VINAYAKA MISSIONS UNIVERSITY, SALEM

TAMILNADU, INDIA.

FACULTY OF ENGINEERING & TECHNOLOGY

SCHOOL OF ELECTRONIC SCIENCES

B.E- ELECTRONICS &COMMUNICATION ENGINEERING

PART TIME

(Seven Semesters)

AARUPADAI VEEDU INSTITUTE OF TECHNOLOGY, PAIYANOOR

&

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

CHOICE BASED CREDIT SYSTEM

2012 REGULATION

I SEMESTER

S.No	Course Title	Offering Department	L	T	P	C
THEORY						
1	Engineering Mathematics	MATHS	3	1	0	3
2	Environmental Science & Engineering	CHEM	3	0	0	4
3	Electron Devices	ECE	3	0	0	3
4	Signals & Systems	ECE	3	1	0	4
PRACTICAL						
5	Electron Devices Lab	ECE	0	0	2	2
		TOTAL				**16**

II SEMESTER

S.No.	Course Title	Offering Department	L	T	P	C
THEORY						
1	Digital Signal Processing	ECE	4	0	0	4
2	Digital Electronics	ECE	3	0	0	3
3	Electromagnetic Fields	EEE	3	0	0	3
4	Electronic Circuits I	ECE	3	0	0	3
PRACTICAL						
5	Digital Electronics Lab	ECE	0	0	2	2
TOTAL						15

III SEMESTER

S.No.	Course Title	Offering Department	L	T	P	C
THEORY						
1	Electronic Circuits II	ECE	3	0	0	3
2	Linear Integrated Circuits	ECE	3	0	0	3
3	Information Theory and Coding	ECE	4	0	0	4
4	Analog Communication	ECE	3	0	0	3
PRACTICAL						
5	Electronic Circuits Lab	ECE	0	0	2	2
TOTAL						15

IV SEMESTER

S.No.	Course Title	Offering Department	L	T	P	C
THEORY						
1	Antenna and Wave Propagation	ECE	3	0	0	3
2	Microprocessor & its applications	ECE	3	0	0	3
3	Computer Architecture	CSE	3	0	0	3
4	Digital Communication	ECE	3	0	0	3
PRACTICAL						
5	Microprocessor Lab	ECE	0	0	2	2
TOTAL						14

V SEMESTER

S.No.	Course Title	Offering Department	L	T	P	C
THEORY						
1	Computer Communication	ECE	4	0	0	4
2	VLSI Design Techniques	ECE	3	0	0	3
3	Embedded Systems	ECE	3	0	0	3
4	Digital Image Processing	ECE	3	0	0	3
PRACTICAL						
5	Networks Lab	ECE	0	0	2	2
TOTAL						15

VI SEMESTER

S.No.	Course Title	Offering Department	L	T	P	C
THEORY						
1	Cellular Mobile Communication	ECE	3	0	0	3
2	Microwave Engineering & Optical Communication	ECE	4	0	0	4
3	Elective I	ECE	3	0	0	3
4	Elective II	ECE	3	0	0	3
PRACTICAL						
5	Microwave & Optical Lab	ECE	0	0	2	2
TOTAL						15

VII SEMESTER

S.No.	Course Title	Offering Department	L	T	P	C
THEORY						
1	Engineering Management & Ethics	MGMT	3	0	0	3
2	Elective III	ECE	3	0	0	3
3	Elective IV	ECE	3	0	0	3
PRACTICAL						
4	Project Work	ECE	0	0	6	6
TOTAL						15

Overall Credits

S.No	Semester	Credits
1	I	16
2	II	15
3	III	15
4	IV	14
5	V	15
6	VI	15
7	VII	15
Total		105

ELECTIVES 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	Electromagnetic Interference & Compatibility	ECE	3	0	0	3
6	Medical Electronics	ECE	3	0	0	3
7	Biomedical Signal Processing	ECE	3	0	0	3
8	VLSI Signal Processing	ECE	3	0	0	3
9	Speech Processing	ECE	3	0	0	3
10	Multimedia Compression & Communication	ECE	3	0	0	3
11	Radio Frequency Engineering	ECE	3	0	0	3
12	Radar & Navigational Aids	ECE	3	0	0	3
13	Optical Networks	ECE	3	0	0	3
14	Cryptography & Network Security	CSE	3	0	0	3
15	Engineering Accounting & Entrepreneur	MGMT	3	0	0	3
16	Satellite Communication	ECE	3	0	0	3
17	Robotics	ECE	3	0	0	3
18	Grid Computing	CSE	3	0	0	3
19	Television & Video Engineering	ECE	3	0	0	3
20	Remote Sensing	ECE	3	0	0	3
21	Nano Electronics	ECE	3	0	0	3
22	Avionics	ECE	3	0	0	3
23	Neural Networks & its Applications	CSE	3	0	0	3
24	Intellectual Property Rights	MGMT	3	0	0	3
25	MEMS	ECE	3	0	0	3
26	Internet & Java Programming	CSE	3	0	0	3

27	Soft Computing	CSE	3	0	0	3
28	Power Electronics	EEE	3	0	0	3
29	Medical Informatics	ECE	3	0	0	3
30	Total Quality Management	MGMT	3	0	0	3
INDUSTRIAL ELECTIVES						
31	Learning IT Essentials by Doing	INFOSYS	3	0	0	3
32	Business Intelligence	INFOSYS	3	0	0	3
33	Virtual Instrumentation	NATIONAL INSTRUMENTS	3	0	0	3
34	Parallel Computing	INTEL	3	0	0	3
35	Advanced Microcontroller	RENESAS SEMICONDUCTORS	3	0	0	3

Semester I

ENGINEERING MATHEMATICS

(COMMON TO THE BRANCHES MECH,ECE,CSE, CSSE,EEE,EIE,CIVIL,IT,MECHTRONICS,AERONAUCTICAL ,ETC,AUTOMOBILE)

(PART TIME)

The syllabus for Engineering Mathematics common to all branches except Bio info and Bio tech approved by the Board of studies held on 28th and 29th July 2012 at VMKV Engineering College, Salem.

UNIT I

MATRICES **09**

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

ORDINARY DIFFERENTIAL EQUATIONS **09**

Solutions of First and Second order linear ordinary differential equation with constant coefficients – Method of variation of parameters –Simultaneous first order linear equations with constant coefficients.

UNIT III

MULTIPLE INTEGRALS AND VECTOR CALCULUS **09**

Double integration - Cartesian and polar coordinates –Area as a double integral – Triple integration – volume as a triple integral- Directional derivatives – Gradient, Divergence and Curl – Irrotational and solenoidal- vector fields – vector integration.

UNIT IV

LAPLACE TRANSFORMS **09**

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 **09**

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

TEXT BOOKS

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

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

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

REFERENCE BOOKS

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

Semester I

ENVIRONMENTAL SCIENCE AND ENGINEERING Credit: 3

(Common to B.E all branches)

OBJECTIVE: It is the branch of science which deals with the effects of human activities &modern technology on environment. It creates awareness among the engineering students about environmental pollution and the role of the engineers in conservation of environment.

OUT COME: The students will get the knowledge about environment and they will work their corresponding field with eco friendly. It will protect our environment from pollution

UNIT – I INTRODUCTION TO ENVIRONMENTAL STUDIES AND NATURAL RESOURCES 10

Definition, scope and importance – need for public awareness- forest resources: use and over exploitation, deforestation, case studies. Timber extraction, mining, dams and their ground water, floods, drought, conflicts over water, dams-benefits and problems-mineral resources: use effects on forests and tribal people-water resources: use and over-utilization of surface and exploitation, environmental effects if extracting and using mineral resources, case studies-food resources: world food problems, changes caused by agriculture and overgrazing, effects of modem agriculture, fertilizer-pesticide problems, water logging, salinity, case studies-energy resources: growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Case studies –land resources: land as a resource, land degradation, man induced landslides, soil erosion and desertification –role of an individual in conservation of natural resources-equitable use of resources for sustainable lifestyles.

Field study of local area to document environmental assets-river/forest./grassland/ hill/mountain.

UNIT – II ECOSYSTEMS AND BIODIVERSITY 14

Concept of and ecosystem –structure and function of an ecosystem-producers, consumers and decomposers-energy flow in the ecosystem-ecological succession-food chains, food webs and ecological pyramids-introduction, types, characteristic features, structure and function of the (a)forest ecosystem (b). grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)-introduction to biodiversity- definition: genetic, species and ecosystem diversity- biogeographical classification of India-value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values-biodiversity at global, national and local levels-India as a mega-diversity nation-hot-spots of biodiversity-threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts-endangered and endemic species of India –conservation of biodiversity: in-situ and ex-situ conservation of biodiversity.

Field study of common plants, insects, birds Field study of simple ecosystems – pond, river, hill slopes, etc.

