Subject: Basic Electronic Devices Code: EC- 102

Credits: 4 **Branch: El, EC, EE** **Sem: I**

UNIT-1: Introduction to semiconductor physics:
Crystalline solids, Band theory of solids, Insulators, Semiconductors and Metals.

UNIT-2: Transport phenomenon in semiconductors:
Mobility and conductivity, Electron and holes in an intrinsic semiconductor, Donor and acceptor impurities, Charge densities in a semiconductor, The Hall effect, Conductivity modulation, Generation and recombination of charges. Diffusion, Injected-minority carrier charges.

UNIT-3: Junction diode characteristics:
The open circuited p-n junction, The p-n junction as an rectifier, Form factor, Average voltage and current, Half wave and full wave rectifier, The current components in a p-n junction diode, The Volt-Ampere Characteristics, The temperature dependence of the V/I characteristics, Diode resistance, Space charge or Transition, Capacitance C, Charge control description of the diode, Diffusion capacitance, Junction diode switching times, Zener diode and its application. Bipolar Junction Transistor: The junction transistor, Transistor configuration CE, CC and CB current-voltage characteristics.

UNIT-4: Introduction to vacuum tubes:
Diodes, Triodes and Introduction to CRT

Text books:

1. Integrated Electronics, Analog and Digital circuit and system: Miliman & Halkias (TMH N. Delhi)
2. Electronic Principles: Malvino (TMH N. Delhi)

Subject: Electromagnetic Theory **Code: EC-203**
Credits: 4 **Branch: EC, El, EE** **Sem: III**

UNIT-1: Elements of Vector calculus:
Co-ordinate system, differential volume, surface & line elements, gradient, divergence, curl and del-operator.

UNIT-2: Review of static electric field:
Coulomb's Law, Electric field-intensity, electric flux and flux density, Gauss's Law, Conservative properties of electrostatic field, Electric potential, Energy and work in electric field, Current, current density and conductor capacitance & dielectric materials, Polarization relative permittivity, Multiple dielectric capacitors, Energy stored in a capacitor.

UNIT-3: Review of magnetic field:
Faraday's Law, Lenz's Law, Biot savart's Law, Ampere's Law, Magnetic flux density, Vector Magnetic potential, Stokes theorem, Magnetic force, Displacement current, Self, Internal and Mutual Inductance.

UNIT-4: Maxwell's, Laplace's and Poisson's Equation and Boundary conditions:
Introduction and its applications.

UNIT-5: Electromagnetic waves:
Introduction and solutions for partially- conducting perfect dielectric and good conductor mediums, Skin depth, Interface conditions at normal incidence, Oblique incidence and Snell's laws, Perpendicular and Parallel Polarization, Standing wave, Power and the Pointing vector.

UNIT-6: Transmission Lines:
Wave equation for ideal Transmission line, Characteristic impedance, Propagation & Reflection, VSWR, Impedance, Transformation, Smith Chart, Parallel and Co-axial Transmission lines, Impedance Matching: Single and double stub matching, Impedance measurement, Motion of charged particles in an Electric & Magnetic Field.

Text books:

1. Electromagnetic: John D. Kraus
2. Schaum's outline series on Electromagnetic: Joseph A. Edinister Mc Graw Hill Inc.
3. Engineering Electromagnetic: Haytt, Kemmerly.
4. Electromagnetic wave and radiating system: Jordan, Balmain
5. Engineering Electromagnetic: William Haytt.

Subject: Electronic Engineering Materials **Code: EC-201**
Credits: 4 **Branch: EC & EI** **Sem.: III**

UNIT-1:- Atoms & aggregates of atoms:
Introduction, Nomenclature pertaining to electronic states, The electron configuration of atoms, Nature of the chemical bond & classification of solids.

UNIT-2:- Dielectric properties of insulators in static fields:
Polarization & dielectric constant, The atomic interpretation of the dielectric constant of non-atomic gases, Qualitative & quantitative analysis of the dielectric constant of non-atomic gases, Qualitative & quantitative analysis of the dielectric constant of poly atomic molecules, The internal fields in solids & liquids, The static dielectric constant of solids, Some properties of ferroelectric materials, Spontaneous polarization, Piezoelectricity.

UNIT-3:- Behavior of dielectrics in alternating fields:
Frequency dependence of the electronic polarizability, Ionic polarization as a function of frequency, Dielectric relaxation, Dielectric losses.

UNIT-4:- Magnetic properties of materials:
Classification of magnetic materials, Diamagnetism, The origin of permanent magnetic dipoles in matters, Paramagnetic spin systems, Some properties of ferromagnetic materials, Anti-ferromagnetic materials, Ferrimagnetic materials.

UNIT-5:- The conductivity of metals:
Relaxation time, Collision time & mean free path, Electron scattering & resistivity of metals, The heat developed in a current carrying conductors, The thermal conductivity of metals, Superconductivity.

UNIT-6:- The mechanism of conduction in semiconductors: Classifying materials as semiconductors, The chemical bond in Si & Ge and its consequences, The density of carriers in intrinsic semiconductors, The energy gap, Conductivity, Hall effect & carrier density.

