FACULTY OF ENGINEERING & TECHNOLOGY

SCHOOL OF ELECTRONIC SCIENCES

B.E- ELECTRONICS & COMMUNICATION ENGINEERING

PART TIME

AARUPADAI VEEDU INSTITUTE OF TECHNOLOGY, PAIYANOOR

&

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

CHOICE BASED CREDIT SYSTEM

2016 REGULATION

(Semester I to VII)

I SEMESTER

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

II SEMESTER

S.No.	Course Title	Offering Department	L	T	P	C
THEORY						
1	Digital Signal Processing	ECE	3	1	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	3	2
TOTAL						**15**

III SEMESTER

S.No.	Course Title	Offering Department	L	T	P	C
THEORY						
1	Microcontroller & Applications	ECE	3	0	0	3
2	Digital Communication	ECE	3	0	0	3
3	Control Systems	EEE	3	1	0	4
4	Antennas and Wave Propagation	ECE	3	1	0	4
PRACTICAL						
5	Microcontroller and Digital Communication Lab	ECE	0	0	3	2
TOTAL						16

IV SEMESTER

S.No.	Course Title	Offering Department	L	T	P	C
THEORY						
1	Digital Image Processing	ECE	3	0	0	3
2	Computer Communication	ECE	3	0	0	3
3	VLSI Design	ECE	3	0	0	3
4	Elective I –	ECE	3	0	0	3
PRACTICAL						
5	Image Processing and VLSI Design Lab	ECE	0	0	3	2
TOTAL						14

V SEMESTER

S.No.	Course Title	Offering Department	L	T	P	C
THEORY						
1	RF & Microwave Engineering	ECE	3	1	0	4
2	Optical Communication	ECE	3	0	0	3
3	Embedded & Real Time Systems	ECE	3	1	0	4
4	Remote Sensing	ECE	3	1	0	4
PRACTICAL						
5	RF, Microwave & Optical Communication Lab	ECE	0	0	3	2
TOTAL						17

VI SEMESTER

S.No.	Course Title	Offering Department	L	T	P	C
THEORY						
1	Disaster Mitigation and Management	CIVIL	3	0	0	3
2	Wireless Communication	ECE	3	1	0	4
3	Medical Electronics	ECE	3	0	0	3
4	Elective – II	ECE	3	0	0	3
PRACTICAL						
5	Medical Electronics Lab	ECE	0	0	3	2
TOTAL						15

VII SEMESTER

S.No.	Course Title	Offering Department	L	T	P	C
THEORY						
1	RFID	ECE	3	1	0	4
2	Elective - III	ECE	3	0	0	3
3	Elective - IV	ECE	3	0	0	3
PRACTICAL						
4	Project Work & Viva Voce	ECE	0	0	12	6
TOTAL						16

ELECTIVES LIST

S.No.	Course Title	Offering Department	L	T	P	C
1	Satellite Communication & Broadcasting	ECE	3	0	0	3
2	Wireless Sensor Networks	ECE	3	0	0	3
3	Video Processing	ECE	3	0	0	3
4	Advanced Microcontrollers	ECE	3	0	0	3
5	Photonics & Optical Networks	ECE	3	0	0	3
6	Modern Wireless Communication Systems	ECE	3	0	0	3
7	Robotics and Automation	ECE	3	0	0	3
8	Advanced Digital Design	ECE	3	0	0	3
9	Electromagnetic Interference & Compatibility	ECE	3	0	0	3
10	VLSI Signal Processing	ECE	3	0	0	3
11	Total Quality Management	MGMT	3	0	0	3
12	Managerial Economics & Financial Analysis	MGMT	3	0	0	3
13	Nanotechnology	ECE	3	0	0	3
14	Programmable Logic Controller	ECE	3	0	0	3
15	Micro Electro Mechanical Systems	ECE	3	0	0	3
16	Electronics Measurements	ECE	3	0	0	3
17	Computer Organization & Architecture	CSE	3	0	0	3
18	Neural Network & Fuzzy Control	ECE	3	0	0	3
19	Artificial Intelligence and Expert System	ECE	3	0	0	3
20	Grid & Cloud Computing	CSE	3	0	0	3
21	Information Security	CSE	3	0	0	3
22	Cyber Security	CSE	3	0	0	3
23	Global Positioning System	ECE	3	0	0	3
INDUSTRIAL ELECTIVIES						
24	Business Intelligence and its Applications	INFOSYS	3	0	0	3
25	Soft Skills	INFOSYS	3	0	0	3
26	Learning IT Essentials by Doing	INFOSYS	3	0	0	3

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

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

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

SEMESTER I	L	T	P	C
ENVIRONMENTAL SCIENCE AND ENGINEERING	3	0	0	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	L	T	P	C
ELECTRONIC DEVICES	**3**	**0**	**0**	**3**

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	L	T	P	C
SIGNALS AND SYSTEMS	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	L	T	P	C
ELECTRONIC DEVICES LAB	**0**	**0**	**3**	**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	**3**	**1**	**0**	**4**

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**

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**

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**

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**	**3**	**2**

List of Experiments:

1. Design and implementation of Adders and Subtractors using logic gates

2. Design and implementation of code converters using logic gates

   1) BCD to excess -3 codes 2) Binary to gray

3. Design and implementation of 4 bit BCD adder using IC 7483

4. Design and implementation of 2 Bit Magnitude comparator using logic gates 8 bit magnitude comparator using IC 7485

5. Design and implementation of Multiplexer and De-Multiplexer using logic gates and study of IC74150 and IC74154

6. Design and implementation of encoder and decoder using logic gates and study of IC7445 and IC74147

7. Design and implementation of 3 bit synchronous up/down counter

8. Implementation of SISO, SIPO, and PISO shift registers using flip flops

SEMESTER III	L	T	P	C
MICROCONTROLLER & APPLICATION	**3**	**0**	**0**	**3**

(Common to ECE, BME, EEE, MECHATRONICS & SOLAR)

AIM

To understand the principles of microcontrollers and applications towards real world existence.

OBJECTIVES

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

UNIT I – INTEL 8086 MICROCPROCESSOR 9

Architecture of 8086-Register organization – Signal Description of 8086 - 8086 Instructions set – Addressing modes – Assembler directives and operators- simple programs.

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UNIT II – PERIPHERAL INTERFACING 9

Programmable Peripheral Interface 8255 – Programmable Communication Interface 8251 USART – Programmable Interrupt Controller 8259A - Programmable Interval Timer 8253 – Keyboard/Display Controller 8279 – A-to-D converter – D-to-A converter.

UNIT III – INTEL 8051 MICROCONTROLLER 9

Introduction to 8 bit microcontroller – architecture of 8051- Signal descriptions of 8051- Role of PC and DPTR- Flags and PSW- CPU registers- Internal RAM & ROM- Special Function Register-Counter & Timers-Serial Communication.

UNIT IV – ASSEMBLY LANGUAGE PROGRAM OF INTEL 8051 9

Interrupt- Addressing Mode- Data Transfer Instruction- Arithmetic Instruction- Logical Instruction- Jump Loop & Call Instruction- I/O Port Programming.

UNIT V – INTERFACING AND APPLICATION OF INTEL 8051 9

LCD Interfacing - A/D and D/A Interfacing- Sensor Interfacing- Relays and Optoisolators- Stepper Motor Interfacing- DC Motor Interfacing.

TOTAL PERIODS: 45

TEXTBOOKS

1. Krishna Kant, “Microprocessors and Microcontrollers Architecture, programming and system Design using 8085, 8086, 8051 and 8096”. PHI2007. (Unit I & II).
2. Muhammad Ali Mazidi and Janica Gilli Mazidi, The 8051 microcontroller and embedded systems, Pearson Education, 5th Indian reprint, 2003. (Unit III to V)

REFERENCE BOOKS

1. Rafiquzzaman M. – Microprocessors – Theory and Applications Intel and Motorola, PHI Pvt. Ltd., New Delhi 2001.
2. Douglas V.Hall – Microprocessors and Interfacing programming and hardware, Tata McGraw Hill Edition 1997.

3. A.K Roy, K.M Bhurchandi, Intel Microprocessors Architecture, Programming and Interfacing McGraw Hill International Edition – 2001

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

AIM:

To introduce the basic concepts of Digital Communication in baseband and passband domains and to give an exposure to error control coding techniques.

OBJECTIVES:

- To study signal space representation of signals and discuss the process of sampling, quantization and coding that are fundamental to the digital transmission of analog signals.
- To understand baseband and bandpass signal transmission and reception techniques.
- To learn error control coding which encompasses techniques for the encoding and decoding of digital data streams for their reliable transmission over noisy channels.

UNIT I WAVEFORM CODING TECHNIQUES 9

Pulse Code Modulation- Channel Noise and Error Probability- Quantization Noise and Signal-to-noise Ratio- Differential Pulse-Code Modulation- Delta Modulation- Coding Speech at Low Bit Rates- Applications.

UNIT II BASEBAND SHAPING FOR DATA TRANSMISSION 9

Discrete PAM Signals- Power Spectra of Discrete PAM Signals- Intersymbol Interference- Nyquist's Criterion for Distortionless Baseband Binary Transmission- Correlative Coding- Eye Pattern- Baseband M-ary PAM Systems- Adaptive Equalization for Data Transmission.

UNIT III DIGITAL MODULATION TECHNIQUES 9

Digital Modulation Formats- Coherent Binary Modulation Techniques- Coherent Quadrature Modulation Techniques- Noncoherent Binary Modulation Techinques- Comparison of Binary and Quaternary Modulation Techniques- M-ary Modulation Techniques-Effect of Intersymbol Interference- Bit Versus Symbol Error Probabilities.

UNIT IV ERROR-CONTROL CODING 9

Rationale for Coding and Types of Codes- Discrete Memoryless Channels- Linear Block Codes- Cyclic Codes- Convolution Codes-Maximum Likelihood Decoding of Convolution Codes-Distance Properties of Convolution Codes- Sequential Decoding of Convolutional Codes-Trellis Codes.

UNIT V SPREAD-SPECTRUM MODULATION 9

Pseudonoise Sequences- A Notion of Spread Spectrum- Direct-Sequence Spread Coherent Binary Phase-Shift Keying- Signal-Space Dimensionality and Processing Gain- Probability of Error- Frequency-Hop Spread Spectrum-Applications.

TOTAL HOURS: 45

TEXT BOOK

1. Simon Haykin, "Digital Communications", John Wiley, 2006.

REFERENCES:

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 III	L	T	P	C
CONTROL SYSTEMS	**3**	**1**	**0**	**4**

AIM

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

OBJECTIVE

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

UNIT - I: SYSTEMS AND THEIR REPRESENTATION 12

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

UNIT - II: TIME RESPONSE 9

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

UNIT - III: FREQUENCY RESPONSE 9

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

UNIT - IV: STABILITY OF CONTROL SYSTEM 9

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

.**UNIT - V: COMPENSATOR DESIGN 6**

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

Lecture Hours : 45, Tutorial Hours : 15

Total Hours : 60

TEXT BOOKS

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

REFERENCES

1. K. Ogata, ‘Modern Control Engineering’, 4th edition, PHI, New Delhi, 2002.
2. Norman S. Nise, Control Systems Engineering, 4th Edition, John Wiley, New Delhi, 2007.

3. Samarajit Ghosh, Control systems, Pearson Education, New Delhi, 2004
4. M. Gopal, 'Control Systems, Principles and Design', Tata McGraw Hill, New Delhi, 2002.

