PHYSICS (PH-101 / PH-201)

L T P
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Unit I

Relativistic Mechanics

Inertial and Non-inertial Frames, Michelson-Morley experiment, Postulates of special theory of relativity, Galilean and Lorentz transformation, Length contraction and Time dilation, Addition of velocities, Mass energy equivalence and variation of mass with velocity.

[6]

Unit II

Interference

Coherent Sources, Conditions of interference, Fresnel's biprism experiment, Displacement of fringes, Interference in thin films – Wedge shaped film, Newton's rings.

[4]

Diffraction

Single, **double slit** and N-slit diffraction, Diffraction grating, Rayleigh's criterion of resolution, Resolving power of Telescope, Microscope and Grating.

[5]

Unit III

Polarization

Phenomenon of double refraction, Ordinary and extra-ordinary rays, Nicol prism, **Brewester's Law, Law of Malus,** Production and analysis of plane, circularly and elliptically polarized light, Fresnel theory, Optical activity, Specific rotation, Polarimeter**(Biquartz and Laurentz half shade polarimeter)**.

[5]

Laser

Principle of laser action, Einstein's coefficients, Construction and working of Ruby and He – Ne Laser.

[3]

Unit IV

Electromagnetics

Ampere's law and displacement current, Maxwell's equations in Integral and Differential forms, Electromagnetic wave propagation in free space and conducting media, Poynting theorem.

[5]

Magnetic Properties of Materials

Basic concept of Para, Dia and Ferro-Magnetism, Langevin's theory of Diamagnetism, Phenomenon of hysteresis and its applications.

[4]

Unit V

X-Rays

Origin of X-rays, Characteristic and continuous X-ray spectra, Diffraction of X-Rays, Bragg's law, Practical applications of X-Rays, Compton effect.

[3]

Wave Mechanics

Wave particle duality, De Broglie concept of matter waves, Heisenberg uncertainty principle, **Wave function and it's admissibility, Orthogonality, Orthonormality and normalization of wave function**, Schrodinger wave equation and its application to Particle in a one dimensional box.

[5]

Books recommended:

1. Robert Resnick: Introduction to Special Theory of Relativity.
2. Aurthur Beiser: Concepts of Modern Physics.
3. Jenkins and White: Optics.
4. Eisberg & Resnick: Physics of Atoms, molecules, solids and nuclei.
5. O. Svelto: An introduction to Lasers.
6. D.J. Griffith: An introduction to Electrodynamics

BASIC ELECTRONICS (EC-101/EC-201)

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UNIT-I

Semiconductor Diode

Mechanism of Conduction in Semiconductors: Mobility and Conductivity, Electrons and holes in an intrinsic semiconductors, Donor and acceptor impurities, Fermi level, Carrier densities in semiconductor, Hall effect, Diffusion, Recombination

Junction Diode

PN junction characteristic and its equation, Effect of Temperature, Depletion Layer, Piecewise linear diode model, Breakdown Mechanism, Zener and Avalanche Breakdown characteristics

Diode as circuit element

Half wave and full wave rectifiers, capacitive filters, Zener diode as a regulator, clamper, clipper and voltage doubler, **special diode**- LED, Schottkey diodes

8

UNIT-II

BJT characteristics and circuits

Transistor Operation, CE, CB, CC configuration and their characteristics, transistor biasing circuits, stability factor, h- parameter model (low frequency), computation of Ai, Av, Ri, Ro of single transistor CE amplifier configuration.

8

UNIT-III

Field Effect Transistors

JFET: Construction and principle of working**,**
Drain / Transfer characteristics, basic amplifier circuits, Biasing of JFET
MOSFET: Enhancement and depletion type N-channel, P-channel, Drain / Transfer Characteristics.

8

UNIT-IV

Switching theory & Logic gates

Number system, Conversion, Compliments, Addition and Subtraction, BCD numbers, Boolean algebra, Canonical form, Logic gates, Minimization of logical function using Karnaugh map

8

UNIT-V

Operational Amplifier

Concept of ideal operational amplifier (inverting and non-inverting) and its applications, Inverter, integrator, differentiator, voltage follower, summing and differential amplifier

Electronic Instruments: Digital Multimeter (block diagram approach), CRO (block diagram and its working),Measurement of voltage, phase, frequency. Double beam CRO (block diagram & its working).

8

Text Books

1. Bolyested& Nashekey / Electronic Devices and Circuit Theory, PHI
2. Milliman & Halkias: Integrated Electronics , Mc Graw Hill
3. J. S. Katre: Electronics Engineering, Tech-Max Publication

Reference Books:

Sedra and Smith / Microelectronic Circuits/ TMH

ELECTRONIC DEVICES AND CIRCUITS (EC-301)

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UNIT-I

PN Junction Diode- minority Carrier injection in semiconductor, Carrier life time, Diffusion length, Continuity equation, potential variation within graded semiconductor, open circuited pn junction diode. Derivation of Diode Current equation with the help of space charge diagram, diode capacitance, switching time

Tunnel diode, Varactor Diode, Schottkey Diode, Light Emitting Diode, photo diode, photo voltaic cell, Laser Diode with their working principle and characteristic

8

UNIT-II

Review of Configuration and characteristics of BJT, Early effect, Ebers-Moll Model, charge control model, biasing the BJT for discrete circuit design, Bias compensation,

Small signal and low frequency analysis of BJT amplifier.

BJT internal capacitance & high frequency model (CE model)

Special amplifier circuit- Darlington pair, cascode amplifier, bootstrapping circuit.

Classification of Amplifiers: Power amplifier, Class A,B,C amplifiers, Coupling methods, Audio Amplifiers, Wide band amplifier.

8

UNIT-III

MOSFET- Review of device structure**,** operation & V I characteristic. Ohmic and saturation region equations. Classification of MOS (NMOS, PMOS, CMOS, principle of working and comparison, MOSFET as an amplifier and switch, biasing of MOS amplifier circuit, CS, CG, CD configuration using NMOS, frequency response of a single stage CS amplifier. MOS internal capacitance and high frequency model (CS configuration only).

8

UNIT-IV

Feedback Amplifiers: Basic concept of feedback, General Characteristics of –ve feedback amplifiers, Classification of feedback, Voltage/Current shunt and series feedback, stability of feedback amplifiers, Multistage Amplifiers, Tuned Amplifier.

8

UNIT-V

Oscillators; Condition for oscillation, generalized form of oscillator circuit, The phase shift oscillator, Hartley & Colpitt's oscillator. The Wein Bridge oscillator, Crystal oscillator, frequency stability. Regulated Power Supplies: Series/Shunt voltage regulator, Monolithic regulators, SMPS,UPS (block diagram)

8

Text Books:

1. Millman & Halkias/ Integrated Electronics / Mc Graw Hill International
2. Sedra, and Smith,/ Microelectronic Circuits/ Oxford University Press/ 5th edition
3. B. P Singh /Solid State Devices & Circuits/ Dhanpat Rai

Reference Books:

1. Shilling & Belove/ Electronic Circuit/ McGraw Hill International
2. Streetman, B.G. Banerjee, Sanjay/ Solid State Electronic Devices/ PHI
3. Salivahanan, Kumar, Suresh & Vallavraj/ Electronic Devices & Circuits/ TMH

ELECTROMAGNETIC FIELD THEORY (EC-302)

L T P
3 1 0

UNIT-I
Electromagnetic Theory
Review of scalar and vector field, dot & scalar products, Other coordinates – cylindrical, spherical, etc, Vector representation of surfaces, physical interpretation of gradient, divergence and curl, Gauss's law, Stocks Theorem, different coordinate systems.

8

UNIT-II
Electromagnetic Fields
Electric field due to point charges, Electrostatic potential, Solution of Laplace and poisson's equation in one dimension, M methods of images applied to plain boundaries, Electric flux density, Boundary conditions, Electrostatic energy.