UNIT - III ENVIRONMENTAL POLLUTION 8

Definition-causes, effects and control measures of: (a) air pollution (b) water pollution (c) soil pollution (d) marine pollution (e) noise pollution (f) thermal pollution (g) nuclear hazards – solid waste management: caused, effects and control measures of urban and industrial wastes-role of an individual in prevention of pollution-pollution case studies – disaster management: floods, earthquake, cyclone and landslides. Field study of local polluted site-urban / rural / industrial / agriculture

UNIT - IV SOCIAL ISSUES AND THEIR ENVIRONMENT 7

From unsustainable to sustainable development-urban problems related to energy- water conservation, rain water harvesting, watershed management –resettlement and rehabilitation of people, its problems and concerns, case studies – environmental ethics: issues and possible solutions – climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies – wasteland reclamation-consumerism and waste products-environment protection act-air (prevention and control of pollution) act-water (prevention and control of pollution) act- wildlife protection act-forest conservation act-issues involved in enforcement of environmental legislation-public awareness.

UNIT – V HUMAN POPULATION AND THE ENVRONMENT 6

Population growth, variation among nations – population explosion – family welfare programme- environment and human health – human rights- value education- HIV/ AIDS – women and child welfare –role of information technology in environment and human health – case studies.

Total Hours : 45

TEXT BOOK:

1. Raman Sivakumar, Environmental Science and Engineering, Vijay Nicole imprints Pvt.Ltd.

REFERENCE BOOKS :

1. Bharucha Erach, The Biodiversity of India, publishing Pvt. Ahmedabad, India,
2. Trivedi R.K. Hand book of Environmental laws, Rules, Guidelines, Compliances and Standards, Vol. and II, Enviro Media.
3. Cunningham, W.P.Cooper, T.H.Gorhani, Environmental Encyclopedia, jaicao., House, Mumbai, 2001.
4. Weger K.D., Environmental Management, W.B. Saunders, Co., Philadelphia, USA., 1998.
5. Gilbert M.Masters, Introduction to Environmental Engineering and science, pearson Education Pvt., Ltd., Second Edition, 2004
6. Miller `T.G. Jr., Environmental Science, Wadsworth Publishing Co.
7. Townsend C., Harper J and Michael Begon, Essentials of Ecology, Blackwell Science
8. Trivedi R.K And P.K. Goel, Introduction to air pollution, Techno-Science publications.

Semester I

ELECTRON DEVICES

L T P C

3 1 0 4

OBJECTIVES:

• To enable the student to learn the major components of a electronic system

• To know the correct and efficient ways of knowing various electronic gadgets

PROGRAMME OUTCOMES:

- The broad education necessary to understand the impact of engineering solutions in a global context.
- An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

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.

TOTAL HOURS: 60

TEXT BOOK:

1. Jacob Millman & Christos C.Halkias, "Electronic Devices and Circuits" Tata McGraw-Hill, 1991 .

REFERENCE:

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 I

SIGNALS AND SYSTEMS

L T P C

3 1 0 4

OBJECTIVES:

- To introduce the concepts and techniques associated with the understanding of signals and systems.
- To familiarize with techniques suitable for analyzing and synthesizing both continuous-time and discrete time systems. To provide with an appreciation of applications for the techniques and mathematics used in this course.

PROGRAMME OUTCOMES:

- Apply engineering principles in solving problems relevant to electrical and electronics engineering.
- Apply critical thinking in designing and evaluating components, processes and systems related to electrical and electronics engineering.

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.

TOTAL HOURS: 60

TEXT BOOKS:

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

REFERENCES:

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 I

ELECTRON DEVICES LAB

L T P C

0 0 2 2

OBJECTIVE

To provide exposure to the students with hands on experience on basic Engineering practices of Electronics Engineering.

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

TOTAL HOURS: 45

	SEMESTER II	L	T	P	C
	DIGITAL SIGNAL PROCESSING	4	0	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

1. 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-Use of FFT algorithms in Linear Filtering and correlation.

2. IIR FILTER DESIGN: 9

Structure of IIR-System Design time IIR filter from continuous time filter-IIR filter design by Impulse Invarience.Bilinear transformation-Approximation derivatives-Design of IIR filter in the frequency domain.

3**. FIR FILTER DESIGN: 9**

Symmetric and Antisymmetric FIR filters – Linear phase FIR filters – Windowing technique-Rectangular, Kaiser windows-Frequency sampling techniques-Structure for FIR 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-Model of speech Wave form-Vocoder.

5. DIGITAL SIGNAL PROCESSORS: 9

Introduction to DSP architecture-Harvard architecture-Dedicated MAC unit-Multiple ALUs Advanced addressing modes, Pipelining, Overview of instruction set of TMS320C5X and C54X.

TOTAL HOURS: 45

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.
2. B.Venkataramani&M.Bhasker, Digital Signal processor, Architecture, Programming and Application, TMH 2002.

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. Sanjit K.Mitra 'Digital Signal Processing', A Computer Based Approach, Tata McGraw-Hill, New Delhi, 1998, Second Edition.

	SEMESTER II	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:

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

1. BASIC CONCEPTS 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, Minters 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.

TOTAL HOURS: 45

TEXT BOOKS:

1. Morris Mano, "Digital logic and Computer Design ", Prentice-Hall of India, 1998.
2.William I. Fletcher, "An Engineering Approach to Digital Design ", Prentice-Hall of India, 1980.
3.Floyd T.L., "Digital Fundamentals ", Charles E. Merrill publishing Company, 1982.
4.Tokheim R.L., "Digital Electronics - Principles and Applications ", Tata McGraw Hill, 1999.
5.Jain R.P., "Modern Digital Electronics ", Tata McGraw Hill, 1999.

	SEMESTER II	L	T	P	C
	ELECTROMAGNETIC FIELDS	**3**	**0**	**0**	**3**

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

1. 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.

2. 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.

3. 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.

4. 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.

5. 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.

TOTAL HOURS: 45

TEXT BOOKS:

1. John D. Krauss, "Electromagnetics ", McGraw Hill, 1992.
2. David K. Chang, "Field and Wave Electromagnetics ", Second edition, Addison Wesley, New Delhi, 1999.
3. Hayt W.H., "Engineering Electromagnetics", McGraw Hill, 1995.

REFERENCES:

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 II	L	T	P	C
	ELECTRONIC CIRCUITS- I	3	0	0	3

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.

TOTAL HOURS: 45

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

REFERENCES:

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 II	L	T	P	C
	DIGITAL ELECTRONICS LAB	0	0	2	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:

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

Semester III

S.No.	Course Title	Offering Department	L	T	P	C
THEORY						
1	Electronic Circuits II	ECE	3	0	0	3
2	Linear Integrated Circuits	ECE	3	0	0	3
3	Information Theory and Coding	ECE	4	0	0	4
4	Analog Communication	ECE	3	0	0	3
PRACTICAL						
5	Electronic Circuits Lab	ECE	0	0	2	2
TOTAL						15

	SEMESTER III	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

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 III	L	T	P	C
	LINEAR INTEGRATED CIRCUITS	**3**	**0**	**0**	**3**

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.

TOTAL HOURS:45

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, 1997.
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 III	L	T	P	C
	INFORMATION THEORY & CODING	**4**	**0**	**0**	**4**

AIM

To provide the basic concepts in information Theory & coding and their applications in the processing of signals.

OBJECTIVES

- To introduce the basics of Source coding.
- To familiarize with Noisy Coding its Characteristics.
- To introduce the channel coding.
- To Introduce about the Error control coding and methods.
- To introduce decoding techniques.

UNIT-I: SOURCE CODING **9**

Mathematical model for information source: - Mutual Information - Discrete Entropy-Definition and properties - Joint and conditional entropies - Entropy in the continuous case - Unique decipherability and instantaneous codes - Kraft inequality.

UNIT-II: NOISY CODING **9**

Discrete memory less channel - Classification of channels & channel capacity - Calculation of channel capacity - Decoding schemes - Fano"s inequality - Shannon's fundamental theorem - Capacity of a band limited Gaussian channel.

UNIT-III: CHANNEL CODING **9**

Channel models: Binary Symmetric channels - Information capacity theorem - Implication of the information capacity theorem - Information capacity of coloured noise channel - Rate distortion theory - Data compression.

UNIT-IV: ERROR CONTROL CODING **9**

Linear block codes: - Cyclic codes, BCH Codes, RS codes, Golay codes, Burst error correcting codes, Interleaved codes, Convolutional codes : Convolutional encoder, code tree, state diagram, trellis diagram - Turbo codes.

UNIT-V: DECODING OF CODES **9**

Maximum likelihood decoding of convolutional codes - Sequential decoding of convolutional codes- Applications of Viterbi decoding.

TOTAL HOURS: 45

TEXT BOOKS:

1.S.P.Eugene Xavier, "Statistical Theory of Communication", New Age International, Reprint 2001
2,Richard B.Wells, "Applied Coding & Information Theory for Engineers",LPE,Pearson Education,1999

REFERENCE BOOKS:

1.Simon Haykin, "Communication Systems", John Wiley & Sons, Inc, Newyork, 3rd Edition.
2.John G.Proakias, "Digital Communication", McGraw Hill, Singapore, 4th Edition,2001.
3.Hwei P Hsu, "Theory of Analog and Digital Communication", Pearson / Prentice Hall
4.Shu Lin& Daniel J. Costello, "Error control coding Fundamentals and applications", Pearson Education 2nd edition

	SEMESTER III	L	T	P	C
	ANALOG COMMUNICATION	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

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 III	L	T	P	C
	ELECTRONIC CIRCUITS LAB	0	0	4	2

Aim:

To Provide the ability to design the electronic circuits using the basic electronic components.