Text book:
1. Electrical Engineering Materials: A.J. Dekkar

Subject: Digital Electronics **Code: EC- 204**
Credits: 4 **Branch: EC, EI, EE, CSIT, MCA** **Sem: IV**

UNIT-1: Digital Numbers and Codes
Introduction to digital system, Number system, Number base conversion, Complements, Codes: Weighted & Non-weighted binary code, Error detection, Error correction, Alphanumeric codes, Floating-point representation.

UNIT-2: Boolean Algebra and Logic Gates
Basic of Boolean Algebra and logic operations, Theorems and their properties, Logic Gates: Basic, Universal, Ex-OR & Ex-NOR Gate.

UNIT-3: Logic Families, A/D & D/A Converter
RTL, DTL, TTL, HTL, ECL, MOS, CMOS, I^2L, Totem pole and Open collector concept, Comparison of logic families, D/A Converter: Weighted register, R-2R Ladder, A/D converter: Ramp type, Dual slope, Successive approximation and Flash type.

UNIT-4: Minimization Techniques
Canonical and Standard form, K-Map method up-to six variables, POS and SOP simplification, Don't-care condition, NAND and NOR implementation & other minimization method, Variable entered mapping(VEM), Plotting & Reading Theory, Quine-McCluskey (Tabulation) Method.

UNIT-5: Combinational Circuits
Design of combinational logic circuit using different chips/gates, Code convertor: BCD, Gray, Excess-three, Encoder, Decoder, Multiplexer, De-Multiplexers, 7-segment decoder/driver, ROM, PLA, PLD, Full and Half adder/substractor, Parallel adder/substractor, Look ahead carry generator, Parity bit checker/generator, Implementation of Boolean function with multiplexer and decoder.

UNIT-6: Sequential Logic Circuit
Latches: RS Latch, D latch, Flip-flops: JK, SR, T, D, Master Slave, Characteristics table, truth table, Concept of Flip-flop conversion, Race-around condition, Triggering of Flip-Flop, Analysis of Synchronous Sequential Circuit, Design steps for sequential circuits: State diagram, State reduction techniques, Asynchronous Sequential logic circuit.

UNIT-7: Registers and Counters
Loading of register, Counter: Asynchronous Counter/Ripple Counter (Binary up & down counter), Synchronous counter, Divide by N counter, Counter with unused states, Ring counter, Johnson counter.

Text books:

1. Digital logic and computer design: M. Morris Mano
2. Modern digital electronics: R.P. Jain

3. Digital principles and application: Malvino & Leach
4. Fundamental of digital electronics : Barttee

Subject: Signal & Systems **Code: EC-202**
Credits: 4 **Branch: EC, EI, CS & EE** **Sem: IV**

UNIT-1:
Fourier analysis of signals, Amplitude, Phase & Power spectrum, Orthogonality of functions, Types of signals, Fourier Transform of some useful functions, Singularity functions & its properties, Dirac delta function & its properties, Sampling function, Laplace Transform of some useful functions.

UNIT-2:
Convolution of signals, Graphical & analytical methods of convolution, Sampling theorem (time domain & frequency domain), Nyquist rate & Nyquist interval, Aliasing, Aperture effect, Recovery from sampled signal, Natural sampling, Flat top sampling, Time convolution theorem, Frequency convolution theorem.

UNIT-3:
Power & Energy signals, Energy & Power spectral densities of signals, Cross correlation, Auto correlation.

UN1T-4:
Systems & Filters: Linear system, Time invariant & LTI system, Impulse response, Causal systems, Filter characteristics of linear systems, Low pass filters, High pass filters, Band pass filters, Band stop filters.

UNIT-5:
Random variables and probability theory, PDF, CDF and their properties, Normal and Gaussian distribution.

Text books:
1. Modern Digital & Analog System: B. P. Lathi
2. Communication systems: Singh & Sapre
3. Communication systems: Simon Haykins
4. Digital communication systems: Taub & Schilling

Subject: Analog Communication Systems **Code: EC-301**
Credits: 4 **Branch: EC, EI** **Sem: V**

Unit-1: Modulation process
Definition of amplitude modulation, Frequency modulation & phase modulation: DSB-AM, DSB-SC-AM, SSB-SC, using linear modulation and nonlinear modulation.

Unit-2: Linear modulation
Collector modulator or Plate modulator and Base modulator.

Unit-3: Non-linear modulation
Balanced modulator & Ring modulator.

Unit-4: Generation of frequency modulation
Indirect method of FM i.e. Armstrong method of frequency modulation, Direct method of FM: reactance modulator

Unit-5: Demodulation I detection process:
Demodulation of AM waves: Diode detection: Average detection and Envelope detection, Superhetrodyne receiver.

Unit-6: Demodulation of FM or frequency discriminators:
Single tuned discriminators, Double tuned discriminators, Foster seely discriminators, Ratio detectors and phase locked loop (PLL) demodulator.

Unit-7: Noise
SNR (signal to noise ratio), noise figure, noise temperature of a cascaded system, S/N in DSB-SC receiver, S/N in SSB-SC receiver, S/N in FM receiver, pre-emphasis and de-emphasis.

