ANNA UNIVERSITY, CHENNAI 600 025

UNIVERSITY DEPARTMENTS

R- 2013

B.E. (PART TIME) ELECTRONICS AND COMMUNICATION ENGINEERING

I – VII SEMESTERS CURRICULUM AND SYLLABUS

SEMESTER I

S.NO	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1.	PTMA8151	Applied Mathematics	3	0	0	3
2.	PTPH8152	Physics for Electrical and Electronics Engineering	3	0	0	3
3.	PTCY8151	Chemistry for Electrical and Electronics Engineering	3	0	0	3
4.	PTEC8101	Circuit Theory	3	0	0	3
5.	PTEC8102	Electronic Devices	3	0	0	3
		TOTAL	**15**	**0**	**0**	**15**

SEMESTER II

S.NO.	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1.	PTEC8201	Digital Electronics and System Design	3	0	0	3
2.	PTEC8202	Electronic Circuits – I	3	0	0	3
3.	PTEC8203	Signals and Systems	3	0	0	3
4.	PTMA8253	Transforms and Partial Differential Equations	3	0	0	3
PRACTICAL						
5.	PTEC8211	Electronic circuits – I Laboratory	0	0	3	2
		TOTAL	**12**	**0**	**3**	**14**

SEMESTER III

S.NO.	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1.	PTEC8301	Communication Theory	3	0	0	3
2.	PTEC8302	Electromagnetic Fields and Waves	3	0	0	3
3.	PTEC8303	Electronic Circuits – II	3	0	0	3
4.	PTEC8304	Operational Amplifiers and Analog Integrated Circuits	3	0	0	3
PRACTICAL						
5.	PTEC8311	Electronic circuits – II Laboratory	0	0	3	2
		TOTAL	**12**	**0**	**3**	**14**

SEMESTER IV

S.NO.	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1.	PTEC8401	Digital Communication Techniques	3	0	0	3
2.	PTEC8402	Discrete Time Signal Processing	3	0	0	3
3.	PTEC8403	Microprocessor and Microcontrollers	3	0	0	3
4.	PTEC8404	Transmission Lines and Wave Guides	3	0	0	3
PRACTICAL						
5.	PTEC8411	Communication Systems Laboratory	0	0	3	2
		TOTAL	**12**	**0**	**3**	**14**

SEMESTER V

S.NO.	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1.	PTEC8501	Antennas and Wave Propagation	3	0	0	3
2.	PTEC8502	Communication Networks	3	0	0	3
3.	PTEC8503	Digital VLSI	3	0	0	3
4.	E1	Elective I	3	0	0	3
PRACTICAL						
5.	PTEC8511	VLSI Design Laboratory	0	0	3	2
		TOTAL	**12**	**0**	**3**	**14**

SEMESTER VI

S.NO.	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1.	PTEC8601	Optical Communication	3	0	0	3
2.	PTEC8602	Wireless Communication	3	0	0	3
3.	E2	Elective II	3	0	0	3
4.	E3	Elective III	3	0	0	3
PRACTICAL						
5.	PTEC8611	High frequency Communication Laboratory	0	0	3	2
		TOTAL	**12**	**0**	**3**	**14**

SEMESTER VII

S.NO.	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1.	PTMG8551	Principles of Management	3	0	0	3
2.	E4	Elective – IV	3	0	0	3
3.	E5	Elective – V	3	0	0	3
PRACTICALS						
4.	PTEC8711	Project Work	0	0	9	6
		TOTAL	**9**	**0**	**9**	**15**

TOTAL NO OF CREDITS: 100

ELECTIVES

COURSE CODE	COURSE TITLE	L	T	P	C
PTCS8351	Operating System	3	0	0	3
PTEC8001	Advanced Digital Signal Processing	3	0	0	3
PTEC8002	Advanced Microcontrollers	3	0	0	3
PTEC8003	Advanced Wireless Communication	3	0	0	3
PTEC8004	Avionics	3	0	0	3
PTEC8005	CAD for VLSI	3	0	0	3
PTEC8006	CMOS Analog IC Design I	3	0	0	3
PTEC8007	CMOS Analog IC Design II	3	0	0	3
PTEC8008	Cognitive Radio Communication	3	0	0	3
PTEC8009	Cryptography and Network Security	3	0	0	3
PTEC8010	Digital Control Engineering	3	0	0	3
PTEC8011	Digital Switching and Transmission	3	0	0	3
PTEC8012	Electro Magnetic Interference and Compatibility	3	0	0	3
PTEC8013	Embedded and Real-time Systems	3	0	0	3
PTEC8014	Foundations for Nano-Electronics	3	0	0	3
PTEC8015	Information Theory	3	0	0	3
PTEC8016	Internet and Java	3	0	0	3
PTEC8017	Measurements and Instrumentation	3	0	0	3
PTEC8018	Medical Electronics	3	0	0	3
PTEC8019	Microwave Engineering	3	0	0	3
PTEC8020	Multimedia Compression and Communication	3	0	0	3
PTEC8021	Parallel and Distributed processing	3	0	0	3
PTEC8022	Principles of Digital Image Processing	3	0	0	3
PTEC8023	RF Microelectronics	3	0	0	3
PTEC8024	Robotics	3	0	0	3
PTEC8025	Satellite Communication	3	0	0	3
PTEC8026	Soft Computing and Applications	3	0	0	3
PTEC8027	Speech Processing	3	0	0	3
PTEC8028	VLSI Signal Processing	3	0	0	3
PTEC8029	Wireless Networks	3	0	0	3
PTGE8551	Engineering Ethics and Human Values	3	0	0	3
PTIT8351	Web technology	3	0	0	3

PTMG8651	Total Quality Management	3	0	0	3
PTCS8075	Foundation Skills in Integrated Product Development	3	0	0	3
PTGE8071	Disaster Management	3	0	0	3
PTGE8072	Human Rights	3	0	0	3

PTMA8151 **APPLIED MATHEMATICS** **L T P C**

(Common to all branches of B.E / B.Tech (PT) Programmes) **3 0 0 3**

OBJECTIVE:

- To facilitate the understanding of the principles and to cultivate the art of formulating physical problems in the language of mathematics.

UNIT I MATRICES **9**

Characteristic equation – Eigen values and Eigenvectors of a real matrix – Properties of eigen values and eigenvectors – Cayley-Hamilton Theorem – Diagonalization of matrices - Reduction of a quadratic form to canonical form by orthogonal transformation.

UNIT II FUNCTIONS OF SEVERAL VARIABLES **9**

Partial derivatives – Homogeneous functions and Euler's theorem – Total derivative – Differentiation of implicit functions – Change of variables – Jacobians – Partial differentiation of implicit functions – Taylor's series for functions of two variables - Maxima and minima of functions of two variables.

UNIT III ANALYTIC FUNCTION **9**

Analytic functions – Necessary and sufficient conditions for analyticity – Properties – Harmonic conjugates – Construction of analytic function – Conformal Mapping – Mapping by functions w = a + z , az, 1/z, **-** Bilinear transformation.

UNIT IV COMPLEX INTEGRATION **9**

Line Integral – Cauchy's theorem and integral formula – Taylor's and Laurent's Series – Singularities – Residues – Residue theorem – Application of Residue theorem for evaluation of real integrals – Use of circular contour and semicircular contour with no pole on real axis.

UNIT V LAPLACE TRANSFORMS **9**

Existence conditions – Transforms of elementary functions – Basic properties – Transforms of derivatives and integrals –Inverse transforms – Convolution theorem – Transform of periodic functions – Application to solution of linear ordinary differential equations with constant coefficients.

TOTAL: 45 PERIODS

OUTCOMES

- To develop the use of matrix algebra techniques this is needed by engineers for practical applications.
- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
- To develop an understanding of the standard techniques of complex variable theory so as to enable the student to apply them with confidence, in application areas such as heat conduction, elasticity, fluid dynamics and flow the of electric current.
- To make the student appreciate the purpose of using transforms to create a new domain in which it is easier to handle the problem that is being investigated.

BOOKS FOR STUDY:

1. Grewal B.S., Higher Engineering Mathematics, Khanna Publishers, Forty Second Edition, Delhi, 2012.
2. Ramana, B.V. Higher Engineering Mathematics" Tata McGraw Hill Publishing Company, 2008.

REFERENCES:

1. Glyn James, Advanced Modern Engineering Mathematics, Prentice Hall of India, Fouth Edition, 2011.
2. Veerarajan, T., Engineering Mathematics (For First Year), Tata McGraw-Hill Pub. Pvt. Ltd., New Delhi, 2007.

PTPH8152 PHYSICS FOR ELECTRICAL AND ELECTRONICS ENGINEERING L T P C
(Common to EEE, E &I and ECE Branches) 3 0 0 3

OBJECTIVES:

- To Illustrate, with suitable examples, the concepts of conductors, semiconductors, dielectric, magnetic and superconducting materials.
- To make the students familiarize with the optical properties of materials.
- To introduce the essential principles of physics for electronics and communication engineering applications.

UNIT I ELECTRICAL PROPERTIES OF METALS 9

Classical theory: Drude model - thermal conductivity, thermal resistance - electrical conductivity of nonmetals: semiconductors, ionic crystals and glasses - thin metal films: conductivity and resistivity - Schrödinger wave equation - particle in a box - Tunneling (qualitative) degenerate states - Fermi-Dirac statistics - density of states: electron concentration and Fermi level - band theory of solids: energy band formation (qualitative) - electron effective mass.

UNIT II SEMICONDUCTORS 9

Intrinsic semiconductors: energy band-diagram - direct and indirect band gap semiconductors - carrier concentrations and conductivity - extrinsic semiconductors: compensation doping - temperature dependence of conductivity - degenerate and nondegenerate semiconductors - recombination and minority carrier injection: direct and indirect recombination - minority carrier lifetime - diffusion and conduction equations and random motion - optical absorption - Hall effect and devices - Ohmic contacts - Schottky diode and solar cell.

UNIT III DIELECTRIC MATERIALS AND INSULATION 9

Matter polarization and relative permittivity: definition - dipole moment and polarization vector P-polarization mechanisms: electronic, ionic, orientational, interfacial and total polarization - frequency dependence - local field and Clausius-Mossetti equation - dielectric constant and dielectric loss - Gauss's law and boundary conditions - dielectric strength and insulation break-down in gases, liquids and solids - capacitor materials - typical capacitor constructions - piezoelectricity, ferroelectricity and pyroelectricity - quartz oscillators and filters - piezo and pyroelectric crystals.

UNIT IV MAGNETIC PROPERTIES AND SUPERCONDUCTIVITY 9

Magnetic dipole moment - origin: atomic magnetic moments - magnetic materials: diamagnetism, paramagnetism, ferromagnetism, antiferromagnetism, ferrimagnetism, ferromagnetism - origin and the exchange interaction - saturation magnetization and Curie temperature - ferromagnetic materials: magnetic domains magnetocrystalline anisotropy, domain walls and motion - M versus H behaviour, demagnetization - soft and hard magnetic materials - examples and uses - Giant Magneto Resistance and materials - superconductivity: properties and classifications - High Tc superconductors - applications.

UNIT V OPTICAL PROPERTIES OF MATERIALS 9

Light waves in a homogeneous medium - refractive index - dispersion: refractive index-wave-length behaviour - group velocity and group index - Fresnel's equations: amplitude, reflection and transmission coefficients, intensity, reflectance and transmittance - complex refractive index and light absorption - Luminescence, phosphors and white LEDs - polarization - optical anisotropy: uniaxial crystals, birefringence, dichroism - electro-optic effect and amplitude modulators.

TOTAL : 45 PERIODS

COURSE OUTCOMES:

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

Understand the essential principles of physics for communication and related engineering applications.

TEXT BOOKS:

1. Palanisamy, P.K., Materials Science, Scitech, 2003
2. Arumugam, M., Materials Science, Anirudha Publ., 2002.

REFERENCES:

1. Kasap, S.O., Principles of Electronic Materials and Devices, Tata McGraw-Hill, 2007.
2. Ali Omar, M., Elementary Solid State Physics, Adition Wiley, 1974.
3. Kittel, C., Introduction to Solid State Physics, John Wiley, 1996.
4. Millman J and Halkias C, Electronic Devices and Circuits, Tata-McGraw Hall, 2004.

PTCY8151 CHEMISTRY FOR ELECTRICAL AND ELECTRONICS ENGINEERING

(Common to Electrical and Electronics Engineering and Electronics and Instrumentation Engineering and Electronics and Communication Engineering)

L	T	P	C
3	0	0	3

OBJECTIVES:

- To know about the electrochemistry and it is applications.
- To understand the basic concepts about the batteries.
- Importance of Conductivity in Solids and specialty polymers.
- Treatment of water for domestic and industrial purpose.
- Familiarize with various type of material analysis.

UNIT I ELECTROCHEMISTRY 9

Electrical conductance - Types of electrode - conductivity of solutions of electrolytes - specific conductance - equivalent conductance- molar conductance- ionic conductance - factors affecting conductance - transport (transference) number- inter ionic attraction theory of conductance. Electrochemical cell - redox reaction, electrode potential- origin of electrode potential - oxidation potential- reduction potential - standard electrode potential(E^o), Nernst equation, Measurement of EMF of the cell - EMF and potential difference - potentiometric measurement. Reference electrodes. Standard hydrogen electrodes- calomel, silver-silver chloride and glass electrodes. Single electrode potential. Measurement and applications- electrochemical series. Determination of pH using glass electrode. Concentration cells- types and applications.

UNIT II ENERGY SOURCES 9

Introduction - nuclear energy - nuclear fission- controlled nuclear fission - nuclear fusion- differences between nuclear fission and fusion - nuclear chain reactions - nuclear reactor power generator - classification of nuclear reactor - components of a reactor - light water reactor -

breeder reactor - solar energy conversion- solar cells- wind energy. Batteries and fuel cells. Introduction- batteries - types of batteries - alkaline battery- lead storage battery- nickel-cadmium battery - lithium battery - fuel cell H_2 -O_2 fuel cell- applications.

UNIT III CONDUCTIVITY IN SOLIDS AND SPECIALTY POLYMERS 9

Electrical properties of solids - band theory of solids - types of energy bands - application of band theory to solids- semiconductors - types-n and p types - super conductors. Classification of insulating materials based on function and physical state - thermal insulators - optical fibers-organic electronic materials - fullerenes. Introduction to thermoplastics and thermosetting plastics- phenolic and epoxy resins, silicone polymers, rubbers; polyelectrolytes, electrically conducting polymers, polymers with piezoelectric, pyroelectric and ferroelectric properties, photonic polymers, photo resists, basics of LCD and LED.

UNIT IV WATER CHEMISTRY 9

Boiler feed water-requirements-formation of deposits in steam boilers and heat exchangers-disadvantages (wastage of fuels, decrease in efficiency, boiler explosion) prevention of scale formation-external treatment (ion exchange method) - internal treatment-(phosphate, calgon, carbonate, colloidal)-boiler compounds-caustic embrittlement-boiler corrosion-priming and foaming- desalination of brackish water –reverse osmosis.

UNIT V ANALYSIS OF MATERIALS 9

Spectroscopic analyses: principle- instrumentation- block diagram-data analysis and applications of Atomic Absorption Spectroscopy, Flame photometry, Microscopic analyses: Scanning Electron Microscopy, Tunneling Electron Microscopy, Scanning Tunneling Microscopy and Atomic Force Microscopy. Thermal methods: Differential Scanning Colorimetry, Thermo-gravimetric analysis.

TOTAL : 45 PERIODS

OUTCOMES:

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

TEXT BOOKS:

1 Jain P.C. & Monica Jain., “Engineering Chemistry”, DhanpatRai Publishing Company (P) Ltd, New Delhi, 2010.

2 Kannan P., Ravikrishnan A., “Engineering Chemistry”, Sri Krishna Hitech Publishing Company Pvt. Ltd. Chennai, 2009

REFERENCE BOOKS:

1 Pahari A., Chauhan B., “Engineering Chemistry”., Firewall Media., New Delhi., 2010.

2 Sivasankar B., “Engineering Chemistry”, Tata McGraw-Hill Publishing Company Ltd., New Delhi, 2008.

3 Vairam S., Kalyani P., Suba Ramesh., “Engineering Chemistry”., Wiley India Pvt Ltd., New Delhi.,2011.

PTEC8101 **CIRCUIT THEORY** **L T P C**
3 0 0 3

OBJECTIVES:

- To introduce the basic concepts of DC and AC circuits behavior
- To study the transient and steady state response of the circuits subjected to step and sinusoidal excitations.
- To introduce different methods of circuit analysis using Network theorems, duality and topology.

UNIT I DC CIRCUIT ANALYSIS 9

Basic Components and electric Circuits, Charge, current, Voltage and Power, Voltage and Current Sources, Ohms Laws, Voltage and Current laws, Kirchoff's Current Law, Kirchoff's voltage law, The single Node – Pair Circuit, series and Parallel Connected Independent Sources, Resistors in Series and Parallel, voltage and current division, Basic Nodal and Mesh analysis, Nodal analysis, Mesh analysis.

UNIT II NETWORK THEOREM AND DUALITY 8

Useful Circuit Analysis techniques, Linearity and superposition, Thevenin and Norton Equivalent Circuits, Maximum Power Transfer, Delta-Wye Conversion. Duals, Dual circuits.

UNIT III SINUSOIDAL STEADY STATE ANALYSIS 10

Sinusoidal Steady – State analysis , Characteristics of Sinusoids, The Complex Forcing Function, The Phasor, Phasor relationship for R, L, and C, impedance and Admittance, Nodal and Mesh Analysis, Phasor Diagrams, AC Circuit Power Analysis, Instantaneous Power, Average Power, apparent Power and Power Factor, Complex Power.

UNIT IV TRANSIENTS AND RESONANCE IN RLC CIRCUITS 9

Basic RL and RC Circuits, The Source- Free RL Circuit, The Source-Free RC Circuit, The Unit-Step Function, Driven RL Circuits, Driven RC Circuits, RLC Circuits, Frequency Response, Parallel Resonance, Series Resonance, Quality Factor.

UNIT V COUPLED CIRCUITS AND TOPOLOGY 9

Magnetically Coupled Circuits, mutual Inductance, the Linear Transformer, the Ideal Transformer, An introduction to Network Topology, Trees and General Nodal analysis, Links and Loop analysis.

TOTAL : 45 PERIODS

OUTCOMES:

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

- Comprehend the basic concepts of DC and AC circuits.
- Evaluate the transient and steady state response of the circuits subjected to step and sinusoidal excitations.
- Solve different methods of circuit analysis using Network theorems, duality etc.,
- Understand the basic concepts of network topology and coupled circuits.

TEXT BOOKS:

1. William H.Kayt, Jr.Jack E. Kemmerly, Steven M.Durbin, "Engineering Circuit Analysis", Sixth Edition, Tata McGraw-Hill Edition, 2006.
2. David A Bell, "Electric Circuits", PHI,2006

REFERENCES:

1. Charles K. Alexander & Mathew N.O.Sadiku, Fundamentals of Electric Circuits", Second Edition, McGraw- Hill 2003.
2. Sudhakar. A and Shyammohan S. Palli, Tata Mc Graw –Hill, Third Edition, 2007. D.R.Cunningham, J.
3. A.Stuller, "Basic Circuit Analysis", Jaico Publishing House, 1996.
4. David E.Johnson, Johny R. Johnson, John L.Hilburn, "Electric Circuit Analysis", Second Edition, Prentice-Hall international Editions, 1997
5. K.V.V.Murthy, M.S.Kamath, "Basic Circuit Analysis", Jaico Publishing House, 1999.
6. Norman Balabanian, "Electric Circuits", International Edition,1994.

PTEC8102 ELECTRONIC DEVICES L T P C
3 0 0 3

OBJECTIVES:

- To acquaint the students with the construction, theory and operation of the basic electronic devices such as PN junction diode, Bipolar and Field effect Transistors, Power control devices, LED, LCD and other Opto-electronic devices

UNIT I SEMICONDUCTOR DIODE 9

PN junction diode, Current equations, Diffusion and drift current densities, forward and reverse bias characteristics, Switching Characteristics.

UNIT II BIPOLAR JUNCTION TRANSISTOR 9

NPN -PNP -Junctions-Early effect-Current equations – Input and Output characteristics of CE, CB CC-Hybrid -π model - h-parameter model, Ebers Moll Model- Gummel Poon-model, Multi Emitter Transistor.

UNIT III FIELD EFFECT TRANSISTORS 9

JFETs – Drain and Transfer characteristics,-Current equations-Pinch off voltage and its significance- MOSFET- Characteristics- Threshold voltage -Channel length modulation, D-MOSFET, E-MOSFET-,Current equation - Equivalent circuit model and its parameters, FINFET,DUAL GATE MOSFET.

UNIT IV SPECIAL SEMICONDUCTOR DEVICES 9

Metal-Semiconductor Junction- MESFET, Schottky barrier diode-Zener diode-Varactor diode – Tunnel diode- Gallium Arsenide device, LASER diode, LDR.

UNIT V POWER DEVICES AND DISPLAY DEVICES 9

UJT, SCR, Diac, Triac, Power BJT- Power MOSFET- DMOS-VMOS. LED, LCD, Photo transistor, Opto Coupler, Solar cell, CCD.