Objective:

- To study the characteristics of basic amplifiers and power supply

List of Experiments:

Designing, Simulation using PSPICE, Assembling and Testing

1. HWR with and without filters
2. FWR with and without filters
3. Power supplies
4. RC coupled Amplifier
5. Darlington & Cascade Amplifier
6. Emitter follower Amplifier
7. Transistor biasing
8. Class A Power amplifier
9. Class B Power amplifier
10. Differential amplifiers, CMRR Measurements

Semester IV

S.No.	Course Title	Offering Department	L	T	P	C
THEORY						
1	Antenna and Wave Propagation	ECE	3	0	0	3
2	Microprocessor & its applications	ECE	3	0	0	3
3	Computer Architecture	CSE	3	0	0	3
4	Digital Communication	ECE	3	0	0	3
PRACTICAL						
5	Microprocessor Lab	ECE	0	0	2	2
TOTAL						14

	SEMESTER IV	**L**	**T**	**P**	**C**
	ANTENNA AND WAVE PROPAGATION	**3**	**0**	**0**	**3**

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.

TOTAL HOURS: 45 HOURS

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 IV	L	T	P	C
	MICROPROCESSOR & ITS APPLICATIONS	**3**	**0**	**0**	**3**

Aim:

To study the course on Microprocessors and its Applications.

Objectives:

- *To study the 8-Bit Microprocessor*
- *To study about Microcontroller*
- *To study about the 8086 Processors*
- *To study about the Peripherals devices and Interfacing*
- *To study about the Microprocessor Based Systems Design, Digital Interfacing*

1.8-BIT MICROPROCESSOR: **9**

8085 Architecture and Memory interfacing, interfacing I/O devices, Instruction set, Addressing Modes, Assembly language programming, counters and time delays, interrupts, timing diagram, Microprocessor applications.

2.MICROCONTROLLER: **9**

Intel 8031/8051 Architecture, Special Function Registers (SFR), I/O pins, ports and circuits, Instruction set, Addressing Modes, Assembly Language Programming, Timer and Counter Programming, Serial Communication, Connection to RS 232, Interrupts Programming, External Memory interfacing, Introduction to 16 bit Microcontroller

3.80X86 PROCESSORS: **9**

8086 Architecture, Pin Configuration, 8086 Minimum and Maximum mode configurations, Addressing modes, Basic Instructions, 8086 Interrupts, Assembly levels programming. Pentium processors- III & IV Features & Architectures.

4.PERIPHERALS AND INTERFACING: **9**

Serial and parallel I/O (8251 and 8255), Programmable DMA Controller (8257), Programmable interrupt controller (8259), keyboard display controller (8279), ADC/DAC interfacing. Inter integrated circuits interfacing (I^2C standard).

5.MICROPROCESSOR BASED SYSTEMS DESIGN, DIGITAL INTERFACING: 9

Interfacing to alpha numeric displays, interfacing to liquid crystal display (LCD 16 x 2 line), high power Devices and Optical motor shaft encoders, stepper motor interfacing, Analog interfacing and industrial control, microcomputer based smart scale, industrial process control system, Robotics and Embedded control, DSP and Digital Filters.

TOTAL HOURS : 45

TEXT BOOKS:

1. Ramesh S. Gaonkar, Microprocessor Architecture Programming and Applications with 8085. Fourth edition, Penram International Publishing 2000.

2. Muhammad Ali Mazidi, Janice Gillispie Mazidi, The 8051 Microcontroller, and Embedded Systems, Prentice Hall 2000.

3. Douglas V.Hall, Microprocessor and Interfacing, Programming and Hardware. Tata McGraw Hill, Second Edition. 1999.

REFERENCES:

1. Kenneth J.Ayala., “The 8051 Microcontroller Architecture Programming and Applications”, Penram International Publishing (India). 1996.

2. Kenneth J.Ayala “The 8086 Microprocessor, Programming and Interfacing the PC”, Penram International Publishing. 1995.

3. Barry.B.Brey. “The Intel Microprocessor 8086/8088. 80186, 80286, 80386 and 80486 Architecture Programming and Interfacing”, Prentice Hall of India Pvt.Ltd.1995.

4. Ray A.K.Bhurchandi.K.M, “Advanced Microprocessor and Peripherals”, Tata McGraw-Hill, 2002.

	SEMESTER IV	L	T	P	C
	COMPUTER ARCHITECTURE	3	0	0	3

AIM:

To understand the organization of a computer, and the hardware-software interface.

OBJECTIVES:

- To know about the various components of a computer and their internals.
- To comprehend the importance of the hardware-software interface, and instruction set architecture.
- To understand the architectural features of superscalar processors.

UNIT I BASIC STRUCTURE OF COMPUTERS 9

Functional units - Basic operational concepts - Bus structures - Software performance – Memory locations and addresses – Memory operations – Instruction and instruction sequencing – Addressing modes – Assembly language – Basic I/O operations – Stacks and queues.

UNIT II ARITHMETIC UNIT 9

Addition and subtraction of signed numbers – Design of fast adders – Multiplication of positive numbers - Signed operand multiplication and fast multiplication – Integer division – Floating point numbers and operations.

UNIT III BASIC PROCESSING UNIT 9

Fundamental concepts – Execution of a complete instruction – Multiple bus organization – Hardwired control – Micro programmed control - Pipelining – Basic concepts – Data hazards – Instruction hazards – Influence on Instruction sets – Data path and control consideration – Superscalar operation.

UNIT IV MEMORY SYSTEM 9

Basic concepts – Semiconductor RAMs - ROMs – Speed - size and cost – Cache memories - Performance consideration – Virtual memory- Memory Management requirements – Secondary storage.

UNIT V I/O ORGANIZATION 9

Accessing I/O devices – Interrupts – Direct Memory Access – Buses – Interface circuits – Standard I/O Interfaces (PCI, SCSI, and USB).

TOTAL HOURS: 45

TEXT BOOKS

1. Carl Hamacher, ZvonkoVranesic and SafwatZaky, 5th Edition “Computer Organization”, McGraw-Hill, 2002.

REFERENCES

1. William Stallings, “Computer Organization and Architecture – Designing for Performance”, 6th Edition, Pearson Education, 2003.
2. David A.Patterson and John L.Hennessy, “Computer Organization and Design: The hardware / software interface”, 2nd Edition, Morgan Kaufmann, 2002.

3. John P.Hayes, "Computer Architectures and Organization", 3rd Edition, McGraw-Hill, 1998.

	SEMESTER IV	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

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 IV	L	T	P	C
	MICROPROCESSOR LAB	**0**	**0**	**2**	**2**

AIM

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

OBJECTIVE

- To write the assembly language program for 8085, 8086.
- 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.

Semester V

S.No.	Course Title	Offering Department	L	T	P	C
THEORY						
1	Computer Communication	ECE	4	0	0	4
2	VLSI Design Techniques	ECE	3	0	0	3
3	Embedded Systems	ECE	3	0	0	3
4	Digital Image Processing	ECE	3	0	0	3
PRACTICAL						
5	Networks Lab	ECE	0	0	2	2
TOTAL						15

	SEMESTER V	L	T	P	C
	COMPUTER COMMUNICATION	**4**	**0**	**0**	**4**

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 12

Introduction: uses of computer networks - Network H/W, Network S/W, OSI reference Model, TCP/IP reference model, comparison of OSI & 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 **15**

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.

The Medium Access Control Sub Layer:Channel allocation problem, Multiple access Protocols – Aloha, Collision free protocol, Ethernet – physical layer and MAC Sub layer protocol, performance, types – Switched, fast and Giga byte, Wireless LAN, Broadband Wireless, Bluetooth,RFID Data Link Layer Switching.

UNIT IIINETWORK LAYER **12**

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 TANSPORT LAYER **12**

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

UNIT VAPPLICATION LAYER **9**

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

TOTAL HOURS: 60

TEXT BOOKS:

1. Andrew S Tanenbaum, David J. Wetherall, “Computer Networks”, 5thEdition. Pearson Education/PHI/2012
2. Behrouz A. Forouzan, Data Communications and Networking, 4thEdition, 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 V	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 VLSI SYSTEM COMPONENTS CIRCUITS 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

TEXT BOOKS:

1. Neil H.E. Weste, Kamran Eshraghian, “Principles of CMOS VLSI Design”, PearsonEducation 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 V	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

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, 2001.

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, First Indian Reprint 2001
3. Frank Vahid and Tony Givargis, Embedded Systems Design – A unified Hardware /Software Introduction, John Wiley, 2002.

	SEMESTER V	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 segmentation and 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 and their properties.

