VINAYAKA MISSION'S RESEARCH FOUNDATION, SALEM (Deemed to be University)

FACULTY OF ENGINEERING & TECHNOLOGY

SCHOOL OF ELECTRONIC SCIENCES

B.E- ELECTRONICS AND COMMUNICATION ENGINEERING

FULL TIME

AARUPADAI VEEDU INSTITUTE OF TECHNOLOGY, PAIYANOOR

&

V.M.K.V. ENGINEERING COLLEGE, SALEM

CHOICE BASED CREDIT SYSTEM

2012 REGULATION

SEMESTER – I

S.No.	Course Title	Offering Department	L	T	P	C
THEORY						
1	English for Effective Communication	ENGLISH	2	1	0	3
2	Engineering Mathematics I	MATHS	3	1	0	4
3	Basic Mechanical Engineering & Basic Civil Engineering	MECH/ CIVIL	2	1	0	3
4	Engineering Physics	PHY	2	1	0	3
5	Computer Foundation Program	CSE	2	1	0	3
6	Environmental Science & Engineering	CHE	3	1	0	4
PRACTICAL						
7	Engineering Physics Lab	PHY	0	0	4	2
8	Workshop Practice	MECH	0	0	2	1
9	Computer Foundation Program Lab	CSE	0	0	4	2
TOTAL						25

SEMESTER – II

S.No.	Course Title	Offering Department	L	T	P	C
THEORY						
1	Business English	ENGLISH	2	1	0	3
2	Engineering Mathematics II	MATHS	3	1	0	4
3	Engineering Chemistry	CHEM	2	1	0	3
4	Basic Electrical Engineering & Basic Electronics Engineering	EEE/ECE	3	1	0	3
5	Circuit Theory	EEE	2	1	0	3
6	Programming in C	CSE	2	1	0	3
PRACTICAL						
7	Engineering Chemistry Lab	CHEM	0	0	4	2
8	Engineering Graphics	MECH	2	0	3	3
9	Basic Electrical & Electronics Engineering Lab	EEE/ECE	0	0	4	2
TOTAL						26

III SEMESTER

S. No	Course Title	Offering Department	L	T	P	C
THEORY						
1	Advanced Engineering Mathematics	MATHS	3	1	0	4
2	Electronic Devices	ECE	3	0	0	3
3	Signals and Systems	ECE	3	1	0	4
4	Digital Electronics	ECE	3	0	0	3
5	Electromagnetic Fields	ECE	3	1	0	4
6	Object oriented Programming	CSE	3	0	0	3
PRACTICAL						
7	Electronic Devices Lab	ECE	0	0	4	2
8	Digital Electronics Lab	ECE	0	0	4	2
9	Object oriented Programming Lab	CSE	0	0	4	2
					TOTAL	27

IV SEMESTER

S. No	Course Title	Offering Department	L	T	P	C
THEORY						
1	Numerical Methods & Random Processes	MATHS	3	1	0	4
2	Control Systems	EEE	3	1	0	4
3	Linear Integrated Circuits	ECE	3	1	0	4
4	Electronic Circuits I	ECE	3	1	0	4
5	Microprocessors & Microcontrollers	ECE	3	0	0	3
6	Communication Theory	ECE	3	0	0	3
PRACTICAL						
7	Professional Communication & Personality Development	MGMT	0	0	4	2
8	Linear Integrated Circuits Lab	ECE	0	0	4	2
9	Microprocessors & Microcontrollers Lab	ECE	0	0	4	2
					TOTAL	28

V SEMESTER

S. No	Course Title	Offering Department	L	T	P	C
THEORY						
1	Digital Communication	ECE	3	0	0	3
2	Electronic Circuits II	ECE	3	0	0	3
3	Transmission Lines and Waveguides	ECE	3	1	0	4
4	Digital Signal Processing	ECE	3	1	0	4
5	Data Structures	CSE	3	0	0	3
6	Elective I	ECE	3	0	0	3
PRACTICAL						
7	Electronic Circuit Simulation Lab	ECE	0	0	4	2
8	Communication Engineering Lab	ECE	0	0	4	2
9	Digital Signal Processing Lab	ECE	0	0	4	2
					TOTAL	26

VI SEMESTER

S. No	Course Title	Offering Department	L	T	P	C
THEORY						
1	Digital Image Processing	ECE	3	0	0	3
2	Antenna and Wave Propagation	ECE	3	1	0	4
3	Computer Communication	ECE	3	0	0	3
4	VLSI Design Techniques	ECE	3	0	0	3
5	Electronic Measurements and Instrumentation	ECE	3	0	0	3
6	Elective II	ECE	3	0	0	3
PRACTICAL						
7	Networks Lab	ECE	0	0	4	2
8	VLSI Techniques Lab	ECE	0	0	4	2
9	Digital Image Processing Lab	ECE	0	0	4	2
					TOTAL	25

VII SEMESTER

S. No	Course Title	Offering Department	L	T	P	C
THEORY						
1	Embedded Systems	ECE	3	0	0	3
2	Microwave Engineering	ECE	3	0	0	3
3	Cellular Mobile Communication	ECE	3	0	0	3
4	Optical Communication	ECE	3	0	0	3
5	Engineering Management & Ethics	MGMT	3	0	0	3
6	Elective III	ECE	3	0	0	3
PRACTICAL						
7	Microwave and Optical Lab	ECE	0	0	4	2
8	Embedded Systems Lab	ECE	0	0	4	2
9	Comprehension	ECE	0	0	4	2
					TOTAL	24

VIII SEMESTER

S. No	Course Title	Offering Department	L	T	P	C
THEORY						
1	Elective IV	MGMT	3	0	0	3
2	Elective V	ECE	3	0	0	3
3	Elective VI	ECE	3	0	0	3
PRACTICAL						
7	Project Work and Viva-Voce	ECE			12	6
					TOTAL	15

ELECTIVE LIST

S. No	Course Title	Offering Department	L	T	P	C
1	Advanced Digital Signal Processing	ECE	3	0	0	3
2	Advanced Microprocessors	ECE	3	0	0	3
3	Video Processing	ECE	3	0	0	3
4	Real Time Operating Systems	ECE	3	0	0	3
5	Telecommunication Switching and Networks	ECE	3	0	0	3
6	Medical Electronics	ECE	3	0	0	3
7	Bio Medical Signal Processing	ECE	3	0	0	3
8	VLSI Signal Processing	ECE	3	0	0	3
9	Integrated Digital Networks	ECE	3	0	0	3
10	Multimedia Compression & Communication	ECE	3	0	0	3
11	Wireless Sensor Networks	ECE	3	0	0	3
12	Optical Networks	ECE	3	0	0	3
13	Information Security	CSE	3	0	0	3
14	Entrepreneurial skills development for Engineers	MECH	3	0	0	3
15	Satellite Communication	ECE	3	0	0	3
16	Robotics & Automation	ECE	3	0	0	3
17	Cloud Computing	CSE	3	0	0	3
18	Speech Processing	CSE	3	0	0	3
19	Nano Electronics	ECE	3	0	0	3
20	Avionics	ECE	3	0	0	3
21	Neural Networks & its Application	ECE	3	0	0	3
22	MEMS	ECE	3	0	0	3
INDUSTRIAL ELECTIVES						
23	Learning IT Essentials by Doing	INFOSYS	3	0	0	3
24	Business Intelligence	INFOSYS	3	0	0	3
25	Advanced Microcontroller	RENESAS SEMICONDUCTORS	3	0	0	3

SEMESTER – I

	ENGLISH FOR EFFECTIVE COMMUNICATION	L	T	P	C
		2	1	0	3

(COMMON TO ALL BRANCHES)

OBJECTIVES:

- To enable learners of Engineering and Technology develop their basic communication skills in English.
- To emphasize specially the development of speaking skills amongst learners of Engineering and Technology.
- To ensure that learners use the electronic media such as internet and supplement the learning materials used in the classroom.
- To inculcate the habit of reading and writing leading to effective and efficient communication.

UNIT – I : **9**

Word formation with prefixes and suffixes, Antonyms & Synonyms - Tense Forms - Different kinds of Nouns and Pronouns - Use of Verbs and Adverbs – Adjectives - Sentence Pattern (SVOCA) - Conditional Sentences - Auxiliary and Modal verbs – Articles.

UNIT – II : **9**

Phonetics (Vowels, Consonants and Diphthongs) - Pronunciation Guidelines - Vocabulary (Homophones).

UNIT – III : **9**

Principles of Communication - Defining and Describing Objects - Listening for Information and Making Inferences - Understanding Ideas and Making Inferences.

UNIT – IV : **9**

How to write reports, report writing – Recommendations - Discussing data and coming to conclusions - Rearranging the jumbled sentences.

UNIT – V : **9**

Skimming - Scanning – Flowcharts - Pie-charts - Formal and Informal letters - Resume Writing.

Total Hours: 45

OUTCOMES: Learners should be able to:

- Speak clearly, confidently, comprehensibly, and communicate with one or many listeners using appropriate communicative strategies.
- Write cohesively and coherently and flawlessly avoiding grammatical errors, using a wide vocabulary range, organizing their ideas logically on a topic.
- Read different genres of texts adopting various reading strategies.
- Listen/view and comprehend different spoken discourses/excerpts in different accents.Excel in academic and professional writing.

TEXT BOOK

1. **English for Effective Communication,** Departments of English, VMKV & AVIT. Erode: SCM Publishers, 2009.

REFERENCES

1. M.Ashraf Rizvi, **"Effective Technical Communication".** New Delhi: Tata McGraw Hill Publications, 2007.
2. Pickett and Laster. **"Technical English: Writing, Reading and Speaking".** New York: Harper and Row Publications, 2002.
3. Cutts, Martin. **"The Plain English Guide – How to Write Clearly and Communicate Better".** New Delhi: Oxford University Press, 1995.
4. Narayanaswami.V.R. **"Strengthen Your Writing".** Chennai: Orient Longman Ltd., 1996.
5. Prof.K.R.Lakshmi Narayanan & Dr.T.Murugavel, **"Communication Skills for Engineers",** Chennai: SCI Publications, 2002.

SEMESTER – I

	ENGINEERING MATHEMATICS – I	L	T	P	C
		3	1	0	4

(Common to MECH, ECE, CSE, CSSE, EEE, EIE, CIVIL, IT, MECHTRONICS, AERONAUCTICAL, ETC & AUTOMOBILE)

OBJECTIVES:

- To develop the use of matrix algebra techniques this is needed by engineers for practical applications.
- To make the student knowledgeable in the area of infinite series and their convergence so that he/ she will be familiar with limitations of using infinite series 12 approximations for solutions arising in mathematical modeling.
- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
- To introduce the concepts of improper integrals, Gamma, Beta and Error functions which are needed in engineering applications.
- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their usage.

UNIT- I : MATRICES **9**

Characteristic equation – Eigen values and eigenvectors of a real matrix – Properties of eigenvalues and eigenvectors (Without proof) – Cayley-Hamilton theorem (excluding proof) – Orthogonal transformation of a symmetric matrix to diagonal form.

UNIT- II : DIFFERENTIAL CALCULUS **9**

Curvature – Cartesian and Parametric Co-ordinates – Centre and radius of curvature – Circle of curvature – Evolute

UNIT- III : FUNCTIONS OF SEVERAL VARIABLES **9**

Partial Derivatives – Total Differential - Maxima and Minima – constrained Maxima and Minima by Lagrangian Multiplier Method.

UNIT- IV : LAPLACE TRANSFORMS **9**

Laplace transform – transform of elementary functions – basic properties – derivatives and integrals of transforms – transforms of derivatives and integrals – initial and final value theorems – Transform of periodic functions.

UNIT- V : APPLICATIONS OF LAPLACE TRANSFORMS **9**

Inverse Laplace transform – Convolution theorem – Initial and Final value theorem - Solution of linear ODE of second order with constant coefficients and first order simultaneous equation with constant coefficients using Laplace transforms.

Total Hours: 60
Lecture Hours: 45
Tutorial Hours: 15

OUTCOMES: Learners should be able to:

- Speak clearly, confidently, comprehensibly, and communicate with one or many listeners using appropriate communicative strategies.
- Write cohesively and coherently and flawlessly avoiding grammatical errors, using a wide vocabulary range, organizing their ideas logically on a topic.
- Read different genres of texts adopting various reading strategies.
- Listen/view and comprehend different spoken discourses/excerpts in different accents.

TEXT BOOKS

1. **"Engineering Mathematics - I"** by Department of Mathematics, VMU

2. Veerarajan, T., **"Engineering Mathematics"**, Tata McGraw Hill Publishing Co., NewDelhi, 2006.

3. Dr.A .Singaravelu , **"Engineering Mathematics Volume I & Volume II"** by Meenakshi Publications.

REFERENCES

1. Grewal, B.S., **"Higher Engineering Mathematics"** (36th Edition), Khanna Publishers, Delhi 2001.

2. Kreyszig, E., **"Advanced Engineering Mathematics"** (8th Edition), John Wiley and Sons (Asia) Pvt Ltd., Singapore, 2001.

3. Kandasamy .P., Thilagavathy. K., and Gunavathy. K., **"Engineering Mathematics",** Volumes I & II (4th edition), S.Chand & Co., New Delhi., 2001.

SEMESTER – I

	BASIC MECHANICAL ENGINEERING & BASIC CIVIL ENGINEERING	L	T	P	C
		2	1	0	3

(COMMON TO ECE, EIE, EEE, ETC, CSE, IT, CSSE, MECT& BME)

OBJECTIVES

- The motive is to impart basic knowledge on Civil and Mechanical Engineering.
- We Aim to explain the materials used for the construction of civilized structures.
- To make the students understand the fundamentals of construction of structure.
- Has to explain the component of power plant units and detailed explanation to IC engines their working principles.

a) CIVIL ENGINEERING

UNIT- I : SURVEYING AND CIVIL ENGINEERING MATERIALS 8

Surveying: Objects – types – classification – principles – measurements of distances – angles – Leveling – determination of areas – illustrative examples.

Civil Engineering Materials: Bricks – stones – sand – cement – concrete – steel sections.

UNIT- II : BUILDING COMPONENTS AND STRUCTURES 8

Foundations: Types, Bearing capacity – Requirement of good foundations.

Superstructure: Brick masonry – stone masonry – beams – columns – lintels – roofing – flooring – plastering – Types of Bridges and Dams – Basics of Interior Design and Landscaping.

UNIT- III : BASICS OF ENGINEERING MECHANICS 7

Mechanics – Internal and external forces – stress – strain – elasticity – Centroid – Centre of Gravity – Simple problems - Moment of Inertia – Simple Problems.

b) MECHANICAL ENGINEERING

UNIT- IV : POWER PLANT ENGINEERING 8

] Introduction, Classification of Power Plants – Working principle of steam, Gas, Diesel, Hydroelectric and Nuclear Power plants – Merits and Demerits – Pumps and turbines – working principle of Reciprocating pumps (single acting and double acting) – Centrifugal Pump.

UNIT- V : IC ENGINES 8

Internal combustion engines as automobile power plant – Working principle of Petrol and Diesel Engines – Four stroke and two stroke cycles – Comparison of four stroke and two stroke engines – Boiler as a power plant.

UNIT-VI : REFRIGERATION AND AIR CONDITIONING SYSTEM 7

Terminology of Refrigeration and Air Conditioning. Principle of vapour compression and absorption system – Layout of typical domestic refrigerator – Window and Split type room Air conditioner.

OUTCOMES

- The main ability is to explain the usage of construction material and proper selection of construction materials.
- To create an ability to design building structures.
- Aim to identify the components use in power plant cycle.
- Ability to demonstrate working principles of petrol and diesel engine.
- Knowledge to explain the components of refrigeration and Air conditioning cycle.

Total Hours: 46

REFERENCES

1. Shanmugam G and Palanichamy M S, **"Basic Civil and Mechanical Engineering"**, Tata McGraw Hill Publishing Co., New Delhi, (1996).

2. Ramamrutham. S**, "Basic Civil Engineering"**, Dhanpat Rai Publishing Co. (P) Ltd. (1999).

3. Seetharaman S. **"Basic Civil Engineering"**, Anuradha Agencies, (2005).

4. Venugopal K and Prahu Raja V, **"Basic Mechanical Engineering"**, Anuradha Publishers, Kumbakonam, (2000).

5. Shantha Kumar S R J., **"Basic Mechanical Engineering"**, Hi-tech Publications, Mayiladuthurai, (2000).

SEMESTER – I

	ENGINEERING PHYSICS	L	T	P	C
		2	1	0	3

(COMMON TO ALL BRANCHES)

OBJECTIVES:

To enhance the fundamental knowledge in Physics and its applications relevant to various streams of Engineering and Technology.

UNIT – I : LASERS **9**

Einstein coefficients (A&B), Nd – YAG laser, CO2 laser, semiconductor laser (homojunction) – uses of lasers – Holography – construction and reconstruction of a hologram.

UNIT – II : FIBRE OPTICS **9**

Principle and propagation of light in optical fibres – numerical aperture and acceptance angle – types of optical fibres (material, refractive index, mode) – Applications: Fibre optic communication system (block diagram only) – fibre optic sensors (displacement sensor and pressure sensor).

UNIT – III : CRYSTAL PHYSICS **9**

Lattice – unit cell – Bravais lattice – Lattice planes – Miller indices – L'd spacing in cubic lattice – calculation of number of atoms per unit cell – atomic radius – coordination number – packing factor for SC, BCC, FCC, HCP structures.

UNIT – IV : ACOUSTICS **9**

Classification of sound – characteristics of musical sound – loudness – Weber-Fechner law – decibel – absorption coefficient – experimental determination – reverberation – reverberation time – Sabine's formula (no derivation) – factors affecting acoustics of buildings (reverberation time, loudness, focusing, echo, echolen effect, resonance and noise) and their remedies.

UNIT – V : NON – DESTRUCTIVE TESTING **9**

Liquid penetrant method – ultrasonic flaw detection – ultrasonic flaw detector (block diagram) – X-ray Radiography: displacement method – X-ray Fluoroscopy – merits and demerits of each method.

Total Hours: 45

OUTCOMES: The students will have knowledge on the basics of physics related to properties of matter, Optics, acoustics etc., and they will apply these fundamental principles to solve practical problems related to materials used for engineering applications

TEXT BOOK

1. **"Engineering Physics",** compiled by Department of Physics, Faculty of Engineering & technology, VMRFDU, Anuradha Agencies, 2006.

REFERENCE BOOKS

1. Gaur R. K. and Gupta S. L., **"Engineering Physics"**, Dhanpat Rai publishers, New Delhi, 2001.
2. Rajendran. V, **"Engineering Physics",** Tata Mc Graw Hill Publication and Co New Delhi, 2009.
3. Pillai S.O, **"Solid State Physics"**, New Age International Publication, New Delhi, (2003).
4. Palanisamy P.K,. **"Physics for Engineers",** SciTech publications (India) Pvt. Ltd., Chennai (2005).
5. Rajendran V and Marikani, **"Physics for Engineers",** Tata McGraw Hill Publishing Company Ltd, New Delhi (2004).

6. Arumugam M, **"Engineering Physics",** Anuradha Agencies, Kumbakonam, Second Edition (2005).

SEMESTER – I

	COMPUTER FOUNDATION PROGRAM	L	T	P	C
		2	1	0	3

(COMMON TO ALL BRANCHES)

OBJECTIVES:

- Learn the organization of a digital computer.
- Be exposed to the number systems.
- Learn to think logically and write pseudo code or draw flow charts for problems.
- Learn to use arrays, strings, functions, pointers, structures and unions in C.

UNIT - I : BASICS OF COMPUTER AND INFORMATION TECHNOLOGY 9

Digital computer fundamentals - Block diagram of a computer - component of a computer system Hardware and software definitions-Categories of software – Booting - Installing and Uninstalling Software - Software piracy - Software terminologies - Application of Computer - Role of Information Technology - History of Internet - Internet Services.

UNIT- II : PROBLEM SOLVING METHODOLOGIES AND TECHNIQUES 9

Problems solving Techniques - Program development cycle – Algorithm – Design - Flow chart - Program control structures - Types and generation of programming languages - Development of algorithms for simple problems. Top down and Bottom up approaches of software development.

UNIT- III : BASICS OF COMPUTER ARCHITECTURE AND SYSTEM SOFTWARE 9

Fundamentals of Computer Architecture - Introduction - Organization of a small computer Central Processing Unit - Execution cycle-Instruction categories – measure of CPU performance Memory - Input/output devices – BUS - addressing modes. System Software - Assemblers-Loaders and linkers - Compilers and interpreters.

UNIT- IV : BASICS OF OPERATING SYSTEM AND DBMS 9

Introduction- Basics of memory management schemes - Scheduling-threads. Introduction to File and Database systems – SQL - DDL statements - DML statements - DCL statements.

UNIT- V : SOFTWARE APPLICATIONS 9

Office Automation: Application Packages - word processing - Spread sheet Application and Basics of HTML. **Total Hours: 45**

OUTCOMES:

- Design C Programs for problems.
- Write and execute C programs for simple applications

REFERENCES

1. Ashok N.Kamthane, **"Programming with ANSI and TURBO C",** Pearson Education (India) 2005.

2. V.Ramesh babu, **"Fundamental of Computing",** VRB publisher, 2004.

3. Carl Hamacher, Zvonko Varnesie and Safwat Zaky, 5th Edition, **"Computer Organization"**, McGraw-Hill, 2002.

4. Leland L.Beck, **"System Software- An Introduction to Systems Programming",** 3rd Edition, Pearson Education Asia, 2000.

5. Abraham Silberschatz, Peter Baer Galvin and Greg Gange, **"Operating System Concepts",** Sixth Edition, John Wiley & Sons Pvt. Ltd,2003.

6. Abraham Silberschatz, Henry F.Korth and S.Sudarshan **, "Database Systems Concepts",** 4th Edition, McGraw-Hill, 2002. **SEMESTER – I**

	ENVIRONMENTAL SCIENCE & ENGINEERING	L	T	P	C
		3	1	0	4

(COMMON TO ALL BRANCHES)

- OBJECTIVES:
- To the study of nature and the facts about environment.
- To finding and implementing scientific, technological, economic and political solutions to environmental problems.
- To study the interrelationship between living organism and environment.
- To appreciate the importance of environment by assessing its impact on the human world; envision the surrounding environment, its functions and its value.
- To study the dynamic processes and understand the features of the earth' s interior and surface.
- To study the integrated themes and biodiversity, natural resources, pollution
- control and waste management.

UNIT – I : ENVIRONMENT AND NATURAL RESOURCES 9

Environment – Definition , scope & importance – Public awareness – Forest resources , mineral resources , water resources, food resources , energy resources (uses, over -exploitation & adverse effects in each case) – Scope & role
of environmental engineers in conservation of natural resources – Sustainability development.

UNIT – II : ECOSYSTEMS AND BIO – DIVERSITY 9

Ecosystem – Definition, structure and function – Energy flow – Ecological succession – food chain, food web, ecological pyramids – Introduction, types, characteristics, structure and function of forest, grassland, desert and Aquatic ecosystems - Bio – Diversity : values and uses, hotspots, threats and conservation.

UNIT – III : ENVIRONMENTAL POLLUTION 9

Pollution – Definition , man made impacts and control measures of air, water and land pollution – Water quality standards & characterization – Importance of sanitation -Nuclear hazards – Hazardous waste management : Solid waste, waste water and biomedical waste – Prevention of pollution and role of individual – Disasters management : Floods, earthquake, cyclone and land slides – Clean technology options.

UNIT – IV : SOCIAL ISSUES AND ENVIRONMENT 9

Urban problems related to energy – Water conservation – Resettlement and rehabilitation of people – Environmental ethics – Climate change – Global warming – Acid rain – Ozone depletion- Waste land reclamation , Environment Protection Act for air, water , wild life and forests - Pollution Control Board.

UNIT – V : HUMAN POPULATION AND ENVIRONMENT 9

Population growth – Population explosion – Family welfare programme – Environment & human health – Human rights – Value education – Women and child welfare, Role of information technology in environment and human health.

Total Hours: 45

OUTCOMES:

Environmental Pollution or problems cannot be solved by mere laws. Public participation is an important aspect which serves the environmental Protection. One will obtain

knowledge on the following after completing the course.

- Public awareness of environmental is at infant stage.
- Ignorance and incomplete knowledge has lead to misconceptions
- Development and improvement in std. of living has lead to serious environmental disasters

TEXT BOOK

1. Raman Sivakumar, **"Introduction to Environment Science and Engineering",** McGraw – Hill International, New Delhi 2005.

REFERENCES

1. **"Environmental Science and Engineering"** by Dr. J. Meenambal , MJP Publication , Chennai

2. Gilbert M. Masters, **"Introduction to Environmental Engineering and Science",** Pearson Education Pvt Ltd., 2nd Edition, ISBN 81-297-0277-0, 2004

3. Miller T.G., **"Jr Environmental Science",** Wadsworth Publishing Co.

4. Townsend C. Harper J. and Michael Begon, **"Essentials of Ecology, Blackwell Science".**

5. Wager K.D. **"Environmental Management",** W.B. Saunders Co. Philadelphia, USA, 1998.

6. Bharucha Erach, **"The Biodiversity of India"**, Mapin Publishing Pvt Ltd, Ahmedabad, India

7. Trivedi R.K. **" Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards Vol I & II"**, Enviro media.

SEMESTER – I

	ENGINEERING PHYSICS LAB	L	T	P	C
		0	0	4	2

(Common to all Branches)

OBJECTIVES: To introduce different experiments to test basic understanding of physics concepts applied in optics, thermal physics and properties of matter.

LIST OF EXPERIMENTS

1. Young's modulus of a bar - Non-uniform bending
2. Rigidity modulus of a wire - Torsional Pendulum
3. Viscosity of a liquid - Poiseuille's method
4. Velocity of ultrasonic waves in liquids - Ultrasonic Interferometer
5. Particle size determination using Laser
6. Wavelength of spectral lines – grating - Spectrometer
7. Thickness of a wire - Air wedge Method
8. Thermal conductivity of a bad conductor - Lee's disc
9. Band gap determination of a thermistor - Post Office Box
10. Specific resistance of a wire – Potentiometer

OUTCOMES: The hands on exercises undergone by the students will help them to apply physics principles of optics and thermal physics to evaluate engineering properties of materials.

SEMESTER – I

	WORKSHOP PRACTICE	L	T	P	C
		0	0	2	1

(Common to MECH, ECE, CSE, CSSE, EEE, EIE, CIVIL, IT, MECHTRONICS, AERONAUCTICAL, ETC & AUTOMOBILE)

OBJECTIVES:

- To provide exposure to the students with hands on experience on various basic engineering practices in Civil, Mechanical, Electrical and Electronics Engineering.