TOTAL : 45 PERIODS

OUTCOMES:

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

Understand the construction, theory and operation of the basic electronic devices such as PN junction diode, Bipolar and Field effect Transistors, Power control devices, LED, LCD and other Opto-electronic devices

TEXT BOOK:

1. Donald A Neaman, “Semiconductor Physics and Devices”, Third Edition, Tata Mc GrawHill Inc. 2007.

REFERENCES:

1. Yang, “Fundamentals of Semiconductor devices”, McGraw Hill International Edition, 1978.
2. Robert Boylestad and Louis Nashelsky, “Electron Devices and Circuit Theory” Pearson Prentice Hall, 10th edition,July 2008.

PTEC8201 DIGITAL ELECTRONICS AND SYSTEM DESIGN L T P C
3 0 0 3

OBJECTIVES:

- To introduce Boolean algebra and its applications in digital systems
- To introduce design of various combinational digital circuits using logic gates
- To bring out the analysis and design procedures for synchronous and asynchronous sequential circuits
- To introduce the electronic circuits involved in the making of logic gates
- To semiconductor memories and related technology

UNIT I BASIC CONCEPTS AND COMBINATIONAL CIRCUITS 9

Number Systems – Decimal, Binary, Octal, Hexadecimal, 1s and 2s complements, Codes – Binary, BCD, 84-2-1, 2421, Excess 3, Biquinary, Gray, Alphanumeric codes, Boolean theorems, Logic gates , Universal gates, Sum of products and product of sums, Minterms and Maxterms, Karnaugh map and Tabulation methods, Problem formulation and design of combinational circuits, Code-Converters

UNIT II MSI CIRCUITS 9

Half and Full Adders, Half and Full Subtractors, Binary Parallel Adder, Carry Look Ahead Adder, BCD Adder, Magnitude Comparator, Decoder, Encoder, Priority Encoder, Mux/Demux, Implementation of combinational logic using standard ICs, ROM, EPROM and EEPROM,PLA and PAL.

UNIT III SYNCRONOUS SEQUENTIAL CIRCUITS 9

Flip flops – SR, JK, T, D, Master/Slave FF, Triggering of FF, Analysis of clocked sequential circuits – their design, state minimization, Moore / Mealy model, state assignment, circuit implementation, Counters, Ripple Counters, Ring Counters, Shift registers, Universal Shift Register.

UNIT III ASYNHRONOUS SEQUENTIAL CIRCUITS 9

Stable, Unstable states, output specifications, cycles and races, state reduction, race free assignments, Hazards, Essential Hazards, Pulse mode sequential circuits, Design of Hazard free circuits

UNIT V LOGIC FAMILIES AND SEMICONDUCTOR MEMORIES 9

Logic families- TTL, MOS, CMOS, Comparison of Logic families, Basic memory cell, RAM, Memory decoding, Static and Dynamic memories.

TOTAL : 45 PERIODS

OUTCOMES:

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

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

TEXT BOOKS:

1. Morris Mano, " Digital logic ", Pearson, 2009
2. Charles H. Roth, Jr, "Fundamentals of Logic Design", Fourth edition, Jaico Books, 2002

REFERENCES:

1. William I. Fletcher, "An Engineering Approach to Digital Design", Prentice- Hall of India, 1980
2. Floyd T.L., "Digital Fundamentals", Charles E. Merril publishing company,1982
3. John. F. Wakerly, "Digital design principles and practices", Pearson Education, Fourth Edition, 2007 .

PTEC8202 ELECTRONIC CIRCUITS – I L T P C
3 0 0 3

OBJECTIVES:

- To learn about biasing of BJTs and MOSFETs
- To design and construct amplifiers
- To study the effect of source and load
- To construct amplifiers with active loads
- To study high frequency response of all amplifiers

UNIT I BIASING OF DISCRETE BJT AND MOSFET 9

DC Load line, operating point, Various biasing methods for BJT-Design-Stability-Bias compensation, Thermal stability, Design of biasing for JFET, Design of biasing for MOSFET

UNIT II BJT AMPLIFIERS 9

Small signal Analysis of Common Emitter-AC Loadline, Voltage swing limitations, Common collector and common base amplifiers – Differential amplifiers- CMRR- Darlington Amplifier- Bootstrap technique - Cascaded stages - Cascode Amplifier,

UNIT III JFET and MOSFET AMPLIFIERS 9

Small signal analysis of JFT amplifiers- Small signal Analysis of MOSFET and JFET, Common source amplifier, Voltage swing limitations, Small signal analysis of MOSFET and JFET Source follower and Common Gate amplifiers, - BiMOS Cascode amplifier

UNIT IV FREQUENCY ANALYSIS OF BJT and MOSFET AMPLIFIERS 9

Low frequency and Miller effect , High frequency analysis of CE and MOSFET CS amplifier, Short circuit current gain, cut off frequency – f_α and f_β unity gain and Determination of bandwidth of single stage and multistage amplifiers

UNIT V IC MOSFET AMPLIFIERS 9

IC Amplifiers- IC biasing Current steering circuit using MOSFET- MOSFET current sources- PMOS and NMOS current sources. Amplifier with active loads - enhancement load, Depletion load and PMOS and NMOS current sources load- CMOS common source and source follower- CMOS differential amplifier- CMRR

TOTAL: 45 PERIODS

OUTCOMES:

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

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

TEXT BOOKS:

1. Donald .A. Neamen, Electronic Circuit Analysis and Design –2nd edition,Tata McGraw Hill, 2009.
2. Adel .S. Sedra, Kenneth C. Smith, Micro Electronic circuits, 6th Edition, Oxford University Press, 2010.

REFERENCES:

1. David A. "Bell Electronic Devices and Circuits", Oxford Higher Education press,5th Edition,2010
2. Behzad Razavi, " Design of Analog CMOS Integrated Circuits", Tata McGraw Hill, 2007.
3. Paul Gray, Hurst, Lewis, Meyer "Analysis and Design of Analog Integrated Circuits", 4th Edition , John Willey & Sons 2005
4. Millman .J. and Halkias C.C, "Integrated Electronics", McGraw Hill, 2001.
5. D.Schilling and C.Belove, "Electronic Circuits", 3rd edition, McGraw Hill, 1989.

PTEC8203 SIGNALS AND SYSTEMS L T P C

3 0 0 3

OBJECTIVES:

- To introduce visualization and mathematical representation of continuous-time and discrete-time signals
- To teach the applications of Laplace and Fourier transforms in the analysis of continuous-time signals
- To teach the applications of z- and fourier transforms in the analysis of discrete – time signals

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 signals, random signals, Energy & Power signals - CT systems and DT systems, Classification of systems.

UNIT II ANALYSIS OF CONTINUOUS TIME SIGNALS 9

Fourier series analysis- spectrum of Continuous Time (CT) signals- Fourier and Laplace Transforms in Signal Analysis.

UNIT III LINEAR TIME INVARIANT –CONTINUOUS TIME SYSTEMS 9

Differential Equation-Block diagram representation-impulse response, convolution integrals-Fourier and Laplace transforms in Analysis.

UNIT IV ANALYSIS OF DISCRETE TIME SIGNALS 9

Baseband Sampling of CT signals- Aliasing, Reconstruction of CT signal from DT signal DTFT and properties, Z-transform & properties.

UNIT V LINEAR TIME INVARIANT –DISCRETE TIME SYSTEMS 9

Difference Equations-Block diagram representation-Impulse response-Convolution sum- DTFT and Z Transform analysis of Recursive & Non-Recursive systems.

TOTAL: 45 PERIODS

OUTCOMES:

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

- Analyze the properties of a continuous time signal in the Fourier transform and Laplace Transform domain.
- Analyze the properties of a discrete time- signal in the Fourier transform and Z transform domain.
- Characterize a continuous time system in the time domain, Fourier Transform domain and Laplace Transform domain.
- Characterize a discrete time system in the time domain, Fourier Transform domain and Z-transform domain.

TEXTBOOKS:

1. Allan V.Oppenheim, S.Wilsky and S.H.Nawab, Signals and Systems, Pearson, Indian Reprint, 2007.
2. P.Ramakrishna Rao, Signals and Systems, Tata Mc Graw Hill Publications, 2008.
3. B. P. Lathi, Principles of Linear Systems and Signals, Oxford, Second Edition, 2009.

REFERENCES:

1. H P Hsu, " Signals and Systems", Schaum's Outlines, Tata McGraw Hill,2006
2. Edward W. Kamen, Bonnie S. Heck, Fundamentals of Signals and Systems Using the Web and MATLAB, Pearson, Indian Reprint, 2007
3. John Alan Stuller, An Introduction to Signals and Systems, Thomson, 2007
4. M.J.Roberts, Signals & Systems, Analysis using Transform methods & MATLAB, Tata McGraw Hill (India), 2007.

PTMA 8253 TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS L T P C
(Common to Textile ,Chemical, Mechanical, ECE & Civil) 3 0 0 3

OBJECTIVES:

- To facilitate the understanding of the principles and to cultivate the art of formulating physical problems in the language of mathematics.

UNIT I FOURIER SERIES 9

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

UNIT II FOURIER TRANSFORM 9

Fourier integral theorem – Fourier transform pair-Sine and Cosine transforms – Properties – Transform of elementary functions – Convolution theorem – Parseval's identity.

UNIT III PARTIAL DIFFERENTIAL EQUATIONS 9

Formation – Solutions of first order equations – Standard types and Equations reducible to standard types – Singular solutions – Lagrange's Linear equation –Solution of homogenous linear equations of higher order with constant coefficients.

UNIT IV APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS 9

Method of separation of Variables – Solutions of one dimensional wave equation and one-dimensional heat equation – Steady state solution of two-dimensional heat equation.

UNIT V Z – TRANSFORM AND DIFFERENCE EQUATIONS 9

Z-transform – Elementary properties – Inverse Z-transform – Convolution theorem –Formation of difference equation – Solution of difference equation using Z-transform.

TOTAL: 45 PERIODS

OUTCOMES

- To introduce Fourier series analysis which is central to many applications in engineering apart from its use in solving boundary value problems.
- To acquaint the student with Fourier transform techniques used in wide variety of situations in which the functions used are not periodic.
- To introduce the effective mathematical tools for the solutions of partial differential equations that model physical processes.
- To develop Z- transform techniques which will perform the same task for discrete time systems as Laplace Transform, a valuable aid in analysis of continuous time systems.

BOOK FOR STUDY:

1. Grewal B.S., Higher Engineering Mathematics, Khanna Publishers, Forty Second Edition, Delhi, 2012

REFERENCES:

1. Glyn James, Advanced Modern Engineering Mathematics, Prentice Hall of India, Fouth Edition, 2011
2. Ramana, B.V. Higher Engineering Mathematics" Tata McGraw Hill Publishing Company, 2008.
3. Bali, N.P. and Manish Goyal, A Text Book of Engineering Mathematics, Lakshmi Publications Pvt. Ltd., New Delhi, 2006.

PTEC8211 ELECTRONIC CIRCUITS – I LABORATORY L T P C
0 0 3 2

OBJECTIVES:

The student should be made to:

- To understand Bias in Amplifier circuits
- Study the characteristic of CE,CB and CC Amplifier
- Learn the frequency response of CS Amplifiers
- Study the Transfer characteristic of differential amplifier
- Study the frequency response characteristics of multistage amplifiers
- Perform SPICE simulation of **E**lectronic **C**ircuits

1. Frequency Response of CE amplifier
2. Frequency response of CB amplifier
3. CC Amplifier - buffer
4. Frequency response of CS Amplifiers
5. Differential Amplifiers- Transfer characterisitic.
6. CMRR Measurment
7. Cascode amplifier
8. Cascade amplifier
9. Spice Simulation of Common Emitter and Common Source amplifiers

TOTAL: 45 PERIODS

OUTCOMES:

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

- Analyze the differential amplifier characteristics
- Analyze the frequency response characteristics of single stage and multi stage amplifiers using BJT and JFET
- Simulate various amplifiers using PSpice

LAB REQUIREMENTS

CRO (30MHz)	– 10 Nos.
Function Generators (3MHz)	– 10 Nos.
Dual Regulated Power Supplies (0 – 30V)	– 10 Nos.
Pentium IV PC	– 10 Nos.
Transistor	– 50 Nos

PTEC8301 COMMUNICATION THEORY L T P C
3 0 0 3

OBJECTIVES:

- To introduce the concepts of various modulations and their spectral analysis
- To introduce random processes and their characteristics
- To understand noise impact on modulations and
- To introduce some of the essential baseband signal processing techniques.

UNIT I AMPLITUDE MODULATION 9

Review of Fourier and Hilbert Transforms-Amplitude Modulation – AM, DSBSC, SSBSC, VSB, Spectral analysis of modulated signal, Demodulation – Square law, envelope detectors Superheterodyne receivers

UNIT II ANGLE MODULATION 9

Angle modulation – PM and FM – Narrow band, Wideband FM - Spectral analysis of modulated signal- FM Modulators and FM Demodulators- Discriminator- PLL, Stereo FM

UNIT III RANDOM PROCESS 9

Random variables, Central limit Theorem, Random Process, Stationary Processes, Mean, Correlation & Covariance functions, Power Spectral Density, Ergodic Processes, Gaussian Process, Transmission of a Random Process Through a LTI filter.

UNIT IV NOISE PERFORMANCE 9

Noise sources and types – Noise figure and noise temperature – Noise in cascaded systems. Narrow band noise – PSD of in-phase and quadrature noise – Noise performance in AM systems – Noise performance in FM systems – Pre-emphasis and de-emphasis – Capture effect, threshold effect.

UNIT V BASEBAND TECHNIQUES 9

Quantization – Uniform and non-uniform quantization – Quantization noise – Companding laws of speech signals – PCM, DPCM, ADPCM, DM, ADM, and Subband Coding.
Multiplexing – TDM (E and T lines), FDM.

TOTAL: 45 PERIODS

OUTCOMES:

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

- Identify the concepts of various modulations and their spectral analysis.
- Understand random processes and their characteristics, noise impact on modulations and essential baseband signal processing techniques.

TEXT BOOKS:

1. S.Haykin, “Communication Systems” 4/e, John Wiley 2007
2. D.Roody, J.Coolen, “Electronic Communications”, 4/e PHI 2006

REFERENCES:

1. J.G.Proakis, M.Salehi, “Fundamentals of Communication Systems” – Pearson Education 2006.
2. H P Hsu, Schaum Outline Series - “Analog and Digital Communications” TMH 2006
3. B.P.Lathi, “Modern Digital and Analog Communication Systems”, 3/e, Oxford University Press,2007.
4. B.Sklar, “Digital Communications Fundamentals and Applications” 2/e Pearson Education 2007

PTEC8302 ELECTROMAGNETIC FIELDS AND WAVES L T P C
3 0 0 3

OBJECTIVES:

- To impart knowledge on the basics of static electric and magnetic field and the associated laws.
- To give insight into the propagation of EM waves and also to introduce the methods in computational electromagnetics.

UNIT I STATIC ELECTRIC FIELD 9

Introduction to co-ordinate systems , Gradient , Divergence , Curl , Divergence theorem, Stokes theorem , Coulombs law , Electric field intensity , Principle of superposition , Electric scalar potential, Electric flux density. Gauss's law and its application, Permittivity, Polarization, Boundary relation, Capacitance, Dielectric strength ,Energy and Energy density, Poisson and Laplace equation and their application, Numerical examples

UNIT II STATIC MAGNETIC FIELD 9

Magnetic field of a current carrying element ,Amperes law , The Biot – Savart law , Magnetic flux Density and Field intensity , Gauss law for magnetic fields , Torque, Magnetic moment, Magneto motive force , Permeability , Vector potential , Field computation. Inductance, Energy in an Inductor and Energy density, Boundary relation, Hysterisis, Reluctance and Permeance. Numerical examples

UNIT III TIME VARYING ELECTRIC AND MAGNETIC FIELDS 9

Faradays law , Transformer and Mutual induction , Maxwell's equation , Self and Mutual inductance ,Displacement current , Amperes law and its inconsistency for time varying fields , Boundary relation , Poynting vector , Numerical examples.

UNIT IV PLANE EM WAVES IN ISOTROPIC MEDIA 9

Wave equation from Maxwell's Equation, Uniform plane waves in perfect dielectric, conductors, free space. Polarization, Reflection and Refraction of plane waves at different boundaries, Surface impedance, Numerical examples

UNIT V APPLICATION OF STATIC FIELDS AND COMPUTATIONAL METHODS 9

Deflection of a charged particle, CRO, Ink Jet Printer, Electro static generator, Magnetic Separator, Cyclotron, Velocity selector and Mass Spectrometer, Electromagnetic pump, Introduction to field computation methods-FDM, FEM, MOM, Numerical examples

TOTAL : 45 PERIODS

OUTCOMES

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

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

TEXT BOOKS:

1. W.H.Hayt and A.Buck,"Engineering ElectroMagnetics" , 7th Edition, McgrawHill, 2010
2. David .K.Cheng, "Field and wave Electromagnetics", 2nd edition, Pearson education, 2004.
3. Mathew.N.O.Sadiku,"Elements of Electromagnetics", Fourth edition ,Oxford University Press, 2009

REFERENCES:

1. Karl E.Longman and Sava V.Savov, "Fundamentals of Electro-Magnetics" , Prentice Hall of India, 2006
2. Kraus, Fleisch, "Electromagnetics with Applications", McGraw-Hill, 2005
3. Guru & Hiziroglu, "Electromagnetic Field Theory Fundamentals`` Second edition Cambridge University press,2005
4. Ashutosh Pramanik," ElectroMagnetism" ,Prentice Hall of India, 2006
5. Nannapaneni Narayana Rao," Elements of Engineering ElectroMagnetics", 6th edition, Prentice Hall of India, 2006

PTEC8303 **ELECTRONIC CIRCUITS II** **L T P C**
3 0 0 3

OBJECTIVES:

- To study about feedback amplifiers and oscillator principles
- To design oscillators
- To study about tuned amplifiers
- To study about active filters
- To know the principles of DC-DC convertors

UNIT I FEEDBACK AMPLIFIERS AND STABILITY 9

Basic feedback concepts – Properties of Negative feedback – Four feedback topologies – Analysis of series–shunt, series-series, shunt-shunt and shunt-shut feedback amplifiers – stability problem – Gain and Phase-margins- Frequency compensation.

UNIT II OSCILLATORS 9

Barkhausen criteria for oscillator – Analysis of RC oscillators – Phase shift Wein bridge oscillators – LC oscillators – Colpitt, Hartley, Clapp, Crystal, Armstrong, Franklin and Ring Oscillators

UNIT III TUNED AMPLIFIERS 9

Basic principles – Inductor losses – Use of transformers – Single tuned amplifier frequency analysis - Amplifier with multiple tuned circuits – Cascade – Synchronous tuning – Stagger tuning – Stability of tuned amplifiers using Neutralization techniques

UNIT IV ACTIVE FILTERS 9

Filter transmission –Types - specification, transfer function - Butterworth and Chebyshev filters - First and second order filter functions - circuit implementation – single-amplifier bi quadratic active filters - Switched-capacitor filters

UNIT V POWER AMPLIFIERS AND DC CONVERTERS 9

Power amplifiers- class A-Class B-ClassAB-Class C-Power Mosfet -Temerature Effect-Class AB Power amplifier utilization mosfet – DC/DC convertors – Buck, Boost, Buck-Boost analysis and design

TOTAL : 45 PERIODS

Outcomes:

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

- Have Knowledge about feedback amplifiers and oscillator principles.
- Design and Construct oscillators,tuned amplifier`s, Multivibrators and DC-DC convertors.

TEXTBOOKS:

1. Adel .S. Sedra, Kenneth C. Smith, Micro Electronic circuits, 6th Edition, Oxford University Press, 2010.
2. F. Bogart Jr. Electronic Devices and Circuits 6th Edition, Pearson Education, 2007.

REFERENCES

1. Donald .A. Neamen, Electronic Circuit Analysis and Design –2nd edition,Tata McGraw Hill, 2007.
2. Muhammed H.Rashid power electronics Pearson Education / PHI , 2004
3. Jacob Millman, Taub Pulse, Digital and Switching Waveforms 2nd Edition 2007

PTEC8304 OPERATIONAL AMPLIFIERS AND ANALOG INTEGRATED CIRCUITS **L T P C 3 0 0 3**

OBJECTIVES:

- To study the circuit configuration of linear integrated circuits
- To introduce practical applications of linear integrated circuits
- To introduce the concept of analog multiplier and Phase Locked Loop with applications
- To study ADC and DAC
- To introduce special function ICs and its construction

UNIT I CIRCUIT CONFIGURATION FOR LINEAR ICS 9

Current sources, Analysis of difference amplifiers with active loads, supply and temperature independent biasing, Band gap references, Monolithic IC operational amplifiers, specifications, frequency compensation, slew rate and methods of improving slew rate.

UNIT II APPLICATIONS OF OPERATIONAL AMPLIFIERS 9

Linear and Nonlinear Circuits using operational amplifiers and their analysis, Inverting and Non inverting Amplifiers, Differentiator, Integrator Voltage to Current converter, Instrumentation amplifier, Sine wave Oscillators, Low pass and band pass filters, comparator, Multivibrator and Schmitt trigger, Triangle wave generator, Precision rectifier, Log and Antilog amplifiers, Non-linear function generator.

UNIT III ANALOG MULTIPLIER AND PLL 9

Analysis of four quadrant and variable Tran conductance multipliers, Voltage controlled Oscillator, Closed loop analysis of PLL, AM, PM and FSK modulators and demodulators. Frequency synthesizers, Compander ICs

UNIT IV ANALOG TO DIGITAL AND DIGITAL TO ANALOG CONVERTORS 9

Analog switches, High speed sample and hold circuits and sample and hold IC's, Types of D/A converter Current driven DAC, Switches for DAC, A/D converter, Flash, Single slope, Dual slope, Successive approximation, DM and ADM, Voltage to Time and Voltage to frequency converters.