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 &MORPHOLOGICAL IMAGE PROCESSING 6

Model of Image Degradation/Restoration process –Inverse filtering -Least Mean Square (Wiener) filtering – Constrained least mean square restoration – Singular value decomposition-Recursive filtering – Morphological Image Processing - Dilation and Erosion - Opening and Closing - The Hit-or-Miss Transformation - Basic Morphological Algorithms - Boundary Extraction

UNIT V IMAGE SEGMENTATION AND COMPRESSION 12

Image Segmentation: Detection of discontinuities-Edge linking and boundary detection and boundary representation – Chain Codes&polygon representation – Shape Numbers&Fourier descriptors-Thresholding- Regional Descriptors - Topological Descriptors - Texture

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

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 V	L	T	P	C
	NETWORKS LAB	0	0	2	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 layerProtocols.

List of Experiments:

1. PC to PC/peripherals communication

a. Establish RS232 communication

b. EstablishParallel port communication

2. MAC Layer LAN Protocols

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

a. CSMA/CD at MAC Layer b. Token Bus at MAC Layer

c. Token Ring at MAC Layer d. CSMA/CA at MAC Layer

3. 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.

a. Stop & Wait at LLC Layer

b. Sliding Window – Go-Back-N at LLC Layer

c. Sliding Window – Selective Repeat at LLC Layer

4. Routing Algorithm

Performance Study of Routing Algorithms through simulation

a. Distance Vector Routing b. Link State Routing

5. Introduction to Socket Communication in Linux & Windows

a. Socket programming concept in Windows & Linux platforms

b. File Transfer between PC's through sockets

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

Semester VI

S.No.	Course Title	Offering Department	L	T	P	C
THEORY						
1	Cellular Mobile Communication	ECE	3	0	0	3
2	Microwave Engineering & Optical Communication	ECE	4	0	0	4
3	Elective I	ECE	3	0	0	3
4	Elective II	ECE	3	0	0	3
PRACTICAL						
5	Microwave & Optical Lab	ECE	0	0	2	2
TOTAL						15

	SEMESTER VI	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 5

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

UNIT – II: WIRELESS SYSTEMS AND STANDARDS 6

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

UNIT – III: CELLULAR CONCEPT - SYSTEM DESIGN FUNDAMENTALS 10

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 12

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 12

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

TEXT BOOK:

1. 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 VI	L	T	P	C
	MICROWAVE ENGINEERING & OPTICAL COMMUNICATION	**4**	**0**	**0**	**4**

AIM

To enable the student to become familiar with active & passive microwave devices & components used in Microwave communication systems & 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 study passive microwave components and their S- Parameters.
- To study Microwave Components.
- To study Microwave Tubes Antennas.
- To impart Knowledge on basics of Optical communication and Optical Sources
- To Study about Optical Detectors and Amplifiers

UNIT I INTRODUCTION 12

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 12

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 & ANTENNAS 12

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

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.

UNIT IV BASICS OF OPTICAL FIBERS AND SOURCES 12

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

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 V OPTICAL DETECTORS & AMPLIFIERS 12

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.

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.

TOTEL HOURS: 60

TEXT BOOKS:

1. Samual Y.Liao, "Microwave Devices and Circuits", PHI, 3rd Edition, 1994.
2. Collin R.E., "Foundation of Microwave Engineering", McGraw Hill, 2nd Edition, 1992.
3. Microwave Principles – Herbert J.Reich, J.G.Skalnik, P.F.Ordung and H.L.Krauss, CBS Publishers and Distributors, New Delhi, 2004.
4. Keiser. G, "Optical fiber communications", 4th Edition Tata McGraw-Hill, New Delhi, 2008.
5. Agrawal. G.P, "Fiber-Optic Communication Systems" 3rd Edition John Wiley & Sons, 2002.

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.
5. Sisodia.M.L and Raghuvanshi.G.S, "Microwave Circuits and Passive Devices", Wiley Eastern Ltd., 1995.

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

Semester VII

S.No.	Course Title	Offering Department	L	T	P	C
THEORY						
1	Engineering Management & Ethics	MGMT	3	0	0	3
2	Elective III	ECE	3	0	0	3
3	Elective IV	ECE	3	0	0	3
PRACTICAL						
4	Project Work	ECE	0	0	6	6
TOTAL						15

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

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

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)

	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

TEXT BOOKS:

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

REFERENCE BOOKS:

1. 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

TEXTBOOKS:

1. 1.B.B.Brey, “The Intel Microprocessor 8086/8088, 80186/80188, 80286,80386,80486 PENTIUM, PENTIUM Pro, PII, PIII & IV Architecture, Programming & Interfacing”, Prentice-Hall of India, 7th Edition, 2006.
2. John Paul Shen, Mikko H. Lipasti, “Modern Processor Design”, Tata McGraw Hill, 2006.
3. B.Govindarajulu, IBM PC and clones Hardware, Trouble Shooting and Maintenance, Second Edition, Tata McGraw Hill, 2005 New Delhi.

	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 IVWAVEFORM-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 : 45 PERIODS

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

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
	ELECTROMAGNETIC INTERFERENCE AND COMPATIBILITY	**3**	**0**	**0**	**3**

AIM:

To understand different electromagnetic Interference problems occurring in Intersystem and in inter system and their possible mitigation techniques in Electronic design

OBJECTIVE:

- To understand the concepts of EMI Sources
- To learn EMI Measurements
- To learn EMC Standards and regulations
- To learn about EMI Control Methods
- To learn about EMC design and Interconnection Techniques.

UNIT-I Basic Concepts 9

Definition of EMI and EMC with examples, Classification of EMI/EMC – CE, RE, CS, RS units of parameters, Sources of EMI, EMI Coupling Modes- CM and DM, ESD phenomena and effects, Transient phenomena and suppression.

UNIT-II EMI Measurements 9

Basic principles of RE, CE, RS and CS measurements EMI measuring instruments- Antennas, LISN, Feed through Capacitor, Current probe, EMC Analyzer ad Detection technique open area site, Shielded anechoic chamber, TEM Cell.

UNIT – III EMC STANDARDS AND REGULATIONS 9

National and International Standardizing Organizations- FCC, CCSPR, ANSI,DOD,IEC,CENEEC,FCC CE and RE Standards, CISPR,CE and RE Standards, IEC/EN, CS Standards, Frequency Assignment- Spectrum Conversation.

UNIT-IV EMI CONTROL METHODS AND FIXES 9

Shielding, Grounding, Bonding, Filtering, EMI gasket, Isolation transformer, Optoisolator.

UNIT-V EMC DESIGN AND INTERCONNECTION TECHNIQUES 9

Cable routing and Connection, Component Selection and Mounting, PCB design- Trace routing, Impedance Control, decoupling, Zoning and grounding.

TOTAL HOURS:45

TEXTBOOK:

1. Prasad Kodali. V – Engineering Electromagnetic Compatibility-S.Chand& Co- New Delhi -2000.
2. Clayton R. Paul – Introduction to Electromagnetic Compatibility – Wiley & Sons- 1992.

REFERENCES:

1. Keiser- Principles of Electromagnetic Compatibility- Artech House- 3rd Edition- 1994.
2. Donwhite Consultant Incorporate- Handbook of EMI/EMC – Vol1-1985

	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

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.

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
	SPEECH PROCESSING	**3**	**0**	**0**	**3**

AIM

To introduce the characteristics of Speech signals and the related time and frequency domain methods for speech analysis and speech enhancement.

OBJECTIVE

- To introduce the basic concepts of speech production
- To develop time and frequency domain techniques for estimating speech parameters
- To introduce a predictive technique for speech compression
- To understand the speech enhancement techniques
- To understand speech recognition, synthesis and speaker identification.

UNIT – I: BASIC CONCEPTS **9**

Discrete time speech signal processing ,Speech Communication Pathway, Anatomy & Physiology of speech production, Spectrographic Analysis of speech, Categorization of speech sounds.

UNIT – II: SPEECH SIGNAL ANALYSIS **10**

Time domain Analysis for speech processing – Short time energy and magnitude - short time average zero crossing - Speech vs silence discrimination - Pitch period estimation using autocorrelation - function - Short time Fourier analysis- Definition and properties

UNIT – III: SPEECH CODING **9**

Linear predictive coding - principle - solution of LPC equation - Cholesky decomposition method - Durbin's method - Lattice formulation - Frequency domain interpretation of LPC - LPC Applications – CELP.

UNIT – IV: SPEECH ENHANCEMENT **8**

Preliminaries, Weiner filtering, Enhancement based on Auditory Masking

UNIT – V: SPEECH RECOGNITION **9**

Special features for speaker recognition, Speaker Recognition Algorithm, Non-spectral features in speaker recognition, signal enhancement for mismatched condition

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Thomas F. Quatieri, "Discrete –Time Speech Signal Processing", Pearson Education - India, New Delhi, 2002, First Indian reprint, 2004.
2. Rabiner L.R / Schaffer R.W., "Digital Processing of Speech Signals", Pearson Education - India, New Delhi, 1993, First Indian reprint, 2004.

REFERENCES:

1. Rabiner L.R. K Juang B.H, “Fundamentals of speech Recognition”, Pearson Education - India, New Delhi, 1993, First Indian reprint, 2003
2. Ben gold and Nelson Morgan, “Speech and audio signal processing”, processing and perception of speech and music, Wiley- India Edition, 2006 Edition.