8

UNIT-III
Magneto-static Fields
Ampere law of force, Magnetic flux density, Ampere's circuital law, Boundary conditions, Faraday's Law, Energy stored in magnetic fields.

8

UNIT-IV
Time-Varying Fields
Continuity equation, Displacement current, Maxwell's equation, boundary conditions, plane wave equation and its solution in conducting and non conducting media.Phasor notation, phase velocity, group velocity, Depth of penetration, conductors and dielectrics,impedence of conducting medium, Polarization, Reflection and refraction of plane waves at plane boundaries, Ponyting vectors, and Poynting theorem.

9

UNIT-V
Transmission Lines
Transmission line equations, Characteristic impedance, Distortion-less lines, Input impedance, lossless lines, Open and short circuited lines, Standing wave and reflection losses, Impedance matching, Application of smith chart, Introduction to guided waves.

8

References

1. Electromagnetic-J.F.D.Kraus
2. Electromagnetic waves and Radiating systems- E.C.Jorden, D.G.Balmein
3. Electromagnetic- Hayt
4. Electromagnetic- J.F.D.Kraus, R.C.Keith

ELECTRICAL AND ELECT1RONICS ENGINEERING MATERIALS (EC-303)

L T P
3 1 0

UNIT-I

Crystal Structure of Materials: Atomic bonding, crystallinity, Miller Indices, x-rays crystallography, Structural imperfections, Crystal Growth. Structures of some semi conducting materials (Si,Ge,GaAs,GaAsP).

5

UNIT-II

Conductivity of Metals: Free electron theory of metals (explanation of ohm's law, thermal conductivity and thermionic emission).factors affecting the electrical conductivity of metals, Thermal conductivity of metals, mechanism of thermal and electrical conductivity, Thermoelectric effect (Seeback,Peltier and Thomson) and its applications, Elementary approach to super conductivity ,London Equation ,High Tc Super Conductivity, Properties and applications of high and low resistivity materials.

8

UNIT-III

Mechanism of Conduction in Semiconductors: Energy Band theory, Band structure for typical semi conducting materials such as Ge, Si, GaAs, GaAsP, classifications of materials using energy band theory, Effect of doping and temperature on mobility, Hall effect, drift and diffusion currents, Einstein relation, Continuity equation, P-N diode, V-I equation and its temperature dependence, Semiconducting materials for LED,LASER and GUNN DIODE, Organic semiconductors.

8

UNIT-IV

Dielectric Properties of Materials: Polarization mechanism and dielectric constant , Behavior of polarization under impulse and frequency switching , Dielectric loss ,Dielectric strength, Spontaneous polarization, Smart material, Piezoelectricity ,introduction to pyroelectricity, Electrostriction, Properties and applications of good insulating materials, Liquid crystals and their applications.

7

UNIT-V

Magnetic Properties of Materials: Origin of permanent magnetic dipoles in materials, Classifications of diamagnetic, Paramagnetic, Ferromagnetic, Antiferromagnetic and Ferrimagnetic. Magnetic anisotropy, Hysteresis loop and its applications, Magnetostriction and its applications, soft and hard magnetic materials,Ferrites, Garnets, Langevin theory of diamagnetism and paramagnetism. Weiss molecular field theory of paramagnetism. Weiss theory of Ferromagnetism

8

Reference Books:

1. A. J. Dekker, Electrical Engineering Materials, PHI.
2. C.S Indulkar & S.Thiruvegada, An introduction electrical Engg Materials, S. Chand & Co.
3. S.O Kasap, Principles of Electronic Materials & Devices, TMH
4. L.V Azaroff, Introduction to Solids, Mc Grow Hill Company
5. Charles Kittle, Quantum theory of Solids, John Wiley and Sons

DIGITAL ELECTRONICS (EC-401)

L	T	P
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UNIT-I

Wave shaping: RC high pass circuit, low pass circuit, Response to sine, step, pulse and square wave inputs, RC circuits as a differentiator, integrator and compensated attenuator

Number Systems, Review of Boolean Algebra, Minimization of Boolean functions, don't care input combinations, Tabular method, K-map

8

UNIT-II

Logic Families: Use of diodes, Transistor and MOSFET as a digital circuit element; Formation of basic logic gates and study of their input-output characteristics, fan-in, fan-out, noise margin, circuit concept and open collector output circuits; interfacing between logic families; power consumption, gate delay

8

UNIT-III

Combinational Circuits: Decoders, Encoders, Three state devices, Multiplexer, Demultiplexer, comparator, Adder, Sub tractor, ALU hazards and its avoidance

8

UNIT-IV

Sequential Circuits: Latches, Flip Flops, Shift Registers, Counters; Synchronous and asynchronous sequential circuits, Multivibrators.

8

UNIT-V

Memory: ROM, PROM, EPROM & EEPROM, RAM, SRAM and DRAM, PLA, PAL, PLD, FPGA, Bi-COMS circuits.

8

References:

1. Mano M Morris / " Digital Design"/ Prentice Hall
2. Mano M Morris / " Digital Logic and Computer Design" / PHI
3. Gopalan , K. " Gopal / Introduction to Digital Microelectronics Circuits" / TMH
4. Jacob Millmam and Herbert Taub / Pulse, Digital & switching wave forms/ TMH
5. Malvino, A. P and Leach. Donald P./ "Digital Principles and Applications/TMH
6. R. P Jain , Modern Digital Electronics, TMH
7. J. M Yarbrough, Digital Logic: Applications and Design/ Vikas Publication

SIGNALS & SYSTEMS (EC-402)

L T P
3 1 0

UNIT-I

Fourier Transform, basic theorem, application of LTI networks frequency response, Fourier series representation of periodic non- sinusoidal signal, application to analysis of LTI networks

Discrete time Fourier transform: representation of a periodic signals, Fourier transform of periodic signals, properties of discrete Fourier transform

8

UNIT-II

Time and frequency characterization

Magnitude- phase representation of Fourier transform, frequency response of LTI systems, time domain properties of ideal frequency selective filters, time domain and frequency domain aspects of ideal and non-ideal filters, first order and second order continuous and discrete systems

8

UNIT-III

Random Variable & Process

Random variable, random process, correlation function (auto & cross), cumulative distribution function, probability function, joint cumulative & distributive and probability density functions.

8

UNIT-IV

Sampling

Sampling theorem, reconstruction of signals from samples, effect of under sampling, discrete time processing of continuous time signals

Continuous and discrete time signals, transform of the independent variable, continuous and discrete time systems, basic system properties

8

UNIT-V

Introduction to Z- transform properties, inverse Z- transform, analysis and characterization of decretive LTI systems, realization of discrete time systems

8

References:

1. A. V Oppenheim, A.S Willsky and S. H Nawab, ‘ Signals and Systems’, Prentise Hall
2. Haykins, ‘ signals and systems’, John Wiley

MEASUREMENT AND INSTRUMENTATION (EC-501)

L	T	P
3	1	0

UNIT-I

Electronic Instrument Systems

Standards of Measurement of Mass, Length, Volume, Time and Frequency, Electrical Standards, Standards of Temperature and Luminous Intensity, IEEE standards, Engineering Analysis of Instrument Systems, Experimental Errors, Minimization of Errors, Frequency Response and Calibration of Instruments systems. 4

Transducers

Classification: Displacement, Resistive, Capacitive, Inductive, Piezo-Electric, piezo-Resistive and Photo-Electric Transducers, Crystal Oscillator, Semiconductor Transducers. 4

UNIT-II

Bridge Measurements

Wheatstone Bridge, Kelvin Bridge, Guarded Wheatstone Bridge, AC Bridges: Maxwell Bridge, Hay Bridge, Schering Bridge, Wien Bridge. 3

High Frequency Measurements

Problems in High Frequency Measurement, RF Power and Voltage Measurements, RF Impedance Measurement, Q Meter, Digital Voltmeter, Time, Frequency and Phase Measurements, Measurement on CRO, Group Delay Measurement, Digital Storage Oscilloscope. 5