UNIT V SPECIAL FUNCTION ICS 9

Timers, Voltage regulators - linear and switched mode types, Switched capacitor filter, Frequency to Voltage converters, Tuned amplifiers, Power amplifiers and Isolation Amplifiers, Video amplifiers, Fiber optics ICs and Opto couplers, Sources for Noises, Op Amp noise analysis and Low noise OP-Amps.

TOTAL : 45 PERIODS

OUTCOMES:

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

- Describe practical applications of linear integrated circuits.
- Apply the concept of analog multiplier and Phase Locked Loop with applications.
- Analyze Analog to Digital Converter and Digital to Analog Converter
- Identify special function ICs and its construction

TEXT BOOK:

1. Sergio Franco, " Design with operational amplifiers and analog integrated circuits", McGraw Hill, 1997.

REFERENCES:

1. Gray and Meyer, " Analysis and Design of Analog Integrated Circuits ", Wiley International, 1995.
2. Michael Jacob J., " Applications and Design with Analog Integrated Circuits " , Prentice Hall of Inida,1996.
3. Ramakant A. Gayakwad, " OP - AMP and Linear IC's ", Prentice Hall, 1994.
4. Botkar K.R., " Integrated Circuits ", Khanna Publishers, 1996.
5. Taub and Schilling, " Digital Integrated Electronics ", McGraw Hill, 1977.
6. Caughlier and Driscoll, " Operational amplifiers and Linear Integrated circuits ", Prentice Hall, 1989.
7. Millman J. and Halkias C.C., " Integrated Electronics ", McGraw Hill, 2001.

PTEC8311 ELECTRONIC CIRCUITS – II LABORATORY L T P C
0 0 3 2

OBJECTIVES:

- To gain hands on experience in designing feedback amplifier, tuned amplifier and oscillators.
- To learn the design of active filters
- To learn simulation software used for circuit design.
- To understand the concepts of multivibrators and power amplifiers.

1. Design and Analysis of Feedback amplifiers
2. Design of RC Oscillators
3. Design of LC Oscillators
4. LPF & HPF
5. Single Tuned amplifier
6. Spice simulation of feedback amplifiers
7. Spice simulation of oscillators and Multivibrators
8. Class A & Class B Power Amplifiers.

TOTAL: 45 PERIODS

OUTCOMES:

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

- Analyze feedback amplifiers
- Design sinusoidal oscillators, tuned amplifiers, wave-shaping circuits and multivibrators
- Analyze electronic circuits through simulation.

LAB REQUIREMENTS :

CRO (30MHz)	– 10 Nos.
Function Generators (3MHz)	– 10 Nos.
Dual Regulated Power Supplies (0 – 30V)	– 10 Nos.
Pentium IV PC (LTSPICE or equivalent s/w)	– 10 user license
BC 107, BC 147	– 50 Nos.
Resistors, Capacitors & Inductors	– As required
Breadboards	– 15 Nos.

PTEC8401 DIGITAL COMMUNICATION TECHNIQUES L T P C
3 0 0 3

OBJECTIVES:

- To understand the concept of information, types of channels
- To understand the capabilities of various source coding theorems the fundamental limit of transmission over the channel.
- To understand the capabilities of various channel coding theorems
- To develop the knowledge on pass band communication and spread spectrum.

UNIT I INFORMATION THEORY 9

Measure of information – Entropy – Source coding theorem – Discrete memoryless channels – lossless, deterministic, noiseless, BEC, BSC – Mutual information – Channel capacity – Shannon-Hartley law - Transform coding – LPC – Shannon-Fano coding, Huffman Coding, run length coding, LZW algorithm.

UNIT II ERROR CONTROL CODING TECHNIQUES 9

Channel coding theorem – Linear block codes – Hamming codes – Cyclic codes – Convolutional codes – Viterbi decoding.

UNIT III BASEBAND TECHINIQUES 9

Pulse Modulation-PAM,PPM and PDM, Line codes – RZ,NRZ, Manchester, Binary N-zero substitution codes - PSDs – ISI – Nyquist criterion for distortionless transmission – Pulse shaping – Correlative coding - Mary schemes – Eye pattern

UNIT IV BANDPASS SIGNALING 9

Geometric representation of signals – ML detection -Correlator and matched filter detection - generation and detection of BPSK, BFSK, QPSK - BER and Power spectral Density Comparison - Structure of non-coherent receivers - generation and detection of BFSK, DPSK – Principles of QAM. Band Pass Sampling.

UNIT V SYNCHRONISATION AND SPREAD SPECTRUM TECHNIQUES 9

Synchronisation – Carrier, symbol, Chip and frame synchronisation techniques, Spread Spectrum - PN Sequences, Direct Sequence and Frequency Hopping Spread Spectrum Systems, BER Analysis, Processing gain and Jamming Margin, Application in Cellular Systems.

TOTAL: 45 PERIODS

OUTCOMES;

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

- Understand the concepts of information, types of channels.
- Understand the capabilities of various source coding theorems and the fundamental limit of transmission over the channel.
- Describe the capabilities of various channel coding theorems.
- Identify pass band communication and spread spectrum.

TEXT BOOKS:

1. S. Haykin, “Digital Communications”, John Wiley, 2005
2. B. Sklar, “Digital Communication Fundamentals and Applications”, 2/e, Pearson Education, 2009

REFERENCES:

1. H P Hsu, Schaum Outline Series - “Analog and Digital Communications” TMH 2006
2. B.P.Lathi, “Modern digital and Analog Communication Systems” 3/e, Oxford University Press 2007
3. J.G Proakis, “Digital Communication”, 4/e, Tata Mcgraw Hill Company, 2001.

PTEC8402 DISCRETE TIME-SIGNAL PROCESSING L T P C
3 0 0 3

OBJECTIVES:

- To introduce discrete fourier transform and its applications
- To teach the design of infinite and finite impulse response filters for filtering undesired signals
- To introduce signal processing concepts in systems having more than one sampling frequency

UNIT I DISCRETE FOURIER TRANSFORM 9

Review of discrete-time signals & systems - DFT and its properties, FFT algorithms & its application to convolution, Overlap-add & overlap-save methods.

UNIT II DESIGN OF INFINITE IMPULSE RESPONSE FILTERS 9

Analog filters – Butter worth filters, Chebyshev Type I filters (upto 3^{rd} order), Analog Transformation of prototype LPF to BPF /BSF/ HPF. Transformation of analog filters into equivalent digital filters using Impulse invariant method and Bilinear Z transform method- Realization structures for IIR filters – direct, cascade, parallel forms.

UNIT III DESIGN OF FINITE IMPULSE RESPONSE FILTERS 9

Design of linear phase FIR filters windowing and Frequency sampling methods - Realization structures for FIR filters – Transversal and Linear phase structures- Comparison of FIR & IIR.

UNIT IV FINITE WORDLENGTH EFFECTS 9

Representation of numbers-ADC Quantization noise-Coefficient Quantization error-Product Quantization error-truncation & rounding errors -Limit cycle due to product round-off error-Round- off noise power-limit cycle oscillation due to overflow in digital filters- Principle of scaling.

UNIT V MULTIRATE SIGNAL PROCESSING 9

Introduction to Multirate signal processing-Decimation-Interpolation-Polyphase Decomposition of FIR filter-Multistage implementation of sampling rate conversion- Design of narrow band filters - Applications of Multirate signal processing.

TOTAL: 45 PERIODS

OUTCOMES:

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

- Understand discrete Fourier transform and its applications.
- Design of infinite and finite impulse response filters for various applications.
- Apply signal processing concepts in systems having more than one sampling frequency

TEXTBOOKS:

1. A.V.Oppenheim, R.W. Schafer and J.R. Buck, Discrete-Time Signal Processing, 8th Indian Reprint, Pearson, 2004.
2. John G Proakis and Manolakis, " Digital Signal Processing Principles, Algorithms and Applications", Pearson, Fourth Edition, 2007

REFERENCES:

1. I.C.Ifeachor and B.W. Jervis, Digital Signal Processing- A practical approach, Pearson, 2002.
2. M.H.Hayes, Digital Signal Processing, Schaum's outlines, Tata McGraw Hill, 2007.
3. S.K. Mitra, Digital Signal Processing, A Computer Based approach, Tata McGraw-Hill, 1998.
4. D.J. De Fatta, J.G.Lucas and W.S. Hodgkiss, Digital Signal Processing- A system Design Approach, John Wiley & sons, Singapore, 1988.
5. P.P.Vaidyanathan, Multirate Systems & Filter Banks, Prentice Hall, Englewood cliffs, NJ, 1993.

PTEC8403 MICROPROCESSOR AND MICROCONTROLLERS L T P C
3 0 0 3

OBJECTIVES:

- To study the architecture of 8085 and 8086, 8051
- To study the addressing modes and instruction set of 8085 and 8086, 8051
- To introduce the need and use of interrupt structure in 8085 and 8051.
- To develop skill in simple program writing for 8085 and 8051 applications.
- To introduce commonly used peripheral / interfacing ICs.

UNIT I ARCHITECTURE OF 8085 /8086 9

8085- Functional Block Diagram- Description - Addressing Modes, Timing diagrams. Introduction to 8086 – Architecture, Instruction set, Addressing Modes.

UNIT II ASSEMBLY LANGUAGE PROGRAMMING 9

8085: Assembly Language Programming, programming techniques, Subroutines, serial I/O and data communication, Interrupts, Interrupt programming, 8086:Simple Assembly Language Programming, Assembler Directives- Interrupts and Interrupt Applications.

UNIT III PERIPHERAL INTERFACING & APPLICATION 9

Programmable Peripheral Interface (8255), keyboard display controller (8279), ADC, DAC Interface, Programmable Timer Controller (8254), Programmable interrupt controller (8259), Serial Communication Interface (8251).

UNIT IV MICROCONTROLLER 9

8051 – Architecture, Special Function Registers(SFRs), I/o Pins Ports and Circuits, Instruction set, Addressing modes, Assembly language programming,

UNIT V INTERFACING 8051: MEMORY, I/O, INTERRUPTS 9

Programming 8051 Timers- Serial Port Programming- Interrupts Programming LCD & Keyboard Interfacing- ADC, DAC & Sensor Interfacing, External Memory Interface- RTC Interfacing using I2C Standard- Motor Control- Relay, PWM, DC & Stepper Motor.

TOTAL : 45 PERIODS

OUTCOMES:

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

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

TEXT BOOKS:

1. Ramesh S. Gaonkar, Microprocessor Architecture Programming and Applications with 8085. Fifthh edition, Penram International Publishing 2010.
2. Douglas V.Hall, Microprocessor and Interfacing, Programming and Hardware. Revised second Edition 2006, Eleventh Reprint 2010. Tata McGraw Hill
3. Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin D.MCKinlay The 8051 Microcontroller and Embedded Systems, Second Edition 2008, Fifth Impression 2010, Pearson Education 2008.

REFERENCES:

1. Krishna Kant, " Microprocessor and Microcontroller Architecture, programming and system design using 8085, 8086, 8051 and 8096, PHI, 2007, Seventh Reprint 2011
2. Kenneth J.Ayala., "The 8051 Microcontroller, 3rd Edition, Thompson Delmar Learning, 2007, New Delhi.
3. A.K. Ray , K.M .Bhurchandi "Advanced Microprocessor and Peripherals" ,Second edition, Tata McGraw-Hill, 2007.
4. Barry B.Brey, "The Intel Microprocessors Architecture, Programming and Interfacing" Pearson Education, 2007. New Delhi.
5. Nilesh B Bahadure, " Microprocessors The 8086 to Pentium Family, PHI, 2010

PTEC8404 TRANSMISSION LINES AND WAVE GUIDES L T P C

3 0 0 3

OBJECTIVES:

- To introduce the various types of transmission lines and to discuss the losses associated.
- To give through understanding about impedance transformation and matching.
- Usage of smith chart in problem solving is dealt with.
- Knowledge on filter theories and waveguide theories are imparted.

UNIT I TRANSMISSION LINE THEORY & PARAMETERS 8

Introduction to different types of transmission lines , Transmission line Equation – Solution – Characteristic impedance-Infinite line concept - Distortion less line – loading – input impedance , Losses in Transmission lines– Reflection loss, Insertion loss, return loss, Introduction to planar transmission lines. Numerical examples

UNIT II IMPEDENCE MATCHING AND TRANSFORMATION 9

Reflection Phenomena – Standing waves – λ/8, λ/4 & λ/2 lines – λ/4 Impedance transformers, Stub Matching – Single and Double Stub – Smith Chart and Applications. Numerical examples

UNIT III NETWORK COMPONENTS 8

Filter fundamentals, Filter design- lumped element and distributed element approach to filter design –Design of Attenuators and Equalizers – Lattice type , Concept of inverse networks – Transients in transmission lines, Lattice diagram. Numerical examples

UNIT IV RECTANGULAR WAVE GUIDES 10

Waves between Parallel Planes – characteristic of TE , TM and TEM waves , Velocities of propagation ,Solution of wave Equation in Rectangular guides ,TE and TM modes , Dominant Mode, Attenuation, Mode Excitation, Dielectric slab wave guides, Numerical examples .

UNIT V CYLINDRICAL WAVE GUIDES 10

Solution of wave equation in circular guides, TE and TM wave in circular guides, Wave impedance, attenuation, mode excitation, formation of cylindrical cavity, Application , cavity resonator and Q for dominant mode, Numerical examples

TOTAL : 45 PERIODS

OUTCOMES:

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

- Analyze the various types of transmission lines and to discuss the losses associated.
- Understand impedance transformation and matching.
- Use smith chart in problem solving
- Apply knowledge on filter theories and waveguide theories are imparted.

TEXTBOOK:

1. John D Ryder “Networks lines and fields” Prentice Hall of India, 2005

REFERENCES:

1. E.C.Jordan and K.G. Balmain, “Electromagnetic Waves and Radiating Systems” Prentice Hall of India, 2006
2. Guru & Hiziroglu,”Electromagnetic Field Theory Fundamentals” Second edition Cambridge University press, 2005
3. R.K.Shevgaonkar, ”ELECTROMAGNETIC FIELDS” Tata McGraw Hill Pblications,2006
4. G.S.N Raju” Electromagnetic Field Theory and Transmission Lines” Pearson Education, First edition 2005

PTEC8411 COMMUNICATION SYSTEMS LABORATORY L T P C

0 0 3 2

OBJECTIVES:

The student should be made to:

- To visualize the effects of sampling and TDM
- To Implement AM & FM modulation and demodulation
- To implement PCM & DM
- To implement FSK, PSK and DPSK schemes
- To implement Equalization algorithms
- To implement Error control coding schemes

1. Signal Sampling and reconstruction
2. Time Division Multiplexing
3. AM / FM Modulator and Demodulator
4. Pulse Code Modulation and Demodulation
5. Delta Modulation and Demodulation
6. Line coding schemes
7. FSK, PSK and DPSK schemes (Simulation)
8. Error control coding schemes (Simulation)
9. Spread spectrum communication (Simulation)
10. Communication link simulation
11. Symbol Timing Synchronization
12. Equalization – Zero Forcing & LMS algorithms

TOTAL: 45 PERIODS

OUTCOMES:

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

- Simulate end-to-end Communication Link
- Demonstrate their knowledge in base band signaling schemes through implementation of FSK, PSK and DPSK
- Apply various channel coding schemes & demonstrate their capabilities towards the improvement of the noise performance of communication system
- Simulate & validate the various functional modules of a communication system

LAB FREQUIREMENTS:

i) Kits for Signal Sampling, TDM, AM, FM, PCM, DM and Line Coding Schemes
ii) Software Defined Radio platform for link simulation studies
iii) MATLAB / SCILAB for simulation experiments
iv) PCs - 6 No.s

PTEC8501 ANTENNAS AND WAVE PROPAGATION L T P C
3 0 0 3

OBJECTIVES:

- To give insight into the radiation phenomena.
- To give a through understanding of the radiation characteristics of different types of antennas .
- To create awareness about the the different types of propagation of radio waves at different frequencies

UNIT I FUNDAMENTALS OF RADIATION 9

Definition of antenna parameters – Gain, Directivity, Effective aperture, Radiation Resistance, Band width, Beam width, Input Impedance. Matching – Baluns, Polarization mismatch, Antenna noise temperature, Radiation from oscillating dipole, Half wave dipole. Folded dipole, Yagi array.

UNIT II APERTURE AND SLOT ANTENNAS 9

Radiation from rectangular apertures, Uniform and Tapered aperture, Horn antenna , Reflector antenna , Aperture blockage , Feeding structures , Slot antennas ,Microstrip antennas – Radiation mechanism – Application ,Numerical tool for antenna analysis

UNIT III ANTENNA ARRAYS 9

N element linear array, Pattern multiplication, Broadside and End fire array – Concept of Phased arrays, Adaptive array, Basic principle of antenna Synthesis-Binomial array

UNIT IV SPECIAL ANTENNAS 9

Principle of frequency independent antennas –Spiral antenna, Helical antenna, Log periodic. Modern antennas- Reconfigurable antenna, Active antenna, Dielectric antennas, Electronic band gap structure and applications, Antenna Measurements-Test Ranges, Measurement of Gain, Radiation pattern, Polarization, VSWR

UNIT V PROPAGATION OF RADIO WAVES 9

Modes of propagation , Structure of atmosphere , Ground wave propagation , Tropospheric propagation , Duct propagation , Troposcatter propagation , Flat earth and Curved earth concept ,Sky wave propagation – Virtual height ,critical frequency , Maximum usable frequency – Skip distance , Fading , Multi hop propagation

TOTAL : 45 PERIODS

OUTCOMES

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

- Have insight into the radiation phenomena
- Have a thorough understanding of the radiation characteristics of different types of Antennas.
- Identify the different types of propagation of radio waves at various frequencies.

TEXT BOOKS :

1. John D Kraus," Antennas for all applications",3 Ed, McGraw Hill, 2005
2. Edward C.Jordan and Keith G.Balmain"Electromagnetic Waves and Radiating Systems" Prentice Hall of India,2006
3. R.E.Collin,"Antennas and radiowave propagation"Mcgraw hill 1985

REFERENCES:

1. Constantine.A.Balanis"Antenna Theory Analysis and Design" Wiley student edition, 2006
2. Rajeswari Chatterjee,:"Antenna Theory and Practice "Revised Second edition "New Age international Publishers, 2006
3. S.Drabowitch, "Modern Antennas" Second edition,Springer Publications,2007
4. Robert S.Elliott"Antenna theory and Design "Wiley student edition,2006
5. H.Sizun" Radio Wave Propagation for Telecommunication Applications "First Indian Reprint, Springer Publications,2007

PTEC8502 **COMMUNICATION NETWORKS** **L T P C**
3 0 0 3

OBJECTIVES:

- To introduce the layered communication architectures
- To understand various physical, data link and routing layer protocols
- To understand application layer protocols and security issues .
- To understand various digital switching techniques.

UNIT I NETWORK FUNDAMENTALS AND PHYSICAL LAYER 9

Introduction to Networks, definition of layers, services, interface and protocols. OSI reference model- layers and duties. TCP/IP reference model – layers and duties. Physical layer- general description, characteristics, signaling media types, topologies, examples physical layer (RS232C, ISDN, ATM,SONET)

UNIT II DATA LINK LAYER AND NETWORK INTERCONNECTION 9

Logical link control Functions:- Framming, Flow control , Error control: CRC, LLC protocols:- HDLC, P to P. Medium access layer:- Random access, Controlled access, Channelization, IEEE standards:- 802.3, 802.4 and 802.5. Internetworking, Interconnection issues, Interconnection devices:- Repeaters, Hubs, Routers/switches and Gateways.

UNIT III MESSAGE ROUTING TECHNOLOGIES 9

Circuit switching, packet switching, message switching. Internet protocols; IPV4, IPV6, ARP, RARP, ICMP, IGMP, VPN. Network Routing Algorithms: - Distance vector routing, OSPF, Dijikstra's , Bellaman Ford, Congestion control algorithms.

UNIT IV END-END PROTOCOLS and SECURITY 9

Process-process delivery:- TCP, UDP and SCTP. Application protocols: WWW,HTTP,FTP and TELNET, Network management protocol: SNMP, Network security.

UNIT V DIGITAL SWITCHING 9

Switching functions, Space Division Switch, Time Division Switch, STS switching, TST switching, No 4 ESS Toll switch, digital cross connect systems.

TOTAL: 45 PERIODS

OUTCOMES:

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

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

TEXT BOOKS:

1. Behrouz.A. Forouzan, Data Communication And Networking, 4th Edition, Tata McGraw Hill, 2007.
2. John C. Bellamy, Digital Telephony, 3rd Edition, John Wiley 2006.

REFERENCES:

1. Stallings.W., Data And Computer Communication, 4th Edition, Prentice Hall of India, 1996
2. Tanenboum, A.S, Computer Netwotks, 3rd Edition , Prentice Hall Of India, 1996
3. Keshav.S. An Engineering Approach To Computer Networking, Addision –Wesley,1999.
4. J.E.Flood, Telecommunication Switching, Traffic and networks, Ist edition, Pearson Education, 2006.

PTEC8503 **DIGITAL VLSI** **L T P C**
3 0 0 3

OBJECTIVES:

- In this course, the MOS circuit realization of the various building blocks that is common to any microprocessor or digital VLSI circuit are studied.
- Architectural choices and performance tradeoffs involved in designing and realizing the circuits in CMOS technology are discussed.
- The main focus in this course is on the transistor circuit level design and realization for digital operation and the issues involved as well as the topics covered are quite distinct from those encountered in courses on CMOS Analog IC design.