	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.

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
	RADIO FREQUENCY ENGINEERING	3	0	0	3

AIM

To impart the modeling of RF engineering in the field of communication system

OBJECTIVE

- To understand basics of RF.
- To know the design of RF Filter.
- To study about RF devices.
- To understand the concepts of matching & biasing networks.
- To gain knowledge about the design of RF transistor amplifier.

UNIT I RF BASICS **9**

RF Safety (general), Frequency Spectrum Overview, RF Power; Bandwidth, dB, Using dB, Transmitter / Receiver Block Diagram; Block descriptions, Discussion, block diagram within applications, Wireless systems, RFID, ECM

UNIT II RF FILTER DESIGN **9**

Basic resonator and filter configurations-special filter realization-filter implementation-coupled filter.

UNIT III ACTIVE RF COMPONENTS **9**

RF diodes-bipolar junction transistor –RF field effect transistor-high electron mobility transistors-diode models-transistor models-measurement of active devices-scattering parameter device characterization

UNIT IV MATCHING AND BIASING NETWORKS **9**

Impedance matching using discrete components-micro strip line matching networks-amplifier classes of operation and biasing networks

UNIT V RF TRANSISTOR AMPLIFIER DESIGN **9**

Characteristics of amplifier-amplifier power relations-stability consideration-constant gain-broadband, high power, and multistage amplifiers, Oscillators and mixers: Basic oscillator model-high frequency oscillator configuration-basic characteristics of mixer.

TOTAL PERIODS: 45

TEXT BOOK

1. Reinhold Ludwig, "RF circuit design, theory and applications" Pavel Bretchko, "Pearson Asia Education", edition 2001
2. http://www.gaddon.co.uk/rfsyllabusaus.html

REFERENCES

1. D.Pozar, “Microwave Engineering”, John Wiley & Sons, New York, 1998.
2. Bahil and P. Bhartia, “Microwave Solid State Circuit Design, John Willey & Sons, NewYork, 1998.
3. Christopher Coleman “An introduction to Radio Frequency Engineering”, University of Adelaide, Cambridge University Press, 2011.
4. Daniel M. Dobkin,“RF Engineering for Wireless Networks: Hardware, Antennas, and Propagation (Communications Engineering)”,2004.

	ELECTIVE	L	T	P	C
	RADAR AND NAVIGATIONAL AIDS	**3**	**0**	**0**	**3**

AIM:

To understand the principles of Radar and its use in military and civilian environment and to learn about Navigational Aids

OBJECTIVES

- To derive and discuss the Range equation and the nature of detection.
- To apply Doppler principle to radars and hence detect moving targets, cluster, also to understand tracking radars.
- To refresh principles of antennas and propagation as related to radars, also study of transmitters and receivers.
- To understand principles of navigation, in addition to approach and landing aids as related to navigation.
- To understand navigation of ships from shore to shore.

UNIT I Introduction to Radar 9

Basic Radar – The Simple form of the Radar Equation – Radar Block Diagram – Radar Frequencies – Applications of Radar – The Radar Equation – Detection of signals in Noise – Receiver Noise and the Signal –to-Noise Ratio- Probability Density Functions- Probabilities of Detection and False Alarm- Integration of Radar Pulses- Radar Cross Section of Targets.

UNIT II MTI and Pulse Doppler Radar 9

Introduction to Doppler and MTI Radar- Delay – Line Cancellers – Staggered Pulse Repetition Frequencies – Doppler Filter Banks – Moving Target Detector – Limitations to MTI Performance – Pulse Doppler Radar- tracking with Radar- Monopulse Tracking – Conical Scan and Sequential Lobing –Limitations to Tracking Accuracy- Comparison of Trackers- Automatic Tracking with Surveillance Radars (ADT)

UNIT III Detection of Signals in Noise 9

Introduction- Matched Filter Receiver – Detection Criteria – Detectors – Automatic Detector – Integrators – Constant False Alarm Rate Receivers – The Radar Operator - Propagation Radar Waves – Radar Transmitters – Linear Beam Power Tubes – Solid State RF Power Sources – Magnetron – Crossed Field Amplifiers – Radar Receivers- Receiver Noise Figure – Superheterodyne Receiver – Radar Displays

UNIT IV Radio Direction Finding 9

Introduction – Four Methods of navigation- Radio Direction Finding- The Loop Antenna- Loop Input Circuits – An Aural Null Direction Finder – The Goniometer – Errors in Direction Finding- Automatic Direction Finders- The LF/MF Four Course Radio Range- Hyperbolic Systems of Navigation – Loran and Decca.

UNIT V Navigational Aids 9

DME and TACAN – Aids to Approach and landing- Doppler Navigation – Inertial Navigation –Satellite Navigation System- The Transit System – Navstar Global Positioning System(GPS).

TOTAL HOURS: 45

TEXT BOOKS:

1. Merrill I. Skolnik, " Introduction to Radar Systems", Tata McGraw- Hill(3rd Edition)2003.
2. N.S. Nagaraja, Elements of Electronic Navigation Systems, 2nd Edition, TMH,2000.

REFERENCE BOOKS:

1. Peyton Z. Peebles, "Radar Principles", John Wiley, 2004.
2. J.C Toomay, "Principles of Radar", 2nd Edition- PHI, 2004

	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, Wavelength Routing 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.

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
	CRYPTOGRAPHY AND NETWORK SECURITY	3	0	0	3

AIM:

To understand the principles of encryption algorithms; conventional and public key cryptography.
To have a detailed knowledge about authentication, application level security mechanisms.

OBJECTIVE:

- To learn about Security trends
- To learn about Data Encryption Standard
- To understand the concepts of public key encryption
- To know the Authentication Applications
- To understand the system level security used

UNIT I **9**

Security trends – Attacks and services – Classical crypto systems – Different types of ciphers – LFSR sequences – Basic Number theory – Congruences – Chinese Remainder theorem – Modular exponentiation – Fermat and Euler's theorem – Legendre and Jacobi symbols – Finite fields – continued fractions

UNIT II **9**

Simple DES – Differential cryptanalysis – DES – Modes of operation – Triple DES –AES – RC4 – RSA – Attacks – Primality test – factoring.

UNIT III **9**

Discrete Logarithms – Computing discrete logs – Diffie-Hellman key exchange –ElGamal Public key cryptosystems – Hash functions – Secure Hash – Birthday attacks -MD5 – Digital signatures – RSA – ElGamal – DSA.

UNIT IV **9**

Authentication applications – Kerberos, X.509, PKI – Electronic Mail security – PGP,S/MIME – IP security – Web Security – SSL, TLS, SET.

UNIT V **9**

System security – Intruders – Malicious software – viruses – Firewalls – Security Standards.

TOTAL HOURS: 45

TEXT BOOKS:

1. Wade Trappe, Lawrence C Washington, “Introduction to Cryptography with coding theory”, 2nd ed, Pearson, 2007.
2. William Stallings, “Cryptography and Network security Principles and Practices”, Pearson/PHI, 4th edition, 2006.

REFERENCES

1. W. Mao, “Modern Cryptography – Theory and Practice”, Pearson Education, Second Edition, 2007.
2. Charles P. Pfleeger, Shari Lawrence Pfleeger – Security in computing Third Edition –Prentice Hall of India, 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

TOTAL= 45 PERIODS

TEXT BOOKS:

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	3	0	0	3

AIM

To make the student learn fundamentals of Operating Systems, implementation aspects of real time concepts and few applications on RTOS.

OBJECTIVES

- To learn about the scope of Industrial Robots
- To study the Robot arm mechanism
- To learn the control of robot arm manipulators
- To know about Robot sensing and vision
- To learn about Robot Intelligence

UNIT 1 SCOPE OF ROBOTS 9

The scope of industrial Robots - Definition of an industrial robot - Need for industrial Robots - applications.Robot Programming Languages: Introduction. Characteristics of Robot Level Languages, Characteristics of Task Level Languages

UNIT 2 ROBOT ARM KINEMATICS & DYNAMICS 9

Robot Arm Kinematics: Direct Kinematics Problem, Inverse Kinematics Problem, Robot Arm Dynamics: Lagrange Euler Formulation, Newton Euler Formulation, Generalized De Alemberts Equations of Motions.

UNIT 3 CONTROL OF ROBOT MANIPULATORS 9

Introduction-Control of Puma Robot Arm, Computed Torque Technique, Near-Minimum-Time Control, Variable Structure Control, Non Linear Decoupled Feedback Control, Resolved Motion Control, Adaptive Control.

4. SENSING & VISION 9

Range Sensing, Proximity Sensing, Touch Sensors, Force and Torque Sensing. Vision: Low level vision, Image acquisition, Illumination Techniques. Higher Level vision: Segmentation, Description. Interpretation.

5. ROBOT INTELLIGENCE AND TASK PLANNING 9

State Space Search, Problem reduction, Use of Predicate Logic, Means-Ends Analysis, Problem Solving, Robot Learning, Robot Task Planning, Basic Problems in Task Planning, Expert Systems and Knowledge Engineering.