Text books:

1. Communication systems: B.P.Lathi
2. Communication system: Simon Haykin
3. Principles of communication: George Kennedy
4. Communication system: Singh & Sapre
5. Principles of communication system: Taub & Shilling

Subject: Antenna & Wave propagation **Code: EC- 303**
Credits: 4 **Branch: EC** **Sem: V**

Unit-1: Introduction
Antenna fundamental and definition, Maxwell equation, Electromagnetic spectrum, Radio frequency band.

Unit-2: Theory of Radio wave radiation and reception
Current across closed surface, Boundary condition in electromagnetic field, Electromagnetic wave equation in dielectrics and conductors, Radiation from elementary source, Radiation of dipole of finite length, The influence of the earth and metal bodies on antenna radiation.

Unit-3: Fundamental of Antenna
Basic antenna parameter, patterns, beam area, radiation intensity, beam efficiency, directivity, antenna aperature, effective height**,** field from oscillating dipole, antennas field zones, polarization.

Unit-3: Types of Antenna devices
Thin linear Antenna, cylindrical antenna, Biconical antenna, Loop antenna, Helical antenna, slot and micro strip antenna, Horn antenna, Reflector antenna, Lens antenna, Wide band antenna, Terahertz antenna, frequency independent antenna, smart antenna, plasma antenna ,embedded antenna

Unit-4: Antenna Measurement
Introduction, Basic concept, Typical sources of errors in antenna measurements, Measurements of different antenna parameters (Input and mutual impedance, Radiation pattern, Gain, Phase front, Polarization).

Unit-5: Radio Wave Propagation
Propagation characteristics of electromagnetic wave, Ground or surface wave propagation, sky wave propagation, space wave propagation, Tropospheric scatter propagation

Text books:

1. Antenna: Fusco (Pearson Education)
2. Antenna: J.D. Kraus (TMH)
3. Antenna: D- Pozar (PHI)
4. Antenna Engineering: Rajeshwari

Subject: Consumer Electronics **Code: EC-315**
Credits: 4 **Branch: EC, EI** **Sem: V**

Unit-1: Audio System
Microphones, Tape recorder, Audio compact disc system, High fidelity Audio system, Stereo sound system, loudspeaker, public address system, magnetic sound recording.

Unit-2: Television
Introduction, Radio and TV Transmission & Reception, Block diagram of TV transmitter, Television studies and Equipment, Antenna for TV transmitter, Block diagram of TV receiver, TV camera tube, Persistence of vision, scanning, Synchronization, CCTR-B System, Composite video signal, Bandwidth of TV signal, Audio signal modulation, TV channel, Television Rx antenna, Feeder cable, Balun T/F, Monochrome picture tube, Black & white TV Rx, Colour TV signal, Colour TV Rx, PAL signal, compatibility, CCTV, Cable TV, HDTV.

Unit-3: Video Cassette Recorder
VCR Principle of video recording on magnetic tapes, Block diagram of VCR, VHS, Tape transport mechanism, study of VCD & DVD.

Unit-4: Miscellaneous Devices
Digital watch, Calculators, An electronic guessing game, Cordless Telephone, Mobile telephone, Cellular telephone, Battery telephone, Battery Eliminator, Battery charger, DC supply, DC supply operational amplifier, IC regulator, UPS, Inverter, Decorative Lighting, Microwave oven, LCD tunes with alarm.

Text books:
1. Consumer Electronics: B.R. Gupta

Subject: Digital Communication System **Code: EC-304**
Credits: 4 **Branch: EC, EI** **Sem: VI**

UNIT-1:
Introduction to Digital Communication, Basic building blocks, Sampling process, Natural & Flat Top samplings, Aperture effect, Equalization, PAM, Channel BW for PAM signals, Signal recovery through holding.

UNIT-2:
Quantization of signals, Quantization error, Companding, PCM, PCM Building blocks, Multiplexing PCM Signals, T1 Digital System, Line Coding, Bit rate, DPCM.

UNIT-3:
Delta Modulation, Slope Overloading, Adaptive Delta Modulation, Digital Modulation Techniques: BPSK, ASK, ASK, DPSK, QPSK, Transmitter & Receiver. Probability of error of Different Modulation Techniques, Expansion.

UNIT-4:
Data Transmission, Different Signals, Integrator Response, Optimum filter and matched filter, Transfer functions calculation, Probability of error calculation for matched filter, Correlation reception of signals, Noise calculation in PCM & DM System.

UNIT-5:
Information Theory, Entropy, Absolute, Conditional and Joint entropy schemes, Rate of information, Mutual information, Noise free channel, Channel with independent input & output channel capacity, Binary symmetric channel, BEC channel, Reception of signals, Shannon Hartley theorem, Capacity of Gaussian channel, Bandwidth S/N trade-off, Coding techniques, Coding efficiency, Binary, Shannon-Fano, Huffman coding, Error control code, Block codes, Linear block code, Hamming distance, Error correcting code, Cyclic code, Convolutional codes.

Text books:

1. Communication System: Taub & Schilling
2. Principles of Communication: George Kennedy
3. Communication System: Singh & Sapre
4. Digital Communication: I.A.Glover
5. Electronics Communication: Dennis Reddy & John Cooten
6. Communication Systems: Simon Haykins

Subject: Digital Signal Processing **Code: EC-302**
Credits: 4 **Branch: EC, El, EE & CSIT** **Sem: VI**

UNIT-1: Discrete time signals & systems
Discrete-time signals, discrete time systems, Analysis of discrete-time linear system-invariant systems.