UNIT I MOS TRANSISTOR PRINCIPLE 9

NMOS and PMOS transistors, Process parameters for MOS and CMOS, Electrical properties of CMOS circuits and device modeling, Scaling principles and fundamental limits, CMOS inverter scaling, propagation delays, Stick diagram, Layout diagrams

UNIT II COMBINATIONAL LOGIC CIRCUITS 9

Examples of Combinational Logic Design, Elmore's constant, Pass transistor Logic, Transmission gates, static and dynamic CMOS design, Power dissipation – Low power design principles

UNIT III SEQUENTIAL LOGIC CIRCUITS 9

Static and Dynamic Latches and Registers, Timing issues, pipelines, clock strategies, Memory architecture and memory control circuits, Low power memory circuits, Synchronous and Asynchronous design

UNIT IV DESIGNING ARITHEMETIC BUILDING BLOCKS 9

Data path circuits, Architectures for ripple carry adders, carry look ahead adders, High speed adders, accumulators, Multipliers, dividers, Barrel shifters, speed and area tradeoff

UNIT V IMPLEMENTATION STRATEGIES 9

Full custom and Semi custom design, Standard cell design and cell libraries, FPGA building block architectures, FPGA interconnect routing procedures.

TOTAL: 45 PERIODS

OUTCOMES:

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

- Realize the digital building blocks using MOS circuit.
- Design combinational circuits, sequential circuits and memory circuits
- Understand the concepts of ASIC design flow.

TEXTBOOKS:

1. Jan Rabaey, Anantha Chandrakasan, B.Nikolic, "Digital Integrated circuits: A design perspective". Second Edition, Prentice Hall of India, 2003.
2. M.J. Smith, "Application specific integrated circuits", Addisson Wesley, 1997

REFERENCES:

1. N.Weste, K.Eshraghian, "Principles of CMOS VLSI DESIGN", second edition, Addision Wesley 1993
2. R.Jacob Baker, Harry W.LI., David E.Boyee, "CMOS Circuit Design, Layout and Simulation", 2005 Prentice Hall of India
3. A.Pucknell, Kamran Eshraghian, "BASIC VLSI DESIGN", Third edition, Prentice Hall of India, 2007.

PTEC8511 **VLSI DESIGN LABORATORY** **L T P C**
0 0 3 2

OBJECTIVES:

- To learn Hardware Descriptive Language(Verilog/VHDL)
- To learn the fundamental principles of VLSI circuit design in digital and analog domain
- To familiarise fusing of logical modules on FPGAs
- To provide hands on design experience with professional design (EDA) platforms.

FPGA Based experiments.

1. HDL based design entry and simulation of simple counters, state machines, adders (min 8 bit) and multipliers (4 bit min).
2. Synthesis, P&R and post P&R simulation of the components simulated in (i) above. Critical paths and static timing analysis results to be identified. Identify and verify possible conditions under which the blocks will fail to work correctly.
3. Hardware fusing and testing of each of the blocks simulated in (i). Use of either chipscope feature (Xilinx) or the signal tap feature (Altera) is a must. Invoke the PLL and demonstrate the use of the PLL module for clock generation in FPGAs.

IC Design Experiments: (**Based on Cadence/MAGMA/Tanner)**

4. Design and simulation of a simple 5 transistor differential amplifier. Measure gain, ICMR, and CMRR
5. Layout generation, parasitic extraction and resimulation of he circuit designed in (a)
6. Synthesis and Standard cell based design of an circuits simulated in 1(i) above. Identification of critical paths, power consumption.
7. For expt (c) above, P&R, power and clock routing, and post P&R simulation.
8. Analysis of results of static timing analysis.

TOTAL: 45 PERIODS

OUTCOMES:

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

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

LAB REQUIREMENTS:

Xilinx or Altera FPGA – 12 nos
Xilinx software
Cadence/MAGMA/Tanner or equivalent software package – 10 User License
PCs – 10 No.s

PTEC8601 OPTICAL COMMUNICATION L T P C
3 0 0 3

OBJECTIVES:

- To introduce the principle of light propagation through optical fibers
- To understand signal distortion mechanisms in the fiber
- To introduce optical transmitters and receivers for fiber /free space links
- To introduce optical network concepts and components involved.

UNIT I OPTICAL FIBERS 9

Introduction, light propagation in optical fibers, ray and mode theory of light, optical fiber structure and parameters, fiber materials, fiber fabrication techniques, optical signal attenuation mechanisms, merits and demerits of guided and unguided optical signal transmissions.

UNIT II TRANSMISSION CHARACTERISTICS 9

Optical signal distortion – Group delay, material dispersion, waveguide dispersion, polarization mode dispersion, intermodal dispersion, profile dispersion, fiber types, Standard Singlemode Fibers, Dispersion Shifted Fibers, Dispersion Flattened Fibers, Polarization Maintaining Fibers, Dispersion compensation, Principles of fiber nonlinearity.

UNIT III OPTICAL TRANSMITTERS 9

Materials for optical souces, light-emitting diodes, semiconductor laser diodes , longitudinal modes, gain and index-guiding, power-current characteristics, spectral behaviour, longitudinal mode control and tunability, noise, direct and external modulation, Laser sources and transmitters for free space communication.

UNIT IV OPTICAL RECEIVERS 9

Principles of optical detection, spectral responsivity, PIN, APD, preamplifier types, receiver noises, Signal to Noise Ratio (SNR) and Bit Error Rate (BER) , Principles of coherent detection, power and risetime budget.

UNIT V OPTICAL NETWORKING PRINCIPLES AND COMPONENTS 9

Network Components: Optical couplers, filters, isolators, switches, optical amplifiers: erbium doped fiber amplifiers, semiconductor optical amplifiers, Networking Concepts: SONET/SDH/FDDI optical networks, WDM optical networks, layered optical network architecture.

TOTAL: 45 PERIODS

OUTCOMES

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

- Understand the principle of light propagation through optical fibers, signal distortion mechanisms in the fiber.
- Describe the optical transmitters and receivers for fiber /free space links.
- Identify optical network techniques and understand the components involved.

TEXTBOOKS:

1. Gerd Kaiser , “Optical Fiber Communications”, 4 th edition,Sixth reprint,Tata Mc Graw Hill, New Delhi,2009.
2. John M. Senior, ”Optical Fiber Communications- Principles And Practice”, Third Edition, Pearson Education, 2010.

REFERENCES:

1. Gerd Keiser, "Optical communications Essentials", Special Indian Edition, Tata Mc Graw Hill, New Delhi,2008.
2. Govind P. Agrawal, " Fiber-Optic Communication Systems", Third Edition, John Wiley & Sons, 2004.
3. Rajiv Ramasamy & Kumar N. Sivarajan, "Optical Networks – A Practical Perspective",2 Ed, Morgan Kauffman 2002.

PTEC8602 WIRELESS COMMUNICATION L T P C
3 0 0 3

OBJECTIVES:

- To study the characteristic of wireless channel
- To understand the design of a cellular system
- To study the various digital signaling techniques and multipath mitigation techniques
- To understand the concepts of multiple antenna techniques

UNIT I WIRELESS CHANNELS 9

Large scale path loss – Path loss models: Free Space and Two-Ray models -Link Budget design – Small scale fading- Parameters of mobile multipath channels – Time dispersion parameters-coherence bandwidth – Doppler spread & Coherence time, Fading due to Multipath time delay spread – flat fading – frequency selective fading – Fading due to Doppler spread – fast fading – slow fading.

UNIT II CELLULAR ARCHITECTURE 9

Multiple Access techniques - FDMA, TDMA, CDMA – Capacity calculations Cellular concept- Frequency reuse - channel assignment- hand off- interference & system capacity- trunking & grade of service – Coverage and capacity improvement.

UNIT III DIGITAL SIGNALING FOR FADING CHANNELS 9

Structure of a wireless communication link, Principles of Offset-QPSK, π/4-DQPSK, Minimum Shift Keying, Gaussian Minimum Shift Keying, Error performance in fading channels, OFDM principle – Cyclic prefix, Windowing, PAPR.

UNIT IV MULTIPATH MITIGATION TECHNIQUES 9

Equalisation – Adaptive equalization, Linear and Non-Linear equalization, Zero forcing and LMS Algorithms.

Diversity – Micro and Macrodiversity, Diversity combining techniques, Error probability in fading channels with diversity reception, Rake receiver,

UNIT V MULTIPLE ANTENNA TECHNIQUES 9

MIMO systems – spatial multiplexing -System model -Pre-coding,- Beam forming - transmitter diversity, receiver diversity- Channel state information-capacity in fading and non-fading channels.

TOTAL : 45 PERIODS

OUTCOMES:

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

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

TEXTBOOKS:

1. Rappaport,T.S., “Wireless communications”, Pearson Education, Second Edition, 2010.
2. Andreas.F. Molisch, “Wireless Communications”, John Wiley – India, 2006.

REFERENCES:

1. David Tse and Pramod Viswanath, “Fundamentals of Wireless Communication”, Cambridge University Press, 2005.
2. Upena Dalal, “ Wireless Communication” Oxford University Press, 2009.
3. Van Nee, R. and Ramji Prasad, “OFDM for wireless multimedia communications”, Artech House, 2000.
4. Simon Haykins & Michael Moher, “Modern Wireless Communications”, Pearson Education, 2007.
5. Vijay. K. Garg, “Wireless Communication and Networking”, Morgan Kaufmann Publishers, 2007.

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PTEC8611 HIGH FREQUENCY COMMUNICATION LABORATORY

L	T	P	C
0	0	3	2

OBJECTIVES:

- To enable the student to verify the basic principles and design aspects involved in high frequency bandpass communication system components design and the performance parameters for the components and the overall system.
- To enable the stuident to gain insight into the practical aspects of radiation phenomena and thoroughly understand the radiation characteristics of different types of antennas.
- To enable the student to appreciate the practical aspects of bandpass system design and understand the associated link power and risetime budgeting challenges and enable them to design and conduct experiments, as well as to analyze and interpret data to produce meaningful conclusions and match with theoretical concepts.

1. Characterisation of Glass and Plastic Optical Fibers – Measurement of Numerical Aperture and Attenuation, OTDR Principle
2. DC Characteristics of LEDs and PiN Photodiodes – Determination of Source Conversion Efficiency and Detector Responsivity
3. P-I Characteristics of Laser Diode Sources – Threshold Current Determination and Study of Temperature Effects
4. Gain Characteristics of APDs – Determination of Threshold Voltage and Average gain estimation
5. Analog Transmission Characteristics of a Fiber Optic Link – Determination of Operating Range and System Bandwidth for Glass and Plastic fiber links
6. Determination of Capacity of a Digital Fiber Optic Link – Maximum Bit Rate estimation for Glass and Plastic fiber links
7. Spectral Characterisation of Optical Sources – Determination of Peak Emission Wavelength and Spectral Width
8. Study of WDM Link Components – WDM Mux / Demux, Isolator, Circulator, Fiber Bragg Grating, EDFA.

9. Gain and Radiation Pattern Measurement of an Antenna - Horn Antenna, Dipole Antenna, Array Antenna,
10. Log-Periodic Antenna, Loop Antenna
11. Determination of Mode Characteristics of of Reflex Klystron Oscillator
12. VSWR and Inpedance Measurement and Impedance Matching
13. Dielectric Constant Measurement
14. Characterisation of Directional Couplers and Multiport junctions
15. Gunn Diode Characteristics
16. Microwave IC – Filter Characteristics

TOTAL: 45 PERIODS

OUTCOMES:

- The student would be able to design and conduct experiments to demonstrate the trade-offs involved in the design of high frequency bandpass communication links and the associated components.
- The student would be able to comprehensively record and report the measured data, and would be capable of analyzing and interpreting the experimental measurement data and produce meaningful conclusions.

LAB REQUIREMENTS:

MM/SM Glass and plastic fiber patch chords with ST/SC/E2000 connectors
LEDs and LDs with ST / SC / E2000 receptacles – 650 / 850 nm
PiN PDs and APDs with ST / SC / E2000 receptacles – 650 / 850 nm
Stabilized current sources,
Signal generators, Pulse generators, Oscilloscopes
Optical power meters and Spectrum Analyzers
WDM modules

MICROWAVE COMPONENTS ?

Microwave source X-band Reflex klystron oscillator / Gunn oscillatior - 5 nos
Klystron / gunn power supply – 5 nos
Isolator – 5 nos
Variable attenuator – 5 nos
Freq meter direct reading type – 5 nos
Detector with mount – 5 nos
Vswr meter - 2 nos
Waveguide slotted-section with probe and carriage – 2 nos
Directional coupler 3 db and 10 db – 1 each
Waveguide TEE E-plane, H-plane and hybrid - 1 each
Pin modulator -1no
Horn antenna – 2 nos
Turn table for receiver antenna – 1 no
Waveguide 90 deg twist - 1 no
Plane short - 1 no
CRO (100 MHz) – 5 nos
Waveguide stands - 15 nos
Matched Terminations – 5 nos
Variable short circuit – 2 nos
Nuts and bolts – 100 nos

PTMG8551 PRINCIPLES OF MANAGEMENT L T P C
(Common to ECE,CSE, Civil , Industrial & EEE branches) 3 0 0 3

AIM

To learn the different principles and techniques of management in planning, organizing, directing and controlling.

OBJECTIVES

- To study the Evolution of Management
- To study the functions and principles of management
- To learn the application of the principles in an organization

UNIT I INTRODUCTION TO MANAGEMENT AND ORGANIZATIONS 9

Definition of Management –Science or Art – Manager Vs Entrepreneur- types of managers-managerial roles and skills – Evolution of Management –Scientific, human relations , system and contingency approaches– Types of Business organization- Sole proprietorship, partnership, company-public and private sector enterprises- Organization culture and Environment – Current trends and issues in Management.

UNIT II PLANNING 9

Nature and purpose of planning – planning process – types of planning – objectives – setting objectives – policies – Planning premises – Strategic Management – Planning Tools and Techniques – Decision making steps and process.

UNIT III ORGANISING 9

Nature and purpose – Formal and informal organization – organization chart–organization structure – types – Line and staff authority – departmentalization – delegation of authority – centralization and decentralization –Job Design - Human Resource Management –HR Planning, Recruitment, selection, Training and Development, Performance Management , Career planning and management.

UNIT IV DIRECTING 9

Foundations of individual and group behaviour– motivation – motivation theories – motivational techniques – job satisfaction – job enrichment – leadership – types and theories of leadership – communication – process of communication – barrier in communication – effective communication –communication and IT.

UNIT V CONTROLLING 9

System and process of controlling –budgetary and non-budgetary control techniques – use of computers and IT in Management control – Productivity problems and management – control and performance – direct and preventive control – reporting.

TOTAL: 45 PERIODS

OUTCOMES:

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

- Apply management principles to become a versatile professional.
- Demonstrate a vivid understanding and significance of inventory systems, finance and management tools.

TEXT BOOKS:

1. Stephen P. Robbins & Mary Coulter, " Management", Prentice Hall (India)Pvt. Ltd., 10th Edition, 2009.
2. JAF Stoner, Freeman R.E and Daniel R Gilbert "Management", Pearson Education, 6th Edition, 2004.

REFERENCES:

1. Stephen A. Robbins & David A. Decenzo & Mary Coulter, "Fundamentals of Management" Pearson Education, 7th Edition, 2011.
2. Robert Kreitner & Mamata Mohapatra, " Management", Biztantra, 2008.
3. Harold Koontz & Heinz Weihrich "Essentials of management" Tata McGraw Hill,1998.
4. Tripathy PC & Reddy PN, "Principles of Management", Tata Mcgraw Hill, 1999

PTEC8711	PROJECT WORK	L T P C 0 0 12 6

PTCS8351	OPERATING SYSTEMS (Common to CSE, ECE, IT, EEE branches)	L T P C 3 0 0 3

OBJECTIVES:

- To learn the components and operations of operating systems
- To get an idea about process synchronization
- To learn concepts behind inter-process communication
- To learn disk scheduling and process scheduling
- To understand deadlock handling and memory management

UNIT I OPERATING SYSTEMS OVERVIEW 9

Introduction to operating systems – Computer system organization, architecture – Operating system structure, operations – Process, memory, storage management – Protection and security – Distributed systems – Computing Environments – Open-source operating systems – OS services – User operating-system interface – System calls – Types – System programs – OS structure – OS generation – System Boot – Process concept, scheduling – Operations on processes – Cooperating processes – Inter-process communication – Examples – Multithreading models – Thread Libraries – Threading issues – OS examples

UNIT II PROCESS MANAGEMENT 9

Basic concepts – Scheduling criteria – Scheduling algorithms – Thread scheduling – Multiple-processor scheduling – Operating system examples – Algorithm Evaluation – The critical-section problem – Peterson's solution – Synchronization hardware – Semaphores – Classic problems of synchronization – Critical regions – Monitors – Synchronization examples – Deadlocks – System model – Deadlock characterization – Methods for handling deadlocks – Deadlock Prevention – Deadlock Avoidance – Deadlock detection – Recovery from deadlock

UNIT III STORAGE MANAGEMENT 9

Memory Management – Swapping – Contiguous memory allocation – Paging –Segmentation – Example: The Intel Pentium - Virtual Memory: Background – Demand paging – Copy on write – Page replacement – Allocation of frames – Thrashing**.**

UNIT IV I/O SYSTEMS 9

File concept – Access methods – Directory structure – File-system mounting –Protection – Directory implementation – Allocation methods – Free-space management – Disk scheduling – Disk management – Swap-space management – Protection

UNIT V CASE STUDY 9

The Linux System – History – Design Principles – Kernel Modules – Process Management – Scheduling – Memory management – File systems – Input and Output – Inter-process Communication – Network Structure – Security – Windows 7 – History – Design Principles – System Components – Terminal Services and Fast User – File system – Networking.

TOTAL: 45 PERIODS

OUTCOMES:

- To write programs using multi-threading
- To solve problems related to process scheduling and disk scheduling
- To use synchronization concepts in real-time programs
- To apply banker's algorithm for solving problems in deadlocks
- To solve problems related to paging and segmentation
- To implement OS concepts in Linux

TEXT BOOKS:

1. Abraham Silberschatz, Peter B. Galvin, Greg Gagne, "Operating System Concepts Essentials", John Wiley & Sons Inc., 2010.

REFERENCES:

1. Andrew S. Tanenbaum, "Modern Operating Systems", Second Edition, Addison Wesley, 2001.
2. Charles Crowley, "Operating Systems: A Design-Oriented Approach", Tata McGraw Hill Education", 1996.
3. D M Dhamdhere, " Operating Systems: A Concept-based Approach", Second Edition, Tata McGraw-Hill Education, 2007.
4. William Stallings, "Operating Systems: Internals and Design Principles", Seventh Edition, Prentice Hall, 2011.

PTEC8001 ADVANCED DIGITAL SIGNAL PROCESSING L T P C
3 0 0 3

OBJECTIVES:

- To bring out the concepts related to stationary and non-stationary random signals
- To emphasize the importance of true estimation of power spectral density
- To introduce the design of linear and adaptive systems for filtering and linear prediction
- To introduce the concept of wavelet transforms in the context of image processing

UNIT I DISCRETE-TIME RANDOM SIGNALS 9

Discrete random process – Ensemble averages, Stationary and ergodic processes, Autocorrelation and Autocovariance properties and matrices, White noise, Power Spectral Density, Spectral Factorization, Innovations Representation and Process, Filtering random processes, ARMA, AR and MA processes.

UNIT II SPECTRUM ESTIMATION 9

Bias and Consistency, Periodogram, Modified periodogram, Blackman-Tukey method, Welch method, Parametric methods of spectral estimation, Levinson-Durbin recursion.

UNIT III LINEAR ESTIMATION AND PREDICTION 9

Forward and Backward linear prediction, Filtering - FIR Wiener filter- Filtering and linear prediction, non-causal and causal IIR Wiener filters, Discrete Kalman filter.

UNIT IV ADAPTIVE FILTERS 9

Principles of adaptive filter – FIR adaptive filter – Newton's Steepest descent algorithm – LMS algorithm – Adaptive noise cancellation, Adaptive equalizer, Adaptive echo cancellers.

UNIT V WAVELET TRANSFORM 9

Short Time Fourier Transform, Continuous and discrete wavelet transform, Multiresolution analysis, Application of wavelet transform, Cepstrum and Homomorphic filtering.

TOTAL : 45 PERIODS

OUTCOMES:

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

- Demonstrate an ability to think and work independently towards conceptualizing a process or product

TEXTBOOKS:

1. Monson H, Hayes, Statistical Digital Signal Processing and Modeling, John Wiley and Sons Inc., New York, Indian Reprint, 2007.
2. John G.Proakis, Dimitris G. Manolakis, Digital Signal Processing, Pearson, Fourth 2007.
3. Dwight F. Mix, Random Signal Processing, Prentice Hall, 1995.

REFERENCE:

1. Sophocles J. Orfanidis, Optimum Signal Processing, An Introduction, McGraw Hill, 1990.

PTEC8002 ADVANCED MICROCONTROLLERS L T P C
3 0 0 3

OBJECTIVES:

- To study the properties and evolution of RISC and CISC processors.
- To study the architecture addressing modes and instruction set of R8C microcontroller.
- To impart knowledge on embedded software development.
- To introduce the concept of microcontroller based system development.

