

4. ELECTRONICS AND COMMUNICATION ENGINEERING

Circuit Analysis: DC Circuit analysis, Thevenin's and Norton's equivalent circuits, Sinusoidal steady state analysis, *Circuit Transients* and resonance in RLC circuits.

Electronic Devices: *Basic semiconductor materials* Diodes, Bipolar Junction Transistors, MOSFET, UJT, Thyristor.

Electronic Circuits: Small signal amplifiers using BJT and *MOSFET* devices, Large signal amplifiers, Power supplies, Feedback amplifiers, *Bandwidth estimation*, Oscillators, *Tuned amplifier*, Pulse shaping circuits.

Linear Integrated Circuits: Operational amplifiers and its applications, PLL, Voltage regulators, *Active filters*, *Timers*, A/D and D/A converters.

Digital Electronics: Logic gates, Combinational circuits, Sequential circuits, *Semiconductor memories – ROM and RAM*.

Computer Architecture and Organization: *Machine instructions and addressing modes, ALU*.

Microprocessor and Microcontroller: Microprocessors 8085 and Microcontroller 8086 architectures and *applications*. interfaces, memory architecture, Program level performance analysis, Assembly, linking and loading, Task assignment and scheduling, IoT architecture and Protocols.

VLSI: *MOS transistor principles, Combinational Logic design, Sequential Logic design, Timing issues, Memory architectures, Data path circuits*. Static and Dynamic CMOS, Verilog / VHDL coding, FPGA architecture.

Signals and Systems: Classification and analysis: Continuous time signals and systems — Fourier series, Fourier Transform, Laplace transform, Discrete time signals and systems DTFT, DFT, Z-Transform, LTI systems analysis using transforms. Random process: moments, joint moments, correlation, covariance, power spectral density.

Digital Signal Processing: *DFT, FFT*, IIR and FIR filters, Realization and implementation, *Finite word length effects*, Quantization effects.

Control Systems: *Feedback principle*, Transfer function, Time and frequency response analysis, Stability analysis.

Communication Theory and Systems: AM, FM and PM, Sampling and Quantization, noise performance analyses, PCM, DPCM, DM, ADM, Multiplexing.

Digital Communication: Base band signaling — Line coding techniques, ISI, Pulse shaping, partial response signaling, Band pass signaling shift keying techniques, Error control coding, Spread spectrum techniques. Information theory: entropy, mutual information, source coding and channel coding. Multiplexing: TDM, FDM, OFDM, Wireless communication: cellular concepts, Frequency reuse, communication link power budget, fading channels, Multiple access: TDMA, FDMA, CDMA.

Computer Communication Networks: Definition of layers, data link protocols ARQ protocols, Network interconnection. Message routing technologies, End -End protocols, optical networks — SONET, SDH.

Electromagnetic Fields: Static Electric and Magnetic fields, Time varying Electric and Magnetic fields, Maxwell equations, boundary conditions, plane wave propagation.

Transmission Lines and Networks: Transmission line equations, *Characteristic impedance*, impedance matching, Filters.

EM waves and waveguides: *Plane Waves and Properties*, *Skin depth*, Guided waves, Rectangular and cylindrical waveguides.

Antennas and Propagation: *Monopole and dipole antenna*, Aperture antennas, *Microstrip* antennas, arrays, Propagation of radio waves.

RF and Microwave Engineering: *Microwave semiconductor devices*, Microwave tubes, Passive component, Microwave measurements.

Optical Communication: *Light propagation in optical fiber*, Optical wave propagation, Optical Fibers and losses, optical transmitters and receivers.