UNIT-2: The Z-transform
The Z-transform, Properties of Z-transform, Inversion of Z-transform, One sided Z transform.

UNIT-3: Discrete Fourier transforms
Its properties & applications: Discrete Fourier Transform, Properties of Discrete Fourier transform, Linear filtering methods based on DFT.

UNIT-4: Efficient computation of the DFT
Fast Fourier Transform: FFT algorithms, Application of FFT algorithms.

UNIT-5: Implementation of discrete-time systems
Structures of the realization of discrete-time systems, Structures of FIR systems, Structures of IIR systems.

UNIT-6: Design of digital filters
General considerations, design of FIR filter, design of IIR filters from analog filters.

Text books:

1. Digital signal processing, principles, algorithms and applications: John G.Proakis & Dimitris G. Manolakis (PHI)
2. Digital signal processing: Alan V. Oppenheim & Ronald W.Schafer
3. Introduction to digital system processing: Roman Kuc (Mc Graw Hill International Editions)

Subject: Microelectronics **Code: EC-308**
Credits: 4 **Branch: EC** **Sem: VI**

UNIT-1:
Introduction to monolithic silicon integrated circuits, Processing technology, Silicon processing, Crystal growth, Vapour phase epitaxy, Chemical vapour deposition, Molecular beam epitaxy.

UNIT-2:
Oxidation, Doping processes: Diffusion & Ion implantation, Isolation techniques: p-n junction isolation & dielectric isolation.

UNIT-3:
Metallization: Vacuum evapouration & Cathode sputtering, Etching Processes: Wet etching & Dry etching or Plazma etching, Reactive plazma etching apparatus.

UNIT-4:
Photolithography: Photo mask fabrication, Photo etching, Photo resist, Electron beam lithography: Resists, electron optics, printing techniques, X-ray lithography: X-ray resist, X-ray sources, Printing techniques, X-ray masks, Synchrotron radiation. Ion beam lithography, Comparison of various lithography's.

UNIT-5:
Fabrication process sequence for Bipolar, NMOS, CMOS.

Text books:

1. V.L.S.I. Technique: S.M.S.-Publisher McGraw Hill.
2. V.L.S.I. Design Analog & Digital Technique: Geiger (Publisher McGraw Hill)
3. Integrated Electronics: K.R.Botkar (Khanna Publisher)

Subject: RADAR and Navigational Aids **Code: EC-316**
Credits: 4 **Branch: EC** **Sem: VI**

Unit-1: Introduction to RADAR

Basic Radar –The simple form of the Radar Equation- Radar Block Diagram- Radar Frequencies –Applications of Radar – The Origins of Radar The Radar Equation Introduction- Detection of Signals in Noise- Receiver Noise and the Signal-to-Noise Ratio-Probability Density Functions- Probabilities of Detection and False Alarm- Integration of Radar Pulses- Radar Cross Section of Targets- Radar cross Section Fluctuations- Transmitter Power-Pulse Repetition Frequency- Antenna Parameters-System losses – Other Radar Equation Considerations.

Unit-2 MTI and Pulse Doppler Radar

Introduction to Doppler and MTI Radar- Delay –Line Cancelers- Staggered Pulse Repetition Frequencies –Doppler Filter Banks - Digital MTI Processing - Moving Target Detector Limitations to MTI Performance - MTI from a Moving Platform (AMIT) - Pulse Doppler Radar – Other Doppler Radar Topics- Tracking with Radar –Monopulse Tracking –Conical Scan and Sequential Lobing - Limitations to Tracking Accuracy - Low-Angle Tracking - Tracking in Range - Other Tracking Radar Topics -Comparison of Trackers - Automatic Tracking with SurveillanceRadars(ADT).

Unit-3: Detection of Signals in Noise

Introduction – Matched –Filter Receiver –Detection Criteria – Detectors –-Automatic Detector - Integrators - Constant-False-Alarm Rate Receivers - The Radar operator - Signal Management - Propagation Radar Waves - Atmospheric Refraction -Standard propagation - Nonstandard Propagation - The Radar Antenna - Reflector Antennas - Electronically Steered Phased Array Antennas - Phase Shifters - Frequency-Scan Arrays Radar Transmitters- Introduction –Linear Beam Power Tubes - Solid State RF Power Sources - Magnetron - Crossed Field Amplifiers - Other RF Power Sources - Other aspects of Radar Transmitter. Radar Receivers - The Radar Receiver - Receiver noise Figure - Superheterodyne Receiver - Duplexers and Receiver Protectors- Radar Displays.

Unit-4: Introduction - Four methods of Navigation

Radio Direction Finding - The Loop Antenna - Loop Input Circuits - An Aural Null Direction Finder - The Goniometer - Errors in Direction Finding - Adcock Direction Finders - Direction Finding at Very High Frequencies - Automatic Direction Finders - The Commutated Aerial Direction Finder - Range and Accuracy of Direction Finders Radio Ranges - The LF/MF Four course Radio Range - VHF Omni Directional Range(VOR) - VOR Receiving Equipment - Range and Accuracy of VOR - Recent Developments. Hyperbolic Systems of Navigation (Loran and Decca) - Loran-A - Loran-A Equipment - Range and precision of Standard Loran - Loran-C - The Decca Navigation System - Decca Receivers - Range and Accuracy of Decca - The Omega

System.