UNIT I RISC PROCESSORS 9

RISC Vs CISC, RISC properties and evolution, Advanced RISC microcontrollers, PIC 8-bit microcontrollers.

UNIT II R8C 16-BIT MICROCONTROLLER 9

The R8C Architecture, CPU Registers, Instruction Set, On-Chip Peripherals, R8C Tiny Development Tools, ADC, PWM, UART, Timer Interrupts, System design using R8C Microcontroller.

UNIT III MSP430 MICROCONTROLLER 9

The MSP430 Architecture, CPU Registers, Instruction Set, On-Chip Peripherals, MSP430 Development Tools, ADC, PWM, UART, Timer Interrupts, System design using MSP430 Microcontroller.

UNIT IV EMBEDDED SOFTWARE DEVELOPMENT 9

Cross development tools, Debugging techniques, Real-time Operating System, Memory Management, Scheduling techniques.

UNIT V SYSTEM DEVELOPMENT 9

Microcontroller based System Design, Peripheral Interfacing, Inter-Integrated Circuit Protocol for RTC, EEPROM, ADC/DAC, CAN BUS interfacing, Application in Automobiles, Robotics and consumer Electronics.

TOTAL : 45 PERIODS

OUTCOMES:

- The student will be familiar in the architecture and instruction set of the following microcontrollers Renesas R8C and Texas MSP430 microcontrollers.
- The student will derive the ability to design and implement any microcontroller based system after undergoing this course.

TEXT BOOK:

1. Julio Sanchez Maria P.Canton, “Microcontroller Programming: The microchip PIC”, CRC Press, Taylor & Francis Group, 2007.

REFERENCES:

1. D. E. Simon, “An Embedded Software Primer”, Addison-Wesley, 1999.
2. Wayne Wolf, “Computers as Components: Principles of Embedded Computing System Design”, Morgan Kaufman Publishers, 2006.
3. John H.Davis , “MSP 430 Micro controller basics” Eelsevier, 2008.

PTEC8003 ADVANCED WIRELESS COMMUNICATION L T P C
3 0 0 3

OBJECTIVES:

- To teach the importance of improving capacity of wireless channel using MIMO
- To teach the characteristic of wireless channel
- To teach techniques for channel improvements using space-time block and Trellis codes
- To teach advanced MIMO system like layered space time codes, MU-MIMO System and MIMO-OFDM systems

UNIT I INTRODUCTION 9

The crowded spectrum, need for high data rate, MIMO systems – Array Gain, Diversity Gain, Data Pipes, Spatial MUX, MIMO System Model. MIMO System Capacity – channel known the TX, Ch unknown to the TX – capacity of deterministic channels, Random channels and frequency selective channels.

UNIT II RADIO WAVE PROPAGATION 9

Radio wave propagation – Macroscopic fading - free space and out door, small scale fading – Fading measurements – Direct pulse measurements, spread spectrum correlation channel sounding frequency domain channel sounding, Antenna Diversity – Diversity combining methods.

UNIT III STBC 9

Delay Diversity scheme, Alamoti space time code – Maximum likelihood decoding maximum ratio combining. Transmit diversity space time block codes for real signal constellation and complex signal constellation- decoding of STBC.

UNIT IV STTC 9

Space time coded systems space time code word design criteria, design of space time T C on slow fading channels, design of STTC on Fast Fading channels, performance analysis in slow and fast fading channels effect of imperfect channel estimation and Antenna correlation on performance, comparison of STBC & STTC.

UNIT V LAYERED SPACE TIME CODES 9

LST transmitter – Horizontal and Vertical LST receiver – ML Rx, Zero forcing Rx; MMSE Rx, SIC Rx, ZF V-blast Rx -MMSE V-blast Rx, Iterative Rx- capacity of MIMO – OFDM systems – capacity of MIMO multi user systems.

TOTAL : 45 PERIODS

OUTCOMES:

- The ability to implement the concepts and the mathematical principles with respect to MIMO systems
- The basics of advanced MIMO communication and MIMO OFDM systems help them to understand the operation of present days wireless network systems.

TEXT BOOKS:

1. Mohinder Jankiraman, Space-time codes and MIMO systems, Artech House, Boston, London . www.artech house.com, ISBN 1-58053-865-7-2004
2. Paulraj Rohit Nabar, Dhananjay Gore, Introduction of space time wireless communication systems, Cambridge University Press, 2003.

REFERENCES:

1. David Tse and Pramod Viswanath, “Fundamentals of Wireless Communication”, Cambridge University Press, 2005.
2. Sergio Verdu “ Multi User Detection” Cambridge University Press, 1998
3. Andre Viterbi “ Principles of Spread Spectrum Techniques” Addison Wesley 1995
4. Volker Kuhn, “Wireless communication over MIMO channels” John Wiley and Sons Ltd.2006.

PTEC8004 **AVIONICS** **L T P C**
3 0 0 3

OBJECTIVES:

- To introduce the hardware required for aircraft
- To introduce communication and navigation techniques used in aircrafts
- To introduce autopilot and cockpit display related concepts

UNIT I INTRODUCTION 9

Introduction to aircraft – Axes system – Parts, importance and role of Avionics – systems which interface directly with pilot – Aircraft state sensor systems – Navigation systems – External world sensor systems – task automation systems. Avionics architecture evolution. Avionics Data buses - MIL STD 1553, ARINC 429, ARINC 629.

UNIT II RADIO NAVIGATION 9

Types of Radio Navigation – ADF, DME, VOR, LORAN, DECCA, OMEGA. ILS, MLS

UNIT III INERTIAL AND SATELLITE NAVIGATION SYSTEMS 9

Inertial sensors – Gyroscopes, Accelerometers, Inertial navigation systems – Block diagram, Platform and strap down INS. Satellite Navigation - GPS

UNIT IV AIR DATA SYSTEMS AND AUTOPILOT 9

Air data quantities – Altitude, Airspeed, Mach no., Vertical speed, Total Air temperature, Stall warning, Altitude warning. Autopilot – basic principles – longitudinal and lateral autopilot.

UNIT V AIRCRAFT DISPLAYS 9

Display technologies – LED, LCD, CRT, Flat Panel Display. Primary Flight parameter displays - Head Up Display, Helmet Mounted Display, Night vision goggles, Head Down Display, MFD, MFK, Virtual cockpit.

TOTAL: 45 PERIODS

OUTCOMES:

- The student would be able to comprehend the hardware challenges involved in the design of aircrafts and the principles involved in the design of air data systems , autopilots and navigation systems.
- The student would be capable of understanding the differences between the different practical navigation systems and the evolution of the aircraft display systems.

TEXT BOOKS:

1. Albert Helfrick. D, ‘Principles of Avionics’, Avionics communications Inc., 2004
2. Collinson, R.P.G, ‘Introduction to Avionics’, Chapman and Hall, 1996.

REFERENCES:

1. Middleton, D.H, ‘Avionics Systems’, Longman Scientific and Technical, Longman Group UK Ltd, England, 1989.
2. Spitzer, C.R. ‘Digital Avionics Systems’, Prentice Hall, Englewood Cliffs, N.J., USA 1993.
3. Spitzer, C.R, ‘The Avionics Handbook’, CRC Press, 2000.
4. Pallet, E.H.J, ‘Aircraft Instruments and Integrated Systems’, Longman Scientific

PTEC8005 **CAD FOR VLSI** **L T P C**
3 0 0 3

OBJECTIVES:

- To understand the suite of tools available for support and design of vlsi circuits
- To introduce rules and planning methodologies for synthesizing VLSI circuits
- To introduce different modeling schemes for synthesizing VLSI circuits

UNIT I VLSI DESIGN METHODOLOGIES 9

Introduction to VLSI Design methodologies - Review of Data structures and algorithms – Review of VLSI Design automation tools - Algorithmic Graph Theory and Computational Complexity - Tractable and Intractable problems - general purpose methods for combinatorial optimization.

UNIT II DESIGN RULES 9

Layout Compaction - Design rules - problem formulation - algorithms for constraint graph compaction - placement and partitioning - Circuit representation - Placement algorithms – partitioning.

UNIT III FLOOR PLANNING 9

Floor planning concepts - shape functions and floorplan sizing - Types of local routing problems - Area routing - channel routing - global routing - algorithms for global routing.

UNIT IV SIMULATION 9

Simulation - Gate-level modeling and simulation - Switch-level modeling and simulation - Combinational Logic Synthesis - Binary Decision Diagrams - Two Level Logic Synthesis.

UNIT V MODELLING AND SYNTHESIS 9

High level Synthesis - Hardware models - Internal representation - Allocation assignment and scheduling - Simple scheduling algorithm - Assignment problem - High level transformations.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course the student will be able to:

- Understand VLSI design Methodologies and design rules
- Understand Floor planning concepts
- Know about gate level and switch level modeling and simulation

TEXT BOOK:

1. S.H. Gerez, "Algorithms for VLSI Design Automation", John Wiley & Sons,2002.

REFERENCE:

1. N.A. Sherwani, "Algorithms for VLSI Physical Design Automation", Kluwar Academic Publishers, 2002.

PTEC8006 **CMOS ANALOG IC DESIGN I** **L T P C**
3 0 0 3

OBJECTIVES:

- To study the DC biasing conditions of various MOS amplifier configurations
- To understand the small signal model of various MOS circuits
- To study OPAMP circuits and its stability conditions
- To study in general negative feedback concept in MOS circuits

UNIT I BASIC BUILDING BLOCKS: 9

NMOS and PMOS device operation in saturation and sub threshold regions, device transconductane, output impedance and equivalent circuit. Introduction to Device models for simulation. CG, CG, and source follower circuits.

UNIT II MULTIPLE TRANSISTOR STAGES: 9

Cascode circuits folded cascode circuits, , Differential amplifier circuits , quantitative analysis of differential pair, CMRR, Differential pair with MOS loads Gilbert Cell. Current Mirrors.

UNIT III FREQUENCY RESPONSE, NOISE. 9

Frequency response of CS and CG stages. Miller effect and association of poles with nodes. Characteristics of noise, thermal and flicker noise. Noise in CS, CG, Cascode and source follower stages.

UNIT IV OPERATIONAL AMPLIFIERS: 9

Two stage op-amps, gain boosting, common mode feedback, input range limitation, slew rate, power supply rejection, noise in op-amps.

UNIT V FEEDBACK AND STABILITY: 9

Properties of feedback circuits, topologies, effect of loading and noise in feedback circuits. Stability in multipole systems, phase margin, frequency compensation in two stage op-amps, other compensation techniques.

TOTAL: 45 PERIODS

OUTCOMES:

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

- To built the different configuration of MOS amplifier
- Able to design small signal model MOS circuits
- Analyze stability conditions and other compensation techniques in OPAMPS circuits

TEXT BOOK:

1. B.Razavi, **"**Design of CMOS Analog Integrated Circuits", Tata McGraw Hill 2002.

REFERENCE:

1. Willy Sansen , **"** Analog Design Essentials:" Springer 2006

PTEC8007 CMOS ANALOG IC DESIGN II L T P C
3 0 0 3

OBJECTIVES:

- To design MOS circuits applied for various data conversion stages namely, sample and hold, ADC and DAC
- To study designs with better precision in data conversion
- To study various ADC and DAC circuit architectures

UNIT I SAMPLE AND HOLD: 9

Properties of MOS Switches, multiplexed input architectures, recycling architecture, open and closed loop sampling architectures, switched capacitor and current mode architectures.

UNIT II BUILDING BLOCK OF DATA CONVERSION CIRCUITS: 9

Amplifiers, open loop and closed loop amplifiers, gain boosting, common mode feedback, bipolar, CMOS and BiCMOS comparators.

UNIT III PRECISION TECHNIQUES: 9

Comparator cancellation, input and output offset storage principles, comparators using offset cancelled latches, opamp offset cancellation, ADC and DAC calibration techniques.

UNIT IV ADC/DAC ARCHITECTURES: 9

DAC Performance metrics, reference multiplication and division, switching and logical functions of DACs, Current steering architectures, DAC Performance metrics, Flash ADC architecture, Gray encoding, thermometer encoding and metastability.

UNIT V OVER SAMPLING CONVERTERS. 9

Delta sigma modulators, alternative modulator architectures, quantization and noise shaping, decimation filtering, implementation of Delta sigma modulators, delta sigma DACs,

TOTAL: 45 PERIODS

OUTCOMES:

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

- Build Data Conversion circuits.
- Discus calibration techniques
- Analyze ADC/DAC Architecture and Performance

TEXT BOOKS:

1. B.Razavi ‘ Data Conversion System Design’ IEEE Press and John Wiley, 1995.
2. Phillip Allen and Douglas Holmberg ‘CMOS Analog Circuit Design’ Second Edition, Oxford University Press, 2004.

PTEC8008 COGNITIVE RADIO COMMUNICATION L T P C
3 0 0 3

OBJECTIVE:

- To introduce the concept of software defined radios and their architectures
- To introduce the concept of cognitive radio communication and the components involved
- To introduce the cognitive radio architecture and the functions and issues involved in communication system design.

UNITI INTRODUCTION TO SOFTWARE DEFINED RADIO 9

Definitions and potential benefits, software radio architecture evolution – foundations, technology tradeoffs and architecture implications.

UNIT II SDR ARCHITECTURE 9

Essential functions of the software radio, architecture goals, quantifying degrees of programmability, top level component topology, computational properties of functional components, interface topologies among plug and play modules, architecture partitions.

UNITIII INTRODUCTION TO COGNITIVE RADIOS 9

Marking radio self-aware, the cognition cycle, organization of congnition tasks, structuring knowledge for cognition tasks, Enabling location and environment awareness in cognitive radios – concepts, architecture, design considerations.

UNIT IV COGNITIVE RADIO ARCHITECTURE 9

Primary Cognitive Radio functions, Behaviors, Components, A–Priori Knowledge taxonomy, observe – phase data structures, Radio procedure knowledge encapsulation, components of orient, plan, decide phases, act phase knowledge representation, design rules.

UNIT V NEXT GENERATION WIRELESS NETWORKS 9

The XG Network architecture, spectrum sensing, spectrum management, spectrum mobility, spectrum sharing, upper layer issues, cross – layer design.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, students will be able to

- Describe the basics of the software defined radios.
- Design the wireless networks based on the cognitive radios
- Explain the concepts behind the wireless networks and next generation networks

TEXT BOOKS:

1. Qusay. H. Mahmoud, “Cognitive Networks : Towards Self aware Network”, John Wiley & Sons Ltd. 2007.
2. Markus Dillinger, Kambiz Madani, Nancy Alonistioti, Software Defined Radio”, John Wiley, 2003.
3. Huseyin Arslan, “Cognitive Radio, SDR and Adaptive System, Springer, 2007.
4. Joseph Mitola, “Cognitive Radio Architecture”, John Wiley & Sons, 2006.
5. Alexander M. wyglinski, Maziarnekovee, Y. Thomas Hu, “Cognitive Radio Communication and Networks”, Elsevier, 2010.

REFERENCES:

1. J. Mitola, “ The Software Radio Architecture”, IEEE Communications Magazine,May 1995.
2. Joseph Mitola III and Gerald Q. Maquire, “Cognitive radio: making software radios morepersonal”, IEEE Personal Communications, August 1999.
3. J. Mitola, “ Cognitive Radio: An Integrated Agent Architecture for software defined radio”, Doctor of Technology thesis, Royal Inst. Technology, Sweden 2000.
4. Simon Haykin, “Cognitive Radio: Brain –empowered wireless communications”,IEEE Journal on selected areas in communications, Feb 2005.
5. Hasari Celebi, Huseyin Arslan , “ Enabling location and environment awareness in cognitive radios”, Elsevier Computer Communications , Jan 2008.
6. Ian F. Akyildiz, Won – Yeol Lee, Mehmet C. Vuran, Shantidev Mohanty, “ Next generation / dynamic spectrum access / cognitive radio wireless networks: A Survey Elsevier Computer Networks, May 2006.

PTEC8009 CRYPTOGRAPHY AND NETWORK SECURITY L T P C
3 0 0 3

OBJECTIVES:

- To teach the importance of security for networks
- To teach the basics of number theory and galois field concepts
- To teach symmetric and asymmetric key in crypto systems
- To teach authentication and key management techniques
- To teach security specific to network layer

UNIT I NUMBER THEORETIC AND ALGEBRAIC ALGORITHMS 9

Introduction – Integer Arithmetic Modular Arithmetic – matrices – Linear congruence - Substitution ciphers – Transposition ciphers – Stream cipher - Block ciphers – Algebraic structure – GF(2^n) fields.

UNIT II MODERN SYMMETRIC KEY CIPHERS 9

Modern block ciphers – Modern stream ciphers – DES – AES – Multiple uses of modern block ciphers and stream cipher.

UNIT III ASYMMETRIC KEY ENCIPHERMENT 9

Mathematics of cryptography – Primality Testing – Factorization – Chinese Remainder Theorem – Quadratic congrivence – Exponentiation & Logarithm – RSA Rabin – Elgamal – Elliptic curve

UNIT IV INTEGRITY AUTHENTICATION AND KEY MANAGEMENT 9

Message integrity – random oracle model – message authentication – SHA-512 – WHIRL POOL - Digital signature schemes – password – challenge response – zero knowledge – Biometrics – Keberos – symmetric key management – public key distribution – stegnography

UNIT V NETWORK SECURITY 9

Security at the Application Layer: E-mail – PGP – S/MIME – Security at the transport layer: SSL and TLS – Security at the network layer: IPsec, Two Security Protocol – Security Association – Internet Key Exchange – ISAKMP.

TOTAL : 45 PERIODS

OUTCOMES:

Upon Completion of the course, the students should be able to:

- Compare various Cryptographic Techniques
- Design Secure applications
- Inject secure coding in the developed applications

TEXT BOOKS:

1. Behrouz A. Ferouzan, “Cryptography & Network Security”, Tata McGraw Hill, 2007.
2. W.Stallings, “Cryptography & Network Security: Principles and Practice”, Prentice Hall, Third Edition, 2003.

REFERENCES:

1. Douglas R.Stlinson, “Cryptography Theory and Practice”, CRC Press series on Discrete Mathematics and its application 1995.
2. Charlie Kaufman, Radia Perlman, Mike Speciner, “Network Security Private Communication in a Public World”, Pearson Education, Second Edition, 2003.

PTEC8010 DIGITAL CONTROL ENGINEERING L T P C
3 0 0 3

AIM

The aim of this course is to familiarize the student with the concept of digital control engineering under the topics continuous time systems, digital control algorithms and its state variable based signal processing techniques.

OBJECTIVES

- Study the characteristics of continuous time systems and its effects.
- Learn the basics of signal processing techniques in the digital control systems.
- Design and implementation of the various digital control algorithms.
- Outline the state variable techniques for digital control systems.
- Discuss the concepts of controllability, observability and stability of the digital control system.

UNIT I CONTINUOUS TIME SYSTEMS 6

Review of frequency and time response analysis and specifications of control systems, need for controllers, continuous time compensations, continuous time PI, PD, PID controllers.

UNIT II SIGNAL PROCESSING IN DIGITAL CONTROL 12

Sampling, time and frequency domain descriptions, aliasing, hold operations, mathematical model of sample and hold, zero and first order hold, factors limiting the choice of sample rate, reconstruction, Difference equation description, Z-transform method of description, pulse transfer function, time and frequency response of discrete time control systems.

UNIT III DESIGN OF DIGITAL CONTROL ALGORITHMS 9

Review of principle of compensator design, Z-plane specifications, digital compensator design using frequency response plots, discrete integrator, discrete differentiator, development of digital PID controller, transfer function, design in Z-plane.

UNIT IV STATE VARIABLE TECHNIQUES 9

Discrete State Variable concepts, Characteristic equation, Eigenvalues and Eigenvectors, Jordan canonical models, Phase Variable companion forms.

UNIT V CONTROLLABILITY, OBSERVABILITY AND STABILITY 9

Definitions and Theorems of Controllability and Observability, Relationships between Controllability, Observability and Transfer Functions, Jury, Routh, Lyapunov stability analysis, Principles of state and output feedback.

TOTAL : 45 PERIODS

OUTCOMES:

Upon completion of the course the student will be able to:

- Outline the characteristics of continuous time systems and determine their impacts on the design of digital control systems. (**Level – I (Knowledge)**)
- Discuss the basics of digital signal processing techniques in the applications of digital control systems. (**Level – II (Comprehension)**)
- Demonstrate the design of various digital control algorithms and its implementation issues in digital control systems. (**Level – III (Application)**)
- Investigate the usage of discrete state variable concepts and its control system specifications. (**Level – IV (Analysis)**)
- Merge the concepts of controllability, observability and stability in a design of modern digital control systems. (**Level – V (Synthesis)**)

TEXT BOOKS:

1. Benjamin C.Kuo, Digital Control Systems, OXFORD University Press, II Edition, 2007
2. M.Gopal, Digital Control and State Variable Methods, Tata McGraw Hill, II Edition, 2007.

REFERENCES:

1. K.Ogata, Discrete-Time Control Systems, PHI, II Edition,2007.
2. Gene. F.Franklin, J.D.Powell, M.Workman, Digital Control of Dynamic Systems, Addison-Wesley, III Edition, 2000.

PTEC8011 DIGITAL SWITCHING AND TRANSMISSION L T P C
3 0 0 3

OBJECTIVES:

- To introduce different types of signaling in digital telephony
- To introduce various transmission schemes for telephony and broadband
- To introduce methods of modeling and analysis techniques for data transmission

UNIT I INTRODUCTION 9

Overview of existing Voice, Data and Multimedia Networks and Services; Review of Basic Communication principles; Synchronous and Asynchronous transmission, Line Codes

UNIT II TRUNK TRANSMISSION 9

Multiplexing & Framing- types and standards; Trunk signaling; Optical Transmission-line codes and Muxing: SONET/SDH; ATM; Microwave and Satellite Systems.