UNIT-III

Measurement of Non Electrical Quantities

Measurement of Temperature: Resistance Thermometer, Thermocouple, IC Sensor, Radiation Method (**Pyrometer)** 3

Measurements of Pressure, Fluid Flow, Force, Torque, Displacement, Velocity and Acceleration. 4

UNIT-IV

Measurement of Amplifier and Receiver Characteristics, Data Distribution and Bus Structure, RS-232, IEEE488 Interface, PC Based Acquisition System, Data Transmission, D to A and A to D convertors, pulse Modulation Techniques. 5

Telemetry, Tracking and Command. 3

UNIT-V

Signal Generation

Frequency Synthesized Signal Generator, Frequency Divider Generator, Signal Generation Modulation, Sweep Frequency Generator, Pulse and Square wave Generators, Function Generator. 3

Display Devices, Signal Analyzer, wave Analyzer, Harmonic Distortion Analyzer, Spectrum Analyzer. 3

Microprocessor Based Instrumentation, Computer Controlled Test System, Fiber Optic Measurements. 3

Books:

1. Helric & Cooper/ "Modern Electronic Instrumentation & Measurement Techniques"/ PHI
2. E.O. Doeblin/ " Measurement Systems"/ MC Graw Hill
3. Oliver & J.M. Cage/ "Electronic Measurement And Instrumentation"/ MC Graw Hill.
4. Ranjan C.S./ "Instrumentation Devices & Systems" / Tata MC Graw Hill.

INTEGRATED CIRCUITS (EC-502)

L	T	P
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UNIT-I

Review of Basic Integrated Circuits: Bipolar, NMOS, CMOS and BiCMOS, use of composite structure, cross-section, layout and equivalent circuit for Darlington pair, Differential pair, Multimeter and Multicollector for BJT and MOS.

6

UNIT-II

BJT and MOS single stage analog amplifiers, differential amplifiers current mirrors and active loads, Widlar, cascaded and Wilson current source, current sources as active loads, Multistage amplifiers, gain and frequency response of the amplifier and other characteristics.

8

UNIT-III

BJT Operational Amplifier, DC analysis and AC analysis of the 741 Op Amp, gain and frequency response, slew rate. Two satge MOS operational amplifier, CMOS Op Amp design, Folded-Cascade load, Bi CMOS Op Amp.

IC Operational Tranconductance Amplifier (OTA) using BJT and CMOS, Applications of Op Amp and OTA, Active Filters.

10

UNIT-IV

Analog Multiplier with BJT Gilbert Multiplier (GM) cell. GM cell as a Balanced Modulator and Phase detector.

Analog Multiplier using NMOS/CMOS devices, Voltage Controlled Oscillator, ICPLL 560,565, BJT/CMOS Bistable Multivibrators and Schmitt Trigger. BJT/CMOS Monostable and Astable circuits, crystal controlled square wave generators, IC Timer (555) as a Monostable, Asatable Multivibrators.

9

UNIT-V

Data Converter ICs, Sample and Hold circuit, DAC: Binary-weighted resistors, R-2R Ladder network & others. ADC: Feedback converter, Dual slope ADC, Flash Converter, successive approx. ADC, IC Voltage Regulators, Circuit analysis of 723 and 78/79

8

Reference Books:

1 A.S.Sedra and K.C.Smith, Microelectronics Circuits, Oxford University press,2003
2 Gray,Ilurst,Lewis& Meyer, Analysis and Design of Analog Integrated Circuits, John Wiley
3 B.Razavi,Design of Analog CMOS Integrated Circuits, Nc Graw-Hill Int.Ed.
4 Gayakwad, Op Amps and Linear Integrated Circuits.

COMMUNICATION SYSTEM (EC-503)

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UNIT-I

Review of Signals

Continuous & Discrete Signals, sampling of Signals, Fourier Transform and its properties, Correlation, Auto Correlation, Cross Correlation, CDF and PDF, Power spectral density

4

UNIT-II

Elements of Communication Systems

Need of modulation and applications, AM: Baseband and carrier communication, DSB, SSB, VSB and AM, calculation of BW, modulation index and power, AM Transmitter and Receiver: Balanced modulator, Ring modulator, Carrier Acquisition, Superheterodyne receiver.

8

UNIT-III

Angle Modulation

Types of angle modulation, mathematical representation of FM, frequency spectrum of FM wave, Carson Rule, WBFM, NBFM, Phase modulation.

Generation of FM: Direct method, stabilized reactance modulator method, indirect method, FM Receivers, Amplitude limiting, Basic FM Demodulators, Ratio Detector, Pre-emphasis & De-emphasis, Superheterodyne receiver, comparison of AM & FM.

8

UNIT-IV

Noise: External noise; Atmospheric, Extraterrestrial, Industrial noise.

Internal Noise: Thermal agitation, Shot, Transit-time noise.

Calculation: Addition of noise due to several sources, Addition of noise due to several Amplifiers in cascade, Noise in Reactive Circuits.

Noise Figure: S/N Ratio, Definition of Noise Figure, Calculation of Noise Resistance, Noise temperature, Noise in AM, FM & PM.

10

UNIT-V

Pulse Communication:

Information Theory: Information in Communication System, Coding, Noise in Information carrying channel.

Pulse modulation: Pulse Amplitude modulation (PAM), Pulse Width modulation (PWM), Pulse Position modulation (PPM), Pulse Code modulation (PCM), comparison of modulation Systems.

10

Reference Books:

1. J.F.Kennedy,Electronic communication System; TMH
2. BP Lathi, Modern Analog Digital communication; Oxford Publication.
3. A.B. Carlson, communication System; TMH.
4. Taub & Schilling, Principles of communication System; TMH.
5. Singh & Sapre, Analog Digital communication Systems; TMH.

MICROELECTRONICS TECHNOLOGY (EC-504)

L T P
3 1 0

UNIT-I

Introduction to Integrated Circuit-Bipolar, MOS, BICMOS, basic circuits and structures, Silicon Wafer preparation and characterization-lapping, polishing, cleaning, resistivity measurement using 4Point probe ,crystal orientation, n type, p type, defects in crystal

8

UNIT-II

Thermal Oxidation: Dry, Wet and Steam oxidation, estimation of oxide layer thickness, furnace for oxidation system, plasma oxidation, dopant distribution at the interface Diffusion of Dopant: Diffusion equation, dopant profile for constant source and limited source, diffusion, sheet resistance, diffusion furnace and accessories for solid, liquid and gaseous sources, measurement of sheet resistance

ION IMPLANTATION: Ion implantation equipment, ion implantation techniques, range and distribution, dopant profile, annealing

8

UNIT-III

EPITAXY: Epitaxial reactor, Vapor Phase epitaxial processes for doped silicon, donor and acceptor atoms redistribution during epitaxy

CHEMICAL VAPOUR DEPOSITION CVD processes for polysilicon and dielectric films in IC fabrication

8

UNIT-IV

PHOTOLITHOGRAPHY AND MASK MAKING: Techniques for pattern transfer mask making, negative and positive photoresist chemicals, etching techniques. Introduction to Electron Beam and X-Ray Lithography

8

UNIT-V

Basic Techniques for Bipolar Integrated Circuits Multiemitter, and Schottkey transistor formations for TTL and IILCircuits MOSFET and MOSIC FABRICATION TECHNIQUES: Metal gate, poly silicon gate, process steps for making N-Channel, P-Channel and CMOS integrated circuits Faults in Integrated Circuits, Fault Detection and Fault Modeling Die Bonding and Wire Bonding, Dicing and Encapsulation, Types of packages for SSI to VLSI chips

8

References:

1. S Gandhi, VLSI fabrication principles (II edition, John Wiley, 1994)
2. S A Cambell, The science and engineering of Microelectronic fabrication by Oxford University Press 1996
3. S M Sze(ED.) VLSI technology , Mc. Graw Hill International Student Ed., 1988

ANTENNA AND WAVE PROPAGATION (EC 506)

L T P
3 1 0

UNIT-I

Electromagnetic Field Radiation: Radiation from an oscillating current element, short monopole and dipole, half wave dipole, Radiation Pattern, Power Radiated, Radiation Resistance

Antenna Terminology: Antenna theorems, Supervisions, Reciprocity, Isotropic Radiator, Directive gain, Power Gain, Efficiency, Effective Area, Effective Length, Bandwidth, Beam width & Polarization, Directional pattern, Directivities, Effective Length, Antenna Impedance.

