Year - II Sem.	L	T/P/D	C
	4	1/-/-	4

Objective : The core objective of this paper is to solve the differential equations by using analytical methods and integral transform methods.

UNIT – I: Linear Differential Equations with Constant Coefficients & Applications

Linear differential equations with constant coefficients - Method of Variation of Parameters.

Applications in Electrical Circuits, Simple Harmonic Motion.

UNIT – II: Laplace Transforms & Its Applications to Ordinary Differential Equations

Laplace Transform of Standard Functions - First and Second Shifting Theorems - Transform of Derivatives and Integrals – Multiplication and Division by 't' - Laplace Transform of a Periodic Function - Unit Step Function - Dirac's Delta Function – Inverse Laplace Transform – Method of Partial Fractions - Convolution Theorem - Application of Laplace Transforms to Ordinary Differential Equations.

UNIT – III: Fourier Series & Fourier Transforms

Fourier Series: Determination of Fourier Coefficients – Fourier Series – Even and Odd Functions – Fourier Series in an Arbitrary Interval – Even and Odd Periodic Continuation – Half-Range Fourier Sine and Cosine Expansions.

Fourier Transforms: Fourier Sine and Cosine Transforms – Properties – Inverse Transforms – Convolution Theorem – Parseval's Identity.

UNIT – IV: Partial Differential Equations

Introduction - Formation of Partial Differential Equation: By Elimination of Arbitrary Constants and Arbitrary Functions - Solution of First Order Equations: Linear (Lagrange's) Equations - Nonlinear (Standard type) Equations and Charpit's Method

Second Order Partial Differential Equations: Method of Separation of Variables – One Dimensional Wave Equation – One Dimensional Heat Equation - Laplace Equation in Two Variables - Transmission Lines.

UNIT – V: Applications of Laplace and Fourier Transforms in IVPs & BVPs

Applications of Laplace Transforms in IVPs and BVPs: Heat Equation - Wave Equation – Laplace Equation.

Applications of Fourier Transforms in IVPs and BVPs: Infinite Fourier Transforms – Choice of Infinite Sine or Cosine Transforms Examples.

TEXT BOOKS:

1. Advanced Engineering Mathematics by **Dr. S.R.K. Iyengar & Others**, Narosa, Publications.
2. Advanced Engineering Mathematics by **Kreyszig**, Wiley Publications.
3. Higher Engineering Mathematics by **B.S. Grewal**, Khanna Publications.

REFERENCES:

1. Mathematical Methods by B. V. Ramana, Tata McGraw Hill Publications.
2. Integral Transforms by I.N. Sneddon, TATA McGraw Hill Edition.
3. Mathematical Methods by Dr.Shahnaz Bathul, PHI Learning Pvt, Ltd (in press).

ELECTRICAL CIRCUITS

I Year – II Sem.	L	T/P/D	C
	4	1/0/0	4

Objective:

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

UNIT I: Analysis of Electrical Circuits

Circuit concept – R-L-C Parameters – Voltage & Current Sources – Independent and dependent sources – Source Transformation - Voltage-Current relationships for passive elements (for different input signals – square, ramp, saw tooth, triangular)

Kirchoff's laws – Network reduction techniques – series, parallel, series parallel, star to delta & delta to star conversion, Nodal analysis, mesh analysis, Super node & super mesh for DC excitations

UNIT II: Single Phase AC Circuits

RMS & Average Values and form Factor for different periodic wave forms, Steady state Analysis of R, L, & C (in series, parallel and series parallel combinations) with sinusoidal excitation – Concept of Reactance, Impedance, Susceptance and Admittance – Phase & phase difference – Concept of power factor, Real & reactive powers – j-Notation, Complex and Polar forms of representation, Complex Power

Locus Diagrams – Series R-L, R-C, R-L-C and parallel combination with variation of various parameters – Resonance – series, parallel circuits, Concept of bandwidth and Q factor.

UNIT III: Magnetic Circuits

Magnetic Circuits – Comparision of Electric & Magnetic Circuits - Analysis of series and parallel magnetic circuits - Composite magnetic circuits.

Concept of self & mutual inductance – dot convention – Coefficient of coupling – Elementary treatment of Coupled circuits

UNIT IV: Network Topology

Definitions – Graph – Tree, Basic cutset & basic tieset matrices for planar networks – Loop & nodal methods of Analysis of Networks with dependent & independent voltage & current sources – Duality & dual networks

UNIT V: Network Theorems (AC & DC excitations)

Tellegan's, Superposition, Reciprocity, Thevenin's, Norton's, Maximum Power Transfer, Millman's and Compensation theorems for AC & DC excitations

TEXT BOOKS :

1. Engineering Circuit Analysis by William Hayt and Jack E. Kemmerly, Mc Graw Hill Company, 6th edition.
2. Circuits & Networks by A. Sudhakar and Shyammohan S.Palli, Tata Mc Graw- Hill.
3. Electical circuits by A.Chakrabarthy, Dhanipat Rai & sons.

REFERENCE BOOKS:

1. Network Analysis by M.E.Van Valkenberg.
2. Linear Circuit Analysis (time domain phasor and Laplace transform approaches) Spend edition by Raymond a.Decarlo and PEN-Min-LIN, Oxford University press. Second 2004.
3. Electric Cirucit theory by K.Rajeswaran, Person Education 2004.
4. Basic Circuit Analysis by D.R.Cunningham & J.A Stuller, Jaico Publication.

ENGINEERING CHEMISTRY

I Year – II Sem.	L	T/P/D	C
	4	-/-/-	4

Objectives:

1. To furnish the conceptual understanding of the basic principles of chemistry.
2. To develop the habit of scientific reasoning in students so that they can work with open and inquiring mind.
3. To impart extensive knowledge of the subject to make them understand the role of chemistry in the field of Engineering.
4. To develop analytical capabilities of chemistry so that they can apply knowledge gained in solving engineering related problems.

Unit-I:

Electro Chemistry and Corrosion: Conductance-Specific conductance, Equivalent conductance, Molar conductance, Effect of dilution on conductance, measurement of electrolytic conductance. Galvanic cell, cell notation, concept of electrode potential, Nernst equation and its applications. Types of Electrodes-Hydrogen, Calomel electrodes. Single electrode potential, Measurement of cell EMF and its applications. Galvanic series and Electrochemical series and its significance. Determination of P^H by using Quinhydrone and Glass electrodes. Concentration cells- Electrolytic concentration cell & its applications, numerical problems.

Introduction to Corrosion, causes and effects of corrosion. Theories of corrosion- Chemical and Electrochemical corrosion with mechanism.Types of corrosion-Galvanic,Waterline & Granular corrosion. Factors affecting rate of corrosion (i)Nature of metal – galvanic series & nature of corrosion product (ii) Nature of environment – effect of temperature, P^H, Humidity.Corrosion control methods – Cathodic protection- Sacrificial anode & Impressed current cathodic methods, Metallic coatings- Hot dipping-Galvanisation,Tinning, Metal Cladding & Cementation.

(16 hrs)

Unit-II:

WaterTechnology: Introduction, Hardness- Causes, units & types of hardness. Estimation of temporary & permanent hardness of water by EDTA method, numerical problems. Boiler Troubles- Scales& Sludge

formation, Priming & Foaming, Caustic embrittlement,, Boiler Corrosion .Softening of water -Internal treatment & External treatment – Lime soda process, Zeolites, Ion exchange process,numerical problems. Specifications & Treatment of potable water.
(12hrs)

Unit-III:

Polymers: Introduction , Types of polymerization, Mechanism (Chain growth- Free radical mechanism & step growth). Plastics-Thermoplastic resins & Thermoset resins, Compounding & Fabrication of plastics. Preparation, properties and engineering applications of PVC, Teflon, Bakelite & Nylon. Conducting polymers: conduction and its applications of Polyacetylene, Polyaniline. Rubber: Natural rubber- Processing & Vulcanization . Elastomers-Buna-S & Thiokol rubber. Bio degradable polymers-example and uses, Fibers- Polyester and Polyacrylonitile and their applications. **(10 hrs)**

Unit-IV

Energy Sources: Introduction**,** Chemical Fuels-classification, solid fuels-coal,analysis of coal– proximate and ultimate analysis. Liquid fuels-petroleum, refining of petroleum. Cracking-Thermal & Catalytic cracking , Synthetic petrol-Bergius & Fischer Tropsech's process, Knocking-Octane & Cetane number. Gaseous fuels – Natural gas, Calorific value of fuel-HCV, LCV, Dulong formula. Determination of calorific value by Junker's calorimeter, Combustion problems. Analysis of flue gas by Orsat's method. **(13 hrs)**

Unit-V

Material Chemistry: Introduction , Cement: Composition of Portland cement , Setting and Hardening of cement (reactions). Lubricants-mechanism of lubrication, Properties of lubricants- Viscosity & its determination by Red wood viscometer, Flash and Fire point& its determination by Pensky-Marten's apparatus, Cloud point & pour point. Refractories- Introduction , Classification & properties-refractoriness & RUL test, Ceramics-Porcelain.

Batteries: Primary cells: zinc-carbon , Secondary cells: Lead-acid storage cell & Ni-Cd cell. Fuel cell: Hydrogen – Oxygen fuel cell .
(9 hrs)

TEXT BOOKS:

1. A text book of Engineering Chemistry – Dr. Y. Bharathi Kumari & Dr.Ch. Jyotsna Cherukuri.
2. Engineering chemistry by P.C.Jain &Mounica Jain,Dhanpatrai publishing company(2008).
3. Text book of Engineering chemistry- Shashi chawla,Dhanpatrai publishing company,NewDelhi(2008)

REFERENCE BOOKS:

1. Text book of Engineering chemistry by C.P.Murthy,C.V.Agarawal,A.Naidu B.S.Publications,Hyd(2006).

2. Text of Engineering chemistry by S.S.Dara and Mukkanti,S.Chand and Co,New Delhi(2006)

3. Engineering chemistry by B.Shivashankar,Mc.Graw Hill publishing company limited, NewDelhi(2006).

4. Engineering chemistry J.C.Kuriacase & J.Rajaram,TataMcGrawHills co.,NewDelhi(2004)

5. Chemistry of Engineering materials by R.P.Mani and K.N.Mishra,CENGAGE learning.

6. Applied chemistry-a text for Engineering and technology-Springar(2005)

7. Engineering chemistry – R.Gopalan,D.Venkatappayya,D.V.SulochanaNagarajan-Vikas publishers(2008).

8. Elements of Physical chemistry by B.R.Puri,L.R .Sharma and M.S.Pathania-2nd edition,vishal publishing co.

DATA STRUCTURES

I Year - II Sem.	L	T/P/D	C
	4	1/-/-	4

UNIT I:
Searching: Linear and binary search methods.
Sorting: Bubble sort, selection sort, Insertion sort, Quick sort, Merge sort, Heap sort, Shell sort, Radix sort. Time complexities.

UNIT II:
Stacks, Queues, Circular queues, Dequeues working and representation using arrays, Applications of stacks :infix to post fix conversion, postfix expression evaluation.

UNIT III:
Linked list: Singly linked list, Doubly linked list, Circular linked list working and representation using pointers. Implementation of stacks and queues using pointers.

UNIT IV:
Trees: Terminology, sequential and linked representation, tree traversals. Binary trees, Binary search trees.

UNIT V:
Graphs: Terminology, sequential and linked representation, graph traversals : Depth First Search & Breadth First Search implementation. Spanning trees, Prims and Kruskals method.

TEXT BOOKS:
1. Computer science, A structured programming approach using C, B.A. Forouzan and R.F. Gilberg, Third edition, Thomson.
2. Data Structures Using C – A.S.Tanenbaum, Y. Langsam, and M.J. Augenstein, PHI/Pearson education.

REFERENCES :
1. C Programming & Data structures – E. Balaguru Swami, TMH
2. The C Programming Language, B.W. Kernighan, Dennis M.Ritchie, PHI/Pearson Education
3. C Programming with problem solving, J.A. Jones & K. Harrow, dreamtech Press
4. Let us C – Yeswanth Kanithkar.

ENGINERING CHEMISTRY LAB

I Year – II Sem.	L	T/P/D	C
	0	-/3/-	2

List of Experiments

Any 10 Experiments of the Following:

1. Estimation of Ferrous ion by dichrometry by using Mohr's salt
2. Estimation of hardness of water by EDTA method
3. Estimation of manganese dioxide in pyrolusite
4. Determination of surface tension of lubricants
5. Titration of strong acid VS strong base by conductometric method
6. Titration of strong acid VS strong base by potentiometric method
7. Estimation of Copper by Colorimetric method
8. Estimation of Iron in Cement by Colorimetric method
9. Conductometric titration of mixture of acids Vs strong base
10. Determination of viscosity of sample oil by Ostwald's viscometer
11. Determination of dissociation constant of weak acid by Conductometric method.
12. Preparation of Thiokol rubber

TEXT BOOKS:

1. Laboratory Manual of Engineering Chemistry by Dr. Y. Bharathi Kumari & Ch. Jyotsna V.G.S Book links.
2. Practical Engineering Chemistry by K.Mukkanti, etal, B.S. Publications, Hyderabad
3. Inorganic quantitative analysis, Vogel

REFERENCE BOOKS:

1. Text Book of Engineering chemistry by R.N. Goyal and Harrmendra Goel
2. A text book on experiments and calculation Engg. S.S. Dara
3. Instrumental methods of chemical analysis, Chatwal, Anand, Himalaya Publications

ELECTRICAL CIRCUITS LAB

I Year - II Sem.	**L**	**T/P/D**	**C**
	0	**0/3/0**	**2**

Any Ten experiments have to be conducted from the following list:

1) Thevenin's, Norton's
2) Maximum Power Transfer theorems .
3) Superposition theorem
4) RMS value of complex wave
5) Verification of Compensation Theorem.
6) Reciprocity , Millmann's Theorems.
7) Locus Diagrams of RL and RC Series Circuits
8) Series and Parallel Resonance
9) Determination of Self, Mutual Inductances and Coefficient of coupling
10) Measurement of Active Power for Star and Delta connected balanced loads
11) Measurement of Reactive Power for Star and Delta connected balanced loads
12) Measurement of 3-phase Power by two Wattmeter Method for unbalanced loads

DATA STRUCTURES LAB

I Year B.Tech II-Sem	L	T/P/D	C
	0	-/3/-	2

Week 1
Write C programs that use both recursive and non recursive functions to perform the following searching operations for a Key value in a given list of integers:
i) Linear search ii) Binary search

Week 2
Write C programs that implement the following sorting methods to sort a given list of integers in ascending order:
i) Bubble sort ii) Selection sort

Week 3
Write C programs that implement the following sorting methods to sort a given list of integers in ascending order:
i) Insertion sort ii) Quick Sort

Week 4
Write C programs that implement stack (its operations) using
i) Arrays ii) Pointers

Week 5
Write C programs that implement Queue (its operations) using
i) Arrays ii) Pointers

Week6
Write a program to convert the given infix expression to post-fix expression.

Week7
Write a program to evaluate a post-fix expression.

Week8
Write C programs to implement the following using arrays
i) Circular queue ii) Dequeue

Week 9
Write a C program that uses functions to perform the following operations on singly linked list:
i) Creation ii) Insertion iii) Deletion iv) Traversal

Week 10
Write a C program that uses functions to perform the following operations on doubly linked list.:
i) Creation ii) Insertion iii) Deletion iv) Traversal in both ways

Week11
Write a C program that uses functions to perform the following operations on circular linked list:
i) Creation ii) Insertion iii) Deletion iv) Traversal

Week 12
Write a C program that uses functions to perform the following:
i) Creating a Binary Tree of integers
ii) Traversing the above binary tree in preorder, in order and post order.

TEXT BOOKS

1. Computer science, A structured programming approach using C, B.A. Forouzan and R.F. Gilberg, Third edition, Thomson.
2. Programming in C, P.Dey & M. Ghosh, Oxford Univ.Press.
3. C and Data Structures, E Balaguruswamy, TMH publications.

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MATHEMATICS – IV
(Common for ECE, EEE, ETM & ICE)

Objective:
The objective of this course is to study the special functions, analytic functions and to solve the problems in complex variable theory.

UNIT- I: Special Functions I
Gamma and Beta Functions – Their properties – Evaluation of improper integrals. Bessel functions – properties – Recurrence relations – Orthogonality.
Legendre's polynomials - Properties – Rodrigue's formula – Recurrence relations – Orthogonality.

UNIT-II: Functions of a Complex variable
Continuity – Differentiability – Analyticity – Properties – Cauchy-Riemann equations in Cartesian and Polar coordinates - Harmonic and Conjugate Harmonic functions – Milne-Thompson's method. Elementary functions - Logarithmic & Power functions

UNIT-III: Complex Integration & Power Series
Cauchy's integral theorem – Cauchy's integral formula – Generalized integral formula. Radius of convergence – Expansion in Taylor's series and Laurent series - Singular point - Isolated singular point – Pole of order m – Essential singularity.

UNIT-IV: Contour Integration
Residue – Evaluation of residue by formula and by Laurent series – Cauchy Residue theorem.

Evaluation of integrals of the type

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

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

UNIT-V: Conformal Mapping
Transformation by e^z, z^n (n positive integer), Sin z, z + a/z. Translation, rotation, inversion and bilinear transformation – Fixed point – Cross ratio – Properties – Invariance of circles and cross ratio – Determination of bilinear transformation mapping 3 given points.

Text Books

1. Advanced Engineering Mathematics by Dr. S.R.K. Iyengar & Others, Narosa Publications.
2. Advanced Engineering Mathematics by Kreyszig, Wiley Publications.
3. Higher Engineering Mathematics by B.S. Grewal, Khanna Publications.

References

1. Higher Engineering Mathematics by B. V. Ramana, Tata McGraw Hill Publications.
2. Engineering Mathematics Vol-III by T.K.V.Iyengar, B.Krishna Gandhi, S.Ranganatham and MVSSN Prasad, S.Chand Publications.
3. Special Functions & Complex Variables by Dr. Shahnaz Bathul, PHI learning Pvt. Ltd.

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PRINCIPLES OF ELECTRICAL ENGINEERING
(Common to ECE & ETM)

Objectives:
This course enables to clearly understand the necessary basic concepts of electrical engineering, which helps in analyzing the behavior of devices like filters, attenuators and basic electrical generators and motors and their applications.

UNIT I: Transient Analysis and Two port Networks
Transient response of RL, RC series, RLC Circuits for different excitations like DC and sinusoidal excitations, Initial conditions, Solution using differential equations approach and Laplace transform method.
Impedance parameters, Admittance parameters, Hybrid parameters, Transmission (ABCD) parameters, Conversion of one parameter to another, Conditions for Reciprocity and Symmetry, Interconnection of two port networks in series, parallel and cascaded configurations, Image parameters and characteristic Impedance, Illustrative problems.

UNIT II: Filters and attenuators
Classification of Filters, Filter Networks, Classification of Pass band and Stop band, Characteristic Impedance in the pass and stop bands, Constant-k Low Pass and High pass filters, m-derived T-section and π sections, Band pass filter and Band Elimination filter, Illustrative Problems.
Symmetrical Attenuators – T-Type Attenuator, π Type Attenuator, Bridged T type Attenuator, Lattice attenuator.

UNIT III: DC Machines
Principle of Operation of DC Machines, Constructional features, EMF equation, Types of Generators, Magnetization and load characteristics of DC Generators.
DC motors, Types of DC Motors, Characteristics of DC Motors, Losses and Efficiency, Swinburne's Test, Speed control of DC Shunt and series Motors, Flux and Armature voltage control methods.

UNIT IV: Transformers
Principle of Operation of Single Phase transformer, Types, Constructional Features, EMF equation, Phasor Diagrams for no load and loaded conditions, efficiency of Transformer and regulation, OC and SC Tests, predetermination of Efficiency and Regulation (Simple Problems).

UNIT V: Single Phase Induction Motors

Concept of rotating field, Principle of Operation, shaded pole motors, Capacitor motors, AC Tachometers, Stepper Motors.

Outcomes:

Students will be able to analyze and estimate the behavior of any electrical circuit/machine and the appropriate application for it.

TEXT BOOKS

1. Fundamentals of Electric Circuits – Charles K.Alexander, Mathew N.O.Sadiku, 3 ed., 2008, TMH.
2. Network Analysis – A Sudhakar, Shyammohan S.Palli,3 ed., 2009. TMH.
3. Introduction to Electrical Engineering – M.S.Naidu and S. Kamakshaiah, 2008, TMH.

REFERENCES

1. Networks, Lines and Fields –John D.Ryder, 2ed. 2008 (Reprint), PHI.
2. Engineering Circuit Analysis – W/H Hayt and J.E Kemmerly and S.M Durbin, 6 ed., 2008, TMH.
3. Network analysis and Systhesis – CL Wadhwa, 3 ed., 2007, New Age International Publishers.
4. Network Analysis – N.C Jagan and C. Lakshmi Narayana, BSP, 2006.
5. Electric Circuits- Nilsson, Riedel, 8 ed., PE.

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ELECTRONIC DEVICES AND CIRCUITS
(Common to ECE, EEE, CSE, ICE, IT, ETM)

Objectives:
This course aims to give the detailed knowledge of basic devices used in Electronic Circuits and Systems. Mainly emphasizes on construction, working, principle of operation, symbols, equivalent circuits, characteristics, applications of devices like p-n Junction diode, Zener diode, BJT, FET, MOSFET, Tunnel diode, Varactor diode, Schottky Barrier Diode, Semiconductor Photo Diode, Photo Transistor, LED, PIN Diode, UJT, SCR and small signal modeling of BJTs and FETs.

UNIT- I: p-n Junction Diode, Rectifiers and Filters
Qualitative Theory of p-n Junction , p-n Junction as a Diode, Diode Equation , Volt-Ampere characteristics, Temperature dependence of V-I characteristics, Ideal versus practical -Resistance levels(Static & Dynamic), Transition and Diffusion Capacitances, Diode Equivalent circuits, Hall effect, Load Line Analysis, Breakdown Mechanism in Semiconductor Diodes, Zener Diode Characteristics.
P-n junction as a Rectifier, Half wave Rectifier, Full Wave Rectifier, Bridge rectifier, Harmonic components in a Rectifier circuit, Inductor Filters, Capacitor Filters, L-Section Filters, ∏-Section filters, Comparison of Filters, Voltage Regulation using Zener Diode.

UNIT- II: Bipolar Junction Transistor, Transistor Biasing and Stabilization
The Junction Transistor, Transistor Current Components, Transistor as an Amplifier, Transistor Construction, BJT Operation, BJT Symbol, Common Base, Common Emitter and Common Collector Configurations, Limits of Operation, BJT Specifications.
Operating Point, The DC and AC Load lines, Need for Biasing, Fixed Bias, Collector Feedback Bias, Emitter Feedback Bias, Collector-Emitter Feedback bias, Voltage Divider Bias, Bias Stability ,Stabilization Factors, Stabilization against variations in V_{BE} and β, Bias Compensation using Diodes and Transistors, Thermal Runaway, Thermal Stability.

UNIT- III: Small Signal Low Frequency BJT Models
BJT Hybrid Model, Determination of h-parameters from Transistor Characteristics, Analysis of Transistor Amplifier using h-Parameters, Comparison of CB, CE and CC Amplifier Configurations.

UNIT- IV: Field Effect Transistor and FET Amplifiers

The Junction Field Effect Transistor (Construction, principle of operation, symbol), Pinch-off Voltage, Volt-Ampere characteristics, Differences between JFET & MOSFET, MOSFET (Construction, principle of operation, symbol), MOSEFT Characteristics in Enhancement & Depletion modes, differences between EMOSFET & DMOSFET.

FET Biasing (Fixed bias, Self Bias, Voltage Divider Bias & Feedback Bias), JFET Small Signal Model, Analysis of Common Source Amplifier, Common Drain amplifier, Generalized FET amplifier, FET as Voltage Variable Resistor, Comparison of BJT & FET.

UNIT- V: Special Purpose Electronic Devices

Principle of Operation and Characteristics of Tunnel Diode (with help of Energy Band Diagram) and Varactor Diode, Principle of Operation of Schottky Barrier Diode, Semiconductor Photo Diode, Photo Transistor, LED, PIN Diode, UJT, SCR.

Outcomes:

The completion of the course enables to understand construction, working, symbols, principle of operation, characteristics, modeling and applications of most important electronic devices of Electronic circuits and Systems.

Text Books

1. Milliman's Electronic Devices and Circuits - J. Milliman, C. C. Halkias and Satyabrata Jit, 2ed,1998, TMH.
2. Electronic Devices and Circuits -R. L. Boylestad and Louis Nashelsky, 9ed, 2006, PEI/PHI.
3. Introduction to Electronic Devices and Circuits –Rober T.Paynter,PE.

References

1. Integrated Electronics - J.Milliman and Christors C.Halkias,1991, ed 2008, TMH
2. Electronic Devices and Circuits-Klal Kishore, 2 ed, 2005, BSP.
3. Electronic Devices and Circuits –Anil K.Maini, Varsha Agrawl,1 ed, 2009, Wiley India Pvt. Ltd
4. Electronic Devices and Circuits - S.Salivahanan, N.Suresh Kumar, A.Vallavaraj, 2 ed., 2008, TMH.
5. Electronic Devices and Circuits- A.P.Godse, U.A.Bakshi, Technical

6.