SEMESTER III	L	T	P	C
ANTENNAS & WAVE PROPAGATION	3	1	0	4

AIM:

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

OBJECTIVES:

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

UNIT I ELECTROMAGNETIC RADIATION AND ANTENNA BASICS 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 POINT SOURCES AND THEIR 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 LOOP, SLOT and HORN 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 PROPAGATION OF RADIO WAVES 9

Basics of wave Propagation, classification of electromagnetic waves, Ground Wave Propagation, Space Wave Propagation Free-space Propagation, Ground Reflection, Surface waves, Diffraction, Wave propagation in complex Environments, Tropospheric Propagation, Tropospheric Scatter. Sky Wave Propagation Ionosphere propagation: Structure of ionosphere, Sky waves, skip distance, Virtual height, Critical frequency, MUF, Electrical properties of ionosphere, Effects of earth's magnetic fields, Faraday rotation, Whistlers.

TUTORIAL: 15
TOTAL HOURS: 60

TEXTBOOK

1. John D.Kraus, Ronald J Marhefka and Ahmad S Khan, “Antennas and Wave Propagation”, McGraw-Hill Education, 4ed, 2013.

REFERENCE BOOKS

1. E.C.Jordan and Balmain, “Electromagnetic waves and Radiating Systems”, Pearson Education / PHI, 2006.
2. A.R.Harish, M.Sachidanada, “Antennas and Wave propagation”, Oxford University Press, 2007.
3. Constantine A. Balanis, Antenna Theory Analysis and Design, John Wiley, 2nd Edition, 2007.
4. R.E.Collins, “Antenna and Radio wave propagation”, McGraw-Hill
5. W.L Stutzman and G.A. Thiele, “Antenna analysis and design”, John Wiley, 2000.

SEMESTER III	L	T	P	C
MICROCONTROLLER AND DIGITAL COMMUNICATION LAB	**0**	**0**	**3**	**2**

AIM

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

To acquire the knowledge to construct and realize the basic communication circuits and interpret the obtained results

OBJECTIVE

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

LIST OF EXPERIMENTS-Microcontroller

1. 8085 & 8086 Assembly Language Program (ALP) for Arithmetic Operations.
2. 8051 Assembly Language Program (ALP) for Arithmetic Operations.
3. 8051 Assembly Language Program (ALP) for Logical Operations.
4. 8051 Assembly Language Program (ALP) for Bit Manipulation Operations.
5. 8051 Assembly Language Program (ALP) for arrange the numbers in Ascending and Descending order.
6. 8051 Assembly Language Program (ALP) for Interrupt & UART Operations.
7. Interfacing an ADC to 8051 Controller.
8. Interfacing DAC to 8051 Controller and generate Square, Triangular & Saw-tooth waveform.
9. Interfacing a Stepper motor to 8051 Controller and operate it in clockwise and anti-clockwise directions.
10. Interfacing a Keyboard & Display controller (8279) to 8051 Controller.

LIST OF EXPERIMENTS - Digital Communication

1. Signal Sampling and reconstruction.
2. Amplitude modulation and demodulation
3. Frequency modulation and demodulation.
4. Pulse code modulation and demodulation.
5. ASK, FSK and PSK Modulation and Demodulation.
6. TDM and FDM
7. Line Coding Schemes
8. FSK, PSK and DPSK schemes (Simulation)
9. Error control coding schemes (Simulation)
10. Spread spectrum communication (Simulation).

SEMESTER IV	L	T	P	C
DIGITAL IMAGE PROCESSING	**3**	**0**	**0**	**3**

AIM:

To introduce the student to various image processing techniques.

OBJECTIVES:

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

UNIT I-DIGITAL IMAGE FUNDAMENTALS 9

Introduction-Elements of Digital Image Processing system- elements of visual perception – image sensing and acquisition – Image sampling and quantization - image representation -Some basic relationship between pixels.

UNIT II-IMAGE TRANSFORMS 9

Introduction - 2D Discrete Fourier Transform – Properties- Importance of Phase -Walsh – Hadamard – Discrete Cosine Transform, Haar, –KL transforms –Singular Value Decomposition.

UNIT III-IMAGE ENHANCEMENT 9

Enhancement through point operation- Histogram manipulation – Gray level transformation- Neighbourhood operation – Median filter - Image Sharpening- Bit plane slicing - Homomorphic Filtering – Zooming operation.

UNIT IV-IMAGE RESTORATION 9

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

UNIT V-IMAGE COMPRESSION AND SEGMENTATION 9

Image compression schemes – Information theory – Run length, Huffman and arithmetic coding –Vector quantization - JPEG. Image Segmentation – Classification – Thresholding – edge based segmentation – Hough transform – Active contour.

Total Hours: 45

TEXT BOOKS:

1. Rafael C Gonzalez and Richard E Woods, “Digital Image Processing”, Pearson Education, 3rd Edition, 2003.
2. S. Jayarman, S. Esakkirajan and T. Veerakumar, “Digital Image Processing”, Tata McGraw Hill, 2010.
3. A.K. Jain, “Fundamentals of Digital Image Processing”, Pearson Education, 1995.

REFERENCE BOOKS:

1. William K Pratt, “Digital Image Processing”, John Willey, 2001.
2. Millman Sonka, Vaclav Hlavac, Roger Boyle, and Broos Colic, “Image Processing Analysis and Machine Vision”, Thompson learning, 1999.

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

AIM:

To understand the architecture, recent advances, current prac-tices and trends in computer network, analyze the networking pro-tocols and the contemporary issues in computer networks

OBJECTIVE

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

UNIT I INTRODUCTION & PHYSICAL LAYER 9

Introduction: uses of computer networks - Network H/W, Net-work 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 trans-mission media, wireless transmission, PSTN, Mobile Telephone Systems, Cable Televisions.

UNIT II DATA LINK LAYER 9

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

UNIT IIINETWORK LAYER 9

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

UNITIV TRANSPORT LAYER 9

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

UNIT V APPLICATION LAYER 9

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

TOTAL HOURS: 45

TEXT BOOKS:

1. Andrew S Tanenbaum, David J. Wetherall, "Computer Net-works", 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 Communica-tions and Networking Technologies, BROOKS/COLE/2001
2. Richard Lai and Jirachiefpattana, "Communication Protocol Specification and Verification", Kluwer Publishers, Boston, 1998.

SEMESTER IV	L	T	P	C
VLSI DESIGN	**3**	**0**	**0**	**3**

Aim

To provide the knowledge on VLSI fabrication and circuit design procedures

Objective

- To understand the MOS transistor theory, CMOS technologies and the Layout
- To understand the circuit concepts and scaling of MOS Circuits.
- To understand the concepts of designing combinational and sequential circuit using CMOS logic configuration
- To understand the subsystem design of IC's
- To understand the concepts of CMOS testing

Unit – I: Introduction to MOS Technology **9**

A brief History-MOS transistor, Ideal I-V characteristics, C-V characteristics, Non ideal I-V effects, DC transfer characteristics - CMOS technologies, Layout design Rules, CMOS process enhancements, Technology related CAD issues, Manufacturing issues.

Unit – II: Concepts and Scaling of MOS Circuits **9**

Sheet resistance – Area capacitances of layers – Delay: Inverter Delays – Driving Large Capacitance loads – Propagation Delay – Wiring Capacitances – Choice of Layers – Scaling of MOS Circuits: Scaling models and factors – Scaling factors of device parameters – Limitation of Scaling.

Unit – III: Combinational and Sequential Circuit design **9**

Circuit families –Low power logic design – comparison of circuit families – Sequencing static circuits, circuit design of latches and flip flops, Static sequencing element methodology- sequencing dynamic circuits – synchronizers

Unit – IV: Datapath and Array Subsystems **9**

Addition/ Subtraction – one/Zero Detectors – Comparators – Boolean Logical Operations – Coding – Shifters – Multiplication – Division – Parallel Prefix Computations – SRAM – DRAM – ROM – Serial Access Memory – Programmable Logic Arrays – Array yield, Reliability and Self-test.

Unit – V: Testing **9**

Need for testing- Testers, Text fixtures and test programs- Logic verification- Silicon debug principles- Manufacturing test – Design for testability – Boundary scan

Total Hours: 45

Text Books:

1. Weste and Harris: CMOS VLSI DESIGN (Third edition) Pearson Education, Third edition, 2006.
2. D.A Pucknell & K. Eshraghian Basic VLSI Design, Third edition, PHI, 2003

Reference Books:

1. Wayne Wolf, Modern VLSI design, Pearson Education, 3rd edition 2003
2. M. J. S. Smith: Application specific integrated circuits, Pearson Education, 1997
3. J. Bhasker: Verilog HDL primer, BS publication, 2001.

SEMESTER IV	L	T	P	C
IMAGE PROCESSING AND VLSI DESIGN LAB	0	0	3	2

AIM

To impart knowledge on Image processing Techniques
To impart knowledge on design of Digital Circuits using VLSI Techniques

OBJECTIVE:

To expertise in writing the program for generalized image pro-cessing and to understand its utilization in real time applications.

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

LIST OF EXPERIMENTS: Image Processing Lab

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

LIST OF EXPERIMENTS : VLSI DESIGN LAB

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

SEMESTER V	L	T	P	C
RF & MICROWAVE ENGINEERING	**3**	**1**	**0**	**4**

AIM

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

OBJECTIVE

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

UNIT I INTRODUCTION TO MICROWAVES AND RF 9

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

UNIT II MICROWAVE COMPONENTS and their S-parameters 9

Waveguide Attenuators- Resistive card, Rotary Vane types. Waveguide Phase Shifters: Dielectric, Rotary Vane types. 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 O-type and M-type TUBES 9

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

UNIT IV MICROWAVE SEMICONDUCTOR DEVICES AND IC'S 9

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

UNIT V MICROWAVE MEASUREMENTS **9**

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

TEXT BOOKS:

1. Mike Golio,"RF and Microwave Passive Technologies", CRC Press, 2ed, 2008.
2. Samual Y.Liao, "Microwave Devices and Circuits", PHI, 3rd Edition, 2003.
3. Collin R.E., "Foundation of Microwave Engineering", McGraw Hill, 2nd Edition, 2009.

REFERENCE BOOKS:

1. Microwave Principles – Herbert J.Reich, J.G.Skalnik, P.F.Ordung and H.L.Krauss, CBS Publishers and Distributors, New Delhi, 2004.
2. Peter A.Rizzi, "Microwave Engineering – Passive Circuits", PHI Publications.
3. Chatterjee.R, "Elements of Microwave Engineering", Affiliated East-West Press Pvt. Ltd.

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

AIM

To learn different types of optical emission, detection, modulation and opto electronic integrated circuits and their applications

OBJECTIVES

- To know the basics of solid state physics and understand the nature and characteristics of light.
- To understand different optical sources.
- To learn the principle of optical detection and mechanism in different detection devices.
- To understand different light modulation techniques and the concepts and applications of optical switching.
- To study optical networks and their applications

UNIT I - INTRODUCTION: OPTICAL FIBRES - STRUCTURES, WAVEGUIDES AND FABRICATION 9

Introduction to vector nature of light, Basic optical Laws and Definitions, Optical Fiber Modes and Configurations, Single Mode Fibers and Graded- Index Fiber Structures, Fiber Materials, Fiber Fabrication

UNIT II - ATTENUATION AND DISPERSION AND OPTICAL SOURCES 9

Attenuation- Absorption, Scattering Losses, Bending Losses, Core and Cladding Losses. Signal distortion in Single-Mode Fiber - Optical sources - LED and LASER diode - Principles of operation, concepts of line width, phase noise, switching and modulation characteristics.