TOTAL HOURS: 45

TEXT BOOKS

1. Fu K.S. Gonzaleaz R.C. and Lee C.S.G., "Robotics Control Sensing, Vision and Intelligence " McGraw Hill International Editions, 1987.
2. Barry Leatham - Jones, "Elements of industrial Robotics" PITMAN Publishing,1987.

REFERENCES

1. MikellP.Groover, Mitchell Weiss, Roger N.Nagel Nicholas G.Odrey, "Industrial Robotics Technology, Programming and Applications ", McGraw Hill Book Company 1986.
2. Bernard Hodges and Paul Hallam, " Industrial Robotics", British Library Cataloging in Publication 1990.
3. Deb, S.R. Robotics Technology and flexible automation, Tata McGrawHill, 1994.

	ELECTIVE	L	T	P	C
	GRID COMPUTING	**3**	**0**	**0**	**3**

AIM:

To learn about the Basic concepts and Techniques involved in Grid Computing

OBJECTIVE:

- To understand about Parallel and Distributed computing
- To learn about Grid Monitoring Architecture
- To Know about Grid security and resource Management
- To Learn about Data Management and Grid Portals
- To learn about Grid Middleware

UNIT I CONCEPTS AND ARCHITECTURE 9

Introduction-Parallel and Distributed Computing-Cluster Computing-Grid Computing- Anatomy and Physiology of Grid-Review of Web Services-OGSA-WSRF.

UNIT II GRID MONITORING 9

Grid Monitoring Architecture (GMA) - An Overview of Grid Monitoring Systems- Grid ICE - JAMM -MDS-Network Weather Service-R-GMA-Other Monitoring Systems- Ganglia and Grid Mon

UNIT III GRID SECURITY AND RESOURCE MANAGEMENT 9

Grid Security-A Brief Security Primer-PKI-X509 Certificates-Grid Security-Grid Scheduling and Resource Management-Scheduling Paradigms- Working principles of Scheduling -A Review of Condor, SGE, PBS and LSF-Grid Scheduling with QoS.

UNIT IV DATA MANAGEMENT AND GRID PORTALS 9

Data Management-Categories and Origins of Structured Data-Data Management Challenges-Architectural Approaches-Collective Data Management Services-Federation Services-Grid Portals-First-Generation Grid Portals-Second-Generation Grid Portals.

UNIT V GRID MIDDLEWARE 9

List of globally available Middlewares - Case Studies-Recent version of Globus Toolkit and GLite - Architecture, Components and Features.

TOTAL HOURS = 45

TEXT BOOK

1. Maozhen Li, Mark Baker, 'The Grid Core Technologies', John Wiley & Sons, 2005.

REFERENCES

1. Ian Foster & Carl Kesselman, "The Grid 2 - Blueprint for a New Computing Infrascture", Morgan Kaufman - 2004.
2. Joshy Joseph & Craig Fellenstein, "Grid Computing", Pearson Education 2004.
3. Fran Berman, Geoffrey Fox, Anthony J.G.Hey, "Grid Computing: Making the Global Infrastructure a reality", John Wiley and sons, 2003.

	ELECTIVE	L	T	P	C
	TELEVISION & VIDEO ENGINEERING	**3**	**0**	**0**	**3**

AIM

- To understand the basics of Television systems and all the new developments in Television Engineering.

OBJECTIVES

- To study the fundamentals of television systems.
- To study the principles of Monochrome Television Transmitter and Receiver systems
- To understand the essentials of Colour television.
- To study the various Color Television systems with a greater emphasis on PAL system.

To study the advanced topics in Television systems and Video Engineering

UNIT I FUNDAMENTALS OF TELEVISION 9

Aspect ratio-Image continuity-Number of scanning lines-Interlaced scanning-Picture resolution-Camera tubes-Image Orthicon-Vidicon- Plumbicon- Silicon Diode Array Vidicon- Monochrome picture tubes-Composite video signal- video signal dimension-horizontal sync-vertical sync. Details-Scanning sequence details, Picture signal transmission-positive and negative modulation- VSB transmission- Sound signal transmission-Standard channel bandwidth.

UNIT II MONOCHROME TELEVISION TRANSMITTER AND RECEIVER 9

TV transmitter-TV signal Propagation- Interference- TV Transmission Antennas-Monochrome TV receiver-RF tuner, UHF tuner, VHF tuner-Digital tuning techniques-AFT-IFsub systems-AGC-Vision IF subsystem of monochrome receiver-Video amplifier circuits-Sync Separation- AFC-Deflection current waveforms, Deflection oscillators- Frame deflection circuits- requirements- Line deflection circuits-EHT generation-Receiver antennas.

UNIT III ESSENTIALS OF COLOUR TELEVISION 9

Compatibility- Colour perception-Three colour theory-Colour television cameras-Values of luminance and colour difference signals-Colour television display tubes-Delta-gun Precision-in-line and Trinitron colour picture tubes-Purity and convergence- Purity and static and Dynamic convergence adjustments-Pincushion-correction techniques-Automatic degaussing circuit- Gray scale tracking, colour signal transmission- Bandwidth-Modulation of colour difference signals-Weighting factors-Formation of chrominance signal.

UNIT IV COLOUR TELEVISION SYSTEMS 9

NTSC colour TV systems-SECAM system- PAL colour TV systems-PAL-D Colour system-Chromo signal amplifier-separation of U and V signals-colour burst separation-Discriminator-ACC amplifier-Reference Oscillator-Ident and colour killer circuits-U and V demodulators- Colour signal matrixing, Sound in TV

UNIT V ADVANCED TELEVISION SYSTEMS 9

Satellite TV technology-Geo Stationary Satellites-Domestic Broadcast System-Cable TV-Cable Signal Sources-Cable Signal Processing &Distribution - Video Disc recording and playback-DVD Players-Tele Text Signal coding and broadcast receiver- Digital television-Digital Terrestrial Television-Projection television-Flat paneldisplay TV receivers-LCD and Plasma screen receivers-3DTV-EDTV-HDTV.

TOTAL HOURS: 45

TEXTBOOKS

1. R.R.Gulati, “Monochrome Television Practice, Principles, Technology and servicing.”Third Edition 2006, New Age International (P) Publishers.
2. R.R.Gulati, Monochrome & Color Television, New Age International Publisher, 2003.

REFERENCE BOOKS

1. A.M Dhake, “Television and Video Engineering”, 2nd ed., TMH, 2003.
2. R.P.Bali, Color Television, Theory and Practice, Tata McGraw-Hill, 1994.

	ELECTIVE	L	T	P	C
	REMOTE SENSING	3	0	0	3

AIM

The purpose of this course is to study the basics of remote sensing, atmospheric characteristics, optical & microwave remote sensing, geographic information system.

OBJECTIVE

- To understand the basics & components of remote sensing and types of laws used for remote sensing.
- To know about the atmospheric characteristics & earth surface materials.
- To study the types of Radar, Sensors & Scanners.
- To know the components of GIS & comparison of Raster and Vector data structure.
- To understand the characteristics of Digital Satellite Image and application of Remote Sensing and GIS.

UNIT 1 REMOTE SENSING **9**

Definition – Components of Remote Sensing – Energy, Sensor, Interacting Body - Active and Passive Remote Sensing – Platforms – Aerial and Space Platforms – Balloons, Helicopters, Aircraft and Satellites – Synoptivity and Repetivity – Electro Magnetic Radiation (EMR) – EMR spectrum – Visible, Infra Red (IR), Near IR, Middle IR, Thermal IR and Microwave – Black Body Radiation - Planck's law – Stefan-Boltzman law.

UNIT II EMR INTERACTION WITH ATMOSPHERE AND EARTH MATERIALS **9**

Atmospheric characteristics – Scattering of EMR – Raleigh, Mie, Non-selective and Raman Scattering – EMR Interaction with Water vapour and ozone – Atmospheric Windows – Significance of Atmospheric windows – EMR interaction with Earth Surface Materials – Radiance, Irradiance, Incident, Reflected, Absorbed and Transmitted Energy – Reflectance – Specular and Diffuse Reflection Surfaces- Spectral Signature – Spectral Signature curves – EMR interaction with water, soil and Earth Surface: Imaging spectrometry and spectral characteristics.

UNIT III OPTICAL AND MICROWAVE REMOTE SENSING **9**

Satellites - Classification – Based on Orbits and Purpose – Satellite Sensors - Resolution – Description of Multi Spectral Scanning – Along and Across Track Scanners – Description of Sensors in Landsat, SPOT, IRS series – Current Satellites - Radar – Speckle - Back Scattering – Side Looking Airborne Radar – Synthetic Aperture Radar – Radiometer – Geometrical characteristics ; Sonar remote sensing systems.