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SIGNALS AND SYSTEMS
(Common to ECE, ICE, ETM)

Objectives:
Prepare the students to understand various continuous time signals and systems. Emphasis on the concept and methods that are necessary for analysis of continuous time signals and systems, Students are made more familiar with different types of transformation and their properties which include Fourier Transform and Laplace Transforms., Additional insight into various applications of signals and systems in different fields.

UNIT I: Signal Analysis
Analogy between Vectors and Signals, Orthogonal Signal Space, Signal approximation using Orthogonal functions. Mean Square Error, Closed or complete set of Orthogonal functions, Orthogonality in Complex functions, Classification of Signals, Exponential and Sinusoidal signals, Concepts of Impulse function, Unit Step function, Signum function.

UNIT II: Fourier Analysis
Representation of Fourier series, Continuous time periodic signals, Dirichlet's conditions, Trigonometric Fourier Series and Exponential Fourier Series, Properties of Fourier Series, Complex Fourier spectrum. Deriving Fourier Transform from Fourier Series, Fourier Transform of arbitrary signal, Fourier Transform of standard signals, Fourier Transform of Periodic Signals, Properties of Fourier Transform, Fourier Transforms involving Impulse function and Signum function, Introduction to Hilbert Transform.

UNIT III: Signal Transmission Through Linear Systems
Linear System, Impulse response, Response of a Linear System, Linear Time Invariant (LTI) System, Linear Time Variant (LTV) System, Transfer function of a LTI system, Filter characteristics of Linear Systems, Distortionless transmission through a system, Signal bandwidth, System bandwidth, Ideal LPF, HPF and BPF characteristics, Causality and Paley-Wiener criterion for physical realization.

UNIT IV: Convolution and Correlation of Signals
Concept of convolution in Time domain and Frequency domain. Graphical representation of Convolution, Convolution property of Fourier Transform, Cross Correlation and Auto Correlation of functions, Properties of Correlation function, Relation between Convolution and Correlation, Detection of periodic signals in the presence of Noise by Correlation, Extraction of

signal from noise by filtering. Energy density spectrum, Parseval's Theorem, Power density spectrum, Relation between Auto Correlation function and Energy/Power spectral density function, Properties of ESD, Properties of PSD.

UNIT V: Sampling and Laplace Transforms

Sampling theorem - Graphical and analytical proof for Band Limited Signals, Impulse Sampling, Natural and Flat top Sampling, Reconstruction of signal from its samples, Effect of under sampling - Aliasing, Introduction to Band Pass samplings

Laplace Transforms

Review of Laplace Transforms (L.T), Partial fraction expansion, Inverse Laplace Transform, Concept of Region of Convergence (ROC) for Laplace Transforms, Constraints on ROC for various classes of signals, Properties of L.T, Relation between L.T and F.T of a signal, Laplace Transform of certain signals using waveform synthesis.

Outcomes:

On successful completion of this course students will understand the concept of signal and system classifications and their properties. Students will understand the concepts of Fourier representation of analog signals and learns about different forms and properties of Fourier transforms., Students will understand the concept of frequency response in analog systems. Students will understand the concept of impulse response and convolution. Students will understand the concept of sampling and reconstruction of analog signals. Students will understand the concept of Laplace transform and its applications in analysis of linear and time-invariant analog systems.

Text Books

1. Signals, Systems & Communications - B.P. Lathi, 2009, BSP.
2. Signals & Systems - Simon Haykin and Van Veen,Wiley, 2 ed.
3. Signals and Systems -A. V. Oppenheim, A.S. Willsky and S.H. Nawab, 2ed, PHI.

References

1. Signals and Systems -A.Anand kumar - 2011, PHI learning Pvt..
2. Introduction to Signal and System Analysis - K.Gopalan 2009, CENGAGE Learning.
3. Fundamentals of Signals and Systems - Michel J. Robert, 2008, MGH International Edition.
4. Signals, Systems and Transforms - C. L. Philips, J.M.Parr and Eve A.Riskin, 3ed. 2004, PE.

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II Year B.Tech I Semester	**L**	**T/P/D**	**C**
	4	**1/-/-**	**4**

PROBABILITY THEORY AND STOCHASTIC PROCESSES
(Common to ECE & ETM)

Objectives:
To give the students introductory background about concepts of probability, random variable, random signal principles and noise. To develop the abilities among the students to model any practical application events and to compute standard distributions and density functions. To facilitate them to identify a random signal, obtain the mean, autocorrelation and covariance functions of random processes and then to identify a stationary and wide sense stationary random process. To give them the concepts of LTI systems and to find the system response of a linear system to a random process and to model resistive noise sources for testing the performance of different systems. To fortify them to apply all concepts of the course in multi dimensional mode.

UNIT I: Introduction to Probability and Random Variable
Probability introduced through Sets and Relative Frequency, Experiments and Sample Spaces, Discrete and Continuous Sample Spaces, Events, Probability Definitions and Axioms, Mathematical Model of Experiments, Probability as a Relative Frequency, Joint Probability, Conditional Probability, Total Probability, Bayes' Theorem, Independent Events. Definition of a Random Variable, Conditions for a Function to be a Random Variable, Discrete, Continuous and Mixed Random Variables, Vector Random Variables. Distribution, Joint Distribution, Marginal Distribution, Density, Joint Density, Marginal Density functions and their Properties. Binomial, Poisson, Uniform, Gaussian, Exponential, Rayleigh Functions. Conditional Distribution and Density functions, Methods of defining Conditional Event - Point and Interval conditioning, Properties.

UNIT II: Operations on Random Variables – Expectations
Expected Value of a Random Variable, Function of a Random Variable, Moments about the Origin, Variance and Skew, Joint Moments about the Origin, Central Moments, Joint Central Moments, Chebychev's Inequality, Characteristic Function, Joint Characteristic Functions, Moment Generating Function, Jointly Gaussian Random Variables: Two Random Variables case, N Random Variable case, Properties.

UNIT III: Transformations of Random Variables
Monotonic Transformations for a Continuous Random Variable, Non-monotonic Transformations of Continuous Random Variable, Transformation of a Discrete Random Variable, Statistical Independence,

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

UNIT IV: Stochastic Processes - Temporal Characteristics

The Stochastic Process Concept, Classification of Processes, Deterministic and Nondeterministic Processes, Distribution and Density Functions, Concept of Stationary and Statistical Independence, First-Order Stationary Processes, Second-Order and Wide-Sense Stationary, N^{th} Order and Strict-Sense Stationary, Time Averages and Ergodic, Mean-Ergodic Processes, Correlation-Ergodic Processes, Autocorrelation Function and its Properties, Cross-Correlation Function and its Properties, Covariance and its Properties, Linear System Response: Mean and Mean-squared Value, Autocorrelation Function, Cross-Correlation Functions of Linear System Response, Gaussian Random Processes, Poisson Random Process.

UNIT V: Stochastic Processes - Spectral Characteristics and Noise

Power Spectrum: Properties, Relationship between Power Spectrum and Autocorrelation Function, Cross-Power Density Spectrum, Properties, Relationship between Cross-Power Spectrum and Cross-Correlation Function, Spectral Characteristics of System Response: Power Density Spectrum of Response, Cross-Power Spectral Density of Input and Output of a Linear System.

Noise:

Types of Noise: Resistive (Thermal) Noise Source, Shot noise, Extra terrestrial Noise, Arbitrary Noise Sources, White Noise, Narrow band Noise: In phase and quadrature phase components and its Properties, Modeling of Noise Sources, Average Noise Bandwidth, Effective Noise Temperature, Average Noise Figures, Average Noise Figure of cascaded networks.

Outcomes:

At the end of this course, the students will be able to apply the knowledge of probability, random variables and random processes gained in this course to several different types of problems in engineering. Students will be able to model any type of random experiment into mathematical model. Compute probability distributions for the parameters of various systems, to estimate average values and variances of these parameters., Identify a random signal, obtain the mean, autocorrelation, covariance functions of random processes a stationary and wide sense stationary random process., Find the response of a linear filter to a random process. Analyze communication systems for statistical parameters like signal to noise ratio, probability of error.

TEXTBOOKS

1. Probability, Random Variables & Random Signal Principles – Peyton Z, Peebles, 4 ed., 2001, TMH.
2. Probability, Random Variables and Stochastic Processes – Athanasios

Papoulis and S. Unnikrishna Pillai, 4 ed., TMH.

REFERENCES

1. Theory of Probability and Stochastic Processes- Pradip Kumar Gosh, University Press
2. Probability Theory and Stochastic Processes- Mallikarjuna Reddy, Cengage Learning'.
3. Probability and Random Processes with Application to Signal Processing - Henry Stark and John W. Woods, 3 ed., PE
4. Probability Methods of Signal and System Analysis - George R. Cooper, Clave D. MC Gillem, 3 ed., 1999, Oxford.
5. Statistical Theory of Communication - S.P. Eugene Xavier, 1997, New Age Publications.
6. Principles of Communication systems - H. Taub, Donald. L. Schilling, Goutam Saha, 3 ed., 2007, TMH.

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II Year B.Tech. ETM/ECE I-Sem	**L**	**T/P/D**	**C**
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ELECTRICAL ENGINEERING LAB

PART-A

The following experiments are to be conducted compulsory

1.Time response of first order RC/RL network for Periodic non-sinusoidal inputs – time constant and steady state error determination.
2. Two port network parameters – Z,Y parameters, analytical verification.
3.Two port network parameters –ABCD and h-parameters
4.Constant – k Low pass filter and high pass filter – Design and Test.
5.Magnetization characteristic of DC shunt generator, Determination of critical field resistance
6.Swinburne's Test on DC shunt machine .
7.Brake test on DC shunt motor. Determination of performance characteristics.
8.OC & SC tests on single –phase transformer.

PART-B

Any Two of the following experiments are to be conducted

9.Load Test on Single Phase Transformer.

10 .Load Test on Single Phase Induction motor.

11.Separation of losses of a DC Machine

12. Speed control of DC Motor

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AUTONOMOUS under JNTUH

II Year B.Tech I Semester	**L**	T/**P/D**	**C**
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ELECTRONIC DEVICES AND CIRCUITS LAB
(Common to ECE, EEE, ETM & ICE)

Objectives:
To give the students introduction about Discrete components (linear and nonlinear), Breadboards, CRO's, Multimeters, Signal generators etc. and make them to identify the different components. Students are trained to design different circuits using Diodes, BJT, FETs etc. for various applications.

PART A: (Only for Viva-voce Examination)
ELECTRONIC WORKSHOP PRACTICE (in 3 lab sessions):

1. Identification, Specifications, Testing of R, L, C Components (Color Codes), Potentiometers, switches (SPDT, DPDT, and DIP), Coils, Gang Condensers, Relays, Bread Boards, PCB's
2. Identification, Specifications and Testing of Active Devices, Diodes, BJT's, Low power JFET's, MOSFET's, Power Transistors, LED's, LCD's, SCR,UJT.
3. Study and operation of
   - Multimeters (Analog and Digital)
   - Function Generator
   - Regulated Power Supplies
   - CRO.

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

1. Forward & Reverse Bias Characteristics of PN Junction Diode.
2. Zener diode characteristics and Zener as voltage Regulator.
3. Input & Output Characteristics of Transistor in CB Configuration.
4. Input & Output Characteristics of Transistor in CE Configuration.
5. Half Wave Rectifier with & without filters
6. Full Wave Rectifier with & without filters
7. FET characteristics
8. Measurement of h parameters of transistor in CB, CE, CC configurations
9. Frequency Response of CC Amplifier.
10. Frequency Response of CE Amplifier.
11. Frequency Response of Common Source FET amplifier
12. SCR characteristics.
13. UJT Characteristics

PART C:
Equipment required for Laboratories:

1.	Regulated Power supplies (RPS)	-	0-30V
2.	CRO's	-	0-20MHZ

3. Function Generators - 0-1 MHz.
4. Multimeters
5 Decade Resistance Boxes/Rheostats
6. Decade Capacitance Boxes
7. Ammeters (Analog or Digital - 0-20uA,0-50uA,0-100uA, 0-200 |uA, 0-10 mA.
8. Voltmeters (Analog or Digital) - 0-50V,0-100V,0-250V
9. Electronic Components - Resistors, Capacitors, LCDs, BJTs pnp & npn, ,SCRs, UJTs, FETs, MOSFETs, diodes- Ge & Si

Outcomes:

Students can identify different components and can operate them properly and also can design different circuits using different components and devices for various applications.

G.NARAYANAMMA INSTITUTE OF TECHNOLOGY & SCIENCE
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II Year B.Tech I Semester	**L**	**T/P/D**	**C**
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BASIC SIMULATION LAB
(Common to ECE, ETM, ICE)

Objectives:
Introduces the students to the basics of MATLAB software. To Generate and analyze various Signals such as UNIT Impulse, UNIT Step, Square, Saw tooth, Triangular, Sinusoidal, Ramp, and Sine., To find convolution and correlation between the signals using MATLAB software., To Generate Gaussian noise , Computation of its mean, M.S. Value and its Skew, Kurtosis, PSD, PDF and Removal of noise by Autocorrelation / Cross correlation.

List of Experiments:
(Minimum of 12 experiments to be performed)

1. Basic Operations on Matrices.
2. Generation of Various Signals such as UNIT Impulse, UNIT Step, Square, Saw tooth, Triangular, Sinusoidal, Ramp, Sine.
3. Operations on Signals such as Addition, Multiplication, Scaling, Shifting, Folding and Computation of Energy and Average Power.
4. Finding the Even and Odd parts of Signal and Real and Imaginary parts of Signal.
5. Convolution between Signals.
6. Auto Correlation and Cross Correlation between Signals.
7. Verification of Linearity and Time Invariance Properties of a given System.
8. Computation of UNIT sample, UNIT step and sinusoidal responses of the given LTI system and verifying its physical realiazability and stability properties.
9. Gibbs Phenomenon
10. Finding the Fourier Transform of a given signal and plotting its magnitude and phase spectrum.
11. Waveform Synthesis using Laplace Transform.
12. Locating the Zeros and Poles and plotting the Pole-Zero maps in S-plane for the given transfer function.
13. Generation of Gaussian noise (Real and Complex), Computation of its mean, M.S. Value and its Skew, Kurtosis, and PSD, Probability Distribution Function.
14. Sampling Theorem Verification.
15. Removal of noise by Autocorrelation / Cross correlation.
16. Extraction of Periodic Signal masked by noise using Correlation.
17. Verification of Weiner-Khinchine Relations.

Outcomes:

At the end of the course, students will be able to understand the different types of signals and the methods of generating them using MATLAB software. Will be able to demonstrate the importance of convolution and correlation by applying it to solve the radar target detection problem. Will be capable to understand the characterization of random signals in statistical terms and explains the concept and relevance of noise in signal processing applications.

G.NARAYANAMMA INSTITUTE OF TECHNOLOGY & SCIENCE
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II Year B.Tech II Semester	**L**	**T/P/D**	**C**
	3	**1/-/-**	**3**

ENVIRONMENTAL STUDIES
(Common to all Branches)

Objectives:
To fulfill the requirement of UGC as per the direction of Supreme Court of India. To create awareness & sensitize the young minds about the environmental issues & their impacts on various environmental components. To motivate the students about the conservation of resources and protection of Environment from over exploitation. To bring awareness regarding various Environmental Policy of India.

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

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

UNIT- III: Natural Resources
Classification of Resources: Living and Non-Living resources, **water resources:** use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. **Mineral resources:** use and exploitation, environmental effects of extracting and using mineral resources, **Land resources: Forest resources, Energy resources:**

growing energy needs, renewable and non renewable energy sources, use of alternate energy source, case studies..

UNIT-IV: Biodiversity & Biotic Resources

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

UNIT- V: Environmental Policy, Legislation & EIA

Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio-economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP). **Towards Sustainable Future:** Concept of Sustainable Development, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA), Low carbon life style.

Outcomes:

Students will get knowledge on aspects & issues of Environment. Improved the attitude & thinking of the students will be positively towards earth & environment. It helps the students to improve the quality of life. Students will be benefited by knowing the concepts like Green Buildings, Low Carbon Lifestyle, International conventions etc.

Text Books

1. Text book of Environmental Science and Technology by M.Anji Reddy 2007, BS Publications.
2. Environmental studies by Erach Bharucha 2013, 2nd Ed. University Grants Commission, University Press.

References

1. Environmental Science: towards a sustainable future by Richard T.Wright. 2008 PHL Learning Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M.Masters and Wendell P. Ela .2008 PHI Learning Pvt. Ltd.
3. Environmental Science by Daniel B.Botkin & Edward A.Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers.

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(FOR WOMEN)
AUTONOMOUS under JNTUH

II Year B.Tech II Semester	**L**	**T/P/D**	**C**
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ELECTRONIC CIRCUIT ANALYSIS
(Common to ETM, ECE, ICE)

Objectives:
To develop knowledge on operating principles of analog electronic circuits like amplifiers, power amplifiers, tuned amplifiers. To provide students with a solid foundation in analyzing techniques like calculation of given input impedance, output impedance, bandwidth of analog electronic circuits. To train the students to design the models to meet the application in the areas of analog electronics. To prepare students to excel in analysis of electronic circuits, and introduce circuits software simulation tool.

UNIT- I: Single Stage Amplifiers & Frequency Response
Classification Of Amplifiers -, Analysis of CE, CC, and CB Configurations with simplified Hybrid Model, Analysis of CE amplifier with Emitter Resistance and Emitter follower, Miller's Theorem and its dual, Design of Single Stage RC Coupled Amplifier using BJT. Frequency response of BJT Amplifier, Analysis at Low and High frequencies. Effect of coupling and bypass Capacitors.

High Frequency Amplifiers
The Hybrid- pi (π) - Common Emitter Transistor Model, Hybrid (π) Conductances, Capacitances CE Short Circuit Current Gain, Current Gain with Resistive Load, Single Stage CE Transistor Amplifier Response, Gain-Bandwidth Product.

UNIT- II: Multi Stage Amplifiers
Classification of multi stage Amplifiers based on different Coupling Schemes used in Amplifiers, RC Coupled Amplifier, Transformer Coupled Amplifier and Direct Coupled Amplifier. Analysis of Cascaded *RC* Coupled BJT amplifiers, Cascode Amplifier, Darlington Pair, Darlington Emitter follower, Bootstrap emitter follower, Bootstrap Darlington amplifier.

MOSFET Amplifiers
MOS Small signal model, common source amplifier with resistive load, Diode connected Load and Current Source Load, Source follower, Common Gate stage.

UNIT- III: Feedback Amplifiers
Concepts of Feedback, Classification of Basic Amplifiers, General characteristics of Negative Feedback Amplifiers, Calculation of input & output resistances of different feedback topologies, Effect of Feedback on

Amplifier Characteristics, Voltage Series, Voltage Shunt, Current Series and Current Shunt Feedback Configurations, Illustrative Problems.

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

UNIT- IV: Large Signal Amplifiers
Classification, Distortion in Amplifiers, Power amplifiers as large signal amplifiers, differences between Voltage amplifiers & power amplifiers, Significance of Transformer used as a load, Class A Large Signal Amplifiers, Transformer Coupled Class A Audio Power Amplifier, Efficiency of Class A Amplifier, Push-Pull amplifiers, Class B Transformer coupled Push-Pull power amplifier and its efficiency, Class B transformer less Push-Pull amplifiers. Cross Over distortion, Class AB transformer coupled Push-Pull power amplifier, Complementary Symmetry Class B Push-Pull Amplifier, Class C operation, Thermal Stability and Heat Sinks.

UNIT- V: Tuned Amplifiers
Introduction, differences between series and parallel resonance circuits, classification of tuned amplifiers, analysis of single tuned capacitive coupled and inductively coupled tuned voltage amplifier. Analysis of double tuned amplifier, Effect of Cascading Single Tuned Amplifiers on Bandwidth, Effect of Cascading Double Tuned Amplifiers on Bandwidth, Stagger Tuned Amplifiers, Stability of Tuned Amplifiers.

Outcomes:
Students will understand the basic characteristics of a generic amplifier such as the input and output impedances, current and voltage gain, and frequency response, will demonstrate the comparison of various types of amplifiers such as voltage, current, power and tuned amplifiers, will be able to identify the difference between large-signal and low-frequency small-signal model of a BJT /FET and the limitations of the models, will demonstrate an ability to analyze and design an amplifier as per needs and specifications, will demonstrate skills to use, software and hard module to analyze problems and students who can participate and succeed in competitive examinations related to ECE stream.

Textbooks
1. Integrated Electronics - Jacob Millman and Christos C Halkias, 1991 ed., 2008, TMH.
2. Electronic Devices and Circuits - S. Salivahanan, N.Suresh Kumar, A Vallavaraj, 2 ed., 2009, TMH.
3. Design of Analog CMOS Integrated Circuits - Behzad Razavi, 2008, TMH.

References

1. Electronic Devices and Circuit Theory - Robert L. Boylestad, Louis Nashelsky, 9ed., 2008PE.
2. Introductory Electronic Devices and Circuits- Robert T. Paynter, 7 ed., 2009, PE
3. Electronic Circuit Analysis - K. Lal Kishore, 2004, BSP.
4. Electronic Devices and Circuits, David A. Bell -5 ed., Oxford University Press.
5. Microelectric Circuits - Sedra and Smith - 5 ed., 2009, Oxford University Press
6. Electronic Circuit Analysis – Godse & Bakshi, Technical.
7. Basic Electronics & Linear circuits – N.N.Bhargava, DC Kulshreshtha, S.C.Gupta, TTTI Chandigarh

G.NARAYANAMMA INSTITUTE OF TECHNOLOGY & SCIENCE
(FOR WOMEN)
AUTONOMOUS under JNTUH

II Year B.Tech II Semester	**L**	**T/P/D**	**C**
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PULSE AND DIGITAL CIRCUITS
(Common to ECE, ETM, ICE)

Objectives:
This course aims to enrich the knowledge of wave shaping, understand the concepts of switching, non-regenerative and regenerative comparators. Emphasis on design procedures and analysis of multivibrators is laid in this course. The course constitutes the foundation of various concepts of Time Base generators, Principles of Synchronization, Sampling gates and Logic Gates.

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

Non-Linear Wave Shaping (Part I)
Diode clippers, Transistor clippers, clipping at two independent levels.

UNIT-II: Non-Linear Wave Shaping (Part II)
Comparators, applications of voltage comparators, clamping operation, clamping circuit taking source and diode resistances into account, Clamping circuit theorem, practical clamping circuits, effect of diode characteristics on clamping voltage, Synchronized clamping.

Switching Characteristics of Devices
Diode as a switch, piecewise linear diode characteristics, Diode switching times, Transistor as a switch, Break down voltages, Transistor in saturation, Temperature variation of saturation parameters, Transistor-switching times, silicon –controlled- switch circuits.

UNIT-III: Multivibrators
Multivibrators (using BJT's): The Bistable Multivibrator: Fixed bias and Self bias transistor binary stable state voltages and currents, Design of Fixed bias and Self Bias Binary, Commutating Capacitors, Symmetrical and Unsymmetrical Triggering, Direct Coupled Binary.
Analysis and Design of Schmitt trigger circuit, Monostable Multivibrator (collector coupled only), Analysis and Design of Astable Multivibrator (collector coupled only) and Applications of Multivibrators.

UNIT-IV: Time Base Generators
General features of a Time Base signal, methods of generating Time Base waveform, Miller and Bootstrap Time Base generators - basic principles, Transistor Miller Time Base generator, Transistor Bootstrap Time Base generator, transistor Current Time Base generators, methods of linearity improvement.

Synchronization and Frequency Division
Pulse Synchronization of relaxation devices, Frequency division in sweep circuit, Stability of relaxation devices, Astable relaxation circuits, Monostable relaxation circuits, Synchronization of a sweep circuit with symmetrical signals, Sine wave frequency division with a sweep circuit, A sinusoidal divider using regeneration and modulation.

UNIT-V: Sampling Gates
Basic operating principles of Sampling Gates, Unidirectional and Bi-directional Sampling Gates, four diode Sampling Gate, Reduction of pedestal in gate circuits, six diode Gate, Applications of Sampling Gates.

Realization of Logic Gates Using Diodes & Transistors
AND, OR and NOT gates using Diodes& Transistors, DCTL, RTL, DTL, TTL and CML Logic families and its comparison.

Outcomes:
The completion of course enables to understand the basics of Wave shaping, differentiate and understand the operation of various Multi vibrators, demonstrate basic knowledge of Time Base generators, Principles of Synchronization, Sampling gates and Logic Gates.

Text Books:
1.Pulse, Digital and Switching Waveforms - J. Millman and H. Taub, and Mothiki S.Prakash Rao, 2ed., 2008, TMH..
2. Pulse and Digital Circuits-Venkata Rao K, Rama Sudha K, Manmadha Rao G, 1ed., 2010, Pearson Education

References:
1. Solid State Pulse circuits - David A. Bell, PHI, 4th Edn., 2002
2. Pulse and Digital Circuits - A. Anand Kumar, PHI, 2005.
3. Wave Generation and Shaping - L. Strauss.
4. Fundamentals of Pulse and Digital Circuits – Ronald J. Tocci, 3rd edition 2008.