Power Launching and Coupling and Optical Connectors

UNIT III - OPTICAL DETECTORS 9

Physical Principal of Photodiodes, Types of Optical detectors –PN Photodiode, PIN Photodiode, Avalanche photodiode, Phototransistor - Principles of operation, concepts of Responsivity, Sensitivity and quantum efficiency, noise in detection.

Multichannel Transmission Technique- Multichannel Amplitude Modulation -Multichannel Frequency Modulation, WDM Concepts and Components.

UNIT IV OPTICAL AMPLIFIERS 9

Basic concepts, semiconductor Laser Amplifiers, Erbium-Doped Fiber Amplifier, Raman Fiber amplifier, Brillouin Fiber amplifier ,Applications of Optical Amplifiers, Noise in Optical Amplifiers, Noise Figure of Amplifier.

UNIT V OPTICAL NETWORKS AND OPTICAL SPACE COMMUNICATION 9

Network Concepts, Network Topologies, SONET/SDH, High Speed Light wave Links, Optical Add/Drop Multiplexing, Optical Switching, WDN Networks, Passive Optical Networks, Optical Ethernet.

Introduction and application of Optical Space Communication.

TEXT BOOKS:

1. Keiser. G, “Optical fiber communications”, 4th Edition Tata McGraw-Hill, New Delhi, 2008.(Unit I , II & III)
2. Franz & Jain, “Optical communication, Systems and Components”, Narosa Publications, New Delhi, 2000. (Unit IV & V)

REFERENCE BOOKS:

1. John Gowar, “Optical Communication Systems”, 2nd Edition Prentice Hall, 1993.
2. Karminvov & T. Li “Optical Fibre Telecommunications”, Vol A & B, Academic Press, 2002.
3. Agrawal. G.P, “Fiber-Optic Communication Systems” 3rd Edition John Wiley & Sons, 2002.

SEMESTER V	L	T	P	C
EMBEDDED & REAL TIME SYSTEMS	**3**	**1**	**0**	**4**

Objective

- To understand the concept and Devices of Embedded Systems
- To understand the basic programming tool for embedded systems
- To learn about various RTOS available
- To understand the basic real time systems and databases

Unit – I Embedded Devices **9**

Introduction to Embedded Systems – Microcontroller 8051 – Advanced Processor Architecture – Memory Organization – Real World Interfacing – Devices for embedded Systems – Communication Buses for Device network.

Unit – II Embedded Programming **9**

Programming concepts and Embedded Programming in C, C++ and Java – Program modeling – Inter-process Communication – Synchronization of Processes – Threads - Tasks.

Unit – III Real Time Operating Systems **9**

OS Services – Process Management – Time and Even Functions – Memory Management – Device, file and IO subsystems – Interrupts – Design and Scheduling – OS Security Issues – Microc/OS-II and Vx Works – Windows CE, OSEK - RTLinux

Unit – IV Real Time Systems and Tasks **9**

Performance Measures – Estimating Program run Times – Task Assignment and Scheduling: Classical uniprocessor Scheduling Algorithms – Uniprocessor Scheduling of IRIS Tasks – Task Assignment – Mode Changes – Fault Tolerant Scheduling.

Unit – V Databases and Communication **9**

RT Databases – Real-time Vs General Purpose Databases – Main memory Databases – Transaction Priorities and Aborts – Concurrency Control Issues – Disk Scheduling Algorithms – Maintaining Serialisation Consistancy – Databases for Hard Real Time Systems – Communication Media – Network Topologies – Protocols.

Text Books

1. Raj Kamal, “Embedded Systems, Architecture, Programming and Design”, Tata McGraw Hill Education Private Limited, 2012.
2. C. M. Krishna, Kang G. Shin, “Real Time Systems”, McGraw Hill International Editions, 2012.

Reference Books:

1. Shibu K. V, “Introduction to Embedded Systems”, McGraw Hill Internationals, 2014.
2. Wayne Wolf, “Computers as Components, Principles of Embedded Computing Design”, Elsevier 2005.
3. Jane W. S. Liu, Real Time Systems”, Pearson Education, Seventh Impression, 2008.

SEMESTER V	L	T	P	C
REMOTE SENSING	**3**	**1**	**0**	**4**

AIM

To make students to understand the Concept and applications of Remote Sensing.

OBJECTIVE

- To study the process of remote sensing.
- To study about characteristics of EMR.
- To understand the various satellites and microwave remote sensing.
- To understand the use of Geographic Information System.
- To learn about the recent application of remote sensing.

UNIT I REMOTE SENSING AND TYPES OF REMOTE SENSING & SENSOR CHARACTERISTICS 9

Introduction-Definition – Remote Sensing Process –Sources of Energy – Interaction with Atmosphere and Target.

Types of Remote Sensing-Characteristics of Images-Orbit of Remote Sensing Satellites-Remote Sensing Satellites.– Black Body Radiation, Sensor parameters- Atmospheric Sensors-Active remote sensors-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 –Factors affecting Microwave Measurements-Radar wave bands-Speckle Noise - Back Scattering – Side Looking Airborne Radar – Synthetic Aperture Radar – Interpreting SAR Images – Geometrical characteristics.

UNIT IV GEOGRAPHIC INFORMATION SYSTEM 9

GIS – Architecture of GIS – Data – Spatial and Non-Spatial – Maps – Types of Maps – Projection – Types of Projection - Data Input – Digitizer, Scanner – Editing – Raster and Vector data structures – Analysis using Raster and Vector data – Retrieval, Reclassification, Overlaying, Buffering – Data Output – Printers and Plotters

UNIT V MISCELLANEOUS TOPICS 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

Urban & Municipal Application- Forest Resources Management - Watershed Management – Natural Disaster Management. Global positioning system – an introduction.

TOTAL HOURS: 45

TEXT BOOKS

1. Basudeb Bhatta, Remote Sensing and GIS, Second Edition,Published in India Oxford University Press,2011. (Unit 1)
3. M.G. Srinivas (Edited by), Remote Sensing Applications, Narosa Publishing House, 2001. (Units 2).
4. Anji Reddy, Remote Sensing and Geographical Information Systems, BS Publications 2001 (Units 3, 4 & 5).

REFERENCE BOOKS

1. Jensen, J.R., Remote sensing of the environment, Prentice Hall, 2000.
2. Kang-Tsung Chang,"Introduction to Geographic Information Systems", TMH, 2002
5. Lillesand T.M. and Kiefer R.W., "Remote Sensing and Image Interpretation", John Wiley and Sons, Inc, New York, 1987.
6. Burrough P A, "Principle of GIS for land resource assessment", Oxford
7. Mischael Hord, "Remote Sensing Methods and Applications", John Wiley & Sons, New York, 1986.
2. Singal, "Remote Sensing", Tata McGraw-Hill, New Delhi, 1990.
3. Floyd F. Sabins, Remote sensing, "Principles and interpretation", W H Freeman and Company 1996.

SEMESTER V	L	T	P	C
RF, MICROWAVE & OPTICAL COMMUNICATION LAB	**0**	**0**	**3**	**2**

AIM

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

OBJECTIVES

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

LIST OF EXPERIMENTS

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

RF

1. Characteristics of RF Amplifier.
2. Characteristics of RF Filter.

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 VI	L	T	P	C
DISASTER MITIGATION AND MANAGEMENT	**3**	**0**	**0**	**3**

AIM

To impart awareness on disasters and preparedness during disasters.

OBJECTIVES

- To Understand basic concepts in Disaster Management
- To Understand Definitions and Terminologies used in Disaster Management
- To Understand the Challenges posed by Disasters
- To understand Impacts of Disasters

UNIT 1 INTRODUCTION 9

Concept of disaster; Different approaches; Concept of Risk; Levels of disasters; Disaster phenomena and events *(Global, national and regional)*; Natural and man-made hazards

UNIT 2 RISK ASSESSMENT AND VULNERABILITY ANALYSIS 9

Response time, frequency and forewarning levels of different hazards; Characteristics and damage potential of natural hazards; hazard assessment ;Dimensions of vulnerability factors; vulnerability assessment; Vulnerability and disaster risk; Vulnerabilities to flood and earthquake hazards

UNIT 3 DISASTER MANAGEMENT MECHANISM 9

Concepts of risk management and crisis management -Disaster management cycle; Response and Recovery; Development, Prevention, Mitigation and Preparedness-Planning for relief

UNIT 4 DISASTER RESPONSE 9

Mass media and disaster management-Disaster Response Plan; Communication, Participation, and Activation of Emergency Preparedness Plan-Logistics Management-Psychological Response-Trauma and Stress Management-Rumour and Panic Management-Minimum Standards of Relief-Managing Relief-Funding

UNIT 5 DISASTER MANAGEMENT IN INDIA 9

Strategies for disaster management planning; Steps for formulating a disaster risk reduction plan; Disaster management Act and Policy in India; Organisational structure for disaster management in India; Preparation of state and district disaster management plans

Total Hours: 45

TEXT BOOKS

1. Alexander, D. *Natural Disasters,* ULC press Ltd, London, 1993.
2. Carter, W. N. *Disaster Management: A Disaster Management Handbook,* Asian Development Bank, Bangkok, 1991.
3. Chakrabarty, U. K. *Industrial Disaster Management and Emergency Response,* Asian Books Pvt. Ltd., New Delhi 2007.

REFERENCE BOOKS

1. Abarquez I. & Murshed Z. *Community Based Disaster Risk Management: Field Practitioner's Handbook,* ADPC, Bangkok, 2004.
2. Goudie, A. *Geomorphological Techniques,* Unwin Hyman, London 1990.
3. Goswami, S. C. *Remote Sensing Application in North East India,* Purbanchal Prakesh, Guwahati, 1997.
4. *Manual on Natural Disaster Management in India,* NCDM, New Delhi, 2001.
5. *Disaster Management in India,* Ministry of Home Affairs, Government of India, New Delhi, 2011.
6. *National Policy on Disaster Management,* NDMA, New Delhi, 2009.
7. *Disaster Management Act. (2005),* Ministry of Home Affairs, Government of India, New Delhi, 2005.

SEMESTER VI	L	T	P	C
WIRELESS COMMUNICATION	3	1	0	4

AIM

To introduce the concepts of wireless / mobile communication using cellular environment and to make the students to know about the various wireless network systems and standards are to be introduced.

OBJECTIVES:

- It deals with the fundamental cellular radio.
- It presents different ways to radio propagation models
- It provides idea about analog and digital modulation techniques used in wireless communication.
- It also deals with the different types of equalization techniques and diversity concepts
- It deals with advanced transceiver schemes and second generation and third generation wireless networks.

UNIT I SERVICES AND TECHNICAL CHALLENGES 9

Types of Services, Requirements for the services, Multipath propagation, Spectrum Limitations, Noise and Interference limited systems, Principles of Cellular networks, Multiple Access Schemes.

UNIT II WIRELESS PROPAGATION CHANNELS 9

Propagation Mechanisms (Qualitative treatment), Propagation effects with mobile radio, Channel Classification, Link calculations, Narrowband and Wideband models.

UNIT III WIRELESS TRANSCEIVERS 9

Structure of a wireless communication link, Modulation and demodulation – Quadrature Phase Shift Keying, π/4-Differential Quadrature Phase Shift Keying, Offset-Quadrature Phase Shift Keying, Binary Frequency Shift Keying, Minimum Shift Keying, Gaussian Minimum Shift Keying, Power spectrum and Error performance in fading channels.