LIST OF EXPERIMENTS

FITTING

1. Vee Joint
2. Square Joint
3. Dove Tail Joint

CARPENTRY

1. Planning
2. Half lab
3. Dove Tail Joint

WELDING

1. Arc Welding of butt Joint.
2. Arc Welding of Lap Joint

DEMONSTRATION

1. Sheet Metal – Fabrication of tray and cone
2. Black Smithy – Round to square rod.
3. Foundry – Mould Preparation using single piece and split pattern

OUTCOMES:

- Ability to fabricate carpentry components and pipe connections including plumbing works.
- Ability to use welding equipments to join the structures
- Ability to fabricate electrical and electronics circuits

REFERENCE

1. **"Basic Workshop Practice",** Department of Mechanical Engineering, VMKV Engineering College, 2008

SEMESTER – I

	COMPUTER FOUNDATION PROGRAM LAB	L	T	P	C
		0	0	4	2

(Common to all Branches)

LIST OF EXPERIMENTS

I. OFFICE AUTOMATION

1. Create a document with all formatting effects.
2. Create a document to send mails using mail merge option.
3. Create an Excel File to analyze the student's performance. Create a chart for the above data to depict it diagrammatically.
4. Create Excel sheet to maintain employee information and use this data to send mails using mail merge.
5. Create a Power Point presentation for your personal profile with varying animation effects with timer.

II. SQL QUERIES

1. Write SQL Commands for Data Definition, Table Creation with constraints.
2. Write SQL Commands for Insert, Select, Update and Delete operations.
3. Write SQL Commands for aggregate functions.

III. HTML

1. Write HTML code to develop a web page having the background in red and title "My First Page" in any other color.
2. Design a page having background color given text color red and using all the attributes of font tab.
3. Create a web page, when user clicks on the link it should go to the bottom of the page.
4. Create a web page, showing an ordered & unordered list of name of your five friends.
5. Create a web page with appropriate content and insert an image towards the left hand side of the page when user clicks on the image. It should open another web page.
6. Create a web page which should contain a table having two rows and two columns.

OUTCOMES

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

- Apply good programming design methods for program development.
- Design and implement C programs for simple applications.
- Develop recursive programs.

SEMESTER – II

	BUSINESS ENGLISH	L	T	P	C
		2	1	0	3

(Common to all Branches)

OBJECTIVES:

- To make learners acquire listening and speaking skills in both formal and informal contexts.
- To help them develop their reading skills by familiarizing them with different types of reading strategies.
- To equip them with writing skills needed for academic as well as workplace contexts.
- To make them acquire language skills at their own pace by using e-materials and language lab components.

UNIT – I : **9**

Subject and Verb Agreement (Concord) - Active and Passive Voice, Impersonal Passive Voice – Preposition - Common Errors - Direct Speech and Indirect Speech - Cause and Effect - Phrasal Verbs and Idioms and Phrases - Question Tags – Vocabulary.

UNIT – II : **9**

Stress (Word Stress and Sentence Stress) – Intonation - Differences in British and American English – Indianism.

UNIT – III : **9**

Role Play - Telephonic Etiquettes - Interview Questions (Direct, Open-ended and Closed Questions) - E-mail Netiquette, Sample E-mails.

UNIT – IV: **9**

Instruction - Check-list - Minutes of the Meeting and Writing Agenda - Note making.

UNIT – V : **9**

Reading Comprehension - Interpreting Tables - Bar charts - Business Letters (Calling for Quotation, Placing Orders and Complaint Letters) - Essay Writing and Developing Hints.

Total Hours : 45

OUTCOMES: students should be able to

- speak convincingly, express their opinions clearly, initiate a discussion, negotiate, argue using appropriate communicative strategies.
- write effectively and persuasively and produce different types of writing such as narration, description, exposition and argument as well as creative, critical, analytical and evaluative writing.

TEXT BOOK

1. **"English for Effective Communication",** Departments of English, VMKV & AVIT. Erode: SCM Publishers, 2009.

REFERENCE BOOKS

1. M.Ashraf Rizvi, **"Effective Technical Communication",** New Delhi: Tata McGraw Hill Publications, 2007.

2. Pickett and Laster, **"Technical English: Writing, Reading and Speaking",** New York: Harper and Row Publications, 2002.
3. Cutts, Martin, **"The Plain English Guide – How to Write Clearly and Communicate Better",** New Delhi: Oxford University Press, 1995.
4. Narayanaswami.V.R., "**Your Writing",** Chennai: Orient Longman Ltd., 1996.
5. Prof.K.R.Lakshmi Narayanan & Dr.T.Murugavel, **"Communication Skills for Engineers",** Chennai: SCI Publications, 2002.

SEMESTER – II

	ENGINEERING MATHEMATICS – II	L	T	P	C
		3	1	0	4

(Common to MECH, ECE, CSE, CSSE, EEE, EIE, CIVIL, IT, MECHTRONICS, AERONAUCTICAL, ETC & AUTOMOBILE)

OBJECTIVES:

- To make the student acquire sound knowledge of techniques in solving ordinary differential equations that model engineering problems.
- To acquaint the student with the concepts of vector calculus, needed for problems in all engineering disciplines.
- To make the student appreciate the purpose of using transforms to create a new domain in which it is easier to handle the problem that is being investigated.

UNIT- I : ORDINARY DIFFERENTIAL EQUATIONS 9

Solutions of third and higher order linear ordinary differential equation with constant coefficients – Method of variation of parameters – Cauchy's and Legendre's linear equations – Simultaneous first order linear equations with constant coefficients.

UNIT- II : MULTIPLE INTEGRALS 9

Double integration – change of order of integration- Cartesian and polar coordinates – Area as a double integral – Triple integration – Volume as a triple integral.

UNIT- III : VECTOR CALCULUS 9

Directional derivatives – Gradient, Divergence and Curl – Irrotational and solenoidal - Vector fields – Vector integration – Green's theorem, Gauss divergence theorem and Stoke's theorem (excluding proof).

UNIT- IV : ANALYTIC FUNCTIONS 9

Function of a complex variable – Analytic function – Necessary conditions - Cauchy Riemann equations – Sufficient conditions (excluding proof) – Harmonic conjugate–Constructions of analytic functions - Conformal mapping (w=z+c, w=z, w=1/z) - Bilinear transformation

UNIT- V : COMPLEX ANALYSIS 9

Statement and application of Cauchy's integral theorem and integral formula – Taylor's and Laurent's expansions – Residues – Cauchy's residue theorem - Contour integration over unit circle.

Total hours: 60
Lecture Hours: 45
Tutorial Hours: 15

OUTCOMES:

The subject helps the students to develop the fundamentals and basic concepts in vector calculus, ODE, Laplace transform and complex functions. Students will be able to solve problems related to engineering applications by using these techniques.

TEXT BOOKS

1**. "Engineering Mathematics - II"** by Department of Mathematics, VMU.

2. Veerarajan, T., **"Engineering Mathematics",** Tata McGraw Hill Publishing Co., NewDelhi, 2006.

3. Dr. A .Singaravelu , **"Engineering Mathematics Volume I & Volume II"** by Meenakshi Publications.

REFERENCE BOOKS

1. Grewal, B.S., **"Higher Engineering Mathematics"** (36th Edition), Khanna Publishers,Delhi 2001.
2. Kreyszig, E., **"Advanced Engineering Mathematics",** (8th Edition), John Wiley and Sons (Asia) Pvt Ltd., Singapore, 2001.
3. Kandasamy .P., Thilagavathy. K., and Gunavathy. K., **"Engineering Mathematics -Volumes I & II",** (4th Edition), S.Chand & Co., New Delhi., 2001

SEMESTER – II

	ENGINEERING CHEMISTRY	L	T	P	C
		2	1	0	3

(Common to all Branches)

OBJECTIVES:

- To make the students conversant with boiler feed water requirements, related problems and water treatment techniques.
- Principles of electrochemical reactions, redox reactions in corrosiion of materials and methods for corrosion prevention and protection of materials.
- Principles and generation of energy in batteries, nuclear reactors, solar cells, wind mills and fuel cells.

UNIT- I : WATER TECHNOLOGY & CORROSION 9

Sources of water – impurities – Hardness and its determination (problems to be avoided) – boiler troubles – water softening (zeolite & Demineralisation) – Domestic water treatment – Desalination (Electrodialysis & Reverse Osmosis). Corrosion – Types – principles – corrosion control methods (Sacrificial and Impressed current method).

UNIT- II : ELECTROCHEMISTRY, BATTERIES AND FUEL CELLS 9

Ostwald Law and Debye Huckle's law - Cells – Electrode (SHE, Calomel and Glass) - Electro de potential – Nernst equation – EMF series. Primary cells – secondary batteries – charging and discharging.

UNIT- III : CHEMISTRY OF ADVANCED MATERIALS 9

Portland cement –setting and hardening – RCC – Special cements. Organic electronic material, solid oxide materials, shape memory alloys, nanomaterials, polymers, fullerenes, ceramics, fibers, lubricants, refractories & composites (definition, classification and applications)

UNIT- IV : PHASE EQUILIBRIA & NUCLEAR CHEMISTRY 9

Phase rule: statement and explanation of terms involved – One component system – Condensed phase rule – Two component system. Nuclear Chemistry – Fission – Fusion – working of nuclear reactor – Radiations and harmful effects.

UNIT- V : CHROMATOGRAPHY AND SPECTROSCOPY 9

Chromatography — classification & principles (Paper, column, thin layer, gas, HPLC). Spectroscopy – Electromagnetic radiation – Beer Lambert's law – UV – Visible – IR (Principle and Instrumentation, block diagram) – Atomic absorption spectroscopy.

Total Hours: 45

OUTCOMES: The knowledge gained on engineering materials, fuels, energy sources and water treatment techniques will facilitate better understanding of engineering processes and applications for further learning.

TEXT BOOK

1. P.C. Jain and M. Jain (2006), **"Engineering Chemistry",** 15th Edition, Dhanpat Rai Publishing Co., New Delhi.

REFERENCES:

1. S.S. Dara (2006), **"A Text book of Engineering Chemistry",** 11th Revised Edition.

2. **"A Text Book of Engineering Chemistry"** by Shashi Chawla (2003), Dhanpat Rai & Co (pvt.)Ltd.(first published 2001).

SEMESTER – II

	BASIC ELECTRICAL ENGINEERING & BASIC ELECTRONICS ENGINEERING	L	T	P	C
		3	1	0	3

(Common to ECE,ETCE,MECHT,BME,BT,BF,EEE,EIE,CSE,IT,CSSE AND CIVIL)

OBJECTIVES:

- Be exposed to basic electronic devices
- Be familiar with the theory, construction, and operation of Basic electronic devices.

a) ELECTRICAL ENGINEERING

UNIT- I : ELECTRICAL CIRCUITS & METERS 8

Definition of electromotive force, current, power and energy - International System of units - Ohm's law and Kirchhoff's laws - solution of series and parallel Circuits. Generation of alternating voltage - average and RMS values - solution of simple R,RL,RC and RLC circuits - Calculation of power and power factor in AC circuits. Construction and principles of operation of moving coil, moving iron and dynamometer instruments.

UNIT- II : DC MACHINES (QUALITATIVE TREATMENT ONLY) 8

Dc machines – parts - DC generator - EMF equation - Different types of DC generators and their applications - DC motors and their applications - different types - speed control - Starters.

UNIT - III : AC MACHINES (QUALITATIVE TREATMENT ONLY) 7

Construction & principle of operation of transformers - Single phase & Three phase transformers - Construction and operation of AC motors - Single phase and three phase Induction motors - applications - construction, principles of operation and application of synchronous motors.

b) ELECTRONICS ENGINEERING

UNIT- I : SEMICONDUCTOR DEVICES AND APPLICATIONS 8

Passive and Active Components – Resistors, Inductors, Capacitors, Characteristics of PN Junction Diode – Zener Effect – Zener Diode and its Characteristics – Half wave and Full wave Rectifiers – Voltage Regulation. Bipolar Junction Transistor – CB, CE, CC Configuration and Characteristics.

UNIT- II : FUNDAMENTALS OF COMMUNICATION ENGINEERING 8

Types of Signals: Analog and Digital Signals – Modulation and Demodulation: Principles of Amplitude Modulation, Angle Modulation, Pulse Amplitude Modulation, Pulse Width Modulation and Pulse Code Modulation Communication Systems: Radio, High Definition TV, MODEM, Fax, Microwave, Radar, Satellite and Optical Fibre, Mobile-Cellphones (block diagram description only).

UNIT- III : STUDY OF ADVANCED ELECTRONIC GADGETS 7

High Definition Camera, High Definition Video Camera, Tablet PC, Android Phones, ipods, Video Game Consoles

Total Hours: 46

OUTCOMES: At the end of the course, the student should be able to:

- Explain the theory, construction, and operation of basic electronic devices.
- Use the basic electronic devices

TEXT BOOKS

1. **"Basic Electrical and Electronics Engineering",** Compiled by Department of EEE & ECE Faculty of Engineering and Technology, VMRFDU, Anuradha Agencies, 2006.

2. Edward Hughes, **"Electrical and Electronics Technology",** Pearson Education Limited, 9th Edition, 2005.

REFERENCES

1. B.R. Guptha, **"Principles of Electrical Engineering",** S.Chand & Co, 2002.
2. I.J.Nagrath, **"Elements of Electrical Engineering",** Tata McGraw Hill Publishing Co., 2002.
3. H.Cotton., **"Advanced Electrical Technology",** Wheeler, 1983.
4. Anokh Singh, **"Principles of Communication Engineering",** S.Chand & Co, 1994.
5. John Kennedy, **"Electronics Communication System",** Tata McGraw Hill.
6. Millman and Halkias, **"Electronic Devices and Circuits",** Tata McGraw Hill.
7. V.K.Mehta, **"Principles of Electronics",** S.Chand & Co, 2002.
8. http://en.wikipedia.org/wiki/cell-phone
9. http://en.wikipedia.org/wiki/high-definition-video
10. http://en.wikipedia.org/wiki/tablet-components
11. http://en.wikipedia.org/wiki/cell-phone
12. http://en.wikipedia.org/wiki/android-operating -system
13. http://www.apple.com/pad/
14. http://en.wikipedia.org/wiki/ipad
15. http://en.wikipedia.org/wiki/video-game-console

SEMESTER – II

	CIRCUIT THEORY	L	T	P	C
		2	1	0	3

(Common to ECE, ETCE, BME and MECHTRONICS)

OBJECTIVES:

- To introduce electric circuits and its analysis
- To impart knowledge on solving circuits using network theorems
- To introduce the phenomenon of resonance in coupled circuits.
- To educate on obtaining the transient response of circuits.
- To Phasor diagrams and analysis of three phase circuits

UNIT- I :- BASIC CIRCUIT ANALYSIS 9

Ohm's law, Kirchoff's laws. DC and AC circuits. Resistors in series and parallel circuits. Mesh current and node voltage method of analysis for DC and AC circuits (AC circuits at elementary level only)

UNIT- II : NETWORK REDUCTION AND NETWORK THEOREMS FOR DC AND AC CIRCUITS 9

Network reduction: Voltage and current division - Source Transformation - Star, delta conversion, Thevenin's Theorem and Norton's Theorem-Superposition Theorem-Maximum power transfer Theorem.

UNIT- III : RESONANCE AND COUPLED CIRCUITS 9

Series and Parallel resonance - their frequency response - Quality factor and Bandwidth - Self and Mutual inductance - Co-efficient of coupling - Tuned circuits - Single Tuned circuits and double Tuned circuits.

UNIT- IV : TRANSIENT RESPONSE OF DC AND AC CIRCUITS. 9

Transient response of RL, RC, and RLC circuits using Laplace Transform for DC input and AC sinusoidal inputs only.

UNIT- V : ANALYSIS OF THREE PHASE CIRCUITS 9

Three phase balanced and unbalanced voltage sources- Analysis of three phase 3 wire and 4 wire circuits with star and delta connected loads - balanced and unbalanced phasor diagram of voltages and currents - Power and power factor measurements in three phase circuits.

Total Hours: 45

OUTCOMES:

- Ability analyze electrical circuits
- Ability to apply circuit theorems
- Ability to analyze AC and DC Circuits

TEXT BOOKS

1. **"Electric Circuit Analysis",** Sudhakar.A and Shyam Mohan.SP, 2nd Edition, 2009, Tata Mc-Graw Hill Publications, New Delhi.
2. **"Engineering Circuit Analysis",** Gnanavadivel.J, Senthilkumar.C and Maruthupandi.P, 2nd Edition, 2010, Anuradha Publications, Kumbakonam.

REFERENCES

1.**"Engineering Circuit Analysis",** W.H.Hayt & J.K.Kemmerly and Steven M.Durbin, 7th Edition, 2007, Tata Mc-Graw Hill Publications, New Delhi.

2. **"Circuit Theory",** A.Chakabarthi, 5th Edition, 2006, Dhanpatrai & Co, New Delhi.

SEMESTER – II

	PROGRAMMING IN C	L	T	P	C
		2	1	0	3

(Common to all Branches)

OBJECTIVES: The students should be made to:

- Learn the organization of a digital computer.
- Be exposed to the number systems.
- Learn to think logically and write pseudo code or draw flow charts for problems.
- Be exposed to the syntax of C.
- Be familiar with programming in C.
- Learn to use arrays, strings, functions, pointers, structures and unions in C.

UNIT – I : **9**

Introduction: Algorithms & flowcharts - Overview of C - Features of C - IDE of C Structure of C program - Compilation & execution of C program - Identifiers, variables, expression, keywords, data types, constants, scope and life of variables, local and global variables. Operators: arithmetic, logical, relational, conditional and bitwise operators- Special operators: size of () & comma (,) operator-Precedence and associativity of operators & Type conversion in expressions.

Basic input/output and library functions: Single character input/output i.e. getch(), getchar(), getche() & putchar() - Formatted input/output: printf() and scanf() - Library Functions: concepts, mathematical and character functions.

UNIT – II : **9**

Control structures: Conditional control - Loop control and Unconditional control structures.

Functions: The Need of a function - User defined and library function - Prototype of a function - Calling of a function - Function argument - Passing arguments to function - Return values - Nesting of function - main() - Command line arguments and recursion. Storage class specifier – auto, extern, static, & register.

UNIT – III : **9**

Arrays: Single and multidimensional arrays - Array declaration and initialization of arrays - Array as function arguments.

Strings: Declaration - Initialization and string handling functions.

Structure and Union: Defining structure - Declaration of structure variable - Accessing structure members - Nested structures - Array of structures - Structure assignment - Structure as function argument - Function that returns structure- Union.

UNIT - IV : **9**

Pointers: The & and * operators - Pointers expressions - Pointers Vs arrays - Pointer to functions - Function returning pointers - Static and dynamic memory allocation in C.

DMA functions: malloc(), calloc(), sizeof(), free() and realloc() - Preprocessor directives.

UNIT – V : **9**

File management: Defining, opening & closing a file, text file and binary file - Functions for file handling: fopen, fclose, gets, puts, fprintf, fscan, getw, putw, fputs, fgets, fread, fwrite - Random access to files: fseek, ftell, rewind - File name as Command Line Argument.

Total Hours: 45

OUTCOMES: At the end of the course, the student should be able to:

- Design C Programs for problems.

- Write and execute C programs for simple applications

TEXT BOOKS

1. Balaguruswami.E, **"Programming in C",** TMH Publications, 1997.

REFERENCES

1. Behrouz A. Forouzan & Richard F. Gilberg, **"Computer Science A Structured Programming using C",** Cengage Learning, 3rd Edition, 2007.
2. Gottfried , **"Programming with C",** schaums outline series, TMH publications,1997.
3. Mahapatra , **"Thinking in C",** PHI publications, 2nd Edition, 1998..
4. Stevens , **"Graphics programming in C",** BPB publication, 2006.
5. Subbura.R , **"Programming in C",** Vikas publishing, 1st Edition.

SEMESTER – II

	ENGINEERING CHEMISTRY LAB	L	T	P	C
		0	0	4	2

(Common to all Branches)

OBJECTIVES:

- To make the student to acquire practical skills in the determination of water quality parameters through volumetric and instrumental analysis.
- To acquaint the students with the determination of molecular weight of a polymer by vacometry.

LIST OF EXPERIMENTS

1. Estimation of total hardness of water sample by EDTA method.
2. Determination of alkalinity by indicator method.
3. Estimation of ferrous ion by Potentiometry.
4. Titration of strong acid with strong base by Conductometry.
5. Acid base reaction by pH metry.
6. Estimation of copper from its ore.
7. Estimation of iron by spectrophotometer.
8. Estimation of sodium by flame photometer.

OUTCOMES: The students will be outfitted with hands-on knowledge in the quantitative chemical analysis of water quality related parameters

SEMESTER – II

	ENGINEERING GRAPHICS	L	T	P	C
		2	0	3	3

(Common to MECH, AUTOMOBILE, AERONAUTICAL, ECE, EIE, EEE, ETC& MECT)

OBJECTIVES :

To develop in students, graphic skills for communication of concepts, ideas and design of engineering products and expose them to existing national standards related to technical drawings.

UNIT- I : PLANE CURVES AND FREE HAND SKETCHING 9

Curves used in engineering practices:

Conics – Construction of ellipse, Parabola and hyperbola by eccentricity method – Construction of cycloid – construction of involutes of squad and circle – Drawing of tangents and normal to the above curves.

UNIT- II : PROJECTION OF POINTS, LINES AND PLANE SURFACES 9

Projection of points and straight lines located in the first quadrant – Determination of true lengths and true inclinations – Projection of polygonal surface and circular lamina inclined to both reference planes.

UNIT- III : PROJECTION OF SOLIDS 9

Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one reference plane by change of position method.

UNIT- IV : SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES 9

Sectioning of above solids in simple vertical position by cutting planes inclined to one reference plane and perpendicular to the other – Obtaining true shape of section. Development of lateral surfaces of simple and truncated solids – Prisms, pyramids, cylinders and cones – Development of lateral surfaces of solids with cylindrical cutouts, perpendicular to the axis.

UNIT- V : ISOMETRIC AND PERSPECTIVE PROJECTIONS 9

Principles of isometric projection – isometric scale – isometric projections of simple solids, truncated prisms, pyramids, cylinders and cones. Perspective projection of prisms, pyramids and cylinders by visual ray method.

Total Hours: 45

OUTCOMES: On Completion of the course the student will be able to:

- Perform free hand sketching of basic geometrical constructions and multiple views of objects.
- Do orthographic projection of lines and plane surfaces.
- Draw projections and solids and development of surfaces.
- Prepare isometric and perspective sections of simple solids.
- Demonstrate computer aided drafting

TEXT BOOK

1. N.D. Bhatt, **"Engineering Drawing",** Charotar Publishing House, 46th Edition, (2003).

REFERENCES BOOKS

1. K. V. Natrajan, **"A text book of Engineering Graphics",** Dhanalakshmi Publishers, Chennai (2006).
2. M.S. Kumar, **"Engineering Graphics",** D.D. Publications, (2007).
3. K. Venugopal & V. Prabhu Raja, **"Engineering Graphics",** New Age International (P) Limited (2008).
4. M.B. Shah and B.C. Rana, **"Engineering Drawing",** Pearson Education (2005).
5. K. R. Gopalakrishnana, **"Engineering Drawing" (Vol.I&II),** Subhas Publications (1998).
6. Dhananjay A.Jolhe, **"Engineering Drawing with an introduction to AutoCAD"**, Tata McGraw Hill Publishing Company Limited (2008).

7. Basant Agarwal and Agarwal C.M., **"Engineering Drawing",** Tata McGraw Hill Publishing Company Limited, New Delhi, (2008).

SEMESTER – II

	BASIC ELECTRICAL & ELECTRONICS ENGINEERING LAB	L	T	P	C
		0	0	4	2

(Common to ECE,ETCE,MECHT,BME,BT,BF,EEE,EIE,CSE,IT,CSSE AND CIVIL)

OBJECTIVES:

- Be exposed to the characteristics of basic electronic devices
- Be exposed to RL and RC circuits
- Be familiar with Thevinin & Norton theorem KVL & KCL, and Super Position Theorems

LIST OF EXPERIMENTS

a) ELECTRICAL ENGINEERING LAB

1. Residential house wiring using switches, fuse, indicator, lamp and energy meter.
2. Fluorescent lamp wiring.
3. Stair case wiring
4. Measurement of electrical quantities – voltage, current, power & power factor in RLC circuit.
5. Measurement of energy using single phase energy meter.
6. Measurement of resistance to earth of electrical equipment.

B) ELECTRONICS ENGINEERING LAB

1. Familiarization with Electronic Components like R, L, C and active devices.
2. Familiarization with Bread board, CRO, Power supply (RPS, FPS) and Soldering Practice.
3. Generation of lissajous patterns using CRO.
4. Measurement of amplitude and time period using CRO.
5. Study of the Characteristic of PN-Junction diode with its applications.
6. Study of the Characteristic of Zener diode with its applications
7. Study of the rectifier circuits (Half wave and Full Wave) with its applications.
8. Study of BJT Characteristics with its applications.
9. Study of AM/FM Receiver.
10. Study of advanced electronic gadgets.

OUTCOMES: At the end of the course, the student should be able to:

- Analyze the characteristics of basic electronic devices
- Design RL and RC circuits
- Apply KVL, KCL, Thevinin, Norton and Super Position Theorems for circuit analysis

	SEMESTER III	L	T	P	C
	ADVANCED ENGINEERING MATHEMATICS	**3**	**1**	**0**	**4**

(Common to CIVIL, MECH, MECHAT,AUTO, AERO, ECE, EEE, CSE, EIE, IT)

OBJECTIVES:

- Partial differential equations arises in most of the Engineering discipline when the number of independent variables in the given problem under discussion is two or more.
- Fourier series is used to express even aperiodic functions in terms of periodic functions making them amenable for further processing.
- Fourier series has the wide application in the field of heat diffusion, wave propagation and in signal and systems analysis.
- Z - transform plays an important role in analysis of Discrete signals. This is a prelude to learn higher semester courses.

1. PARTIAL DIFFERENTIAL EQUATIONS 9

Formation - Solutions of standard types f(p,q)=0, clairauts form, f(z,p,q)=0,f(p,x)=g(q,y) of first order equations - Lagrange's Linear equation - Linear partial differential equations of second and higher order with constant coefficients.

2. FOURIER SERIES 9

Dirichlet's conditions - General Fourier series - Half-range Sine and Cosine series - Parseval's identity
– Harmonic Analysis.

3. BOUNDARY VALUE PROBLEMS 9

Classification of second order linear partial differential equations - Solutions of one - dimensional wave equation, one-dimensional heat equation - Steady state solution of two-dimensional heat equation
- Fourier series solutions in Cartesian coordinates.

4. FOURIER TRANSFORMS 9

Statement of Fourier integral theorem - Fourier transform pairs - Fourier Sine and Cosine transforms – Properties - Transforms of simple functions - Convolution theorem - Parseval's identity.

5. Z - TRANSFORM 9

Z-Transform – Elementary Properties – Inverse Z-Transform – Convolution Theorem – Formation of
Difference Equations – Solution of Difference Equations using Z-Transform.