UNIT III LOCAL LOOP TRANSMISSION 9

The Analog Local Loop; ISDN local loop; DSL and ADSL; Wireless Local Loop; Fiber in the loop; Mobile and Satellite Phone local loop.

UNIT IV SWITCHING 9

Evolution; Space switching, Time switching and Combination Switching; Blocking and Delay characteristics; Message ,Packet and ATM switching; Advances in switching techniques – shared memory fast packet switches, shared medium fast packet switches and space division fast packet switches, Photonic switching- Optical TDM, WDM.

UNIT V TELETRAFFIC ENGINEERING 9

Telecom Network Modeling; Arrival Process; Network Blocking performance; Delay Networks--Queuing system analysis and delay performance.

TOTAL : 45 PERIODS

OUTCOMES:

- The student would be able to appreciate the importance of quality of service requirements for different applications and the expectation from the provider networks
- The student would be able to differentiate between the design aspects of trunk networks, the local loop systems and switching systems
- The student would able to understand the concepts behind the traffic modeling and network dimensioning problems

TEXTBOOKS:

1. J. Bellamy, “Digital Telephony”, John Wiley, 2003, 3rd Edition.
2. JE Flood, “Telecommunications Switching, Traffic and Networks”, Pearson, 2005.

REFERENCES:

1. R.A.Thompson, “Telephone switching Systems”, Artech House Publishers, 2000.
2. W. Stalling, “ Data and Computer Communications”, Prentice Hall, 1993.
3. T.N.Saadawi, M.H.Ammar, A.E.Hakeem, “Fundamentals of Telecommunication Networks”, Wiley Interscience, 1994.
4. W.D. Reeve, “Subscriber Lop Signalling and Transmission Hand book”,IEEE Press(Telecomm Handbook Series), 1995.
5. Tarmo Anttalaien, “ Introduction to telecommunication network engineering”, 2nd edition, Artech House, 2003.
6. T. Viswanathan, “Telecommunication Switching Systems”, Prentice-Hall, 1992.

PTEC8012 ELECTRO MAGNETIC INTERFERENCE AND COMPATIBILITY L T P C
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 BASIC CONCEPTS 7

Definition of EMI and EMC; Intra and Inter system EMI; Sources and victims of EMI, Conducted and Radiated EMI emission and susceptibility; Transient & ESD; Case Histories; Radiation Hazards to humans.

UNIT II COUPLING MECHANISM 9

Common made coupling; Differential mode coupling; Common impedance coupling; Ground loop coupling; Field to cable coupling; Cable to cable coupling; Power mains and Power supply coupling.

UNIT III EMI MITIGATION TECHNIQUES 10

Shielding – principle, choice of materials for H, E and free space fields, and thickness; EMI gaskets; Bonding; Grounding – circuits, system and cable grounding; Filtering; Transient EMI control devices and applications; PCB Zoning, Component selection, mounting, trace routing.

UNIT IV STANDARDS AND REGULATION 7

Units of EMI; National and International EMI Standardizing Organizations – IEC, ANSI, FCC, CISPR, BIS, CENELEC; FCC standards; EN Emission and Susceptibility standards and specifications; MIL461E Standards.

UNIT V TEST METHODS AND INSTRUMENTATION 12

EMI test sites - Open area site; TEM cell; Shielded chamber; Shielded Anechoic chamber; EMI test receivers; Spectrum Analyzer; Transient EMI Test wave Simulators; EMI coupling Networks - Line impedance Stabilization Networks; Feed through capacitors; Antennas and factors; Current probes and calibration factor; MIL-STD test methods; Civilian STD Test methods.

TOTAL : 45 PERIODS

OUTCOMES:

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

- To design a EMI free system
- To reduce system level crosstalk
- To design high speed Printed Circuit board with minimum interference
- To make our world free from unwanted electromagnetic environment

TEXT BOOKS:

1. V.P. Kodali, "Engineering EMC Principles, Measurements and Technologies", IEEE Press, Newyork,2001
2. Henry W.Ott., "Noise Reduction Techniques in Electronic Systems", A Wiley Inter Science Publications, John Wiley and Sons, Newyork, 1988.
3. C.R. Paul, "Introduction to Electromagnetic Compatibility", John wiley & sons Inc. 2006

REFERENCES:

1. Don R.J.White Consultant Incorporate, "Handbook of EMI/EMC", Vol I-V, 1988.
2. Bemhard Keiser, "Principles of Electromagnetic Compatibility", 3rd Ed, Artech house, Norwood, 1987

PTEC8013 EMBEDDED AND REAL - TIME SYSTEMS L T P C
3 0 0 3

OBJECTIVES:

- To study the architecture and programming of ARM processor.
- To introduce the basic concepts of hard real time multiprocessing.
- To introduce the analysis concepts for effective programming .
- To study about the basics of the buses used for embedded system networking.

UNIT I INTRODUCTION TO EMBEDDED COMPUTING AND ARM PROCESSORS 9

Complex systems and micro processors– Embedded system design process – Formalism for system design– Design example: Model train controller- ARM Processor Fundamentals- Instruction Set and Programming using ARM Processor.

UNIT II COMPUTING PLATFORM 9

CPU: Programming input and output – Supervisor mode, exception and traps – Coprocessor – Memory system mechanism – CPU performance – CPU power consumption- CPU buses – Memory devices – I/O devices – Component interfacing- System Level Performance Analysis- Parallelism. Design Example : Data Compressor.

UNIT III PROGRAM DESIGN AND ANALYSIS 9

Program design – Model of programs – Assembly and Linking – Basic compilation techniques – Program Optimization- Analysis and optimization of execution time, power, energy, program size – Program validation and testing- Example : Software Modem.

UNIT IV PROCESS AND OPERATING SYSTEMS 9

Multiple tasks and Multi processes – Processes – Context Switching – Operating Systems – Priority based Scheduling- RMS and EDF - Inter Process Communication mechanisms – Evaluating operating system performance – Power optimization strategies for processes.

UNIT V HARDWARE ACCELERATORS & NETWORKS 9

Multiprocessors- CPUs and Accelerators – Performance Analysis- Distributed Embedded Architecture – Networks for Embedded Systems: - I^2C, CAN Bus, SHARC link supports, Ethernet, Myrinet – Network based design – Internet enabled systems. Design Example: Digital Still Camera – Video Accelerator.

TOTAL : 45 PERIODS

OUTCOMES:

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

TEXT BOOKS:

1. Wayne Wolf, "Computers as Components - Principles of Embedded Computing System Design", Morgan Kaufmann Publisher (An imprint from Elsevier), Second Edition ,2008.
2. Andrew N Sloss, Dominic Symes, Chris Wright, "ARM System Developer's Guide-Designing and Optimizing System Software", Elsevier/Morgan Kaufmann Publisher, 2008.

REFERENCES:

1. David E-Simon, "An Embedded Software Primer", Pearson Education, 2007.
2. K.V.K.K.Prasad, "Embedded Real-Time Systems: Concepts, Design & Programming", dreamtech press, 2005.
3. Jane.W.S. Liu, "Real-Time systems", Pearson Education Asia.
4. Sriram V Iyer, Pankaj Gupta, "Embedded Real Time Systems Programming", Tata Mc-Graw Hill, 2004.
5. Tammy Noergaard, "Embedded Systems Architecture", Elsevier,2006.

PTEC8014 FOUNDATIONS FOR NANO-ELECTRONICS L T P C
3 0 0 3

OBJECTIVES:

The objectives of the course is to introduce quantum mechanics concepts, approximations and statistical mechanics for understanding nano systems

UNIT I INTRODUCTION TO QUANTUM MECHANICS 9

Particles, waves, probability amplitudes, schrodinger equation, wavepackets solutions, operators, expectation values, eigenfuntions, piecewise constant potentials.

UNIT II SIMPLE HARMONIC OSCILLATORS AND APPROXIMATIONS 9

SHM Operators, SHM wavepacket solutions, Quantum LC circuit, WKB approximations, variational methods.

UNIT III SYSTEMS WITH TWO AND MANY DEGREES OF FREEDOM 9

Two level systems with static and dynamic coupling, problems in more than one dimensions, electromagnetic field quantization, density of states.

UNIT IV STATISTICAL MECHANICS 9

Basic concepts, microscopic, quantum systems in equilibrium, statistical models applied to metals and semiconductors

UNIT V APPLICATIONS **9**

Hydrogen and Helium atoms, electronic states, Atomic force microscope, Nuclear Magnetic Resonance, carbon nanotube properties and applications

TOTAL : 45 PERIODS

OUTCOMES:

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

- Understand concepts of quantum mechanics
- Know about simple harmonic oscillator
- Understand basic concepts of statistical mechanics in metals and semiconductors

TEXT BOOKS:

1. Hagelstein, Peter L., Stephen D. Senturia, and Terry P. Orlando, "Introduction to Applied Quantum and Statistical Physics.", New York, NY: Wiley, 2004.
2. Rainer Waser, "Nanoelectronics and Information Technology", Wiley 2005
3. Michael A. Nielsen and Isaac L. Chuang, "Quantum Computation and Quantum Information", Cambridge University Press, 2000.

REFERENCES:

1. Neil Gershenfeld "The Physics of Information Technology", Cambridge University Press, 2000.
2. Adrian Ionesu and Kaustav Banerjee eds. " Emerging Nanoelectronics: Life with and after CMOS" , Vol I, II, and III, Kluwer Academic, 2005.

PTEC8015 INFORMATION THEORY **L T P C**
3 0 0 3

OBJECTIVES:

- To teach different types of entropy
- To teach entropy in the context of data compresson
- To teach channel capacities over different channels

UNIT I QUANTITATIVE STUDY OF INFORMATION **8**

Basic inequalities, Entropy, Kullback-Leibler distance, Mutual information, Bounds on entropy, Fisher information , Cramer Rao inequality, Second law of thermodynamics , Sufficient statistic , Entropy rates of a Stochastic process .

UNIT II CAPACITY OF NOISELESS CHANNEL **8**

Fundamental theorem for a noiseless channel ,Data compression , Kraft inequality , Shannon-Fano codes , Huffman codes , Asymptotic equipartition , Rate distortion theory

UNIT III CHANNEL CAPACITY **9**

Properties of channel capacity , Jointly typical sequences , Channel Coding Theorem, converse to channel coding theorem, Joint source channel coding theorem

UNIT IV DIFFERENTIAL ENTROPY AND GAUSSIAN CHANNEL 9

AEP for continuous random variables, relationship between continuous and discrete entropy, properties of differential entropy, Gaussian channel definitions, converse to coding theorem for Gaussian channel, channels with colored noise, Gaussian channels with feedback

UNIT V NETWORK INFORMATION THEORY 11

Gaussian multiple user channels , Multiple access channel , Encoding of correlated sources , Broadcast channel , Relay channel , Source coding and rate distortion with side information , General multi-terminal networks

TOTAL : 45 PERIODS

OUTCOMES:

The course teaches types of entropy, data compression and channel capacities over different channels

The student will be capable of understanding and designing various sources ,for various types of channel , and means to achieve full channel capacity

TEXT BOOK:

1. Thomas Cover, Joy Thomas ,"Elements of Information theory ", Wiley, 2005.

REFERENCE:

1. David Mackay , "Information theory, interference & learning algorithms", Cambridge University Press, I edition, 2002.

PTEC8016 INTERNET AND JAVA L T P C
3 0 0 3

OBJECTIVES:

- To introduce various concepts of internetworking with TCP/IP
- To introduce the principles of world wide web
- To introduce Java programming and Java script programming
- To teach students to develop simple web pages with data bases

UNIT I INTERNET WORKING WITH TCP/IP 9

Review of network technologies, Internet addressing, Address resolution protocols (ARP/RARP), Routing IP data grams Reliable stream transport service (TCP) TCP/IP over ATM networks, Internet applications-E-mail, Telnet, FTP, NFS, Internet traffic management.

UNIT II WORLD WIDE WEB 9

HTTP protocol, Web browsers Netscape, Internet explorer, Web site and web page design, HTML,XHTML, XML, CSS, Dynamic HTML, CGI.

UNIT III JAVASCRIPT PROGRAMMING 9

Introduction, Control statements, Functions, Arrays and Objects - Programming

UNIT IV JAVA PROGRAMMING: 9

Language features, Classes, Object and methods. Sub-classing and dynamic binding, Multithreading, Overview of class library, Object method serialization, Remote method invocation, Java Servelets and Javaserver pages.

UNIT V WEB DESIGN AND DATABASES 9

Macromedia Dream Weaver, Web Servers, Databases – SQL, MYSQL, DBI and ADO.NET, Web design.

TOTAL : 45 PERIODS

OUTCOMES:

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

- Implement Java programs.
- Create a basic website using HTML and Cascading Style Sheets.
- Design and implement dynamic web page with validation using JavaScript objects and by applying different event handling mechanisms.
- Design rich client presentation using AJAX.
- Design and implement simple web page in PHP, and to present data in XML format.
- Design and implement server side programs using Servlets and JSP.

TEXT BOOKS:

1. Deitel, Internet and World Wide Web, Pearson Education / PHI, 2007
2. Deitel, "Java How to Program", Pearson Education / PHI, 2006.
3. Herbert Schildt, The complete Reference JAVA 2, Fifth Edition, Tata McGRaw Hill Publishing Com.Ltd, New Delhi.
4. A S Godbole A Kahate, "Web Technoligies, TCP/IP to Internet Application Archtiectures", TMH 2007

REFERENCES:

1. Margaret Levine Young, "Internet The Complete Reference", Tata McGraw Hill, 1999
2. Balagurusamy.E.`Programming with Java, A premier` Second Edition, Tata McGraw Hill,2006
3. Douglas E.Comer,"Internetworking with TCP/IP", Vol 1: 3rd edition, Prentice Hall of India, 1999.
4. Cay S. Horstmann & Gary Cornell, Core Java™ Volume – I & II, Pearson Education, 2006

PTEC8017 MEASUREMENTS AND INSTRUMENTATION L T P C
3 0 0 3

OBJECTIVES:

- To introduce principles of various measurement techniques using analog and digital equipments
- To teach Importance of signal generators and analyzers in measurements
- To emphasize the need for data acquisition systems and optical domain measurement techniques

UNIT I SCIENCE OF MEASUREMENT 9

Measurement System – Instrumentation – Characteristics of measurement systems – Static and Dynamic – Errors in Measurements – Calibration and Standards.

UNIT II TRANSDUCERS 9

Classification of Transducers – Variable Resistive transducers – Strain gauges , Thermistor, RTD- Variable Inductive transducers- LVDT, RVDT,- Variable Capacitive Transducers – Capacitor microphone- Photo electric transducers – Piezo electric transducers – Thermocouple – IC sensors - Fibre optic sensors – Smart/intelligent sensors.

UNIT III SIGNAL CONDITIONING AND SIGNAL ANALYZERS 9

DC and AC bridges – Wheatstone, Kelvin, Maxwell, Hay and Schering.Pre- amplifier – Isolation amplifier – Filters – Data acquisition systems. Spectrum Analyzers – Wave analyzers – Logic analyzers.

UNIT IV DIGITAL INSTRUMENTS 9

Digital Voltmeters – Millimeters – automation in Voltmeter – Accuracy and Resolution in DVM - Guarding techniques – Frequency counter- Data Loggers – Introduction to IEEE 488/GPIB Buses.

UNIT V DATA DISPLAY AND RECORDING SYSTEMS 9

Dual trace CRO – Digital storage and Analog storage oscilloscope. Analog and Digital Recorders and printers. Virtual Instrumentation - Block diagram and architecture – Applications in various fields. Measurement systems applied to Micro and Nanotechnology.

TOTAL : 45 PERIODS

OUTCOMES:

Students should have gained knowledge about the transducers and measurement systems and ability to develop and design measurement systems

TEXT BOOKS:

1. Albert D.Helfrick and William D. Cooper, “Modern Electronic Instrumentation and Measurement Techniques”, Prentice Hall of India, 2007.
2. Ernest o Doebelin and dhanesh N manik, “Measurement systems” ,5th edition ,McGraw-Hill, 2007.

REFERENCES:

1. John P. Bentley, “Principles of Measurement Systems”, Fourth edition, pearson Education Limited, 2005.
2. A. K. Sawhney, “Course In Electrical And Electronic Measurement And Instrumentation”, Dhanpat Rai Publisher, 2000.
3. Bouwens,A.J, “Digital Instrumentation”, Tata Mc-Graw Hill, 1986.
4. David A.Bell, “Electronic Instrumentation and Measurements”, Second edition, Prentice Hall of India, 2007.

PTEC8018 **MEDICAL ELECTRONICS** **L T P C**
3 0 0 3

AIM:
To get knowledge about the role of electronics in the medical field.

OBJECTIVES:
- To gain knowledge about the various physiological parameters both electrical and non electrical and the methods of recording and also the method of transmitting these parameters.
- To study about the various assist devices used in the hospitals.
- To gain knowledge about equipment used for physical medicine and the various recently developed diagnostic and therapeutic techniques.

UNIT I ELECTRO-PHYSIOLOGY AND BIO-POTENTIAL RECORDING 9
The origin of Bio-potentials; biopotential electrodes, biological amplifiers, ECG, EEG, EMG, PCG, lead systems and recording methods, typical waveforms and signal characteristics.

UNIT II BIO-CHEMICAL AND NON ELECTRICAL PARAMETER MEASUREMENT 9
pH, PO_2, PCO_2, colorimeter, Auto analyzer, Blood flow meter, cardiac output,respiratory measurement, Blood pressure, temperature, pulse, Blood cell counters.

UNIT III ASSIST DEVICES 9
Cardiac pacemakers, DC Defibrillator, Dialyser, Heart lung machine

UNIT IV PHYSICAL MEDICINE AND BIOTELEMETRY 9
Diathermies- Shortwave, ultrasonic and microwave type and their applications, Surgical Diathermy Telemetry principles, frequency selection, biotelemetry, radiopill, electrical safety

UNIT V RECENT TRENDS IN MEDICAL INSTRUMENTATION 9
Thermograph, endoscopy unit, Laser in medicine, cryogenic application, Introduction to telemedicine

OUTCOMES:
Upon completion of the course, students will be able to:
- Discuss the application of electronics in diagnostic and therapeutic area.
- Measure biochemical and various physiological information.
- Describe the working of units which will help to restore normal functioning.

TEXTBOOKS:
1. Leislie Cromwell, “Biomedical instrumentation and measurement”, Prentice Hall of India, New Delhi, 2007.
2. John G.Webster,” Medical Instrumentation Application and Design”, 3rd Edition, Wiley India Edition, 2007

REFERENCES:
1. Khandpur, R.S., “Handbook of Biomedical Instrumentation”, TATA McGraw-Hill, New Delhi, 2003.
2. Joseph J.Carr and John M.Brown, “Introduction to Biomedical equipment Technology”, John Wiley and Sons, New York, 2004.

PTEC8019 MICROWAVE ENGINEERING L T P C
3 0 0 3

OBJECTIVES:

- To inculcate understanding of the basics required for circuit representation of RF networks
- To deal with the issues in the design of microwave amplifier
- To instill knowledge on the properties of various microwave components
- to deal with the microwave generation and microwave measurement techniques

UNIT I TWO PORT RF NETWORKS-CIRCUIT REPRESENTATION 9

Low frequency parameters-impedance , admittance, hybrid and ABCD. High frequency parameters-Formulation of S parameters, properties of S parameters-Reciprocal and lossless networks, transmission matrix, Introduction to component basics, wire, resistor, capacitor and inductor,

UNIT II MICROWAVE TRANSISTOR AMPLIFIER DESIGN AND MATCHING NETWORKS 9

Amplifier power relation, stability considerations, gain considerations, noise figure, impedance matching networks, frequency response, T and Π matching networks, microstripline matching networks

UNIT III PASSIVE AND ACTIVE MICROWAVE DEVICES AND CIRCUITS 9

Open, short and matched terminations; coupling probes and loops; power divider; directional coupler; attenuators; phase shifter; circulator; isolator; Impedance matching Devices– Tuning screw, stub and quarter-wave transformers. Crystal diodes and Schottkey diode detector and mixers; PIN diode switch, Gunn diode oscillator; IMPATT diode oscillator and amplifier; varactor diode; Introduction to MIC.

UNIT IV MICROWAVE GENERATION 9

High frequency effects in Tubes, Two cavity klystron amplifier; Reflex klystron oscillator; TWT amplifier, Backwards wave oscillator; Magnetron oscillator – Theory and applications.

UNIT V MICROWAVE MEASUREMENTS 9

Measuring Instruments – VSWR meter, Power meter, Spectrum Analyser, Network Analyser – principles; Measurement of Impedance, frequency, power, VSWR, Q factor, dielectric constant, S-Parameter.

TOTAL: 45 PERIODS

OUTCOMES:

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

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

TEXTBOOKS:

1. Robert E.Colin, “Foundations for Microwave Engineering”, 2 edition, McGraw Hill, 2001.
2. Reinhold.Ludwig and Pavel Bretshko ‘RF Circuit Design”, Pearson Education, Inc., 2006.
3. Guillermo Gonzalez,”Microwave transistor amplifier design “Second edition.Prentice hall,1997.
4. Annapurna Das and Sisir K Das, “Microwave Engineering”, Tata Mc Graw Hill Inc., 2004.