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(FOR WOMEN)
AUTONOMOUS under JNTUH

II Year B.Tech II Semester	**L**	**T/P/D**	**C**
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SWITCHING THEORY AND LOGIC DESIGN (STLD)
(Common to ECE, ETM, ICE)

Objectives:
To strengthen the students on Number systems and Codes, Boolean algebra and Switching Functions, Karnaugh Map, Logic Gates, Minimization of Switching Functions using Tabular Method, Combinational logic design using conventional logic gates, Encoder, Decoder, Mux and Demux, Realization of Hazard free circuits, Programmable Logic devices ,Sequential circuits classification ,Flip flops, Finite state machines and Algorithmic state machines.

UNIT-I: Number Systems & Codes
Philosophy of number systems – complement representation of negative numbers-binary arithmetic, complement method of Subtraction - classification of binary codes-error detecting & error correcting codes – hamming codes.

Boolean Algebra, Switching Functions
Fundamental postulates of Boolean algebra, Basic theorems and properties, Algebraic simplification - switching functions–Canonical and Minimal SOP and POS forms.

UNIT-II: Minimization Of Switching Functions
Karnaugh Map (K-Map) method, Implicants, Prime implicants, Essential Prime implicants, don't care combinations- Tabular Method, Prime – Implicant chart, simplification rules.

Combinational Circuits-I
Digital logic gates, properties of XOR gates –universal gates-Realization of logic gates using universal logic gates-Realization of Multilevel NAND/NOR realizations-Design of Half Adder, Full Adder ,Half Subtractor , Full Subtractor ,magnitude comparator, 4-bit parallel adder, Carry look ahead adder using conventional logic gates.

UNIT-III: Combinational Circuits-II
Encoder, Decoder, Multiplexer, De-Multiplexer, Modular design using IC chips**,** MUX Realization of switching functions, Parity bit generator, Code-converters, Hazards and hazard free realizations.

Programmable Logic Devices:

Basic PLD's-ROM, PROM, PLA, PAL, and Realization of Switching functions using PLD's.

UNIT-IV: Sequential Circuits - I

Combinational versus sequential circuits, Classification of sequential circuits: Synchronous, Asynchronous, Pulse mode, Level mode with examples. Basic flip-flops (SR, JK, T, D) -Triggering and excitation tables of flip-flops, conversion among different flip-flops. Steps in synchronous sequential circuit design. Classification of Counters (Synchronous and Asynchronous counters), Design of modulo-N synchronous binary, gray, BCD, excess-3, bi-directional and universal shift registers, Shift register counters(Ring and Johnson counters) Serial binary adder, sequence detector.

UNIT-V: Sequential Circuits - II

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

Algorithmic State Machines:

Salient features of the ASM chart-Simple examples-System design using data path and control subsystems-control implementations-examples of Weighing machine and Binary multiplier.

Outcomes:

At the end of the course, students will be able to convert a number from one number system to the other number systems. Perform the three basic logic operations and construct the truth tables for the different types of gates. Implement logic circuits using basic AND, OR and NOT gates and universal logic gates. Design combinational circuits and sequential circuits. Analyze and minimize Finite State Machines.

Textbooks:

1. Digital Design – Morris Mano, PHI, 3rd Edition, 2006.
2. Modern Digital Electronics –R.P Jain, TMH, 3rd Edition.

References:

1. Switching & Finite Automata theory – Zvi Kohavi, TMH, 2nd Edition.
2. An Engineering Approach to Digital Design – Fletcher, PHI. Digital Logic – Application and Design – John M. Yarbrough, Thomson.
3. Fundamentals of Logic Design – Charles H. Roth, Thomson Publications, 5th Edition, 2004.
4. Digital Logic Applications and Design – John M. Yarbrough, Thomson Publications, 2006.

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(FOR WOMEN)
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II Year B.Tech II Semester	**L**	**T/P/D**	**C**
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ELECTROMAGNETIC THEORY AND TRANSMISSION LINES
(ECE)

Objectives:
To introduce the students to the fundamentals of transmission line systems and electromagnetic wave propagation and radiation. To constitute the foundation for understanding the basics of electro and magneto static's and the importance of Maxwell's equations. To develop concepts of electromagnetic wave propagation in both guided structures and open wire transmission lines, and their subsequent application to the analysis and design of electromagnetic wave-guiding systems and antennas. To prepare the students for future work in RF/microwave engineering and antenna design.

UNIT-I: Electrostatics
Review of coordinate systems & Vector operators, Coulomb's Law, Electric Field Intensity – Fields due to Different Charge Distributions, Electric Flux Density, Gauss Law and Applications, Electric Potential, Relations Between E and V, Maxwell's Two Equations for Electrostatic Fields, Energy Density, Related Problems.
Convection and Conduction Currents, Dielectric Constant, Isotropic and Homogeneous Dielectrics, Continuity Equation, Relaxation Time, Poisson's and Laplace's Equations; Capacitance – Parallel Plate, Coaxial, Spherical Capacitors, Related Problems.(specified topics of ch. 4,5,6,of Ref.1)

UNIT -II: Magnetostatics
Biot-Savart's Law, Ampere's Circuital Law and Applications, Magnetic Flux Density, Maxwell's Two Equations for Magnetostatic Fields, Magnetic Scalar and Vector Potentials, Forces due to Magnetic Fields, Ampere's Force Law, Inductances and Magnetic Energy. Related Problems. (Specified topics of ch. 7, 8 of Ref.1)

UNIT-III: Maxwell's Equations (Time Varying Fields)
Faraday's Law and Transformer EMF, Inconsistency of Ampere's Law and Displacement Current Density, Maxwell's Equations in Different Final Forms and Word Statements. Conditions at a Boundary Surface: Dielectric-Dielectric and Dielectric-Conductor Interfaces. Related Problems. (Ref.2, 1)

UNIT-IV: EM Wave Characteristics

Wave Equations for Conducting and Perfect Dielectric Media, Uniform Plane Waves – Definition, All Relations between E & H. Sinusoidal Variations. Wave Propagation in Lossless and Conducting Media. Conductors & Dielectrics – Characterization, Wave Propagation in Good Conductors and Good Dielectrics, Parallel plane Waveguides- TE, TM and TEM Modes, Polarization. Related Problems.

Reflection and Refraction of Plane Waves – Normal and Oblique Incidences, for both Perfect Conductor and Perfect Dielectrics, Brewster Angle, Critical Angle and Total Internal Reflection, Surface Impedance,

Poynting Vector and Poynting Theorem – Applications, Power Loss in a Plane Conductor. Related Problems. (Ref. 2,1)

UNIT-V: Transmission Lines

Types, Parameters, Transmission Line Equations, Primary & Secondary Constants, Expressions for Characteristic Impedance, Propagation Constant, Phase and Group Velocities, Infinite Line Concepts, Losslessness/Low Loss Characterization, Distortion – Condition for Distortionlessness and Minimum Attenuation, Loading - Types of Loading, Related Problems.

Input Impedance Relations, SC and OC Lines, Reflection Coefficient, VSWR. UHF Lines as Circuit Elements; $\lambda/4$, $\lambda/2$, $\lambda/8$ Lines – Impedance Transformations. Smith Chart – Configuration and Applications, Single and Double Stub Matching. Related Problems. (Ref.3,2)

Outcomes:

At the end of the course, students Are knowledgeable in static electric and magnetic fields. Will be able to demonstrate an ability to apply Gauss' law, Ampere's Law, Biot- Savart law, Faraday's law and Maxwell's equations in the analysis of electromagnetic systems. Will be capable to understand the concept of plane wave reflection and transmission at normal incidence. Will be able to understand the voltage and current wave equations along a transmission line. Will be able to understand the concepts of incident and reflected waves, reflection coefficient, and Standing-Wave Ratio along a transmission line.

Text Books:

1. Elements of Electromagnetics – Matthew N.O. Sadiku, Oxford Univ. Press, 4th ed., 2008.
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, 2001.

References:

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

3. Networks, Lines and Fields – John D. Ryder, PHI, 2nd ed., 1999.

G.NARAYANAMMA INSTITUTE OF TECHNOLOGY & SCIENCE
(FOR WOMEN)
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II Year B.Tech II Semester	**L**	**T/P/D**	**C**
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CONTROL SYSTEMS
(Common to ECE, ETM, EEE, ICE)

Objectives:
To give the students an introduction to the analysis of linear control systems. This permits the students to exploit time and frequency domain tools to design and study the linear control systems.

UNIT- I: Introduction
Concepts of Control Systems - Open Loop and closed loop control systems and their differences - Different examples of control systems - Classification of control systems, Feed-Back Characteristics, Effects of feedback.
Mathematical models - Differential equations, Impulse Response and transfer functions - Translational and Rotational mechanical systems

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

UNIT-III: Time Response Analysis & Stability Analysis
Standard test signals - Time response of first order systems - Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications - Steady state response - Steady state errors and error constants – Effects of proportional derivative, proportional integral systems.
The concept of stability - Routh's stability criterion - Qualitative stability and conditional stability - Limitations of Routh's stability. Root Locus Technique: The Root locus concept - Construction of root loci - Effects of adding poles and zeros to G(s)H(s) on the root loci.

UNIT-IV: Frequency Response & Stability Analysis
Introduction, Frequency domain specifications - Bode diagrams - Determination of Frequency domain specifications and transfer function from the Bode Diagram - Phase margin and Gain margin - Stability Analysis from Bode Plots. Polar Plots, Nyquist Plots - Stability Analysis.
Compensation techniques - Lag, Lead and Lead-Lag Controllers design in frequency Domain, PID Controllers.

UNIT-V: State Space Analysis of Continuous Systems

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

Outcomes:

Upon successful completion of this course, the students will be able to describe the feedback control and the basic components of control systems, analyze various time and frequency domain methodologies for the design of linear control systems, examine the methods of stability analysis of systems from transfer function forms and to develop the state space models for various systems.

Text Books:

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

References:

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

G.NARAYANAMMA INSTITUTE OF TECHNOLOGY & SCIENCE
(FOR WOMEN)
AUTONOMOUS under JNTUH

II Year B.Tech II Semester	**L**	T/**P/D**	**C**
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ELECTRONIC CIRCUIT ANALYSIS LAB
(Common to ECE, ETM)

Objectives:
To design the single stage and multi stage amplifiers, the Power amplifiers using power transistors for the required output power, the single tuned and double tuned amplifier circuit for the given resonant frequency and to develop necessary skills to function effectively on teams, in technical writing in effective communication.

List of Experiments (Twelve experiments to be done):
I) Design and Simulation in Simulation Laboratory using any Simulation Software. (Any Six):

1. Common Emitter
2. Common Source amplifier
3. Two Stage RC Coupled Amplifier
4. Current shunt and voltage series Feedback Amplifier
5. Cascode Amplifier
6. Wien Bridge Oscillator using Transistors
7. RC Phase Shift Oscillator using Transistors
8. Class A Power Amplifier (Transformer less)
9. Class B Complementary Symmetry Amplifier
10. Common base (BJT) / Common gate (JFET) Amplifier.

II) Testing in the Hardware Laboratory (Six Experiments: (**3 + 3)**:
A) Any Three circuits simulated in Simulation laboratory
B) Any Three of the following
1. Class A Power Amplifier (with transformer load)
2. Class C Power Amplifier
3. Single Tuned Voltage Amplifier
4. Hartley & Colpitts Oscillators
5. Darlington Pair
6. MOS Amplifier

Equipments required for Laboratories:
1. For software simulation of Electronic circuits
   i) Computer Systems with latest specifications
   ii) Connected in LAN (Optional)
   iii) Operating system (Windows XP)
   iv) Simulations software (Multisim/TINAPRO) Package
2. For Hardware simulations of Electronic Circuits

i) RPSs
ii) CROs
iii) Functions Generators
iv) Multimeters
v) Components

Outcomes:
Students will demonstrate the ability to design, analyze and test single and multi stage amplifiers by using hard ware module. Verifying the Design circuit by using software simulation. Measure gain and bandwidth. They will demonstrate the ability to design, analyze oscillator circuits to get sustained oscillation frequency using hardware module and measure frequency of oscillation, to analyze power amplifiers in time domain and frequency domain based on conduction angle and efficiency using software simulation. Design and test the same by hardware module, to analyze tuned amplifiers (single and double) time domain and frequency domain using software simulation. To design and test the same by hardware module also measure gain and band width for tuned frequency and to communicate and share their experiences by working in small team groups.

G.NARAYANAMMA INSTITUTE OF TECHNOLOGY & SCIENCE
(FOR WOMEN)
AUTONOMOUS under JNTUH

II Year B.Tech II Semester	**L**	**T/P/D**	**C**
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PULSE AND DIGITAL CIRCUITS LAB
(Common to ECE, ETM)

Objectives:
The objective of the lab is, students will understand the concepts covered in PDC theory i.e., linear /non-linear wave shaping circuits, multi-vibrators, various oscillators, realization of gates by diodes, resistances and transistors.

Minimum Twelve experiments to be conducted:
List of Experiments (Ten experiments to be done):

1. Linear wave shaping.
2. Non Linear wave shaping - Clippers.
3. Non Linear wave shaping - Clampers.
4. Transistor as a switch.
5. Study of Logic Gates & some applications.
6. Study of Flip-Flops & some applications.
7. Sampling Gates.
8. Astable Multivibrator.
9. Monostable Multivibrator.
10. Bistable Multivibrator.
11. Schmitt Trigger.
12. UJT Relaxation Oscillator.
13. Bootstrap Sweep Circuit.

Equipment required for Laboratories:

1.	Regulated Power Supply	-	0-30V
2.	CRO	-	0-20MHz.
3.	Function Generators	-	0 -1 M Hz
4.	Components		
5.	Multi Meters		

Outcomes:
After this lab is completed the students will be able to design linear/non-linear wave shaping circuit for the specified waveform. The students will also be able to understand concepts of multi-vibrators, transistor as switch, UJT as oscillator.

G.NARAYANAMMA INSTITUTE OF TECHNOLOGY & SCIENCE
(FOR WOMEN)
AUTONOMOUS under JNTUH

III Year B.Tech I Semester	**L**	**T/P/D**	**C**
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MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS
(Common to ECE & ETM)

Objectives:
To explain the basic principles of managerial economics, accounting and current business environment underlying business decision making.

UNIT-I: Introduction to Business & Managerial Economics
Characteristic features of Business, Features and evaluation of Sole proprietorship, Partnership, Joint Stock Company, Public Enterprises and their types. Definition, Nature and Scope of Managerial Economics, Features & Relationship with other sciences – Managerial Economics Concepts – Demand Analysis: Demand Determinants, Law of Demand and its exceptions.
Definition, Types, Measurement and Significance of Elasticity of Demand. Demand forecasting, Factors governing demand forecasting, methods of demand forecasting (survey methods, statistical methods, expert opinion method, test marketing controlled experiments, judgmental approach to demand forecasting), Demand Forecasting for new Products.

UNIT-II: Theory of Production
Production Function – Law of diminishing returns, Isoquants and Isocosts, MRTS, Least Cost Combination of Inputs, Cobb-Douglas Production function, Laws of Returns, Internal and External Economies of Scale.

Cost Analysis:
Cost Concepts, Opportunity cost, Fixed vs. Variable costs, Explicit costs Vs. -kImplicit Costs, Out of pocket costs vs. Imputed costs. Cost analysis in Short-run & Long-run. Break-even Analysis (BEA) – Determination of Break-Even points (Simple problems) – Managerial Significance and limitations of BEA.

UNIT-III: Introduction to Market Pricing Methods
Market Structures: Types of competition, Features of Markets based on competition, Price-Output determination in case of perfect competition and monopolistic competition.

Objectives and policies of Pricing - Methods of Pricing:
Cost plus Pricing, Marginal Cost Pricing, Sealed Bid Pricing, Going Rate Pricing, Limit Pricing, Market Skimming Pricing, Penetration Pricing, Two-Part Pricing, Block Pricing, Bundling Pricing, Peak Load Pricing, Cross Subsidization.

UNIT-IV: Financial Accounting & Analysis

Accounting – Definition, Accounting Concepts & Conventions, Importance of Accountancy, Difference between Book-keeping & Accountancy, Double-Entry Book Keeping - Advantages, Types of Accounts and its rules, Accounting Cycle - Journal, Ledger, Trial Balance .

Final Accounts:

Introduction to Final Accounts (Trading, Profit & Loss Account and Balance Sheet) Adjustments with Simple Problems. Introduction to Ratio Analysis, Need & Importance of Ratios (Theory only)

UNIT-V: Capital and Capital Budgeting

Introduction to Sources of raising finance Nature and scope of capital budgeting, features of capital budgeting proposals, Methods of capital Budgeting, Payback Method, Accounting Rate of Return (ARR) and Net Present Value NPV , Profitability Index(PI), Internal Rate of Return (IRR),(Simple Problems)

Outcomes:

The candidate would be in a position to understand, analyze and interpret the basics of economics, accounting and that of business environment associated with.

Text Books:

1. Managerial Economics and Financial Analysis – A R Aryasri

References:

1. Managerial Economics Analysis, Problems & Cases – P.L.Mehta.
2. Managerial Economics – Varshney & Maheshwari
3. Financial Management Text and problems – Khan & Jain
4. Financial Management – I.M.Pandey
5. Double Entry Book Keeping – T.S. Grewal
6. Managerial Economics & Financial Analysis – S.A Siddiqui & A.S Siddiqui
7. Managerial Economics & Financial Analysis – Raghunatha Reddy & Narasimhachary
8. Financial Accounting – S.N. Maheswari & S.K Maheswari

G.NARAYANAMMA INSTITUTE OF TECHNOLOGY & SCIENCE
(FOR WOMEN)
AUTONOMOUS under JNTUH

III Year B.Tech I Semester	**L**	**T/P/D**	**C**
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COMPUTER ORGANIZATION
(COMMON TO ECE, ETM, CSE, IT)

Objectives:
To acquire the knowledge of the basic hardware and software issues of computer organization, to analyze the operational concepts of computers data representation, to know about the architecture and the features of advanced processors, to learn hierarchical memory system including cache memories and virtual memory and to acquire the knowledge about computer architecture, machine language, and low-level programming.

UNIT-I: Basic Structure of Computers
Computer Types, Functional Unit, Basic OPERATIONAL Concepts, Bus Structures, Software, Performance, Multiprocessors and Multicomputers. Data Representation, Fixed Point Representation, Floating – Point Representation, Error Detection Codes.

UNIT-II: Register Transfer Language and Micro operations
Register Transfer language, Register Transfer Bus and Memory Transfers, Arithmetic Micro operations, Logic Micro operations, Shift Micro operations, Arithmetic Logic Shift Unit. Instruction codes, Computer Registers, Computer Instructions - Instruction cycle.
Memory - Reference Instructions, Input - Output and Interrupt, STACK Organization, Instruction Formats, Addressing Modes, DATA Transfer and Manipulation. Program Control, Reduced Instruction Set Computer.

UNIT-III: Micro Programmed Control
Control Memory, Address Sequencing, Micro Program Example, Design of Control Unit, Hard Wired Control, Micro Programmed Control.

Computer Arithmetic:
Addition and Subtraction, Multiplication Algorithms, Division Algorithms, Floating Point Arithmetic Operations, Decimal Arithmetic Unit, Decimal Arithmetic Operations.

UNIT-IV: Memory Organization

Memory Hierarchy, Main Memory, Auxiliary Memory, Cache Memory, Virtual Memory, Introduction to RAID.

Input-Output Organization:
Peripheral Devices, Input-Output Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, Direct Memory Access, Input - Output Processor (IOP), Serial Communication: Introduction to Peripheral Component Interconnect (PCI) Bus. Introduction to Standard Serial Communication Protocols like RS232, USB, and IEEE1394.

UNIT-V: Pipeline and Vector Processing
Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline, Vector Processing, Array Processors.
Multi Processors:
Characteristics of Multiprocessors, Interconnection Structures, Interprocessor Arbitration. Interprocessor Communication and Synchronization, Cache Coherence, Shared Memory Multiprocessors.

Outcomes:
Upon successful completion of this course the student will be able to apply knowledge of computer science and electronics engineering to computer hardware and assembly level programming, design, analyze and interpret data, understand how instruction pipelining enhances processor performance.

Text Books:
1. Computer Organization - Carl Hamacher, Zvonks Vranesic, SafeaZaky, Vth Edition, McGraw Hill.
2. Computer Systems Architecture - M.Moris Mano, IIIrd Edition, Pearson/PHI

References:
1. Computer Organization and Architecture - William Stallings Sixth Edition, Pearson/PHI
2. Structured Computer Organization - Andrew S. Tanenbaum, 4th Edition PHI/Pearson

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AUTONOMOUS under JNTUH

III Year B.Tech I Semester	**L**	**T/P/D**	**C**
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ANTENNAS & WAVE PROPAGATION
(Common to ECE, ETM)

Objectives:
To understand how an antenna works, different types of antennas, their features and the modes of wave propagation

UNIT-I: Antenna Basics
Antenna Basics: Introduction. Basic Antenna Parameters - Patterns, Beam Area, Radiation Intensity. Beam Efficiency, Directivity-Gain-Resolution, Antenna Apertures. Effective Height. Illustrative Problems. Fields from Oscillating Dipole. Field Zones. Shape-Impedance Considerations. Antenna Temperature. Front - to-back Ratio. Antenna Theorems. Radiation- Basic Maxwell's Equations, Retarded Potentials - Helmholtz Theorem

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

UNIT-III: Antenna Arrays: Point Sources
Antenna Arrays: Point Sources - Definition. Patterns, arrays of 2 Isotropic Sources - Different Cases, Principle of Pattern Multiplication, Uniform Linear Arrays - Broadside Arrays. End fire Arrays. EFA with Increased Directivity. Derivation of their Characteristics and Comparison. BSAs with Non-uniform Amplitude Distributions - General Considerations and Binomial Arrays. Arrays with Parasitic Elements. Yagi-Uda Array. Folded Dipoles and their Characteristics. Illustrative Prob1ems.

UNIT-IV: VHF, UHF and Microwave Antennas and Antenna Measurements:
Helical Antennas - Helical Geometry, Helix Modes, Practical Design Considerations for Monofilar Helical Antenna in Axial and Normal Modes. Horn Antennas -Types, Fermat's Principle. Optimum Horns. Design Considerations of Pyramidal Horns, Reflector Antennas - Introduction,

Flar Sheet and Corner Reflectors. Paraboloidal Reflectors - Geometry, Pattern Characteristics, Feed Methods, Reflector Types - Related Features, Lens Antennas - Introduction, Geometry of Non-metallic Dielectric Lenses. Zoning, Tolerances, Applications, Micro strip Antennas -Introduction, Features, Advantages and Limitations, Rectangular Patch Antennas - Geometry and Parameters, Characteristics of Micro strip Antennas. Impact of Different Parameters on Characteristics. Illustrative Problems. : Introduction. Concepts - Reciprocity, Near and Far Fields, Coordinate System, Sources of Errors. Patterns to be Measured, Pattern Measurement Arrangement. Directivity Measurement, Gain Measurements (by Comparison, Absolute and 3-Antenna Methods)

UNIT-V: Wave Propagation

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

Wave Propagation - II:

Sky Wave Propagation - Introduction, Structure of Ionosphere, Refraction and Reflection of Sky Waves by Ionosphere, Ray Path. Critical Frequency, MUF. LET. OF, Virtual Height and Skip Distance, Relation between MUF and Skip Distance. Multi-hop Propagation, Energy Loss in Ionosphere, Summary of Wave Characteristics in Different Frequency Ranges.

Outcomes:

The students will know different types of antennas, design procedures and modes of wave propagation.

TEXT BOOKS:

1. Antennas and Wave Propagation - J.D. Kraus, RJ. Marhefka and Ahmad S. Khan. TMH, New Delhi, 4th ed., (Special Indian Edition), 2010.
2. Electromagnetic Waves and Radiating Systems - E.C. Jordan and K.G. Bahrain. PHI, 2nd e d., 2000.

REFERENCES:

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

edition, 1955.

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IC APPLICATIONS
(Common to ECE, EEE, ETM, ICE)

Objectives:
To strengthen the basic concepts in IC's design and its applications, to introduce basic building blocks of analog and digital integrated circuits, to familiarize linear and non-linear applications of op-amp, to study about functioning of IC 555 timer, PLL , ADC and DAC converters and their applications and to introduce the analysis and design of digital IC's of 74 series which form core part of digital electronics.

UNIT- I: Integrated Circuits
Classification, Chip Size and Circuit Complexity, Ideal and Practical Op-Amp, Op-amp characteristics-DC and AC Characteristics. 741 Op-Amp and its Features, Modes of operation-inverting, non-inverting, differential.

OP-Amp Applications
Basic Applications of Op-Amp, Instrumentation Amplifier. AC Amplifier, V to I and I to V Converters, Sample & Hold Circuits, Differentiators and Integrators, Comparators, Schmitt Trigger, Multivibrators, Introduction to Voltage Regulators, Features of 723 Regulator.

UNIT-II:Active Filters & Oscillators
Introduction, First Order and Second Order Low Pass, High Pass and Band Pass Filters, Active Band Reject and All Pass Filters.
Principle of Operation and Types of Oscillators - RC, Wien Bridge and quadrature type. Waveform Generators - Triangular, Saw Tooth. Square Wave.

Timers
Introduction to 555 Timer, Functional Diagram, Monostable and Astable Operations and Applications, Schmitt Trigger.

UNIT-III: Phase Locked Loops
PLL- Introduction, Block Schematic, Principles and Description of Individual Blocks of 565, VCO.

D-A and A-D Converters
Introduction, Basic DAC Techniques - Weighted Resistor Type, R-2R Ladder Type, Inverted R-2R Type. Different types of ADCs – Parallel Comparator Type, Counter Type, Successive Approximation Register Type and Dual Slope Type. DAC and ADC specifications.