UNIT IV SIGNAL PROCESSING IN WIRELESS SYSTEMS 9

Principle of Diversity, Macrodiversity, Microdiversity, Signal Combining Techniques, Transmit diversity, Equalisers- Linear and Decision Feedback equalisers, Review of Channel coding and Speech coding techniques.

UNIT V ADVANCED TRANSCEIVER SCHEMES 9

Spread Spectrum Systems- Cellular Code Division Multiple Access Systems- Principle, Power control, Effects of multipath propagation on Code Division Multiple Access, Orthogonal Frequency Division Multiplexing – Principle, Cyclic Prefix, Transceiver implementation, Second Generation(GSM, IS–95) and Third Generation Wireless Networks and Standards

TOTAL HOURS: 45

TEXT BOOKS:

1. Andreas.F. Molisch, “Wireless Communications”, John Wiley – India, 2006.
2. Simon Haykin & Michael Moher, “Modern Wireless Communications”, Pearson Education, 2007.

REFERENCES:

1. Rappaport. T.S., “Wireless communications”, Pearson Education, 2003.
2. Gordon L. Stuber, “Principles of Mobile Communication”, Springer International Ltd., 2001.
3. Andrea Goldsmith, Wireless Communications, Cambridge University Press, 2007.

SEMESTER VI	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 BIOPOTENTIAL 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.

2. BIO-CHEMICAL AND NON ELECTRICAL PARAMETER MEASUREMENTS 9

Measurement of Blood pH, pO2 and pCO2, Electrophoresis, colorimeter, photometer, Blood flow meter, cardiac output, respiratory measurement, Blood pressure, temperature, pulse, Method of cell counting.

3. THERAPEUTIC EQUIPMENT 9

Cardiac pacemakers, DC Debrillators, Dialyzer, Artificial Kidney, Artificial Heart, Artificial Ventilation and Ventilators.

4. PHYSICAL MEDICINE AND BIO-TELEMETRY 9

Diathermies – its type and their applications, Bio telemetry – Elements and design of Bio telemetry system, Multi-patient Telemetry, Implantable Telemetry, Tele-stimulation.

Medical imaging-X-ray generation, Magnetic Resonance Imaging system, Image Intensifiers-Computer Aided Tomography,

5. RECENT TRENDS IN MEDICAL INSTRUMENTATION 9

Thermograph, endoscopy unit, Laser in medicine, surgical diathermy, Foetal Monitoring Instruments, Patient Monitoring System, Electrical safety.

TOTAL HOURS: 45

TEXT BOOKS:

1. Khandpur, R.S, “Handbook of Biomedical Instrumentation”, Tata McGraw-Hill, New Delhi, 1997. (All Five Units)
2. Leslie Cromwell, “Biomedical instrumentation and measurement”, Prentice Hall of India New Delhi, 1997. (All Five Units)

REFERENCEBOOKS:

1. John G.Webster, “Medical Instrumentation Application and Design”, John Wiley and Sons, New York, 1998.
2. Joseph J.Carr and John M.Brown, “Introduction to Biomedical equipment technology”, John Wiley and Sons, New York, 1997.

SEMESTER VI	L	T	P	C
MEDICAL ELECTRONICS LAB	**0**	**0**	**3**	**2**

AIM

To enable the students to know about the measurements and recording of Bioelectric Signals.

OBJECTIVES

- Record the various Bio Signals and Analysis it.
- To study the different preamplifiers used for amplifying the Bio Signals.
- To measure various physiological parameters using patient monitoring units.

LIST OF EXPERIMENTS

1. Study of Operational amplifier IC741 with its Characteristics.
2. Inverting and Non-Inverting mode of operation.
3. Construction and testing of Instrumentation amplifier
4. Recording and analysis of ECG signals.
5. Recording and analysis of EEG signals.
6. Recording and analysis of EMG signals.
7. Measurement of Heart Beat Rate
8. Measurement of Respiration Rate
9. Measurement of Pulse Rate
10. Study of biotelemetry

SEMESTER VII	L	T	P	C
RFID	3	1	0	4

AIM:
This course is offered to students to gain basic knowledge on RF Identification and various techniques involved in RFID, Applications in Various fields.

OBJECTIVE:

- To Know the basic concepts in RF Identification
- To learn the Fundamental of RFID Tags
- To learn the RFID authenticity of goods and RFID privacy and regulation.
- To learn the RFID Applications in healthcare, Pharmacy and in Library
- To study about the threats in RFID, hacking and it's Technical Solutions.

Unit-I RFID Principles **9**
Introduction-Automatic Identification-Bar Codes-Magnetic stripes and MICR,RF Identification-Benefits in manufacturing, Distribution and inventory, retail, Document Tracking, security, Food supplies, Healthcare, RFID-Elements-Coupling, Range and penetration, RFID Implants, Verichip and Mark of the Beast.

Unit-II RFID Global and Private Policies **9**
Definitions of Privacy-Personal Information-Current Privacy Paradigm-Privacy through Data protection Law and Fair Information Practices-Understanding RFID's Privacy threats-current state of RFID Policy-issues – privacy, Integrity, security of the system, Health impact-Labour impact, Current EPC global policy

Unit-III RFID in Authenticity of Goods and Interaction Design for Wireless **9**
Important concepts in Authentication-Key Distribution problem-stolen keys and revocation-Authenticity of Tags and Goods. Anticounterfeiting Measures of Goods, Authentication of Readers and Users Across the supply chain-Role of Interaction Design-Designing and Modifying WID Systems-Disclosure at read and Read ange, Identifiable Reqaders, permissions based Tags, Physical remedies

Unit-IV RFID Applications **9**
RFID Payments at ExxonMobil-RFID Transformation in battlefield-RFID in Pharmacy-in Health care – Wireless Tracking in the Library-System Components and their Effects in Libraries-US Libraries-Tracking Livestock with RFID-Livestock Marketing-Auction Markets-World Live Stock round up

Unit-V RFID Technical Solutions, Hacking Problem, threats **9**
Reverse Engineering the protocol-Security Implications-protect against these tyes of Attacks-Bluetooth's background-Bluetooth security and Privacy Attacks-Cracking Bluetooth-Bluetapping-Locational Surveillance Technical Challenges of RFID Privacy-Blocker Tags-Soft Blocking-Signal to Noise Measurement-Tags with Pseudonyms-Corporate Privacy-Technology and Policy-Robust RFID Security

Total Hours:45

Text Book:

1. RFID –Applications,Security and Privacy- Simson Garfinkel ,Beth Rosenberg,Pearson Education,2006

Reference Books:

1. RFID Essentials-Bill Gover and Himansu Bhat- O'Reilly Media Edition,2006
2. RFID Implementation-Dennis E.Brown,Tata McGraw Hill Edition,2007

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

OBJECTIVE

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

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

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

- Every project work shall have a guide who is the member of the faculty of the institution. Six periods per week shall be allotted in the time table and this time shall be utilized by the students to receive the directions from the guide, on library reading, laboratory work, com-puter analysis or field work as assigned by the guide and also to present in periodical seminars on the progress made in the project.
- The aim of the project work is to deepen comprehension of principles by applying them to a new problem which may be the design and manufacture of a device, a research investigation, a computer or management project or a design problem.
- The progress of the project is evaluated based on a minimum of three reviews. The review committee may be constituted by the Head of the Department.
- Each student shall finally produce a comprehensive report covering background information, literature survey, problem statement, project work details and conclusion.
- This final report shall be typewritten form as specified in the guidelines.
- The continuous assessment shall be made as prescribed in the regulations

ELECTIVE	L	T	P	C
SATELLITE COMMUNICATION & BROADCASTING	**3**	**0**	**0**	**3**

AIM:

To understand the basic concept in the field of satellite communication

OBJECTIVE

- To obtain knowledge on orbital aspects involved in satellite communication.
- To obtain knowledge on Power budget calculation.
- To obtain knowledge on Satellite system and services provided

UNIT I-SATELLITE ORBIT **9**

Satellite orbits: Kepler's laws – Earth satellite orbiting satellite terms-Orbital elements – Orbital perturbations –Inclined Orbits – Sun synchronous orbit. **Constellation:** Geo stationary satellites – Non geostationary constellation – Launching of Geostationary satellites.

UNIT II-INK DESIGN **9**

EIRP – Transmission Losses – Power Budget equation – System Noise Carrier to noise ratio – Uplink – Downlink –Effects of rain – Inter modulation noise.

UNIT III-SPACE AND EARTH SEGMENT **9**

Space Segment: Power Supply – Altitude control – Station keeping – Thermal Control – TT&C – Subsystems – Antenna subsystem –Transponders – Wideband Receiver. **Earth Segment:** receive only home TV system – Community antenna TV system.

UNIT IV-SATELLITE ACCESS **9**

Single Access- Pre assigned FDMA – Demand Assigned FDMA – SPADE system- TWT amplifier operation – Downlink analysis – TDMA – reference bursts – Preamble – Postamble – Carrier recovery – Network synchronization – Pre assigned TDMA – Assigned –CDMA introduction.

UNIT V-BROADCAST AND SERVICES **9**

Broadcast: DBS – Orbital Spacings- Power ratings – Frequency and Polarization – Transponder Capacity – Bit rate – MPEG – Forward Error Correction. ODU-IDU – Downlink Analysis – Uplink – Satellite Mobile services: VSAT–GPS.

Total Hours: 45

TEXT BOOK

1. Dennis Roddy, *"Satellite Communications",* Tata Mc-Graw Hill Publications, 4th Edition, 2008.

REFERENCES

1. Madhavendra Richharia, Leslie David, *"Satellite Systems for Personal Applications Concepts and Technology",* Wiley- Blackwell, 2010.
2. Wilbur L.Prichard, Henry G. Suyerhood, Ropert A. Nelson, *"Satellite Communication System Engineering",* 2nd Edition, Pearson Education, 1993.
3. Pratt, Timothy, Charles W. Bostian, *"Satellite Communication",* John Wiley and Sons, 2nd Edition, New York, 1986.

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

AIM:

To impart knowledge on the wireless sensors and its network communications

OBJECTIVE

- To study the basic wireless sensor networks
- To study the architecture of WSN
- To study the networking sensors
- To study about infrastructure establishment
- To study the sensor network platforms and tools

UNIT I OVERVIEW OF WIRELESS SENSOR NETWORKS 9

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

UNIT II ARCHITECTURES 9

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

UNIT III NETWORKING SENSORS 9

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

UNIT IV INFRASTRUCTURE ESTABLISHMENT 9

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

UNIT V SENSOR NETWORK PLATFORMS AND TOOLS 9

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

TOTAL HOURS: 45

TEXT BOOKS

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

REFERENCES

1. Kazem Sohraby, Daniel Minoli, & Taieb Znati, “Wireless Sensor Networks- Technology, Protocols, And Applications”, John Wiley, 2007.
2. Anna Hac, “Wireless Sensor Network Designs”, John Wiley, 2003.
3. Bhaskar Krishnamachari,”Networking Wireless Sensors”, Cambridge Press,2005.

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

AIM

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

OBJECTIVE

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

UNIT I VIDEO FORMATION, PERCEPTION AND REPRESENTATION 9

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

UNIT II TWO-DIMENSIONAL MOTION ESTIMATION 9

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

UNIT III FOUNDATIONS OF VIDEO CODING 9

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

UNIT IV WAVEFORM-BASED VIDEO CODING 9

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

UNIT V CONTENT DEPENDENT & SCALABLE VIDEO CODING 9

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

TOTAL HOURS: 45

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
ADVANCED MICROCONTROLLERS	**3**	**0**	**0**	**3**

AIM

To learn the architecture and programming of advanced Intel family microprocessors and microcontrollers.