8

UNIT-II

Antenna Arrays: Uniform Linear Arrays, Broad side, End fire, Collinear, Parasitic arrays, Binomial arrays, Pattern multiplication.

Practical Antenna: VLF, LF, & MF Transmitting antennas, Vertical Radiator, Effect of ground, Grounded Antennas, Grounding systems, Effect of Antenna Height, Antenna Top Loading and tunning, Antenna Array in MF Band. Antenna coupling at medium frequency.

8

UNIT-III

Types of Antenna: Traveling wave antenna, long wire Harmonic antennas, rhombic antenna, VLF & UHF Antenna: Folded dipole, Yagi- Uda, Corner reflector, Helical frequency independent, Log-periodic Antenna, Microwave Antennas, Parabolic reflector, feed systems and Lens Antennas

8

UNIT-IV

Radio wave Propagation: Modes of radio wave propagation: Ground wave & surface Wave Propagation, Effect of Earth & Terrain, Troposphere, ionosphere propagation, Structure of ionosphere, Sky wave propagation, critical frequency, Effect of Earth's Magnetic Field, Virtual Height , Maximum Usable Frequency, Skip distance, Noise, precipitation, Static fading, Multi-Hop Propagation, Space wave propagation Range, Effect of Earths Curvature, Troposphere Propagation, Duct Propagation

8

UNIT-V

Antenna Measurement: Instrumentation, Amplitude Pattern, Phase Measurements, Absolute- Gain Measurements, Gain- Transfer (Gain Compression) Measurements, Directivity Measurements, Impedance Measurements, Current Measurements, Polarization Measurements, Scale Model Measurements.

8

Reference:

1. Jordan EC Balmyain Kg/ Electromagmnetic Wave and Radiating systems
2. Hayt Jr. William H/E Engineering Electromagnetics/ TMH
3. Krauss J. D / Antennas/TMH
4. Parasd K .D / Antenna s and wave and propagation / Khanna Publications
5. Chatterjee Rajeswari/ Antenna Theory and Practices/ Wiley Eastern
6. R. Collin / Antenna and radio wave Propagation/ TMH

DIGITAL SIGNAL PROCESSING (EC-601)

L T P
3 1 0

UNIT-I

Discrete Time Signals and System:

Discrete time signals, Sequences, Sampling and reconstruction of continuous time signals. Discrete time systems. Time domain characterization of discrete time systems, discrete random signals, mean, Variance, Covariance and power spectral density.

8

UNIT-II

Frequency Domain Analysis:

Review of DFT algorithm, Frequency response of LTI systems, Frequency selective LTI systems. All pass systems, Minimum, Maximum and Mixed
Phase systems.

8

UNIT-III

DESIGN OF IIR FILTERS:

IIR filters design by impulse invariance, bilinear transformation, Matched Z Transform, Butterworth filter, Chebyshev filters and Elliptic filters.

8

UNIT-4

DESIGN OF FIR FILTERS:

Symmetric and Antisymmetric FIR filters. Window function and their characteristics. Design of linear phase FIR filters using windows and frequency sampling method. Realization of IIR and FIR system.

8

UNIT-5

Multirate Digital Signal Processing:

Introduction, Decimation, Interpolation, Sampling rate conversion, Design and Implementation of Direct Form, FIR Filter structure and poly phase filter structure.

8

Books:

1. Digital Signal Processing: Principles, Algorithms and Applications, G Prokis &DG Manolakis, PHI.
2. Discrete Time Signal Processing: Oppenheim &Schafer, PHI.
3. Theory and Applications of Digital Signal Processing : Rabiner and B.Gold, PHI.
4. Digital Signal Processing : S.K. Mitra, MH-IT

DIGITAL COMMUNICATION (EC-602)

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3 1 0

UNIT-I

Elements of Digital Communication and Information Theory: Model of a Digital Communication, Logarithmic measure of information System, Entropy and Information Rate, Conditional Entropy and Redundancy, Source Coding theorem, Prefix coding and Kraft Inequality, Shannon-Fanno and Huffman Coding for nth order expressions, maximum entropy of a continous source(with Gaussian distribution), Entropy of band limited white Gaussian noise, mutual information & channel capacity of a discrete memoryless channel, continous AWGN channel, channel coding theorem, Hartely-Shannon law.

8

UNIT-II

Waveform coding techniques: Discretization in time and amplitude, Linear quantizer, quantization noise, power calculation, signal to quantization ratio, non uniform quantizer, A-law, μ-law compounding, encoding, PCM, bandwidth of PCM, differential pulse code modulation, delta modulation, idling noise and slope overload, adaptive delta modulation, adaptive DPCM, comparison of PCM & DM.

Digital Multiplexing: Fundamentals of Time Division Multiplexing, Electronic Commutator, Bit, Byte Interleaving T1 Carrier System, Synchronization and Signaling of T1, M12 multiplexer.

8

UNIT-III

Digital Base Baseband Transmission: Line Coding and Its Properties, NRZ & RZ Types, Signalling Format For Unipolar, Polar, Bipolar(AMI) & Manchester Coding and Their Power Spectra (No Derivation) HDB & BBZS signaling, ISI, Nyquist Criterion For Zero ISI & Raised Cosine Spectrum, Matched Filter Receiver, Derivation of Its Impulse Response and Peak Pulse Signal to Noise Ratio. Correlation Detector Decision threshold and Error Probability for unipolar Signalling.

8

UNIT-IV

Digital Modulation Technique: Types of Digital ModulationS, Wave forms for Amplitude, Frequency and Phase Shift Keying, Gram-Schmitt Orthogonalization Procedure, detection of known signals in noise, maximum likelihood detector, Method of Generation and Detection of Coherent & Non-Coherent Binary ASK, PSK & FSK signals, Differential Phase Shift Keying, QPSK & MSK, Probability of Error and Comparison of Various Digital Modulation Techniques.

8

UNIT-V

Error Control Coding: Error Free Communication Over Noise Channel, Hamming sphere, Hamming distance and Hamming bound, Relation Between Minimum Distance and error detecting & Correcting Capability, Linear Block Codes, encoding and syndrome decoding, Cyclic codes, Encoder and Decoder For systematic Cyclic Codes, Convolution codes, code Tree and Trellis Diagram, Viterbi and Sequential Decoding, Burst error detection and correction.

8

Text Book:

1. Digital Communication Systems: Haykin Simon, John Wiley.
2. Communication Systems: Haykin Simon, John Wiley
3. Modern Digital & Analog Communication Systems: Lathi, B.P Oxford University Press
4. : Analog & Digital Communication Systems: Singh R.P. & Sapre S.D. Tata McGraw-Hill
5. Digital Communication: Prokis, Tata McGraw-Hill

MICROPROCESSORS AND APPLICATIONS (EC-603)

L	T	P
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UNIT-I

Introduction to Microprocessor: Introduction to 8-bit & 16 bit Intel microprocessors, pin configuration, architecture, register organization ,PSW, machine instructions and addressing modes, instruction format execution, timing & control, bus interface, memory organization, interrupt structures and their modeling, 8088 and 8087 processor.

10

UNIT-II

Assembly Language Programming: Instruction format, classification and description of instructions, assembler directives and operators, assembly process, translation of assembler instructions.