UNIT IV GEOGRAPHIC INFORMATION SYSTEM **9**

GIS – Components of GIS – Hardware, Software and Organisational Context – Data – Spatial and Non-Spatial – Maps – Types of Maps – Projection – Types of Projection - Data Input – Digitizer, Scanner – Editing – Raster and Vector data structures – Comparison of Raster and Vector data structure – Analysis using Raster and Vector data – Retrieval, Reclassification, Overlaying, Buffering – Data Output – Printers and Plotters

UNIT V APPLICATIONS **9**

Visual Interpretation of Satellite Images – Elements of Interpretation - Interpretation Keys Characteristics of Digital Satellite Image – Image enhancement – Filtering – Classification - Integration of GIS and Remote Sensing – Application of Remote Sensing and GIS – Urban Applications- Integration of GIS and Remote Sensing – Application of Remote Sensing and GIS – Water resources – Urban Analysis – Watershed Management – Resources Information Systems. Global Positioning system – an introduction.

TOTAL HOURS: 45

TEXT BOOKS

1. M.G. Srinivas (Edited by), Remote Sensing Applications, Narosa Publishing House, 2001. (Units 1 & 2).
2. Anji Reddy, Remote Sensing and Geographical Information Systems, BS Publications 2001 (Units 3, 4 & 5).

REFERENCES

1. Jensen, J.R., Remote sensing of the environment, Prentice Hall, 2000.
2. Kang-TsungChang,"Introduction to Geographic Information Systems", TMH, 2002
3. Lillesand T.M. and Kiefer R.W., "Remote Sensing and Image Interpretation", John Wiley and Sons, Inc, New York, 1987.
4. Janza.F.J., Blue, H.M., and Johnston, J.E., "Manual of Remote Sensing Vol. I., American Society of Photogrammetry, Virginia, U.S.A, 1975.
5. Burrough P A, "Principle of GIS for land resource assessment", Oxford
6. MischaelHord, "Remote Sensing Methods and Applications", John Wiley & Sons, New York, 1986.

	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 Nanoelectronics
- 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

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 **6**

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 **10**

Digital Computers - Microprocessors – Memories

3. DIGITAL AVIONICS ARCHITECTURE **6**

Avionics system architecture-Data buses MIL-STD 1553 B-ARINC 429-ARINC 629.

4. FLIGHT DECK AND COCKPITS **8**

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 **15**

Communication Systems - Navigation systems - Flight control systems –Radar electronic warfare - Utility systems Reliability and maintainability - Certification.

TOTAL HOURS: 45

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
	INTELLECTUAL PROPERTY RIGHTS	**3**	**0**	**0**	**3**

AIM:

To appreciate the rights of others

OBJECTIVE:

To Impart Knowledge about

- ❖ Basic Property types & Introduction to IPR
- ❖ Patents and procedures
- ❖ Conventions of IPR
- ❖ IPR policies and case studies

UNIT I **9**

Introduction - Invention and Creativity - Intellectual Property (IP) - Importance - Protection of IPR - Basic types of property (i). Movable Property - Immovable Property and - Intellectual Property.

UNIT II **9**

IP - Patents - Copyrights and related rights - Trade Marks and rights arising from Trademark registration - Definitions - Industrial Designs and Integrated circuits - Protection of Geographical Indications at national and International levels - Application Procedures..

UNIT III **9**

International convention relating to Intellectual Property - Establishment of WIPO - Mission and Activities - History - General Agreement on Trade and Tariff (GATT) - TRIPS Agreement.

UNIT IV **9**

Indian Position Vs WTO and Strategies - Indian IPR legislations - commitments to WTO-Patent Ordinance and the Bill - Draft of a national Intellectual Property Policy - Present against unfair competition.

UNIT V **9**

Case Studies on - Patents (Basumati rice, turmeric, Neem, etc.) - Copyright and related rights - Trade Marks - Industrial design and Integrated circuits - Geographic indications Protection against unfair competition.

TOTAL HOURS: 45

TEXT BOOK

1. Subbaram N.R. "Handbook of Indian Patent Law and Practice ", S. Viswanathan Printers and Publishers Pvt. Ltd., 1998.

REFERENCE BOOKS

1. Eli Whitney, United States Patent Number: 72X, Cotton Gin, March 14, 1794.
2. Intellectual Property Today: Volume 8, No. 5, May 2001, [www.iptoday.com].
3. Using the Internet for non-patent prior art searches, Derwent IP Matters, July 2000.
4. www.ipmatters.net/features/000707_gibbs.html.

	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.

	ELECTIVE	L	T	P	C
	INTERNET & JAVA PROGRAMMING	**3**	**0**	**0**	**3**

AIM

To understand the concepts of Internet and Java Programming

OBJECTIVE

- To study about the basics of Internet and web concepts
- To understand scripting languages and databases
- To introduce object oriented programming concepts and Java
- To understand the concepts of Packages, inheritance and interfaces
- To understand the concepts of Event handling, threads and exception handling

UNIT I INTRODUCTION TO NETWORK AND WEB CONCEPTS 6

History of the Internet and World Wide Web – HTML 4 protocols – HTTP, SMTP, POP3, MIME, and IMAP. Introduction to JAVA Scripts – Object Based Scripting for the web. Structures – Functions – Arrays – Objects - Internet standards – TCP and UDP protocols – URLs – MIME – CGI – Introduction to SGML.

UNIT II SCRIPTING LANGUAGES & DATABASE- ASP – XML 12

HTML – forms – frames – tables – web page design - JavaScript introduction – control structures – functions – arrays – objects – simple web applications, Dynamic HTML – introduction- Relational Database model – Overview, SQL – ASP – Working of ASP – Objects – File System Objects – Session tracking and cookies –Access a Database from ASP – Server side Active-X Components – Web Resources – XML – Structure in Data – Name spaces – DTD – Vocabularies – DOM methods.

UNIT III JAVA INTRODUCTION 6

Object oriented programming concepts – objects – classes – methods and messages –abstraction and encapsulation – inheritance – abstract classes – polymorphism.- Objects and classes in Java – defining classes – methods - access specifiers – static members – constructors – finalize method

UNIT IV PACKAGES , INHERITANCE & INTERFACES 9

Arrays – Strings - Packages – Java-Doc comments –- Inheritance – class hierarchy – polymorphism – dynamic binding – final keyword – abstract classes-The Object class – Reflection – interfaces – object cloning – inner classes – proxies - I/O Streams - Graphics programming – Frame – Components – working with 2D shapes.

UNIT IVEVENTS , THREADS & EXCEPTIONS 12

Basics of event handling – event handlers– actions – mouse events – AWT event hierarchy – introduction to Swing –buttons – layout Management – Swing Components –Motivation for generic programming – generic classes – generic methods – generic code and virtual machine –reflection and generics - Multi-threaded programming – interrupting threads – thread states – thread properties – thread synchronization – Executors – synchronizers- exception handling – exception hierarchy – throwing and catching exceptions.

TOTAL PERIODS: 45

TEXT BOOK

1. Deitel&Deitel, Goldberg, “Internet and World Wide Web – How to Program”, Pearson Education Asia, 2001.
2. Elliotte Rusty Harold, “Java Network Programming”, O’Reilly Publishers, 2002
3. Cay S. Horstmann and Gary Cornell, “Core Java: Volume I – Fundamentals”, Eighth
4. Edition, Sun Microsystems Press, 2008.

REFERENCES

1. Eric Ladd, Jim O’ Donnel, “Using HTML 4, XML and JAVA”, Prentice Hall of India – QUE, 1999.
2. Aferganatel, “Web Programming: Desktop Management”, PHI, 2004.
3. Rajkamal, “Web Technology”, Tata McGraw-Hill, 2001.
4. R. Krishnamoorthy& S. Prabhu, “Internet and Java Programming”, New Age International Publishers, 2004.
5. Thomno A. Powell, “The Complete Reference HTML and XHTML”, fourth edition, Tata McGraw Hill, 2003.

	ELECTIVE	L	T	P	C
	SOFT COMPUTING	**3**	**0**	**0**	**3**

AIM

To introduce the techniques of soft computing and adaptive neuro-fuzzy inferencing systems which differ from conventional AI and computing in terms of its tolerance to imprecision and uncertainty.

OBJECTIVES

- To introduce the ideas of fuzzy sets, fuzzy logic and use of heuristics based on human experience
- To become familiar with neural networks that can learn from available examples and generalize to form appropriate rules for inferencing systems.
- To provide the mathematical background for carrying out the optimization associated with neural network learning
- To familiarize with genetic algorithms and other random search procedures useful while seeking global optimum in self-learning situations.
- To introduce case studies utilizing the above and illustrate the intelligent behavior of programs based on soft computing

UNIT I - FUZZY SET THEORY **10**

Introduction to Neuro – Fuzzy and Soft Computing – Fuzzy Sets – Basic Definition and Terminology – Set-theoretic Operations – Member Function Formulation and Parameterization – Fuzzy Rules and Fuzzy Reasoning – Extension Principle and Fuzzy Relations – Fuzzy If-Then Rules – Fuzzy Reasoning – Fuzzy Inference Systems – Mamdani Fuzzy Models – Sugeno Fuzzy Models – Tsukamoto Fuzzy Models – Input Space Partitioning and Fuzzy Modeling.

