PGET Syllabus for M. Tech. - Electronics & Communication Engineering specialization in IoT

Electrical Circuits and Networks

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, wye-delta transformation.

Signals & Systems

Signals and systems: representation, classification, properties; Transforms: Fourier, Laplace and Z-Transform; Analysis of LTI systems: Time and frequency domain; Systems stability criterion; DFT and FFT; Digital filters: FIR, IIR.

Communication Systems

Analog and angle modulations and demodulations, Spectra of AM and FM; Superheterodyne receivers; Sampling and data reconstructions; Quantization & coding; Digital modulation techniques; Time division and frequency division multiplexing techniques; Random signals: Random variables, autocorrelation, power spectral density.

Control Systems

Basic control system components; Feedback principle; Transfer function; Block diagram representation; Signal flow graph; Transient and steady-state analysis of LTI systems; Frequency response; Routh-Hurwitz and Nyquist stability criteria; Bode and root-locus plots; Lag, lead and lag-lead compensation; State variable model and solution of state equation of LTI systems.

Analogue Electronics

Energy bands in intrinsic and extrinsic semiconductors, basic semiconductor theory; PN junction, Zener diode, BJT, MOS capacitor, MOSFET, LED and photo diode; 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 circuits: amplifiers, summers, differentiators, integrators, active filters, Schmitt triggers and oscillators.

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, arithmetic circuits, code converters, multiplexers, decoders; Sequential circuits: latches and flip-flops, counters, shift-registers; Data converters: sample and hold circuits, ADCs and DACs; Semiconductor memories: ROM, SRAM, DRAM.

VLSI Technology

VLSI circuits and system representation, CMOS processing technology, MOS Transistor Theory, Logic design with MOSFETs, CMOS inverter, Analysis of CMOS Logic Gates, VLSI Logic circuit Design, FPGA and their Programming Techniques.

Instrumentation & Sensors

Measurement, error, accuracy, precision, sensitivity, calibration and signal conditioning; Sensors and actuators: classification, characteristics, working principle, types i.e. temperature sensors, level sensors, displacement sensors, flow sensor, pressure sensors, strain sensors, humidity sensors, proximity sensors, piezoelectric sensor, smart sensors, motors.

Microprocessors & Embedded Systems

8086 microprocessor architecture, Addressing Modes, Instruction Set, Embedded systems overview, classification, design challenges, design metrics; Communication interface; Embedded firmware; ARM Processor Fundamentals and Architectures, ARM instruction set, PIC Microcontroller its Architecture and instruction set.