OUTCOMES:

The understanding of the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering.

Tutorial : 15
Total hours: 60

Credits : 04

TEXT BOOK:

A.Singaravelu,"Transforms and Partial Differential Equations", Meenakshi Agencies,Chennai

REFERENCES:

1. T. Veerarajan, "Engineering Mathematics" (for semester III), Third Edition Tata McGraw- Hill Publishing Company limited.

2. Grewal, B.S., "Higher Engineering Mathematics" (35th Edition), Khanna Publishers,Delhi 2000.

3 .Kreyszig, E., "Advanced Engineering Mathematics" (8th Edition), John Wiley and Sons,(Asia) Pte Ltd.,Singapore, 2000.

	SEMESTER III	L	T	P	C
	ELECTRONIC DEVICES	**3**	**0**	**0**	**3**

AIM

The purpose of this course is to provide a basis for understanding the characteristics, operation and limitations of various semiconductor devices.

OBJECTIVES

- To understand the basics of electrons and to find the motion of charges in electrostatic and magnetic fields.
- To understand the basics and characteristics of a Semiconductor and its types in Equilibrium and Non-Equilibrium conditions.
- To understand the working of PN junction diodes and special purpose diodes.
- To understand the basic operations of BJT and its characteristics.
- To understand the Constructional features working and characteristics of FET, UJT and SCR.

UNIT I: ELECTRON BALLISTICS AND INTRINSIC SEMICONDUCTORS 9

Force on charge in electric field - Motion of Charge in uniform and time varying electric fields - Force on a moving charge in a magnetic field - calculation of cyclotron frequency - calculation of electrostatic and magnetic deflection sensitivity.

Energy band structure of conductors, semiconductors and insulators - Density distribution of available energy states in semiconductors - Fermi- Diac probability distribution function at different temperatures - Thermal generation of carriers - Calculation of electron and hole densities in intrinsic semiconductors - Intrinsic concentration - Mass Action Law.

UNIT II: EXTRINSIC SEMICONDUCTOR AND PN JUNCTIONS 9

N and P type semiconductors and their energy band structures - Law of electrical neutrality - Calculation of location of Fermi level and free electron and hole densities in extrinsic semiconductors - Mobility, drift current and conductivity - Diffusion current - Continuity equation - Hall effect. Band structure of PN Junction - Current Component in a PN Junction - Derivation of diode equation - Temperature dependence of diode characteristics.

UNIT III: SWITCHING CHARACTERISTICS OF PN JUNCTION AND SPECIAL DIODES 9

Calculation of transition and diffusion capacitance - Varactor diode - charge control description of diode - switching characteristics of diode - Mechanism of avalanche and Zener breakdown - Temperature dependence of breakdown voltages - Backward diode - Tunneling effect in thin barriers Tunnel diode - Photo diode - Light emitting diodes.

UNIT IV: BIPOLAR JUNCTION TRANSISTORS AND FIELD EFFECT TRANSISTORS 9

Construction of PNP and NPN transistors - BJT current components - Emitter to collector and base to collector current gains - Base width modulation CB and CE characteristics - Breakdown characteristics - Ebers - Moll model - Transistor switching times.

Construction and Characteristics of JFET - Relation between Pinch off Voltage and drain current - Derivation. MOSFETS - Enhancement and depletion types.

UNIT V: METAL SEMICONDUCTOR CONTACTS AND POWER CONTROL DEVICES 9

Metal Semiconductor Contacts - Energy band diagram of metal semiconductor junction Schottky diode and ohmic contacts.Power control devices: Characteristics and equivalent circuit of UJT - intrinsic stand off ratio. PNPN diode - Two transistor model, SCR, Triac, Diac.

OUTCOMES:

At the end of the course the students will be able to Understand the construction, theory and operation of the basic electronic devices such as PN junction diode, Bipolar and Field effect Transistors, Power control devices, LED, LCD and other electronic devices

TOTAL HOURS: 45

TEXT BOOK:

1. Jacob Millman & Christos C.Halkias, "Electronic Devices and Circuits" 2nd Edition, Tata McGraw-Hill, 2007.

REFERENCE BOOKS:

1. Nandita Das Gupta and Amitava Das Gupta, Semiconductor Devices - Modelling and Technology, Prentice Hall of India, 2004.
2. Donald A.Neaman," Semiconductor Physics and Devices" 3rd Ed., Tata McGraw-Hill, 2002.
3. S.M.Sze, Semiconductor Devices - Physics and Technology, 2nd edn. John Wiley, 2002.
4. Ben G.Streetman and Sanjay Banerjee, Solid State Electronic Devices, Pearson Education 2000.

	SEMESTER III	L	T	P	C
	SIGNALS AND SYSTEMS	3	1	0	4

Aim

To introduce and analyse the continuous time signal and continuous time systems, discrete time signals and discrete time system.

Objective:

- To impart the knowledge of basic classifications of signals.
- To analyse the continuous time signals.
- To introduce linear time invariant continuous time systems.
- To impart knowledge on analysis of discrete time signals.
- To analyse linear time invariant discrete time systems.

UNIT I: CLASSIFICATION OF SIGNALS AND SYSTEMS **9**

Continuous time signals (CT signals), discrete time signals (DT signals) - Step, Ramp, Pulse, Impulse, Exponential, Classification of CT and DT signals - periodic and aperiodic, random signals, CT systems and DT systems, Classification of systems - Linear Time invariant Systems.

UNIT II: ANALYSIS OF C.T. SIGNALS **9**

Fourier series analysis, Spectrum of C.T. signals, Fourier Transform and Laplace Transform in Signal Analysis.

UNIT III: LTI-CT SYSTEMS **9**

Differential equation, Block diagram representation, Impulse response, Convolution integral, Frequency response, Fourier Methods and Laplace transforms in analysis, State equations and Matrix.

UNIT IV: ANALYSIS OF D.T. SIGNALS **9**

Z Transforms and Properties, Spectrum of D.T. signals, Discrete Time Fourier Transform (DTFT)

UNIT V: LTI-DT SYSTEMS **9**

Difference equations, Block diagram representation, Impulse response, Convolution SUM, Frequency response, FFT and Z-transform analysis, State variable equation and Matrix.

OUTCOMES:

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

- Analyze the properties of signals & systems
- Apply Laplace transform, Fourier transform, Z transform and DTFT in signal analysis
- Analyze continuous time LTI systems using Fourier and Laplace Transforms
- Analyze discrete time LTI systems using Z transform and DTFT

TUTORIAL: 15
TOTAL HOURS: 60

TEXT BOOK:

1. Allan V. Oppenheim et al, “Signals & Systems ", Prentice Hall of India Pvt. Ltd., 1997.

REFERENCE BOOKS:

1. Douglas K. Lindner, “Signals and Systems ", McGraw Hill International, 1999.
2. Simon Haykin and Barry Van Veen, “Signals and Systems ", John Wiley & Sons Inc., 1999.
3. Robert A. Gabel and Richard A. Roberts, “Signals & Linear Systems ", John Wiley, 3rd Edition, 1987.
4. Roger E. Zeimer et al, " Signals & Systems : Continuous and Discrete ", McMillan, 2nd Edition, 1990.

	SEMESTER III	L	T	P	C
	DIGITAL ELECTRONICS	3	0	0	3

AIM

The Aim of this course is to develop a strong foundation in analysis and design of digital electronics.

OBJECTIVES:

- Understand the basic concepts.
- Understand concepts of logic gates constructional features.
- To understand the concepts of gate-level minimization & combinational logic.
- To analyze synchronous sequential logic.
- To realize the hazard free circuits and pulse mode sequential Circuits.

1. BASIC COCEPTS AND BOOLEAN ALGEBRA **9**

Number systems - Binary, Octal, Decimal, Hexadecimal, conversion from one to another, complement arithmetic, Boolean theorems of Boolean algebra, Sum of products and product of sums, Minterms and Maxterms, Karnaugh map, Tabulation and computer aided minimization procedures.

2. LOGIC GATES **9**

RTL, DTL, TTL, ECL, ICL, HTL, NMOS & CMOS logic gates, Circuit diagram and analysis characteristics and specifications, tri-state gates.

3. COMBINATIONAL CIRCUITS **9**

Problem formulation and design of combinational circuits, Adder / Subtractor, Encoder / decoder, Mux / Demux, Code-converters, Comparators, Implementation of combinational logic using standard ICs, ROM, EPROM, EEPROM, Basics of PLD, PAL, PLA and their use in combinational circuit design.

4. SEQUENTIAL CIRCUITS **9**

Flip flops - SR, JK, T, D, Master/Slave FF, Triggering of FF, Analysis of clocked sequential circuits - their design, State minimization, state assignment, Circuit implementation, Registers-Shift registers, Ripple counters, Synchronous counters, Timing signal, RAM, Memory decoding, Semiconductor memories.

5. FUNDAMENTAL MODE SEQUENTIAL CIRCUITS **9**

Stable, Unstable states, Output specifications, Cycles and Races, Race free Assignments, Hazards, Essential hazards, Pulse mode sequential circuits.

OUTCOMES:

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

- Use Boolean algebra and applied to digital systems.
- Design various combinational digital circuits using logic gates.
- Bring out the analysis and design procedures for synchronous and asynchronous
- sequential circuits.
- Understand electronic circuits involved in the design of logic gates.
- Understand the semiconductor memories and related technology.

TOTAL HOURS: 45

TEXT BOOK:

1. Morris Mano, "Digital logic and Computer Design ", Prentice-Hall of India, 3rd edition, 2008.

REFERENCE BOOKS:

1.William I. Fletcher, "An Engineering Approach to Digital Design ", Prentice-Hall of India, 1980.
2.Floyd T.L., "Digital Fundamentals ", Charles E. Merrill publishing Company, 1982.

3.Tokheim R.L., “Digital Electronics - Principles and Applications ", Tata McGraw Hill, 1999.
4.Jain R.P., “Modern Digital Electronics ", Tata McGraw Hill, 1999.

	SEMESTER III	L	T	P	C
	ELECTROMAGNETIC FIELDS	**3**	**1**	**0**	**4**

AIM:

To impart the knowledge of basics of electric and magnetic fields and their effects.

OBJECTIVE:

To provide the knowledge on

- Static Electromagnetic fields
- Static Magnetic fields
- Effect of Electric Field in dielectrics
- Effect of Magnetic Fields on ferromagnetic materials
- Time varying Electric and Magnetic fields

UNIT I STATIC ELECTROMAGNETIC FIELDS **9**

Introduction to co-ordinate system, Gradient, Divergence, Curl, Divergence Theorem, Stroke's Theorem, Coulomb's Law, Electric field Intensity, Principle of superposition, Electric Scalar potential, Line charge distribution by Moment method, Electric flux Density, Gauss's Law and its applications, Field Computations and Problems.

UNIT II STATIC MAGNETIC FIELD **9**

Magnetic field of a current carrying element, Ampere's Force law, The Biot-Savart Law, Magnetic Flux density, Gauss law for magnetic fields, Torque on a loop, Magnetic moment, Ampere's Law and Magnetic field intensity, Magnetomotive force, Field cells and permeability, Vector potential, Field computation and problems.

UNIT III ELECTRIC FIELD IN DIELECTRICS **9**

Permittivity, Polarization, Boundary relation, Capacitance, Dielectric strength, Energy and energy density, Poisson's and Laplace equations and applications, Electric Current, Current Density, Ohms law at a point, Resistance and Conductance, Continuity relations for current problems.

UNIT IV MAGNETIC FIELD IN FERROMAGNETIC MATERIALS **9**

Magnetic materials, Magnetic dipoles, Loops and Solenoids, Magnetization, Inductance, Energy in an Inductor and Energy Density, Boundary relations, Ferro magnetism, Hysteresis, Reluctance and Permeance, Problems.

TIME VARYING ELECTRIC & MAGNETIC FIELDS **9**

Faraday's Law, Transformer and Motional Induction, Maxwell's equation from Faraday's Law, Self and Mutual inductance, Displacement current, Maxwell's equation from Ampere's Law and its in-consistency, Boundary relation, Poynting Vector, Comparison of field and circuit theory, Circuit Application of pointing Vector.

TUTORIAL: 15

TOTAL HOURS: 45

OUTCOMES

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

- Have knowledge on the basics of static electric and magnetic field and the associated laws.
- Understand the propagation of EM waves and also get introduce the methods in computational electromagnetics.

TEXT BOOKS:

1. John D. Krauss, "Electromagnetics ", McGraw Hill, 1992.
2. David K. Chang, "Field and Wave Electromagnetics ", Second edition, Addison Wesley, New Delhi, 2004.
3. Hayt W.H., "Engineering Electromagnetics", McGraw Hill, 8th Edition, 2012.

REFERENCE BOOKS:

1. Narayana Rao N., "Basic Electromagnetics with applications ", Prentice Hall of India, 1988.
2. Harrington R.F., "Field computation by moment methods ", Macmillan, 1988.
3. Stanley V. Marshall, Richard DuBroff, Gabriel G.Skitek, "Electromagnetic Concepts and Applications", Fourth Edition, Prentice Hall International Inc., New Jersey, 1996.
4. Narayana Rao N., "Elements of Engineering Electromagnetics ", Fourth Edition,Prentice Hall of India Pvt. Ltd., New Delhi 1998.
5. David J. Griffiths, "Introduction to Electrodynamics ", Third Edition, Prentice Hall of India Pvt. Ltd., New Delhi, 1999.

	SEMESTER III	L	T	P	C
	OBJECT ORIENTED PROGRAMMING	**3**	**0**	**0**	**3**

AIM:

To implement and manipulate object oriented programming concepts

OBJECTIVES:

- To implement the concepts of object oriented programming.
- To implement oops structures using object oriented programming language.
- To use standard template library in the implementation oops data structures

UNIT I **9**

Object oriented programming concepts – objects – classes – methods and messages – abstraction and encapsulation – inheritance – abstract classes – polymorphism. Introduction to C++ – classes – access specifiers – function and data members – default arguments – function overloading – friend functions – const and volatile functions – static members – Objects – pointers and objects – constant objects – nested classes – local classes

UNIT II **9**

Constructors – default constructor – Parameterized constructors – Constructor with dynamic allocation – copy constructor – destructors – operator overloading – overloading through friend functions – overloading the assignment operator – type conversion – explicit constructor

UNIT III **9**

Function and class templates - Exception handling – try-catch-throw paradigm – Exception specification – terminate and Unexpected functions – Uncaught exception.

UNIT IV **9**

Inheritance – public, private, and protected derivations – multiple inheritance - virtual base class – abstract class – composite objects Runtime polymorphism – virtual functions – pure virtual functions – RTTI – typeid – dynamic casting – RTTI and templates – cross casting – down casting .

UNIT V **9**

Streams and formatted I/O – I/O manipulators - file handling – random access – object serialization – namespaces - std namespace – ANSI String Objects – standard template library.

TOTAL HOURS: 45

OTCOMES

The completion of the course, students will be able to:

- Explain the concepts of Object oriented programming.
- Write simple applications using C++.
- Discuss the different methods of organizing large amount of data.

TEXT BOOK:

1. B. Trivedi, “Programming with ANSI C++”, Oxford University Press, 2007.

REFERENCE BOOKS:

1. Ira Pohl, “Object Oriented Programming using C++”, Pearson Education, Second Edition Reprint 2004.
2. S. B. Lippman, Josee Lajoie, Barbara E. Moo, “C++ Primer”, Fourth Edition, Pearson Education, 2005.
3. B. Stroustrup, “The C++ Programming language”, Third edition, Pearson Education, 2004.

	SEMESTER III	L	T	P	C
	ELECTRONIC DEVICES LAB	**0**	**0**	**4**	**2**

AIM

To verify practically, the fundamental characteristics of Electron Devices.

OBJECTIVES

- To study experimentally the characteristics of diodes, BJT's and FET's.
- To verify practically, the response of various special purpose electron devices.

LIST OF EXPERIMENTS

1. Diode Forward characteristics.
2. Zener Diode characteristics.
3. Input and Output characteristics of BJT.
4. Output characteristics of JFET.
5. Fixed Bias amplifier circuits using BJT.
6. Differential amplifier using BJT.
7. Power supply Full wave rectifier with simple capacitor filter.
8. Measurement of UJT Characteristics.
9. Measurement of SCR Characteristics.
10. Study of photo diodes and transistors

OUTCOMES:

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

- Analyze the characteristics of diode, BJT, UJT, SCR and other electronic devices

	SEMESTER III	L	T	P	C
	DIGITAL ELECTRONICS LAB	**0**	**0**	**4**	**2**

Aim:

To provide the knowledge of design and implementation of digital circuits using logic gates and flip flops.

Objectives:

Designing the basic digital circuits like adders, subtractors, code converters, magnitude converters using logic gates and counters using flip flops.

List of Experiments:

1. Design and implementation of Adders using logic gates
2. Design and implementation of Subtractors using logic gates
3. Design and implementation of BCD to Excess -3 code converter using logic gates
4. Design and implementation of Binary to Gray code converter using logic gates
5. Design and implementation of 4 bit BCD adder using IC 7483
6. Design and implementation of 2 Bit Magnitude comparator using logic gates
7. Design and implementation of Multiplexer and De-Multiplexer using logic gates
8. Design and implementation of encoder and decoder using logic gates
9. Design and implementation of 3 bit synchronous up/down counter
10. Implementation of SISO, SIPO, and PISO shift registers using flip flops

OUTCOMES

- Ability to design, build and test any digital logic circuit using digital ICs for handling real life projects

	SEMESTER III	L	T	P	C
	OBJECT ORIENTED PROGRAMMING LAB	**0**	**0**	**4**	**2**

LIST OF EXPERIMENTS

1. Design C++ classes with static members, methods with default arguments, friend functions. (For example, design matrix and vector classes with static allocation, and a friend function to do matrix-vector multiplication)
2. Implement complex number class with necessary operator over loadings and type conversions such as integer to complex, double to complex, complex to double etc.
3. Implement Matrix class with dynamic memory allocation and necessary methods. Give proper constructor, destructor, copy constructor, and overloading of assignment operator.
4. Overload the new and delete operators to provide custom dynamic allocation of memory.
5. Develop a template of linked-list class and its methods.
6. Develop templates of standard sorting algorithms such as bubble sort, insertion sort, merge sort, and quick sort.
7. Design stack and queue classes with necessary exception handling.
8. Define Point class and an Arc class. Define a Graph class which represents graph as a collection of Point objects and Arc objects. Write a method to find a minimum cost spanning tree in a graph.
9. Develop with suitable hierarchy, classes for Point, Shape, Rectangle, Square, Circle, Ellipse, Triangle, Polygon, etc. Design a simple test application to demonstrate dynamic polymorphism and RTTI.
10. Write a C++ program that randomly generates complex numbers (use previously designed Complex class) and writes them two per line in a file along with an operator (+, -, *, or /). The numbers are written to file in the format (a + ib). Write another program to read one line at a time from this file, perform the corresponding operation on the two complex numbers read, and write the result to another file (one per line).

OUTCOMES:

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

- Design and implement C++ programs for manipulating stacks, queues, linked lists, trees, and graphs.
- Apply good programming design methods for program development.
- Apply the different data structures for implementing solutions to practical problems.

	SEMESTER IV	L	T	P	C
	NUMERICAL METHODS AND RANDOM PROCESSES	3	1	0	4

OBJECTIVES:

- **To find the missing values in a table of data using interpolation**
- **To study the initial value problems of Ordinary Differential Equation using various numerical methods**
- **To study the analysis of electrical system, signal processing operation using the concept of Random Processes.**
- **To apply the concept of correlation in RADAR, fault detection in VLSI circuits.**

1.INTERPOLATION AND APPROXIMATION 9

Interpolation with Newton's divided differences, Lagrange's polynomial, Newton forward and backward differences, central difference Formula (Stirling's and Bessel's)

2.INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS 9

Single Step Methods - Taylor Series, Euler and Modified Euler, Runge-Kutta method of fourth order - first and second order differential equations. Multistep Methods - Milne and Adam's-Bash forth predictor and corrector methods.

3.RANDOM VARIABLES 9

Discrete and continuous random variables- Probability mass function – Probability density functions - moments, Moment generating functions and their properties.

4.RANDOM PROCESSES 9

Classification, Stationary and Markov process, Binominal process, Poisson process, Sine-wave process, Ergodic processes.

5.CORRELATION FUNCTION AND SPECTRAL DENSITIES 9

Auto correlation for discrete and continuous process, Cross correlation functions - properties, Power spectral density, Cross spectral density – properties

TUTORIAL :15

TOTAL HOURS:60

CREDITS:04

OUTCOMES:

- The students will have an exposure of various distribution functions and help in acquiring skills in handling situations involving more than one variable. Able to analyze the response of random inputs to linear time invariant systems.

Text Book:

1. A. Singaravelu ,"Numerical Methods" , Meenakshi Agency, Chennai
2. A. Singaravelu, S. Sivasubramanian and R. Ramaa, "Probability and Random Processes", Revised Edition 2013, Meenakshi Agency, Chennai.

References:

1. T.Veerarajan, T.Ramachandran, "Numerical Methods with Programs in C and C++", Tata McGraw-Hill (2004).
2. P.Kandasamy, K.Thilagavathy, K.Gunavathy " Probability, Random Variables and Random Processes" (First Edition 2003) : S.Chand &Company Ltd., New Delhi.
3. Kapur.J.N. and Saxena.H.C."Mathematical Statistics",S.Chand & Company Ltd.New Delhi(1997)

	SEMESTER IV	L	T	P	C
	CONTROL SYSTEMS	3	1	0	4

AIM

To provide sound knowledge in the basic concepts of linear control theory and design of control system.

OBJECTIVE

- To understand the methods of representation of systems and to desire their transfer function models.
- To provide adequate knowledge in the time response of systems and steady state error analysis
- To accord basic knowledge in obtaining the open loop and closed–loop frequency responses of systems.
- To understand the concept of stability of control system and methods of stability analysis.
- To study the three ways of designing compensation for a control system

UNIT I SYSTEMS AND THEIR REPRESENTATION 12

Basic elements in control systems – Open and closed loop systems – Electrical analogy of mechanical and thermal systems – Transfer function – Synchros – AC and DC servomotors – Block diagram reduction techniques – Signal flow graphs.

UNIT II TIME RESPONSE 9

Time response – Time domain specifications – Types of test input – I and II order system response – Error coefficients – Generalized error series – Steady state error – P, PI, PID modes of feedback control.

UNIT III FREQUENCY RESPONSE 9

Frequency response – Bode plot – Polar plot – Determination of closed loop response from open loop response – Correlation between frequency domain and time domain specifications.

UNIT IV STABILITY OF CONTROL SYSTEM 9

Characteristics equation – Location of roots in S plane for stability – Routh Hurwitz criterion – Root locus construction – Effect of pole, zero addition – Gain margin and phase margin –Nyquist stability criterion.

UNIT V COMPENSATOR DESIGN 6

Performance criteria – Lag, lead and lag-lead networks – Compensator design using bode plots.

TUTORIAL: 15

TOTAL HOURS: 60

OUTCOMES:

Students will be able to:

- Perform time domain and frequency domain analysis of control systems required for stability analysis.
- Design the compensation technique that can be used to stabilize control systems.

TEXT BOOKS:

1. I.J. Nagrath and M. Gopal, ‘Control Systems Engineering’, New Age International Publishers, 2003.
2. Benjamin C. Kuo, Automatic Control systems, Pearson Education, New Delhi, 2003.

REFERENCE BOOKS:

1. K. Ogata, ‘Modern Control Engineering’, 4th edition, PHI, New Delhi, 2002.
2. Norman S. Nise, Control Systems Engineering, 4th Edition, John Wiley, New Delhi, 2007.
3. Samarajit Ghosh, Control systems, Pearson Education, New Delhi, 2004
4. M. Gopal, ‘Control Systems, Principles and Design’, Tata McGraw Hill, New Delhi, 2002.

	SEMESTER IV	L	T	P	C
	LINEAR INTEGRATED CIRCUITS	3	1	0	4

AIM

To provide the basic concepts in the design of electronic circuits using linear integrated circuits and their applications in the processing of analog signals.

OBJECTIVES

- To introduce the basics of Integrated Circuits and its fabrication.
- To familiarize with operational amplifiers and its Characteristics.
- To introduce the applications of Operational Amplifier
- To Introduce about the regulator and filters.
- To introduce ADC/ DAC and PLL.

UNIT – I: Integrated Circuit Fabrication **9**

Classifications of ICs – IC chip size and Circuit Complexity – Fundamentals of Monolithic IC Technology – Basic Planar Process – Fabrication of Typical Circuit – Active and Pasive Components of ICs – Fabrication of FET – Thick and Thin Film Technology – Technology Trends.

UNIT – II: Operational Amplifier and its Characteristics **9**

Basic Information of operational Amplifier – Ideal Operational Amplifier - Operational Amplifier Internal Circuits – Examples of IC Op Amps – FET Operational Amplifiers – DC Characteristics – AC Characteristics – Analysis of Data Sheets of an Op Amp.

UNIT – III: Operational Amplifier Applications **9**

Basic Op Amp Applications – Instrumentation Amplifiers – AC Amplifiers – V to I and I to V Converters – Op Amp Circuits Using Diodes – Sample and Hold Circuits – Log/Antilog Amplifiers – Adder/ Subtractor – Multiplier and Divider – Differentiator and Integrator – Operational Trans conductance Amplifier – Comparators – Multivibrators – Square, Triangular and Sawtooth wave Generators.

UNIT – IV: Regulators and Filters **9**

Series Op Amp Regulators – IC Voltage Regulators – 723 General Purpose Regulators – Switching regulators – RC Active Filters – Transformation – State variable Filter – Switched Capacitor Filters – Active Filters using OTA's.

UNIT – V: D/A and A/D Converters, Timers and PLL **9**

Timer – Description of Functional Diagram – Monostable and Astable Operation – Schmitt Trigger – PLL – Basic Principles – Phase Detectors/ Comparators – Voltage Controlled Oscillator – Low Pass Filter – Monolithic PLL – PLL Applications – Basic DAC Techniques – A–D Converters – DAC/ ADC Specifications.

TUTORIAL: 15

TOTAL HOURS: 60

OUTCOMES:

The students will be able to:

- Design linear and non linear applications of op – amps.
- Design applications using analog multiplier and PLL.
- Design ADC and DAC using op – amps.
- Generate waveforms using op – amp circuits.
- Analyze special function ICs.

Text Book:

1. D. Roy Choudhury, Shail B. Jain, "Linear Integrated Circuits", New Age International Publishers, 3rd Edition 2007.

Reference Books:

1. Segio Franco, "Design with Operational Amplifiers and Analog Integrated Circuits", McGraw Hill, 2008.
2. Ramakant A. Gayakwad, "OP – AMP and Linear ICs", Prentice Hall, 1994.
3. Botkar K. R., "Integrated Circuits", Khanna Publishers, 1996.
4. Gray and Mayer, "Analysis and design of Analog Integrated Circuits", Wiley International, 1995.