OBJECTIVES

- To introduce the concepts in internal programming model of Intel family of 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 16 bit microcontrollers.
- To introduce the concepts and architecture of RISC processor and ARM.

UNIT I ADVANCED MICROPROCESSOR ARCHITECTURE 9

Internal Microprocessor Architecture-Real mode memory addressing – Protected Mode Memory addresses –Memory paging - Data addressing modes – Program memory addressing modes – Stack memory addressing modes – Data movement instructions – Program control instructions- Arithmetic and Logic Instructions.

UNIT II MODULAR PROGRAMMING AND ITS CONCEPTS 9

Modular programming –Using keyboard and Video display –Data Conversions- Disk files- Interrupt hooks- using assembly languages with C/ C++

UNIT III PENTIUM PROCESSORS 9

Introduction to Pentium Microprocessor – Special Pentium registers- Pentium memory management – New Pentium Instructions –Pentium Processor –Special Pentium pro features – Pentium 4 processor – Intelligent Processors and its successors.

UNIT-IV 16-BIT MICRO CONTROLLER 9

8096/8097 Architecture-CPU registers –RALU-Internal Program and Data memory Timers-High speed Input and Output –Serial Interface-I/O ports –Interrupts –A/D converter-Watch dog timer –Power down feature – Instruction set- External memory Interfacing –External I/O interfacing.

UNIT V RISC PROCESSORS AND ARM 9

The RISC revolution – Characteristics of RISC Architecture – The Berkeley RISC – Register Windows – Windows and parameter passing – Window overflow – RISC architecture and pipelining – Pipeline bubbles – Accessing external memory in RISC systems – Reducing the branch penalties – Branch prediction – The ARM processors – ARM registers – ARM instructions – The ARM built-in shift mechanism – ARM branch instructions – sequence control – Data movement and memory reference instructions – Real Time Applications of RISC and ARM.

Total Hours: 45

TEXT BOOK

1. Barry B.Brey, The Intel Microprocessors 8086/8088, 80, 86, 80286, 80386 80486, Pentium, Pentium Pro Processor, Pentium II, Pentium III, Pentium 4, Architecture, Programming and interfacing, Prentice Hall of India Private Limited, New Delhi, 2003. (UNIT I, II and III).

2. John Peatman, Design with Microcontroller McGraw Hill Publishing Co Ltd, New Delhi. (UNIT IV).
3. Alan Clements, “The principles of computer Hardware”, Oxford University Press, 3rd Edition, 2003. (UNIT V)

REFERENCE BOOKS

1. Rajkamal, The concepts and feature of micro controllers 68HC11, 8051 and 8096; S Chand Publishers, New Delhi.

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

UNIT I-INTRODUCTION TO PHOTONICS 9

Review of wave nature and particle nature of light, Interaction of light with matter emission and absorption of radiation. Review of optics- Reflection and refraction of plane waves; Fresnel's formulas, Interference and interferometers, Diffraction, Optical coherence, Polarization of light.

UNIT II-OPTICAL FIBER WAVEGUIDES, SOURCES AND DETECTORS 9

The propagation of light in optical waveguides, Classification of optical fibers, Single mode fiber, Material and Waveguide Dispersion, Dispersion shifted fiber, Signal Attenuation. Introduction to Non linear fiber optics. Laser Fundamentals: Stimulated and spontaneous Emission, Einstein relations, Optical feedback, threshold condition, Injection Laser Diode (ILD), Laser Modes. Photo detection, PIN and Avalanche Photo diode (APD), Quantum Efficiency, Responsivity and Speed of Response , Noise mechanism in photo detectors.

UNIT III-OPTICAL COMPONENTS AND SYSTEM DESIGN 9

Principle and Operation of couplers/splitters, WDM MUX/DEMUX - AWG, Isolators, Circulators, Fabry Perot Filters, Mach-Zehnder Interferometer, optical switches, EDFA, Semiconductor Optical Amplifier. Optical Link Design: Power penalty -Point- to- point links – System considerations – Link Power budget – Rise time budget.

UNIT IV-OPTICAL NETWORKS ARCHITECTURE 9

Optical network concepts – Topology – Metropolitan – Area Networks - SONET/SDH: – Optical specifications – SONET frame structure –Optical transport network - Broadcast and Select networks.

UNIT V-WDM NETWORK DESIGN 9

WDM network elements, WDM network design - Cost tradeoffs, virtual Topology design, Routing and wavelength assignment, statistical dimensioning models.

TEXT BOOKS

1) Rajiv Ramaswamy, Kumar N. Sivaranjan and Galen H. Sasaki, “Optical Networks – A practical perspective”, 3rd edition, Elsevier, 2010.
2) Keiser, “Optical Fiber Communication Systems”, 4th edition, Tata McGrawHill. Edition, 2010.
3) Joseph C.Palais “Fiber Optic Communications”, Fifth edition, Seventh impression, Pearson, 2012.
4) Djafar.K. Mynbaev Lowell and Scheiner, “Fiber Optic Communication Technology”, Sixth impression, Pearson Education Asia, 9th impression, 2011.

ELECTIVE	L	T	P	C
MODERN WIRELESS COMMUNICATION SYSTEMS	**3**	**0**	**0**	**3**

AIM:

To provide comprehensive background knowledge of wireless, mobile communication and to introduce all the most important wireless technologies

OBJECTIVES

- To discuss the fundamentals of cellular mobile wireless networks
- To provide an overview of various approaches to communication networks
- To study the numerous different-generation technologies with their individual pros and cons
- To discuss about the principles of operation of the different access technologies like FDMA, TDMA, SDMA and CDMA and their pros and cons.

UNIT I-TRANSMISSION FUNDAMENTALS 10

Cellphone Generations: 1G, 2G, 2.5G, 3G & 4G Transmission Fundamentals: Time domain & Frequency domain concepts, Radio, Analog Vs Digital, channel capacity, transmission media, carrier-based signaling, spread-spectrum signaling.

UNIT II-NETWORK CONCEPTS 12

Communication Networks: LANs, MANs, WANs, circuit switching, packet switching, ATM Cellular Networks: Cells, duplexing, multiplexing, voice coding Multiple Access Techniques: FDMA, TDMA, SDMA, CDMA, spectral efficiency.

UNIT III-PERSONAL COMMUNICATION SERVICES 8

GSM, HSCSD, GPRS, D-AMPS, CDMA One, CDMA Two, Packet Data Systems.

UNIT IV - 3G & BEYOND 7

IMT-2000, W-CDMA, CDMA 2000, EDGE, Wi-Fi, WiMAX, OFDM.

UNIT V-MOBILE DATA SERVICES & SHORT-RANGE NETWORKS 8

Mobile Data Services: Messaging, wireless web, WAP, site design Short-Range Wireless Networks: Unlicensed spectrum, WLANs, cordless telephony, IrDA, Bluetooth Smart Phones: Future phones, mobile OSs, smart phone applications.

TEXT BOOKS:

1. Andy Dornan, “The essential guide to wireless communications applications: from cellular systems to Wi-Fi”, 2nd Edition, Prentice Hall, 2002.
2. Misra, “Wireless Communications and Networks: 3G & Beyond”, Tata McGraw-Hill, 2009.

REFERENCE BOOKS:

1. Theodore S. Rappaport, “Wireless Communications: Principles and Practice”, 2nd Edition, Pearson Education, 2009. 2. William Stallings, “Wireless communications and networking”, Prentice Hall, 2002.

ELECTIVE	L	T	P	C
ROBOTICS AND AUTOMATION	**3**	**0**	**0**	**3**

AIM

To learn the fundamentals of Robotics and implementation aspects of real time concepts.

OBJECTIVES

- To learn about the Basic concepts of Robots
- To study the Sensor and Vision Systems.
- To learn the Grippers and robot dynamics.
- To know about kinematics and path planning.
- To learn about Robot Programming Languages and applications

UNIT I BASIC CONCEPTS 9

Origin & various generation of Robots - Robot definition - Robotics system components – Robot classification - Coordinate frames - Asimov's laws of robotics – degree of freedom – work volume - Need for Automation – types of automation – fixed, programmable and flexible automation.

UNIT II SENSORS AND VISION SYSTEM 9

Sensing - Range, proximity, position, velocity, acceleration, Touch, Force, Torque, Optical & laser sensors. Machine vision - Introduction, Image acquisition, Illumination Techniques, Image conversion, Cameras, Image processing and analysis – image data reduction – segmentation feature extraction – Object recognition.

UNIT III GRIPPERS AND ROBOT DYNAMICS 9

Introduction - various types of grippers-design considerations. Construction of Manipulator – Introduction to Robot - Dynamics – Lagrange formulation – Newton Euler formulation – Properties of robot dynamic equations.

UNIT IV KINEMATICS AND PATH PLANNING 9

Forward Kinematics – Denavit Hartenberg Representation. Inverse Kinematics – Geometric approach.

UNIT V PROGRAMMING LANGUAGES AND APPLICATIONS 9

Robot programming - Fixed instruction, sequence control, General programming language, Specific programming languages. Robots for welding, painting and assembly – Remote Controlled robots – Robots for nuclear, thermal and chemical plants.

Total Hours: 45

TEXT BOOKS:

1. Mikell P. Groover ,Weiss G.M. Nagel R.N. Odraj . N.G. , "Industrial Robotics", Tata Mc Graw Hill, 3rd Reprint, Edition 2008.
2. Deb.S.R. "Robotics Technology and flexible Automation", Tata Mc Graw Hill, 9th Reprint 2004.
3. K.S Fu, R C.Gonzalez, CSG Lee- "Robotics", McGraw Hill, Edition 2008.

REFERENCE BOOKS:

1. John J Craig "Introduction to Robotics Mechanics & control, Low price Edition, 7th Reprint, 2005.
2. Ghosh, "Control in Robotics and Automation : Sensor Based Integration", Allied Publishers.
3. Juan Manuel Ramos Arreguin, "Automation and Robotics", I-Tech Education and Publishing, 2008.

ELECTIVE	L	T	P	C
ADVANCED DIGITAL DESIGN	3	0	0	3

AIM:

Learning design of digital circuits is a fundamental necessity for designing embedded systems. This subject provides necessary instruments to achieve that goal.

OBJECTIVE:

To make the student learn: theory of logic and logic functions, design of digital circuits, and an introduction to VHDL language.

1. ADVANCED TOPICS IN BOOLEAN ALGEBRA 9

Shannon's expansion theorem, Conseusus theorem, Octal designation, Run measure, INHIBIT /
INCLUSION / AOI / Driver / Buffer gates, Gate expander, Reed Muller expansion, Synthesis of multiple output combinational logic circuits by product map method, Design of static hazard free and dynamic hazard free logic circuits.

2. THRESHOLD LOGIC 9

Linear seperability, Unateness, Physical implementation, Dual comparability, reduced functions, various theorems in threshold logic, Synthesis of single gate and multigate threshold Network.

3. SYMMETRIC FUNCTIONS 9

Elementary symmetric functions, partially symmetric and totally symmetric functions, Mc Cluskey decomposition method, Unity ratio symmetric ratio functions, Synthesis of symmetric function by contact networks.

4. SEQUENTIAL LOGIC CIRCUITS 9

Mealy machine, Moore machine, Trivial / Reversible / Isomorphic sequential machines, State diagrams,
State table minimization, Incompletely specified sequential machines, State assignments, Design of synchronous and asynchronous sequential logic circuits working in the fundamental mode and pulse mode, Essential hazards Unger's theorem.