8

UNIT-III

Modular Programming: Linking and relocation, stacks, procedures, definitions and operators, interrupts and routines, macros, program design and examples.

7

UNIT-IV

I/O Interfacing: I/O interfacing programmed and interrupt driven I/O, DMA, parallel (8255 PPI), and series (8250/8251, stndard RS232) I/O, 8259, 8237 and 8253/8254 controllers, memory interfacing and organization.

10

UNIT-V

Microprocessor Interfacing and Application:

Keyboard and alphanumeric display interfacing, opamp characteristics ,interfacing of integrator, interfacing of light and temperature sensors, A/D(MC 1508L8/MC 1408L) and D/A(DAC 1208)conversions.

Advances microprocessor: Introduction to, and the features of 80X86 and Pentium processors.

10

References:

1. Liu & Gibson/Microcomputer Systems 8086/8088 Family/PHI 2nd edition.
2. Hall, D.V./Microprocessor and Interfacing, 2nd Ed. (revised)/MGH.
3. B.P. Singh/Microprocessor Interfacing and Applications/New Age Int.

WIRELESS COMMUNICATIONS (EC-604)

L	T	P
3	1	0

UNIT-I

Introduction to RF propagation, multi-path fading, mobile channel description & analysis, RF circuits & systems

6

UNIT-II

Mobile communication concepts, cellular engineering, cellular concepts, Frequency allocation, Spectrum efficiency, Speech coding. Modulation/Demodulation techniques, multiple access techniques-TDMA/CDMA.

10

UNIT-III

Error control coding for mobile channel, communication applications, capacity of cellular communication networks, Mobile communication standards.

8

UNIT-IV

Wireless data communication systems, Wireless multimedia, ATM & IP, Paging,Wireless local loops

6

UNIT-V

Mobile satellite communication, Third generation cellular systems, GSM systems, Universal mobile telecommunication systems.

8

REFERENCES:

1. William C.Y.Lee/Mobile cellular telecommunications Analog & Digital systems/Mc Graw Hill.
2. Pandya/Mobile & personal communication Services & system/PHI.
3. Feher/ Wireless Digital communications: Modulation & spread spectrum Applications/PHI.

DATA COMMUNICATION NETWORK (EC-701)

L	T	P
3	1	0

UNIT-I

Basic concepts- Components, Networks, Protocols and standards, Line configuration, Topologies, Transmission modes, Categories of networks

ISO-OSI-Model- OSI layered architecture, Function of each layer, TCP/IP Protocols, Design issues for different layers

Physical layer- Analog/Digital modulation formats, Data rate, Baud rate, Mediums for communication, Synchronous/Asynchronous communication

8

UNIT-II

Data Link Layer: Services provided to network layer, framing, Flow Control: stop & wait, sliding window, Error control: ARQ, go-back n, selective repeat, SLIP, PPP

MAC sub layer-contention protocols: ALOHA, CSMA, CSMA/CD contentions free protocols; a bitmap protocol, binary countdown, Limited contention protocols; adaptive tree walk

8

UNIT-III

Project IEEE 802-802.1: internetworking, 802.2: LLC, 802.3: CSMA/CD, 802.4: token Bus, 802.5: Token Ring, 802.6: DQDB, 802.11: Wireless LAN, Ethernet LAN, Switched Ethernet, Fast Ethernet

Internetworking Devices: Repeaters, Bridges, Switches, Routers, Gateways

8

UNIT-IV

Network Layer: Services provided to Transport layer, Logical Addressing, Routing Distance vector routing, Link state routing, Dijkstra Algorithm, Hierarchical Routing, Routing for mobile hosts, Congestion control; Leaky Bucket, Token Bucket Algorithm, Congestion control in virtual circuit subnet, choke packets, IP addresses and IP protocols.

8

UNIT-V

Transport layer: Services provided to user support layers, Connection and Connection less services,addressing,establishing releasing connection, Flow control & buffering,Multiplexing,Crash recovery TCP & UDP, Introduction to Network Security

8

Text Books:

1. Data Communication & Networking, IV Edition, B.A.Forouzan, TMH
2. Computer Networks; Tanenbaum, PHI

Reference Book: Understanding Data Communication & Networking; William A. Shay, Vikas Publishing House Pvt. Ltd.

MICROWAVE ENGINEERING (EC-702)

L T P
3 1 0

UNIT-I

Propagation through wave guide: Solution of wave equation in rectangular co-ordinates, derivation of field equation for TE and TM modes, degenerate and dominant mode, power transmission, power loss, excitation of wave guides, on excitation of TEM mode in waveguides, Introduction to circular waveguides, strip and micro strip lines. Microwave cavity resonators: Rectangular and cylindrical cavities, quality factor, excitation of cavities.

8

UNIT-II

Microwave components: System scattering parameters and their properties, E plane, H plane, Hybrid Tee, Hybrid ring, Directional coupler, Isolators, Circulators, modeling of Microwave components: Wave guide coupling, window, irises, attenuation and phase shifter.

8

UNIT-III

Microwave Tubes: Limitation of Conventional Tubes at microwave frequency, microwave tubes, klystron, reflex klystron, magnetron, TWT, BWO, and Principle of operation, performance characteristic and application with schematic diagram.

8

UNIT-IV

Microwave Measurement:

Measurement of power (low and high), VSWR, wavelength, Impedance, frequency Attenuation.

8

UNIT-V

Microwave Semiconductor Devices: Tunnel diode, PIN, Gunn Diode, IMPATT and TRAPATT; their principle of operation, characteristics and application.

8

REFERENCES:

1. Liao S.Y/Microwave devices and circuits/PHI.
2. Rizzu/Microwave Engg. : Passive circuits/PHI
3.M.L. Sisodia/Microwave/New Age International.

VLSI DESIGN (EC-703)

L T P
3 1 0

UNIT-I
Introduction of integrated circuit, Brief review IC fabrication process, oxidation, diffusion, ion implantation, epitaxy, metallization, photolithography, photo masking, Fabrication of R, C ,diode, BJT, MOS, CMOS

8

UNIT-II
Review of MOS Principles and Technology: MOS operation type, characteristics, Parasitic, scaling of MOS and its effects, Layout rule, Stick diagram & layout of circuits, Micron and Submicron Technologies

8

UNIT-III
MOS Based Circuits: Depletion load and CMOS inverter, characteristics, design consideration, NAND, NOR, circuits and design, various circuits methodologies, Physical limitation, Circuit Simulation

8

UNIT-IV
System and subsystems design consideration, VLSI approach to system design. Combinational and sequential circuits, Design of standard Cell for LSI, VLSI circuits, Use of CAD software, Memory circuits and their layouts.

8

UNIT-V
ASICS, PLA, PAL, PGA, FPGA, simple examples of VLSI circuits' faults, testing and reliability

8

References:

1 DA Pucknell & Eshraghian, Basic VLSI Design PHI 2001
2 Introduction to VLSI circuits JP Uyemura, John Wiley, India 2005
3 Wayne Wolf Modern VLSI Design System on Silicon 2d Ed, Additional-Wesley 2000
4 NHE Weste & K. Eshraghian, Principles of CMOS Design @d Ed Addison
5 K.Gopalan Intr. To Digital Microelectronics Circuits TMH 1998

NANO ELECTRONICS (EC-707)

L	T	P
2	1	0

UNIT-I

The development of microelectronics, region of nano structure, challenge initiated by nano electronics, Band diagram of semiconductor technological process for micro miniaturization. Estimated optoelectronics,

Basis of Nano electronics: Electromagnetic fields & photons, Quantization of Action, charge and flux, electron behaving waves(Schrodinger Equation), Electrons in Potential wells, photons interacting with Electrons in solids, diffusion process, Data and bits, data processing. 7

