

Syllabus: PhD Admission Exam May-2019 (Microelectronics and VLSI)

Networks

Network solution methods: nodal and mesh analysis; Network theorems: superposition, Thevenin and Norton's, maximum power transfer; Wye-Delta transformation; Steady state sinusoidal analysis using phasors; Time domain analysis of simple linear circuits; Frequency domain analysis of RLC circuits;.

Electronic Devices

Basic Semiconductor Physics, Crystal Structure, Band Diagram, Carrier Concentrations, Resistivity and Conductivity; Excess Carriers and Transport Processes - Recombination, Generation, Drift, and Diffusion; Junction Diodes - pn and metal-semiconductor; Bipolar Junction Transistors (BJTs); Metal-Oxide-Semiconductor Capacitors (MOSCAPs); and Metal-Oxide-Semiconductor Field-Effect Transistors (MOSFETs).

Analog Circuits

Small signal equivalent circuits of diodes, BJTs and MOSFETs; Simple diode circuits: clipping, clamping and rectifiers; Single-stage BJT and MOSFET amplifiers: biasing, bias stability, mid-frequency small signal analysis and frequency response; BJT and MOSFET amplifiers: multi-stage, differential, feedback, power and operational; Simple op-amp circuits.

Digital Circuits

Logic gates and their static CMOS implementations.