5. PROGRAMMABLE LOGIC DEVICES 9

Basic concepts, Programming technologies, Programmable Logic Element (PLE), Programmable Logic Array (PLA), Programmable Array Logic (PAL), Structure of Standard PLD's, Complex PLD's (CPLD). System Design Using PLD's - Design of combinational and sequential circuits using PLD's, Programming PAL device using PALASM, Design of state machine using Algorithmic State Machines (ASM) chart as a design tool. Introduction To Field Programmable Gate Arrays - Types of FPGA, Xilinx XC3000 series, Logic Cell array (LCA), Configurable Logic Blocks (CLB) Input/Output Block (IOB)- Programmable Interconnect Point (PIP), Introduction to Actel ACT2 family and Xilinx XC4000 families, Design examples.

Total Hours: 45

Reference

1. William I. Fletcher, “An Engineering Approach to Digital Design" , Prentice Hall of India, 1996.
2. James E. Palmer, David E. Perlman, “Introduction to Digital Systems", Tata McGraw Hill, 1996.
3. N.N. Biswas, "Logic Design Theory", Prentice Hall of India, 1993.
4. S. Devadas, A. Ghosh and K. Keutzer, "Logic Synthesis", Mc Graw Hill, 1994.

ELECTIVE	L	T	P	C
ELECTROMAGNETIC INTERFERENCE & COMPATIBILITY	3	0	0	3

OBJECTIVES:

- To tutor the basics of EMI,EMC
- To instill knowledge on the EMI coupling mechanism and its mitigation techniques
- To impart comprehensive insight about the current EMC standards and about various measurement techniques

UNIT I INTRODUCTION 9

EMI-EMC Definitions- Prectical experiences and concerns- Frequency Spectrum Conservation- Celestial Electromagnetic Noise- Lightning Discharge- Electrostatic Discharge- Electromagnetic Pulse- Noise from Relays and Switches- Nonlinearities in circuits- Cross-talk in Transmission Lines- Transients in power supply lines- Electromagnetic interference.

UNIT II INTERFERENCE MEASUREMENT 9

Introduction to Radiated Interference measurement- Anechoic chamber- Transverse electromagnetic cell- Reverberating chamber- Giga-Hertz TEM cell-Comparison of test facilities- Introduction to Conducted Interference measurement- Characterization of conduction currents/voltages- Conducted EM noise on power supply lines- Conducted EMI from equipment.

UNIT III EMI FILTERS AND COMPONENTS 9

Introduction to EMI filters- Characteristics of filters- Power line filter design- Introduction to cables,connectors and components- EMI suppression cables- EMC connectors- EMC gaskets- Isolation transformer- Opto-isolators- Transient and surge suppression devices- EMI accessories.

UNIT IV SPECTRUM CONSERVATION AND EMC COMPUTER MODELING 9

Introduction to Frequency allocation and frequency assignment- Modulation techniques- Introduction to spectrum conservation- Introduction to EMC computer modeling and simulation- EMC analysis of complex systems- Illustrating an automated system level EMC analysis procedure- Future of EMC computer modeling and simulation.

UNIT V SIGNAL INTEGRITY AND EMC STANDARDS 9

Introduction to signal integrity- SI problems and analysis- SI issues in design- Modeling and simulation- Introduction to standards for EMI- MIL-STD-461/462- IEEE/ANSI standards- CISPR/IEC standards- CISPR/IEC standards- FCC regulations- British standards- VDE standards- Euro norms- EMI/EMC standards in japan- Performance standards and comparisons

TOTAL HOURS: 45

TEXT BOOK:

1. Prasad Kodali.V, “Engineering Electromagetic Compatability”, Second Edition, Wiley India Pvt.Ltd.

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

AIM:

To learn the VLSI Signal Processing Techniques.

OBJECTIVE:

- v To study about Iteration Bound and parallel processing
- v To study about Retiming and Unfolding
- v To study about Systolic Architecture Design
- v To study about Scaling and Lattice Filter
- v 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-Normalized 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:

5. 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.
2. S.Y. Kung,H.J. white house, T. kailath , “VLSI and Modern Signal processing” ,Prentice Hall , 1985.
3. Jose E. france , Yannis Tisividis , “Design of analog digital VLSI circuits for Telecommunication and signal Processing “ ,Prentice hall ,1994 .

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

UNIT I – 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.

UNIT II – 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.

UNIT III – 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.

UNIT IV – 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.

UNIT V – QUALITY SYSTEMS 9

Need for ISO 9000 and other quality systems – ISO 9000:2000 Quality system – Elements – Implementation of quality system – Documentation – Quality auditing – TS 16949 – ISO 14000 –Concept – Requirements and benefits.

Total Hours: 45

TEXT BOOKS

1. Besterfiled, D.H. “Total Quality Management”, Pearson Education, Inc. 2003.
2. Zeiri., “Total Quality Management for Engineers”, Wood Head Publishers, 1991.

REFERENCES

1. Evans, J. R., and Lidsay, W.M., “The Management and Control of Quality”, 5th Edition, South-Western (Thomson Learning), 2002.
2. Oakland.J.S. “Total Quality Management”, Butterworth – Hcinemann Ltd., Oxford, 1989.
3. Narayana V. and Sreenivasan, N.S., “Quality Management – Concepts and Tasks”, New Age International, 1996.

ELECTIVE	L	T	P	C
MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS	3	0	0	3

UNIT - I Introduction to Managerial Economics 9

Definition, Meaning, Nature and Scope Managerial Economics-Demand Analysis: Demand Determinants, Law of Demand and its exceptions. Definition, Types, Measurement and Significance of Elasticity of Demand. Demand Forecasting, Factors governing demand forecasting, methods of demand forecasting.

UNIT - II Theory of Production and Cost Analysis 10

Production Function, Laws of Returns, Internal and External Economies of Scale. Cost Analysis: Cost concepts, Opportunity cost, Fixed Vs Variable costs, Explicit costs Vs Implicit costs, Out of pocket costs vs. Imputed costs. Break-even Analysis (BEA) - Determination of Break-Even Point (simple problems) - Managerial Significance and limitations of BEA.

UNIT III Introduction to Markets & Pricing strategies 8

Market structures: Types of competition, Features of Perfect competition, Monopoly and Monopolistic Competition. Price-Output Determination in case of Perfect Competition and Monopoly. Pricing Strategies

UNIT IV Capital and Capital Budgeting 9

Capital and its significance, Types of Capital, Estimation of Fixed and Working capital requirements, Methods and sources of raising finance. Nature and scope of capital budgeting, features of capital budgeting proposals, Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR) and Net Present Value Method (only theory)

UNIT V Introduction to Financial Accounting & Ratios 9

Introduction to Double-Entry Book Keeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments only). Computation, Analysis and Interpretation of Liquidity Ratios (Current Ratio and quick ratio), Activity Ratios (Inventory turnover ratio and Debtor Turnover ratio), Capital structure Ratios (Debt-Equity ratio, Interest Coverage ratio), and Profitability ratios (Gross Profit Ratio, Net Profit ratio, Operating Ratio, P/E Ratio and EPS).

TOTAL HOURS: 45

TEXT BOOK

1. A R Aryasri: Managerial Economics and Financial Analysis, Tata Mc Graw Hill, 2006
2. Varshney & Maheswari: Managerial Economics, Sultan Chand, 2003.

REFERENCES

1. Ambrish Gupta, Financial Accounting for Management, Pearson Education, New Delhi, 2004.
2. Domnick Salvatore: Managerial Economics In a Global Economy, 4th Edition, Thomson, 2003.
3. Narayanaswamy: Financial Accounting-A Managerial Perspective, Prienceton Hall of India, 2005

ELECTIVE	L	T	P	C
NANOTECHNOLOGY	**3**	**0**	**0**	**3**

AIM:

This course is offered to students to gain basic knowledge on Nano electronics and various fabrication techniques involved in Nano science.

OBJECTIVE:

- To Know basic concepts in Nanotechnology
- To learn the Fundamental of Nano electronics
- To learn the silicon MOSFET and Quantum Transport Devices
- To learn the fabrication of Carbon Nanotubes
- To study about the Molecular Electronics in Nanotechnology

UNIT I INTRODUCTION TO NANOTECHNOLOGY 9

Background to nanotechnology: Types of nanotechnology and nanomachines – periodic table – atomic structure – molecules and phases – energy – molecular and atomic size – surface and dimensional space – top down and bottom up; Molecular Nanotechnology: Electron microscope – scanning electron microscope – atomic force microscope – scanning tunnelling microscope – nanomanipulator – nanotweezers – atom manipulation – nano dots – self assembly – dip pen nanolithography. Nanomaterials: preparation– plasma arcing – chemical vapor deposition – sol-gels – electrodeposition – ball milling – applications of nanomaterials;

UNIT II FUNDAMENTALS OF NANOELECTRONICS 9

Fundamentals of logic devices:- Requirements – dynamic properties – threshold gates; physical limits to computations; concepts of logic devices:- classifications – two terminal devices – field effect devices – coulomb blockade devices – spintronics – quantum cellular automata – quantum computing – DNA computer; performance of information processing systems;- basic binary operations, measure of performance processing capability of biological neurons – performance estimation for the human brain. Ultimate computation:- power dissipation limit – dissipation in reversible computation – the ultimate computer.

UNIT III SILICON MOSFETS& QUANTUM TRANSPORT DEVICES 9

Silicon MOSFETS - Novel materials and alternate concepts:- fundamentals of MOSFET Devices- scaling rules – silicon-dioxide based gate dielectrics – metal gates – junctions & contacts – advanced MOSFET concepts. Quantum transport devices based on resonant tunneling, Electron tunneling – resonant tunneling diodes – resonant tunneling devices; Single electron devices for logic applications:- Single electron devices – applications of single electron devices to logic circuits.

UNIT IV CARBON NANOTUBES 9

Carbon Nanotube: Fullerenes - types of nano tubes – formation of nano tubes – assemblies – purification of carbon nanotubes – electronic propertics – synthesis of carbon nanotubes – carbon nanotube interconnects – carbon nanotube FETs – Nanotube for memory applications – prospects of all carbon nanotube nanoelectronics.

UNIT V MOLECULAR ELECTRONICS 9

Electrodes & contacts – functions – molecular electronic devices – first test systems – simulation and circuit design – fabrication; Future applications: MEMS – robots – random access memory – mass storage devices.

TOTAL HOURS: 45

TEXTB OOKS

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
PROGRAMMABLE LOGIC CONTROLLER	3	0	0	3

AIM

To learn about Programmable logic Controllers.

OBJECTIVES

- To study about programmble logic.
- To study about PLCs and operation of PLC
- To study about PLC programming.
- To study about Timers and counters
- To get an idea about PLC applications

UNIT I PROGRAMMABLE LOGIC 9

Programmable logic introduction, Programmbale logic structures, Programmbale Logic Arrays (PLAs), Programmable Arrary Logic (PALs). Field Programmable Gate Array(FPGA). Sequential network design with Programmable logic devices. Design of sequential networks using ROMs and PLAs. Traffic light controller using PAL.

UNIT II PROGRAMMABLE LOGIC CONTROLLERS (PLCS) 9

Programmable Logic Controller. Introduction part of PLC- Principles of operation. PLC sizes, PLC hardware components, I/O section, Analog I/O section, Analog I/O modules, digital I/O modules. CPU, Processor memory module, Programming devices, Diagnostics of PLCs with computers.