UNIT-II

Biochemical and quantum- mechanical computers, DNA computer, parallel processing, quantum computer Parallel Architectures for Nanosystems, Mono and multiprocessor systems, Architecture of parallel processing in Nanosystems, Processors with large Memories , SIMD and PUP Architecture Soft computing and Nanoelectronics, Fuzzy systems, Evolutionary Algorithms, Computational intelligence systems, Neural Network in Nanoelectronics, Local Processing 7

UNIT-III

Integrated switches and basic circuits: Ideal and real switches. Threshold Gates, Fredkin Gate, Quantu, Electronics Devices, short channel MOS Transistors, Split Gate Transistors, Quantum Cellular Automata, Quantum DoArray, Switches based on Fullerenes and Nanotubes, Polymer Electrons, Optical Molecular Memories. Tunneling diode, Resonant Tunneling Diode(RTD), Digital Circuits based on RTDT,RTDT mobile, RTDT Threshold gate, RTDT Multiplexer, Single Electron Transistor(SET): Performance of single electron transistor technology, logic and memory circuits, SET Adder, Comparison between FET and SET 7

UNIT-IV

Nanoelectronics with super conducting devices, The Macroscopic model, Cryotron, the Josephson Tunneling device, Memory cell, super conducting quantum interferometer device. Flux quantum device: LC gate, single flux quantum device. Limits of integrated electronics: Energy supply and heat dissipation, the limits due to thermal particles motion, thermal noise, reliability as limiting factor, physical limits, equal failure rates by tunneling and thermal noise.

Uncertainties in development of nano electronics 7

Reference:

Karl Goger, Peter Glosekotter, Jan Dienstuhel : Nanoelectronics & NanoSystems
(Pub: Springer)

TV & SATELLITE COMMUNICATION (EC-801)

L T P
3 1 0

UNIT-I

Elements of TV Systems: Picture and sound, transmission and reception, composite video signal ,Fundamental of monochrome &color television systems ,modulation scheme, band width requirement, frequency allocation, standard of monochrome and color TV systems.

Picture tubes &camera tubes: Monochrome and color picture tubes various camera tubes. 8

UNIT-II

Television Broadcasting & receivers: TV Transmitter, monochrome & color TV receivers Block Diagram.

Introduction to modern TV system: Introduction to cable TV system HDTV, Satellite TV. 8

UNIT-III

Introduction: Origin and brief history of satellite communication, Elements of a satellite communication, link current status of satellite communication.

Orbital Mechanism and Launching of satellite: Equation of orbit, locating the satellite in the orbit, orbital elements, Elevation and Azimuth calculation, geostationary and other orbits, Mechanics of launching satellite.

Space craft: Satellite subsystems, Telemetry, tracking and command (TT&C), Communication subsystem, transponders, Spacecraft antennas. 8

UNIT-IV

Satellite Channel and link Design: G/T ratio of earth station Design of down link and uplink, FM Improvement factor, Earth station technology: Earth station Design, earth station tracking, Low noise amplifier. 8

UNIT-V

Multiple Access Techniques: frequency division Multiple Access (FDMA), FDM/FM/FMFDMA, Time Division Multiple access, Frame structure and synchronization, Code Division Multiple Access, random access. 8

References:

1. R.R. Gulati/ colour television: Principles and practice /New Age.
2. R.R. Gulati/modern television practice: Principles Technology and servicing /New Age.
3. Dhake/Modern Television &Video Engineering/TMH.
4. Gulati R.R/Composite satellite and cable TV/New Age.
5. Pratt T& Bostian,C.w./satellite Telecommunication /JW&sons/1986.
6. RoddyD/Satellite Communication/Prentice Hall/1989.
7. D.C.Agrawal/satellite Communication/Khanna publishing.

OPTICAL COMMUNICATION (EC-802)

L T P
3 1 0

UNIT-I

Introduction: Block diagram of optical fiber communication system, Advantages of optical communication, Structure of optical wave guide light propagation in optical fiber, Ray & Wave theory, Modes in optical fiber: Step and graded fibers. 8

UNIT-II

Transmission characteristics of optical fibers: Attenuation, Intermodal and intermodal dispersion, Polarizations maintaining fibers. 8

UNIT-III

Optical sources & components: Fabrication & characteristics of semiconductors, lasers and LEDs, Fiber Splicer, Fiber connector, Fiber couplers, Multiplexers, Tunable Filters. 8

UNIT-IV

Optical detectors: Requirements for photo detectors, photo detectors, Characteristics of photo detectors, Principle of APD and Pin Diodes, Noise in photo detectors, Photo transistor and Photo conductors. 8

UNIT-V

Optical fiber communication system: The optical transmitter circuits, the optical receiver circuits, Modulation and Demodulation format. 8

References:

1. G.Keiser, Optical fiber Communication, Mc Graw Hill, 2002.
2. J.M.Senior, Optical fiber Communication, PHI, 2003.
3. F.D.K.Mynlave, LL Schein, Fiber Optic Communication Technology, Pearson Edition, 2001.

RADAR GUIDANCE & NAVIGATION (EC-011)

L T P
3 1 0

UNIT-I

Introduction Block Diagram , Range Equation , Performance Factors, Pulse & CW Radar , Moving target indicator, Pulse, Doppler Radar , Delay Line Chancellors, Tracking & Scanning

8

UNIT-II

Radar Transmitter & Receivers: Different type of radar modulator, receiver block diagram & operation, low noise front ends receiver protector radar displays, A-scope & PPI, Ends, Mixer, and Duplexer

10

UNIT-III & IV

Navigation aids: Radio Direction finding, loop antenna Goniometer , Adcock, Error in direction finder , Radar Beacons, VHF & UHF Radio Range, LF/MF radio range, VOR,DME , hyperbolic navigation system , loran-Decca-tacan landing system , GCAs, ILS , MLS, Global positioning system 12

UNIT 5

Guidance : Basic Guidance , block diagram ,Internal Guidance ,Gyroscopes , Servo Accelerator, Basic Application of server System components.

8

References:

1. Merril I., Skolnik / Introduction to Radar system / McGrawHill
2. R.S. Berkowiz / Modern Radar/ John Wiley & sons
3. N.S. Nagrajan / Element of Electronic Navigation/ (MGH)

ARTIFICIAL NEURAL NETWORK (EC-012)

L T P
3 1 0

UNIT-I

Fundamentals: Basic of Neuroscience and artificial neurons model. Graph Algorithms, Inter connection and routing, Placement and portioning /Parllel/computation/Associative memory.

8

UNIT-II & III

Networks: Perception, Multilayer networks, training. Feed Forward Networks, unsupervised and reinforcement learning, adaptive structure network, recurrent network, competitive and self organizing networks, , unsupervised competitive learning adaptive resonant networks, Hybrid Learning Radial basis function networks, and time delay networks.

14

UNIT-IV

Fuzzy Neural Network: Fuzzy sets and logic ANN implantations

6

UNIT-V

Application: hardware and implantation concern, approach to solving hard problems, multimarket tracking, time series Prediction, Handwritten digit recognition, Image compression, Visual Processing Networks

10

Reference:

1. N.K. Bose & p. Liang/ Neural Network Fundamental with graph, Algorithms and Application/TMH.
2. Robert Schalkogs/ Artificial Neural Network /TMH.
3. Limin Fee/ Neural Network in computer intelligence/TMH
4. Kosko/ Neural Networks & fuzzy systems: A dynamical system approach machine intelligence/PHI

OPTO ELECTRONICS (EC-013)

L T P
3 1 0

UNIT-I
Propagation Through Waveguides: Solution of wave equation in rectangular co-ordinates

UNIT-II
Photo sources & Detector: Injection luminescence and the light emitting diode (LED), Materials, Construction, Drive circuitry, Fundamentals of lasers, Einstein relations, Semiconductor Lasers- Hetro junctions, the optical resonator laser, characteristics of laser radiation, single mode operation, Compound cavity and Distributed feedback lasers, Photo detectors- PIN & APD, Responsively, response time, detector performance parameters.