UNIT- IV: Logic Families

Classification of Integrated Circuits, Standard TTL NAND Gate - Analysis & Characteristics, TTL Open Collector Outputs, Tristate TTL, MOS & CMOS open drain and tristate outputs, Comparison of Various Logic Families, IC interfacing- TTL driving CMOS & CMOS driving TTL.

UNIT -V: Combinational Circuit ICs

Use of TTL-74XX Series & CMOS 40XX Series ICs, TTL ICs – Code Converters, Decoders, Demultiplexers, Encoders, Priority Encoders, multiplexers & their applications, Priority Generators, Arithmetic Circuit ICs-Parallel Binary Adder/ Subtractor Using 2's Complement System, Magnitude Comparator Circuits.

Sequential Circuit ICs

Commonly Available 74XX & CMOS 40XX Series ICs - RS, JK, JK Master-Slave, D and T Type Flip-Flops & their Conversions, Synchronous and Asynchronous counters, Decade counters, Shift Registers & applications.

Outcomes:

Students will develop the ability to design the analog circuits using op-amps for various applications, will demonstrate their skills in designing waveform generation circuits using op-amps, will demonstrate their skills in analyzing 555 timer, PLL and its applications, will be able to design logic circuits using digital IC's and also will develop the ability to design and analyze various combinational and sequential circuits using IC 74 series.

Text books:

1. Linear Integrated Circuits -D. Roy Chowdhary, New Age International (p)Ltd, 3rdEd.,2008.
2. Digital Fundamentals - Floyd and Jain, Pearson Education,8th Edition, 2005.
3. Op-Amps and Linear Integrated Circuits - Concepts and Applications by James M.Fiore, Cengage / Jaico, 2/e, 2009.

References:

1. Modern Digital Electronics - RP Jain- 4/e-TMH, 2010.
2. Op-Amps & Linear ICs-Ramakanth A. Gayakwad, PHI, 1987.
3. Operational Amplifiers and Liner Integrated Circuits by K.Lai Kishore - Pearson, 2008.
4. Operational Amplifiers with Linear Integrated Circuits, 4/e William D.stanley, Pearson Education India, 2009.

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III Year B.Tech I Semester	**L**	**T/P/D**	**C**
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ANALOG COMMUNICATIONS
(ECE)

Objectives:
This subject will help in understanding complete basic concepts of analog communication systems. This consists of Transmitters , receivers , different modulation and demodulation techniques available in anolog communications.. And noise effect on different modulation schemes and remidies for those also have been discussed. These concepts will also help in understanding the concepts of digital communications concepts**.**

UNIT- I: Introduction
Introduction to communication system, need for modulation, Frequency Division Multiplexing , Amplitude Modulation, definition, time domain and frequency domain description, single tone modulation, power relations in AM waves, generation of AM waves, square law Modulator, Switching modulator, detection of AM Waves; Square law detector, Envelope detector.

DSB Modulation:
Double side band suppressed carrier modulators, time domain and frequency domain description, generation of DSBSC Waves, balanced modulators, Ring modulator, Coherent detection of DSB-SC Modulated waves, COSTAS Loop.

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

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

Noise:

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

UNIT-IV: Transmitters

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

Receivers:

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

UNIT-V: Pulse Modulation

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

Outcomes:

From the syllabus provided Students can learn basics in Analog communications and various modulation and demodulation techniques in AM. Students can learn here the importance and advantage of cutting of sidebands and can be able to distinguish between DSB-SC, SSB-SC, VSB techniques of AM and as well as FM. Also can learn about different types of AM and FM transmitters and receivers. This will help students in learning basic modulation and demodulation techniques in pulse communication techniques such as PAM, PWM and PPM.

Text Books:

1. Principles of Communication Systems – H Taub & D. Schilling, Gautam Sahe, TMH, 2007 3rd Edition.
2. Communication Systems – B.P. Lathi, BS Publication, 2006.

References:

1. Principles of Communication Systems - Simon Haykin, John Wiley, 2nd Ed.
2. Electronics & Communication System – George Kennedy and Bernard Davis, TMH 2004.
3. Communication Systems Second Edition – R.P. Singh, SP Sapre, TMH, 2007.
4. Fundamentals of Communication Systems - John G. Proakis, Masond, Salehi PEA, 2006.

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DIGITAL SIGNAL PROCESSING
(Common to ECE, ETM)

Objectives:
To introduce students to Digital signal processing, to represent aperiodic signals using Discrete Fourier Series and to analyze DFT, Z-Transform of aperiodic signals and to obtain their properties. And to reduce the number of computations in DFT using FFT algorithm, to design digital IIR and FIR filters and to realize them..

UNIT-I: Introduction
Introduction to Digital Signal Processing, Elementary Discrete time signals, Discrete time systems, properties of discrete time systems, Linear constant coefficient difference equations, Frequency domain representation of discrete time signals and systems.

UNIT-II: Z-Transform
Z- Transform of a discrete sequence, Distinction between Laplace and Z transforms. Region of convergence in Z-Transform, constraints on ROC for various classes of signals, properties of Z-transforms, one sided Z-transform, application-solution to difference equation, Inverse Z-transform-contour integration, power series expansion and partial fraction method.

Discrete Time Fourier Series and Transform: Representation of Periodic Sequences (DFS), Properties of Discrete Fourier Series, Discrete Time Fourier Transform (DTFT) of aperiodic sequence, properties of DTFT.

UNIT-III: Discrete Fourier Transform
Frequency domain Sampling, Discrete Fourier Transforms, Properties of DFT, Computation of DFT, linear convolution of sequences using DFT, Over-lap Add method, Over-lap Save method, Relation between DTFT, DFS, DFT and Z-Transform.

Fast Fourier Transform:
Fast Fourier transforms (FFT) - Radix-2 decimation-in-time and decimation-in-frequency FFT Algorithms, Inverse FFT and FFT with general Radix-N.

UNIT-IV: IIR Digital Filters
Analog filter approximations – Butterworth and Chebyshev, Design of IIR Digital filters from analog filters, Step and Impulse invariant techniques, Bilinear transformation method, Spectral transformations.

Realization of IIR Filters:
Direct form, signal flow graphs and transposed structure, Cascade and Parallel forms, Lattice-Ladder structure.

UNIT-V: FIR Digital Filters
Characteristics of FIR Digital Filters, Frequency response, Design of FIR Filters: Fourier Series Method, Digital Filters using Window Techniques, Frequency Sampling technique, Comparison of IIR & FIR filters.

Realization of FIR Filters:
Direct form, Cascaded form, Linear Phase, Poly Phase and Lattice structures.

Outcomes:
At the end of the course students will be able to represent periodic signals using Fourier series, to represent aperiodic sequences using DTFT, Z-transform and DFT, also to obtain relationship between them. They will also be able obtain DFT using FFT algorithm and to understand importance of FFT algorithm. They will also be able to design and represent IIR and FIR methods using different methods.

Text Books:

1. Digital Signal Processing, Principles, Algorithms, and Applications: John G. Proakis, Dimitris G. Manolakis, Pearson Education / PHI, 2007.
2. Discrete Time Signal Processing – A. V. Oppenheim and R.W. Schaffer, PHI, 2009

References:

1. Digital Signal Processing - Ramesh Babu.
2. Digital Signal Processing – S.Salivahanan, A.Vallavaraj and C.Gnanapriya, TMH, 2009
3. Digital Signal Processing – Fundamentals and Applications – Li Tan, Elsevier, 2008
4. Fundamentals of Digital Signal Processing using Matlab – Robert J. Schilling, Sandra L. Harris, Thomson, 2007
5. Discrete Systems and Digital Signal Processing with MATLAB – Taan S. ElAli, CRC press, 2009.
6. Digital Signal Processing - A Practical approach, Emmanuel C. Ifeachor and Barrie W. Jervis, 2nd Edition, Pearson Education, 2009

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III Year B.Tech I Semester	**L**	**T/P/D**	**C**
	-	**-/3/-**	**2**

ADVANCED ENGLISH COMMUNICATION SKILLS LAB
(Common to ECE, EEE, CSE, ETM & ICE)

The Advanced English Communication Skills lab focuses on the career planning, professional skills and interpersonal communication skills in the globalised context.

Objectives
To improve the students' fluency in English, through well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts and to enable the professional students to communicate their ideas relevantly and coherently both in writing and speaking.

Syllabus
The following course content is prescribed for the Advanced English Communication Skills Lab sessions:

1. Functional English – starting a conversation – responding appropriately and relevantly – using the right body language – role play in different situations.
2. Vocabulary Building – synonyms and antonyms, word roots, one-word substitutes, prefixes and suffixes, study of word origin, analogy, idioms and phrases.
3. Listening Skills – Purpose of listening – Types of listening – Barriers to listening – Sub Skills of listening – Tips for being a good listener
4. Reading Comprehension – reading for facts, guessing meanings from context, scanning, skimming, inferring meaning, critical reading.
5. Writing Skills – structure and presentation of different types of writing – Resume writing/e-correspondence/ Technical report writing/Portfolio writing/Mind-mapping - planning for writing – research abilities/data collection/ organizing data/tools/analysis – improving one's writing.
6. Group Discussion – dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and coherence.
7. Presentation Skills – Oral presentation (individual and group) through JAM sessions/seminars and written presentations through posters/projects/reports/PPTs/e-mails/mind maps/assignments etc.
8. Interview Skills – concept and process, pre-interview through tele and video-conferencing.

Minimum Requirement

The Advanced English Communication Skills Lab shall have integrated MultiMedia resources: 20 Multimedia systems, with movable chairs and audio-visual aids with a P.A System, a Multimedia Projector, a digital stereo –audio & video system and camcorder.

System Requirement (Hardware component)

Computer network with LAN with minimum 30 multimedia systems with the following specifications:

i) CPU Requirements
   a) Duel Core Processor
   b) Speed – 2.8 GHZ
   c) RAM – 1 GB Minimum
   d) Hard Disk – 80 GB Minimum
   e) DVD ROM Drive

ii) Headphones of High quality

Suggested Software

- *Oxford Advanced Learner's Compass*, 7th Edition.
- *DELTA's key to the Next Generation TOEFL Test:* Advanced Skill Practice.
- *English in Mind*, Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge University Press.
- *Job Hunting* by Colm Downes with CD, Cambridge University Press 2008.
- *Business Vocabulary in Use* – Elementary to Intermediate with CDs, Cambridge University Press.

Outcomes:

The candidate would be in a position to communicate both in writing and speaking critically and intelligibly with appropriate use of vocabulary and grammatical structures.

REFERENCES:

1. *Soft Skills: Know Yourself and Know the World*, Dr.K.Alex. S.Chand & Company Ltd.
2. *Group Discussion and Interview Skills* with VCD, Priyadarshi Patnaik, Foundation Books.
3. *Communication Skills for Engineers and Scientists*, Sangeeta Sharma & Binod Mishra, PHI Learning Private Limited.
4. *Critical Reasoning, Acedemic Writing and Presentation Skills,* Marilyn Anderson, Pramod K.Nayar and Madhucchanda Sen, Pearson Publishers.

DISTRIBUTION AND WEIGHTAGE OF MARKS

Advanced English Language Laboratory Practical Paper:

1. The practical examinations for the English Language Laboratory shall be conducted as per the norms stipulated for the core engineering practical sessions.
2. For the Language lab sessions, there shall be a continuous evaluation during the semester for 25 sessional marks and 50 year-end Examination marks. Of the 25 marks, 15 marks shall be awarded for day-to-day work and 10 marks to be awarded by conducting Internal Lab Test(s). The year- end Examination shall be conducted by the teacher concerned with an external examiner from the other Universities or colleges.

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AUTONOMOUS under JNTUH

III Year B.Tech I Semester	**L**	T/**P/D**	**C**
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IC APPLICATIONS LAB
(Common to ECE, ETM)

Objectives:
The main objective of this lab course is to gain the practical hands on experience by exposing the students to various linear and digital IC applications. The students will have an understanding of the concepts involved in various linear circuits and their applications. Through this lab course the students will get a good understanding of various linear ICs especially the 741 operational amplifier and its various applications. The lab also introduces to the students 555 timer and its applications, various voltage regulators and 74 series TTL ICs

Note: Minimum of 12 experiments have to be conducted (Six from each part):
List of Experiments:
Part-1
TO VERIFY THE FOLLOWING FUNCTIONS.

1. Adder, Subtractor, Comparator using IC 741 Op-Amp.
2. Integrator and Differentiator using IC741 Op-Amp.
3. Active Low Pass & High Pass Butterworth (second Order).
4. RC Phase Shift and Wien Bridge Oscillators using IC 741 Op-Amp.
5. IC 555 timer in Monostable operation.
6. Schmitt trigger circuits using IC 741 & IC 555.
7. IC 565 – PLL applications
8. Voltage regulator IC 723, three terminal voltage regulators- 7805, 7809, 7912.
9. Sample and Hold LF 398 IC.

Part-2
TO VERIFY THE FUNCTIONALITY of the following 74 series TTL ICs.

1. D Flip –Flop (74LS74) and JK Master-Slave Flip-Flop (74 LS73}.
2. Decade counter (74LS90) and UP-Down Counter(74 LS192).
3. Universal Shift registers- 74LS194/ 195.
4. 3 -8 decoder- 74LS138.
5. 4 bit comparator 74LS85.
6. 8X1 Multiplexer –- 74151 and 2X4 demultiplexer – 74155.
7. RAM (16X4) – 74189 (read and write operations).
8. Stack and queue implementation using RAM, 74189.

EQUIPMENT REQUIRED:

1. 20 MHz/ 40 MHz/60 MHz Oscilloscope.
2. 1 MHz Function Generator (Sine, Square, Triangular and TTL) .
3. Regulated Power Supply.
4. Multimeter / Volt Meter.

Outcomes:

Student develops the ability to design various types of amplifiers using op-amps, waveform generation circuits, basic timer, analog and digital circuits, logic circuits using digital ICs, can be able to conduct experiments as well as to analyze and interpret results.

G.NARAYANAMMA INSTITUTE OF TECHNOLOGY & SCIENCE
(FOR WOMEN)
AUTONOMOUS under JNTUH

III Year B.Tech II Semester	**L**	**T/P/D**	**C**
	3	**1 /-/-**	**3**

MANAGEMENT SCIENCE
(Common to ECE, ETM)

Objectives:
To familiarize with the process of management and to provide basic insights into select contemporary management practices.

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

UNIT- II: Strategy & Organisation Structure
Strategic Management: Mission, Goals, Objectives, Policy, Strategy, Programmes, Elements of Corporate Planning Process, Environmental Scanning, SWOT Analysis.
Organisational Structures: Basic concepts related to Organisation – Departmentation and Decentralisation, Types of Mechanistic and organic structures of organisation (Line organization, Line and Staff organisation, functional organization, Committee organisation, Matrix organisation, Virtual Organisation, Cellular organisation, team structure, boundaryless organisation, Inverted Pyramid structure, Lean and Flat organisation structure) and their merits , demerits and suitability.

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

UNIT-IV: Operations Management
Operations Management: Principles and types of Plant Layout -Methods of production (Job, batch and Mass Production), Work Study – Basic procedure involved in Method Study and work Measurement – Statistical Quality Control : X Chart, R chart, C chart, P chart, (Simple Problems).

Materials Management: Objectives, Need for Inventory control, EOQ, ABC Analysis.
Project Management (PERT/CPM): Network Analysis, Program Evaluation and Review Technique (PERT), Critical Path Method (CPM) (Simple Problems).
Marketing: Functions of Marketing, Marketing Mix and Marketing Strategies based on Product Life Cycle, Channels of Distribution, Retailing & Branding.

UNIT-V: Contemporary Management Practices
Contemporary Management Practices: Basic Concepts of Just-in-time (JIT) System, Capability Maturity Model (CMM) Levels, Value Chain Analysis, Enterprise Resource Planning (ERP), Performance Management, Business Process Outsourcing (BPO), Business Process Re-engineering, Supply Chain Management, Total Quality Management, Six Sigma, CRM, Bench Marking & Balanced Score Card.

Outcomes:
The candidate would be in a position to suggest appropriate solution for the business decision making problem.

Text Books:
1. Management Science – A R Aryasri

References:

1. Management - Stoner, Freemen & Gilberth
2. Industrial Engineering & Management Science – T.R. Banga & Sharma
3. Marketing Management – Kotler Philip & Keller Kevin
4. Human Resource Management – K. Aswathappa
5. Principles of Management – Koontz, Weihrich & Aryasri
6. PERT / CPM – L.S. Srinath
7. Management – VSP Rao & Gangadhar Rao
8. Production and Operations Management – SN Chary

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(FOR WOMEN)
AUTONOMOUS under JNTUH

III Year B.Tech II Semester	**L**	T/**P/D**	**C**
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VLSI DESIGN
(Common to ECE, ETM, EEE, ICE, IT)

Objectives:
The goal of the course is to introduce design concepts and Architecture underlying modern complex VLSI and system-on-chip. The course is build upon student's prior knowledge of digital circuits, digital logic and Computer Architecture. The concepts teach how complex chip-scale systems can be designed. The course is designed to give the student an understanding of different design steps required to carry out a complete digital VLSI design in silicon and to apply CMOS Technology specific layout rules in the placement and routing of transistors and interconnect, and to verify the functionality, timing, power and parasitic effects. The course main objective is to introduce the fundamental principles of VLSI Circuit design and layout and to cover the basic building blocks of large scale CMOS digital Integrated circuits. It also describes the general steps required for processing of CMOS Integrated circuits and to design functional units.

UNIT- I: Introduction
Introduction to IC Technology – MOS, PMOS, NMOS, CMOS & BiCMOS fabrication Technologies; fabrication processes: Oxidation, Lithography, Diffusion, Ion implantation, Metallization, Etching, Planarization, Encapsulation, Integrated Resistors and Capacitors, CMOS Nanotechnology.

UNIT-II: Basic Electrical Properties
Basic Electrical Properties of MOS and BiCMOS Circuits: I_{ds}-V_{ds} relationships, MOS transistor threshold Voltage V_t, g_m, g_{ds}, Figure of merit ω_o; Pass transistor, NMOS Inverter, Various pull ups, CMOS Inverter - analysis and design, BiCMOS Inverters.

VLSI Circuit Design Processes:
VLSI Design Flow, MOS Layers, Stick Diagrams, Design Rules and Layout, 2 μm CMOS Design rules for wires, contacts and Transistors, Layout Diagrams for NMOS and CMOS Inverters and Gates, Scaling of MOS circuits.

UNIT- III: Gate Level Design
Logic Gates and Other complex gates, Switch logic, Alternate gate circuits, Time delays, Driving large capacitive loads, Wiring capacitance, Fan–in, Fan–out, Choice of layers.

Data path Subsystems:
Subsystem Design, Shifters, Adders, ALUs, Multipliers, Parity generators, Comparators, Zero/One Detectors, Counters.

UNIT-IV:Array Subsystems
SRAM, DRAM, ROM, Serial Access Memories, Content Addressable Memory.

Semiconductor Integrated Circuit Design:
PLAs, Programmable Array Logic, FPGAs, CPLDs, Standard Cells, Design Approach, Introduction to low power design.

UNIT-V: CMOS Testing
CMOS Testing, Need for testing, Test Principles, Wafer-level, package-level testing, System-level Test Techniques, Layout Design for improved Testability, Principles of Design for testability (DFT).

Outcomes:
Students will be able to understand the operation of a MOS transistor, down to physical level and relate the knowledge to the development of its operational equations, and will be able to analyze and implement various logic gates and circuits, using MOS Transistors. The student will be able to design circuit components and verify their performance using simulation tools. The student can design static CMOS Combinational and Sequential logic at the transistor level, including mask layout, and will be able to implement designs with FPGA devices and CPLD'S.

Text Books:

1. Essentials of VLSI circuits and systems – Kamran Eshraghian, Douglas A. Pucknell, Sholeh Eshraghian, PHI, 2005 Edition
2. CMOS VLSI Design – A circuits and systems perspective, Neil H. E Weste, David Harris, Ayan Banerjee, Pearson, 2009.

References:

1. VLSI Designing- K. Lal Kishore, V. S. V. Prabhakar, I.K International, 2009.
2. CMOS logic circuit Design - John .P. Uyemura, Springer, 2007.
3. Modern VLSI Design - Wayne Wolf, Pearson Education, 3rd Edition, 1997.
4. VLSI Design – A. Albert Raj, Latha, PHI, 2008
5. Introduction to VLSI – Mead & Convey, BS Publications, 2010

6. VLSI Design – M. Micheal Vai, CRC Press, 2009.

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AUTONOMOUS under JNTUH

III Year B.Tech II Semester	**L**	**T/P/D**	**C**
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DIGITAL COMMUNICATIONS
(ECE)

Objectives:
To enable the students to learn about elements of Digital communication, understand the importance of Digital communication over analog communication. To make the students learn baseband modulation, Digital modulation and Spread spectrum modulation techniques. Also to make the students perform Source coding and channel coding for reducing the bit rate and probability of error respectively.

UNIT-I: Elements of Digital Communication Systems and Pulse Code Modulation
Elements of Digital Communication Systems
Model of Digital Communication Systems, Digital Representation of Analog Signal, Certain issues in Digital Transmission, Advantages of Digital Communication Systems, Bandwidth-S/N tradeoff, Hartley Shannon Law, Sampling Theorem.

Pulse Code Modulation:
PCM Generation and Reconstruction, Quantization noise, Non uniform Quantization and Companding, DPCM, Adaptive DPCM, DM and Adaptive DM. Noise in PCM and DM.

UNIT-II: Baseband Transmission and Digital Modulation Techniques
Baseband transmission and Optimal Reception of Digital Signal
Baseband transmission and Optimal Reception of Digital Signal: Pulse shaping for optimum transmissions. A Baseband Signal Receiver, Probability of Error. Optimum Receiver, optima! of Coherent Reception. Signal Space Representation and Probability of Error, eye diagrams, Cross talk.

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

UNIT-III: Information Theory and Source Coding Techniques
Information Theory: Information and entropy, conditional entropy and redundancy, Shannon-Fano coding, Mutual Information, Information loss due to noise.

Source Coding:
Huffman Code, variable length coding, Source coding to Increase average Information per bit. Lossy source coding.

UNIT-IV: Channel Coding Techniques: Linear Block Codes:
Matrix description of Linear Block Codes, Error detection & error Correction capabilities of linear block codes.

Cyclic Codes: Algebraic structure, encoding, syndrome calculation. Decoding

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

UNIT-V: Spread Spectrum Modulation
Spread Spectrum Modulation: Use of Spread Spectrum, Direct Sequence Spread Spectrum (DSSS), Code Division Multiple Access, Ranging using DSSS. Frequency Hopping Spread Spectrum, PN - sequences: Generation and Characteristics. Synchronization in Spread Spectrum Systems.

Outcomes:
At the end of the course students will be able to understand baseband modulation, Digital modulation, Spread spectrum modulation techniques and their importance. They will also be able to reduce the probability of error, bit rate using Channel coding, Source coding respectively.

Text Books:

1. Principles of communication systems - Herbert Taub. Donald L Schiling, Goutam Sana, 3rd Edition, McGraw-Hill, 2008.
2. Digital and Analog Communicaton Systems - Sam Shanmugam, John Wiley, 2005.

3 Digital Communications - Simon Haykin, Jon Wiley, 2005

References:

1. Digital Communications - John G. Proakis, Masoud salehi 5th Edition, McGraw-Hill, 2008.
2. Digital Communications - Ian A. Glover, Peter M. Grant, Edition, Pearson Edu., 2008.
3. Communication Systems-B.P. Lathi, BS Publication, 2006.

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III Year B.Tech II Semester	**L**	**T/P/D**	**C**
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MICROPROCESSORS AND MICROCONTROLLERS
(Common to ECE, ETM, EEE, ICE)

Objectives:
To provide the students the concepts of Intel 8086 microprocessors and their architectures. To enable the students to write efficient programs in assembly level language of 8086 family of microprocessors. To train the students on the techniques of interfacing between the 8086 processor and peripheral devices, so that they can design and develop a complete microprocessor-based system. To provide the students, the fundamentals of different serial communication standards. To prepare students to learn hardware architecture of 8051 microcontroller and to do programming on it. To provide the students an introduction to RISC micro controllers.

UNIT-I: 8086 Architecture
An overview of 8085,8086 Architecture-Functional diagram, Register Organization, Memory Segmentation, Programming Model, Memory addresses, Physical memory organization, Signal descriptions of 8086-common function signals, Minimum and Maximum mode signals, Timing diagrams.

UNIT-II: Instruction Set and Assembly Language Programming of 8086
Instruction formats, addressing modes, instruction set, assembler directives, macros, simple programs involving logical, branch and call instructions, sorting, evaluating arithmetic expressions, string manipulations.

UNIT-III: I/O and Memory Interfacing
8255 PPI, various modes of operation and interfacing to 8086, interfacing keyboard, display, stepper motor interfacing, D/A and A/D converter, Memory interfacing to 8086.

Interrupts: Interrupt structure of 8086, Vector interrupt table, Interrupt service routine, Introduction to DOS and BIOS interrupts, Interfacing Interrupt Controller 8259, Interfacing of DMA Controller 8257.

Communication Interface:
Serial communication standards, Serial data transfer schemes, 8251 USART architecture and interfacing, Basics of RS-232.