UNIT III PLC PROGRAMMING 9

PLC programming, simple instructions, Programming EXAMINE ON and EXAMINE OFF instructions , Electromagnetic control relays, Motor starters, Manually operated switchs, Mechanically operated and proximity switches, Output control devices, Latching relays, PLC ladder diagram, Converting simple relay ladder diagram into PLC relay ladder diagram.

UNIT V TIMERS 9

Timer instructions, ON DELAY timer and OFF DELAY timer , counter instructions, UP/DOWN counters, Timer and counter applications, Program control instructions, Data manipulating instructions, math instructions.

UNIT V APPLICATIONS OF PLC 9

Automatic control of warehouse door, Automatic lubricating oil supplier, Conveyor belt motor control, Automatic car washing machine, Bottle label detection, Process control applications.

TOTAL HOURS : 45

TEXT BOOKS:

1. Charles H. Roth, Jr “Fundamentals of Logic Design”, 4th edition, Jaico publishing house, 1999
2. Frank D. Petruzella, “Programmable Logic Controllers”, McGraw Hill book company, 1989.

REFERENCE BOOKS:

1. William I. Fletcher, “ An Engineering Approach to Digital Design” Prentice Hall of India Ltd., New Delhi, 1999

ELECTIVE	L	T	P	C
MICRO ELECTRO MECHANICAL SYSTEMS	3	0	0	3

AIM

To students to gain basic knowledge on MEMS (Micro Electro Mechanical System). This enables them to design, analyze, fabricate and test the MEMS based components.

OBJECTIVES

- Introduction to MEMS.
- To study the Mechanics for MEMS Design.
- To study Electro Static Design and System Issues.
- To know various MEMS Applications

UNIT I INTRODUCTION TO MEMS 9

MEMS and Microsystems, Typical products of MEMS and Microsystem products, Micro sensors, Micro actuator, Evolution of Micro fabrication, Microsystems and Microelectronics, MEMS materials.

UNIT II PRINCIPLES OF MICROSYTEMS 9

Micro sensors- Acoustic wave sensors, Biomedical Sensors and Biosensors, Optical Sensors, Pressure sensors, Micro actuation- Actuation using Thermal Forces, Piezoelectric Crystals, Electrostatic Forces, MEMS with Micro actuators- Micro grippers , Micro motors , Micro valves , Micro accelerometers

UNIT III MICROMACHINING 9

Introduction, Photolithography, Bulk Micromachining, Thin Film Deposition, Etching, surface Micromachining, LIGA

UNIT IV MICRO-OPTO-ELECTROMECHANICAL SYSTEMS 9

Fundamental Principle of MOEMS Technology, Review Properties of Light, Light Modulators, Beam Spliotter, Micro lens, Micro mirrors, Digital Micro mirror Device(DMD),Light Detectors, Grating Light Valve, Optical Switch

UNIT V MEMS APPLICATION 9

Application – Health Care, Micro fluid Dispenser, Micro needle, Micro pumps, Chem-Lab-On-A-Chip(CLOC), E-Nose, DNA sensors, Surface Acoustic Wave(SAW) Sensors.

TOTAL HOURS: 45

TEXT BOOKS:

1. Tai Ran Hsu," MEMS & Micro systems Design and Manufacture" Tata McGraw Hill, New Delhi, 2002. Liu,"MEMS", Pearson education, 2000(Unit-I,II)
2. N. P. Mahalik, "MEMS",Tata McGraw hill, Sixth reprint, 2012.(Unit-III,IV,V)

REFERENCE BOOKS:

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. Stephen Santeria," Microsystems Design", Kluwer publishers, 2000.

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

AIM

To provide adequate knowledge in Electrical and electronic measurements and instrumentation

OBJECTIVES

- To make the students to gain a clear knowledge of the fundamental elements of an instrument and static and dynamic characteristics.
- Emphasis is laid on the meters used to measure current & voltage and instrument transformers.
- To have an adequate knowledge in the measurement techniques for power and energy meters are included.
- To have basic knowledge about output display devices.
- Elaborate discussion about transducer and its classification.

UNIT I -INTRODUCTION 6

Functional elements of an instrument - static and dynamic characteristics – errors in measurement - statistical evaluation of measurement data - standard and calibration.

UNIT II-ELECTRICAL AND ELECTRONICS INSTRUMENTS 12

Principle and types analog and digital ammeters and voltmeters – single and three phase Wattmeters and Energy meter– instrument transformers – instruments for measurement of frequency and phase.

UNIT III -SIGNAL CONDITIONING CIRCUITS 9

Bridge circuits – differential and Instrumentation amplifiers - filter circuits - V/f and f/V converters – A/D and D/A converters - multiplexing and demultiplexing - data acquisition systems – grounding techniques.

UNIT IV -STORAGE AND DISPLAY DEVICES 8

Magnetic disc and tape recorders – digital plotters and printers – CRT displays – digital CRO – LED, LCD and Dot matrix displays. Data Logger

UNIT V - TRANSDUCERS 10

Classification of transducers – selection of transducers – resistive, capacitive and inductive transducers – piezo electric transducers – optical and digital transducers. - transducers for measurement of displacement, temperature, level, flows, pressure, velocity, torque, speed. Smart sensor.

Total Hours = 45

TEXT BOOKS

1. Doebeling, E.O., 'Measurement Systems – Application and Design', McGraw Hill Publishing Company, 1990.
2. H.S. Kalsi, ‘Electornic Instrumentation’, TMH Co., 1995.

REFERENCES

1. John P. Bentley, ‘Principles of Measurement Systems’, III Edition, Pearson Education, 2000.
2. Stout M.B., 'Basic Electrical Measurement', Prentice Hall of India, 1986.
3. Dalley, J.W., Riley, W.F. and Meconnel, K.G., 'Instrumentation for Engineering Measurement', John Wiley & Sons, 1993
4. Moorthy, D.V.S., 'Transducers and Instrumentation', Prentice Hall of India Pvt. Ltd., 1995.

ELECTIVE	L	T	P	C
COMPUTER ORGANISATION & ARCHITECTURE	3	0	0	3

AIM:

To study the internal organization and the architecture of computer.

OBJECTIVE:

- To learn about the design of the processors.
- To learn about the data transfer

UNIT I: INTRODUCTION 9

Computer Organization- Main memory – CPU operation – Interrupt concept – I/ O techniques – Bus concept – Computer performance factors – System performance measurement- High performance techniques – Comparison of Architecture and Organization – Study of Salient features and architectures of Advanced processors (80286, 80386, 80486, Pentium)

UNIT II: PROCESSOR DESIGN AND CONTROL UNIT 9

Goals – Design process –Data path organization – Main memory interface – Data path for single instructions- Floating point unit data path – Role of control unit – Reset sequence – Interrupt recognition and servicing – Abnormal situation handling – Hardwired control unit – Micro programmed control unit

UNIT III: MEMORY DESIGN & MEMORY MANAGEMENT 9

Memory types – Functional and usage modes – Memory allocation- Multiple memory decoding – Memory hierarchy – Instruction pre fetch – Memory interleaving – Write buffer – Cache memory –Virtual memory – Associative memory

UNIT IV: INTRA SYSTEM COMMUNICATION AND I/O 9

I/O controller & driver- Case study : Hard disk controller in IBM PC – I /O ports and bus concepts – Case study : Keyboard interface – Bus cycle – Asynchronous and Synchronous Transfer – Interrupt handling in PC – I/O techniques in PC – Case Study : RS 232 interface – Modern serial I/O interface – Bus arbitration techniques – Hard disk interface in PC

UNIT V: ADVANCED ARCHITECTURE 9

Classification of parallelism – Multiple functional units – Pipelining – Vector computing – array processors – High performance architecture – RISC systems – Super scalar architecture – VLIW architecture – EPIC architecture – Multiprocessor systems – Cache coherence problem – Fault tolerance

TOTAL HOURS: 45

TEXT BOOKS

1. B.Govindarajulu, " Computer Architecture and Organization – Design principles and applications" , Tata McGrawHill publications, New Delhi
2. Carl Hamacher, Zvonko Vranesic And Safwat Zaky, "Computer Organization", Fifth Edition,Tata Mcgraw Hill, 2002.

REFERENCE BOOKS

1. William Stallings, "Computer Organization And Architecture – Designing For Performance", Sixth Edition, Pearson Education, 2003.
2. David A. Patterson And John L. Hennessy, "Computer Organization And Design: The Hardware/Software Interface", Second Edition, Morgan Kaufmann, 2002.
3. John P. Hayes, "Computer Architecture And Organization", Third Edition, Tata McGraw Hill, 1998.
4. A.K.Ray & K.M.Bhurchandi, "Advanced Microprocessors and peripherals- Architectures, Programming and Interfacing", TMH, 2002 reprint.

ELECTIVE	L	T	P	C
NEURAL NETWORK & FUZZY CONTROL	3	0	0	3

AIM:

To learn the basic concepts of Neural Networks & Fuzzy Logic and learn to design and use them for biomedical applications

OBJECTIVES

- To understand the basic concepts of artificial neural networks
- To study the various ANN Models
- To familiarize about the Self organizing maps and competitive networks
- To study the basic concepts of fuzzy Logic systems
- To apply the concepts of ANN and Fuzzy Logic in Biomedical applications

UNIT I - ARTIFICIAL NEURAL NETWORKS-AN OVERVIEW 9

Neural Networks Basics-Biological Neural nets, Processing elements-Mc Culloh Pitts Model, Types of Learning, Network Parameters-Weights, Activation, Threshold Functions, Hebb Rule, Delta Rule, Perception learning Algorithm.

UNIT II - ANN MODELS 9

Mapping, training of Feed forward networks-Perception, Mapping, training of Recurrent Networks-Hopfield Network, Radial Basis Function Network, Training of Feed Forward Back Propagation Network, Applications of BPN-Implementation of neural models

UNIT III - SELF ORGANIZING MAPS (SOM) 9

Self-organizing maps-Pattern clustering, SOM-Topological Mapping, Kohonen"s SOM, K-means clustering algorithm, competitive models-Min, Max Net, Adaptive Resonance Theory (ART)-Introduction, Network and Processing in ART, Associative memory model, Implementation of SOM using soft computing tools.

UNIT IV - INTRODUCTION TO FUZZY LOGIC 9

Fuzzy logic-Basic concepts -Fuzzy Vs Crisp set, Linguistic variables, Membership functions, Fuzzy IF-THEN rules, Variable inference techniques, De-fuzzification techniques, Basic fuzzy inference algorithm,. Implementation

UNIT V - NEURAL NETWORK AND FUZZY LOGICAPPLICATIONS IN MEDICINE 9

Neural Networks in Biomedical Applications, Cancer, Cardiovascular Applications, Medical Image Analysis using neural networks, Image Analysis –Case Study, Fuzzy Logic Applications, Fuzzy Logic Controller, Neuro fuzzy systems- Applications in medicine

Total Hours:45

TEXT BOOKS

1. Mohamad H, Hassoun, "*Fundamentals of Artificial Neural Network"*, Cambridge, The MIT Press, First edition, 1995.
2. Laurene Fausett, "*Fundamentals of Neural Networks: Architectures, Algorithms, and Applications",* Pearson Education India, Third edition, 2008.

REFERENCE BOOKS

1. Bishop C M, "*Pattern Recognition and Machine Learning",* Springer-Verlag, 2006.
2. Timothy J, Ross, "*Fuzzy Logic with Engineering Applications",* John Wiley and Sons, Second edition, 1995.
3. Yegnanarayana B, "*Artificial Neural Networks"*, Prentice Hall of India, Third edition 2006.