	SEMESTER IV	L	T	P	C
	ELECTRONIC CIRCUITS – I	3	1	0	4

AIM

The purpose of this course is to introduce to the students the basics of biasing transistor circuits, low frequency amplifiers, large signal amplifiers, and its frequency response and various rectifiers and power supplies.

OBJECTIVES

- To understand the Operating point calculations and biasing circuits for BJT, FET and MOSFET.
- To understand the characteristics of transistor and its analysis using h-parameter model.
- To understand the working and to find the efficiency of different types of large signal amplifiers.
- To understand the basic concept of Frequency response of the amplifier.
- To understand the basic operation of rectifiers, filters and power Supplies

1. BASIC STABILITY AND DEVICE STABILIZATION **9**

Biasing circuits for BJT, DC and AC Load lines, Stability factor analysis, Temperature compensation methods, biasing circuits for FET's and MOSFET's.

2. SMALL SIGNAL LOW FREQUENCY ANALYSIS AND DESIGN **9**

Transistor, FET and MOSFET Amplifiers, Equivalent circuit, input and output characteristics, calculation of midband gain, input and output impedance of various amplifiers, cascode amplifier, Darlington Bootstrapping, Differential amplifier, CMRR measurement, Use of current source in Emitter.

3. LARGE SIGNAL AMPLIFIERS **9**

Class A, B, AB and C type of operation, efficiency of Class A amplifier with resistive and transformer coupled load, efficiency of Class B, Complementary Symmetry amplifiers, Thermal stability of Power amplifiers, heat sink design.

4. FREQUENCY RESPONSE OF AMPLIFIERS **9**

High frequency equivalent circuits for BJT and FET amplifiers, Calculation of Lower and Higher cutoff frequencies, Bode plot of frequency response, relation bandwidth and rise time, HF amplifiers, Video amplifiers, Optocouplers, BJT modeling.

5. RECTIFIERS AND POWER SUPPLIES **9**

Half and Full wave rectifiers, Ripple factor calculation for C, L, L-C and π section filters, Switch mode power supplies, Linear electronic voltage regulators, Power control using SCR.

TUTORIAL: 15

TOTAL HOURS: 60

OUTCOMES:

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

- Identify biasing of BJTs and MOSFETs.
- Design and construct amplifiers.
- Determine the effect of source and load.
- Construct amplifiers with active loads.
- Exposed to high frequency response of BJT and FET amplifiers.

TEXT BOOKS:

1. Millman J. and Halkias C.C., "Integrated Electronics ", McGraw Hill,
2. Robert Boylestead and Louis Nashelsky, "Electronic Devices and Circuit Theory", Pearson Education, Ninth Edition

REFERENCE BOOKS:

1. David A. Bell, "Electronic Devices and Circuits ", Prentice Hall of India, 1998.
2. Donald L. Schilling Charles Beloue, "Electronic Circuits ", Third Edition, 1989.

	SEMESTER IV	L	T	P	C
	MICROPROCESSORS & MICROCONTROLLERS	**3**	**0**	**0**	**3**

AIM

Enable students to understand different types of microprocessors and micro controllers and to use microprocessor and microcontroller for different applications.

OBJECTIVES

- To learn the concepts of basic microprocessors.
- To get knowledge in interfacing devices.
- To know the concepts of microcontroller and its applications.
- To develop skill in simple program writing.

UNIT I INTEL 8085 MICROCPROCESSOR 9

Evolution of microprocessors– 8085-microprocessor architecture –addressing modes- Instruction set – Memory interfacing –Basic timing diagram- interrupts – Software Interrupts - Data transfer schemes simple programs.

UNIT II PERIPHERAL INTERFACING 9

Programmable Peripheral Interface 8255 – Programmable Communication Interface 8251 USART – Programmable Interrupt Controller 8259A - Programmable Interval Timer 8253 – Keyboard/Display Controller 8279 – DMA Controller 8237 – Floppy Disk Controller 8272- CRT Controller 8275.

UNIT III INTEL 8086/8088 MICROPROCESSOR 9

Architecture of 8086/8088-Register organization – Signal Description of 8086 – Minimum mode – Maximum mode and timings –8086 Instruction set – Addressing modes – Assembler directives and operators- simple programs.

UNIT IV 8031/8051 MICROCONTROLLER 9

Single chip microcontroller – Introduction to 8 bit microcontroller – architecture of 8031/8051- Signal descriptions of 8051- Register set of 8051 operational features of 8051- Memory and I/O Interfacing-Interrupts –Instruction set – addressing mode –simple programs

UNIT V INTERFACING 9

Microprocessor based process control system – microcomputer based scale – interfacing alphanumeric displays, keyboard interface-speed control of stepper motor – high power devices interfacing - A/D and D/A interfacing.

TOTAL PERIODS: 45

OUTCOMES:

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

- Describe the architecture of 8085 and 8086, 8051.
- Identify the addressing modes and instruction set of 8085 , 8086 and 8051.
- Analyze the need and use of interrupt function.
- Write simple program writing for 8085 and 8051 based applications and Interfaces.

TEXTBOOKS

1. Ramesh S.Gaonkar Microprocessor architecture, programming and its application with 8085, Penram Int. Pub. (India) IV edition.

2. A.K Roy, K.M Bhurchandi, Intel Microprocessors Architecture, Programming and Interfacing McGraw Hill International Edition – 20001

3. Muhammad Ali Mazidi and Janica Gilli Mazidi, The 8051 microcontroller and embedded systems , Pearson Education, 5th Indian reprint, 2003

REFERENCE BOOKS

1. Rafiquzzaman M. – Microprocessors – Theory and Applications Intel and Motorola , PHI Pvt. Ltd. , New Delhi 2001.

2. Douglas V.Hall – Microprocessors and Interfacing programming and hardware , Tata McGraw Hill Edition 1997.

	SEMESTER IV	L	T	P	C
	COMMUNICATION THEORY	**3**	**0**	**0**	**3**

AIM:

To provide the knowledge about the different modulation Techniques, Noise performance of AM and FM receivers, Understand the bandwidth, power, and complexity requirements

OBJECTIVE:

- To impart the basic concepts of Amplitude modulation Schemes.
- To impart the basic concepts of Frequency and Phase modulation Schemes.
- To understand the performance of AM and FM Receivers
- To understand the noise performance in the AM and FM modulations.
- To impart the concepts of pulse modulations schemes.

UNIT I BASICS OF ELECTRONIC COMMUNICATION AND NOISE THEORY 9

Electromagnetic spectrum allocation for various communication systems- Basic communication model - transmitter, receiver and channel – Need for modulation – classification of modulation, Band pass and pass band transmission. Noise definition- Atmospheric Noise, Thermal Noise, Shot noise, partition noise, flicker noise, transit time noise-noise factor, noise factor for cascaded amplifier (Friss formula) –Noise figure – Equivalent noise temperature, signal to noise ratio.

UNIT II AMPLITUDE MODULATION AND DEMODULATION 9

Mathematical representation of AM – waveform and its spectrum – power relations – Multi tone and its modulation index – DSB with carrier- Collector and base modulation circuits, square law modulator- DSB-SC: Balanced modulator circuit using FET – Generation of SSB: Filter method and phase shift method – VSB, Comparison of various AM schemes-AM transmitter: Low level and high level Modulation. Demodulation – Envelope detector, Significance of RC time constant- Square law detector.

UNIT III ANGLE MODULATION AND DEMODULATION 9

FM-Mathematical representation-waveform and its spectrum – Modulation Index – Narrowband and Wideband, Comparison of FM and AM –Phase modulation (PM): Relation between FM and PM- Generation of PM from FM–Indirect method of FM generation (Armstrong method) -Direct method of FM generation (using Varactor diode)-Pre emphasis and De emphasis, FM stereo broadcast transmitter. Demodulation of FM – Balanced slope detector- Foster Seelay discriminator – Ratio detector – Demodulation using PLL – FM threshold effect.

UNIT IV MULTIPLEXING & ANALOG PULSE MODULATION 9

Multiplexing- TDM, FDM - Analog pulse modulation-Sampling theorem – Nyquist rate – concepts of PAM, PWM, PPM- modulators and demodulators – Noise performance in AM & FM.

UNIT V RECEIVERS AND SYSTEMS 9

AM Receivers-TRF receivers –Super heterodyne receivers: choice of IF, double conversion technique, Image frequency tracking, AGC-characteristics of receiver. FM Receivers- FM stereo broadcast receivers-AFC – Capture effect. Communication Receivers – Variable Sensitivity and Variable selectivity – Squelch circuit – Beat frequency Oscillator.

TOTAL HOURS:45

OUTCOMES:

At the end of the course, the students would

- Design AM communication systems, Angle modulated communication systems
- Apply the concepts of Random Process to the design of Communication systems
- Analyze the noise performance of AM and FM systems

TEXT BOOKS

1. *Kennedy, "Electronic Communications Systems", 4th Edition, McGraw-Hill Publishers, 1992.*

REFERENCE BOOKS

1. Wayne Thomasi, "Advanced Electronic Communication Systems", 6th Edition, PHI Publishers, 2003.
2. Dennis Reddy and John Coolen, "Electronic Communications", 4th Edition, Prentice Hall Publishers, 1995.
3. Singh R.P and Sapre, "Communication Systems: Analogue and Digital", 2nd Edition, McGraw Hill

Publishers, 1995

	SEMESTER IV	L	T	P	C
	PROFESSIONAL COMMUNICATION AND PERSONALITY DEVELOPMENT	**0**	**0**	**4**	**2**

AIM: To develop graduates with good Presentation and Writing skills (Professional & Technical)

OBJECTIVES: To improve Aptitude Skills, train to improve self-learning/researching abilities, Presentation Skills & Technical Writing (Reports, Brochures, Manuscripts/Articles)

METHODOLOGY: Modular Evaluation will be done based on Continuous Internal Assessment as Assignments, Short Communications, Proposals, Briefs, Reports, etc. Final Evaluation will be based on a Real-time research article based on current research carried out in the Institution or by any Faculty of the Institution (Good articles can be submitted to Journals co-authored by the Student and Faculty, with affiliation to the Institution)

UNIT I – COMMUNICATION AND SELF DEVELOPMENT: Basic Concepts of Communication; Process of Communication; Types of Formal communication; The Media of Communication; Channels of Communication; Barriers in Communication; How to Overcome Barriers to Communication.

UNIT II - GRAMMAR & SYNTAX: Synonyms; Antonyms; Words used as different parts of speech; Spotting errors; Concord; Principle of proximity between subject and verb. Sentence Structure; Combination and Transformation of sentences; Verb Patterns in English.

UNIT III - READING AND WRITING SKILLS: Purpose and Process of Reading; Reading Tactics; Reading Strategies; Reading Comprehension; Paraphrase; Preparing outlines of paragraph/text. Elements of Effective Writing; Job Application, Bio-data, Personal Resume and Curriculum Vitae; Preparing Agenda and Minutes of a Meeting; Back office job for organizing a conference/seminar; Writing Styles; Scientific and Technical Writing; Summary Writing; Writing paragraphs; Writing Essays.

UNIT IV – LISTENING AND SPEAKING SKILLS: Process of listening; Hard and Soft Skills; Feedback Skills; Essentials of Good Communications; Types of Listening; Barriers to Listening; Note taking and Note making. Skills of Effective Speaking; Component of an Effective Talk; Tone of Voice; Accent, Body Language; Timing and Duration of Speech; Audio-Visual Aids in Speech.

UNIT V – TECHNICAL REPORT, RESEARCH CASE STUDY & REPORTING: Main considerations in writing a good report; Types and Structure of Reports; Collecting Data; Technical Proposals; Visual Aids; General Tips for Writing Reports. Research Case Study and Reporting

OUTCOMES:

At the end of the course, the students would be Aptitude Skills, trained self-learning/researching abilities, Presentation Skills & Technical Writing, etc..

Text Book

I The Functional Aspects of Communication Skills, Prajapati Prasad and Rajendra K. Sharma, S. K Kataria & Sons, New Deihl, Rep"nt 2007.

Reference Books

1 Business Communication, Sinha K. K, S. Chand, New Delhi.

2. Business Communication, Asha Kaul, Prentice Hall of India.

3 Business Correspondence and Report Writing' A Practical Approach to Business and

Technical Communication, Sharma, R.C. and Krishna Mohan, Tata McGraw-HilI.

4 A New Approach to English Grammar for High Schools, Madan Sabina, Spectrum Books, New Delhi

	SEMESTER IV	L	T	P	C
	LINEAR INTEGRATED CIRCUITS LAB	**0**	**0**	**4**	**2**

AIM:

To provide the ability to design simple linear integrated circuits using op-amp and other special purpose registers.

OBJECTIVE:

- To study the linear and non-linear applications of operational amplifiers.
- To introduce the theory and applications of analog multipliers and PLL.
- To know the applications of special purpose integrated circuits eg: 555 timer

List of Experiments:

Design and Testing of

1. Inverting, Non inverting and differential amplifiers using Op Amp.
2. Integrator and Differentiator using Op Amp.
3. Instrumentation amplifier using Op Amp
4. Active Low Pass, High Pass and Band Pass filters using Op Amp.
5. Astable & Monostable Multivibrators and Schmitt Trigger using Op Amp.
6. Phase shift and Wien Bridge Oscillators using op-amp.
7. Astable and Monostable Multivibrators using NE555 Timer.
8. PLL characteristics and its use as Frequency Multiplier.
9. DC power supply using LM317 and LM723.
10. Study of SMPS.

OUTCOMES:

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

- Design oscillators and amplifiers using operational amplifiers.
- Design filters using Opamp and perform experiment on frequency response.
- Analyse the working of PLL and use PLL as frequency multiplier.
- Design DC power supply using ICs.
- Analyse the performance of oscillators and multivibrators using SPICE

	SEMESTER IV	L	T	P	C
	MICROPROCESSORS & MICROCONTROLLERS LAB	**0**	**0**	**4**	**2**

AIM

To provide the knowledge of assembly language programming of microprocessors and microcontrollers and interfacing peripheral devices with microprocessors.

OBJECTIVE

- To write the assembly language program for 8085, 8086 and 8051.
- To write the programs for communication between microprocessor and peripheral devices.
- To interface ADCs, DACs with microprocessor and learn the real time applications like stepper motor control, key board etc

LIST OF EXPERIMENTS

1. 8085 Assembly language Program (ALP) to add and subtract two 8 bit numbers.
2. 8085 Assembly language Program (ALP) to multiply and divide two 8 bit numbers.
3. 8085 Assembly language Program (ALP) to arrange the numbers in ascending and descending order.
4. 8086 Assembly language Program (ALP) to add and subtract two 8 bit numbers.
5. 8086 Assembly language Program (ALP) to multiply and divide two 8 bit numbers.
6. Interfacing a stepper motor to 8085 processor and operate it in clockwise and anti-clockwise directions.
7. Interfacing an ADC to 8085 processor and generate step, ramp, triangle and square waveforms.
8. Interfacing a keyboard to 8085 microprocessor and display the key number pressed on the 7- segment display.
9. 8051 Assembly language Program (ALP) to add and subtract two 8-bit numbers.
10. 8051 Assembly language Program (ALP) to multiply and divide two 8 bit numbers.

OUTCOME:

- The student will be familiar in the architecture and instruction set of the following processors and Controller 8085 and 8086, 8051.
- The lab will equip the student with the interfacing knowledge and right selection of processors.
- The lab will equip the student with the right selection of add on cards and peripheral / interfacing ICs for a specific task.

	SEMESTER V	L	T	P	C
	DIGITAL COMMUNICATION	**3**	**0**	**0**	**3**

Aim:

To provide the knowledge about various digital modulation and demodulation schemes in communication engineering.

Objectives:

- To impart knowledge on base band modulation.
- To impart knowledge on baseband demodulation.
- To impart knowledge on band pass modulation and detection schemes.
- To introduce the synchronization techniques involved in modulation and demodulation.
- To introduce the communication link and budget analysis.

UNIT I SAMPLING AND QUANTIZATION **9**

Sampling process – Aliasing - PAM- Natural Sampling-Flat Sampling-PPM- PWM–Bandwidth –Noise trade off–PCM- Noise considerations in PCM- Quantization-Delta modulation –Linear prediction – differential pulse code modulation – Adaptive Delta Modulation.

UNIT II BASEBAND PULSE TRANSMISSION **9**

Matched Filter- Error Rate due to noise –Intersymbol Interference- Nyquist's criterion for Distortionless Baseband Binary Transmission- Correlative level coding – Baseband M-ary PAM transmission – Adaptive Equalization –Eye patterns

UNIT III DIGITAL MODULATION TECHNIQUES **9**

Introduction – ASK- FSK – PSK- coherent modulation techniques-BFSK-BPSK-signal space diagram-probability of error-Coherent Quadrature modulation techniques- QPSK-MSK-signal space diagram-probability of error- Non coherent modulation techniques-M-ary modulation techniques Carrier Synchronization- Timing Synchronization

UNIT IV ERROR CONTROL CODING **9**

Discrete memoryless channels – Linear block codes - Cyclic codes - Convolutional codes – Maximum likelihooddecoding of convolutional codes-Viterbi Algorithm, Trellis coded Modulation, Turbo codes.

UNIT V SPREAD SPECTRUM MODULATION **9**

Pseudo- noise sequences – a notion of spread spectrum – Direct sequence spread spectrum with coherentbinary phase shift keying – Signal space Dimensionality and processing gain –Probability of error – Frequency – hopspread spectrum.

TOTAL HOURS: 45

OUTCOMES:

After completion of the course, students will be able to

- Design PCM systems
- Design and implement base band transmission schemes
- Design and implement band pass signaling schemes
- Analyze the spectral characteristics of band pass signaling schemes and their noise performance
- Design error control coding schemes

TEXT BOOKS:

1. Simon Haykins, "Communication Systems" John Wiley, 5th Edition, March 2009.
2. Taub. H & Schilling, G Saha, "Principles of Communication"3/e,2007.

REFERENCE BOOKS:

1. John G. Proakis, MasoudSalehi, "Digital Communication", McGraw Hill 5th edition , 2007.
2. Bernard Sklar, "Digital Communication, Fundamentals and Application", Pearson Education Asia, 2nd Edition, 2012.

	SEMESTER V	L	T	P	C
	ELECTRONIC CIRCUITS- II	**3**	**0**	**0**	**3**

AIM

To introduce the students about the feedback amplifiers, oscillators, tuned amplifiers, Multivibrators and voltage and current sweep generators.

OBJECTIVES

- To understand the basic concept of feedback and its types and also to know about the working of various types of feedback amplifiers and its analysis.
- To understand the basic concept of working of different types oscillators.
- To understand the working of different types of tuned amplifiers and its analysis.
- To understand the basic working & design of different types of multivibrator circuits.
- To understand the fundamentals of various sweep generator circuits.

UNIT – I: FEEDBACK AMPLIFIER **9**

Types of feedback – effect of feedback amplifier on noise, distortion gain, input and output impedance of the amplification, analysis of voltage and current feedback amplifier.

UNIT – II: OSCILLATORS **9**

Barkhausen Criterion for Oscillation in Feedback Oscillator – Sinusoidal Oscillator – Phase Shift Oscillator – RC and Wein Bridge Oscillator – Analysis of LC Oscillator, Colpitts, Hartley, Clap, Crystal Oscillator.

UNIT – III: TUNED AMPLIFIERS **9**

Resonance Circuits, Unloaded and Loaded Q of Tank Circuit – Bandwidth – Types of Tuned Amplifiers – Analysis of Single Tuned Amplifier – Double Tuned Amplifier-Stagger Tuned Amplifier – Instability of Tuned Amplifier – Stabilization Techniques, Neutralization and Unilaterlization – Class C Tuned Amplifiers and their Application.

UNIT IV WAVE SHAPING AND MULTIVIBRATOR CIRCUITS **9**

RL & RC Integrator and Differentiator circuits. Diode clippers, clampers and slicers. Collector coupled and Emitter coupled Astable multivibrator. Monostable multivibrator. Bistable multivibrators. Triggering methods. Storage delay and calculation of switching times. Speed up capacitors. Schmitt trigger circuit.

UNIT V BLOCKING OSCILLATORS AND TIMEBASE GENERATORS **9**

Pulse transformers, Monostable Blocking Oscillators using Emitter and base timing. Frequency control using core saturation. Astable blocking oscillator, UJT sawtooth generators.Linearization using constant current circuit. Bootstrap and Miller saw-tooth generators. Current time base generators.

TOTAL HOURS : 45

OUTCOMES:

Upon Completion of the course, the students will be able to

- Design and analyze feedback amplifiers.
- Design LC and RC oscillators, tuned amplifiers, wave shaping circuits, multivibrators, blocking oscillators and time base generators.
- Analyze performance of tuned amplifiers.

TEXT BOOKS:

1. Millman. J & Taub. H, “Pulse, Digital and Switching Waveforms”, TMH, 2000.
2. Mithal G.K, “Electronic Devices and Circuits”, Khanna Publishers, 23rd Edition, 2004.

REFERENCE BOOKS:

1. David A. Bell, “Solid State Pulse Circuits”, PHI, 2002.
2. Venkatraman. R, “Pulse, Digital Circuits and Computer Fundamentals”, Dhanpat Rai Publications (P) Ltd., 1986
3. Jacob Millman and C. Halkias, “Integrated Electronics, Analog and Digital Circuits and Systems”, McGraw Hill, 1997

	SEMESTER V	L	T	P	C
	TRANSMISSION LINES AND WAVEGUIDES	**3**	**1**	**0**	**4**

AIM:

To lay a strong foundation on the theory of transmission lines and wave guides by highlighting their applications.

OBJECTIVE:

- To become familiar with propagation of signals through lines
- Understand signal propagation at Radio frequencies
- Understand radio propagation in guided systems
- To become familiar with resonators

UNIT I TRANSMISSION LINE THEORY **9**

Introduction - Types of transmission lines – General theory of transmission line – Line constants – Transmission line equation – Physical significance of the equations – The Infinite line – Distortion in a line – Distortion-less line – Telephone cables – Loading of lines – Types of loading – Campbell's formula – General equation for line with any termination – Input impedance – Open and Short circuited line.

UNIT II RADIO FREQUENCY TRANSMISSION LINES **9**

Line approximations – Parameters of open wire line at radio frequency, parameters of coaxial lines at radio frequencies, constants for the line of zero dissipation – Voltages and Currents on the dissipation-less lines – input impedance of a lossless line – Wavelength and velocity of propagation – Reflection – Reflection coefficient, Reflection loss, Reflection factor, Standing wave ratio, Input impedance in terms of reflection coefficient – Practical types – Microstripline, Microwave Transmission line, Super Conducting transmission line, Characteristics of different printed transmission lines.

UNIT III MATCHING, MEASUREMENTS AND INTERFERENCE **9**

Types of transmission line sections – Half wave line – One eighth wave line – Quarter wave line – Properties of quarter wave transformer – Location of V_{max} and V_{min} – Impedance matching – Single and double stub matching – Smith chart – Solutions of problems using smith chart – Applications of smith chart – Measurement of line parameters – Measurement of VSWR, Wavelength, Impedance and Power – Electrostatic and Electromagnetic Interference with Communication lines, Phenomenon of corona, Methods of reducing corona and interference.

UNIT IV ELECTROMAGNETIC WAVES **9**

Review of Maxwell's/Faraday's Equation – Waves between parallel planes – Transverse electric waves – Transverse magnetic waves – Characteristics of TE and TM waves – Transverse electromagnetic waves – Velocities of propagation – Attenuation in parallel plane waves – Wave impedance.

UNIT V GUIDED WAVES AND WAVEGUIDE THEORY **9**

Rectangular wave guides – TE and TM waves in rectangular wave guides – Dominant mode – Cut off frequency in wave guides – Impossibility of TEM waves in wave guides – Circular wave guides – TE and TM waves in circular wave guides – Wave impedance and characteristic impedance – Power flow in wave guides – Attenuation factor and Q of wave guides – Transmission line analogy for wave guide.

TUTORIAL : 15
TOTAL HOURS: 60

OUTCOMES:

After completion of the course, students will be able to:

- Discuss the propagation of signals through transmission lines.
- Analyze signal propagation at Radio frequencies.
- Explain radio propagation in guided systems.
- Utilize cavity resonators.

TEXT BOOKS:

1. Umesh Sinha, "Transmission lines and networks", 8th Edition, Sathya Prakasham Publishers, 2003. (Unit I – IV)
2. Edward Jordan and K.G.Balmain, "Electromagnetic Waves and Radiating Systems", 2nd Edition, PHI, 2005. (Unit V)

REFERENCE BOOKS:

1. John D. Ryder, Network lines and fields, 2nd Edition, Prentice Hall of India, 2003.
2. Samuel Y. Liao, Microwave devices and circuits, 3rd Edition, Prentice Hall of India, 2003.
3. David M.Pozar, Microwave Engineering, 2nd Edition, John Wiley, 2002.
4. Seth S.P., Elements of Electromagnetic Fields, 2nd Edition, Dhanpat Rai& Sons, 2007.

	SEMESTER V	L	T	P	C
	DIGITAL SIGNAL PROCESSING	3	1	0	4

AIM :

To introduce the concepts of Digital signal processing and DSP Processor. The mathematical analysis of FIR and IIR filter design and simulation using MATLAB are dealt with in detail.

OBJECTIVES

- Structures of Discrete time signals and systems
- Frequency response and design of FIR and IIR filters.
- Finite word length effect
- DSP Processor- TMS320C5X

UNIT I DISCRETE FOURIER TRANSFORMS & FAST FOURIER TRANSFORMS: 9

Introduction to DFT-Efficient computation of DFT properties of DFT -FFT algorithms-Radix-2 and Radix-4 FFT algorithms-Decimation in Time- Decimation in Frequency algorithms- IFFT - Use of FFT algorithms in Linear Filtering and correlation.

UNIT II IIR FILTER DESIGN: 9

Design of IIR filter – Butterworth, Chebyshev– Order determination –Digital IIR filter design from analog transfer function by Impulse Invariant, Bilinear transformation-Approximation derivatives - Frequency Transformation from LPF to BPF, BSF and HPF.

3**. FIR FILTER DESIGN: 9**

Symmetric and Anti-symmetric FIR filters – Linear phase FIR filters – Windowing technique-Rectangular, Kaiser windows-Frequency sampling techniques-Structure for FIR systems & IIR Systems.

4. FINITE WORD LENGTH EFFECTS: 9

Quantization noise – derivation for quantization noise power – Fixed point and binary floating point number representations – Comparison – Overflow error – truncation error – coefficient quantization error – limit cycle oscillations- signal scaling – analytical model of sample and hold operations-Application of DSP.