10

UNIT-III
ELECTRO OPTIC EFFECTS: EO Retardation, Amplitude, Phase & frequency modulation, Beam deflection, Acoustic – optics, AO devices, non linear optics – second harmonic generation, parametric amplification, oscillation, materials perceptive.

4

FOURIER OPTICS AND HOLOGRAPHY: Fourier transforming property of lens, Image forming property of lens, Holograpby4nline, Off Axis, Holographic interferometer, Holographic storage.

4

UNIT-IV
OPTICAL COMMUNICATION SYSTEMS: Analog and Digital modulation schemes, FO Communication Systems (block diagram), FO Local Area Networks.

4

OPTICAL FIBER SENSORS: Passive, Active Multimode FO sensors, single mode FO sensors, phase modulated, polarization modulated fiber optic gyroscope.

5

UNIT-V
OPTICAL COMPUTING: Optical Analog Computing, Digital optical computing, optical interconnects, optical computing by symbolic substitution, the residue Number system.

5

References:

1. J. Wilson, J.F.B. Hawkes/Opto Electronics, an Introduction/PH1; 2000.
2. I.P. Kaminov/An introduction to electro optic devices, Academic press New York, 1974.
3. A. Yariv/optical electronics/C.B.S. Collage publishing, New York, 1985.
4. A.K. Ghatak & K. Thyagrajan / Optical Electronics / Cambridge University Press, 1989.
5. F. Zernike and J.E. Midwinter / Applied Non linear Optics/ John Wiley & Sorts. New York.1973.
6. F.T.S, Yu, /Optical information Processing/ Wiley, New York, 1983.
7. A.Selvarajan, Krishana Swami /Opto Electronics: Current Trend /TMH.

BIOMEDICAL INSTRUMENTATION (EC-013)

L T P
3 1 0

UNIT-I
Human Anatomy & physiology: Biomedical potentiometric, leads & electrodes, Transducers for biological applications, Biomaterials.

6

UNIT-II
Monitors and Recorders: Biopotentialis, amplifiers, monitors, galvanometric, potentiometric, ultraviolet, electrostatic, ink jet recorders, video monitors, color printers, electro physical recorder, ECO, Working principles & clinical applications.

10

UNIT-III
Nervous system measurements: Anatomy of the Nervous system, Neuronal communication, EPSP & IPSP, Neuronal firing measurements, EEG-block diagram, various Rhythms, EEC in diagnostics, EMG and applications.

6

UNIT-IV
Ophthalmology Instruments: Electroretinagram, Electroocculogram, Ophthalmoscope, Tonometer for eye pressure measurement.

6

UNIT-V
Therapeutic Instruments :Diathermy, Defibrillator, cardiac pacemaker, stimulators, Laser applications in machine, X-Rays production & use, Radiographic Diagnostic and Therapeutic, Hint construction and processing ,interaction with body, Fundamentals of radiation therapy.

10

References:

1. W.F.Ganong/review of Medical Physiology/8th Asian Ed/Medical Publishers, 1977.
2. J.G.Websster, Eds / Medical instrumentation/ Houghton Mifflin, 1978.
3. A.M.Cook and Webster, Eds/ Therapeutic Medical Devices/ PHI, 1982.

ELECTROMAGNETIC INTERFERENCE AND ELECTROMAGNETIC COMPATIBILITY (EC-021)

L T P
3 1 0

UNIT-I

Introduction: Types of EMI, sample models, natural and manmade sources of EMI 3

Grounding techniques: Safety Grounds, High frequency, Low frequency, Chassis grounds. Optical couplers, Ground shields, cable and connectors1 digital grounds 5

UNIT-II

Shielding techniques: Effectiveness of shield, near and far fields, Characteristics and wave impedances, Absorption and reflection loss, shield big material, Trend in Modern shielding enclosures. 5

Types of cables: Coaxial, Twisted pair, Braided shields, Ribbon cables, Inductance, Capacitance, Magnetics & ground Coupling in 5

UNIT-III

Conducted EMI/EMC: Sources models and prevention, EMI filters for Mans noise, Choice of passive circuit components for EMC such as capacitors, inductors, Transformers, Resistors, Ferrite Beads, Conductive Gaskets 8

UNIT-IV & V

EMC Design guide lines: EMI hardening, susceptibilities and remedies for typical subsystems such as Transmitters, Receivers, Power supplies, Motors, Control devices, Digital Circuits, Digital Computers, Integrated Circuits, EMI Standards & Measurements: Military, household and Industrial Standards EMI Measurement Technology, spectrum analysis, Conducted measurements, Radiated measurements, Automated EMI testing. 12

References:

1. Weston, David A/ Electromagnetic Compatibility- Principles & applications/ Marcel Deker, New York, USA-1991
2. Tihanyi, Laszlo/ Electromagnetic Compatibility in power Electronics/ Butter Worth Heinemann, Oxford, UK,1995
3. V.Presad Kodali/ Engineering Electromagnetic Compatibility, Principles, Measurements & Technologies/ S.Chand

VLSI FOR TELECOMMUNICATIONS (EC-022)

L T P
3 1 0

UNIT-I
System integration in single chip / multichip module, system partitioning, high throughput and latency design requirement for real time communication, critical path analysis for high speed/design switch capacitor circuits, high speed A/D and D/A converters, concepts of mix signal design.

10

UNIT-II
VLSI CAD tools, software and language, low power circuit/architecture, design methodologies

5

UNIT-III
High speed switching circuits, high speed memory organization, high speed control decision circuits, design of analog front end , impedance matching with bounding pads , Si-Ge Devices for RF circuits interface for optical fibers

8

UNIT-IV
VLSI for generation & detection of PSK ,FSK, QAM, Subscriber line interface circuit , Network Switching circuit, VLSI system for modem design , Adaptive filter , equalizers, CVSD Codex, PLL , ISDN, UDLT , USART, Viterbe decoding , Data Encryption

8

UNIT-V
Digital audio/ Video compression, Video conferencing, case studies for implementation of specific protocols currently in vogue

5

References:

1. Wayne Wolf/ Modern VLSI Design System on chip design
2. Kaushik Roy,Sharat Prasad/Low Power CMOS VLSI Circuit Design
3. Neil HE Weste/Principles Of CMOS VLSI Design/Kamaran Eshragian

EMBEDDED SYSTEM DESIGN (EC 023)

L T P
3 1 0

UNIT-I

Introduction: Embedded systems and its applications, embedded operating system, Design parameters of an embedded system and its significance, design life cycle, tools introduction, hardware and software partitioning and co-design

Hardware Fundamentals for the embedded developers Digital circuit parameters: Open collector outputs, Tristate outputs I/O sinking and sourcing, PLD's, Watchdog timers, Hardware design and development Custom Single Purpose Processors: Optimizing program, FSMD, Data path and FSM. General purpose processors and ASIP's (Application Specific Instruction set Programming):Software and operation of general purpose processors-Programmers, View development environment ASIPs, Microcontrollers-DSP Chips.

12

UNIT-II

Introduction to Microcontrollers and Microprocessors, Embedded versus external memory devices, CISC and RISC processors, Harvard and Von Neumann Architectures.

6

UNIT-III

8051 Microcontrollers: Assembly language, architecture, registers, Addressing modes, Instruction set, I/O ports and memory organization, interrupts, Timer/Counter and serial communication.

8

UNIT-IV

RTOS-Tasks, states,Data, Semaphores and shared data, Operating system services, Message queues, Mailboxes Advanced Processor(only architectures),80386,80486 and ARM(References)

6

UNIT-V

Communication basics, Microprocessor Interfacing, I/O Addressing, Direct memory access, Arbitration, multilevel bus architecture, Serial Protocols, parallel protocols and wireless protocols. Real world interfacing: LCD, Stepping Motor, ADC, DAC, LED, Push buttons key board, Latch Interconnection, PPI.