UNIT-IV: Introduction to Microcontrollers
Overview of 8051 microcontroller, Architecture, I/O Ports, Memory organization, addressing modes and instruction set of 8051, simple programs.

8051 Real Time Control: Timer/Counter, programming 8051 timers and counters, Interrupts, programming Timer Interrupts, programming external hardware interrupts, Serial communication, programming the serial communication interrupts.

UNIT- IV: The RISC microcontroller architecture
Introduction to RISC Microcontroller,SPI,I^2C,TWI Serial Bus, Memory – Flash memory, EEPROM, SRAM, USART, Basics of USB.

Outcomes:
Students will be able to understand the principle of operation of Intel 8086 microprocessor. Students will be able to write assembly language programs on Intel 8086 including ascending order and descending order of data, string operations. Students will be able to interface Intel 8086 processor with 8255, DMA controller, Intel 8259, USART to develop the microprocessor based system. Students will develop and run program of Intel 8051 microcontroller. Students will learn architecture and interrupt structure of RISC microcontrollers.

Text Books:

1. Advanced Microprocessors and Peripherals – A. K. Ray and K.M. Bhurchandi, Tata-McGraw Hill, 2nd edition 2006.
2. D. V. Hall, Micro processors and Interfacing, Tata-McGraw Hill, 2nd edition 2006.
3. Kenneth. J. Ayala, The 8051 microcontroller, 3rd edition, Cengage learning, 2010.
4. Microprocessors and Microcontrollers, Lyla. B.Das, 1st edition, Pearson, 2012.

References:

1. The 8051Microcontrollers, Architecture and programming and Applications - K. Uma Rao, Andhe Pallavi, Pearson, 2009.
2. The 8051 Microcontroller and Embedded Systems Using Assembly and C, Second Edition
3. Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin D. McKinlay, Prentice Hall.
4. Micro Computer System 8086/8088 Family Architecture, Programming and Design - Liu and GA Gibson, Prentice-Hall India, 2nd Ed.,
5. Microcontrollers and application, Ajay. V. Deshmukh, Tata-McGraw Hill, 2005
6. The 8085 Microprocessor: Architecture, programming and Interfacing – K. Uday Kumar, B.S. Umashankar, 2008, Pearson.

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AUTONOMOUS under JNTUH

III Year B.Tech II Semester	**L**	**T/P/D**	**C**
	4	**1/-/-**	**3**

OPERATING SYSTEMS
(Common to ECE & ETM)

Objectives:
To get knowledge of OS and the specifications of some OS like WINDOWS and LINUX, to get knowledge of processes/threads management polices and scheduling polices, memory management like paging, segmentation and both together, file management and protective schemes and device management polices and scheduling of devices like discs.

UNIT-I: Operating System Overview
Operating System Objectives and functions – Evaluation of operating System – Example Systems – Modern Unix Systems, Linux Systems.

Process Description
Process States, Process description and Control, Examples Systems.

UNIT-II: Uniprocessor Scheduling
Types of Scheduling – Scheduling algorithms, Examples Systems. Threads – Processes and Threads, Examples Systems.

I/O management
I/O devices, organization of the I/O function, OS design issues,, I/O buffering

Disc Scheduling
Disk scheduling Policies, RAID, Disk Cache, Examples System – Linux I/O and Windows I/O Management.

UNIT-III: Memory Management
Memory Management requirements, Memory Partitioning, Paging, Segmentation.

Virtual memory
Hardware and Control structures, OS Software, Example Systems – Linux and Windows Memory Management.

UNIT-IV: Concurrency
Principles of Concurrency, Mutual Exclusion – Hardware Support, Semaphores, Monitors, Message Passing, Readers Writers Problem.

Principles of Deadlock
Deadlock prevention, detection and avoidance, Dining Philosophers Problem, Example Systems - UNIX, Linux, and Windows Concurrency Mechanisms.

UNIT-V: File Management
Overview, File Organization and Access, File Directories, File Sharing, Record Blocking, Secondary Storage Management, File System Security, Example system – Unix, Linux, and Windows.

Computer Security Threats
Concepts, Threats, Attacks, and Assets, Intruders, Malicious Software Overview, Viruses, Warms, and Bots, Root kits

Computer Security Techniques
Authentication, Access Control, Intrusion Detection, Malware Defense, Dealing with Buffer Overflow Attacks, Example Systems

Outcomes:
Student has knowledge of OS and the specifications of some OS like WINDOWS and LINUX, scheduling polices, can select required scheduling for IT products, has knowledge of memory management, can select required policy IT products, has knowledge of file management, can select block size and files (contiguous/scattered) and has knowledge of device management, can select scheduling for discs

Text Books:
1. Operating Systems – Internals and Design Principles, William Stallings, 6th Edition, Pearson education.

References:
1. Modern Operating Systems, Andrew S Tanenbaum 3rd edition Pearson/PHI
2. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 8th Edition, John Wiley.
3. Operating System a Design Approach-Crowley, TMH.

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III Year B.Tech II Semester	**L**	**T/P/D**	**C**
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OBJECT ORIENTED PROGRAMMING
(Common to ECE, ETM & ICE)

Objectives:
The objective of this course is to provide object oriented concepts through which robust, secured and reusable software can be developed. To understand object oriented principles like abstraction, encapsulation, inheritance, polymorphism and also fundamentals of object-oriented programming in Java, including objects, classes, and interfaces. To provide the knowledge in packages, exception handling, multithreading. To explore AWT and applets to create GUI applications. To give the students the ability to use the potential benefits of object-oriented programming for solving complex problems efficiently.

UNIT-I: Object Oriented Thinking
Need for OOP paradigm, A way of viewing world – Agents, responsibility, messages, methods, classes and instances, class hierarchies (Inheritance), method binding, overriding and exceptions, summary of OOP concepts, coping with complexity, abstraction mechanisms.

Java Basics History of Java, Java buzzwords, data types, variables, scope and life time of variables, arrays, operators, expressions, control statements, type conversion and costing, simple java program, concepts of classes, objects, constructors, methods, access control, this keyword, garbage collection, overloading methods and constructors, parameter passing, recursion, nested and inner classes, String handling

UNIT-II: Inheritance
Hierarchical abstractions, Base class object, subclass, subtype, substitutability, forms of inheritance- specialization, specification, construction, extension, limitation, combination, benefits of inheritance, costs of inheritance. Member access rules, super uses, using final with inheritance, polymorphism- method overriding, abstract classes, Object class

Packages and Interfaces:
Defining, Creating and Accessing a Package, Understanding CLASSPATH, importing packages, differences between classes and interfaces, defining an interface, implementing interface, applying interfaces, variables in interface and extending interfaces, package java.io – File, Byte Streams, Character Streams, Stream I/O.

UNIT-III: Exception handling
Concepts of exception handling, benefits of exception handling, Termination or resumptive models, exception hierarchy, usage of try, catch, throw, throws and finally, built in exceptions, creating own exception sub classes. Package java.util- Collections Framework: Collection Interface: Queue, Collection class:LinkedList,Stack class, StringTokenizer, Date, Random, Scanner.

Multi threading:
Differences between multi threading and multitasking, tread life cycle, creating threads, thread priorities, synchronizing threads, inter thread communication, thread groups, daemon threads.

UNIT-IV:
Enumerations, auto boxing Generics –A simple generics example

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

AWT:
Class hierarchy, component, container, panel, window, frame, canvas, graphics. Layout Manager – layout manager types – boarder, grid, flow, card and grib bag.

UNIT-V: AWT controls
Labels, button, canvas, scrollbars, text components, check box, check box groups, choices, lists panels – scrollpane, dialogs, menubar.

Applets
Concepts of Applets, differences between applets and applications, life cycle of an applet, types of applets, creating applets, passing parameters to applets.

Swing
Introduction, limitations of AWT, MVC architecture, components, containers.

Outcomes:
At the end of the course, students will be able to understand the fundamental concepts of the object oriented paradigm and their implementation in the Java programming language, write code to define classes and interfaces that uses class libraries such as java.lang, java.util, java.io. , use exception handling and multithreading in programs, develop GUI applications and give object oriented solutions for the complex problems.

Text Books:

1. Java- the complete reference, 7th editon, Herbert schildt, TMH.
2. Understanding OOP with Java, updated edition, T. Budd, Pearson Education.

References:

1. Introduction to Java Programming, Y. Daniel Liang, Pearson Education.
2. Core Java 2, Vol 1, Fundamentals, Cay.S.Horstmann and Gary Cornell, eighth Edition, Pearson Education.

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NANO TECHNOLOGY
(OPEN ELECTIVE)
(Common to ECE, EEE, ETM & ICE)

Objectives:
To understand what nanotechnology is about and how to use it, to gain knowledge of structure, properties, manufacturing, and applications of carbon materials, characterization methods in nanotechnology, some of the applications of nano devices and to learn the basic concepts and methods of lithography.

UNIT -I: Introduction to Nanotechnology
Importance of Nanoscale, Nanostructure Types, Electronic, Magnetic, Optical Properties of Nonmaterials, top-down and bottom-up approach to Nanostructures.

Quantum Mechanical Phenomenon in Nanostructures:
Quantum confinement of electrons in semiconductor Nanostructures, one dimensional confinement (Quantum Wires), two dimensional confinements (Quantum Wells), three dimensional confinements (Quantum Dots).

UNIT-II: Carbon Nano Structures
Carbon Nanotubes (CNTs), Fullerenes, C60, C80 and C240 Nanostructures, Properties (Mechanical, Optical and Electrical) and Applications.

UNIT-III: Fabrication of Nanomaterials
Physical Methods - Inert Gas Condensation, Arc Discharge, RF Plasma, Plasma Arc Technique, Ion Sputtering, Laser Ablation, Laser Pyrolysis, Molecular Beam Epitaxy, Chemical Vapour Deposition Method.

Nano Scale Characterization Techniques:
Scanning Probe Techniques (AFM, MFM, STM, SEM, TEM), XRD

UNIT-IV: Nanodevices and Nanomedicine
Lab on chip for Bioanalysis, Core/Shell Nanoparticles in Drug Delivery Systems (site specific and targeted drug delivery), Cancer Treatment and Bone Tissue Treatment.

Nano and Molecular Electronics:

Resonant-Tunneling Structures, Single Electron Tunneling, Single Electron Transistors, Coulomb Blockade, Giant Magneto Resistance, Tunneling Magneto Resistance.

UNIT-V: Nanolithography and Nanomanipulation

e-beam Lithography and SEM based Nanolithography and Nanomanipulation, Ion Beam Lithography, Oxidation and Metallization, Mask and its Application, Deep UV Lithography, X-ray based Lithography.

Outcomes:

Students will be able to demonstrate a basic knowledge of the physical principles and techniques appropriate for solving nanotechnology problems, will be able to demonstrate an understanding of some of the most common applications of nano scale phenomena, will be able to understand and express the main principles of some commonly applied characterization techniques and methodologies and will be able to understand the basic concepts involved in lithography.

Text Books:

1. Charles P Pode, Introduction to Nanotechnology, Springer Publications
2. Springer Handbook of Nanotechnology - Bharat Bhusan

References Books:

1. Phani Kumar, Principles of Nanotechnology, Scitech Publications
2. David Ferry "Transport in Nanostructures" Cambridge University Press 2000
3. Nanobiotechnology - C.M.Niemeyer, C.A. Mirkin
4. Nanofabrication Towards Biomedical Application: Techniques, Tools, Application and Impact - Challa S S R Kumar, J. H. Carola
5. Encyclopedia of Nanotechnology- Hari Singh Nalwa
6. Carbon Nanotubes: Properties and Applications - Michael J O'Connell
7. S. Dutta - Electron Transport in Mesoscopic Systems, Cambridge University Press
8. H. Grabert and M. Devoret "Single charge Tunneling" Plenum press 1992

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III Year B.Tech II Semester **L T/P/D C**
-/3/- 2

MICROPROCESSORS AND MICROCONTROLLERS LAB
(Common to ECE, ETM, ICE)

Objectives:
To develop and execute variety of assembly language programs of Intel 8086 including arithmetic and logical, sorting, searching, and string manipulation operations. To develop and execute the assembly language programs based on DOS/BIOS commands for various operations. To develop and execute the assembly language programs for interfacing Intel 8086 with peripheral devices. To develop and execute simple programs on 8051 micro controller. To train students on keil software for execution of 8051 programs. To develop and execute the assembly language programs for interfacing Intel 8051 with peripheral devices on keil software.

List of Experiments:
The Following programs/experiments are to be written for assembler and execute the same with 8086 and 8051 kits.

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

Note:- Minimum of 12 experiments to be conduct

Outcomes:

Students can demonstrate the use of arithmetic and logical and shift operations, sorting, and searching and string manipulation operations, the usage of DOS/BIOS commands in various assembly language programs, stepper motor interfacing, ADC and DAC conversion of voltage using Intel 8086 micro processor, the use of arithmetic and logical operation of 8051 micro controller, keil software for verification of 8051 microcontroller programs and for interfacing of 8051 microcontroller programs with peripheral devices and also for 8051 microcontroller based mini projects.

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III Year B.Tech II Semester	**L**	**T/P/D**	**C**
	0	**-/3/-**	**2**

DIGITAL SIGNAL PROCESSING LAB
(Common to ECE & ETM)

Objectives:
The main objective of this lab is to gain the practical hands on experience by exposing the students to various digital signal processing techniques. The various signal processing operations such as linear convolutions and circular convolution and the design of various filters.

The programs shall be implemented in software (Using MATLAB / Lab view / C programming/ OCTAVE or Equivalent) and hardware (Using TI / Analog devices / Motorola / Equivalent DSP processors).

1. Linear Convolution & Circular Convolution
2. Impulse response of first order and second order systems.
3. To find Z-Transform of a given sequence and to locate the zeros and poles.
4. To find DFT / IDFT of given DT signal
5. To find response of a system given its Transfer Function or Differential equation form.
6. Implementation of FFT of given sequence
7. Determination of Power Spectrum of a given signal(s).
8. Implementation of LP FIR filter for a given sequence.
9. Implementation of HP FIR filter for a given sequence.
10. Implementation of LP IIR filter for a given sequence.
11. Implementation of HP IIR filter for a given sequence.
12. Generation of DTMF signals
13. Implementation of Decimation Process
14. Implementation of Interpolation Process
15. Implementation of I/D sampling rate converters
16. Audio application such as to plot a time and frequency display of microphone plus a cosine using DSP. Read a.wav file and match with their respective spectrograms.
17. Noise removal: Add noise above 3 KHz and then remove, interference suppression using 400 Hz tone.

Outcomes:
By the end of the course, students should be able to use the Fast Fourier Transform and Discrete Fourier Transform in various applications, perform the convolution of two signals, estimate power spectral densities, quickly choose and design filters.

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III Year B.Tech II Semester **L T/P/D C**
0/3/- 2

ANALOG COMMUNICATIONS LAB
(ECE)

Objectives:
Students can learn interpretation of the theory concepts of AM, FM, Sampling, TDM, PAM, PWM & PPM in practical and also will learn how to simulate these experiments using MATLAB.

Note: Minimum 12 experiments should be conducted: All these experiments are to be simulated first either using Comm sim, MATLAB, SCILAB, OCTAVE or any other simulation package and then to be realized in hardware.

1. Amplitude modulation and demodulation.
2. DSB-SC Modulator & Detector
3. SSB-SC Modulator & Detector (Phase Shift Method)
4. Frequency modulation and demodulation.
5. Study of spectrum analyzer and analysis of AM and FM Signals
6. Pre-emphasis & de-emphasis.
7. Time Division Multiplexing & De multiplexing
8. Frequency Division Multiplexing & De multiplexing
9. Verification of Sampling Theorem
10. Pulse Amplitude Modulation & Demodulation
11. Pulse Width Modulation & Demodulation
12. Pulse Position Modulation & Demodulation
13. Frequency Synthesizer.
14. AGC Characteristics.
15. PLL as FM Demodulator

Equipment required for laboratories:

16. RPS 0-30V
17. CRO 0-20 MHz
18. Function Generators 0-1 MHz
19. RF Generators 0-1000 MHz / 0-100 MHz
20. Multimeters
21. Lab Experimental kits for Analog Communication
22. Components
23. Radio Receiver/TV Receiver Demo kits or Trainees.
24. Spectrum Analyzer 60 MHz.
25. Any one simulation package

Outcomes:
After completion of the lab students can be able to do small mini projects such as designing of various modules in modulation and demodulation techniques relevant to the analog communication systems. They can easily understand the concepts of digital communication system.

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IV Year B.Tech I Semester	**L**	**T/P/D**	**C**
	3	**1/-/-**	**4**

ELECTRONIC MEASUREMENTS AND INSTRUMENTATION
(ECE)

Objectives:
This course introduces the basics concepts of measuring Instruments, their characteristics, Oscillators, Signal analyzers, CROs, Transducers and measurement of various physical parameters using these transducers.

UNIT-I
Block Schematics of Measuring Systems, Performance Characteristics. Static Characteristics, Accuracy, Precision, Resolution, Types of Errors, Gaussian Error, Root Sum Squares formula, Dynamic Characteristics, Repeatability. Reproducibility, Fidelity, Lag Measuring Instruments: DC Voltmeters, D' Arsonval Movement, DC Current Meters, AC Voltmeters and Current Meters, Ohmmeters, Multimeters, Meter Protection, Extension of Range, True RMS Responding Voltmeters, Specifications of Instruments.

UNIT-II: Electronic Voltmeters, Multimeters, AC, DC Meters, Digital Voltmeters:
Ramp Type, Staircase Ramp, Dual slope, Integrating type, Successive Approximation Type, Auto ranging, *3½ ,* 3¾ Digit display, Pico ammeter, High Resistance Measurements, Low Current Ammeter, Applications; Signal Generators: AF, RF Signal Generators, Sweep frequency Generators, Pulse and Square wave Generators, Function Generators, Arbitrary waveform Generator, Video signal Generators, Specifications.

UNTT-IIl: Signal Analyzers and Bridges
Signal Analyzers, AF, HF Wave Analyzers, Harmonic Distortion. Hetero dyne wave Analyzers, Spectrum Analyzers. Power Analyzers, Capacitance-Voltage Meters.

DC Bridges:
Wheat stone Bridge, Kelvin's Bridge, **AC Bridges**: Maxwell, Hay, Schering, Wien. Anderson Bridges. Resonance Bridge, Similar Angle Bridge, Wagners' ground connection, Twin T. Bridged T Networks, Detectors.

UNIT-IV: Oscilloscopes
CRT, Block Schematic of CRO, Time Base Circuits**,** Lissajous Figures, CRO Probes, High Frequency CRO Considerations, Delay lines. Applications, Specifications. Special purpose oscilloscopes: Dual Trace, Dual Beam CROs, Sampling oscilloscopes. Storage oscilloscopes,Digital Storage CROs, Frequency Measurement. Period Measurement, Errors in

Time/Frequency measurements, universal counters, Extension of range; Recorders: Strip-Chart, X-Y, Oscillographic recorders.

UNIT-V: Transducers and measurement of physical parameters

Transducers: Classification, Strain gauges, Bonded, unbounded; Force and Displacement Transducers, Resistance Thermometers, Hotwire Anemometers, LVDT. Thermocouples, Synchros. Special Resistance Thermometers, Digital Temperature sensing system. Piezoelectric Transducers, Variable Capacitance Transducers, Magneto strictive Transducers, Flow Measurement, Displacement Meters, Liquid level Measurement, Measurement of Humidity and Moisture, Velocity. Force, Pressure - High Pressure, Vacuum level, Temperature - Measurements, Data Acquisition Systems.

Text books:

1. Electronic Measurements and Instrumentation - K. Lai Kishore, Pearson Education 2010.
2. Electronic Instrumentation: H.S.Kalsi -TMH, 2nd Edition 2004.

References:

1. Electronic Instrumentation and Measurements - David A. Bell, Oxford Univ. Press, 1997.
2. Modern Electronic Instrumentation and Measurment Techniques: A.D. Helbincs, W.D. Cooper: PHI 5;th Edition 2003.
3. Electronic Measurements and Instrumentation: B, M. Oliver, J.M. Cage TMH Reprint 2009.
4. Industrial Instrumentation: T.R. Padmanabham Springer 2009.

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IV Year B.Tech I Semester	**L**	**T/P/D**	**C**
	4	**1/-/-**	**4**

MICROWAVE ENGINEERING
(ECE)

Objectives:
To prepare students to understand basic principle of microwave and its applications, to train the students to analyze microwave transmission line and its characteristics, to prepare students to understand different microwave components and analyzing different type of junctions used in microwave engineering, to enable the students to understand the concepts of solid state devices and microwave measurements. This course finds an extensive application in various fields like Television transmission, satellite communication and Radar systems.

UNIT-I: Microwave Transmission Lines
Introduction, Microwave Spectrum and Bands, Applications of Microwaves. Rectangular Waveguides – solutions of wave equations in Rectangular Coordinates, TE/TM mode analysis, Expressions for Fields, Characteristic Equation and Cut-off Frequencies, Filter Characteristics, Dominant and Degenerate Modes, Sketches of TE and TM mode fields in the cross-section, Mode Characteristics – Phase and Group Velocities, Wavelengths and Impedance Relations, Related Problems.
Power Transmission and Power Losses, Impossibility of TEM mode, Micro strip Lines– Introduction, Z_o Relations, Effective Dielectric Constant, Losses, Q factor. Cavity Resonators– Introduction, Rectangular Cavities, Dominant Modes and Resonant Frequencies, Q factor and Coupling Coefficients. Related Problems.

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

UNIT-III: Microwave Tubes

Limitations and Losses of conventional tubes at microwave frequencies. Microwave tubes – O type and M type classifications
O-type tubes : 2 Cavity Klystrons – Structure, Reentrant Cavities, Velocity Modulation Process and Applegate Diagram, Bunching Process and Small Signal Theory – Expressions for o/p Power and Efficiency. Reflex Klystrons – Structure, Velocity Modulation and Applegate Diagram, Mathematical Theory of Bunching, Power Output, Efficiency, Oscillating Modes and o/p Characteristics, Effect of Repeller Voltage on power o/p, Related Problems.
Helix travelling wave tubes: Significance, Types and Characteristics of Slow Wave Structures; Structure of TWT and Amplification Process (qualitative treatment), Suppression of Oscillations, Gain Considerations.
M-type tubes : Introduction, Cross-field effects, Magnetrons – Different Types, Cylindrical Travelling Wave Magnetron – Hull Cut-off and Hartree Conditions, Modes of Resonance and PI-Mode Operation, Separation of PI-Mode, o/p characteristics Related Problems.

UNIT-IV: Microwave Solid State Devices
Introduction, Classification, Applications. TEDs – Introduction, Gunn Diode – Principle, RWH Theory, Characteristics, Basic Modes of Operation-Gunn Oscillation Modes, LSA Mode, Introduction to Avalanche Transit Time Devices.

UNIT-V: Microwave Measurements
Description of Microwave Bench – Different Blocks and their Features, Errors and Precautions; Microwave Power Measurement – Bolometer Method. Measurement of Attenuation, Frequency standing wave Measurements-Measurement of Low and High VSWR, Cavity Q. Impedance Measurements.

Outcomes:
At the end of the course, students will calculate cut off frequency, identify possible modes and obtain mode characteristics, will understand the principle of operation of waveguide irises, tuning screws, posts, attenuators etc., students will derive scattering matrix for various junctions, students will excel in measuring the microwave parameters like attenuation, frequency, VSWR, impedance on different loads etc. , students will know the basics of microwave solid state devices such as Gunn diode and Avalanche Devices such as IMPATT, TRAPATT diodes and efficiently use them in microwave engineering applications.

Text Books:

1. Microwave Devices and Circuits – Samuel Y. Liao, PHI, 3rd Edition, 1994.
2. Microwave Principles – Herbert J. Reich, J.G. Skalnik, P.F. Ordung and H.L. Krauss, CBS Publishers and Distributors, New Delhi, 2004.

References:

1. Foundations for Microwave Engineering – R.E. Collin, IEEE Press, John Wiley, 2nd Edition, 2002.
2. Microwave Circuits and Passive Devices – M.L. Sisodia and G.S.Raghuvanshi, Wiley Eastern Ltd., New Age International Publishers Ltd., 1995.
3. Microwave Engineering Passive Circuits – Peter A. Rizzi, PHI, 1999.
4. Electronic and Radio Engineering – F.E. Terman, McGraw-Hill, 4th ed., 1955.
5. Elements of Microwave Engineering – R. Chatterjee, Affiliated East-West Press Pvt. Ltd., New Delhi, 1988.
6. Micro Wave and Radar Engineering – M. Kulkarni, Umesh Publications, 1998.

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(FOR WOMEN)
AUTONOMOUS under JNTUH

IV Year B.Tech I Semester	**L**	**T/P/D**	**C**
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COMPUTER NETWORKS
(Common to ECE, ICE)

Objectives:
To make student understand various design issues that lead to the creation of protocols in various layers of network model. To give a comprehensive idea of various Internet protocols in TCP/IP model, to make student understand issues involved in wireless networks which make them operational

UNIT-I: Introduction
Uses of Computer Networks, Network Hardware, Network Software, Reference models OSI, TCP/IP, Example networks.

Physical Layer:
Signals, channel data rate, Guided Transmission Media: Magnetic Media, Twisted Pair, Coaxial Cable, Fiber Optics, Wireless transmission, Digital Modulation and Multiplexing, the Mobile Telephone System.