Unit-5:

DME and TACAN - Distance Measuring Equipment - Operation of DME - TACAN - TACAN Equipment, Aids to Approach and Landing - Instrument Landing System - Ground Controlled Approach System - Microwave Landing System(MLS) Doppler Navigation - The Doppler Effect - Beam Configurations -Doppler Frequency Equations - Track Stabilization - Doppler Spectrum - Components of the Doppler Navigation System - Doppler range Equation - Accuracy of Doppler Navigation Systems. Inertial Navigation - Principles of Operation - Navigation Over the Earth - Components of an Inertial Navigation System - Earth Coordinate Mechanization - Strapped-Down Systems - Accuracy of Inertial Navigation Systems. Satellite Navigation System - The Transit System - Navstar Global Positioning System (GPS)

Text books:

1. Introduction to Radar Systems: Merrill I. Skolnik (TMH)
2. Navigation: Nagrajan

Subject: Digital System Design **Code: EC- 433**
Credits: 4 **Branch: EC** **Sem: VII**

UNIT-1: Digital Design Fundamentals & Design of Combinational Circuits:
Hardware Aspects Related to ASSERTED and NOT-ASSERTED conditions, The Karnaugh Map, Five and Six Variable Maps, Prime and Essential Implicants, Variable-Entered Mapping, VEM Plotting Theory, VEM Reading theory, Tabulation Method.

UNIT-2: Sequential Machine Fundamentals
The Need for Sequential Circuits, Basic Architectural Distinctions between Combinational and Sequential Circuits, Concept of Memory, The Binary Cell, Fundamental Differences between Sequential Machines, The Flip-Flop, Flip-Flop Conversion from one type to another.

UNIT-3: Traditional Approaches to Sequential Analysis and Design
Introduction, Analysis of Synchronous Sequential Circuits, Approaches to the Design of Synchronous Sequential Finite State Machines, Design Steps for Traditional Synchronous Sequential Circuits, State Reduction, Counters, Shift Register, Shift Register Sequences.

UNIT-4: Asynchronous Finite State Machines
Why Asynchronous Circuits, Scope, Asynchronous Analysis, The Design of Asynchronous Machines.

UNIT-5: Introduction to VHDL
Introduction to Hardware Descriptive Languages, Types of Modeling and Fundamental to VHDL Programming

Text books:

1. An Engineering Approach to Digital Design: William I. Fletcher (PHI)
2. Digital Design: Morris Mano (PHI)

Subject: VLSI Design & Circuits **Code: EC-403**
Credits: 4 **Branch: EC** **Sem: VII**

UNIT-1:
MOS transistor, Depletion MOS Transistor, Enhancement MOS Transistor, Basic inverter device, Sizing, Enhancement load verses load inverters, Basic NMOS NOR logic circuit, Basic NMOS NAND logic circuit, Multi input NAND & NOR logic circuit.

UNIT-2:
A basic CMOS inverter, CMOS inverter logic levels, Inverter device sizing. CMOS NOR logic gate, CMOS NAND logic gate, Multi-input CMOS logic gate, NMOS pass transistor, CMOS Transmission gate.

UNIT-3:
Ratio logic model, Process characteristics time constant, Inverter pair delay, Super buffer NMOS NAND and NOR delay, Enhancement v/s depletion load, CMOS logic delay, Interconnection characteristics, Capacitive loading, Logic fan out delay, Distributive drivers, NMOS power dissipation, CMOS power dissipation, Resistive noise coupling, Capacitive noise coupling, NMOS noise margin, CMOS noise margin.

UNIT-4:
Structured gate layout, Logic gate arrays, Dynamic MOS storage circuit, Simple shift register, other shift register, Clock CMOS logic, Evalute logic, Domino CMOS.

UNIT-5:
Semiconductor memory, Memory organization, ROM design, EPROM, EEPROM, Static RAM, Storage cell, Decode and selector circuit, Select time delay calculation, Optimum precharge voltage concept, Dynamic RAM cell, Sense amplifier, Stick rules & diagrams.

Text books:

1. VLSI Design & circuits: Geige (Publisher Mc. Graw Hill)
2. VLSI Design & circuits: Shoji
3. VLSI Design: Puknill
4. Design technique for Analog and Digital circuits: L.Geizer, Philip E.Allen & Noel R.Starder.

Subject: Optical Fiber Communication **Code: EC-435**
Credits: 4 **Branch: EC** **Sem.: VII**

UNIT-1:- Introduction:
Historical development, The general system, Advantage of optical fiber communication.

UNIT-2:- Optical fiber waveguides
Total internal reflection, Acceptance angle, Numerical aperture, Skew rays, Modes in planer guides, Phase and group velocity. Cylindrical fiber Modes, Mode coupling, Step index fibers, Graded index fibers.

UNIT-3:- Transmission Characteristics of optical fibers
Attenuation, Intrinsic absorption, Intrinsic & Extrinsic absorption, Linear & non-linear scattering, Rayleigh scattering, Mie scattering, Stimulated Brillouin scattering, Stimulated Raman scattering, Fiber bend loss, Mid infrared and far infrared transmission, Dispersion.