REFERENCES:

1. Thomas H.Lee, “Planar Microwave Engineering”, Cambridge University Press, 2004
2. M.M.Radmanesh,“RF and Microwave Electronics”, Pearson Education, Inc., first edition 2005
3. S.Y.Liao, “Microwave Devices and Circuits”, Pearson Education Limited, third edition 2006.
4. D.M.Pozar, “Microwave Engineering.”, John Wiley & sons, Inc., 2006

PTEC8020 MULTIMEDIA COMPRESSION AND COMMUNICATION L T P C
3 0 0 3

OBJECTIVES:

- To introduce probability related study of the characteristics of text, voice, image and video data
- To introduce various compression schemes for text, voice, image and video
- To analyse the compression schemes
- To introduce communication protocols for voice over internet and multimedia networking

UNIT I MULTIMEDIA COMPONENTS 9

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

UNIT II AUDIO AND VIDEO COMPRESSION 9

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

UNIT III TEXT AND IMAGE COMPRESSION 9

Compression principles-source encoders and destination encoders-lossless and lossy compression-entropy encoding –source encoding -text compression –static Huffman coding dynamic coding –arithmetic coding –Lempel ziv-welsh Compression-image compression

UNIT IV VOIP TECHNOLOGY 9

Basics of IP transport, VoIP challenges, H.323/ SIP –Network Architecture, Protocols, Call establishment and release, VoIP and SS7, Quality of Service- CODEC Methods-VOIP applicability

UNIT V MULTIMEDIA NETWORKING 9

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

TOTAL : 45 PERIODS

OUTCOMES:

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

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

TEXT BOOKS:

1. Fred Halshall, “Multimedia communication - applications, networks, protocols and standards”, Pearson education, 2007.
2. Tay Vaughan, “Multideai: making it work”, 7/e, TMH, 2007.
3. Kurose and W.Ross, “Computer Networking “a Top down approach, Pearson education, 3rd ed, 2005.

REFERENCES:

1. Marcus goncalves “Voice over IP Networks”, McGraw Hill,
2. KR. Rao,Z S Bojkovic, D A Milovanovic, “Multimedia Communication Systems: Techniques, Standards, and Networks”, Pearson Education 2007
3. R. Steimnetz, K. Nahrstedt, “Multimedia Computing, Communications and Applications”, Pearson Education, First ed, 1995.
4. Ranjan Parekh, “Principles of Multimedia”, TMH, 2006

PTEC8021 PARALLEL AND DISTRIBUTED PROCESSING L T P C
3 0 0 3

OBJECTIVES:

- To study the principles of parallel processing
- To understand the concept shared memory architecture in multiprocessing
- To study the parallel programming models.

UNIT I PARALLEL ARCHITECTURE 9

Parallel Computer Models, Program and Network properties, Principles of scalable performance

UNIT II PROCESSORS AND MEMORY HIERARCHY, BUS 9

Advanced processor Technology, Super scalar and vector processor, Memory hierarchy technology, Virtual Memory Technology, Backplane Bus systems.

UNIT III PIPELINING AND SUPER SCALAR TECHNIQUES 9

Linear Pipeline, Nonlinear pipeline, Instruction pipeline, Arithmetic pipeline, Superscalar and super pipeline design, Parallel and scalable architectures- Multiprocessor and Multicomputers.

UNIT IV SOFTWARE FOR PARALLEL PROGRAMMING 9

Parallel programming models, languages, compliers- Parallel Program Development and Environments.

UNIT V DISTRIBUTED SYSTEMS 9

Models, Hardware concepts, communication, synchronization mechanism, case study: MPI and PVM, Distributed file systems.

TOTAL : 45 PERIODS

OUTCOMES:

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

- Know about processors and memory hierarchy technology
- Understand various types of pipelining methods
- Understand models, languages and compilers for parallel programming
- Understand the concepts of distributed systems.

TEXT BOOKS:

1. Hwang. K, “Advanced computer Architecture”, Parallelism, scalability, Programmability, Tata McGraw Hill, 1993.
2. Tanenbaum A.S, “Distributed Operating Systems”, Peaeson Education Asia, 2002.
3. Dezso Sima,Terence Fountain, Peter Kacsuk, “Advanced Computer Architectures”, Pearson Education, 2007.

REFERENCES:

1. V.Rajaraman and C.Siva Ram Murthy, “Parallel Computers Architecture and Programming”, PHI, 2000.
2. Quinn, M.J., “Designing Efficient Algorithms for Parallel Computers”, McGraw - Hill, 2003.
3. Culler, D.E., “Parallel Computer Architecture”, A Hardware – Software approach, Harcourt Asia Pte. Ltd., 1999.

PTEC8022 PRINCIPLES OF DIGITAL IMAGE PROCESSING L T P C
3 0 0 3

OBJECTIVES:

The student should be made to:

- Learn digital image fundamentals.
- Be exposed to simple image processing techniques.
- Be familiar with image compression and segmentation techniques.
- Learn to represent image in terms of features

UNIT I DIGITAL IMAGE FUNDAMENTALS 9

Elements of digital image processing systems, Vidicon and Digital Camera working principles, - Elements of visual perception, brightness, contrast, hue, saturation, mach band effect, Color image fundamentals - RGB, HSI models, Image sampling, Quantization, dither, Two-dimensional mathematical preliminaries, 2D transforms - DFT, DCT, KLT, SVD.

UNIT II IMAGE ENHANCEMENT 9

Point processing, Histograms, Histogram equalization and specification techniques, Noise distributions, Spatial averaging, Directional Smoothing, Median, Geometric mean, Harmonic mean, Contraharmonic mean filters, Homomorphic filtering, Color image enhancement.

UNIT III IMAGE RESTORATION 9

Image Restoration - degradation model, Unconstrained and Constrained restoration, Inverse filtering, Wiener filtering, Geometric transformations-spatial transformations.

UNIT IV IMAGE SEGMENTATION 9

Edge detection, Edge linking via Hough transform – Thresholding - Region based segmentation – Region growing – Region splitting and Merging – Segmentation by morphological watersheds – Hybrid methods

UNIT V IMAGE COMPRESSION 9

Need for data compression, Huffman, Run Length Encoding, Shift codes, Arithmetic coding, Vector Quantization, Transform coding, JPEG standard, MPEG.

TOTAL : 45 PERIODS

OUTCOMES:

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

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

TEXT BOOKS:

1. Rafael C. Gonzalez, Richard E. Woods, , Digital Image Processing', Pearson,Education, Inc., Second Edition, 2004.
2. Anil K. Jain, , Fundamentals of Digital Image Processing', Pearson Education,Inc., 2002.

REFERENCES:

1. Kenneth R. Castleman, “Digital Image Processing", Pearson, 2006.
2. Rafael C. Gonzalez, Richard E. Woods, Steven Eddins, ”Digital Image Processing using MATLAB”, Pearson Education, Inc., 2004.
3. D,E. Dudgeon and RM. Mersereau, “Multidimensional Digital Signal Processing”,Prentice Hall Professional Technical Reference, 1990.
4. William K. Pratt, “Digital Image Processing”, John Wiley, New York, 2002
5. Milan Sonka et al, “Image Processing, Analysis and Machine vision”, Brookes/Cole, Vikas Publishing House, 2nd edition, 1999
6. Alan C. Bovik, “Handbook of image and video processing” Elsevier Academic press, 2005
1. S.Sridhar, “ Digital Image processing” Oxford University press, Edition 2011.

PTEC8023 RF MICROELECTRONICS L T P C

3 0 0 3

OBJECTIVES:

- To introduce radio transceiver architectures
- To understand the design issues in CMOS LNAs , Mixers, Oscillators, PLLs, Synthesizers and Power Amplifiers.

UNIT I TRANSCEIVER ARCHITECTURES 9

Heterodyne and Homodyne architectures, Discrete and CMOS realization passive components for RF, Impedance Matching, Distortion, IIP3 and Blocking Effects, Noise Figure, Noise matching conditions. Friis Formula for cascaded blocks. .

UNIT II CMOS LNAS AND MIXERS 9

Noise Figure of and impedance matching issues CS, CG and differential LNAs, Passive mixers and conversion loss, Active mixers, Gilbert cells, linearity and Noise, Figure of mixers.

UNIT III OSCILLATORS 9

Negative transconductance, nonlinearity and Differential LC tuned oscillators, Ring oscillators and Colpitts oscillator, Quadrature oscillators, Phase noise.

UNIT IV PLLS AND SYNTHESIZERS 9

Phase Detectors, charge pumps and their transfer functions. Synthesizers based on First, second order and third PLLs and stability issues, Introduction to integer and fractional N synthesizers.

UNIT V POWER AMPLIFIERS 9

Class A, B, C, D, E, F and AB power amplifiers, Linearization and impedance matching issues of power amplifiers.

TOTAL : 45 PERIODS

OUTCOMES:

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

- Understand radio transceiver achitectures
- Design and Analyze CMOS LNAs , Mixers, Oscillators, PLLs, Synthesizers and Power Amplifiers.

TEXT BOOK

1. Thomas Lee, "The Design of Radio Frequency Integrated Circuits", Cambridge University Press, Second Edition, 2004

REFERENCE:

1. B. Razavi, ' RF Microelectronics", Pearson Education, 1997.

PTEC8024 ROBOTICS L T P C

3 0 0 3

OBJECTIVES:

- To introduce the electronics and software aspects in robots
- To bring out the different languages for programming robot
- To specify robot requirements in the industry
- To introduce latest state of the art robots

UNIT I SCOPE OF ROBOTS 9

The scope of industrial Robots - Definition of an industrial robot - Need for industrial robots – Economic and Social Issues- applications.

UNIT II ROBOT COMPONENTS 9

Fundamentals of Robot Technology - Automation and Robotics - Robot anatomy - Work volume - Precision of movement - End effectors - Sensors.

UNIT III ROBOT PROGRAMMING 9

Robot Programming - Methods - interlocks textual languages. Characteristics of Robot level languages, characteristic of task level languages.

UNIT IV ROBOT WORK CELL 9

Robot Cell Design and Control - Remote Center compliance - Safety in Robotics.

UNIT V FUTURE TRENDS 9

Advanced robotics, Advanced robotics in Space - Specific features of space robotics systems - long-term technical developments, Advanced robotics in under - water operations. Robotics Technology of the Future - Future Applications.

TOTAL : 45 PERIODS

OUTCOMES:

- After undergoing this course the student will gain the ability to design, test and implement robotics for the industry.
- The concept of robotic programming will help him in the selection of right robot level language for the given system..
- The student will be familiar with the future trends in robotics and give a robotic solution for a given task.

TEXT BOOK:

1. Barry Leatham - Jones, "Elements of industrial Robotics" PITMAN Publishing , 1987.

REFERENCES:

1. Mikell P.Groover, Mitchell Weiss, Roger N.Nagel Nicholas G.Odrey, "Industrial Robotics Technology, Programming and Applications ", McGraw Hill Book Company 1986.
2. Fu K.S. Gonzaleaz R.C. and Lee C.S.G., "Robotics Control Sensing, Vision and Intelligence " McGraw Hill International Editions, 1987.
3. Bernard Hodges and Paul Hallam, " Industrial Robotics", British Library Cataloging in Publication 1990.
4. Deb, S.R. Robotics Technology and flexible automation, Tata Mc GrawHill, 1994.

PTEC8025 SATELLITE COMMUNICATION L T P C
3 0 0 3

OBJECTIVES:

- To introduce orbital mechanics and related parameters
- To introduce the different satellite subsytems
- To introduce different aspects of communication link design, multiple access methods
- To expose some of the important applications of satellites

UNIT I SATELLITE ORBITS AND TRAJECTORIES 8

Orbital Mechanics—Orbit Equations, Kepler's Laws, Orbital Period, Orbits and their types, look angle calculation; Satellite Launch.

UNIT II SATELLITE SUBSYSTEM 10

Satellite Subsystems—AOCS, TTC&M, Power, Transponders, Antennas; earth control-Effects of earth-Perturbation, suntransit, moontransit, satellite power design, MTBF. Basic Equations; System Noise and G/T ratio; Uplink, Downlink and Design for a specified C/N ratio, with GEO and LEO examples; Atmospheric and Rain effects on link performance.

UNIT III LINK DESIGN, MODULATION AND ERROR CONTROL 10

Single link design-double link design aspects, PAM, baseband processing, Digital Modulation for satellite links- BPSK,QPSK and QAM; TDM standards for satellite systems; Error control requirements for satellite link—ARQ, Concatenated Codes, Interleaving, Turbo codes.

UNIT IV MULTIPLE ACCESS FOR SATELLITE COMMUNICATIONS 9

FDM-FM-FDMA - TDMA-structure and system design; Onboard Processing systems; DAMA and PAMA; CDMA-system design and capacity.

UNIT V SOME APPLICATIONS 8

Remote sensing, navigation, scientific and military application, VSAT—Network architecture, Access Control protocols and techniques, VSAT Earth stations; Satellite Mobile Telephony—Global star, DBS/DTH Television, GPS, Weather satellites.

TOTAL : 45 PERIODS

OUTCOMES:

- The student would be able to demonstrate an understanding of the basic principles of satellite orbits , placement and control, satellite link design and the communication system components.
- The student would be able to demonstrate an understanding of the different communication, sensing and navigational applications of satellite and their implementation

TEXT BOOKS:

1. T.Pratt, C. Bostian and J.Allnutt; "Satellite Communications", John Wiley and Sons, Second Edition., 2003.
2. D.Rody, "Satellite Communications", Regents/Prentice Hall; Englewoods (NJ), 1989**.**
3. M. Richharia, "Satellite communication systems", McGraw-Hill Professional , 1999.

REFERENCES:

1. W.L.Pritchard,H G Suyderhoud and R A Nelson, "Satellite Communication System Engineering", Second edition, Prentice Hall, 1993.
2. Tri. T. Ha, "Digital Satellite Communications", McGraw Hill, Second Edition, 1990.
3. B.N.Agarwal, "Design of Geosynchronous Space craft", Prentice Hall, 1986.

PTEC8026 SOFT COMPUTING AND APPLICATIONS L T P C
3 0 0 3

OBJECTIVES:

- This course gives an idea and principles of various soft computing techniques, which are applicable to core areas such as networks , pattern recognition, image processing
- To introduce fuzzy set theory
- To teach different optimization techniques
- To introduce neural networks and neuro-fuzzy modeling
- To teach various applications of computational intelligence

UNIT I FUZZY SET THEORY 10

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

UNIT II OPTIMIZATION 8

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

UNIT III NEURAL NETWORKS 10

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

UNIT IV NEURO FUZZY MODELING 9

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

UNIT V APPLICATIONS OF COMPUTATIONAL INTELLIGENCE 8

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

TOTAL : 45 PERIODS

OUTCOMES:

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

- Apply various soft computing frame works.
- Design of various neural networks.
- Use fuzzy logic.
- Discuss hybrid soft computing.

TEXT BOOKS:

1. J.S.R.Jang, C.T.Sun and E.Mizutani, "Neuro-Fuzzy and Soft Computing", PHI, 2004, Pearson Education 2004.
2. N.P.Padhy, "Artificial Intelligence and Intelligent Systems", Oxford University Press, 2006.

REFERENCES:

2. Timothy J.Ross, "Fuzzy Logic with Engineering Applications", McGraw-Hill, 1997.
3. Davis E.Goldberg, "Genetic Algorithms: Search, Optimization and Machine Learning", Addison Wesley, N.Y., 1989.
4. S. Rajasekaran and G.A.V.Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithms", PHI, 2003.
5. R.Eberhart, P.Simpson and R.Dobbins, "Computational Intelligence - PC Tools", AP Professional, Boston, 1996.
6. Dr.S.N.Sivanandam and S.N.Deepa, "Principles of Soft Computing", Wiley India, 2007.
7. Amit Konar, "Artificial Intelligence and Soft Computing Behaviour and Cognitive model of the human brain", CRC Press, 2008.

PTEC8027 **SPEECH PROCESSING** **L T P C**
3 0 0 3

OBJECTIVES:

- To introduce speech production and related parameters of speech
- To show the computation and use of techniques such as short time fourier transform, linear predictive coefficients and other coefficients in the analysis of speech
- To understand different speech modeling procedures such as Markov and their implementation issues
- To introduce speech recognition and synthesis techniques

UNIT I BASIC CONCEPTS 10

Speech Fundamentals: Articulatory Phonetics – Production and Classification of Speech Sounds; Acoustic Phonetics – acoustics of speech production; Review of Digital Signal Processing concepts; Short-Time Fourier Transform, Filter-Bank and LPC Methods.

UNIT II SPEECH ANALYSIS 10

Features, Feature Extraction and Pattern Comparison Techniques: Speech distortion measures – mathematical and perceptual – Log Spectral Distance, Cepstral Distances, Weighted Cepstral Distances and Filtering, Likelihood Distortions, Spectral Distortion using a Warped Frequency Scale, LPC, PLP and MFCC Coefficients, Time Alignment and Normalization – Dynamic Time Warping, Multiple Time – Alignment Paths.

UNIT III SPEECH MODELING 8

Hidden Markov Models: Markov Processes, HMMs – Evaluation, Optimal State Sequence – Viterbi Search, Baum-Welch Parameter Re-estimation, Implementation issues.

UNIT IV SPEECH RECOGNITION 8

Large Vocabulary Continuous Speech Recognition: Architecture of a large vocabulary continuous speech recognition system – acoustics and language models – n-grams, context dependent sub-word units; Applications and present status.

UNIT V SPEECH SYNTHESIS 9

Text-to-Speech Synthesis: Concatenative and waveform synthesis methods, sub-word units for TTS, intelligibility and naturalness – role of prosody, Applications and present status.

TOTAL: 45 PERIODS

OUTCOMES:

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

- Model speech production system and describe the fundamentals of speech.
- Extract and compare different speech parameters.
- Choose an appropriate statistical speech model for a given application.
- Design a speech recognition system.
- Use different speech synthesis techniques.

TEXTBOOKS:

1. Lawrence Rabinerand Biing-Hwang Juang, “Fundamentals of Speech Recognition”, Pearson Education, 2003.
2. Daniel Jurafsky and James H Martin, “Speech and Language Processing – An Introduction to Natural Language Processing, Computational Linguistics, and Speech Recognition”, Pearson Education, 2002.
3. Frederick Jelinek, “Statistical Methods of Speech Recognition”, MIT Press, 1997.

REFERENCES:
1. Steven W. Smith, “The Scientist and Engineer’s Guide to Digital Signal Processing”, California Technical Publishing, 1997.
2. Thomas F Quatieri, “Discrete-Time Speech Signal Processing – Principles and Practice”, Pearson Education, 2004.
3. Claudio Becchetti and Lucio Prina Ricotti, “Speech Recognition”, John Wiley and Sons, 1999.
4. Ben gold and Nelson Morgan, “Speech and audio signal processing”, processing and perception of speech and music, Wiley- India Edition, 2006 Edition.

PTEC8028 VLSI SIGNAL PROCESSING L T P C
3 0 0 3

OBJECTIVES:
- To design DSP architectures that are suitable for VLSI implementation for a given algorithm
- To learn high-level algorithms that reduce the number of multipliers, area of implementation and power consumption.
- To address issues related to high performance VLSI architectures such as pipelining styles.

UNIT I PIPELINING AND PARALLEL PROCESSING 9

Introduction to DSP Systems, Typical DSP algorithms, Data flow graph representations, Loop bound and Iteration bound, Longest Path Matrix algorithm; Pipelining and Parallel processing of FIR digital filters, Pipelining and Parallel processing for low power.

UNIT II RETIMING AND ALGORITHMIC STRENGTH REDUCTION 9

Retiming - definitions and properties; Unfolding – an algorithm for Unfolding, properties of unfolding, sample period reduction and parallel processing application; Algorithmic strength reduction in filters and transforms – 2-parallel FIR filter, 2-parallel fast FIR filter, DCT algorithm architecture transformation, Odd-Even Merge-Sort architecture, Parallel Rank-Order filters.

UNIT III FAST CONVOLUTION AND COMBINED PIPELINING AND PARALLEL PROCESSING OF IIR FILTERS 9

Fast convolution – Cook-Toom algorithm, Modified Cook-Took algorithm; Pipelined and parallel recursive adaptive filters, Look- Ahead pipelining in first- order IIR filters, Look-Ahead pipelining with power-of-two decomposition, Clustered Look-Ahead pipelining, parallel processing of IIR filters, combined pipelining and parallel processing of IIR filters, pipelined adaptive digital filters, relaxed look-ahead, pipelined LMS adaptive filter.

UNIT IV BIT-LEVEL ARITHMETIC ARCHITECTURES 9

Bit-Level Arithmetic Architectures- parallel multipliers with sign extension, parallel carry-ripple array multipliers, parallel carry-save multiplier, 4x 4 bit Baugh-Wooley carry-save multiplication tabular form and implementation, Bit-serial FIR filter, CSD representation, CSD multiplication using Horner’s rule for precision improvement, Distributed Arithmetic

UNITV NUMERICAL STRENGTH REDUCTION AND WAVE PIPELINING 9

Numerical Strength Reduction – subexpression elimination, Multiple Constant Multiplications, Synchronous pipelining and Clocking styles, Clock skew in edge-triggered single-phase clocking, Wave pipelining.