UNIT-II: Data Link Layer
Design issues, services provided to the network layer, Framing, Error Control, Flow Control, Error detection and correction, Elementary Protocols: stop and wait, Sliding Window, Go Back N, Selective Repeat, Data Link Layer in HDLC and Internet.

Medium Access Sub Layer: Channel Allocation, Multiple Access Protocols ALOHA CSMA, Ethernet, Wireless LAN's, Data Link Layer Switching.

UNIT-III: Network Layer
Design issues, Routing algorithms - the Optimality Principle, Shortest Path routing, flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing, Broadcast & Multicast Routing, Routing for Mobile hosts, Routing in Ad-Hoc Networks,

Quality Of Service:
Application Requirements, Traffic Shaping, Congestion control algorithms

Internetworking:
How Networks Differ, How Networks can be Connected, Tunneling, Internetwork Routing, Packet Fragmentation.

UNIT-IV: Network Layer in the Internet
IP Version 4 protocol, IP Addresses, IP Version 6, Internet Control Protocols, OSPF, BGP, Internet multicasting, Mobile IP

Transport Layer:
The Transport service, Elements of Transport Protocols, The Internet Transport Protocols: UDP, The Internet Transport Protocols: TCP.

UNIT-V: Application Layer
Domain Name System: DNS Name Space, Resource Records, Name Servers.

Electronic mail:
Architecture and services, User Agent, Message Formats, Message, Transfer and Final delivery. Streaming Audio and Video Digital Audio, Digital Video, Streaming Stored Media, Streaming Live Media, Real-Time Conferencing.

Content Delivery:
Content and Internet Traffic, Server Farms and Web Proxies**,** Server Replication, Content Delivery Networks, Peer-to-Peer Networks.

Outcomes:
Student should be able to design a protocol depending on various factors involved in communicating from one node to another node in a network, students should be able to give network address and should be able to specify subnets and supernets by setting netmask. able to explain what are various types of wireless networks and how these communicate using the given protocols

Text Books:
1. Computer Networks — Andrew S Tanenbaum, 5th Edition. Pearson Education/PHI

References:
1. Data Communications and Networking – Behrouz A. Forouzan. Third Edition TMH.
2. Computer Networking A Top-Down Approach -- James F Kurose, Keith W Ross 5th edition. Pearson Education Inc

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AUTONOMOUS under JNTUH

IV Year B.Tech I Semester	**L**	T/**P/D**	**C**
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CELLULAR AND MOBILE COMMUNICATIONS
(ECE, ETM)

Objectives:
The objective of this subject is to familiarize the student with the concepts of cellular Mobile Communication in both analog and digital cellular systems as it is very popular wireless communication technology adopted by the public in the recent past in the current

UNIT-I: Introduction To Cellular Mobile Radio Systems
Limitations of conventional mobile telephone systems, Basic Cellular Mobile System First, Second, third and fourth generation cellular wireless systems, Uniqueness of mobile radio environment-Long term fading. Factors influencing short term fading. Parameters of mobile muitipath fading-Time dispersion parameters, Coherence bandwidth. Doppler spread and coherence time, Types of small scale fading.

Concept of frequency reuse, Co-channel interference, Co-channel Interference reduction factor, Desired C/I from a normal case in a omni directional antenna system, system capacity, Trunking and grade of service, Improving coverage and capacity in cellular systems* Cell splitting, Sectoring. Microcell zone concept.

UNIT-II: Co-Channel Interference & Non-Co-Channel Interference
Measurement of real time Co-Channel interference, Design of antenna system. Antenna parameters and their effects, Diversity techniques-Space diversity. Polarization diversity, Frequency diversity. Time diversity.

Adjacent channel interference, Near end far end interference. Cross talk. Effects on coverage and interference by power decrease. Antenna height decrease, Effects of cell site components, UHF TV interference.

UNIT-III: Cell Coverage for Signal and Traffic & Cell Site and Mobile Antennas
Signal reflections in flat and hilly terrain, Effect of human made structures. Phase difference between direct and reflected paths, Constant standard deviation. Straight line path loss slope, General formula for mobile propagation over water and flat open area, Near and long distance propagation. Path loss from a point to point prediction model in different conditions, merits of Lee model.
Sum and difference patterns and their synthesis, Coverage-omni directional antennas, Interference reduction- directional. antennas for interference

reduction, Space diversity antennas, Umbrella pattern antennas, and Minimum separation of cell site antennas, mobile antennas.

UNIT-IV: Frequency Management and Channel Assignment & Handoffs

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.

Handoff initiation. Types of handoff, Delaying handoff. Advantages of handoff, Power difference handoff, Forced handoff, Mobile assisted and soft handoff. Intersystem handoff.

UNIT-V: Dropped Calls & Digital Cellular Systems

Introduction to dropped call rates and their evaluation. Global system for Mobile (GSM) – Architecture, OSI Model, Transmission, Channels and Channel Modes.

CDMA - Terms of CDMA systems, Modulation characteristics, Access channel, Call processing, Handoff Procedures

Outcomes:

This subject aims at providing the student with suitable concepts to understand the cellular mobile analog and digital systems and enable them to understand and apply these concepts in the state of the art projects in wireless communication in the current context.

Text Books:

1. Mobile Cellular Telecommunications - W.C.Y. Lee, Me Graw Hill. 2nd Edn., 1989.
2. Wireless Communications - Theodore. S. Rapport, Pearson education. *2nd* Edn., 2002.

References:

1. Principles of Mobile Communications - Gordon L. Stuber, Springer International, 2r'[Edn., 2001.
2. Modern Wireless Communications-Simon Haykin. Michael Moher, Pearson Education, 2005.
3. Wireless communications theory and techniques, Asrar U. H .Sheikh, Springer, 2004.
4. Wireless Communications and Networking, Vijay Garg, Elsevier Publications, 2007.
5. Wireless Communications -Andrea Goldsmith, Cambridge University Press, 2005.

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IV Year B.Tech I Semester	**L**	**T/P/D**	**C**
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ELECTROMAGNETIC INTERFERENCE AND ELECTROMAGNETIC COMPATIBILITY (ELECTIVE-I)
(Common to ECE & ETM)

Objectives:
To understand the standards of electromagnetic interference and compatibility, sources of electromagnetic interference, measurement of interference and to make the systems compatible.

UNIT-I: Sources of EMI and EMI Coupling Modes
Definition of EMI and EMC, Classification, Natural and man-made EMI sources, Switching transients, Electrostatic Discharge, Nuclear Electromagnetic Pulse and High Power Electromagnetics.
Penetration- Introduction Shielding theory- shielding effectiveness, the circuit approach, the wave approach, Aperture theory, Calculation of effectiveness of a conducting box with an aperture. Introduction to propagation and cross talk- Introduction, Basic principles, determination of EM Field from Transmission Lines.

UNIT-II: EMI controlling techniques
Grounding – Principles and Practice of Earthing, Precautions in Earthing, Measurements of ground resistance, System grounding for EMC, Cable shielding grounding.
Shielding- Theory and effectiveness, Materials, Integrity at discontinuities, Conductive coatings, cable shielding, Effectiveness measurements, Electrical Bonding.
Characteristics and types of filters- Impedance mismatch, Lumped element Low-pass, High-pass, Band-pass and Band-reject filters, Power line filter design - Common mode, Differential mode, Combined CM and DM filters, Design example.
EMC Gaskets – Knitted wire – Mesh Gaskets, Wire-screen Gaskets, Oriented wire mesh, Conductive Elastomer, Transparent conductive windows, Conductive adhesive, Conductive grease, conductive coatings, Isolation transformers, Opto- Isolators.

UNIT-III: EMI Measurements-1
Introduction to open area test site measurements – Measurement precautions – open area test site – Terrain roughness – NSA – Measurement of test site imperfections – Antenna factor measurement – Measurement errors

Radiated interference measurements – Anechoic chamber – TEM cell – Reverberating chamber – GHz TEM cell- Comparison of test facilities – Measuremrnt uncertainities.

UNIT-IV: EMI Measurements-2

Conducted interference measurements – Characterization – Conducted EM noise on power supply lines – Conducted EMI from equipment – Immunity – Detectors and measurement – Pulsed EMI immunity – Electrostatic Discharge

UNIT-V: EMI/EMC Standards

Introduction – Standards of EMI/EMC – MIL – STD 461/462 – IEEE/ANSI Standards – CISPR/IEC Standards – FCC Regulations

Outcomes:

The students will know the types of interferences, sources, disadvantages, ways of controlling them, measurement techniques and compatibility.

Text Books:

1. Engineering Electromagnetic Compatibility – V.Prasad Kodali – 2/e – IEEE Press – Wiley India Pvt. Ltd – 2001.
2. Principles and Techniques of Electromagnetic Compatibility – Christos Christopoulos – 2/e – CRC Press (Taylor & Francis Group) – 2007

References:

1. Introduction to Electromagnetic Compatibility – Clayton R.Paul – John Wiley & Sons, 1992.
2. Electromagnetic Compatibility of Integrated Circuits – Techniques for low emission and susceptibility – Edited by Sonia Ben Dhia, Mohamed Ramdani and Etienne Sicard – Springer, 2006
3. EMI reduction in Electronic Systems – Mills – J.P – Prentice Hall Inc.
4. Noise Reduction in Electronic Systems – Henry W.Ott, 2nd Edition, Wiley Interscience, 1988.

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AUTONOMOUS under JNTUH

IV Year B.Tech I Semester	**L**	**T/P/D**	**C**
	4	**1/-/-**	**3**

DSP PROCESSORS AND ARCHITECTURES
(ELECTIVE-I)
(Common to ECE, ETM)

Objectives:
To make the students learn the analysis and design tool for DSP systems MATLAB, computational errors in DSP algorithms implementations due to quantization, and to study the architecture of DSP processors. This subject also makes the students learn in detail about TMS320C54XX series processor which enables them to implement DSP algorithms in it and to interface the same to different memory and I/O peripheral devices.

UNIT-I: Introduction to Digital Signal Processing
Introduction, A Digital signal-processing system, The sampling process, Discrete time sequences. Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT), Linear time-invariant systems, Digital filters, Decimation and interpolation, Analysis and Design tool for DSP Systems MATLAB, DSP using MATLAB.

Computational Accuracy in DSP Implementations
Number formats for signals and coefficients in DSP systems, Dynamic Range and Precision, Sources of error in DSP implementations, A/D Conversion errors, DSP Computational errors, D/A Conversion Errors, Compensating filter.

UNIT-II: Architectures for Programmable DSP Devices
Basic Architectural features, DSP Computational Building Blocks, Bus Architecture and Memory, Data Addressing Capabilities, Address Generation Unit, Programmability and Program Execution, Speed Issues, Features for External interfacing.

UNIT-III: Execution Control And Pipelining
Hardware looping, Interrupts, Stacks, Relative Branch support, Pipelining and Performance, Pipeline Depth, Interlocking, Branching effects, Interrupt effects, Pipeline Programming models.

Programmable Digital Signal Processors
Commercial Digital signal-processing Devices, Data Addressing modes of TMS320C54XX DSPs, Data Addressing modes of TMS320C54XX Processors, Memory space of TMS320C54XX Processors, Program Control, TMS320C54XX instructions and Programming, On-Chip

Peripherals, Interrupts of TMS320C54XX processors, Pipeline Operation of TMS320C54XX Processors.

UNIT-IV: Implementations Of Basic DSP Algorithms
The Q-notation, FIR Filters, IIR Filters, Interpolation Filters, Decimation Filters, PID Controller, Adaptive Filters, 2-D Signal Processing.

Implementation Of 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.

UNIT-V: Interfacing Memory and I/O Peripherals to Programmable DSP Devices
Memory space organization, External bus interfacing signals, Memory interface, Parallel I/O interface, Programmed I/O, Interrupts and I/O, Direct memory access (DMA). A Multichannel buffered serial port (McBSP), McBSP Programming, a CODEC interface circuit, CODEC programming, A CODEC-DSP interface example.

Outcomes:
At the end of the course students will be able to understand the errors that occur in different DSP algorithms due to quantization (A/D conversion). They will also be able to understand the architecture of TMS320C54XX processor, implement different algorithms on it, and interface it to different memory and peripheral devices.

Text Books:

1. Digital Signal Processing – Avtar Singh and S. Srinivasan, Thomson Publications, 2004.
2. DSP Processor Fundamentals, Architectures & Features – Lapsley et al. S. Chand & Co, 2000.
3. Digital Signal Processors, Architecture, Programming and Applications – B.Venkata Ramani and M. Bhaskar, TMH, 2004

References:

1. Digital Signal Processing – Jonatham Stein, John Wiley, 2005.

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IV Year B.Tech I Semester	**L**	**T/P/D**	**C**
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DIGITAL IMAGE PROCESSING
(ELECTIVE-I)
(Common to ECE, ETM)

Objectives:
The primary objective of this course is to introduce students to fundamentals of digital images, image transforms, image enhancement methods, restoration techniques, image encoding techniques, and various image segmentation approaches**.**

UNIT-I: Digital Image Fundamentals & Image Transforms
Digital Image Fundamentals: Digital Image representation, Fundamental steps in digital image processing, Sampling and quantization, Relationship between pixels.
Image Transforms: 2-D DFT, Properties of 2D Fourier transform, Walsh Transform, Hadamard Transform, Discrete Cosine transform, Haar Transform, Slant transform, Hotelling transform.

UNIT-II: Enhancement In Spatial & Frequency Domain
Image Enhancement (Spatial Domain): Basics of Spatial filtering, point operations- linear and non-linear gray level transformation, histogram processing, local histogram processing, smoothing spatial filters, sharpening spatial filters.

Image Enhancement (Frequency Domain): Basics of Filtering in Frequency Domain, Image smoothing using Frequency domain filters, Image sharpening using frequency domain filters, selective filtering.

UNIT-III: **Image Restoration**
Image restoration: Model of Image Degradation, Algebraic approach to restoration, inverse filtering, Minimum Mean square error(Wiener) filtering, constrained least square Filtering, Geometric Mean filter, Interactive Restoration.

UNIT-IV: Image Segmentation And Morphological Processing
Image segmentation: Detection of discontinuities, Edge linking and boundary detection, Thresholding, Region based segmentation.
Morphological Image processing: Dilation and erosion: Dilation, structuring element decomposition, The Strel function, Erosion. Combining Dilation and erosion: opening and closing, the hit or miss transformation.

UNIT-V: **Image Compression And Wavelet Based Image Processing**:
Image Compression: Redundancies and their removal methods, fidelity criteria, Image Compression models, error free compression, lossy compression, JPEG 2000 standards, Introduction to digital image Watermarking methods.
Wavelet based Image Processing: Introduction to wavelet transform, continuous wavelet transform, discrete wavelet transform, examples of wavelets, wavelet based image compression, wavelet based denoising and wavelet thresholding methods.

Outcomes:
After studying this course the student understands various image processing operations. Applications of image processing techniques, which are basically various combinations of image processing techniques, can be well understood by students.

Text Books:
1. Digital Image processing- Rafael C. Gonzalez, Richard E.Woods, 3rd edition Pearson, 2008.
2. Digital Image processing – S Jayaraman, S Esakkirajan, T Veerakumar TMH, 2010.

References:
1. Digital Image Processing using MATLAB – Rafael C Gonzalez, Richard E Woods and Steven L Eddings, 2nd Edition, TMH 2010
2. Fundamentals of Digital Image Processing A.K.Jain PHI 1989
3. Digital Image Processing and Computer vision – Sonka, Hlavac, Boyle, Ceneage learning (Indian edition) 2008.
4. Introductory Computer vision Imaging Techniques and solutions- Adrian low 2008 2nd Edition.
5. Introduction to Image Processing and Analysis- John C, Russ J. Christian Russ, CRC Press, 2010

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(FOR WOMEN)
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IV Year B.Tech I Semester	**T**	**L/T/P/**	**C**
	4	**1***	**3**

DIGITAL DESIGN THROUGH VERILOG HDL
(ELECTIVE – I)
(ECE, ETM)

Objectives:
To provide an in-depth knowledge of the design of digital circuits and the use of Hardware Description Language in digital system design and to introduce the students, digital designs, which focuses on different methodologies and styles in Hardware modeling with emphasis on the use of verilog HDL. The student should be able to Design combinational circuits using logic gates and other common building blocks and to Design sequential circuits, including registers and counters using Verilog HDL.

UNIT-I: Introduction to Verilog HDL
Verilog as HDL, Levels of Design Description, Concurrency, Simulation and Synthesis, Functional Verification, System Tasks, Programming Language Interface (PLI), Module, Simulation and Synthesis Tools, Test Benches.

Language Constructs And Conventions
Introduction, Keywords, Identifiers, White Space Characters, Comments, Numbers, Strings, Logic Values, Strengths, Data Types, Scalars and Vectors, Parameters, Operators.

UNIT-II: Modeling At Data Flow Level
Introduction, Continuous Assignment Structures, Delays and Continuous Assignments, Assignment to Vectors, Operators, Test benches and Exercises.

Gate Level Modeling
Introduction, AND Gate Primitive, Module Structure, Other Gate Primitives, Illustrative Examples, Tri-State Gates, Array of Instances of Primitives, Additional Examples, Design of Flip-flops with Gate Primitives, Delays, Strengths and Contention Resolution, Net Types, Design of Basic Circuits, Test Benches and Exercises.

UNIT-III: Behavioral Modeling
Introduction, Operations and Assignments, Functional Bifurcation, Initial Construct, Always Construct, Examples, Assignments with Delays, Wait construct, Multiple Always Blocks, Designs at Behavioral Level, Blocking and Non blocking Assignments, The case statement, Simulation Flow. i*f* and i*f*-else constructs, assign-de assign construct, repeat

construct, for loop, the disable construct, while loop, forever loop, parallel blocks, force-release construct, Event, Functional registers ,Test Benches and Exercises.

UNIT-IV: Switch Level Modeling
Introduction, Basic Transistor Switches, CMOS Switches, Bi-directional Gates, Time Delays with Switch Primitives, Instantiations with Strengths and Delays, Strength Contention with Trireg Nets, Test Benches and Exercises.

System Tasks, Functions, and Compiler Directives:
Introduction, Parameters, Path Delays, Module Parameters, System Tasks and Functions, File-Based Tasks and Functions, Compiler Directives, Hierarchical Access, User- Defined Primitives, Design Verification, Assertion Verification.

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.

Verilog Models:
Static RAM Memory, A simplified 486 Bus Model, Interfacing Memory to a Microprocessor Bus, UART Design, Design of Microcontroller CPU.

Outcomes:
Students will be able to design different digital circuits and are able to write the programs in Verilog code. Students will have the knowledge of HDL, structural, data flow and behavioral models architectures. Students will be able to design the combinational & sequential logic circuits using Verilog HDL.

Text Books:

1. T.R. Padmanabhan and B. Bala Tripura Sundari, Design through Verilog, HDL – Wiley, 2009.
2. Digital Systems Design using VHDL-Charles H.Roth,Jr.Thomson Publications,2004.

References:

1. Digital Logic Design using Verilog, State machine &synthesis for FPGA,Sunggu Lee, Cengage Learning, 2009.
2. Verilog HDL - Samir Palnitkar, 2nd edition, Pearson Education, 2009.
3. Advanced Digital Design with Verilog HDL – Michael D. Ciletti, PHI, 2009.
4. Zainalabdien Navabi, Verilog Digital system Design, TMH, second edition.
5. A Verilog Primer - J.Bhaskar, BSP, 2003.
6. Fundamentals of Digital Logic with Verilog design by Stephen Brown, Zvonko Vranesic , TMH, 2nd edition, 2010.

G.NARAYANAMMA INSTITUTE OF TECHNOLOGY & SCIENCE
(FOR WOMEN)
AUTONOMOUS under JNTUH

IV Year B.Tech I Semester	**L**	T/**P/D**	**C**
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OPTICAL COMMUNICATIONS
(Elective-II)
(Common to ECE & ETM)

Objectives
To learn the importance, introductions and the basic elements, of optical fiber transmission link, fiber modes configurations and structures.To understand the different kind of losses, signal distortion in optical wave guides and other signal degradation factors.To learn the various optical source, detectors and optical fiber connectors.To learn the concept of WDM, optical fiber communication system design.

UNIT-I: Overview of optical fiber communication
Historical development, The general system, advantages of optical fiber communications. Optical fiber wave guides- Introduction, Ray theory transmission, Total Internal Reflection, Acceptance angle, Numerical Aperture, Skew rays. Cylindrical fibers- Modes, Vnumber, Mode coupling, Step Index fibers, Graded Index fibers. Single mode fibers- Cut off wavelength, Mode Field Diameter, Effective Refractive Index. Fiber materials — Glass, Halide, Active glass, Chalgenide glass, Plastic optical fibers.

UNIT-II: Signal distortion in optical fibers
Attenuation, Absorption, Scattering and Bending losses, Core and Cladding losses.
Information capacity determination, Group delay, Types of Dispersion - Material dispersion, Wave-guide dispersion, Polarization mode dispersion, Intermodal dispersion, Pulse broadening. Optical fiber Connectors- Connector types, Single mode fiber connectors, Connector return loss. Fiber Splicing- Splicing techniques, splicing single mode fibers. Fiber alignment and joint loss- Multimode fiber joints, single mode fiber joints,

UNIT-III: Optical sources
LEDs, Structures, Materials, Quantum efficiency, Power, Modulation, Power bandwidth product. Injection Laser Diodes- Modes, Threshold conditions, External quantum efficiency, Laser diode rate equations, Resonant frequencies. Reliability of LED & ILD. Source to fiber power launching - Output patterns, Power coupling, Power launching, Equilibrium Numerical Aperture, Laser diode to fiber coupling.

UNIT-IV: Optical detectors

Physical principles of PIN and APD, Detector response time, Temperature effect on Avalanche gain, Comparision of Photodetectors. Optical receiver operation- Fundamental receiver operation, Digital signal transmission, error sources, Receiver configuration, Digital receiver performance, Probability of error, Quantum limit, Analog receivers.

UNIT-V: Optical system design

Considerations, Component choice, Multiplexing. Point-to- point links, System considerations, Link power budget with examples. Overall fiber dispersion in Multi mode and Single mode fibers, Rise time budget with examples.

Transmission distance, Line coding in Optical links, WDM, Necessity , Principles, Types of WDM, Measurement of Attenuation and Dispersion, Eye pattern.

Outcomes

Student should be able to understand the importance, introductions and the basic elements, of optical fiber transmission link, fiber modes configurations and structures. Student should be able to understand the different kind of losses, signal distortion in optical wave guides and other signal degradation factors. Student will demonstrate the ability to design a system, with the knowledge of optical components as per needs and specifications.

Text Books:

1. Optical Fiber Communications – Gerd Keiser, Mc Graw-Hill International edition, 4th Edition, 2000.
2. Optical Fiber Communications – John M. Senior, PHI, 3rd Edition, 2009.

References:

1. Optical Communication systems-John Gowar, 2nd edition, PHI, 2001
2. Fiber Optic Communications – D.K. Mynbaev , S.C. Gupta and Lowell L. Scheiner, Pearson Education, 2005.
3. Text Book on Optical Fibre Communication and its Applications – S.C.Gupta, PHI, 2005.
4. Fiber Optic Communication Systems – Govind P. Agarwal , John Wiley, 3rd Ediition, 2004.
5. Fiber Optic Communications – Joseph C. Palais, 4th Edition, Pearson Education, 2004.
6. Introduction to fiber optics by Donald J.Sterling Jrcengage learning, 2004

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(FOR WOMEN)
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IV Year B.Tech I Semester	**L**	T/**P/D**	**C**
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EMBEDDED SYSTEMS
(ELECTIVE-II)
(Common to ECE, ETM, CSE, IT)

Objectives:
With this course students learn types of embedded systems and the various blocks involved in designing the target devices. They also learn about various processors used in embedded systems such as 8051, PSoC and programming these processors for the design. And also the types of operating systems used in the embedded systems.

UNIT-I: Embedded Computing
Introduction, Complex Systems and Microprocessor, Embedded System Design Process, Formalisms for System Design. Design Examples.

UMT-II: 8051 Architecture
Introduction, 8051 Microcontroller Hardware. Timers and Counters, I/O Ports and Circuits, Serial Data Communication, External Memory Interrupts

8051 Programming:
Assembly Language Programming Process, 8051 Instruction Set: Data Transfer, Arithmetic, Logical and Branch Instructions, Decimal Arithmetic, Interrupt Programming (Chapters 4-8 from Text Book 2, Ayala and Gadre)

UNIT-III: PSoC Architecture and Programming
PSoC as a Single-Chip Solution for Embedded System Design, Analog, Digital and Controller (8051) Blocks in PSoC. Hardware Programming through PSoC Creator, I/O Pin Configurability

Applications:
Blinking an LED, Cap Sense, Digital Logic. Precision Analog and Serial Communications

UNIT-IV: **Basic Design Using a Real-Time Operating System**
Principles, Semaphores and Queues, Hard Real-Time Scheduling Considerations. Saving Memory and Power, An example RTOS like µC-OS (Open Source); Embedded Software Development Tools: Host and Target machines, Linker/Locators for Embedded Software, Getting Embedded Software into the Target System; Debugging Techniques: Testing on Host Machine, Using Laboratory Tools. An Example System.