UNIT-4:- Optical fibers and cables
Preparation of optical fibers, Liquid phase (melting) techniques, Vapour phase deposition techniques, Fluoride glass fibers, Optical fiber, Optical fiber cable, Stability of the fiber transmission characteristics.

UNIT-5:- Optical sources
LASER, Basic concepts of LASER, Optical emission from semiconductors, Injection LASER characteristics, LED characteristics, Modulation.

UNIT-6:- Optical detectors
Device types, Optical detection principles, Quantum efficiency, Semiconductor photodiode, Midinfrared photo diodes, Photo transmitter, Photo conductive detectors.

UNIT-7:- Optical fiber systems
Basic system, Modulation formats, Demodulation schemes, Optical transmitter, Optical receiver, Optical power budgeting.

UNIT-8:- Optical Fiber Measurements
Fiber numerical aperture measurements, Reflection and optical return loss, Field measurement, Fiber attenuation measurements.

UNIT-9:- Applications and future developments
Military applications, Computer applications, Local area networks, Public network application, Medical applications.

Text Book:

1. Optical fiber communication: John M. Senior (PHI)
2. Optical fibers and fiber optic communication systems: Subir Kumar Sarkar (Publisher S.Chand & Company Ltd)
3. Optical fiber communication: Keiser (Publisher Mc. Graw Hill)

4. Optical communication systems: J. Franz, V.K. Jain (Publisher Narosa publishing house)

Subject: Microwave Engineering **Code: EC- 405**
Credits: 4 **Branch: EC** **Sem: VII**

Unit-1: Introduction to Microwave
Microwave, Low frequency v/s Microwaves frequency, Microwave signal propagation, Advantages and application of microwave, Interaction b/w electron and fields.

Unit-2: Transmission Media, Transmission line and Waveguides
Transmission line propagation modes, Transmission line parameters, Scattering matrix, Smith chart, Waveguide (Rectangular and circular), Mathematical analysis of propagation modes and cut-off wavelength.

Unit-3: Microwave Components
Coupling probes and loops, Windows, Waveguide junctions, Directional couplers, Isolators and circulators, Waveguide flanges, Rotating joints, Attenuators, Phase shifters, Cavity Resonators, Wave meters, Hybrid ring, slotted line, Strip lines and micro strip lines ,quarter wave transformer, microwave filters

Unit-4: Microwave Tubes
Limitation of gridded tubes at high frequency, Klystron, Megnetron, CFA, TWT, BWO, Gyrotron, Peniotron, Comparison of microwave tubes.

Unit-5: Semiconductor Microwave Devices & Integrated circuits
Parametric amplifier, PIN diode, Tunnel diode, Gun diode, Impact diode, Trapatt diode, Barritt diode, Mitatt diode, MFET's, MMIC's.

Unit-6: Microwave Measurements
Network analysis, Microwave power measurements, Noise measurements, Spectrum analysis, and Frequency counter.

Text books:

1. Microwave Engineering: Lio
2. Microwave Engineering: R.E. Collin
3. Microwave Engineering: D-Pozar
4. Microwave Engineering: Annapurna Das Sisir K Das

Subject: Antenna Engineering **Code: EI-435**
Credits: 4 **Branch: EI** **Sem.: VII**

UNIT-1:- Elements of Antenna Theory
Antenna action, Antenna parameters; Gain, Power gain, Directive gain, Antenna resistance and its efficiency, Radiation from a short dipole, half wave dipole. Short monopole, Hertizen dipole, Pointing vector & power flow, Power & field pattern, Antenna aperture.

UNIT-2:- Types of antennas
Folded dipole, Loop & Bicanonical antenna, Rhombic antenna, Turnstile antenna, Helical antenna, Log periodic antenna and Parabolic reflectors.

UNIT-3:- Antenna arrays
Two element array: Broad side array, end fire array. Linear arrays multiplication of patterns, Bionomial array, Chebyshev array and Yagi-Uda array.

UNIT-4:- Antenna measurements
Effective area, Total resistance of Ariel, Effective height & radiation resistance.

Text books:

1. Antennas: J D Kraus
2. Antenna & Wave propagation: K. D. Prasad
3. Electromagnetic Waves & radiating system: Edward C. Jordan, Keith G. Balmain

Subject: Digital Image Processing **Code: EC- 458**
Credits: 4 **Branch: EC** **Sem: VIII**

UNIT-1: Digital Image Processing Fundamentals & Image Enhancement
Introduction of Digital Image Processing, Origins of Digital Image Processing and its Applications, Fundamental steps in Digital Image Processing, Components of an Image Processing System, Some Basic Relationships Between Pixels, Some Basic Level Transformations, Histogram Processing, Smoothing Spatial Filters, Sharpening Spatial Filters, Filtering in the Frequency Domain, Sharpening Frequency Domain Filters.

UNIT-2: Image Transform
Orthogonal and unitary transforms, Transform frequency, Optimum transform, Properties of unitary transforms, DFT, Dimensional and two Dimensional, Cosine transform, Sine transform, Hadamard transform, Harr transform, Slant transform, KL transforms and their properties.