5. MULTI RATE SIGNAL PROCESSING 9

Introduction- Concepts of Multi-rate Signal Processing- Decimation by integer factor- interpolation by integer factor-Sampling rate conversion by non integer factor – multistage approach to sampling rate conversion – Application: echo canceller.

TUTORIAL : 15
TOTAL HOURS: 60

OUTCOMES:

Upon completion of the course, students will be able to

- apply DFT for the analysis of digital signals & systems
- design IIR and FIR filters
- characterize finite Word length effect on filters
- design the Multirate Filters
- apply Adaptive Filters to equalization

TEXT BOOK:

1. John G. Proakis and Dimitris G.Manolakis, 'Digital Signal Processing Principles, Algorithms and Applications ', PHI of India Ltd., New Delhi 3rd Edition 2000. (Unit I to IV)
2. Sanjit K.Mitra 'Digital Signal Processing', A Computer Based Approach, Tata McGraw-Hill, New Delhi, 1998, Second Edition.

REFERENCES:

1. Alan V Oppenheim, Ronald W Schafer and John R Buck."Discrete time signal processing", PHI/Pearson Education, 2000, second Edition.
2. Jhony R.Johnson, "Introduction to Digital Signal Processing", Prentice Hall of India/Pearson Education, 2002.
3. S. Salivahanan, A. Vallavaraj G. Gnapriya, "Digital Signal Processing", Tata McGraw-Hill Education,

	SEMESTER V	L	T	P	C
	DATA STRUCTURES	**3**	**0**	**0**	**3**

AIM:

The aim is to introduce the concept of storage of data using list, stack, queue

OBJECTIVES:

- To introduce the concepts of Advanced Data Structures.
- To introduce the concepts of Tree

Unit I Linear Structures **9**

Abstract Data Types (ADT) – List ADT – array-based implementation – linked list implementation – cursor-based linked lists – doubly-linked lists – applications of lists –Stack ADT – Queue ADT – circular queue implementation – Applications of stacks and queues

Unit II Tree Structures **9**

Tree ADT – tree traversals – left child right sibling data structures for general trees – Binary Tree ADT – expression trees – applications of trees – binary search tree ADT – Threaded Binary Trees.

Unit III Balanced Trees **9**

AVL Trees – Splay Trees – B-Tree - heaps – binary heaps – applications of binary Heaps

Unit IV Hashing and Set **9**

Hashing – Separate chaining – open addressing – rehashing – extendible hashing - Disjoint Set ADT – dynamic equivalence problem – smart union algorithms – path compression – applications of Set

Unit V Graphs **9**

Definitions – Topological sort – breadth-first traversal - shortest-path algorithms – minimum spanning tree – Prim's and Kruskal's algorithms – Depth-first traversal – biconnectivity – Euler circuits – applications of graphs

Total: 45 PERIODS

OUTCOMES:

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

- Explain the concepts of Object oriented programming.
- Write simple applications using C++.
- Discuss the different methods of organizing large amount of data.

TEXT BOOK

1. M. A. Weiss, “Data Structures and Algorithm Analysis in C”, Second Edition , Pearson Education, 2005.

REFERENCES

1. A. V. Aho, J. E. Hopcroft, and J. D. Ullman, "Data Structures and Algorithms", Pearson Education, First Edition Reprint 2003.

2. R. F. Gilberg, B. A. Forouzan, "Data Structures", Second Edition, Thomson India Edition, 2005.

	SEMESTER V	L	T	P	C
	ELECTRONIC CIRCUIT SIMULATION LAB	**0**	**0**	**4**	**2**

AIM:

To design the basic amplifier circuits with simulation software's

List of Experiments

Design Simulation using SPICE, Assembling & Testing of

1. Tuned Amplifier
2. Current Series Feedback amplifier
3. Voltage Shunt Feedback amplifier
4. Hartley Oscillator
5. Colpitts Oscillator
6. RC Phase Shift Oscillator.
7. Wein bridge oscillator Using Transistors
8. Schmitt Trigger Using Transistors.
9. Design of Collector Coupled Astable Multivibrator
10. Design of Collector Coupled Monostable Multivibrator

OUTCOMES:

On completion of this lab course, the students will be able to

- Analyze various types of feedback amplifiers
- Design oscillators, tuned amplifiers, wave-shaping circuits and multivibrators
- Design and simulate feedback amplifiers, oscillators, tuned amplifiers, wave-shaping circuits and multivibrators using SPICE Tool.

	SEMESTER V	L	T	P	C
	COMMUNICATION ENGINEERING LAB	**0**	**0**	**4**	**2**

AIM:

To help the students to design and implement communication circuits. To give hands on training on simulation software.

OBJECTIVES

- To carry out AM and FM modulation experiments using discrete electronic components. Software's like MATLAB and Pspice are used to simulate the circuit operations.

List of Experiments:

Designing, Assembling & Testing of

1. Sampling Theorem – Verification, Aliasing effects
2. AM generation and Detection
3. FM generation and Detection
4. Pre emphasis & De emphasis
5. TDM
6. Pulse modulation (PAM, PDM, PPM)
7. PCM / DM
8. IF amplifier / Mixer
9. Receiver Characteristics
10. ASK, FSK, PSK
11. Study of Spectrum Analyzer

OUTCOMES:

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

 Simulate end-to-end Communication Link

 Demonstrate their knowledge in base band signaling schemes through implementation of FSK, PSK and DPSK

 Apply various channel coding schemes & demonstrate their capabilities towards the improvement of the noise performance of communication system

 Simulate & validate the various functional modules of a communication system

	SEMESTER V	L	T	P	C
	DIGITAL SIGNAL PROCESSING LAB	**0**	**0**	**4**	**2**

AIM

To verify practically, the fundamental characteristics of various discrete time signals.

OBJECTIVES

- To study experimentally the characteristics of filters.
- To verify practically, the response of various transforms.

LIST OF EXPERIMENTS:

I.USING MATLAB.

1. Representation of time-series signal
2. Computation of convolution of signals
3. Response of a system for different inputs
4. Stability test
5. DFT computation
6. Design of IIR filters
7. Design of FIR filters
8. Sampling
9. Multi Rate signal Processing

II.DSP PROCESSOR IMPLEMENTATION

1. Sampling & Waveform generation
2. FIR & IIR Filters Implementation
3. Fast Fourier transforms

OUTCOMES:

Students will be able to

- Carry out simulation of DSP systems
- Demonstrate their abilities towards DSP processor based implementation of DSP systems
- Analyze Finite word length effect on DSP systems
- Demonstrate the applications of FFT to DSP
- Implement adaptive filters for various applications of DSP

	SEMESTER VI	L	T	P	C
	DIGITAL IMAGE PROCESSING	3	0	0	3

AIM

To introduce the student to various image processing techniques.

OBJECTIVES

- To study the image fundamentals
- To study the mathematical transforms necessary for image processing.
- To study the image enhancement techniques.
- To study image restoration procedures.
- To study the image compression techniques.

UNIT I DIGITAL IMAGE FUNDAMENTALS 9

Introduction-Elements of Digital Image Processing system- Visual perception and properties of human eye-Image representation-Image Sampling & Quantization-A simple image model-Some basic relationship between pixels- Image processing applications.

UNIT II IMAGE TRANSFORMS 9

Introduction to Fourier transform - Discrete Fourier transform - Properties of two dimensional FT – Separability, Translation, Periodicity, Rotation, Average Value – DCT, DST, Walsh, Hadamard, Haar transforms.

UNIT III IMAGE ENHANCEMENT 9

Histogram Modelling, equalization and modification. Image smoothing-Image sharpening- Spatial Filtering-Edge detection - Homomorphic filtering for image enhancement.

UNIT IV IMAGE RESTORATION 9

Model of Image Degradation/Restoration process –Inverse filtering -Least Mean Square (Wiener) filtering – Constrained least mean square restoration – Singular value decomposition-Recursive filtering –

UNIT V IMAGE COMPRESSION 9

Image Compression: Fundamentals -Image compression models; Lossless compression:Variable-Length Coding -Contents - LZW Coding; Lossy Compression:Lossy Predictive Coding - Transform Coding - Wavelet Coding.

TOTAL PERIODS:45

OUTCOMES:

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

- Discuss digital image fundamentals.
- Apply image enhancement and restoration techniques.
- Use image compression and segmentation Techniques.
- Represent features of images.

TEXT BOOKS:

1. Rafael C. Gonzalez and Richard E.woods, "Digital Image Processing", Addition - Wesley Publishing Company, New Delhi, Third Edition,2007.
2. Anil.K.Jain, "Fundamentals of Digital Image Processing", Prentice Hall of India Pvt Ltd., New Delhi, 1995

REFERENCES:

1. Kenneth R Castleman, "Digital Image Processing", Prentice Hall, New Delhi, 1995.
2. William K. Pratt, "Digital Image Processing", John Wiley, NJ, 1987.
3. Sid Ahmed M.A., "Image Processing Theory, Algorithm and Architectures", McGraw-Hill, 1995.
4. Rafael C. Gonzalez and Richard E.woods, "Digital Image Processing Using MATLAB", Addition - Wesley Publishing Company,Second Edition, New Delhi, 2004.

	SEMESTER VI	L	T	P	C
	ANTENNA AND WAVE PROPAGATION	3	1	0	4

Aim:

To study the course on antenna theory and propagation of waves.

Objectives:

To study the EM theory and radiation fundamentals
To study about wire antenna and arrays
To study about the aperture antennas
To study about the antenna measurements
To study about the wave propagation

UNIT I ELECTROMAGNETIC RADIATION AND ANTENNA FUNDAMENTALS 9

Review of electromagnetic theory: Vector potential, Solution of wave equation, retarded case, Hertizian dipole. Antenna characteristics: Radiation pattern, Beam solid angle, Directivity, Gain, Input impedance, Polarization, Bandwidth, Reciprocity, Equivalence of Radiation patterns, Equivalence of Impedances, Effective aperture, Vector effective length, Antenna temperature.

UNIT II WIRE ANTENNAS AND ANTENNA ARRAYS 9

Wire antennas: Short dipole, Radiation resistance and Directivity, Half wave Dipole, Monopole, Small loop antennas. Antenna Arrays: Linear Array and Pattern Multiplication, Two-element Array, Uniform Array, Polynomial representation, Array with non-uniform Excitation-Binomial Array.

UNIT III APERTURE ANTENNAS 9

Aperture Antennas: Magnetic Current and its fields, Uniqueness theorem, Field equivalence principle, Duality principle, Method of Images, Pattern properties, Slot antenna, Horn Antenna, Pyramidal Horn Antenna, Reflector Antenna-Flat reflector, Corner Reflector, Common curved reflector shapes, Lens Antenna.

UNIT IV SPECIAL ANTENNAS AND ANTENNA MEASUREMENTS 9

Special Antennas: Long wire, V and Rhombic Antenna, Yagi-Uda Antenna, Turnstile Antenna, Helical Antenna- Axial mode helix, Normal mode helix, Biconical Antenna, Log periodic Dipole Array, Spiral Antenna, Micro strip Patch Antennas. Antenna Measurements: Radiation Pattern measurement, Gain and Directivity Measurements, Anechoic Chamber measurement.

UNIT V RADIO WAVE PROPAGATION 9

Calculation of Great Circle Distance between any two points on earth, Ground Wave Propagation, Free-space Propagation, Ground Reflection, Surface waves, Diffraction, Wave propagation in complex Environments, Tropospheric Propagation, Tropospheric Scatter. Ionosphere propagation: Structure of ionosphere, Sky waves, skip distance, Virtual height, Critical frequency, MUF, Electrical properties of ionosphere, Effects of earth's magnetic fields, Faraday rotation, Whistlers.

TUTORIAL: 15
TOTAL HOURS: 60

OUTCOMES:

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

- Explain the various types of antennas and wave propagation.
- Write about the radiation from a current element.
- Analyze the antenna arrays, aperture antennas and special antennas such as frequency independent and broad band

TEXTBOOKS

1. E.C.Jordan and Balmain, "Electromagnetic waves and Radiating Systems", Pearson Education / PHI, 2006.
2. John D.Kraus, Ronald J Marhefka and Ahmad S Khan, "Antennas for all Applications", Tata McGraw-Hill Book Company, 3 ed, 2007.

REFERENCE BOOKS

1. A.R.Harish, M.Sachidanada, "Antennas and Wave propagation", Oxford University Press, 2007.
2. Constantine A. Balanis, Antenna Theory Analysis and Design, John Wiley, 2nd Edition, 2007.
3. R.E.Collins, "Antenna and Radio wave propagation", McGraw-Hill
4. W.L Stutzman and G.A. Thiele, "Antenna analysis and design", John Wiley, 2000.

	SEMESTER VI	L	T	P	C
	COMPUTER COMMUNICATION	**3**	**0**	**0**	**3**

AIM:

To understand the architecture, recent advances, current practices and trends in computer network, analyze the networking protocols and the contemporary issues in computer networks

OBJECTIVE

- To know about the concepts of Data communication and networks and Physical Layer and different protocols.
- To impart knowledge on Medium Access Layer
- To impart knowledge on Networks Layer
- To impart knowledge on transport protocol.
- To impart knowledge on Application Layer.

UNIT I INTRODUCTION & PHYSICAL LAYER **9**

Introduction: uses of computer networks - Network H/W, Network S/W, OSI reference Model, TCP/IP reference model, comparison of OSl & TCP/ IP model, Network Standardization.

Physical Layer: Theoretical basics of data communication, guided transmission media, wireless transmission, PSTN, Mobile Telephone Systems, Cable Televisions.

UNIT II DATA LINK LAYER **9**

Data link layer design issues – framing, error control, flow control – Error detecting codes and Error Correcting codes, Elementary data link protocols –stop-and wait protocol for error free and noisy channel – sliding window protocol – one bit, go back-N and selective repeat.

UNIT IIINETWORK LAYER **9**

The Network Layer: Network Layer Design Issues, Routing Algorithms – optimality principle, shortest path, flooding, distance vector routing, Congestion Control Algorithms, Quality of Service, Integrated Services, internetworking, Network layer in the Internet.

UNITIV TRANSPORT LAYER **9**

Transport Service, Elements of transport protocol, Congestion Control Algorithms, Internet Transport Protocol - UDP, Internet Transport Protocol - TCP, Performance issues,

UNIT V APPLICATION LAYER **9**

DNS-(Domain Name System), Electronic Mail, World Wide Web, Real Time Audio and Video, Content Delivery and Peer-to-peer,

TOTAL HOURS: 45

OUTCOMES:

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

- Describe the layered communication architectures.
- Understand various physical, data link and routing layer protocols.
- Analyze the application layer protocols and security issues and also the various

TEXT BOOKS:

1. Andrew S Tanenbaum, David J. Wetherall, "Computer Networks", 5th Edition. Pearson Education/PHI/2012
2. Behrouz A. Forouzan, Data Communications and Networking, 4th Edition, McGraw Hill Higher Education 2007.

REFERENCE BOOKS:

1. Michael A.Gallo, William Hancock.M, Computer Communications and Networking Technologies, BROOKS/COLE/2001
2. Richard Lai and Jirachiefpattana, "Communication Protocol Specification and Verification", Kluwer Publishers, Boston, 1998.

	SEMESTER VI	L	T	P	C
	VLSI DESIGN TECHNIQUES	3	0	0	3

AIM:

To learn about the VLSI technology

OBJECTIVES:

- To study the MOS transistor and technology
- To study the stick diagram characteristics
- To study the circuit characterization
- To study the VLSI components
- To study the Verilog language

UNIT I MOS TRANSISTOR THEORY AND PROCESS TECHNOLOGY 9

NMOS and PMOS transistors - Threshold voltage - Body effect - Design equations - Second order effects - MOS models and small signal AC characteristics - Basic CMOS technology.

UNIT II INVERTERS AND LOGIC GATES 9

NMOS and CMOS Inverters - Stick diagram - Inverter ratio - DC and transient characteristics -switching times - Super buffers - Driving large capacitance loads - CMOS logic structures -Transmission gates - Static CMOS design - Dynamic CMOS design.

UNIT III CIRCUIT CHARACTERISATION AND PERFORMANCE ESTIMATION 9

Resistance estimation - Capacitance estimation - Inductance - Switching characteristics –Transistorsizing - Power dissipation and design margining - Charge sharing - Scaling.

UNIT IV CMPONENTS AND SYSTEM LEVEL PHYSICAL DESIGN 9

Multiplexers - Decoders - comparators - Priority encoders - Shift registers - Arithmetic circuits -Ripple carry adders - Carry look ahead adders - High-speed adders - Multipliers- Physical design -Delay modeling - Cross talk - Floor planning - Power distribution - Clock distribution - Basics of CMOS testing.

UNIT V VERILOG HARDWARE DESCRIPTION LANGUAGE 9

Overview of digital design with Verilog HDL - Hierarchical modeling concepts - Modules and port definitions - Gate level modeling - Data flow modeling - Behavioral modeling - Task & functions -Test Bench.

TOTAL HOURS: 45

OUTCOMES:

Upon completion of the course, students should

- Explain the basic CMOS circuits and the CMOS process technology.
- Discuss the techniques of chip design using programmable devices.
- Model the digital system using Hardware Description Language.

TEXT BOOKS:

1. Neil H.E. Weste, Kamran Eshraghian, “Principles of CMOS VLSI Design”, Pearson Education ASIA, 2nd edition, 2000.
2. Samir Palnitkar, “Verilog HDL”, Pearson Education, 2nd Edition, 2004.

REFERENCES:

1. Pucknell, “Basic VLSI Design”, Prentice Hall of India Publication, 1995.
2. Eugene D. Fabricius, “Introduction to VLSI Design”, McGraw Hill International Editions,1990.
3. Bhasker J., “A Verilog HDL Primer”, 2nd Edition, B.S. Publications, 2001.
4. John P. Uyemura, “Introduction to VLSI Circuits and Systems”, John Wiley & Sons, Inc.,2002.

	SEMESTER VI	L	T	P	C
	ELECTRONIC MEASUREMENTS AND INSTRUMENTATION	**3**	**0**	**0**	**3**

AIM:

To understand the concepts of electronic measurements

OBJECTIVE:

- To familiarize the students with the concept of measurement and the related instrumentation systems.
- To impart knowledge on to take valid measurements and calibration details using these instruments.
- To understand the importance of signal generators and signal analyzers in measurements.
- To know about measurement technique in optical domains.

UNIT I BASIC MEASUREMENT CONCEPTS **9**

Measurement systems – Static and dynamic characteristics – Units and standards of measurements – error analysis – moving coil, moving iron meters – multimeters – True RMS meters – Bridge measurements – Maxwell, Hay, Schering, Anderson and Wien bridge.

UNIT II BASIC ELECTRONIC MEASUREMENTS **9**

Electronic multimeters – Cathode ray oscilloscopes – block schematic – applications – special oscilloscopes – Q meters – Vector meters – RF voltage and power measurements.

UNIT III SIGNAL GENERATORS AND ANALYZERS **9**

Function generators – RF signal generators – Sweep generators – Frequency synthesizer – wave analyzer – Harmonic distortion analyzer – spectrum analyzer.

UNIT IV DIGITAL INSTRUMENTS **9**

Comparison of analog and digital techniques – digital voltmeter – multimeters – frequency counters – measurement of frequency and time interval – extension of frequency range – measurement errors.

UNIT V DATA ACQUISITION SYSTEMS AND FIBER OPTIC MEASUREMENTS **9**

Elements of digital data acquisition system – interfacing of transducers – multiplexing – computer controlled instrumentation – IEEE 488 bus – fiber optic measurements for power and system loss – Optical time domain reflectometer.

TOTAL HOURS: 45

OUTCOMES:

Students will be able to understand

- The three phase supply and power measurement.
- The concepts in electrical generators, motors and transformers.
- The basic measurement and instrumentation based devices.
- The relevance of digital instruments in measurements.

TEXT BOOKS:

1. Albert D.Helfrick and William D.Cooper – Modern Electronic Instrumentation and Measurement Techniques, Prentice Hall of India, .

REFERENCES :

1. Joseph J.Carr, Elements of Electronics Instrumentation and Measurement, 2nd Edition Pearson education, 2009.
2. Alan. S. Morris, Principles of Measurements and Instrumentation, Prentice Hall of India, 2nd edn., 2003.
3. Ernest O. Doebelin, Measurement Systems- Application and Design-Tata McGraw-Hill- 2004.

	SEMESTER VI	L	T	P	C
	NETWORKS LAB	**0**	**0**	**4**	**2**

AIM

To know and understand communication networks using NETSIM Software and LAN Trainer kit.

OBJECTIVES

- To study the communication networks characteristics and to analyze various MAC and routing layer Protocols.

List of Experiments:

PC to PC/peripherals communication

1. Establish RS232 communication
2. EstablishParallel port communication

MAC Layer LAN Protocols

Observe the behavior & measure the throughput, compare the performance with other MAC Layer protocols.

3. CSMA/CD at MAC Layer 4. Token Bus at MAC Layer
5. Token Ring at MAC Layer 6. CSMA/CA at MAC Layer

LLC (Logical Link Control) Layer LAN Protocols

observe the behavior & measure the throughput of reliable data transfer protocols. Compare the performance with other LLC Layer protocols.

7. Stop & Wait at LLC Layer
8. Sliding Window – Go-Back-N at LLC Layer
9. Sliding Window – Selective Repeat at LLC Layer

Routing Algorithm

Performance Study of Routing Algorithms through simulation

10. Distance Vector Routing 11. Link State Routing

Introduction to Socket Communication in Linux & Windows

12. Socket programming concept in Windows & Linux platforms
13. File Transfer between PC's through sockets

14. Study of Data Encryption & Decryption techniques by using them in a File Transfer

OUTCOMES:

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

- Communicate between two desktop computers.
- Implement the different protocols
- Program using sockets.
- Implement and compare the various routing algorithms
- Use simulation tool.

	SEMESTER VI	L	T	P	C
	VLSI TECHNIQUES LAB	**0**	**0**	**4**	**2**

AIM

To impart knowledge on design of Digital Circuits using VLSI Techniques

OBJECTIVE:

- To gain expertise in design and development and simulation of digital circuits with VHDL and Verilog

LIST OF EXPERIMENTS

1. Design of all logic gates
2. Design of adders
3. Design of subtractors
4. Design of Encoder and Decoder
5. Design of Multiplexer and Demultiplexer
6. Design of Comparator
7. Design of Flip Flop
8. Design of Code converters
9. Design of Magnitude Comparator
10. Design of registers using latches and flip flops
11. Design of Synchronous Counters
12. Design of ALU
13. Design of RAM

OUTCOMES:

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

- Write HDL code for basic as well as advanced digital integrated circuits.
- Import the logic modules into FPGA Boards.
- Synthesize, Place and Route the digital IPs.
- Design, Simulate and Extract the layouts of Analog IC Blocks using EDA tools.

	SEMESTER VI	L	T	P	C
	DIGITAL IMAGE PROCESSING LAB	**0**	**0**	**4**	**2**

1) Image types – acquisition and display
2) Image Transforms – fourier and inverse fourier
3) Image Transforms – DCT,
4) Image Transforms – Hadamard
5) Image Enhancement – Histogram Equalisation
6) Image Smoothening
7) Image Sharpening
8) Edge detection
9) Image restoration – Noise removal
10) Image Restoration – Inverse filtering
11) Image Compression – Lossy compression
12) Image Compression – Wavelet coding

OUTCOMES:
Upon successful completion of this course, students will be able to:
- Discuss digital image fundamentals.
- Apply image enhancement and restoration techniques.
- Use image compression and segmentation Techniques.
- Represent features of images.

	SEMESTER VII	L	T	P	C
	EMBEDDED SYSTEMS	3	0	0	3

AIM

To learn the basic concepts of embedded systems and its applications.

OBJECTIVES

- To introduce students to the embedded systems, its hardware and software.
- To introduce devices and buses used for embedded networking.
- To explain programming concepts and embedded programming in C and C++
- To introduce the software development tools in embedded systems.
- To introduce the concepts of Real Time Operating System.

UNIT I INTRODUCTION TO EMBEDDED SYSTEMS 9

Definition –Processor Embedded into a System – Embedded Hardware Units and Devices in system –Embedded Software in a System – Examples of Embedded system –System on Chip (Soc) and Use of VLSI Design Technology – Complex Design and Processors – Design Process – Formalizations of System Design – Design Process and Design Examples – Classifications of Embedded Systems.

UNIT II DEVICES AND BUSES FOR DEVICES NETWORK 9

Device I/O Types and Examples – Serial Communication Devices – Parallel Devices Ports – Sophisticated Interfacing Features in Devices Ports – Wireless Devices – Timer and Counting Devices – Watchdog Timer – Real Time Clock – Networked Embedded Systems – Serial Bus Communication Protocols – Parallel Bus Device Protocol – Parallel Communication Network Using ISA, PCI, PCI-X, cPCI and advanced buses.

UNIT III PROGRAMMING CONCEPTS AND EMBEDDED PROGRAMMING IN C, C++ 9

Programming in assembly language (ALP) vs. High Level Language - C Program Elements, Macros and functions -Use of Pointers - NULL Pointers - Use of Function Calls – Multiple function calls in a Cyclic Order in the Main Function Pointers – Function Queues and Interrupt Service Routines Queues Pointers – Concepts of EMBEDDED PROGRAMMING in C++ - Objected Oriented Programming – Embedded Programming in C++, 'C' Program compilers – Cross compiler– Optimization of memory codes.

UNIT IVSOFTWARE DEVELOPMENT AND TOOLS 9

Embedded system evolution trends. Round - Robin, robin with Interrupts, function-One-Scheduling Architecture, Algorithms. Introduction to-assembler-compiler-cross compilers and Integrated Development Environment (IDE). Object Oriented Interfacing, Recursion, Debugging strategies, Simulators.

UNIT VREAL TIME OPERATING SYSTEMS 9

Task and Task States, tasks and data, semaphores and shared Data Operating system Services-Message queues-Timer Function-Events-Memory Management, Interrupt Routines in an RTOS environment, basic design Using RTOS.

TOTAL HOURS: 45

OUTCOMES:

- After undergoing this course the student will derive the ability to design and implement embedded system for a given problem.
- The student will be familiar in the programming concept and right selection of interfacing bus /peripheral / interfacing ICs.
- The concept of RTOS will help the student in right selection of OS for a given embedded system.

TEXT BOOKS:

1. Rajkamal, Embedded Systems Architecture, Programming and Design, TATA McGraw-Hill, Second Edition, Sixth reprint Oct. 2010
2. David E Simon, "An embedded software primer ", Pearson education Asia, Eighth Impression, 2009.

REFERENCE BOOKS:

1. Steve Heath, Embedded Systems Design, Second Edition-2003, Newnes,
2. Wayne Wolf, Computers as Components; Principles of Embedded Computing System Design – Harcourt India, Morgan Kaufman Publishers, 2008.
3. Frank Vahid and Tony Givargis, "Embedded Systems Design – A unified Hardware /Software Introduction", John Wiley, 2006.