UNIT-V: Introduction to advanced architectures
ARM and SHARC, Processor and memory organization and Instruction level parallelism, Networked embedded Systems, Bus protocols, I2C bus and CAN bus, Internet-Enabled Systems. Design Example-Elevator Controller.

Outcomes:
By the end of the course students learn how to design application firmware for an embedded system with and without using an operating systems.

Text books:
1. Computers as Components — Principles of Embedded Computing System Design, Wayne Wolf. Elsevier (2nd Edition)
2. The 8051 Microcontroller, Kenneth Ayala and Dhanunjay Gadre, Thomson
3. The PSoC Controller, (Paper Back Edition), Robert Ashby, Newens
4. My First Five PSoC Designs, Robert Ashby, e-Book

References:

1. Embedding system building blocks, Labrosse, via CMP publishers.
2. Embedded Systems, Raj Kamal, TMH.
3. Micro Controllers, Ajay V Deshmukhi, TMH.
4. Embedded System Design, Frank Vahid, Tony Givargis, John Wiley.
5. Microcontrollers, Raj kamal, Pearson Education.
6. An Embedded Software Primer, David E. Simon, Pearson Education.

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(FOR WOMEN)
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IV Year B.Tech I Semester	**L**	**T/P/D**	**C**
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TELEVISION ENGINEERING
(ELECTIVE – II)
(ECE)

Objectives:
Students are made to learn the basics and internals of how a Television works. Different types of TV cameras and picture tubes and how a Color TV signal is generated and transmitted. Differences in Monochrome and color TV systems. and last but not the least the latest trends in DIGITAL TV i.e. Digital Satellite TV, Direct to Home Satellite TV, Digital TV Receiver, Digital Terrestrial TV DTH

UNIT-I: Introduction
TV transmitter and receivers, synchronization.
Television Pictures:
Geometric form and aspect ratio, image continuity, interlaced scanning, picture resolution,
TV Cameras:
Camera tube types, Vidicon, Silicon Diode Array Vidicon, Monochrome TV camera, color camera. CCD Image Sensors.
Picture Tubes:
Monochromatic Picture tube, Electrostatic focussing, Beam deflection, picture tube characteristics and specifications, colour picture tubes. TV Standards: American 525 line B&W TV system, NTSC colour system, 625-line monochrome system,b PAL colour system, TV standards.

UNIT-II: Composite video signal
Horizontal and vertical sync, scanning sequence details.
Colour signal generation and Encoding:
Perception of brightness and colours, additive colour mixing, video signals for colours, luminance signal, colour difference signals, encoding of colour difference signals, formation of chrominance signals, PAL encoder.
TV Signal Transmission and Propagation:
Picture signal transmission, positive and negative modulation, VSB transmission, sound signal transmission, standard channel BW, TV transmitter, TV signal propagation, interference, TV broadcast channels, TV transmission Antennas.

UNIT-III: Monochrome TV Receiver
RF tuner, IF subsystem, video amplifier, sound section, sync separation and processing, deflection circuits, scanning circuits.

PAL-D Colour Receiver:
Electron tuners, IF subsystem, Y-signal channel, Chroma decoder, Separation of U & V Colour Phasors, synchronous demodulators, Subcarrier generation, raster circuits.

TV Receiver Tuners:
Tuner operation, VHF and UHF tuners, digital tuning techniques, remote control of receiver functions

UNIT-IV: Vision If Subsystem
AGC, noise cancellation, video and inter carrier sound signal detection, vision IF subsystem of Black and White receivers, Colour receiver IF subsystem.

Receiver sound system:
FM detection, FM Sound detectors, typical applications.

Colour Signal Decoding : PAL – D decoder, chroma signal amplifiers, separation of U and V signals, Color burst separation, Burst phase discriminator, ACC amplifier, Reference oscillator, Indent and colour killer circuits, RO phase shift and 180° PAL–SWITCH circuitry, U&V demodulators, Colour signal mixing.

UNIT-V: Sync Separation, AFC and Deflection Oscillators
Synchronous separation, k noise in sync pulses, separation of frame and line sync pulses, AFC, Single ended AFC circuit. Deflection Oscillators, deflection drive IC's, Receiver Antennas.

Digital TV:
Digital Satellite TV, Direct to Home Satellite TV, Digital TV Receiver, Digital Terrestrial TV.

Outcomes:
By the end of the course students learn about the types of TV systems and the various blocks involved in TV and also the current technology used in digital TV

Test Books:

1. Modern Television Practice – Principles, Technology and Service – R.R. Gulati, New Age International Publication, 2002.
2. Monochrome and Colour TV – R.R. Gulati, New Age International Publication, 2002.

References:

1. Television and Video Engineering - A.M. Dhake, 2nd Edition.
2. Basic Television and Video Systems – B. Grob and C.E. Herndon, McGraw Hill, 1999.
3. Colour Television Theory and Practice – S.P. Bali, TMH, 1994

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IV Year B.Tech I Semester	**L**	T/**P/D**	**C**
	3	1/-/-	3

MULTIMEDIA AND SIGNAL CODING
(ELECTIVE - II)
(ECE, ETM)

Objectives:
This course introduces the basic concepts of Multimedia, fundamentals of Color in Image and Video, Compression Algorithms of Image and Video Compression Techniques along with Audio Compression required to support multimedia requirements. Emphasis on the topics of Computer and Multimedia Networks Multimedia Network Communications and Applications is laid.

UNIT-I: Introduction to Multimedia
Multimedia. World Wide Web. Overview of multimedia tools, Multimedia authoring, Graphics/ image data types, and file formats.

Color in Image and Video:
Color Science - Image Formation, Camera Systems, Gamma Correction, Color Matching Functions, CIE Chromaticity Diagram, Color Monitor Specifications, Out-of-Gamut colors. White point correction, XYZ to RGB transform. Transform with Gamma Correction, L*a*b* Color model.
Color models in images - RGB color model for CRT displays. Sub - tractive

Color:
CMY Color model, Transformation from RGB to CMY. Under color removal: CMYK System, printer Gamuts.

UNIT-II: Color models in video
Video Color Transforms. YUV color model, YIQ color model, YCbCr Color Model
.
Video Concepts:
Types of video signals. Analog video. Digital Video.

Audio Concepts:
Digitization of sound, Quantization and Transmission of audio.

UNIT-III: Compression Algorithms
Lossless compression algorithms: Run length coding, Variable length coding. Arithmetic coding, Lossless JPEG, Image Compression.

Lossy Image Compression Algorithms: Transform Coding
KLT and DCT Coding, Wavelet based coding.

Image Compression Standards:
JPEG and JPEG2O00.

UNIT-IV: Video Compression Techniques
Introduction to Video Compression. Video Compression based on Motion Compensation. Search for motion vectors. H.261- Intra-frame and Inter-frame coding, Quantization, Encoder and Decoder, Overview of MPEG 1 andMPEG2.

Audio Compression Techniques
ADPCM in Speech Coding, G.726 ADPCM, Vocoders - Phase Insensitivity, Channel Vocoder, Formant Vocoder, Linear Predictive Coding, CELP, Hybrid Excitation Vocoders, MPEG Audio - MPEG Layers, MPEG Audio Strategy, MPEG Audio Compression algorithms, MPEG-2 AAC, MPEG-4 Audio.

UNIT-V: Computer and Multimedia Networks
Basics of Computer and Multimedia networks, Multiplexing technologies, LAN and WAN Access networks.

Multimedia Network Communications and Applications
Quality of Multimedia data transmission, multimedia over IP, Multimedia over ATM networks, Transport of MPEG4, Media on Demand.

Outcomes:
The completion of course enables to understand the basics of Multimedia, Color models of Image and Video, Compression of Image, Video and Audio, demonstrate the knowledge of Computer and Multimedia Networks Multimedia Network Communications and Applications.

Text books:
1. Fundamentals of Multimedia - Ze- Nian Li, Mark S. Drew, PHI, 2010.
2. Multimedia Signals & Systems - Mrinal Kr. Mandal Springer International Edition 1"! Edition, 2009.

Reference Books:
1. Multimedia Communication Systems - Techniques, Stds & Netwroks K.R. Rao, Zorans. Bojkoric, Dragorad A. Milovanovic, lsi Edition, 2002.
2. Fundamentals of Multimedia Ze- Nian Li, Mark S.Drew, Pearson Education (LPE), 1st Edition, 2009.
3. Multimedia Systems John F. Koegel Bufond Pearson Education (LPE), 1st Edition, 2003.
4. Digital Video Processing - A. Murat Tekalp, PHI, 1996.
5. Video Processing and Communications - Yaowang, Jorn Ostermann, Ya-QinZhang, Pearson,2002

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AUTONOMOUS under JNTUH

IV Year B.Tech I Semester	**L**	T/**P/D**	**C**
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E-CAD AND VLSI LAB
(ECE)

Objectives:

The objective of this lab is to learn and acquainted with HDL Designing and downloading the HDL Program onto FPGA Boards. The student can design and implement the CMOS circuits using Mentor Graphics tools and familiar with Gate level design, Transistor level design and Hierarchical design. the lab provide the student, in depth knowledge on lay out and physical verification of CMOS Circuits.

List of Experiments

Design and implementation of the following CMOS digital/analog circuits using Cadence / Mentor Graphics / Synopsys / GEDA/ Equivalent CAD tools. The design shall include Gate-level design, Transistor-level design. Hierarchical design, Verilog HDL/VHDL design, Logic synthesis, Simulation and verification. Scaling of CMOS Inverter for different technologies, study of secondary effects (temperature, power supply and process corners). Circuit optimization with respect to area, performance and/or power, Layout, Extraction of parasitics and back annotation, modifications in circuit parameters and layout consumption, DC/transient analysis, Verification of layouts (DRC, LVS)

E-CAD programs:

Programming can be done using any compiler. Down load the programs on FPGA/CPLD boards and performance testing may be done using pattern generator (32 channels) and logic analyzer apart from verification by simulation with any of the front end tools.

1. HDL code to realize all the logic gates
2. Design of 2-to-4 decoder
3. Design of 8-to-3 encoder (without and with priority)
4. Design of 8-to-l multiplexer
5. Design of 4 bit binary to gray converter
6. Design of Multiplexer/ Demultiplexer, comparator
7. Design of Full adder using 3 modeling styles
8. Design of flip flops: SR, D, JK, T
9. Design of 4-bit binary, BCD counters (synchronous/ asynchronous reset) or any sequence counter
10. Finite State Machine Design

VLSI programs:

1. Introduction to layout design rules
2. Layout, physical verification, placement & route for complex design. static timing analysis, IR drop analysis and crosstalk analysis of the following:
    - Basic logic gates
    - CMOS inverter
    - CMOS NOR/NAND gates
    - CMOS XOR and MUX gates
    - CMOS 1-bit full adder
    - Static/Dynamic logic circuit (register cell)
    - Latch
    - Pass transistor

3. Layout of any combinational circuit (complex CMOS logic gate)- Learning about data paths
4. Introduction to SPICE simulation and coding of NMOS/CMOS circuit
5. SPICE simulation of basic analog circuits: Inverter / Differential amplifier
6. Analog Circuit simulation (AC analysis) -CS & CD amplifier
7. System level design using PLL
   Note: Any SIX of the above experiments from each part are to be conducted (Total 12)

Outcomes:

The student will be able to write HDL Code and simulate the code for Simple and complex digital circuits. The student can implement the digital design on FPGA Kit. The student can perform Layout and physical verification of complex digital circuits using Mentor Graphics tools.

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(FOR WOMEN)
AUTONOMOUS under JNTUH

IV Year B.Tech I Semester	**L**	T/**P/D**	**C**
	0	-/3/-	2

MICROWAVE ENGINEERING AND DIGITAL COMMUNICATIONS LAB
(ECE)

Objectives:
Characteristics of gunn diode and reflex klystron, Directional couplers, Parameters of Wave guide measurements, In Digital Communication, analyzing baseband and digital modulation schemes

Note: Minimum 12 Experiments to be conducted

Part -A: Microwave Engineering Lab (Any 6 Experiments)
1. Reflex Klystron Characteristics
2. Gunn Diode Characteristics
3. Directional Coupler Characteristics.
4. VSWR Measurement
5. Measurement of Waveguide Parameters
6. Measurement of Impedance of a given Load
7. Measurement of Scattering parameters of a Magic Tee
8. Measurement of Scattering parameters of a Circulator
9. Attenuation Measurement
10.Microwave Frequency Measurement

Part - B: Digital Communication Lab (Any 6 Experiments)
1. PCM Generation and Detection
2. Differential Pulse Code Modulation
3. Delta Modulation
4. Time Division Multiplexing of 2 Band Limited Signals
5. Frequency shift keying: Generation and Detection
6. Phase Shift Keying: Generation and Detection
7. Amplitude Shift Keying: Generation and Detection
8. Study of the spectra! characteristics of PAM, QAM
9. DPSK: Generation and Detection
10.QPSK : Generation and Detection

Equipment required for Laboratories -
1. Microwave Engineering Lab:
Microwave Bench set up with Klystron Power Supply Microwave Bench set up with Gunn Power Supply
Micro Ammeter
VSWR meter
Microwave Components
2. Digital Communication Lab

RPS: 0-30V
CRO: 0-20MHz
Function fenerators: 0-1 MHz
RF Generators: 0-100MHz
Experimental Kits / Modules

Outcomes:
Students will be able to differentiate characteristics for different microwave devices and modulation techniques.

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IV Year B.Tech II Semester	**T/P/D**	**C**
	4 -/-	**4**

TELECOMMUNICATION SWITCHING SYSTEMS AND NETWORKS
(Elective III)
(ECE, ETM)

Objectives:
To provide students with a balanced blend of theoretical and practical aspects regarding Telecommunication Switching Systems. To expose through the evolution of switching systems from manual and electromechanical systems to stored-program-controlled digital systems, To provide knowledge to the students regarding design and performance analysis of various switching systems. To train the students about basic Telephone Networks structures and traffic engineering concepts , To inculcate students on various internet concepts like OSI reference model, LAN, WAN, WAN, Repeaters, bridges, routers & gateways, To provide a comprehensive coverage of data communication networks and ISDN.

UNIT-I: Telecommunication Switching Systems
Introduction, Elements of switching systems, switching network configuration, Rotary switches, Uniselector, Two motion selector, Trunking principle ,principles of cross bar switching, Crossbar Switch Configuration, Crosspoint Technology, Crossbar Exchange Organization.

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

UNIT-III: Telecommunications Traffic
Introduction; The Unit of Traffic, Congestion; Traffic Measurement, A Mathematical Model, Lost-Call Systems-Theory, Traffic Performance, Loss Systems in Tandem, Use of Traffic Tables, Queuing Systems-The Second Erlang Distribution, Probability of Delay, Finite Queue Capacity, Some Other Useful Results, Systems with a Single Server, Queues in Tandem, Delay Tables, Applications of Delay Formulae.

UNIT-IV: Telephone networks

Subscriber loop systems, switching hierarchy and routing, transmission plan, transmission systems, numbering plan, charging plan, Signaling techniques: In channel signaling, common channel signaling, Cellular mobile telephony.

DATA NETWORKS

Data transmission in PSTNs, Switching techniques for data transmission, data communication architecture, link to link layers, end to end layers, satellite based data networks, LAN, MAN, Internetworking.

UNIT-V: INTEGRATED SERVICES DIGITAL NETWORK (ISDN)

Introduction, motivation, new services, Network and protocol architecture, Transmission channels, User-Network interfaces, functional grouping, reference points, signaling, numbering, addressing, BISDN.

DSL TECHNOLOGY:

ADSL, Cable Modem, Traditional Cable Networks, HFC Networks, Sharing, CM & CMTS and DOCSIS.

SONET:

Devices, Frame, Frame Transmission, Synchronous Transport Signals, STS I, Virtual Tributaries and Higher rate of service.

Outcomes:

Students will demonstrate knowledge about Telecommunication Switching Systems. Students will be able to analyze different switching methodologies. Students will be able to differentiate between signaling methods used in Telecommunication Networks, Students will exhibit a good knowledge on data communication networks and ISDN and be able to differentiate LAN, MAN, WAN, and Students will demonstrate an ability to work on various Telecommunication Network concepts. Students will demonstrate knowledge on modern telecommunication concepts like DSL & SONET.

Text Books:

1. Tele communication switching system and networks - Thyagarajan Viswanath, PHI, 2000. (Unit-I, II, III, V, VI, VIII)
2. J. E Flood, "Telecommunications Switching and Traffic Networks," Pearson Education, 2006 (Unit-IV)
3. Data Communication & Networking - B.A. Forouzan, TMH, 4th Edition, 2004. (Unit-VIII)

References:

1. Digital telephony - J. Bellamy, John Wiley, 2nd edition, 2001.
2. Data Communications & Networks - Achyut. S.Godbole, TMH, 2004.
3. Principles of Communication Systems – H. Taub & D. Schilling , TMH, 2nd Edition, 2003.
4. An Engineering approach to computer networking - S.Keshav, Addison Wesely

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IV Year B.Tech II Semester	**T**	**T/L /P**	**C**
	4	**1*/0**	**4**

SATELLITE COMMUNICATIONS
(ELECTIVE – III)
(ECE, ETM)

Objectives:
Main aim of this subject is to analyse &design of the satellite communication system. It discusses various topics of basic communications such as electromagnetic fields, radiopropagation, antennas, orbital mechanics, GPS, multiple access systems etc. This will help students for persuing post graduate studies and also for those who prepare for various competitive examinations.

UNIT-I: INTRODUCTION
Origin of Satellite Communications, historical back-ground, basic concepts of satellite communications, frequency allocations for satellite services, applications, future trends of satellite communications.

Orbital Mechanics And Launchers [1]: 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 orbit control system, telemetry, tracking, command and monitoring, power systems, communication subsystems, satellite antenna equipment reliability and space qualification.

Satellite Link Design
Basic transmission theory, system noise temperature and G/T ratio, Design of down links, up link design, Design of satellite links for specified C/N, System design example.

UNIT-III: Multiple Access
Frequency division multiple access (FDMA), intermediation, calculation of C/N. Time division Multiple Access (TDMA) frame structure, examples. Satellite Switched TDMA Onboard processing, DAMA, Code Division Multiple Access (CDMA), Spread spectrum transmission and reception.

UNIT-IV: Earth Station Technology
Introduction, transmitters, receivers, antennas, tracking systems, terrestrial interface, primary power test methods.

Low Earth Orbit and Geo-Stationary Satellite Systems:
Orbit consideration, coverage and frequency considerations, delay & throughput considerations, system considerations, operational NGSO constellation designs.

UNIT-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.

Outcomes:
From this unit students can learn basics in satellite communications, and also can learn about telemetry, tracking of satellite sub systems and system designing. Since this subject have inter link with wireless communications students can easily understand, analyze the concepts and also helpful in pursuing higher studies.

Text Books:

1. Satellite Communications – Timothy Pratt, Charles Bostian and Jeremy Allnutt, WSE, Wiley Publications, 2nd Edition, 2003.
2. Satellite Communications Engineering – Wilbur L. Pritchard, Robert A Nelson and Henri G.Suyderhoud, 2nd Edition, Pearson Publications, 2003.

References:

1. Satellite Communications: Design Principles – M. Richharia, BS Publications, 2nd Edition, 2003
2. Satellite Communication - D.C Agarwal, Khanna Publications, 5th Ed.
3. Fundamentals of Satellite Communications – K.N. Raja Rao, PHI, 2004
4. Satellite Communications – Dennis Roddy, McGraw Hill, 2nd Edition, 1996

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(FOR WOMEN)
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IV Year B.Tech II Semester	**L**	**T/P/D**	**C**
	4	1/-/-	**4**

SPREAD SPECTRUM COMMUNICATIONS
(ELECTIVE - III)
(ECE)

Objectives:
To understand the principles of Spread Spectrum Systems, to understand the performance of Spread Spectrum Systems in Jamming Environments & also with Forward Error correction

UNIT-I: Introduction to Spread Spectrum Systems
Fundamental Concepts of Spread Spectrum Systems, Pseudo Noise Sequences, Direct Sequence Spread Spectrum, Frequency Hop Spread Spectrum, Hybrid Direct Sequence Frequency Hop Spread Spectrum, Code Division Multiple Access

Cellular CDMA Principles
Introduction, Wide Band Mobile Channel, The Cellular CDMA System, CDMA System Capacity

UNIT-II: Multi-User Detection in CDMA Cellular Radio
Single User Receiver in a Multi User Channel, Optimal Multi-User Detection, Linear Suboptimal Detectors, Interference Combat Detection Schemes, Interference Cancellation Techniques

UNIT-III: Binary Shift Register Sequences for Spread Spectrum Systems
Introduction, Definitions, Mathematical Background and Sequence Generator Fundamentals, Maximal Length Sequences, Gold Codes

Code Tracking Loops
Introduction, Optimum Tracking of Wide Band Signals, Base Band Delay-Lock Tracking Loop, Tau-Dither Non-Coherent Tracking Loop, Double Dither Non-Coherent Tracking Loop

UNIT-IV: Initial Synchronization of the Receiver Spreading Code
Introduction, Problem Definition and the Optimum Synchronizer, Serial Search Synchronization Techniques, Synchronization Using a Matched Filter, Synchronization by Estimated the Received Spreading Code

UNIT-V: Performance of Spread Spectrum Systems in Jamming Environments
Spread Spectrum Communication System Model, Performance of Spread Spectrum Systems without Coding

Performance of Spread Spectrum Systems with Forward Error Correction

Elementary Block Coding Concepts, Optimum Decoding Rule, Calculation Of Error Probability, Elementary Convolution Coding Concepts, Viterbi Algorithm, Decoding And Bit-Error Rate

Outcomes:

After completing this course student should be able to understand the Characteristics of Spread Spectrum Systems, Understand the Performance Analysis Methods for Spread Spectrum Systems and CDMA Systems, Apply their knowledge of Communication Technology to CDMA and Wireless Systems

Textbooks:

1. Rodger E Ziemer, Roger L. Peterson and David E Borth, Introduction to Spread Spectrum Communication, Pearson, 1st Edition, 1995.
2. Mosa AH Abu-Rgheff, Introduction to CDMA Wireless Communications, Elsevier Publications, 2008.

References:

1. Steve Lee –Spread Spectrum CDMA, McGraw Hill, 2002
2. George R. Cooper, Clare D. Me Gillem, "Modern Communication and Spread Spectrum McGraw Hill, 1986.
3. Andrew J. Viterbi, CDMA; Principles of Spread Spectrum Communication Pearson Education, 1st Edition, 1995.
4. Kamilo Feher, Wireless Digital Communications, PHI, 2009.
5. Andrew Richardson, WCDMA Design Handbook, Cambridge University Press, 2005.

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AUTONOMOUS under JNTUH

IV Year B.Tech II Semester	**L**	T/**P/D**	**C**
	4	1/-/-	**4**

ARTIFICIAL NEURAL NETWORKS
(ELECTIVE – III)
(ECE)

Objectives:
An artificial neural network, often just named a neural network, is a mathematical model inspired by biological neural networks. A neural network consists of an interconnected group of artificial neurons, and it processes information using a connectionist approach to computation. In most cases a neural network is an adaptive system changing its structure during a learning phase. Neural networks are used for modeling complex relationships between inputs and outputs or to find patterns in data.

UNIT-I: Introduction to Artificial Neural Networks
Introduction, Artificial Neural Networks, Historical Development of Neural Networks, Biological Neural Networks, Comparison Between Brain and the Computer, Comparison Between Artificial and Biological Neural Networks, Network Architecture, Setting the Weights, Activation Functions, Learning Methods.

UNIT-II: Fundamental Models of Artificial Neural Networks
Introduction, McCulloch – Pitts Neuron Model, Architecture, Learning Rules, Hebbian Learning Rule, Perceptron Learning Rule, Delta Learning Rule (Widrow-Hoff Rule or Least Mean Square (LMS) rule, Competitive Learning Rule, Out Star Learning Rule, Boltzmann Learning, Memory Based Learning.

UNIT-III: FEED FORWARD NETWORKS
Introduction, Single Layer Perceptron Architecture, Algorithm, Application Procedure, Perception Algorithm for Several Output Classes, Perceptron Convergence Theorem, Brief Introduction to Multilayer Perceptron networks, Back Propagation Network (BPN), Generalized Delta Learning Rule, Back Propagation rule, Architecture, Training Algorithm, Selection of Parameters, Learning in Back Propagation, Application Algorithm, Local Minima and Global Minima, Merits and Demerits of Back Propagation Network, Applications, Radial Basis Function Network (RBFN), Architecture, Training Algorithm for an RBFN with Fixed Centers.

UNIT-IV: ADALINE AND MADALINE NETWORKS
Introduction, Adaline Architecture, Algorithm, Applications, Madaline, Architecture, MRI Algorithm, MRII Algorithm.

COUNTER PROPAGATION NETWORKS

Winner Take – all learning, out star learning, Kohonen Self organizing network, Grossberg layer Network, Full Counter Propagation Network (Full CPN), Architecture, Training Phases of Full CPN, Training Algorithm, Application Procedure, Forward Only counter Propagation Network, Architecture, Training Algorithm, Applications, Learning Vector Quantizer (LVQ).

UNIT-V: ASSOCIATIVE MEMORY NETWORKS – I

Types, Architecture, Continuous and Discrete Hopfield Networks, Energy Analysis, Storage and Retrival Algorithms, Problems with Hopfield Networks.

ASSOCIATIVE MEMORY NETWORKS – II:

Boltzman Machine, Bidirectional Associative Memory, Adaptive Resonance Theory Networks Introduction, Architecture, Algorithm.

