

Indian Institute of Technology Goa

Syllabus for M. Tech admission test (under sponsored Category)

SCHOOL OF ELECTRICAL SCIENCES

Communication and Signal Processing

1. LTI Systems- Impulse response, frequency response, convolution, correlation.
2. Analysis of LTI Systems using Continuous and Discrete time Fourier transform, Z transform, Laplace transform.
3. Sampling of low pass signals, Nyquist Theorem, Aliasing, Anti-aliasing filter.
4. Probability and Random Variables – Single random variable, Two random variables, probability density function (PDF), cumulative density function (CDF), joint density functions, marginal density functions, transformation of random variables, moment generating functions. Gaussian random process.
5. Random Process – stationarity, wide-sense stationarity, autocorrelation, power spectral density, joint power spectral densities.
6. Analog modulation - AM - DSB full carrier, DSB-SC, SSB, VSB, FM - Narrowband and wideband FM, bandwidth, Armstrong method. Noise performance of AM and FM.

VLSI and Micro engineering:

1. Electronic Devices and Modelling - Energy bands semiconductors; drift and diffusion currents, mobility; Generation and recombination of carriers; diodes, BJT, MOS capacitor, MOSFETs and device models.
2. Digital circuits - Logic gates and their static CMOS implementations, combinational and Sequential circuits: latches, flip-flops, registers and counters.
3. Analog and Mixed-signal Circuits: Small signal equivalent circuits of diodes and MOSFETs; Simple diode circuits, current mirrors, biasing circuits, MOSFET amplifiers, Opamps: frequency compensation and stability, comparators, active

filters (RC and Switched Capacitor), comparators, data converters: DACs and ADCs.

Power Engineering:

1. Electromagnetics- Electrostatics, magneto statics, boundary conditions.
2. Electrical Machines- Magnetic circuits, Transformers, Rotating machines, DC motors: construction and operation, AC machines: Induction motor, Synchronous motor and generator.
3. Power Electronics – Switching circuits, Non-isolated DC/DC converters, Phase controlled Rectifiers, Single phase voltage source inverters.
4. Power System- Swing equation, Fault analysis, Transients in power systems, outdoor insulation, High voltage techniques for power systems.
5. Control systems- Modelling of dynamical system: in time domain and frequency