	SEMESTER VII	L	T	P	C
	MICROWAVE ENGINEERING	3	0	0	3

AIM

To enable the student to become familiar with active & passive microwave devices & components used in Microwave communication systems.

OBJECTIVE

- To study passive microwave components and their S- Parameters.
- To study Microwave Components.
- To study Microwave Tubes.
- To study Microwave Semiconductor Devices.
- To Study Microwave Antennas.

UNIT I INTRODUCTION **9**

Microwave spectrum and bands-characteristics of microwaves-a typical microwave system. Traditional, industrial and biomedical applications of microwaves. Microwave hazards.S-matrix – significance, formulation and properties. S-matrix representation of a multi port network, S-matrix of a two port network with mismatched load.

UNIT II MICROWAVE COMPONENTS **9**

Waveguide Attenuators- Resistive card, Rotary Vane types. Waveguide Phase Shifters : Dielectric, Rotary Vanetypes. Waveguide Multi port Junctions- E plane and H plane Tees, Magic Tee, Hybrid Ring. Directional Couplers- 2hole, Bethe hole types. Ferrites-Composition and characteristics, Faraday Rotation. Ferrite components: Gyrator, Isolator, Circulator. S-matrix calculations for 2 port junction, E & H plane Tees, Magic Tee, Directional Coupler, Circulator and Isolator

UNIT III MICROWAVE TUBES **9**

Microwave tubes: O-type – Two cavity Klystrons: structure, resonant cavities, velocity modulation and Applegatediagram, bunching process. Reflex Klystrons- structure, modes and o/p characteristics, electronic and mechanicaltuning.M-type – cross-field effects, Magnetrons- types, 8-cavity Cylindrical Travelling Wave Magnetron- Hull cut-off and Hartree conditions, modes of resonance and PI-mode operation, o/p characteristics. HELIX TWT- types and characteristics of slow wave structures, structure of TWT and amplification process (qualitative treatment), Backward
Wave Oscillators

UNIT IV MICROWAVE SEMICONDUCTOR DEVICES AND INTEGRATED CIRCUITS **9**

Avalanche Transit Time Devices- principle of operation and characteristics of IMPATT and TRAPATT diodes,Point Contact Diodes, Schottky Barrier Diodes, Parametric Devices, Detectors and Mixers.Monolithic MicrowaveIntegrated Circuits (MMIC), MIC materials- substrate, conductors and dielectric materials. Types of MICs, hybridMICs(HMIC)

UNIT V MICROWAVEANTENNAS AND MEASUREMENTS **9**

Horn antenna and its types, micro strip and patch antennas. Network Analyzer, Measurement of VSWR, Frequency, Power, Noise, cavity Q, Impedance, Attenuation, Dielectric Constant and antenna gain.

OUTCOMES:

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

- Explain the active & passive microwave devices & components used in Microwave communication systems.
- Analyze the multi- port RF networks and RF transistor amplifiers. Generate Microwave signals and design microwave amplifiers. Measure and analyze Microwave signal and parameters.

TEXT BOOKS:

1. Samual Y.Liao, "Microwave Devices and Circuits", PHI, 3rd Edition, 2003.
2. Collin R.E., "Foundation of Microwave Engineering", McGraw Hill, 2nd Edition, 2009.
3. Microwave Principles – Herbert J.Reich, J.G.Skalnik, P.F.Ordung and H.L.Krauss, CBS Publishers and Distributors, New Delhi, 2004.

REFERENCE BOOKS:

1. Reich J. et al, "Microwaves", East West Press, 1978.
2. Gupta.K.C, "Microwaves", Wiley Eastern Ltd., 1995.
3. Peter A.Rizzi, "Microwave Engineering – Passive Circuits", PHI Publications.

4. Chatterjee.R, “Elements of Microwave Engineering”, Affiliated East-West Press Pvt. Ltd.

	SEMESTER VII	L	T	P	C
	CELLULAR MOBILE COMMUNICATION	3	0	0	3

AIM

- To introduce the concepts of wireless / mobile communication using cellular environment.
- To make the students to know about the various modulation techniques, propagation methods, coding and multi access techniques used in the mobile communication. Various wireless network systems and standards are to be introduced.

OBJECTIVE:

- ❖ To study the Basic wireless communication devices
- ❖ To study the wireless systems and standards
- ❖ To study the cellular concept and systems design fundamentals.
- ❖ To study the mobile radio propagation
- ❖ To study the equalization techniques, diversity techniques and speech coding.

UNIT – I: INTRODUCTION TO WIRELESS MOBILE COMMUNICATIONS 9

History and evolution of mobile radio systems, paging, cordless, WLL, Cellular telephones, comparison of Common wireless communication systems.

UNIT – II: WIRELESS SYSTEMS AND STANDARDS 9

AMPS&ETACS, USDC, GSM, CDMA, Digital Cellular Standard, CT, DECT, PACS, PDC, PHS.

UNIT – III: CELLULAR CONCEPT - SYSTEM DESIGN FUNDAMENTALS 9

Introduction, Frequency reuse, Channel assignment strategies, handoff strategies, Interference and system capacity, Trunking and GOS, Improving coverage and Capacity in cellular systems,

4. MOBILE RADIO PROPAGATION 9

Large scale path loss: Radio wave propagation, Free space Propagation model, Three basic propagation mechanisms, Two-ray model, Knife edge diffraction model, outdoor propagation model, Indoor Propagation Model. Small Scale Fading: Small scale multipath propagation, Impulse response Model of a multipath channel, Parameters of mobile multipath channels, Types of Small Scale Fading.

5. EQUALISATION, DIVERSITY AND SPEECH CODING 9

Fundamentals of equalization, Survey of equalization techniques, Linear Equalizers, Non-Linear Equalizers, Algorithms for adaptive equalization. Diversity Techniques, Space Diversity, Polarisation Diversity, Frequency Diversity, Time Diversity. RAKE Receiver, Interleaving. Speech Coding: Characteristics of Speech Signals, Quantization Techniques, ADPCM, Frequency Domain coding of Speech, Vocoders, LPC.

TOTEL HOURS: 45

OUTCOMES:

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

- Illustrate advanced concepts in 2.5G, 3G mobile networks, Adhoc and Sensor networks.
- Identify the importance of internetworking between LAN and 3GWANS.

TEXT BOOK:

- T.S. Rappaport, Wireless Communication; Principles and Practice, Pearson Education,2nd Edition,2009.

REFERENCE BOOKS:

1. K. Feher, Wireless Digital Communication, Prentice Hall of India, New Delhi, 1995.
2. W.C.Y. Lee, Mobile Communication Engineering; Theory and Application, Second Edition, McGraw-Hill International, 1998.

	SEMESTER VII	L	T	P	C
	OPTICAL COMMUNICATION	3	0	0	3

AIM:

To introduce the various optical fiber modes, configurations and various signal degradation factors associated with optical fiber and also to study about various optical sources and optical detectors

OBJECTIVE:

- To impart Knowledge on basics of Optical communication
- To Study about signal degradation and Optical Sources
- To Study about Optical Detectors
- To Study about Optical Amplifiers
- To Study about Optical Networks and Dispersion.

UNIT I INTRODUCTION **9**

Introduction to vector nature of light, propagation of light, propagation of light in a cylindrical dielectric rod. Raysand Modes. Different types of optical fibers, Modal analysis of a step index fiber, Linearly Polarized Modes, Singlemodefibers and Graded- Index Fiber.

UNIT II SIGNAL DEGRADATION AND OPTICAL SOURCES **9**

Attenuation- Absorption, Scattering Losses, Bending Losses, Core and Cladding Losses. Signal distortion in Opticalwaveguides- Material Dispersion, Waveguide Dispersion.Optical sources - Semiconductor Device Fabrication, LED and LASER diode - Principles of operation, conceptsof line width, phase noise, switching and modulation characteristics.

UNIT III OPTICAL DETECTORS **9**

Optical detectors – PN detector, pin detector, avalanche photodiode - Principles of operation, concepts of responsivity, sensitivity and quantum efficiency, noise in detection.Multichannel Transmission Technique-Multichannel Frequency Modulation, Subcarrier multiplexing. WDM Conceptsand Components.

UNIT IV OPTICAL AMPLIFIERS **9**

Basic concepts, semiconductor amplifier, Erbium-Doped Fiber Amplifier, Raman amplifier, Brillouin amplifier -principles of operation, amplifier noise, signal to noise ratio, gain, gain bandwidth, gain and noise dependencies,intermodulation effects, saturation induced crosstalk, wavelength range of operation.

UNIT V OPTICAL NETWORKS AND DISPERSION COMPENSATION **9**

Optical networks: SONET/SDH, ATM, IP, Wavelength routed networks, soliton communication system, fiber soliton, Soliton based communication system design, High capacity and WDM soliton system. Limitations, Post and Pre-compensation techniques, Equalizing filters, fiber based gratings, Broad band compensation-Applications.

TOTAL HOURS: 45

OUTCOMES:

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

- Discuss the various optical fiber modes, configurations and various signal degradation factors associated with optical fiber.
- Explain the various optical sources and optical detectors and their use in the optical communication system.
- Analyze the digital transmission and its associated parameters on system performance.

TEXT BOOKS:

1. Keiser. G, “Optical fiber communications”, 4th Edition Tata McGraw-Hill, New Delhi, 2008.
2. Agrawal. G.P, “Fiber-Optic Communication Systems” 3rd Edition John Wiley & Sons, 2002.

REFERENCE BOOKS:

1. John Gowar, “Optical Communication Systems”, 2nd Edition Prentice Hall, 1993.
2. Franz & Jain, “Optical communication, Systems and Components”, Narosa Publications, New Delhi, 2000.
3. Karminvov & T. Li “Optical Fiber Telecommunications”, Vol. A & B, Academic Press, 2002.

	SEMESTER VII	L	T	P	C
	ENGINEERING MANAGEMENT AND ETHICS	3	0	0	3

OBJECTIVE :

To facilitate the understanding of engineering Management principles and process.

UNIT I PLANNING 9

Nature and purpose of planning - Planning process - Types of plans – Objectives Managing by objective (MBO) Strategies - Types of strategies - Policies – Decision Making - Types of decision - Decision Making Process - Rational Decision Making Process - Decision Making under different conditions.

UNIT II ORGANIZING 9

Nature and purpose of organizing - Organization structure - Formal and informal groups *I* organization - Line and Staff authority - Departmentation - Span of control - Centralization and Decentralization - Delegation of authority - Staffing - Selection and Recruitment - Orientation - Career Development - Career stages – Training - Performance Appraisal.

UNIT III DIRECTING 9

Creativity and Innovation - Motivation and Satisfaction - Motivation Theories - Leadership Styles - Leadership theories - Communication - Barriers to effective communication - Organization Culture - Elements and types of culture – Managing cultural diversity.

UNIT IV INTRODUCTION TO ETHICS 9

Moral dilemmas -Uses of Ethical Theories- Engineering As Social Experimentation- Engineer's Responsibility For Safety-Codes of Ethics-Challenger Case Study

UNIT V ETHICS IN ENGINEERING 9

Employed Engineers Rights and Duties- Collective Bargaining-Occupational Crime- Global Issues- Multinational Corporation- Technology transfer-Engineers as managers-Consulting Engineers-Expert Witness- Moral Leadership

TOTAL:45 HOURS

OUTCOMES :

 The student would be able to apply the tools and techniques of quality management to manufacturing and services processes.

TEXT BOOKS:

1. Stephen P. Robbins and Mary Coulter, 'Management', Prentice Hall of India, 8th edition.

2. Charles W L Hill, Steven L McShane, 'Principles of Management', Mcgraw Hill Education, Special Indian Edition, 2007.

3. Mike Martin and Roland Schinzinger, “Ethics in Engineering”, McGraw Hill, New York (2005).

REFERENCES:

1. Charles D Fleddermann, “Engineering Ethics”, Prentice Hall, New Mexico, (1999).

2. Harold Koontz, Heinz Weihrich and Mark V Cannice, 'Management - A global & Entrepreneurial Perspective', Tata Mcgraw Hill, 12th edition, 2007.

3. Andrew J. Dubrin, 'Essentials of Management', Thomson Southwestern, 7th edition, 2007.

4. Prof. (Col) P S Bajaj and Dr. Raj Agrawal, “Business Ethics – An Indian Perspective”, Biztantra, New Delhi, (2004)

5. David Ermann and Michele S Shauf, “Computers, Ethics and Society”, Oxford University Press, (2003)

	SEMESTER VII	L	T	P	C
	MICROWAVE & OPTICAL LAB	**0**	**0**	**4**	**2**

AIM

To know and understand how communication is being established at microwave frequencies and using fiber in optical communication.

OBJECTIVES

- To have a detailed practical study on microwave equipments
- To study the optical devices and to use in the appropriate application

LIST OF EXPERIMENTS

Experiments pertaining to Fiber optics, Optical Communication and Fiber optic sensors

MICROWAVE:

1. Characteristics of Gunn diode Oscillator.
2. Characteristics of Reflex Klystron.
3. Characteristics of Directional Coupler
4. Characteristics of E / H Plane Tee, Magic Tee.
5. Horn Antenna – Gain and directional Characteristics

OPTICAL COMMUNICATION

1. Numerical aperture determination for fibers
2. D.C. Characteristics of LED and PIN Photo Diode
3. Optical transmission using Analog Modulation
4. Data transmission through Fiber Optic Link.
5. PI Characteristics of LASER diode.

OUTCOMES:

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

- Analyze the performance of simple optical link.
- Test microwave and optical components.
- Analyse the mode characteristics of fiber
- Analyse the radiation of pattern of antenna.

	SEMESTER VII	L	T	P	C
	EMBEDDED SYSTEMS LAB	**0**	**0**	**4**	**2**

AIM:

To know and understand the concepts of micro controller functioning and to study about various RTOS and their functioning

OBJECTIVE:

- To know about processors, controllers and their behaviors
- To study about the programming concept of embedded systems

LIST OF EXPERIMENTS

1. Design with 8 bit Microcontrollers 8051/PIC Microcontrollers
   i) I/O Programming, Timers, Interrupts, Serial port programming
   ii) PWM Generation, Motor Control, ADC/DAC, LCD and RTC Interfacing, Sensor Interfacing
   iii) Both Assembly and C programming
2. Design with 16 bit processors: I/O programming, Timers, Interrupts, Serial Communication,
3. Study of one type of Real Time Operating Systems (RTOS)
4. Electronic Circuit Design of sequential, combinational digital circuits using CAD Tools
5. Simulation of digital controllers using MATLAB/LabVIEW.
6. Programming with DSP processors for Correlation, Convolution, Arithmetic adder, Multiplier,
7. Design of Filters - FIR based , IIR based
8. Design with Programmable Logic Devices using Xilinx/Altera FPGA and CPLD
9. Design and Implementation of simple Combinational/Sequential Circuits.
10. Programming of TCP/IP protocol stack.

OUTCOMES:

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

- Write programs in ARM for a specific Application
- Interface memory and Write programs related to memory operations
- Interface A/D and D/A convertors with ARM system
- Analyse the performance of interrupt
- Write programmes for interfacing keyboard, display, motor and sensor.
- Formulate a mini project using embedded system

	SEMESTER VII	L	T	P	C
	COMPREHENSION	**0**	**0**	**4**	**2**

AIM:

The objective of "Comprehension" is to provide opportunity for the student to apply the knowledge acquired during the earlier semesters to real-life problems which he/she may have to face in future as an engineer. While learning as to how to solve real life problems, the student will receive guidance from teachers and also review various courses (subjects) learnt earlier.

The comprehension assessment will consist of 100 to 5 tests in each Streams covering all the subject of study in the respective streams under B.E. Electronics and Communication Engineering Course.

	SEMESTER VIII	L	T	P	C
	PROJECT WORK & VIVA-VOCE	**0**	**0**	**12**	**6**

OBJECTIVE

- The objective of the project work is to enable the students to form the groups of not more than 3 members on a project involving theoretical and experimental studies related to the branch of study.

- Formation of Group as follows
  - Group A : 8.5CGPA and above
  - Group B : 7 to 8.49 CGPA
  - Group C : 5 to 6.9 CGPA

  Group A Student will have a choice to take 2 students from Group B&C

- Every project work shall have a guide who is the member of the faculty of the institution. Six periods per week shall be allotted in the time table and this time shall be utilized by the students to receive the directions from the guide, on library reading, laboratory work, computer analysis or field work as assigned by the guide and also to present in periodical seminars on the progress made in the project.

- The aim of the project work is to deepen comprehension of principles by applying them to a new problem which may be the design and manufacture of a device, a research investigation, a computer or management project or a design problem.

- The progress of the project is evaluated based on a minimum of three reviews. The review committee may be constituted by the Head of the Department.

- Each student shall finally produce a comprehensive report covering background information, literature survey, problem statement, project work details and conclusion.

- This final report shall be typewritten form as specified in the guidelines.

- The continuous assessment shall be made as prescribed in the regulations

OUTCOMES:

On Completion of the project work students will be in a position to take up any challenging practical problems and find solution by formulating proper methodology.

	ELECTIVE	L	T	P	C
	ADVANCED DIGITAL SIGNAL PROCESSING	**3**	**0**	**0**	**3**

AIM:

To learn the advanced digital signal processing techniques.

OBJECTIVE:

- To study the parametric methods for power spectrum estimation
- To study Spectrum Estimation
- To study about Linear Estimation and Prediction
- To study adaptive filtering techniques using LMS algorithm and to study the applications of adaptive filtering
- To study Multirate signal processing fundamentals

UNIT I DISCRETE RANDOM PROCESS **9**

Discrete random process, Random Variables, Ensemble Averages, Parameter Estimation, Gaussian processes, Stationary Process, Autocovariance and Autocorrelation Matrices, Simulation of White noise, Power Spectrum, Filtering random processes, Spectral factorization theorem, Special types of random processes.

UNIT II SPECTRUM ESTIMATION **9**

Nonparametric methods – Periodogram, Modified periodogram, Bartlett's method, Welch's method, Blackman-Tukey method, Parametric methods- Autoregressive Spectrum Estimation, Moving Average Spectrum Estimation, Autoregressive Moving Average Spectrum Estimation.

UNIT III LINEAR ESTIMATION AND PREDICTION **9**

Levinson Durbin Recursion, Levinson Recursion, FIR Wiener filter, Linear prediction, Noise Cancellation, Lattice realization, IIR Wiener Filter- Causal Wiener Filtering, Discrete Kalman Filter.

UNIT IV ADAPTIVE FILTERS **9**

FIR adaptive filters- Newton' Steepest descent method- Wiener Hoff LMS adaptive algorithm, Adaptive Noise Cancellation, Adaptive channel equalization, Recursive least squares- Exponentially weighted RLS, Sliding Window RLS.

UNIT V MULTIRATE DIGITAL SIGNAL PROCESSING **9**

Interpolation and Decimation – Direct digital domain approach- Decimation by an integer factor- Interpolation by an Integer factor- Single and Multistage realization- Polyphase realization, Application to sub band coding.

TOTAL HOURS:45

OUTCOMES:

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

- Explain the parametric methods for power spectrum estimation.
- Discuss adaptive filtering techniques using LMS algorithm and the applications of adaptive filtering.
- Analyze the wavelet transforms.

TEXT BOOKS:

1. Monson H Hayes," Statistical Digital Signal processing and Modeling," Wiley student Edition, John Wiley and sons.2004.

REFERENCE BOOKS:

- John G Proakis and Manolakis," Digital signal Processing principles, Algorithms and Application," Pearson, Fourth Edition,2007 .

	ELECTIVE	L	T	P	C
	ADVANCED MICROPROCESSORS	**3**	**0**	**0**	**3**

AIM

To learn the architecture and programming of advanced microprocessors.

OBJECTIVES

- To introduce the concepts of advanced microprocessors.
- To introduce the programming techniques using MASM, DOS and BIOS function calls.
- To introduce the basic architecture of Pentium family of processors.
- To introduce the architecture programming and interfacing of advanced Microprocessors.
- To introduce the concepts and architecture of RISC processor.

UNIT I 80186, 80286, 80386 AND 80486 MICROPROCESSORS 9

80186 Architecture, Enhancements of 80186 – 80286 Architecture – Real and Virtual Addressing Modes – 80386 Architecture – Special Registers – Memory Management – Memory Paging Mechanism – 80486 Architecture – Enhancements – Cache Memory Techniques – Exception Handling – Comparison of Microprocessors (8086 – 80186 – 80286 – 80386 – 80486).

UNIT II PENTIUM MICROPROCESSORS 9

Pentium Microprocessor Architecture – Special Pentium Registers – Pentium Memory Management – New Pentium Instructions – Pentium Pro Microprocessor Architecture – Special features – Pentium II Microprocessor Architecture – Pentium III Microprocessor Architecture – Pentium III Architecture – Pentium IV Architecture – Comparison of Pentium Processors.

UNIT III RISC PROCESSORS I 9

PowerPC620 – Instruction fetching – Branch Prediction – Fetching – Speculation, Instruction dispatching – dispatch stalls – Instruction Execution – Issue stalls- Execution Parallelism – Instruction completion – Basics of P6 micro architecture – Pipelining – our of- order core pipeline – Memory subsystem.

UNIT IV RISC PROCESSORS II(Superscalar Processors) 9

Intel i960 – Intel IA32- MIPS R8000 – MIPS R10000 – Motorola 88110 – Ultra SPARC processor- SPARC version 8 – SPARC version 9.

UNIT V PC HARDWARE OVERVIEW 9

Functional Units & Interconnection, New Generation Mother Boards 286 to Pentium 4 Bus Interface- ISA- EISA- VESA- PCI- PCIX. Peripheral Interfaces and Controller, Memory and I/O Port Addresses.

TOTAL HOURS: 45

OUTCOMES:

The student will be familiar in the architecture and instruction set of the following microcontrollers Renesas R8C and Texas MSP430 microcontrollers.

The student will derive the ability to design and implement any microcontroller based system after undergoing this course.

TEXTBOOKS:

1. B.B.Brey The Intel Microprocessor 8086/8088 /80186/80188, 80286, 80386, 80486 PENTIUM, PENTIUM Pro, PII, PIII & IV Architectures, Programming & Interfacing, Pearson Education , 2004.

- 1. John Paul Shen, Mikko H.Lipasti, "Modern Processor Design", Tata McGraw Hill, 2006.
- **REFERENCE BOOKS**
- 1. Douglas V.Hall, "Microprocessors and Interfacing", Tata McGraw Hill, II Edition 2006
- 2. Mohamed Rafiquzzaman, "Microprocessors and Microcomputer Based System Design", II Edition, CRC Press, 2007

	ELECTIVE	L	T	P	C
	VIDEO PROCESSING	**3**	**0**	**0**	**3**

AIM

The purpose of Video Processing course is to cover the fundamentals of digital video signal generation and further processing over the communication systems.

OBJECTIVE

- To learn the basic concepts of video processing
- To learn about the various methodologies for motion estimation
- To learn the basic concepts of coding systems
- To understand about the waveform based video coding techniques
- To understand about the content dependent and scalable video coding techniques

UNIT I VIDEO FORMATION, PERCEPTION AND REPRESENTATION 9

Color Perception and Specification, Video Capture and Display, Analog Video Raster, Analog Color Television Systems, Digital Video.

UNIT II TWO-DIMENSIONAL MOTION ESTIMATION 9

General Methodologies, Pixel-Based Motion Estimation, Block Matching Algorithm, Mesh-based Motion estimation, Global Motion Estimation, Region Based Motion Estimation, Multi resolution Motion Estimation, Application of Motion Estimation in Video Coding. Feature based Motion Estimation.

UNIT III FOUNDATIONS OF VIDEO CODING 9

Overview of Coding Systems, Basic Notions in Probability and Information Theory, Information Theory for Source Coding, Binary Encoding, Scalar Quantization , Vector Quantization.

UNIT **IV WAVEFORM-BASED VIDEO CODING 9**

Block Based Transform Coding, Predictive Coding, Video Coding Using Temporal Prediction and Transform Coding.

UNIT V CONTENT DEPENDENT & SCALABLE VIDEO CODING 9

Two Dimensional Shape Coding, Texture coding for Arbitrarily Shaped Regions, Joint Shape & Texture Coding, Region-Based Video Coding, Object-based Video Coding. Basic Modes of Scalability, Object Based Scalability, Wavelet-transform Based Coding.

TOTAL HOURS: 45

OUTCOMES:

Upon Completion of the course, the students will be able to

- Describe various multimedia components
- Describe compression and decompression techniques.
- Apply the compression concepts in multimedia communication.

TEXT BOOKS:

1. YaoWang, JornOstermann, Ya-Qin Zhang, "Video Processing & Communication", Pearson Education - India, New Delhi, Prentice Hall, 2002.

REFERENCES:

1. M. Tekalp, Digital Video Processing, Prentice Hall, 1995.

	ELECTIVE	L	T	P	C
	REAL TIME OPERATING SYSTEMS	**3**	**0**	**0**	**3**

AIM

To expose the concepts of embedded system principles – Operating System – RTOS – Software Development Tools.

OBJECTIVES

To Impart Knowledge on

- Basic operating systems and their structures
- Real Time systems
- RT models and Languages
- RT Kernel
- RTOS Applications

1. REVIEW OF OPERATING SYSTEMS **9**

Basic principles – system calls - files – processes – design and implementation of processes - communication between processes – operating system structures

2. REAL TIME SYSTEMS **9**

Characterizing Real Time Systems and Tasks, Task Assignment and Scheduling- Rate Monotonic Scheduling Algorithm, EDF Algorithm. Real Time Communication-Network Topologies, Protocols-Contention Based Protocol, Token Based Protocol. Fault Detection, Redundancy.

3. REAL TIME MODELS AND LANGUAGES **9**

Event based – process based and graph based models – petrinet models – real time languages – RTOS tasks – RT scheduling – interrupt processing – synchronization control blocks – memory requirements

4. REAL TIME KERNEL **9**

Principles – design issues – Polled loop systems - RTOS porting to a target – comparison and study of various RTOS like QNX – VX Works – PSOS – C Executive - case studies.

5. RTOS APPLICATION DOMAINS **9**

RTOS for Image processing – Embedded RTOS for voice over IP – RTOS for fault tolerant applications – RTOS for control systems

TOTAL HOURS: 45

OUTCOMES:

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

- Design various Scheduling algorithms.
- Apply the principles of concurrency.
- Design deadlock, prevention and avoidance algorithms.
- Compare and contrast various memory management schemes.
- Design and Implement a prototype file systems.
- Perform administrative tasks on Linux Servers.

TEXT BOOKS:

1. Charles Crowley, “Operating Systems-A Design Oriented approach”, McGraw Hill 1997.
2. C.M. Krishna, Kang, G.Shin, “Real Time Systems”, McGraw Hill, 1997.
3. Raymond J.A.Bhur, Donald L.Bailey, “An Introduction to Real Time Systems”, PHI 1999.