UNIT-3: Image Restoration and Image Compression
A Model of Image Degradation/Restoration Process, Noise Models, Inverse Filtering, Minimum Mean Square Error (Wiener) Filtering, Fundamental of Image Compression, Image Compression Models, Error-Free Compression, Lossy Compression.

UNIT-4: Image Morphology and Image Segmentation
Introduction of Morphological Image Processing, Dilation and Erosion, Opening and Closing, The Hits-or-Miss Transformation, Some Basic Morphological Algorithms, Detection of Discontinuities, Edge Linking and Boundary Detection, Thresholding, Region-Based Segmentation.

UNIT-5: Image Representation, Description and Recognition
Introduction of Image Representation & Description, Boundary Descriptors, Regional Descriptors, Object Recognition.

Text books:

1. Digital Image Processing: Anil Kr. Jain
2. Digital Image Processing: Rafael C.Gonzalez & Richard E. Woods

Subject: Satellite Communication **Code: EC- 456**
Credits: 4 **Branch: EC** **Sem: VIII**

UNIT-1: Introduction
Origin of Satellite Communication**,** Brief History of Satellite Communication**,** Current State of Satellite Communication.

UNIT-2:
Orbital Aspects of Satellite Communication: The equations of the orbit, Describing the orbit, Locating the satellite in the orbit, Locating the satellite with respect to the earth, Orbital elements, Orbit determination. Orbital Perturbations: Effects of earth's oblateness, Effects of sun & moon. Orbital effects in Communication system performance: Doppler Shift, Range variation, Sun transit outage, Eclipse effect.

UNIT-3: Spacecraft
Space craft subsystems, Attitude and orbit control system, Telemetry tracking and command, Power systems, Transponders, Space qualification.

UNIT-4: Satellite link design
Basic transmission theory, System noise temperature and G/T ratio, Design of downlinks, Uplink design.

UNIT-5: Modulation and multiplex techniques for satellite links
Analog television transmission, Digital transmission of voice.

UNIT-6: Earth station technology
Earth station design for low system noise temperature, Large earth station antennas, Basic antenna theory, Antenna noise temperature, Design of small earth station antennas, FDM system, TDM system.

Text books:

1. Satellite Communication: Timothy Pratt & Charles W. Bostian.
2. Electronic Communication System; George Kennedy
3. Satellite Communication: D.C. Agarwal

Subject: Mobile Communication **Code: EC-416**
Credits: 4 **Branch: EC** **Sem: VIII**

Unit-1: Introduction to wireless communication
Evolution of mobile radio communication, examples of wireless comm. Systems, paging systems, cordless telephone systems, comparison of various wireless comm. systems, modern wireless communication systems : second, third and fourth generation wireless networks, WLL, WLAN, Bluetooth, PAN.

Unit-2: Introduction to cellular mobile systems
Spectrum allocation, basic cellular systems ,performance criteria, operation of cellular systems, analog cellular systems, digital cellular systems, frequency reuse, channel assignment , handoff strategies , capacity of cellular systems

Unit-3: Multiple Access Techniques
Introduction to multiple access techniques: FDMA, TDMA, CDMA, Performance of CDMA systems, Comparison of various multiple access techniques, RAKE receiver.

Unit-4: Digital modulation techniques for wireless communication
Performance analysis of BPSK, DPSK, QPSK, M-ary FSK, MSK, QAM, OFDM for Wireless transmission.

Unit-5: Fading
Propagation path loss, free-space propagation model, outdoor and indoor propagation models, multipath fading frequency dispersive, time dispersive and frequency dispersive channels, delay spread and coherence band with

Unit-6: Diversity and basic Combining methods
Diversity and types of Diversity: time Diversity, antenna Diversity, frequency Diversity, Combining methods: selection combiner, maximal ratio combiner, equal gain combiner.

Text books:

1. Wireless Communication: Theodore S Rappaport
2. IS-95 CDMA: Vijay K Garg
3. Communication Systems: Simon Haykins

Subject: PC Interfacing **Code EC-452**
Credits: 4 **Branch: EC** **Sem: VIII**

UNIT-1:
Introduction to computer, Personal computer, Motherboard, Microprocessor, The memory, Basic I/O interface, Operating system.

UNIT-2:
Communication with external devices, Timing circuits, Parallel I/O ports, Serial I/O ports, Plug in slots, PCI bus.

UNIT-3:
Computer interfacing for data acquisition and control, Family of PCs, Operator interface, Computer languages.

UNIT-4:
Signals, Interfacing input signals, Analog signal conditioning, Input signal buffering and amplification, Digital signal conditioning, Electromechanical relay.

UNIT-5:
Output system with continuous actuators, Cabling, Digital to analog converter, Analog to digital converters.

UNIT-6:
Plug-in-cards, Input/output devices, Software from transducer to control room, SCXI.

UNIT-7:
Low cost multi-functional DA and C card, IEEE-4888 GPIB, Standard add-on-cards, Backplane bus, VME bus, VXI bus microcontrollers.

Text books:

1. The Intel microprocessors, architecture, Programming and interfacing: Barry B. Brey
2. Microprocessors and interfacing programming and Hardware: Douglas V.Hall.
3. Hardware and software of personal computers: Sanjay K Bose.
4. Interfacing to the IBM personal computer: Lewis C Eggerbrecht (SAMS Publication)
5. Computer control of processes: M. Chidambaram.