8

Text Books:

1. Embedded System Design-Frank Vahid/Tony Givargis,John Wiley@2005
2. Microcontroller(Theory and Applications) Ajay V Deshmukh,Tata McGraw Hill@2005
3. An Embedded Software Primer-David E. Simon,Pearson Education@1999

Reference Books:

1. The 8051 Microcontroller and embedded systems-Muhammad Ali Mazidi and Janice Gillespie.
2. Microcontrollers(Architecture,Implementation and programming) Kenneth Hintz,Daniel Tabak,Tata McGraw –Hill@2005
3. 8051 Microcontrollers and Embedded Systems Edition-Sampath Kr, Katson Books@2006

DIGITAL IMAGE PROCESSING (EC 024)

L T P
3 1 0

UNIT-I
Introduction to Digital Signal Processing: Fourier & Z-transform, Multidimensional sequence, Image digitizing, image processing software, Histograms, point operations.

8

UNIT-II
Introduction to algebraic operations, filtering: Convolution, optional filter design, data processing, computing, truncation, optics and system analysis, diffraction limited, optical systems, abbreviations

8

UNIT-III
Application: Image restoration, approaches and models, image segmentation, segmented image structure.

8

UNIT-IV
Measurement and classification of size, shape measurement feature selection, classification, three dimensional image processing, optics sectioning.

8

UNIT-V
CAT, Steriometric ranging, Stereoscopic Image Display, Shaded surface display

6

Reference:

1. Kenneth R. Castleman/ Digital Image Processing/PHI
2. A.K. Jain/Image Processing/Pearson Education 2003
3. GonzaleZ R.C. & P. Wint/ Digital Image Processing/ Addision Wesley.

INFORMATION THEORY AND CODING (EC-031)

L T P
3 1 0

UNIT-I

Discrete messages, sampling Theorem, concept of entropy, marginal, joint, information rate, bit rate/baud rate. Coding to increase average information per bit, Shannon fanon algorithm, Hoffman coding, channel capacity, Shannon theorems, capacity of Gaussian channel,bandwidth,S/N trade-off, Efficiency of orthogonal signal transmission

10

UNIT-II

Introduction to coding, error detecting,/correcting codes, concepts of codes, length, minimum distance, weight, Binary symmetric channels, equivalence of codes, block codes, perfect codes, bar codes, ISBN codes, linear codes, encoding and decoding with a linear code, error correction, parity bit, parity check matrix, syndrome decoding, hamming codes, extended binary hamming codes, cyclic codes, cyclic redundancy check, convolution coding, decoding, Probability of error of convolution codes, orthogonal codes.

12

UNIT-III

Auto & cross correlation functions, generation algorithm of Prime, quasiprime codes, optical orthogonal codes, decoding schemes, S/N performance, automatic repeat request(ARQ) schemes, data compression codes, data encryption and decryption

8

UNIT-V

Application of information theory and optimum modulation system ,comparison of AM system with the optimum system ,comparison of F.M with the optimum system, comparison of PCM and FM, Feedback communication, Trellis decoded modulation

8

References:

1 Taub and Schilling/Principles of communication systems/TMH
2 A first course in coding theory/claredon press, oxford-raymond hill
3 Shulin and Costello/Error Correcting Codes/Prentice Hall
4 Dr. P.S Sathyanarayana/Probability, Informations and coding theory/Dynaram Publications, Bangalore.
5 John G. Prokis/Digital Communication/Mc Graw Hill

DIGITAL SYSTEM DESIGN USING VHDL (EC 032)

L T P
3 1 0

UNIT-I

INTRODUCTION TO VHDL: VHDL description, combinational networks, modeling flip flop using VHDL, VHDL model for multiplexer, compliance and simulation of VHDL, codes, modeling a sequential machine, variables, signals and constants, arrays VHDL operators, VHDL functions, VHDL procedures, packages and libraries, VHDL model for a counter.

ADVANCED VHDL: Attributes, transport and inertial delays, operator over loading, multi valued logic and signal resolution, IEEE-1164, standard logic, generic, generates statements, synthesis of VHDL codes, synthesis examples, file handling and TEXTIO.

10

UNIT-II

DESIGN OF NETWORKS FOR ARITHMATIC OPERATIONS: Design of serial adder with accumulator, state graph for control networks design of binary multiplier, multiplication of signed binary numbers, design of binary divider.

DIGITAL DESIGN WITH SM CHART: state machine charts, derivation of SM charts, realization of SM charts, implementation of dice game, alternative realization of SM charts using microprogramming, linked state machine.

10

UNIT-III

FLOATING POINT ARITHMETIC: Representation of floating point numbers, floating point multiplication, and other floating point operations.

DESIGNING WITH PROGRAMMABLE GATE ARRAYS AND COMPLEX PROGRAMMABLE LOGIC DEVICES: Xilinx 3000 series FPGAs, Xilinx 4000 series FPGAs, using one hot state assignment.

8

UNIT-IV

MEMORY MODELS FOR MEMORIES AND BUSES: Static RAM, a simplified 486 bus model, interfacing memory to microprocessor bus.

6

UNIT-V

DESIGN EXAMPLES: UART design, description of MC68HC05 microcontroller, design of microcontroller CPU, complete microcontroller design.

6

Text Book:

1. Charles H Roth Jr, "Digital System Design using VHDL", Thomson Learning, 2002.

Reference Books:

2. Stephen Brown & Zvonko Vranesic, "Fundamentals of digital logic design with VHDL", TMH, 2nd Ed., 2007.
3. Jhon F Wakerly, "Digital design", PHI, 4th Ed.

FILTER DESIGN (EC 033)

L T P
3 1 0

UNIT-I

Review of op-amps circuits, Categorization of filters-Low-pass filter, High-pass filter, band-pass filter, band-reject filter, Gain equalizers, and Delay equalizers.

8

UNIT-II

Approximation Theory: Butterworth approximation, Chebyshev approximation, Inverse Chebyshev approximation, Basic of sensitivity, Frequency Transformations.

8

UNIT-III

Three amplifier Biquad: Basic low pass and band pass circuit, realization of the general Biquadratic Functions, summing of four Amplifier biquad, feed forward three amplifier biquad, Passive Ladder structures, Inductor Substitution using Gyrator, Transformation of elements using The FDNR.

8

UNIT-IV

Elementary transconductor building blocks, resistors, integrators, amplifiers, summers, gyrator, First and second order filters, higher order filters.

8

UNIT-V

Switched capacitor filters: The MOS switch, The switched capacitor, first order building blocks, Second order sections, sampled data operation, Switched capacitor first and second order filters, Bilinear transformation.

8

Text Book:

1. Gobind Daryanani, "Principles of active network synthesis and design, John Wiley and Sons.
2. R.Schaumann, M.E. Van Valkenburg, "Design of analog filters ,Oxford University Press

ARCHITECTURE AND APPLICATIONS OF DIGITAL SIGNAL PROCESSORS (EC-034)

UNIT-I & II

Review of DSP Fundamentals 4

Issues involved in DSP processor design speed, cost, accuracy, pipeling, parallelism, Quantization error, 8

UNIT-III

Key DSP hardware elements, Multiplier, ALU Shifter, Address generator, 6

UNIT-IV

ADSP 2100 and 21000 family. Architecture and instruction set. 8

UNIT-V 4

Software development tools, assemblers, linker and simulator, application using DSP Processor spectral analysis , FIR/IIR Filter, linear predictive coding. 8

References:

1. Oppenheim, A.V., and Schafer, R.W.J Digital signal processing/ prentice Hall
2. Kung, S.Y. 1988/ VLSI army Processor/ Prentice Hall
3. Lee,, ES.1988/Programmable DSP Architecture: part 1 /IEEE ASSP Magazine 4-19.
4. Yuen, C.JC, Beauchamp, K.G and Eraser, LX 1989 / Microprocessor systems in signal processing / San Diego Academic Press.