



Indian Institute of Technology Roorkee

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Entrance Exam Syllabus

Section 1: Engineering Mathematics

Linear Algebra-matrix algebra, Eigen values and eigen vectors, rank,

Calculus: Multiple integrals.

Differential Equations: First order equations (linear and nonlinear)

Vector Analysis: Vectors in plane.

Complex Analysis: Analytic functions.

Probability and Statistics: Mean, median, mode, standard deviation.

Section 2: Networks, Signals and Systems

Circuit Analysis: Node and mesh analysis, superposition, Thevenin's theorem, Norton's theorem, reciprocity. Sinusoidal steady state analysis: phasors, complex power, maximum power transfer. Time and frequency domain analysis of linear circuits: RL, RC and RLC circuits, solution of network equations using Laplace transform. Linear 2-port network parameters.

Continuous-time Signals: Fourier series and Fourier transform, sampling theorem and applications.

Discrete-time Signals: DTFT, DFT, z-transform.

Section 3: Electronic Devices

Energy bands in intrinsic and extrinsic semiconductors.

Carrier Transport: diffusion current, drift current, mobility and resistivity, P-N junction, BJT, MOS capacitor, MOSFET.

Section 4: Analog Circuits

Diode Circuits: clipping, clamping and rectifiers.

BJT and MOSFET Amplifiers: biasing, ac coupling, small signal analysis, frequency response.

Current mirrors and differential amplifiers.

Op-Amp based circuits

Transient and steady-state analysis of LTI systems, Feedback principle; Transfer function,; Frequency, Response, Bode

Section 5: Digital Circuits

Number Representations: binary, integer and floating-point- numbers. Combinatorial circuits:

Boolean algebra, minimization of functions using Boolean identities and Karnaugh map, logic gates and their static CMOS implementations, arithmetic circuits, code converters, multiplexers, decoders.

Sequential Circuits: latches and flip-flops, counters, shift-registers, finite state machines, propagation delay, setup and hold time, critical path delay.

Data Converters: sample and hold circuits, ADCs and DACs.

Semiconductor Memories: ROM, SRAM, DRAM.

Computer Organization: Machine instructions and addressing modes, ALU, data-path and control unit, instruction pipelining.