TOTAL : 45 PERIODS

OUTCOMES:

- Ability to recognize issues of power, area and speed requirements in the development of dedicated and general purpose DSP architectures
- Ability to design and implement algorithms that reduce the number of multipliers, area of implementation and power consumption in DSP structures

TEXT BOOK

1. Keshab K.Parhi, " VLSI Digital Signal Processing systems, Design and implementation ", Wiley, Inter Science, 1999.

REFERENCES:

1. Mohammed Ismail and Terri Fiez, " Analog VLSI Signal and Information Processing ", Mc Graw-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 Tsividis, " Design of Analog - Digital VLSI Circuits for Telecommunication and Signal Processing ", Prentice Hall, 1994.

PTEC8029 WIRELESS NETWORKS L T P C
3 0 0 3

OBJECTIVES:

- To teach advanced Mobile technology of 2.5G and #G techniques
- To introduce $G technologies such as Adhoc and Sonsor networks
- To teach the importance of internetworking between LAN and 3GWWANS

UNIT I 2G & 2.5G EVOLUTION 9

Evolution of cellular communication, GSM – Architecture, Frame format, channels, call progress. CDMA –IS95 Forward and reverse channel, GPRS and EDGE

UNIT II 3G Systems 9

Migration path to UMTS, UMTS Basics, Air Interface, 3GPP Network Architecture, CDMA2000 overview- Radio and Network components, Network structure, Radio network, TD-CDMA, TD-SCDMA.

UNIT III WIRELESS LOCAL AREA NETWORKS 9

Introduction to wireless LANs - IEEE 802.11 WLANs - Physical Layer- MAC sublayer- MAC Management Sublayer- Overview of WIMAX systems.

UNIT IV ADHOC & SENSOR NETWORKS 9

Characteristics of MANETs, Table-driven and Source-initiated On Demand routing protocols, Hybrid protocols, Wireless Sensor networks- Classification, MAC and Routing protocols.

UNIT V 4G & INTERWORKING 9

4G features and challenges, Technology path, Overview of LTE, Interworking OBJECTIVES:s and requirements, Schemes to connect WLANs and 3G Networks, Session Mobility, Interworking Architectures for WLAN and GPRS, System Descripltion, LMDS and MMDS

TOTAL : 45 PERIODS

OUTCOMES:

Ability to understand and implement the concepts and the mathematical principles of almost always used essential fundamental of advanced Mobile technology of 2.5G and 4G such as Adhoc and Sensor networks

TEXT BOOKS:

1. Clint Smith. P.E., and Daniel Collins, "3G Wireless Networks", 2nd Edition, Tata McGraw Hill, 2007.
2. Vijay. K. Garg, "Wireless Communication and Networking", Morgan Kaufmann Publishers, 2007.
3. Rappaport,T.S., "Wireless communications", Pearson Education, Second Edition, 2010.
4. Schiller, " Mobile Communications" , Pearson Education, 2nd edition, 2005

REFERENCES:

1. William Stallings, "Wireless Communications and networks" Pearson / Prentice Hall of India, 2nd Ed., 2007.
2. Dharma Prakash Agrawal & Qing-An Zeng, "Introduction to Wireless and Mobile Systems", Thomson India Edition, 2nd Ed., 2007.
3. Gary. S. Rogers & John Edwards, "An Introduction to Wireless Technology", Pearson Education, 2007.
4. Sumit Kasera and Nishit Narang, " 3G Networks – Architecture, Protocols and Procedures", Tata McGraw Hill, 2007.
5. Jeffrey. G. Andrews ," Fundamentals of WIMAX – Understanding Broadband Wireless Networking", Prentice Hall Publication, 2007.
6. C.Sivaramoorthy and C.S.Manoj, "Adhoc Wireless Networks Architecture& Protocols", Pearson Education, 2008.

PTGE8551 ENGINEERING ETHICS AND HUMAN VALUES L T P C

(Common to CSE, ECE, EEE, Industrial, Textile, Printing, Auto, Mechanical & Civil branches) 3 0 0 3

OBJECTIVES:

The course explains various moral issues through predominant theories. It educates the code of ethics as well as the industry standards and how they can be used for ensuring safety and reducing the risk. The course enunciated the Rights and Responsibilities of individuals. Various other ethical global issues also have been explained along with case studies

UNIT I HUMAN VALUES 10

Morals, values and Ethics – Integrity – Work ethic – Service learning – Civic virtue – Respect for others – Living peacefully – Caring – Sharing – Honesty – Courage – Valuing time – Cooperation – Commitment – Empathy – Self confidence – Character – Spirituality.

UNIT II ENGINEERING ETHICS 9

Senses of 'Engineering Ethics' – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg's theory – Gilligan's theory – Consensus and Controversy – Models of professional roles - Theories about right action – Self-interest – Customs and Religion – Uses of Ethical Theories

UNIT III ENGINEERING AS SOCIAL EXPERIMENTATION 9

Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics – A Balanced Outlook on Law – The Challenger Case Study

UNIT IV SAFETY, RESPONSIBILITIES AND RIGHTS 9

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk – The Three Mile Island and Chernobyl Case Studies

Collegiality and Loyalty – Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination

UNIT V GLOBAL ISSUES 8

Multinational Corporations – Environmental Ethics – Computer Ethics – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Moral Leadership – Sample Code of Conduct

TOTAL: 45 PERIODS

OUTCOMES:

- Ability to understand and implement the concepts and the mathematical principles of almost always used essential fundamental preprocessing algorithms in image processing such as enhancement, denoising, deblurring, segmentation
- Ability to compress the images to the desired level as required in storage and internet transmission of images

TEXTBOOK

1. Mike W. Martin and Roland Schinzinger, "Ethics in Engineering", Tata McGraw Hill, New Delhi, 2003.

REFERENCES:

1. Charles B. Fleddermann, "Engineering Ethics", Pearson Prentice Hall, New Jersey, 2004.
2. Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, "Engineering Ethics – Concepts and Cases", Thompson Wadsworth, A Division of Thomson Learning Inc., United States, 2000
3. John R Boatright, "Ethics and the Conduct of Business", Pearson Education, New Delhi, 2003
4. Edmund G Seebauer and Robert L Barry, "Fundametals of Ethics for Scientists and Engineers", Oxford University Press, Oxford, 2001

WEB SOURCES:

1. www.onlineethics.org
2. www.nspe.org
3. www.globalethics.org
4. www.ethics.org

PTIT8351 **WEB TECHNOLOGY** **L T P C**

(Common to ECE & IT branches) **3 0 0 3**

AIM:

To provide an introduction to Java and basic Web concepts and enable the student to create simple Web based applications.

OBJECTIVES:

- To introduce the features of object oriented programming languages using Java
- To design and create user interfaces using Java frames and applets
- To have a basic idea about network programming using Java
- To create simple Web pages and provide client side validation
- To create dynamic web pages using server side scripting

UNIT I JAVA FUNDAMENTALS 9

Java Data types – Class – Object – I / O Streams – File Handling concepts – Threads – Applets – Swing Framework – Reflection

UNIT II JAVA NETWORKING FUNDAMENTALS 9

Overview of Java Networking - TCP - UDP - InetAddress and Ports - Socket Programming - Working with URLs - Internet Protocols simulation - HTTP - SMTP - POP - FTP - Remote Method Invocation - Multithreading Concepts

UNIT III CLIENT SIDE TECHNOLOGIES 9

XML - Document Type Definition - XML Schema - Document Object Model - Presenting XML - Using XML Parsers: DOM and SAX – JavaScript Fundamentals - Evolution of AJAX - AJAX Framework - Web applications with AJAX - AJAX with PHP - AJAX with Databases

UNIT IV SERVER SIDE TECHNOLOGIES 9

Servlet Overview - Life cycle of a Servlet - Handling HTTP request and response - Using Cookies - Session tracking - Java Server Pages - Anatomy of JSP - Implicit JSP Objects – JDBC - Java Beans - Advantages - Enterprise Java Beans - EJB Architecture - Types of Beans - EJB Transactions

UNIT V APPLICATION DEVELOPMENT ENVIRONMENT 9

Overview of MVC architecture - Java Server Faces: Features - Components - Tags - **Struts:** Working principle of Struts - Building model components - View components - Controller components - Forms with Struts - Presentation tags - Developing Web applications - **Hibernate:** Configuration Settings - Mapping persistent classes - Working with persistent objects - Concurrency - Transactions - Caching - Queries for retrieval of objects - **Spring:** Framework - Controllers - Developing simple applications

TOTAL: 45 PERIODS

OUTCOMES:

Able to program in Java and create simple Web based applications.

TEXT BOOK:

1. Deitel, Deitel, Goldberg, "Internet & World Wide Web How To Program", Third Edition, Pearson Education, 2006.

REFERENCE BOOKS:

1. Marty Hall and Larry Brown, “Core Servlets And Javaserver Pages”, Second Edition
2. Bryan Basham, Kathy Siegra, Bert Bates, “Head First Servlets and JSP”, Second Edition
3. Uttam K Roy, “Web Technologies”, Oxford University Press, 2011.

PTMG8651 TOTAL QUALITY MANAGEMENT L T P C
(Common to Manufacturing, Mechanical, Production, Printing, Industrial, Auto, Leather, CSE, ECE, IT & EEE) 3 0 0 3

AIM

To provide comprehensive knowledge about the principles, practices, tools and techniques of Total quality management.

OBJECTIVES:

- To understand the various principles, practices of TQM to achieve quality.
- To learn the various statistical approaches for Quality control.
- To understand the TQM tools for continuous process improvement.
- To learn the importance of ISO and Quality systems

UNIT I INTRODUCTION 9

Introduction - Need for quality - Evolution of quality - Definition of quality - Dimensions of product and service quality - Basic concepts of TQM – TQM Framework - Contributions of Quality Gurus – Barriers to TQM – Cost of Quality.

UNIT II TQM PRINCIPLES 9

Quality statements - Customer focus –Customer orientation, Customer satisfaction, Customer complaints, Customer retention - Continuous process improvement – PDCA cycle, 5s, Kaizen - Supplier partnership – Partnering, Supplier selection, Supplier Rating.

UNIT III TQM TOOLS & TECHNIQUES I 9

The seven traditional tools of quality – New management tools – Six-sigma: Concepts, methodology, applications to manufacturing, service sector including IT – Bench marking – Reason to bench mark, Bench marking process – FMEA – Stages, Types.

UNIT IV TQM TOOLS & TECHNIQUES II 9

Quality circles – Quality Function Deployment (QFD) – Taguchi quality loss function –TPM – Concepts, improvement needs – Performance measures - BPR.

UNIT V QUALITY SYSTEMS 9

Need for ISO 9000- ISO 9000-2000 Quality System – Elements, Documentation, Quality auditing- QS 9000 – ISO 14000 – Concepts, Requirements and Benefits –Quality Council – Leadership, Employee involvement – Motivation, Empowerment, Team and Teamwork, Recognition and Reward.

TOTAL : 45 PERIODS

OUTCOMES :

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

TEXT BOOK:

1. Dale H.Besterfiled, et al., "Total Quality Management", Pearson Education Asia, Third Edition, Indian Reprint , 2006.

REFERENCE BOOKS:

1. James R. Evans and William M. Lindsay, "The Management and Control of Quality", (6th Edition), South-Western (Thomson Learning), 2005.
2. Oakland, J.S. "TQM – Text with Cases", Butterworth – Heinemann Ltd., Oxford, Third Edition , 2003.
3. Suganthi,L and Anand Samuel, "Total Quality Management", Prentice Hall (India) Pvt. Ltd., 2006 .
4. Janakiraman,B and Gopal, R.K, "Total Quality Management – Text and Cases",Prentice Hall (India) Pvt. Ltd., 2006.

PTCS8075	FOUNDATION SKILLS IN INTEGRATED PRODUCT DEVELOPMENT	L T P C 3 0 0 3

OBJECTIVE:

This program can be offered with all Undergraduate programs/courses for all engineering streams. The FSIPD program aims to improve student's awareness and understanding of the basic concepts involved in Integrated product Development (IPD) by providing exposure to the key product development concepts. Students, who complete this program, will stand a better chance to be considered for jobs in the Engineering industry.

COURSE OBJECTIVES:

After completing this program, the student will be able to obtain the technical skills needed to effectively play the entry level design engineer role in an engineering organization.

The student will be able to:

- Understand the global trends and development methodologies of various types of products and services
- Conceptualize, prototype and develop product management plan for a new product based on the type of the new product and development methodology integrating the hardware, software, controls, electronics and mechanical systems
- Understand requirement engineering and know how to collect, analyze and arrive at requirements for new product development and convert them in to design specification
- Understand system modeling for system, sub-system and their interfaces and arrive at the optimum system specification and characteristics
- Gain knowledge of the Innovation & Product Development process in the Business Context

UNIT I FUNDAMENTALS OF PRODUCT DEVELOPMENT 9

Global Trends Analysis and Product decision - Social Trends - Technical Trends- Economical Trends - Environmental Trends - Political/Policy Trends - Introduction to Product Development Methodologies and Management - Overview of Products and Services - Types of Product Development - Overview of Product Development methodologies - Product Life Cycle - Product Development Planning and Management

UNIT II REQUIREMENTS AND SYSTEM DESIGN 9

Requirement Engineering - Types of Requirements - Requirement Engineering - Traceability Matrix and Analysis - Requirement Management - System Design & Modeling - Introduction to System Modeling - System Optimization - System Specification - Sub-System Design - Interface Design

UNIT III DESIGN AND TESTING 9

Conceptualization - Industrial Design and User Interface Design - Introduction to Concept generation Techniques – Challenges in Integration of Engineering Disciplines - Concept Screening & Evaluation - Detailed Design - Component Design and Verification – Mechanical, Electronics and Software Subsystems - High Level Design/Low Level Design of S/W Program - Types of Prototypes, S/W Testing- Hardware Schematic, Component design, Layout and Hardware Testing – Prototyping - Introduction to Rapid Prototyping and Rapid Manufacturing - System Integration, Testing, Certification and Documentation

UNIT IV SUSTENANCE ENGINEERING AND END-OF-LIFE (EOL)SUPPORT 9

Introduction to Product verification processes and stages - Introduction to Product validation processes and stages - Product Testing standards and Certification - Product Documentation - Sustenance - Maintenance and Repair – Enhancements - Product EoL - Obsolescence Management - Configuration Management - EoL Disposal

UNIT V BUSINESS DYNAMICS ENGINEERING SERVICES INDUSTRY 9

The Industry - Engineering Services Industry - Product development in Industry versus Academia - The IPD Essentials - Introduction to vertical specific product development processes - Manufacturing/Purchase and Assembly of Systems - Integration of Mechanical, Embedded and S/W systems – Product development Trade-offs - Intellectual Property Rights and Confidentiality - Security and configuration management.

TOTAL: 45 PERIODS

OUTCOMES:

The students will be able to

- Define, formulate and analyze a problem
- Solve specific problems independently or as part of a team
- Develop documentation, test specifications and coordinate with various teams to validate and sustain up to the EoL (End of Life) support activities for engineering customer
- Work independently as well as in teams
- Manage a project from start to finish

COURSE MATERIAL AND PEDAGOGY:

- NASSCOM has agreed to prepare / revise the course materials [selected teachers Anna University from major disciplines will be included in the process] as PPT slides for all the UNITS. The PPTs can be printed and given to each student if necessary at a Nominal Fee. This is the best possible material for this special course.

- NASSCOM will train the teachers of Anna University to enable them to teach this course. Atraining programme for nearly 3500 teachers needs to be organized. The team is exploring use of technology including the EDUSAT facility at Anna University.
- The course is to be offered as an elective to all UG Students both in the Constituent Colleges and Affiliated colleges of Anna University.

TEXT BOOKS [INDIAN ECONOMY EDITIONS]:

1. Karl T Ulrich and Stephen D Eppinger, "Product Design and Development", TataMcGraw Hill, Fifth Edition, New Delhi, 2011
2. John W Newstorm and Keith Davis, "Organizational Behavior", Tata McGraw Hill,Eleventh Edition, New Delhi, 2005.

REFERENCES:

1. Hiriyappa B, “Corporate Strategy – Managing the Business”, Authorhouse, USA, 2013
2. Peter F Drucker, “People and Performance”, Butterworth – Heinemann [Elsevier],Oxford, UK, 2004.
3. Vinod Kumar Garg and Venkitakrishnan N K, “Enterprise Resource Planning – Conceptsand Practice”, Prentice Hall India, New Delhi, 2003
4. Mark S Sanders and Ernest J McCormick, "Human Factors in Engineering and Design",McGraw Hill Education, Seventh Edition, New Delhi, 2013.

PTGE8071 DISASTER MANAGEMENT L T P C
3 0 0 3

OBJECTIVES:

- To provide students an exposure to disasters, their significance and types.
- To ensure that students begin to understand the relationship between vulnerability, disasters, disaster prevention and risk reduction
- To gain a preliminary understanding of approaches of Disaster Risk Reduction (DRR)
- To enhance awareness of institutional processes in the country and
- To develop rudimentary ability to respond to their surroundings with potential disaster response in areas where they live, with due sensitivity

UNIT I INTRODUCTION TO DISASTERS 9

Definition: Disaster, Hazard, Vulnerability, Resilience, Risks – Disasters: Types of disasters – Earthquake, Landslide, Flood, Drought, Fire etc - Classification, Causes, Impacts including social, economic, political, environmental, health, psychosocial, etc.- Differential impacts- in terms of caste, class, gender, age, location, disability - Global trends in disasters: urban disasters, pandemics, complex emergencies, Climate change- Dos and Don’ts during various types of Disasters.

UNIT II APPROACHES TO DISASTER RISK REDUCTION (DRR) 9

Disaster cycle - Phases, Culture of safety, prevention, mitigation and preparedness community based DRR, Structural- nonstructural measures, Roles and responsibilities of- community, Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), States, Centre, and other stake-holders- Institutional Processess and Framework at State and Central Level- State Disaster Management Authority(SDMA) – Early Warning System – Advisories from Appropriate Agencies.

UNIT III INTER-RELATIONSHIP BETWEEN DISASTERS AND DEVELOPMENT 9

Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land-use etc.- Climate Change Adaptation- IPCC Scenario and Scenarios in the context of India - Relevance of indigenous knowledge, appropriate technology and local resources.

UNIT IV DISASTER RISK MANAGEMENT IN INDIA 9

Hazard and Vulnerability profile of India, Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management, Institutional arrangements (Mitigation, Response and Preparedness, Disaster Management Act and Policy - Other related policies, plans, programmes and legislation – Role of GIS and Information Technology Components in Preparedness, Risk Assessment, Response and Recovery Phases of Disaster – Disaster Damage Assessment.

UNIT V DISASTER MANAGEMENT: APPLICATIONS AND CASE STUDIES AND FIELD WORKS 9

Landslide Hazard Zonation: Case Studies, Earthquake Vulnerability Assessment of Buildings and Infrastructure: Case Studies, Drought Assessment: Case Studies, Coastal Flooding: Storm Surge Assessment, Floods: Fluvial and Pluvial Flooding: Case Studies; Forest Fire: Case Studies, Man Made disasters: Case Studies, Space Based Inputs for Disaster Mitigation and Management and field works related to disaster management.

TOTAL: 45 PERIODS

OUTCOMES:

The students will be able to

- Differentiate the types of disasters, causes and their impact on environment and society
- Assess vulnerability and various methods of risk reduction measures as well as mitigation.
- Draw the hazard and vulnerability profile of India, Scenarious in the Indian context, Disaster damage assessment and management

TEXTBOOK:

1. Singhal J.P. “Disaster Management”, Laxmi Publications, 2010. ISBN-10: 9380386427 ISBN-13: 978-9380386423
2. Tushar Bhattacharya, “Disaster Science and Management”, McGraw Hill India Education Pvt. Ltd., 2012. **ISBN-10:** 1259007367, **ISBN-13:** 978-1259007361]
3. Gupta Anil K, Sreeja S. Nair. Environmental Knowledge for Disaster Risk Management, NIDM, New Delhi, 2011
4. Kapur Anu Vulnerable India: A Geographical Study of Disasters, IIAS and Sage Publishers, New Delhi, 2010.

REFERENCES

1. Govt. of India: Disaster Management Act , Government of India, New Delhi, 2005
2. Government of India, National Disaster Management Policy,2009.

PTGE8072 **HUMAN RIGHTS** **L T P C**
3 0 0 3

OBJECTIVES :

- To sensitize the Engineering students to various aspects of Human Rights.

UNIT I **9**

Human Rights – Meaning, origin and Development. Notion and classification of Rights – Natural, Moral and Legal Rights. Civil and Political Rights, Economic, Social and Cultural Rights; collective / Solidarity Rights.

UNIT II **9**

Evolution of the concept of Human Rights Magana carta – Geneva convention of 1864. Universal Declaration of Human Rights, 1948. Theories of Human Rights.

UNIT III **9**

Theories and perspectives of UN Laws – UN Agencies to monitor and compliance.

UNIT IV **9**

Human Rights in India – Constitutional Provisions / Guarantees.

UNIT V **9**

Human Rights of Disadvantaged People – Women, Children, Displaced persons andDisabled persons, including Aged and HIV Infected People. Implementation of Human Rights – National and State Human Rights Commission – Judiciary – Role of NGO's, Media, Educational Institutions, Social Movements.

TOTAL : 45 PERIODS

OUTCOMES:

- Engineering students will acquire the basic knowledge of human rights.

REFERENCES:

1. Kapoor S.K., "Human Rights under International law and Indian Laws", Central Law Agency, Allahabad, 2014.
2. Chandra U., "Human Rights", Allahabad Law Agency, Allahabad, 2014.
3. Upendra Baxi, The Future of Human Rights, Oxford University Press, New Delhi.