Subject: DSP Processors and Architecture **Code: EC-462**
Credits: 4 **Branch: EC** **Sem: VIII**

Unit-1: Introduction to digital signal processing
Introduction, A Digital signal-processing system, The sampling process, Discrete time sequences. Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT), linear time-invariant systems, Digital filters, Decimation and interpolation.

Unit-2: Computational accuracy in DSP implementations
Number formats for signals and coefficients in DSP systems, Dynamic Range and Precision, Sources of error in DSP implementations, A/D Conversion errors, DSP Computational errors, D/A Conversion Errors, Compensating filter.

Unit-3: Architectures for programmable DSP devices
Basic Architectural features, DSP Computational Building Blocks, Bus Architecture and Memory, Data Addressing Capabilities, Address Generation Unit, Programmability and Program Execution, Speed Issues, Features for External interfacing.

Unit-4: Execution control and pipelining
Hardware looping, Interrupts, Stacks, Relative Branch support, Pipelining and Performance, Pipeline Depth, Interlocking, Branching effects, Interrupt effects, and Pipeline Programming models.

Unit-5: Programmable digital signal processors
Commercial Digital signal-processing Devices, Data Addressing modes of TMS32OC54XX DSPs, Data Addressing modes of TMS32OC54XX Processors, Memory space of TMS32OCS4XX Processors, Program Control, TMS32OCS4XX instructions and Programming, On-Chip Peripherals, Interrupts of TMS32OC54XX processors, Pipeline Operation of TMS32OC54XX Processors.

Unit-6: Implementations of basic DSP algorithms
The Q-notation, FIR Filters, IIR Filters, Interpolation Filters, Decimation Filters, PID Controller, Adaptive Filters, 2-D Signal Processing.

Unit-7: Interfacing memory and I/O peripherals to programmable DSP devices
Memory space organization, External bus interfacing signals, Memory interface, Parallel I/O interface, Programmed I/O, Interrupts and I/O, Direct memory access (DMA).

Text books:

1. Digital Signal Processing Avtar Singh and S. Srinivasan, Thomson Publications, 2004.
2. DSP Processor Fundamentals, Architectures & Features Lapsley et al. S. Chand & Co, 2000.
3. Digital Signal Processors, Architecture, Programming and Applications B. Venkata Ramani and M. Bhaskar, TMH, 2004.
4. Digital Signal Processing Jonatham Stein, John Wiley, 2005

Subject: Monolithic Microwave Integrated Circuit **Code: EC-460**
Credits: 4 **Branch: EC** **Sem: VIII**

UNIT:-1
History of Monolithic Integrated Circuits.

UNIT:-2
Monolithic circuit components: Planar transmission lines, Lumped and distributed passive elements, GaAs MESFET, Other active devices.

UNIT:-3
Metal semiconductor functions and their characteristics.

UNIT:-4
S-parameter measurement and their use in GaAs MESFET circuit design, S-parameter: General concept, Measurement of S-parameters of active devices, On wafer S-parameter of active devices, On wafer S-parameter measurements, Utilization, S-parameter in circuit design.

UNIT:-5
MMIC process.

UNIT:-6
Optical control of MMICs.

Faculty of Engineering & Technology
M.J.P. Rohilkhand University, Bareilly

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

LIST OF SUBJECTS IN **ODD** SEMESTER

SR. NO.	YEAR	SEM	PAPER CODE	PAPER NAME	BRANCH	NO. OF COPIES
1	II	III	EC-201	Electronics Engineering Materials	EC, EI	150
2	II	III	EC-203	Electromagnetic Theory	EC, EI	150
3	III	V	EC-301	Analog Communication System	EC, EI	150
4	III	V	EC-303	Antenna and Wave Propagation	EC	70
5	III	V	**EC-315**	**Consumer Electronics**	EC, EI	150
6	III	V	EC-202	Signals and Systems	EE	70
7	IV	VII	EC-403	VLSI Design And Circuits	EC	70
8	IV	VII	EC-405	Microwave Engineering	EC	70
9	IV	VII	EC-435	Optical Fiber Communication	EC	70
10	IV	VII	EC-433	Digital System Design	Pool Elective	70

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2	II	IV	EC-202	Signals and Systems	EC, EI, CS	210
3	II	IV	EC-204	Digital Electronics	EC,EI,CS,EE	280
4	III	VI	EC-302	Digital Signal Processing	EC, EI, CS	210
5	III	VI	EC-304	Digital Communication Systems	EC, EI	150
6	III	VI	**EC-316**	**Radar & Navigational Aids**	EC	70
7	III	VI	EC-308	Microelectronics	EC	70
8	III	VI	EC-312	Elements Of Communication Engineering	EE	70
9	IV	VIII	**EC-416**	**Mobile Communication**	EC	70
10	IV	VIII	EC-456	Satellite Communication	EC	70
11	IV	VIII	EC-458	Digital Image Processing	Pool Elective	70
12	IV	VIII	**EC-450**	**Microwave Communication**	Pool Elective	70
	IV	VIII	**EC-462**	**DSP Processors and Architecture**	Pool Elective	70