	ELECTIVE	L	T	P	C
	TELECOMMUNICATION AND SWITCHING NETWORKS	**3**	**0**	**0**	**3**

AIM:

To understand the basic concepts of telecommunication transmissions, switching systems and network traffic analysis.

OBJECTIVE

To impart knowledge on

- Basic Telecommunication Systems and it various multiplexing techniques.
- Types of switching and functioning of switching system
- Switching networks
- Telecommunication signaling and network traffic analysis
- Different telephone networks.

UNIT – I Telecommunication Transmission

Introduction – Power Levels – Four-Wire Circuits – Digital Transmission – Frequency Division Multiplexing – Time Division Multiplexing – Transmission Performance – Transmission Systems.

UNIT – II Evolution of Switching Systems

Message Switching – Circuit Switching – Circuit Switching – Manual Systems – Functions of Switching Systems – The Strowger Step-by-step System – Register-transistor-senders – Distributed Frames – Crossbar Systems – General Trunking – Electronics Switching – Read-Electronic Systems – Digital Switching Systems.

UNIT – III Switching Networks

Single-Stage Networks – Gradings – Link systems – Grades of Service of Link Systems – Application of Graph Theory to Link Systems – Call Packaging – Rearrangeble Networks – Sectionalised Switching Networks – Space and Time Switching – Time Division Switching Networks – Grades of Service of Time Division Switching Networks – Nonblocking Networks – Synchronisation – Call Processing Functions – Common Control – Reliability, Availability and Security – Stored Programmable Control

UNIT – IV Telecommunication Signaling and Traffic

Customer Line Signaling – Audio-frequency Junctions and Trunk Circuits – FDM Carrier Systems – PCM Signaling – Inter-Register Signaling – Common Channel Signaling – CCITT Signaling System no. 6 – CCITT Signaling System no. 7 – Digital Customer Line Signaling – The Unit of Traffic – Congestion – Traffic Management – A Mathematical Model – Lost-Call Systems – Queuing Systems – Simulation.

UNIT – V Packet Switching and Telephone Networks

Statistical Multiplexing – Local-area and Wide-are Networks – Large Scale Networks – Broadband Networks – Analog Networks – Integrated Digital Networks – Integrated services Digital Networks – Cellular Radio Networks – Intelligent Networks – Private Networks – Numbering – Charging – Routing – Network Management.

Text Book:

1. J. E. Flood, “Telecommunication Switching, Traffic and Networks”, 2/e, Pearson Education, 2007.

Reference Books:

1. J. Bellamy, “Digital Telephony”, John Wiley, 2003, 3rd Edition.
2. R.A.Thomson, “Telephone switching Systems”, Artech House Publishers, 2000.
3. T.N.Saadawi, M.H.Ammar, A.E.Hakeem, “Fundamentals of Telecommunication Networks”, Wiley Interscience, 1994.
4. W.D. Reeve, “Subscriber Loop Signaling and Transmission Hand book”, IEEE Press (Telecomm Handbook Series), 1995.
5. Viswanathan. T., “Telecommunication Switching System and Networks”, Prentice Hall of India Ltd., 1994

	ELECTIVE	L	T	P	C
	MEDICAL ELECTRONICS	**3**	**0**	**0**	**3**

AIM

To make students to understand the applications of electronics in diagnostic and therapeutic area.

OBJECTIVE

- To study the methods of recording bio-potentials
- To study how to measure biochemical and various physiological information
- To understand the working of units which will help to restore normal functioning
- To understand the use of radiation for diagnostic and therapy
- To learn about the recent trends in medical field and also the electrical safety in Hospitals

UNIT I ELECTRO-PHYSIOLOGY AND BIO POTENTIAL RECORDING 9

The Cell: the Basic Unit of Life - Molecular Components of Cells,The origin of Biopotentials, biopotential electrodes, biological amplifiers, ECG, EEG, EMG, PCG, EOG, lead systems and recording methods, typical waveforms and signal characteristics.

UNIT II BIO-CHEMICAL AND NON ELECTRICAL PARAMETER MEASUREMENTS 9

pH, PO2, PCO2, PHCO3, Electrophoresis, colorimeter, photometer, Auto analyzer, Blood flow meter, cardiac output, respiratory measurement, Blood pressure, temperature, pulse, Blood cell counters, Oxygen saturation of Blood.

UNIT III ASSIST DEVICES 9

Cardiac pacemakers, DC Debrillators, Dialyser, Artificial heart valves – Artificial Heart, Heart-Lung machine.

UNIT IV PHYSICAL MEDICINE AND BIO-TELEMETRY 9

Diathermies – Short-wave, ultrasonic and microwave type and their applications, Bio telemetry – Elements and design of Bio telemetry system, radio-pill and tele-stimulation. Medical imaging-X-ray generation, Radiographic & Fluoroscopic Techniques – Image Intensifiers-Computer Aided Tomography.

UNIT VRECENT TRENDS IN MEDICAL INSTRUMENTATION 9

Thermograph, endoscopy unit, Laser in medicine, surgical diathermy, cryogenic application, Electrical safety, Patient Monitoring System

OUTCOMES:

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

- Discuss the application of electronics in diagnostic and therapeutic area.
- Measure biochemical and various physiological information.
- Describe the working of units which will help to restore normal functioning.

TOTAL HOURS: 45

TEXT BOOKS:

1. John G.Webster, "Medical Instrumentation Application and Design", John Wiley and Sons, New York, 1998.
2. Leslie Cromwell, "Biomedical instrumentation and measurement", Prentice Hall of India New Delhi, 1997.

REFERENCE BOOKS:

1. Khandpur, R.S, "Handbook of Biomedical Instrumentation", Tata McGraw-Hill, New Delhi, 1997.
2. Joseph J.Carr and John M.Brown, "Introduction to Biomedical equipment technology", John Wiley and Sons, New York, 1997.

	ELECTIVE	L	T	P	C
	BIOMEDICAL SIGNAL PROCESSING	**3**	**0**	**0**	**3**

Aim:

To understand the concepts of Biomedical Signal processing.

Objective:

- To learn about the Basics of signal processing
- To learn about various compression techniques in Biomedical signals
- To learn about the Cardiological signals processing
- To learn about the concepts of Noise canceling.
- To learn about the techniques of neurological signal processing

UNIT-I: Introduction to Signal Processing **9**

Discrete and continuous Random variables, Probability distribution and density functions. Gaussian and Rayleigh density functions, Correlation between random variables. Stationary random process, Ergodicity, Power spectral density and autocorrelation function of random processes. Noise power spectral density analysis, Noise bandwidth, noise figure of systems.

UNIT-II: Data Compression Techniques **9**

Lossy and Lossless data reduction Algorithms, ECG data compression using Turning point, AZTEC, CORTES, Huffman coding, vector quantization, DCT transform.

UNIT-III: Cardiological Signal Processing **9**

Pre-processing, QRS Detection Methods, Rhythm analysis, Arrhythmia detection Algorithms, Automated ECG Analysis, ECG Pattern Recognition, Heart rate variability analysis.

UNIT-IV : Adaptive Noise Canceling **9**

Principles of Adaptive Noise Canceling, Adaptive Noise Canceling with the LMS adaptation Algorithm, Noise Canceling Method to Enhance ECG Monitoring, Fetal ECG Monitoring.

UNIT-V: Neurological Signal Processing **9**

Modeling of EEG Signals, Detection of spikes and spindles Detection of Alpha, Beta and Gamma Waves - Auto Regressive (A.R.) modeling of seizure EEG - Sleep Stage analysis - Inverse Filtering - Least squares and polynomial modeling.

TOTAL HOURS : 45

TEXT BOOKS:

1. Rangaraj M. Rangayyan – Biomedical Signal Analysis. IEEE Press, 2001.
2. D.C.Reddy, Biomedical Signal Processing- principles and techniques, Tata McGraw-Hill, 2005.
3. Biomedical Digital Signal Processing, Willis J.Tompkins, PHI,

REFERENCE BOOKS:

1. Weitkunat R, Digital Bio signal Processing, Elsevier, 1991.
2. Akay M , Biomedical Signal Processing, Academic: Press 1994
3. Cohen.A, Biomedical Signal Processing -Vol. I Time & Frequency Analysis, CRC Press, 1986.

	ELECTIVE	L	T	P	C
	VLSI SIGNAL PROCESSING	**3**	**0**	**0**	**3**

AIM:

To Learn the VLSI Signal Processing Techniques.

OBJECTIVE:

- To study about Iteration Bound and parallel processing
- To study about Retiming and Unfolding
- To study about Systolic Architecture Design
- To study about Scaling and Lattice Filter
- To study about pipelining and power reduction techniques

UNIT-I **9**

Introduction to DSP system-Iteration bound, Algorithm for computing Iteration Bound-Loop bound algorithm for computing-Iteration bound-Iteration band of multi rate data- flow graphs-pipelining and parallel processing-pipelining of digital FIR filter

UNIT-II **9**

Retiming-Unfolding-critical path-retiming properties of unfolding transformation-algorithmic strength reduction in filters & transforms-Discrete cosine transform & Inverse DCT.

UNIT-III **9**

Systolic architecture design-FIR systolic arrays-Systolic design for Space representation containing delays-fast convolution-Pipelined & parallel recursive and adaptive filters.

UNIT-IV **9**

Scaling and round off noise-Digital lattice filter structure-Schur Algorithm-Derivation of one multiplier lattice filter-Normalised lattice filter-Bit level arithmetic Architecture-Bit-serial multipliers-Bit-serial filter design and implementation-Redundant arithmetic-Redundant number representation.

UNIT-V **9**

Numerical strength reduction-synchronous pipelining and clocking styles-Wave pipelining-Asynchronous pipelining-Low power design-Scaling versus power consumption-Power reduction techniques-Programmable digital signal processors.

OUTCOMES

Ability to recognize issues of power, area and speed requirements in the development of dedicated and general purpose DSP architectures

Ability to design and implement algorithms that reduce the number of multipliers, area of implementation and power consumption in DSP structures

TOTAL HOURS: 45

TEXT BOOKS:

1. Keshab k.parhi, "VLSI Digital Signal Processing Systems", Design and implementation, Wiley, Inter science, 1999.

REFERENCES:

1. Mohammad Ismail and Terri Fiez , "Analog VLSI Signal and information Processing" , McGraw Hill,1994.
3. S.Y. Kung,H.J. white house, T. kailath , "VLSI and Modern Signal processing" ,Prentice Hall , 1985.
4. Jose E. france , Yannis Tisividis , "Design of analog digital VLSI circuits for Telecommunication and signal Processing " ,Prentice hall ,1994 .

	ELECTIVE	L	T	P	C
	INTEGRATED SERVICES DIGITAL NETWORK	**3**	**0**	**0**	**3**

1. ISDN – STANDARDS AND SERVICES: 9

Review of switching technologies and OSI protocol architecture, ISDN channels, access interfaces, functional devices and standards, ISDN bearer services and teleservice attribute, Broadband services.

2. ISDN PROTOCOL ARCHITECTURE AND SIGNALING: 9

Physical layer protocol, D-channel data link layer and layer 3 protocols, Network signaling systems, SS7 protocol overview and services, ISDN products, Switches, Multiplexers, Terminal adapters, ISDN chip sets.

3. BROAD BAND ISDN: 9

Frame Relay – concepts, protocols, applications and products, asynchronous transfer mode – concepts, protocols, application and products, switched multi megabit data service, Internet protocol over ISDN frame relay and ATM.

4. NETWORK TRAFFIC MANAGEMENT: 9

ATM traffic and congestion control, Traffic management framework, control mechanism and attributes, ABR traffic management

5. NETWORK PERFORMANCE MODELING AND ESTIMATION: 9

Queuing analysis, single server and multi server queues, Networks of Queues, Estimating model parameters, Self-similar traffic – performance implication, modeling and estimation

OUTCOMES:

 The student would be able to appreciate the importance of quality of service requirements for different applications and the expectation from the provider networks

 The student would be able to differentiate between the design aspects of trunk networks, the local loop systems and switching systems

 The student would able to understand the concepts behind the traffic modeling and network dimensioning problems

TOTAL = 45

TEXT BOOKS:

1. Gary C. Kesslar and Peter Southwick, "ISDN – concepts, facilities and services", McGraw Hill, 3rd Edition, 1997.
2. William Stallings, "High Speed Networks-TCP/IP and ATM Design Principles", Prentice Hall Inc., 1998.

REFERENCE BOOKS:

1. Balaji Kumar, "Broad Band Communications" McGraw-Hill, 1995.

	ELECTIVE	L	T	P	C
	MULTIMEDIA COMPRESSION AND COMMUNICATION	**3**	**0**	**0**	**3**

AIM

To introduce technologies for multimedia processing, coding, and communications.

OBJECTIVE

- To learn about the multimedia components & characteristics.
- To understand the various text and image compression techniques.
- To understand the various audio & video compression techniques.
- To understand basics of IP,CODEC methods
- To understand about the various networking concepts and applications

UNIT I MULTIMEDIA COMPONENTS **9**

Introduction - Multimedia skills - Multimedia components and their characteristics -Text, sound, images, graphics, animation, video, hardware.

UNIT II TEXT AND IMAGE COMPRESSION **9**

Compression principles-source encoders and destination encoders-Lossless and Lossy compression-entropy encoding –source encoding -text compression –static Huffman coding dynamic coding –arithmetic coding – Lempel Ziv-welsh Compression-image compression

UNIT III AUDIO AND VIDEO COMPRESSION **9**

Audio compression–DPCM-Adaptive PCM –adaptive predictive coding-linear Predictive coding-code excited LPC-perpetual coding Video compression –principles-H.261-H.263-MPEG 1, 2, 4.

UNIT IV MULTIMEDIA SOFTWARE & AUTHORING TOOLS **9**

Text Editing & Word Processing tools, Painting & Drawing tools, 3D Modeling & Animation tools, Image Editing, Sound editing tools, Animation, Video & Digital Movie tools. Types of Authoring tools-Card & Page Based tools, Icon & Object based tools, Time Based , Cross Platform Tools.

UNIT V MULTIMEDIA NETWORKING **9**

Multimedia networking -Applications-streamed stored and audio-making the best Effort service-protocols for real time interactive Applications-distributing multimedia-beyond best effort service-scheduling and policing Mechanisms-integrated services-differentiated Services-RSVP.

OUTCOMES:

Upon Completion of the course, the students will be able to

- Describe various multimedia components
- Describe compression and decompression techniques.
- Apply the compression concepts in multimedia communication.

TOTAL HOURS= 45

TEXT BOOKS:

1. Fred Halsall “Multimedia communication - applications, networks, protocols and standards”, Pearson education, 2007. (Unit II, III)
2. Tay Vaughan, “Multimedia: making it work”, 6/e, TMH 2007.(Unit I, IV)
3. Kurose and W.Ross” Computer Networking “a Top down approach, Pearson Education, 3rd edition (Unit V)

REFERENCE BOOKS:

1. Marcus gonzalves “Voice over IP Networks”, McGraw Hill.
2. KR. Rao, ZS Bojkovic, D A Milovanovic, “Multimedia Communication Systems:Techniques, Standards, and Networks”, Pearson Education 2007

	ELECTIVE	L	T	P	C
	WIRELESS SENSOR NETWORKS	**3**	**0**	**0**	**3**

Aim:

UNIT I OVERVIEW OF WIRELESS SENSOR NETWORKS 8

Challenges for Wireless Sensor Networks-Characteristics requirements-required mechanisms, Difference between mobile ad-hoc and sensor networks, Applications of sensor networks- Enabling Technologies for Wireless Sensor Networks.

UNIT II ARCHITECTURES 9

Single-Node Architecture - Hardware Components, Energy Consumption of Sensor Nodes , Operating Systems and Execution Environments, Network Architecture - Sensor Network Scenarios, Optimization Goals and Figures of Merit, Gateway Concepts.

UNIT III NETWORKING SENSORS 10

Physical Layer and Transceiver Design Considerations, MAC Protocols for Wireless Sensor Networks, Low Duty Cycle Protocols And Wakeup Concepts - S-MAC, The Mediation Device Protocol, Wakeup Radio Concepts, Address and Name Management, Assignment of MAC Addresses, Routing Protocols-Energy-Efficient Routing, Geographic Routing.

UNIT IV INFRASTRUCTURE ESTABLISHMENT 9

Topology Control, Clustering, Time Synchronization, Localization and Positioning, Sensor Tasking and Control.

UNIT V SENSOR NETWORK PLATFORMS AND TOOLS 9

Operating Systems for Wireless Sensor Networks, Sensor Node Hardware – Berkeley Motes, Programming Challenges, Node-level software platforms, Node level Simulators, State-centric programming.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the student should be able to:

 Explain the concepts, network architectures and applications of ad hoc and wireless sensor networks

 Analyze the protocol design issues of ad hoc and sensor networks

 Design routing protocols for ad hoc and wireless sensor networks with respect to some protocol design issues

 Evaluate the QoS related performance measurements of ad hoc and sensor networks

TEXT BOOKS

1. Holger Karl & Andreas Willig, " Protocols And Architectures for Wireless Sensor Networks" , John Wiley, 2005.
2. Feng Zhao & Leonidas J. Guibas, “Wireless Sensor Networks- An Information Processing Approach", Elsevier, 2007.

REFERENCES

1. Kazem Sohraby, Daniel Minoli, & Taieb Znati, “Wireless Sensor Networks- Technology, Protocols, And Applications”, John Wiley, 2007.
2. Anna Hac, “Wireless Sensor Network Designs”, John Wiley, 2003.
3. Bhaskar Krishnamachari,”Networking Wireless Sensors”, Cambridge Press,2005.
4. Mohammad Ilyas And Imad Mahgaob,”Handbook Of Sensor Network: Compact Wireless And Wired Sensing Systems”, Crc Press, 2005.
5. Wayne Tomasi, “Introduction To Data Communication And Networking”, Parson Education,

2007.

	ELECTIVE	L	T	P	C
	OPTICAL NETWORKS	**3**	**0**	**0**	**3**

AIM

To understand about the basic concepts of various optical networks.

OBJECTIVE

- ❖ To understand about the basic optical components
- ❖ To understand about architecture of various optical networks
- ❖ To understand about the wavelength routing networks
- ❖ To understand the concepts of packet switching and access networks
- ❖ To understand about the overall design considerations and network managements

NIT I OPTICAL SYSTEM COMPONENTS 9

Light propagation in optical fibers – Loss & bandwidth, System limitations, Non-Linear effects; Solitons; Optical Network Components – Couplers, Isolators & Circulators, Multiplexers & Filters, Optical Amplifiers, Switches, Wavelength Converters.

UNIT II OPTICAL NETWORK ARCHITECTURES 9

Introduction to Optical Networks; SONET / SDH, MetropolitonArea Networks, Layered Architecture ; Broadcast and Select Networks – Topologies for Broadcast Networks, Media-Access Control Protocols, Testbeds for Broadcast & Select WDM; Wavelength Routing Architecture.

UNIT III WAVELENGTH ROUTING NETWORKS 9

The optical layer, Node Designs, Optical layer cost tradeoff, Routing and wavelength assignment,Virtual topology design, WavelengthRouting Testbeds, Architectural variations.

UNIT IV PACKET SWITCHING AND ACCESS NETWORKS 9

Photonic Packet Switching – OTDM, Multiplexing and De-multiplexing, Synchronisation, Broadcast OTDM networks, Switch-based networks; Access Networks – Network Architecture overview, Future Access Networks, Optical Access Network Architectures; and OTDM networks.

UNIT V NETWORK DESIGN AND MANAGEMENT 9

Transmission System Engineering – System model, Power penalty - transmitter, receiver, Optical amplifiers, crosstalk, dispersion; Wavelength stabilization ; Overall design considerations; Control and Management – Network management functions, Configuration management, Performance management, Fault management, Optical safety, Service interface.

OUTCOMES:

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

- Discuss the various optical fiber modes, configurations and various signal degradation factors associated with optical fiber.
- Explain the various optical sources and optical detectors and their use in the optical communication system.
- Analyze the digital transmission and its associated parameters on system performance.

TOTAL HOURS: 45

TEXT BOOK

1. Rajiv Ramaswami and Kumar N. Sivarajan, “Optical Networks : A Practical Perspective”, Harcourt Asia Pte Ltd., Second Edition 2004.

REFERENCES

1. Siva Ram Moorthy and Mohan Gurusamy, “WDM Optical Networks :Concept,Design and Algorithms”, Prentice Hall of India, Ist Edition, 2002.
2. P.E. Green, Jr., “Fiber Optic Networks”, Prentice Hall, NJ, 1993.

	ELECTIVE	L	T	P	C
	INFORMATION SECURITY	**3**	**0**	**0**	**3**

AIM

To study the critical need for ensuring Information Security in Organizations

OBJECTIVES

- To understand the basics of Information Security
- To know the legal, ethical and professional issues in Information Security
- To know the aspects of risk management
- To become aware of various standards in this area
- To know the technological aspects of Information Security

UNIT 1 INTRODUCTION 9

History, What is Information Security?, Critical Characteristics of Information, NSTISSC Security Model, Components of an Information System, Securing the Components, Balancing Security and Access, The SDLC, The Security SDLC

UNIT II SECURITY INVESTIGATION 9

Need for Security, Business Needs, Threats, Attacks, Legal, Ethical and Professional Issues

UNIT III SECURITY ANALYSIS 9

Risk Management: Identifying and Assessing Risk, Assessing and Controlling Risk

UNIT IV LOGICAL DESIGN 9

Blueprint for Security, Information Security Poicy, Standards and Practices, ISO 17799/BS 7799, NIST Models, VISA International Security Model, Design of Security Architecture, Planning for Continuity

UNIT V PHYSICAL DESIGN 9

Security Technology, IDS, Scanning and Analysis Tools, Cryptography, Access Control Devices, Physical Security, Security and Personnel

TOTAL HOURS: 45

OUTCOMES:

The course teaches types of entropy, data compression and channel capacities over different channels The student will be capable of understanding and designing various sources ,for various types of channel , and means to achieve full channel capacity.

TEXT BOOK

1) Michael E Whitman and Herbert J Mattord, "Principles of Information Security", Vikas Publishing House, New Delhi, 2003

REFERENCE BOOKS

1. Micki Krause, Harold F. Tipton, " Handbook of Information Security Management", Vol 1-3 CRC Press LLC, 2004.
2. Stuart Mc Clure, Joel Scrambray, George Kurtz, "Hacking Exposed", Tata McGraw-Hill, 2003
3. Matt Bishop, " Computer Security Art and Science", Pearson/PHI, 2002.

	ELECTIVE	L	T	P	C
	ENTERPRENEURIAL SKILLS DEVELOPMENT FOR ENGINEERS	**3**	**0**	**0**	**3**

AIM:

To develop a good entrepreneurial skills to the budding engineers

OBJECTIVE:

- To understand the importance of entrepreneurship for engineering students.
- To inculcate entrepreneurship skills among engineers.
- To create awareness of business and train in preparing the project report and create awareness of IPR for engineering students.
- To understand the importance of finance and its transactions.
- To develop the skills of consequences of business sickness and take corrective measures.

UNIT I ENTREPRENEURSHIP 9

Entrepreneur – Definition-Evolution and importance of entrepreneurship-Views and Theories of Entrepreneurship-Traits of Entrepreneurs - Types of Entrepreneurs – Risks and Rewards -Entrepreneur - Technocrat –Manager -Comparison –Role of Entrepreneurship in Economic Development- Factors affecting Entrepreneurial Growth-Engineers as Entrepreneurs-Ten commandments for the beginning entrepreneur.

UNIT 2 MOTIVATION **9**

Motivation-Definition and objectives-Types of motivation-Theories of Motivation- Achievement Motivation Training- Self Rating- Business games- Thematic Apperception Test - Stress Management. Entrepreneurship Development Programmes - Need- objectives.

UNIT 3 BUSINESS AND ENTERPRISE MANAGEMENT **9**

Business-definition- Classification –Small Enterprises- Characteristics- ownership structure-Various types of ownership-Project Formulation – Steps involved in setting up a Business - Market survey and Research- Techno economic Feasibility Report - Preliminary Project Report-Importance of Project Appraisal-Sources of information-Classification of needs and Agencies-Intellectual property rights.

UNIT 4 FINANCIAL MANAGEMENT 9

Need and objectives of financial management for engineers-Sources of Finance- Term Loans- Capital structure-Financial Institutions- Management of working capital- Costing - Break Even Analysis- Managerial uses of Breakeven analysis-Network analysis Techniques –Problems on PERT &CPM – Taxation

UNIT 5 BUSINESS SICKNESS AND GROWTH STRATEGIES 9

Sickness in small Business –Definition of sick unit- Symptoms of Sickness- Magnitude- Causes and Consequences-Preventive and Corrective measures - Institutional Support to Entrepreneurs- Government Policy for small Enterprises - Growth strategies in small Industry - Expansion- Diversification- Joint venture-Merger- sub-contracting.

OUTCOMES :

 Upon completion of the course, students will be able to gain knowledge and skills needed to run a business successfully.

TEXT BOOKS: **TOTAL HOURS: 45**

1. S.S. Khanka- Entrepreneurial Development- S.Chand & Co. Ltd- Ram Nagar - New Delhi- 2005.
2. Bhramarbar Badhai-"Entrepreneurship for Engineers"-DhanpatRai&co (P) ltd, Delhi-2001.

REFERENCES:

1. EDII - "A manual for Entrepreneurs"- Entrepreneurship Development Institute of India, Ahmedabad-Tata McGrawHill-2006...
2. MSME-'A guide book for new entrepreneurs'-2nd edition-2010.
3. Lawrence R.Jauch, Rajiv Gupta,William F.Glueck- "Business Policy & Strategic Management"- 7th edition-Frank Bros&co.(publishers) ltd,.2007
4. Robert D Hisrich, Michael P Peters &Dean A Shepherd-"Entrepreneurship"-TataMcGrawHill, 2008.
5. Mary K Coulter, "Entrepreneurship in Action", Prentice Hall-2006.

	ELECTIVE	L	T	P	C
	SATELLITE COMMUNICATION	**3**	**0**	**0**	**3**

AIM

To enable the student to become familiar with satellites and satellite services.

OBJECTIVES

- Overview of satellite systems in relation to other terrestrial systems.
- Study of satellite orbits and launching.
- Study of earth segment and space segment components
- Study of satellite access by various users.
- Study of DTH and compression standards.

UNIT I SATELLITE ORBITS **9**

Kepler's Laws, Newton's law, orbital parameters, orbital perturbations, station keeping, geo stationary and non Geo-stationary orbits – Look Angle Determination- Limits of visibility –eclipse-Sub satellite point –Sun transit outage-Launching Procedures -launch vehicles and propulsion.

UNIT II SPACE SEGMENT AND SATELLITE LINK DESIGN **9**

Spacecraft Technology- Structure, Primary power, Attitude and Orbit control, Thermal control and Propulsion, communication Payload and supporting subsystems, Telemetry, Tracking and command. Satellite uplink and downlink Analysis and Design, link budget, E/N calculation- performance impairments-system noise, inter modulation and interference, Propagation Characteristics and Frequency considerations- System reliability and design lifetime.