UNIT II - OPTIMIZATION **8**

Derivative-based Optimization – Descent Methods – The Method of Steepest Descent – Classical Newton's Method – Step Size Determination – Derivative-free Optimization – Genetic Algorithms – Simulated Annealing – Random Search – Downhill Simplex Search.

UNIT III - NEURAL NETWORKS **10**

Supervised Learning Neural Networks – Perceptrons - Adaline – BackpropagationMutilayerPerceptrons – Radial Basis Function Networks – Unsupervised Learning Neural Networks – Competitive Learning Networks – Kohonen Self-Organizing Networks – Learning Vector Quantization – Hebbian Learning.

UNIT IV - NEURO FUZZY MODELING **9**

Adaptive Neuro-Fuzzy Inference Systems – Architecture – Hybrid Learning Algorithm – Learning Methods that Cross-fertilize ANFIS and RBFN – Coactive Neuro Fuzzy Modeling – Framework Neuron Functions for Adaptive Networks – Neuro Fuzzy Spectrum.

UNIT V - APPLICATIONS OF COMPUTATIONAL INTELLIGENCE **8**

Printed Character Recognition – Inverse Kinematics Problems – Automobile Fuel Efficiency Prediction – Soft Computing for Color Recipe Prediction.

TOTAL HOURS: 45

TEXT BOOK

1. J.S.R.Jang, C.T.Sun and E.Mizutani, “Neuro-Fuzzy and Soft Computing”, PHI, 2004, Pearson Education 2004.

REFERENCES

1. Timothy J.Ross, “Fuzzy Logic with Engineering Applications”, McGraw-Hill, 1997.
2. Davis E.Goldberg, “Genetic Algorithms: Search, Optimization and Machine Learning”, Addison Wesley, N.Y., 1989.
3. S. Rajasekaran and G.A.V.Pai, “Neural Networks, Fuzzy Logic and Genetic Algorithms”, PHI, 2003.
4. R.Eberhart, P.Simpson and R.Dobbins, “Computational Intelligence - PC Tools”, AP Professional, Boston, 1996.

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

AIM

To study the applications of information science and its impact in medical field

OBJECTIVE

- To understand the hospital management system and integrated hospital information system
- To know about the basic concepts of artificial intelligence and expert systems
- To study the hospital management information systems and computer assisted patient education
- To understand the concept of 3 dimensional imaging and its applications
- To study the concepts of telemedicine, its issues and reliability

UNIT I: **9**

Introduction- Hospital management and information system: functional area- pre-requisites- integrated hospital information systems- health information system- and disaster management plan

UNIT II: **9**

Artificial intelligence- expert systems- materials and methods- computer based patient Records- computer assisted medical education

UNIT III: **9**

Hospital Management and Information systems- structure and functions- computer assisted patient education computer assisted patient surgery

UNIT IV: **9**

Three-dimensional imaging: limitations of endoscopy and imaging- benefits of virtual endoscopy- materials and methods- limitations- applications- merits and demerits- surgical simulation- virtual environment

UNIT V: **9**

Telemedicine- needs- materials and methods- Internet telemedicine- controversial issues- reliability- cost analysis- applications- Telesurgery- the Internet

TOTAL HOURS: 45

TEXT BOOK:

1. Mohan Bansal, Medical Informatics- a primer, Tata McGraw-Hill, 2003.

REFERENCE BOOKS:

1. Hsinnchun Chen, Medical Informatics: Knowledge Management and Data Mining in Biomedicine, Springer, 2005.
2. F. T. De Dombal, Medical Informatics: The Essentials, Butterworth-Heinemann, 1996.

3. Charles P. Friedman, Jeremy C. (EDT) Wyatt, Evaluation Methods in Medical Informatics- Springer Verlag, 1997.

	ELECTIVE	L	T	P	C
	TOTAL QUALITY MANAGEMENT	**3**	**0**	**0**	**3**

1. INTRODUCTION **9**

Definition of Quality, Dimensions of Quality, Quality Planning, Quality costs - Analysis Techniques for Quality Costs, Basic concepts of Total Quality Management, Historical Review, Principles of TQM, Leadership – Concepts, Role of Senior Management, Quality Council, Quality Statements, Strategic Planning, Deming Philosophy, Barriers to TQM Implementation.

2. TQM PRINCIPLES **9**

Customer satisfaction – Customer Perception of Quality, Customer Complaints, Service Quality, Customer Retention, Employee Involvement – Motivation, Empowerment, Teams, Recognition and Reward, Performance Appraisal, Benefits, Continuous Process Improvement – Juran Trilogy, PDSA Cycle, 5S, Kaizen, Supplier Partnership – Partnering, sourcing, Supplier Selection, Supplier Rating, Relationship Development, Performance Measures – Basic Concepts, Strategy, Performance Measure.

3. STATISTICAL PROCESS CONTROL (SPC) **9**

The seven tools of quality, Statistical Fundamentals – Measures of central Tendency and Dispersion, Population and Sample, Normal Curve, Control Charts for variables and attributes, Process capability, Concept of six sigma, New seven Management tools.

4. TQM TOOLS **9**

Benchmarking – Reasons to Benchmark, Benchmarking Process, Quality Function Deployment (QFD) – House of Quality, QFD Process, Benefits, Taguchi Quality Loss Function, Total Productive Maintenance (TPM) – Concept, Improvement Needs, FMEA – Stages of FMEA.

5. QUALITY SYSTEMS **9**

Need for ISO 9000 and Other Quality Systems, ISO 9000:2000 Quality System – Elements, Implementation of Quality System, Documentation, Quality Auditing, QS 9000, ISO 14000 – Concept, Requirements and Benefits.

TOTAL HOURS: 45

TEXT BOOK:

1. Dale H.Besterfiled, et at., Total Quality Management, Pearson Education Asia, 1999. (Indian reprint 2002).

REFERENCES:

1. James R.Evans & William M.Lidsay, The Management and Control of Quality, (5th Edition), South-Western (Thomson Learning), 2002 (ISBN 0-324-06680-5).
2.Feigenbaum.A.V. "Total Quality Management, McGraw-Hill, 1991.
3. Oakland.J.S. "Total Quality Management Butterworth – Hcinemann Ltd., Oxford. 1989.
4. Narayana V. and Sreenivasan, N.S. Quality Management – Concepts and Tasks, New Age International 1996.
5. Zeiri. "Total Quality Management for Engineers Wood Head Publishers, 1991.

	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	**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.

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
	VIRTUAL INSTRUMENTATION	**3**	**0**	**0**	**3**

UNIT I - REVIEW OF DIGITAL INSTRUMENTATION 6

Representation of analog signals in the digital domain – Review of quantization in amplitude and time axes, sample and hold, sampling theorem, ADC and DAC.

UNIT II FUNDAMENTALS OF VIRTUAL INSTRUMENTATION 10

Concept of virtual instrumentation – PC based data acquisition – Typical on board DAQ card – Resolution and sampling frequency - Multiplexing of analog inputs – Single-ended and differential inputs – Different strategies for sampling of multi-channel analog inputs. Concept of universal DAQ card - Use of timer-counter and analog outputs on the universal DAQ card.

UNIT III CLUSTER OF INSTRUMENTS IN VI SYSTEM 10

Interfacing of external instruments to a PC – RS232, RS 422, RS 485 and USB standards - IEEE 488 standard – ISO-OSI model for serial bus – Introduction to bus protocols of MOD bus and CAN bus.

UNIT IV APHICAL PROGRAMMING ENVIRONMENT IN VI 10

Concepts of graphical programming – Lab-view software – Concept of VIs and sub VI - Display types – Digital – Analog – Chart – Oscilloscopic types – Loops – Case and sequence structures - Types of data – Arrays – Formulae nodes –Local and global variables – String and file I/O.

UNIT V ANALYSIS TOOLS AND SIMPLE APPLICATIONS IN VI 9

Fourier transform - Power spectrum - Correlation – Windowing and filtering tools – Simple temperature indicator – ON/OFF controller – P-I-D controller - CRO emulation - Simulation of a simple second order system – Generation of HTML page.

TOTAL HOURS: 45

TEXT BOOKS:

1. S. Gupta and J.P Gupta, 'PC Interfacing for Data Acquisition and Process Control', Instrument society of America, 1994.
2. Peter W. Gofton, 'Understanding Serial Communications', Sybex International.
3. Robert H. Bishop, 'Learning with Lab-view', Prentice Hall, 2003.

REFERENCE BOOKS:

1. Kevin James, 'PC Interfacing and Data Acquisition: Techniques for Measurement, Instrumentation and Control', Newness, 2000.
2. Gary W. Johnson, Richard Jennings, 'Lab-view Graphical Programming', McGraw Hill Professional Publishing, 2001.
3. Peter W. Gofton, 'Understanding Serial Communications', Sybex International.
4. Robert H. Bishop, 'Learning with Lab-view', Prentice Hall, 2003.

	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.

Reference Books:

1. Embedded systems using Renesas RL78 Microcontrollers – by Alexander Dean and James Conrad.
2. Smart Book on Renesas RL78 Microcontrollers – by M.Balaji.
3. Renesas Knowledge base on RL78 microcontrollers: www.renasas rulz.com