APPLICATIONS OF NEURAL NETWORKS:

Implementation of A/D Converter using Hopfield Network, Solving Optimization Problems, Solving Simultaneous Linear Equation, Solving Traveling Salesman Problems using Hopfield Networks, Application in Pattern Recognition, Image Processing.

Outcomes:

By the end of the course students learn the utility of artificial neural network models lies in the fact that they can be used to infer a function from observations. This is particularly useful in applications where the complexity of the data or task makes the design of such a function by hand impractical

Textbooks:

1. Introduction to Artificial Neural Systems - J.M.Zurada, Jaico Publishers, 3rd Edition.
2. Artificial Neural Networks - B. Yegnanarayana, PHI.

References:

1. Introduction to Neural Networks Using MATLAB 6.0 - S.N. Shivanandam, S. Sumati, S. N. Deepa, TMH.
2. Elements of Artificial Neural Networks - Kishan Mehrotra, Chelkuri K. Mohan, and Sanjay Ranka, Penram International.
3. Artificial Neural Network – Simon Haykin, Pearson Education, 2nd Ed.
4. Fundamental of Neural Networks – Laurene Fausett, Pearson, 1st Ed.

G.NARAYANAMMA INSTITUTE OF TECHNOLOGY & SCIENCE
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AUTONOMOUS under JNTUH

IV Year B.Tech II Semester	**L**	T/**P/D**	**C**
	4	1/-/-	3

INTERNETWORKING
(ELECTIVE-IV)
(ECE, ETM)

Objectives:
To understand the major protocols for internetworking in today's Internet and to gain the ability to learn new Internet technologies by yourself .

UNIT I: Internetworking Concepts
Principles of internetworking, Connectionless Interconnection, Application level Interconnection. Network level interconnection, Interconnection through IP routers. Network Models: Layered Tasks, The OSI Model, Layers in OS1 Model. TCP/IP Protocol suite, Addressing.

Connecting devices
Passive hubs, repeaters, active hubs. Bridges, Two layer Switches, Routers, Three layer switches. Gateway, Backbone Networks. IP Datagram, fragmentation, options, IPv4 Addresses-Introduction, Ciassfui addressing, Classless Addressing, Mobile IP- Addressing, Agents, Three phases, Inefficiency in Mobile IP. IPv6 protocol-Introduction, packet format.

UNIT II: TCP
TCP Services, TCP features, segment, A TCP connection, UDP-Introduction, User datagram, UDP Services: process-to-process communication, connectionless services, flow control, error control, congestion control, encapsulation and decapsulation.

UNIT III: TCP Flow control
Opening and closing windows, shrinking windows, silly window syndrome, TCP error control-checksum, acknowledgement, retransmission, out-of-order segments. TCP Congestion control- congestion window, congestion policy.

UNIT IV: **Stream Control Transmission Protocol**
Introduction, SCTP services: process-to-process communication, multiple streams, muiti homing, full-duplex communication, connection-oriented service. SCTP features: transmission sequence number, stream identifier, packets, acknowledgement number, flow control, error control. Packet format.

Unicast Routing Protocols: Intra and Inter-domain Routing. Distance Vector Routing, RIP, Link State Routing, OSPF, Path Vector Routing, BGP,

Multicast Routing - Unicast - Multicast- Broadcast, Multicast Applications, Multicast Routing.

UNIT V: Domain Name System (DNS)

Name Space, Domain Name Space, Distribution of Name Space, File Transfer (FTP and TFTP)- File Transfer Protocol (FIT), TFTP, Network Management-SNMP- Concept, Management Components. World Wide Web and HTTP-Architecture, web documents, HTTP transaction. Electronic Mail- Architecture, Message transfer agent: SMTP.

Multimedia

Digitizing audio and video. Network security, security in the internet firewalls. Audio and video compression, Streaming stored audio/ video, Streaming live audio/video. Real-time interactive audio/video, RTP.

Outcomes:

Internetworking concepts with IP Address of Classful Addressing and Classless Addressing, Internet Protocol (IP) and Transmission Control Protocol (TCP), Unicast Routing Protocols (RIP, OSPF and BGP), Domain Name System (DNS), Remote Login TELNET, Network Management and Multimedia: Digitizing Audio and Video

TEXTBOOKS:

1. TCP/IP Protocol suite: Behrouz A. Forouzan, TMH, 4* Edition, 2010.
2. Internetworking with TCP/IP— Douglas. E.Comei, Volume I, PHI, 2000.
3. Data and Computer Communications, William Stallings. 8lh Edition. Pearson Education, 2007

REFERENCES:

1. Data communication & Networking: B.A. Forouzan, TMH. 4r'; Edition, 2008.

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(FOR WOMEN)
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IV Year B.Tech II Semester	**L**	T/**P/D**	**C**
	4	1/-/-	3

RADAR SYSTEMS
(ELECTIVE-IV)
(ECE, ETM)

Objectives:
To learn the basics of radar, complete Radar Equation, System Losses, C W and FMCW Radars, MTI and Pulse Doppler Radar, Tracking Radar, Detection of Radar Signals in Noise, Radar Receivers and its components.

UNIT-I
Introduction to basic Radar, Maximum Unambiguous Range, Radar Waveforms, Radar Frequencies, Simple form of Radar Equation, Prediction of Range Performance, Basic pulse Radar Block Diagram and Operation, Minimum Detectable Signal, Envelope Detector - False Alarm Time and Probability, Integration of Radar Pulses, Radar Cross Section of Targets (simple targets - sphere, cone-sphere), Transmitter Power, PRF and Range Ambiguities, System Losses (qualitative treatment), Applications and Related Problems.

UNIT-II: CW and Frequency Modulated Radar
Doppler Effect, CW Radar – Block Diagram, Isolation between Transmitter and Receiver, Non-zero IF Receiver, Receiver Bandwidth Requirements, Applications of CW radar, FM-CW Radar, Range and Doppler Measurement, Block Diagram and Characteristics (Approaching/ Receding Targets), FM-CW altimeter, Measurement Errors, Airborne Doppler Navigation, Multiple Frequency CW Radar.

UNIT-III: MTI and Pulse Doppler Radar
Introduction, Principle, MTI Radar with - Power Amplifier Transmitter and Power Oscillator Transmitter, Delay Line Cancellers – Filter Characteristics, Blind Speeds, Double Cancellation, Staggered PRFs. Range Gated Doppler Filters, digital signal processing, other MTI delay lines, MTI Radar Parameters, Limitations to MTI Performance. Non-coherent MTI, MTI versus Pulse Doppler radar.

UNIT-IV: Tracking Radar and Phased Array Antennas
Tracking with Radar, Sequential Lobing, Conical Scan, Monopulse Tracking Radar – Amplitude Comparison Monopulse (one- and two-coordinates), Phase Comparison Monopulse. Target Reflection Characteristics and Angular Accuracy. Tracking in Range, Acquisition and Scanning Patterns, Comparison of Trackers. Introduction to Phased Array Antennas – Basic Concepts, Radiation Pattern, Beam Steering and Beam Width changes, Series versus Parallel Feeds, Applications, Advantages and Limitations.

UNIT-V: Radar receivers and Detection of Radar Signals in Noise
Introduction, Matched Filter Receiver – Response Characteristics and Derivation, Correlation Function and Cross-correlation Receiver, Efficiency of Non-matched Filters, Matched Filter with Non-white Noise., Radar receivers Receiver Noise and SNR, Noise Figure and Noise Temperature Displays – types. Duplexers – Branch type and Balanced type, Circulators as Duplexers

Outcomes
The student should be able to Explain the basic operation of radar system Demonstrate the C W and FMCW Radars, MTI and Pulse Doppler Radar, Tracking Radar, Detection of Radar Signals in Noise, Radar Receivers and its components. Design a radar system with the knowledge of Radar Equation, System Losses and its components.

Text Books:

1. Introduction to Radar Systems – Merrill I. Skolnik, SECOND EDITION, McGraw-Hill, 1981

References:

1. Introduction to Radar Systems by Merrill I. Skolnik, THIRD EDITION, Tata McGraw-Hill, 2001.
2. Radar Systems by V.S.Bagad FIRST EDITION, Technical Publications, 2008.

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BIO MEDICAL INSTRUMENTATION
(ELECTIVE-IV)
(Common to ECE & ETM)

Objectives:
To enable the students to develop knowledge of how instruments work in the various department and laboratories of a hospital and thereby recognize their limitations. To make the students learn to interpret technical aspects of medicine and solve Engineering Problems related to medical field, To enable the students to understand medical diagnosis and therapy, This course introduces the basics concepts of Bio medical Instrumentation, electrical and mechanical activities of the heart, cardiac instrumentation, Neuro-Muscular and respiratory instrumentation

UNIT-I:
Components of Medical Instrumentation System. Bioamplifier. Static and dynamic characteristics of medical instruments. Biosignals and characteristics. Problems encountered with measurements from human beings.

UNIT-II:
Organisation of ceil. Derivation of Nernst equation for membrane Resting Potential Generation and Propagation of Action Potential, Conduction through nerve to neuromuscular junction.

UNIT-III: Cardiac Instrumentation
Mechanical function, Electrical Conduction system of the heart. Cardiac cycle. Relation between electrical and mechanical activities of the heart. Blood pressure and Blood flow measurement. Specification of ECG machine. Einthoven triangle, Standard 12-lead configurations, Interpretation of ECG waveform with respect to electromechanical activity of the heart.

UNIT-IV: **Bio Electrodes**
Biopotential Electrodes - External electrodes, Internal Electrodes. Biochemical Electrodes.
Therapeutic equipment: Pacemaker, Defibrillator, Shortwave diathermy. Hemodialysis machine.

UNIT-V: Neuro-Muscular Instrumentation
Specification of EEG and EMG machines. Electrode placement for EEG and EMG recording. Intrepretation of EEG and EMG.

Respiratory Instrumentation:
Mechanism of respiration, Spivometry. Pnemuotachograph Ventilators.

Outcomes:
Upon successful completion of the syllabus will be able to analyze Bioelectric Potentials namely the ECG, EMG, EEG. Have a broad knowledge in Working of various biomedical Instruments. Acquire knowledge about a range of Non Invasive techniques of patient monitoring and Biotelemetry.

Textbooks:
1. Biomedical Instrumentation and Measurements ~ by Leslie Cromwell, F.J. Weibell, E.A. Pfeiffer, PHI.
2. Medical Instrumentation, Application and Design - by John G. Webster, John Wiley.

References:
1. Principles of Applied Biomedical Instrumentation - by L.A. Geoddes and L.E. Baker, John Wiley and Sons
2. Hand-book of Biomedical Instrumentation - by R.S. Khandpur, McGraw-Hill, 2003.
3. Biomedical Telemetry - by Mackay, Stuart R., John Wiley.

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IV Year B.Tech II Semester	**L**	T/**P/D**	**C**
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NETWORK SECURITY
(ELECTIVE - IV)
(ECE, ETM)

Objectives:
To acquire an understanding of network security and its changing character, to understand how network security is conceptualized and carried out, to examine the historical evolution of network security, to analyze both early and contemporary threats to network security, to articulate informed opinion about issues related to network security, to identify and investigate threats to network security, to appreciate the challenges of network security.

UNIT-I: Introduction
Security Attacks - Interruption, Interception, Modification & Fabrication, Security Services - Confidentiality, Authentication, Integrity, Non-Repudiation, Access Control & Availability, Mechanisms, A Model for Internetwork Security, Internet Standards and RFCs, Buffer Overflow & Format String Vulnerabilities, TCP Session Hijacking, ARP Attacks, Route Table Modification, UDP Hijacking and Man-in-the-Middle Attacks.

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 Kerberos, X.509 Directory Authentication Service.

UNIT- III: 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, SNMP V1 Community Facility and SNMPv3, Intruders, Viruses and Related Threats

Firewall Design Principles:
Trusted Systems, Intrusion Detection Systems

Outcomes:
After completing this course student should know the protocols related to security services, be familiar with the fundamentals of cryptography. Be familiar with network security threats and counter measures. be familiar with network security designs using available secure solutions, Be familiar with advanced security issues and technologies, Be exposed to original research in network security.

Text books:
1. Network Security Essentials (Applications and Standards) by William Stallings Pearson Education.
2. Hack Proofing your Network by Ryan Russell, Dan Kaminsky, Rain Forest Puppy, Joe Grand, David Ahmad. Hal Flynn Ido Dubrawsky, Steve W.Manzuik and Ryan Permeh, Wiley Dreamtech.

References:

1. Fundamentals of Network Security by Eric Maiwald {Dream Tech Press)
2. Network Security - Private Communication in a Public World by Charlie Kaufman, Radia Perlman and Mike Speciner, Pearson/PHI
3. Cryptography and Network Security, Third Edition, Stallings, PHI/ Pearson
4. Principles of Information Security, Whitman, Thomson
5. Network Security: The Complete Reference, Robert Bragg, Mark Rhodes, TMH
6. Introduction to Cryptography, Buchmann, Springer
7. Network Security and Cryptography: Bernard Menezes, CENGAGE Learning
8. Information Systems Security, Godbole, Wiley Student Edition
9. Cryptography and Network Security, B.A.Forouzan, D.Mukhopadhyay, 2nd Edition, TMH

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IV Year B.Tech II Semester	**L**	T/**P/D**	**C**
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RF CIRCUIT DESIGN
(ELECTIVE – V)
(ECE)

Objectives:
To deal with RF filters, Networks and designing

UNIT-I: Introduction
Importance of RF Design-Dimensions and units-Frequency spectrum-RF Behavior of passive components: High Frequency Resistors, High Frequency Capacitors. High Frequency Inductors-Chip Components and circuit board considerations: chip resistors, chip capacitors and surface mount inductors.

UNIT-II: Review Of Transmission Lines
Types of Transmission lines-Equivalent circuit representation-R, L, C, G parameters of different line configurations-Terminated lossless Transmission lines-special Terminations: short circuit, open circuit and quarter wave Transmission lines-Sourced and Loaded transmission Lines: Power considerations, Input Impedance Matching, Return Loss and Insertion Loss. Single and multi-port networks: The Smith chart: Reflection coefficient, Normalised impedance Transformation: Standing Wave Ratio, Special Transformation Conditions-Admittance Transformation-Parallel and Serial RL &RC Connections-Basic Definitions of single and multi-Port Networks-Interconnecting Networks.

UNIT-III: RF Filter Design
Scattering parameters: Definition, Meaning, Chain Scattering Matrix, Conversion between S-and *z*-parameters, Signal Flow Chart Modeling, Generalization-Basic Resonator and Filter Configurations: Low Pass, High Pass, Band Pass and Band Stop type Filters-Filter Implementation using UNIT Element and Kuroda's Identities Transformations-Coupled Filters. Active RF component modeling: RF Diode models: nonlinear and linear models-transistor models: large signal and small signal BJT models, large signal and small signal FET models scattering parameter device characterization.

UNIT-IV: MATCHING AND BIASING NETWORKS
Impedance matching using discrete components: two component matching networks, forbidden regions, frequency response and quality factor, T and Pi Matching Networks-Amplifier classes of operation and Biasing Networks: classes of operation and efficiency of amplifiers, Biasing Networks for BJT, Biasing Networks for FET.

UNIT-V: RF Transistor Amplifier Design

Characteristics of amplifiers-amplifier power relations: RF source, transducer power gain, additional power relations-Stability considerations: stability circles, unconditional stability, and stabilization methods-unilateral and bilateral design for constant gain-noise figure circles-constant VSWR circles. RF oscillators and mixers**:** Basic oscillator model: Negative resistance oscillator, feedback oscillator design, design steps, Quartz oscillators-Fixed Frequency high Frequency oscillator-Basic Characteristics of Mixers: Concepts, Frequency Domain considerations, single ended mixer Design, single and double balanced mixers.

Outcomes:

RF Design, RF Behavior, Transmission Lines, matching and biasing networks, RF transistor amplifier design

Text Books:

1. RF Circuit Design-Theory and applications by Reinhold Ludwig, Pavel Bsetchko-Pearson Education India, 2000.
2. Radio frequency and Microwave Communication circuits-Analysis and design by Devendra K.Misra-Wiley student Edition-John Wiley& Sons, Inc.
3. Radio Frequency and Microwave Electronics-illustrated by Matthew M.Radmanesh-PEI

References:

1. RF Circuit Design-Christopher Bowick, Cheryl Aljuni and john Biyler, Elsevier science, 2008.
2. Secrets of RF Circuit Design by Joseph J.carr, TMH, 2000.
3. Design of RF and Microwave Amplifiers and Oscillators, Peter L.D.Abrif, Artech House, 2000.
4. The Design of CMOS Radio Frequency Integrated Circuits By Thomas H.Lee,2/e-Cambridge University Press,2004.

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WIRELESS COMMUNICATIONS AND NETWORKS
(Elective - V)
(ECE, ETM)

Objectives:
To provide the students with the fundamental treatment about many practical and theoretical concepts that forms basic of wireless communications. To equip the students with various kinds of wireless networks and its operations. To prepare students to understand the concept of frequency reuse, and be able to apply it in the design of mobile cellular system. To prepare students to understand various modulation schemes and multiple access techniques that are used in wireless communications, To provide an analytical perspective on the design and analysis of the traditional and emerging wireless networks, and to discuss the nature of, and solution methods to, the fundamental problems in wireless networking. To train students to understand the architecture and operation of various wireless wide area networks such as GSM, IS-95, GPRS and SMS. To train students to understand wireless LAN architectures and operation. To prepare students to understand the emerging technique OFDM and its importance in the wireless communications.

UNIT-I: Introduction to Wireless Communication Systems
Evolution of mobile radio communications, Examples of wireless communication systems, Paging systems, Cordless telephone systems, Comparison of various wireless systems.

Modern Wireless Communication Systems:
Second generation cellular networks, Third generation wireless networks, Wireless in local loop, Wireless local area networks, Blue tooth and Personal area networks.

UNIT-II: Cellular System Design Fundamentals
Spectrum Allocation, Basic Cellular System, Frequency reuse, Channel assignment strategies, Handoff Strategies, Interference and system capacity, Trunking and grade off service, Improving coverage and capacity, cell splitting.

UNIT-III: Multiple Access Techniques For Wireless Communication
Introduction to multiple access, FDMA, TDMA, Spread spectrum multiple access, Space division multiple access, Packet radio, Capacity of a cellular systems.

Wireless Networking:
Difference between wireless and fixed telephone networks, Development of wireless networks, Fixed network transmission hierarchy, Traffic routing in wireless networks, Wireless data services, Common channel signaling.

UNIT-IV: Wireless Wan
Mechanism to support a mobile environment, Communication in the infrastructure, IS-95 CDMA forward channel, IS – 95 CDMA reverse channel, Packet and frame formats in IS – 95, IMT – 2000, Forward channel in W-CDMA and CDMA 2000, Reverse channels in W-CDMA and CDMA-2000, GPRS and higher data rates, Short messaging service in PRS mobile application protocols.

UNIT-V: Wireless LAN
Historical overviews of the LAN industry, Evolution of the WLAN industry, Wireless home networking, IEEE 802.11. The PHY Layer, MAC Layer, wireless ATM, HYPER LAN, HYPER LAN – 2.

OFDM Technology:
Basic Principles of Orthogonality, Single Versus Multi channel Systems, OFDM Block Diagram and its explanation, OFDM Signal mathematical representation.

Outcomes:
Students will understand the principles of wireless communications. Students will understand fundamentals of wireless networking; Students will understand cellular system design concepts. Students will analyze various multiple access schemes used in wireless communication. Students will understand wireless wide area networks and their performance analysis. Students will demonstrate wireless local area networks and their specifications. Students will become familiar with some of the existing and emerging wireless standards. Students will understand the concept of orthogonal frequency division multiplexing.

Text Books:

1. Theodore S. Rappaport, "Wireless Communications and Applictions," Pearson Education - 2003.
2. Upen Dalal, "Wireless Communications," Oxford University Press, 2010.
3. Kaveh Pahlavan, Prashant Krishnamoorthy, "Principles of Wireless Networks, - A united approach," Pearson Education, 2002.

References:

1. P.Nicopolitidis, M.S.Obaidat, G.I. papadimitria, A.S. Pomportsis, “Wireless Networks,” John Wiley & Sons, 2003.
2. X.Wang and H.V.Poor, “Wireless Communication Systems,” Pearson education, 2004.
3. Dr.Sunil Kumar S. Manvi, Mahabaleshwar S. Kakkasageri,”Wireless and Mobile Networks: concepts and Protocols,” Wiley India, 2010.
4. Jon W. Mark and Weihua Zhqung,” Wireless Communication and Networking,” PHI, 2005.
5. Jochen Schiller, “Mobile Communications,” Pearson Education, 2nd Edition, 2003.

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ADAPTIVE SIGNAL PROCESSING
(Elective V)
(ECE)

Objectives:
This course introduces the basic concepts of adaptive systems and development of adaptive filter theory. It also deals with LMS adaption algorithms - their stability and analysis, Kalman filtering and its applications.

UNIT-I: Adaptive Systems
Definitions, characteristics, Applications, Example of an adaptive system. The adaptive linear combiner - Description, Weight vectors desired response performance function - Gradient & Mean square error.

UNIT-II: Approximation to the Development of Adaptive Filter Theory
Introduction to filtering - Smoothing and Prediction – Linear optimum filtering, Problem statement, Principle of Orthogonality - Minimum – Mean- Square error - Wiener- Hope equations, Error performance - Normal equation.

UNIT-III: LMS Algorithm
Overview - LMS Adaptation algorithms, Stability & performance, Analysis of LMS algorithms - LMS gradient & stochastic algorithms - Convergence of LMS algorithm.

UNIT-IV: Kalman Filtering
Introduction - Recursive mean square estimation random variables, Statement of Kalman filtering problem – Filtering - Initial conditions - Summary of kalman filtering.

UNIT-V: Applications
Noise cancellation - Canceling echoes in long distance telephone circuits, Adaptive beam forming.

Outcomes:
The completion of the course enables to understand the basics of adaptive systems and development of adaptive filter theory, demonstrate the knowledge of LMS algorithms, their stability and performance, the concepts of Kalman filtering and their applications.

Text Books:

1. Bernard Widrow - Adaptive signal processing, PH Pearson Education, Asia.
2. Simon Haykin - Adaptive filter Theory, PH.

References:

1. Sophocles. J. Orfamadis - optimum signal processing - An Introduction, 2nd Editon, MGH.
2. S.Thomas Alexander – Adaptive signal processing - Theory and applications, Springer – Verlag

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PATTERN RECOGNITION
(Elective V)
(ECE, ETM)

Objectives:
The primary objective of this course is to enable students to understand various pattern recognition techniques and computer-based methods of discriminate functions, feature extraction, classification strategies, statistical pattern recognition principles, supervised, unsupervised learning and clustering strategies.

UNIT-I: Pattern Recognition Overview, Pre-Processing and Feature Selection Pattern recognition, classification description, patterns and features extraction with examples, training and learning in PR systems, pattern recognition approaches.

Pattern Preprocessing and Feature Selection
Introduction, distance measures, clustering transformation and feature ordering, clustering in feature selection through entropy minimization, feature selection through orthogonal expansion, binary feature election.

UNIT-II: Statistical Pattern Recognition
Introduction to statistical pattern recognition, Gaussian case and class dependence, discriminant functions, classifier performance, risk and errors. Bays classified decision – For Bayes classifier, Bayes classifier for normal patterns. Trainable pattern classifiers-deterministic approach perceptron approach reward-punishment concept Gradient approach. Gradient Descent algorithms:LMSE Algorithms, Multi category classification.

UNIT-III: Syntactic Pattern Recognition
Recognition with strings: String matching, Edit Distance, Computational complexity, string matching with errors, string matching with "Don't Care" symbol, Grammatical methods: Grammars, Type of string grammars, a grammar for pronouncing numbers, recognition using grammars, Rule based methods: Learning rules.

UNIT- IV: Hidden Markov Models
First order Markov models, first order Hidden Markov models, Hidden Markov models, Hidden Markov model computation, evaluation, HMM decoding, learning.

UNIT- V: Supervised, Unsupervised Learning and Clustering
Supervised learning using parametric approach: Introduction, parametric estimation and supervised learning, Maximum likelihood (ML) estimation, the Bayesian parameter estimation approach.

Unsupervised learning
Formulation of unsupervised learning problems, clustering for unsupervised learning: LVQ, clustering strategies, K-means algorithm, MIN-MAX clustering.

Outcomes:
By this PR syllabus students can learn basics in PR fundamentals such as feature selection, pattern training and classification approaches. Students can learn to build statistical pattern recognition classifiers. Further concepts of HMM are understood by students. Also students will be able to do projects involving clustering of data based on unsupervised or supervised learning.

Text Books:

1. Pattern Classification-Richard duda, Hart, David strok, John Wiley, 2nd edition, 2008.
2. Pattern Recognition: Statistical structure and neural approaches – sRobert Schalkoff, Wiley, 2007.

References:

1. Pattern Recognition principles – Tou.Rafael. Gonzalez, Pearson education 1978, 1st Edition.
2. Pattern Recognition and Image analysis – Gose Johnsonbaught. Jost PHI, 2008.
3. Pattern Recognition: Concepts, Methods and Applications – J.P.Marques de Sa. Springer, 2008.
4. Pattern Recognition – Rajjan Shingal, Oxford, 2009.