ELECTIVE	L	T	P	C
ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS	3	0	0	3

AIM:
To represent the concepts of intelligent agents, search techniques, knowledge, reasoning and planning and applications in expert systems.

OBJECTIVE

- To study the ideas of intelligent agents and search methods.
- To study about knowledge representation.
- To study about planning and learning methodologies.
- To construct plans and methods for designing controllers.
- To study the concepts of expert systems

UNIT I –INTRODUCTION TO ARTIFICIAL INTELLIGENC 8
Overview of AI – History and developments in AI – general concepts – production systems and examples – Intelligent agents – Perception – Introduction to natural language processing.

UNIT II – SEARCHSTRATEGIES AND ALGORITHMS. 9
Structures and strategies for state space search – Data and Goal driven search – search techniques– BFS, DFS, DFS with iterative deepening, best first search and Heuristic search – A* algorithm – AO* algorithm – constraint satisfaction.

UNIT III – KNOWLEDGE REPRESENTATION AND REASONING. 10
Representing knowledge – propositional calculus – predicate calculus – AI representational schemes – semantic networks, conceptual dependency, scripts and frames – theorem proving by resolution refutation –Basic probability notation – Axioms of probability – Baye's rule – Probabilistic reasoning.

UNIT IV – PLANNING AND LEARNING 10
Planning: Planning problem – Partial order planning – Planning and acting in non- deterministic domains – Learning: Learning decision trees – Knowledge in learning – Neural networks – basic architectures and types – Reinforcement learning – Passive and active.

UNIT V – EXPERT SYSTEMS 8
Definition – Features of an expert system – Organization – Characteristics – Prospector – Knowledge Representation in expert systems – Expert system tools – MYCIN – EMYCIN.

TEXT BOOKS

1. George. F, Luger, "Artificial Intelligence – Structures and Strategies for Complex Problem Solving", Fourth Edition, Pearson Education, 2002.
2. Elain Rich and Kevin Knight, "Artificial Intelligence", Second Edition Tata McGraw Hill, 2004.

REFERENCE BOOKS

1. Stuart Russel and Peter Norvig, "Artificial Intelligence - A Modern Approach", Second Edition, Pearson Education, 2003.
2. Donald. A, Waterman, "A Guide to Expert Systems", Pearson Education.2009.
3. Oliver Pourret, PatrikNaim and Bruce Marcot, "Bayesian Networks-A Practical guide to applications", 2008.

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

AIM

To Study about Grid and Cloud Computing.

OBJECTIVES

- Understand how Grid computing helps in solving large scale scientific problems.
- Gain knowledge on the concept of virtualization that is fundamental to cloud computing.
- Learn how to program the grid and the cloud.
- Understand the security issues in the grid and the cloud environment.

UNIT I INTRODUCTION 9

Evolution of Distributed computing: Scalable computing over the Internet – Technologies for network based systems – clusters of cooperative computers - Grid computing Infrastructures – cloud computing - service oriented architecture – Introduction to Grid Architecture and standards – Elements of Grid – Overview of Grid Architecture.

UNIT II GRID SERVICES 9

Introduction to Open Grid Services Architecture (OGSA) – Motivation – Functionality Requirements – Practical & Detailed view of OGSA/OGSI – Data intensive grid service models – OGSA services.

UNIT III VIRTUALIZATION 9

Cloud deployment models: public, private, hybrid, community – Categories of cloud computing: Everything as a service: Infrastructure, platform, software - Pros and Cons of cloud computing – Implementation levels of virtualization – virtualization structure – virtualization of CPU, Memory and I/O devices – virtual clusters and Resource Management – Virtualization for data center automation.

UNIT IV PROGRAMMING MODEL 9

Open source grid middleware packages – Globus Toolkit (GT4) Architecture , Configuration – Usage of Globus – Main components and Programming model - Introduction to Hadoop Framework - Mapreduce, Input splitting, map and reduce functions, specifying input and output parameters, configuring and unning a job – Design of Hadoop file system, HDFS concepts, command line and java interface, dataflow of File read & File write.

UNIT V SECURITY 9

Trust models for Grid security environment – Authentication and Authorization methods – Grid security infrastructure – Cloud Infrastructure security: network, host and application level – aspects of data security, provider data and its security, Identity and access management architecture, IAM practices in the cloud, SaaS, PaaS, IaaS availability in the cloud, Key privacy issues in the cloud.

TOTAL HOURS: 45

TEXT BOOKS:

1. Kai Hwang, Geoffery C. Fox and Jack J. Dongarra, "Distributed and Cloud Computing: Clusters, Grids, Clouds and the Future of Internet", First Edition, Morgan Kaufman Publisher, an Imprint of Elsevier, 2012.

REFERENCES

1. Jason Venner, “Pro Hadoop- Build Scalable, Distributed Applications in the Cloud”, A Press, 2009
2. Tom White, “Hadoop The Definitive Guide”, First Edition. O’Reilly, 2009.
3. Bart Jacob (Editor), “Introduction to Grid Computing”, IBM Red Books, Vervante, 2005
4. Ian Foster, Carl Kesselman, “The Grid: Blueprint for a New Computing Infrastructure”, 2nd Edition, Morgan Kaufmann.
5. Frederic Magoules and Jie Pan, “Introduction to Grid Computing” CRC Press, 2009.
6. Daniel Minoli, “A Networking Approach to Grid Computing”, John Wiley Publication, 2005.
7. Barry Wilkinson, “Grid Computing: Techniques and Applications”, Chapman and Hall, CRC, Taylor and Francis Group, 2010.

ELECTIVE	L	T	P	C
INFORMATION SECURITY	3	0	0	3

AIM

To study the critical need for ensuring Information Security in Organizations

OBJECTIVES

- To understand the basics of Information Security
- To know the legal, ethical and professional issues in Information Security
- To know the aspects of risk management
- To become aware of various standards in this area
- To know the technological aspects of Information Security

UNIT 1 INTRODUCTION 9

History, What is Information Security?, Critical Characteristics of Information, NSTISSC Security Model, Components of an Information System, Securing the Components, Balancing Security and Access, The SDLC, The Security SDLC

UNIT II SECURITY INVESTIGATION 9

Need for Security, Business Needs, Threats, Attacks, Legal, Ethical and Professional Issues

UNIT III SECURITY ANALYSIS 9

Risk Management: Identifying and Assessing Risk, Assessing and Controlling Risk

UNIT IV LOGICAL DESIGN 9

Blueprint for Security, Information Security Poicy, Standards and Practices, ISO 17799/BS 7799, NIST Models, VISA International Security Model, Design of Security Architecture, Planning for Continuity

UNIT V PHYSICAL DESIGN 9

Security Technology, IDS, Scanning and Analysis Tools, Cryptography, Access Control Devices, Physical Security, Security and Personnel

TOTAL HOURS: 45

TEXT BOOK

1. Michael E Whitman and Herbert J Mattord, “Principles of Information Security”, Vikas Publishing House, New Delhi, 2003

REFERENCE BOOKS

1. Micki Krause, Harold F. Tipton, “ Handbook of Information Security Management”, Vol 1-3 CRC Press LLC, 2004.
2. Stuart Mc Clure, Joel Scrambray, George Kurtz, “Hacking Exposed”, Tata McGraw-Hill, 2003
3. Matt Bishop, “ Computer Security Art and Science”, Pearson/PHI, 2002.

ELECTIVE	L	T	P	C
CYBER SECURITY	**3**	**0**	**0**	**3**

AIM

To study the critical need for ensuring Cyber Security in real time problems

OBJECTIVES

- To understand the basics of Cyber Security
- To know the legal, ethical and professional issues in Cyber Security
- To know the various attacker techniques

UNIT I CYBER SECURITY FUNDAMENTALS 9

Network and security concepts – basic cryptography – Symmetric encryption – Public key Encryption – DNS – Firewalls – Virtualization – Radio Frequency Identification – Microsoft Windows security Principles.

UNIT II ATTACKER TECHNIQUES AND MOTIVATIONS 9

Antiforensics – Tunneling techniques – Fraud Techniques - Threat Infrastructure.

UNIT III EXPLOITATION 9

Techniques to gain a foot hold – Misdirection, Reconnaissance, and disruption methods.

UNIT IV MALICIOUS CODE 9

Self Replication Malicious code – Evading Detection and Elevating privileges – Stealing Information and Exploitation.

UNIT V DEFENSE AND ANALYSIS TECHNIQUES 9

Memory Forensics – Honeypots – Malicious code naming – Automated malicious code analysis systems – Intrusion detection systems – Defense special file investigation tools.

TEXT BOOK

1. James Graham, Richard Howard and Ryan Olson, “Cyber Security Essentials”, CRC Press, Taylor & Francis Group, 2011.

REFERENCE BOOKS

1. By Dan Shoemaker, Ph.D., William Arthur Conklin, Wm Arthur Conklin, “Cybersecurity: The Essential Body of Knowledge**”,** Cengage Learning, 2012.

2. Ali Jahangiri, “Live Hacking: The Ultimate Guide to hacking Techniques & Counter measures for Ethical Hackers & IT Security Experts”, 2009.

ELECTIVE	L	T	P	C
GLOBAL POSITIONING SYSTEM	**3**	**0**	**0**	**3**

AIM:

To impart the knowledge on basic functioning of GPS and its calibration.

OBJECTIVE:

- To understand Global Positioning systems
- To analyse and calibrate GPS devices
- To learn about various types of communication in GPS

Unit – I: Overview of GPS **9**

Basic concept, system architecture, space segment, user segment, GPS aided Geo-augmented navigation (GAGAN) architecture.

Unit II GPS Signals **9**

Signal structure, anti spoofing (AS), selective availability, Difference between GPS and GALILEO satellite construction.

Unit III GPS coordinate frames **9**

Time references: Geodetic and Geo centric coordinate systems, ECEF coordinates, world geodetic 1984 (WGS 84), GPS time.

Unit IV GPS orbits and satellite position determination **9**

GPS orbital parameters, description of receiver independent exchange format (RINEX) – Observation data and navigation message data parameters, GPS position determination.

Unit V GPS Errors **9**

GPS error sources – clock error, ionospheric error, tropospheric error, multipath, ionospheric error estimation using dual frequency GPS receiver.

Total Hours: 45

TEXTBOOKS:

1. G S RAO, Global Navigation Satellite Systems, McGraw-Hill publications, New Delhi, 2010

REFERENCE BOOKS:

2. B. Hoffman – Wellenhof, H. Liehtenegger and J. Collins, 'GPS – Theory and Practice', Springer – Wien, New York (2001).
3. James Ba – Yen Tsui, 'Fundamentals of GPS receivers – A software approach', John Wiley & Sons (2001).

INDUSTRIAL ELECTIVE	L	T	P	C
BUSINESS INTELLIGENCE AND ITS APPLICATIONS	3	0	0	3

AIM

To learn about the building up of a successful BI strategy.

OBJECTIVES

- Introduce students to various business intelligence concepts
- To learn the concepts of data integration
- To introduce enterprise reporting

UNIT-I INTRODUCTION TO BUSINESS INTELLLIGENCE 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 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 - V BI 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 HOURS: 45

TEXT BOOKS

1.RN Prasad, Seema Acharya, ”Fundamentals Of Business Analytics” Wiley India,2011

REFERENCES

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
SOFT SKILLS	3	0	0	3

ELECTIVE	L	T	P	C
LEARNING IT ESSENTIALS BY DOING	**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.

TOTAL: 45 PERIODS