UNIT III SATELLITE ACCESS **9**

Modulation and Multiplexing: Voice, Data, Video, Analog – digital transmission system,
Digital video Broadcast, multiple access: FDMA, TDMA, CDMA, Assignment Methods, Spread Spectrum communication, compression – encryption

UNIT IV EARTH SEGMENT **9**

Earth Station Technology-- Terrestrial Interface, Transmitter and Receiver, Antenna Systems TVRO, MATV, CATV, Test Equipment Measurements on G/T, C/No, EIRP, Antenna Gain.

UNIT V SATELLITE APPLICATIONS **9**

INTELSAT Series, INSAT, VSAT, Mobile satellite services: GSM, GPS, INMARSAT, LEO, MEO, Satellite Navigational System. Direct Broadcast satellites (DBS)- Direct to Home Broadcast (DTH), Digital audio broadcast (DAB) - World space services, Business TV (BTV), GRAMSAT, Specialized services – E –mail, Video conferencing, Internet

OUTCOMES:

- The student would be able to demonstrate an understanding of the basic principles of satellite orbits , placement and control, satellite link design and the communication system components.
- The student would be able to demonstrate an understanding of the different communication, sensing and navigational applications of satellite and their implementation

TEXT BOOKS: TOTAL HOURS :45

1. Dennis Roddy, 'Satellite Communication', McGraw Hill International, 4th Edition, 2006.
2. Wilbur L. Pritchard, Hendri G. Suyderhoud, Robert A. Nelson, 'Satellite Communication Systems Engineering', Prentice Hall/Pearson, 2007.

REFERENCE BOOKS

1. N.Agarwal, 'Design of Geosynchronous Space Craft, Prentice Hall, 1986.
2. Bruce R. Elbert, 'The Satellite Communication Applications' Hand Book, Artech House Bostan London, 1997.
3. Tri T. Ha, 'Digital Satellite Communication', II edition, 1990.
4. Emanuel Fthenakis, 'Manual of Satellite Communications', McGraw Hill Book Co., 1984.
5. Robert G. Winch, 'Telecommunication Transmission Systems', McGraw-Hill Book Co., 1983.
6. Brian Ackroyd, 'World Satellite Communication and earth station Design', BSP professional Books, 1990.
7. G.B.Bleazard, 'Introducing Satellite communications', NCC Publication, 1985.
8. M.Richharia, 'Satellite Communication Systems-Design Principles', Macmillan 2003.

	ELECTIVE	L	T	P	C
	ROBOTICS & AUTOMATION	**3**	**0**	**0**	**3**

AIM

To learn the fundamentals of Robotics and implementation aspects of real time concepts.

OBJECTIVES

- To learn about the Basic concepts of Robots
- To study the Sensor and Vision Systems.
- To learn the Grippers and robot dynamics.
- To know about kinematics and path planning.
- To learn about Robot Programming Languages and applications

UNIT I BASIC CONCEPTS **9**

Origin & various generation of Robots - Robot definition - Robotics system components – Robot classification - Coordinate frames - Asimov's laws of robotics – degree of freedom – work volume - Need for Automation – types of automation – fixed, programmable and flexible automation.

UNIT II SENSORS AND VISION SYSTEM **9**

Sensing - Range, proximity, position, velocity, acceleration, Touch, Force, Torque, Optical & laser sensors. Machine vision - Introduction, Image acquisition, Illumination Techniques, Image conversion, Cameras, Image processing and analysis – image data reduction – segmentation feature extraction – Object recognition.

UNIT III GRIPPERS AND ROBOT DYNAMICS **9**

Introduction - various types of grippers-design considerations. Construction of Manipulator – Introduction to Robot - Dynamics – Lagrange formulation – Newton Euler formulation – Properties of robot dynamic equations.

UNIT IV KINEMATICS AND PATH PLANNING **9**

Forward Kinematics – Denavit Hartenberg Representation. Inverse Kinematics – Geometric approach.

UNIT V PROGRAMMING LANGUAGES AND APPLICATIONS **9**

Robot programming - Fixed instruction, sequence control, General programming language, Specific programming languages. Robots for welding, painting and assembly – Remote Controlled robots – Robots for nuclear, thermal and chemical plants.

Total Hours: 45

OUTCOME:

- After undergoing this course the student will gain the ability to design, test and implement robotics for the industry.
- The concept of robotic programming will help him in the selection of right robot level language for the given system..
- The student will be familiar with the future trends in robotics and give a robotic solution for a given task.

TEXT BOOKS:

1. Mikell P. Groover ,Weiss G.M. Nagel R.N. Odraj . N.G. , "Industrial Robotics", Tata Mc Graw Hill, 3rd Reprint, Edition 2008.
2. Deb.S.R. "Robotics Technology and flexible Automation", Tata Mc Graw Hill, 9th Reprint 2004.
3. K.S Fu, R C.Gonzalez, CSG Lee- "Robotics", McGraw Hill, Edition 2008.

REFERENCE BOOKS:

1. John J Craig "Introduction to Robotics Mechanics & control, Low price Edition, 7th Reprint, 2005.

2. Ghosh, “Control in Robotics and Automation : Sensor Based Integration”, Allied Publishers.

	ELECTIVE	L	T	P	C
	CLOUD COMPUTING	3	0	0	3

Aim

The purpose of cloud computing is used to end users access cloud-based applications through a web browser or a light-weight desktop or mobile app while the business software and user's data are stored on servers at a remote location.

OBJECTIVES

The main objective of a cloud computing entrusts remote services with a user's data, software and computation.

UNIT I UNDERSTANDING CLOUD COMPUTING 9

Cloud Computing – History of Cloud Computing – Cloud Architecture – Cloud Storage –

Why Cloud Computing Matters – Advantages of Cloud Computing – Disadvantages of Cloud Computing – Companies in the Cloud Today – Cloud Services

UNIT II DEVELOPING CLOUD SERVICES 9

Web-Based Application – Pros and Cons of Cloud Service Development – Types of Cloud Service Development – Software as a Service – Platform as a Service – Web Services – On-Demand Computing – Discovering Cloud Services Development Services and Tools – Amazon Ec2 – Google App Engine – IBM Clouds

UNIT III CLOUD COMPUTING FOR EVERYONE 9

Centralizing Email Communications – Collaborating on Schedules – Collaborating on To-Do Lists – Collaborating Contact Lists – Cloud Computing for the Community – Collaborating on Group Projects and Events – Cloud Computing for the Corporation

UNIT IV USING CLOUD SERVICES 9

Collaborating on Calendars, Schedules and Task Management – Exploring Online Scheduling Applications – Exploring Online Planning and Task Management – Collaborating on Event Management – Collaborating on Contact Management – Collaborating on Project Management – Collaborating on Word Processing - Collaborating on Databases – Storing and Sharing Files

UNIT V OTHER WAYS TO COLLABORATE ONLINE 9

Collaborating via Web-Based Communication Tools – Evaluating Web Mail Services –

Evaluating Web Conference Tools – Collaborating via Social Networks and Groupware –

Collaborating via Blogs and Wikis

Total Hours: 45

TEXT BOOKS

1. Michael Miller, "Cloud Computing: Web-Based Applications That Change the Way

You Work and Collaborate Online", Que Publishing, August 2008.

2. Haley Beard, "Cloud Computing Best Practices for Managing and Measuring.Processes for On-demand Computing, Applications and Data Centers in the Cloud with SLAs", Emereo Pty Limited, July 2008.

REFERENCE BOOK

Rajkumar Buyya, James Broberg, Andzej M.Goscinski, "Cloud Computing –Principles and Paradigms",John Wiley & Sons, 2010

	ELECTIVE	L	T	P	C
	SPEECH PROCESSING	3	0	0	3

UNIT I MECHANICS OF SPEECH **9**

Speech production: Mechanism of speech production, Acoustic phonetics – Digital models for speech signals - Representations of speech waveform: Sampling speech signals, basics of quantization, delta modulation, and Differential PCM – Auditory perception: psycho acoustics.

UNIT II TIME DOMAIN METHODS FOR SPEECH PROCESSING **9**

Time domain parameters of Speech signal – Methods for extracting the parameters Energy, Average Magnitude, Zero crossing Rate – Silence Discrimination using ZCR and energy – Short Time Auto Correlation Function – Pitch period estimation using Auto Correlation Function.

UNIT III FREQUENCY DOMAIN METHOD FOR SPEECH PROCESSING **9**

Short Time Fourier analysis: Fourier transform and linear filtering interpretations, Sampling rates - Spectrographic displays - Pitch and formant extraction - Analysis by Synthesis - Analysis synthesis systems: Phase vocoder, Channel Vocoder - Homomorphic speech analysis: Cepstral analysis of Speech, Formant and Pitch Estimation, Homomorphic Vocoders.

UNIT IV LINEAR PREDICTIVE ANALYSIS OF SPEECH **9**

Basic Principles of linear predictive analysis – Auto correlation method – Covariance method – Solution of LPC equations – Cholesky method – Durbin's Recursive algorithm, – Application of LPC parameters – Pitch detection using LPC parameters – Formant analysis – VELP – CELP.

UNIT V APPLICATION OF SPEECH & AUDIO SIGNAL PROCESSING **9**

Algorithms: Dynamic time warping, K-means clusering and Vector quantization, Gaussian mixture modeling, hidden Markov modeling - Automatic Speech Recognition: Feature Extraction for ASR, Deterministic sequence recognition, Statistical Sequence recognition, Language models - Speaker identification and verification – Voice response system – Speech synthesis: basics of articulatory, source-filter, and concatenative synthesis – VOIP

TOTAL= 45 PERIODS

OUTCOMES:

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

- Model speech production system and describe the fundamentals of speech.
- Extract and compare different speech parameters.
- Choose an appropriate statistical speech model for a given application.
- Design a speech recognition system.
- Use different speech synthesis techniques.

TEXT BOOK:

1. Thomas F, Quatieri, Discrete-Time Speech Signal Processing, Prentice Hall / Pearson Education, 2004.

REFERENCE BOOKS:

1. Ben Gold and Nelson Morgan, Speech and Audio Signal Processing, John Wiley and Sons Inc., Singapore, 2004
2. L.R.Rabiner and R.W.Schaffer – Digital Processing of Speech signals – Prentice Hall -1979
3. L.R. Rabiner and B. H. Juang, Fundamentals of Speech Recognition, Prentice Hall, 1993.
4. J.R. Deller, J.H.L. Hansen and J.G. Proakis, Discrete Time Processing of Speech Signals, John Wiley, IEEE Press, 1999.

	ELECTIVE	L	T	P	C
	NANO ELECTRONICS	**3**	**0**	**0**	**3**

AIM:

This course is offered to students to gain basic knowledge on Nanoelectronics and various fabrication techniques involved in nanoscience.

OBJECTIVE:

- To Know basic concepts in Nanotechnology
- To learn the Fundamental of Nano electronics
- To learn the silicon MOSFET and Quantum Transport Devices
- To learn the fabrication of Carbon Nanotubes
- To study about the Molecular Electronics in Nanotechnology

UNIT I INTRODUCTION TO NANOTECHNOLOGY 9

Background to nanotechnology: Types of nanotechnology and nanomachines – periodic table – atomic structure – molecules and phases – energy – molecular and atomic size – surface and dimensional space – top down and bottom up; Molecular Nanotechnology: Electron microscope – scanning electron microscope – atomic force microscope – scanning tunnelling microscope – nanomanipulator – nanotweezers – atom manipulation – nano dots – self assembly – dip pen nanolithography. Nanomaterials: preparation– plasma arcing – chemical vapor deposition – sol-gels – electrodeposition – ball milling – applications of nanomaterials;

UNIT II FUNDAMENTALS OF NANOELECTRONICS 9

Fundamentals of logic devices:- Requirements – dynamic properties – threshold gates; physical limits to computations; concepts of logic devices:- classifications – two terminal devices – field effect devices – coulomb blockade devices – spintronics – quantum cellular automata – quantum computing – DNA computer; performance of information processing systems;- basic binary operations, measure of performance processing capability of biological neurons – performance estimation for the human brain. Ultimate computation:- power dissipation limit – dissipation in reversible computation – the ultimate computer.

UNIT III SILICON MOSFETs& QUANTUM TRANSPORT DEVICES 9

Silicon MOSFETS - Novel materials and alternate concepts:- fundamentals of MOSFET Devices- scaling rules – silicon-dioxide based gate dielectrics – metal gates – junctions & contacts – advanced MOSFET concepts. Quantum transport devices based on resonant tunneling, Electron tunneling – resonant tunneling diodes – resonant tunneling devices; Single electron devices for logic applications:- Single electron devices – applications of single electron devices to logic circuits.

UNIT IV CARBON NANOTUBES 9

Carbon Nanotube: Fullerenes - types of nano tubes – formation of nano tubes – assemblies – purification of carbon nanotubes – electronic propertics – synthesis of carbon nanotubes – carbon nanotube interconnects – carbon nanotube FETs – Nanotube for memory applications – prospects of all carbon nanotube nanoelectronics.

UNIT V MOLECULAR ELECTRONICS 9

Electrodes & contacts – functions – molecular electronic devices – first test systems – simulation and circuit design – fabrication; Future applications: MEMS – robots – random access memory – mass storage devices.

TOTAL HOURS: 45

OUTCOME

At end of the course students to gained basic knowledge on Nanoelectronics and various fabrication techniques involved in nanoscience. the fabrication of Carbon Nanotubes and Molecular Electronics in Nanotechnology

TEXTBOOKS

1. Michael Wilson, Kamali Kannangara, Geoff Smith, Michelle Simmons and BurkhardRaguse, "Nanotechnology: Basic Science and Emerging Technologies", Chapman & Hall / CRC, 2002
2. Rainer Waser (Ed.), "Nanoelectronics and Information Technology: Advanced Electronic Materials and Novel Devices", Wiley-VCH, 20032. T.Pradeep, NANO:"The Essentials–Understanding Nanoscience and Nanotechnology", TMH, 2007

REFERENCES:

1. T.Pradeep, "NANO:The Essentials–Understanding Nanoscience and Nanotechnology", TMH, 2007.

	ELECTIVE	L	T	P	C
	AVIONICS	3	0	0	3

AIM

To introduce the basic concepts of navigation & communication systems of aircraft.

OBJECTIVE

- To study the basics in avionics system.
- To know the principles of digital system.
- To understand the architecture of digital avionics
- To study the control and display technologies
- To know the utility systems in avionics.

UNIT – I: INTRODUCTION TO AVIONICS **9**

Need for Avionics in civil and military aircraft and space systems - Integrated Avionics and Weapon system - Typical avionics sub systems - Design and Technologies.

UNIT – II: PRINCIPLES OF DIGITAL SYSTEMS **9**

Digital Computers - Microprocessors – Memories

3. DIGITAL AVIONICS ARCHITECTURE **9**

Avionics system architecture-Data buses MIL-STD 1553 B-ARINC 429-ARINC 629.

4. FLIGHT DECK AND COCKPITS **9**

Control and display technologies CRT, LED, LCD, EL and plasma panel - Touch screen -Direct voice input (DVI) - Civil cockpit and military cockpit: MFDS, HUD, MFK, HOTAS

5. INTRODUCTION TO AVIONICS SYSTEMS **9**

Communication Systems - Navigation systems - Flight control systems –Radar electronic warfare - Utility systems Reliability and maintainability - Certification.

TOTAL HOURS: 45

OUTCOMES:

 The student would be able to comprehend the hardware challenges involved in the design of aircrafts and the principles involved in the design of air data systems , autopilots and navigation systems.

 The student would be capable of understanding the differences between the different practical navigation systems and the evolution of the aircraft display systems.

TEXT BOOKS

1. Malcrno A.P. and Leach, D.P., "Digital Principles and Application", Tata McGraw-Hill, 1990.
2. Gaonkar, R.S., "Microprocessors Architecture - Programming and Application", Wiley and Sons Ltd., New Delhi, 1990.

REFERENCES

1. 1. Middleton, D.H., Ed., "Avionics Systems, Longman Scientific and Technical", Longman Group UK Ltd., England, 1989.
2. Spitzer, C.R., "Digital Avionic Systems", Prentice Hall, Englewood Cliffs, N.J., USA., 1987.
3. Brain Kendal, "Manual of Avionics", The English Book House, 3rd Edition, New Delhi, 1993.

	ELECTIVE	L	T	P	C
	NEURAL NETWORKS & ITS APPLICATIONS	**3**	**0**	**0**	**3**

AIM

To examine mathematical and computational fundamentals of artificial neural networks and their applications in signal and image processing, pattern recognition and modelling.

OBJECTIVE

- To understand the fundamentals of artificial neural networks
- To study about the concepts of Bi-directional Associative memories and Back propagation networks.
- To study about the concepts of counter propagation networks
- To study about the concepts of self organizing map and adaptive resonance theory.
- To study the concepts of Neocognitrion.

UNIT I: INTRODUCTION TO ARTIFICIAL NEURAL NETWORKS 9

Neuro-physiology - General Processing Element - ADALINE - LMS learning rule –application of adaptive signal processing, MADALINE - MR2 training algorithm.

UNIT II: BPN AND BAM 9

Back Propagation Network –BPN operation - updating of output and hidden layer weights -application of BPN, Bi-directional Associative Memory –architecture, processing, mathematics, - Hopfield memory - traveling sales man problem.

UNIT III: SIMULATED ANNEALING AND CPN 9

Annealing: Real and Stimulated,Boltzman machine - learning - application - Counter Propagation network - architecture - training –an image classification example.

UNIT IV: SOM AND ART 9

Self organizing map - learning algorithm - feature map classifier - applications, Adaptive Resonance Theory - pattern matching in ART network-gain control in ART.

UNIT V: NEOCOGNITRON 9

Architecture of Neocognitron - Data Processing, Architecture of spatiotemporal networks for speech recognition, architecture of Sequential Competitive Avalanche Field.

TOTAL HOURS: 45

TEXT BOOK:

1. J.A. Freeman and B.M.Skapura , "Neural Networks, Algorithms Applications and ProgrammingTechniques", Addison-Wesely, 1990.

REFERENCE BOOK:

1. LaureneFausett, "Fundamentals of Neural Networks: Architecture, AlgorithmsandApplications",Prentice Hall, 1994.

	ELECTIVE	L	T	P	C
	MEMS	**3**	**0**	**0**	**3**

AIM

To students to gain basic knowledge on MEMS (Micro Electro Mechanical System) and various fabrication techniques. This enables them to design, analyze, fabricate and test the MEMS based components.

OBJECTIVES

- Introduction to MEMS and micro fabrication
- To study the Mechanics for MEMS Design.
- To study Electro Static Design and System Issues.
- To know various MEMS Applications
- To know about the optical and RF MEMS

UNIT I INTRODUCTION TO MEMS 9

MEMS and Microsystems, Miniaturization, Typical products, Micro sensors, Micro actuation, MEMS with micro actuators, Micro accelorometers and Micro fluidics, MEMS materials, Micro fabrication

UNIT II MECHANICS FOR MEMS DESIGN 9

Elasticity, Stress, strain and material properties, Bending of thin plates, Spring configurations, torsional deflection, Mechanical vibration, Resonance, Thermo mechanics – actuators, force and response time, Fracture and thin film mechanics.

UNIT III ELECTRO STATIC DESIGN AND SYSTEM ISSUES 9

Electrostatics: basic theory, electro static instability. Surface tension, gap and finger pull up, Electro static actuators, Comb generators, gap closers, rotary motors, inch worms, Electromagnetic actuators. bistable actuators. Electronic Interfaces, Feedback systems, Noise, Circuit and system issues,

UNIT IV MEMS APPLICATION 9

Case studies – Capacitive accelerometer, Peizo electric pressure sensor, Microfluidics application, Modeling of MEMS systems, CAD for MEMS.

UNIT V INTRODUCTION TO OPTICAL AND RF MEMS 9

Optical MEMS, - System design basics – Gaussian optics, matrix operations, resolution. Case studies, MEMS scanners and retinal scanning display, Digital Micro mirror devices. RF Memes – design basics, case study – Capacitive RF MEMS switch, performance issues.

TOTAL HOURS: 45

TEXT BOOK:

1. Stephen Santeria," Microsystems Design", Kluwer publishers, 2000.
2. N.P.Mahalik, "MEMS",Tata McGraw hill, Sixth reprint, 2012.

REFERENCE:

1. Nadim Maluf," An introduction to Micro electro mechanical system design", ArtechHouse, 2000.
2. Mohamed Gad-el-Hak, editor," The MEMS Handbook", CRC press Baco Raton,2000.
3. Tai Ran Hsu," MEMS & Micro systems Design and Manufacture" Tata McGraw Hill, New Delhi, 2002.
Liu,"MEMS", Pearson education, 2007.

	INDUSTRIAL ELECTIVE	L	T	P	C
	LEARNING IT ESSENTIALS	**3**	**0**	**0**	**3**

Unit I:

- Fundamentals of Computer architecture-introduction-organization of a small computer
- Central Processing Unit - Execution cycle – Instruction categories – measure of CPU performance Memory – Input/output devices - BUS-addressing modes.
- System Software – Assemblers – Loaders and linkers – Compilers and interpreters
- Operating system – introduction – memory management schemes Process management Scheduling – threads.

Unit II:

- Problem solving with algorithms- Programming styles –
- Coding Standards and Best practices - Introduction to C Programming
- Testing and Debugging. Code reviews
- System Development Methodologies – Software development Models
- User interface Design – introduction – The process – Elements of UI design & reports.

Unit III:

- RDBMS- data processing – the database technology – data models
- ER modeling concept –notations – Extended ER features
- Logical database design - normalization
- SQL – DDL statements – DML statements – DCL statements
- Writing Simple queries – SQL Tuning techniques – Embedded SQL - OLTP

Unit IV:

- Objected oriented concepts – object oriented programming
- UML Class Diagrams– relationship – Inheritance – Abstract classes – polymorphism
- Object Oriented Design methodology - Common Base class
- Alice Tool – Application of OOC using Alice tool.

Unit V:

- Client server computing - Internetworking – Computer Networks –
- Working with TCP/IP – IP address – Sub netting – DNS – VPN – proxy servers World Wide Web – Components of web application - browsers and Web Servers
- URL – HTML – HTTP protocol – Web Applications - Application servers – Web Security.

	INDUSTRIAL ELECTIVE	L	T	P	C
	BUSINESS INTELLIGENCE AND ITS APPLICATIONS	**3**	**0**	**0**	**3**

UNIT – I

INTRODUCTION TO BUSINESS INTELLIGENCE **9**

Introduction to OLTP AND OLAP – BI Definition and BI Concepts – Business Applications of BI - BI Framework- Role of Data Warehousing in BI –BI Infrastructure Components- BI Process – Developing Data Warehouse – Management Framework – Business driven approach –BI Technology — BI Roles & Responsibilities

UNIT - II BASICS OF DATA INTEGRATION (Extraction Transformation Loading) **9**

Concepts of Data Integration need and advantages of using Data Integration – Introduction to common data integration approaches – Introduction to ETL using SSIS – Introduction to Data Quality – Data Profiling Concepts and Applications.

UNIT - III INTRODUCTION TO MULTIDIMENSIONAL DATA MODELING **9**

Introduction to Data and Dimensional Modeling – Multi Dimensional Data Model – ER modeling Vs Multi Dimensional Model – Concepts of Dimensions - facts - cubes- attributes- hierarchies- star and snowflake schema – Introduction to Business Metrics and KPIs – Creating Cubes using SSAS.

UNIT - IV BASICS OF ENTERPRISE REPORTING **9**

Introduction to Enterprise Reporting - Concepts of dashboards - balanced scorecards – Introduction to SSRS Architecture– Enterprise Reporting using SSRS reporting service

UNIT - VBI ROAD AHEAD **9**

BI and Mobility – BI and cloud computing – BI for ERP systems - Benefits of BI in ERP-NorthWind_Traders Data-Data Analyses through Excel-Kettle Tool – Conversion of data using Kettle Tool.

OUTCOMES :

The student would be able to apply the tools and techniques of quality management manufacturing and services processes.

TOTAL : 45

TEXT BOOKS

1.RN Prasad, Seema Acharya, "Fundamentals Of Business Analytics" Wiley India,2011

REFERENCE BOOKS

1.Soumendra Mohanty, "Data Warehousing Design, Development and Best Practices", Tata McGraw-Hill, New Delhi, 2007

2.David Loshin, "Business Intelligence", Morgan Kaufmann Publishsers, San Francisco, Fifth edition, 2007

3. Larissa Terpeluk Moss and Shaku Atre, "Business Intelligence Roadmap", Pearson Education, 2007

	INDUSTRIAL ELECTIVE	L	T	P	C
	ADVANCED MICROCONTROLLER	**3**	**0**	**0**	**3**

Unit 1: RL78 Microcontroller Architecture

New generation embedded systems: low power operations, high performance, battery operated embedded systems; Introduction to RL78 microcontrollers; Architecture of RL78 microcontrollers, General purpose registers; Memory space; Flash mirror facility; Boot clusters; Special function registers; Pipeline execution.

Unit 2: RL78 Clock circuitry, Voltage detection and Operating modes.

RL78 clock circuitry and operating modes; Clock management; Operating modes- Standby operating modes; HALT mode; Sub-HALT mode; STOP mode; SNOOZE mode; Reset management; Power-on-reset; Voltage detection circuit; Applying voltage detection circuits.

Unit 3: Instruction set and Fail-safe features of RL78.

Instruction set; Addressing modes; Types of instructions; Types of interrupts; Interrupt sources and configurations, Interrupt priority; Interrupt servicing; Key interrupt functions; Introduction to fail- safe standard IEC60730; Usage of CRC in memory; Detection of abnormal CPU operations.

Unit 4: RL78 peripherals: I/O ports, serial communication functions.

RL78 peripheral functions; I/O Ports; Port architecture; Port operations; Port controlling registers; Serial ports of RL78, Functions of 3-wire serial I/O; Functions of UART channels; Functions of simplified IIC channels; Functions of LIN communications.

Unit 5: Timer array units, Analog to Digital converters, Software development tools of RL78.

Timer array units; PWM output generation; One-shot pulse outputs; Multiple PWM outputs; Interval timers; Real time counters; Watchdog timers; Analog to digital converter overview; A/D conversion operations; A/D conversion modes; Flash memory configurations; Flash memory programming; Software development environment for RL78 microcontrollers.

OUTCOMES:

The student will be able to work with suitable microprocessor / microcontroller for a specific real world application.

Reference Books:

Embedded systems using Renesas RL78 Microcontrollers – by Alexander Dean and James Conrad.
4. Smart Book on Renesas RL78 Microcontrollers – by M.Balaji.
11. Renesas Knowledge base on RL78 microcontrollers: www.renasas rulz.com