PGET Syllabus for M. Tech. -Electronics & Communication Engineering

Electrical Circuit Analysis

Response of passive components to voltage & current waveforms – impedance. Time &Frequency domain analysis of RLC circuits, resonance. Transient analysis of electric circuits, Steady state analysis of circuits, network theorems- Superposition, Thevenin, Norton and Maximum Power Transfer theorems', two port networks.

Electrical Machine and Instruments

Basics of electrical machines, single phase and three phase circuits and analysis, transformers, small power AC&DC machines, electric meters- galvanometer, ammeter, voltmeter, wattmeter. Measurement of R,L and C, various bridges. A to D & D to A Converters, Sensors & Actuators, Laboratory Electronic Instruments– DMM, CRO, function generator and power supplies.

Analogue Electronics

Basic Semiconductor theory, PN junctions, PN junction diodes, Zener Diode, Rectifiers and Regulator circuits. Wave shaping circuits, BJTs, JFET and MOSFET, UJT's, Thyristors, Triacs & Diacs: characteristics, biasing, different configurations. Detailed analysis of BJT and FET biasing circuits. Parametric models, Analysis of single and multistage Voltage & Current amplifiers. Types of feedbacks & its effects. Power amplifiers, tuned amplifiers, Oscillators, linear integrated circuits- process technology, differential amplifiers and current mirrors. Op-amp circuits and applications.

Digital Electronics

Boolean algebra, Logic families. SoP & PoS Logic function realization using universal logic gates, Minimization techniques for Boolean expression-K-map reduction. Combinatorial circuits. Sequential circuits. Timing diagram and State diagram. Semiconductor memories. Multiplexers & De-multiplexers. Display systems LED & LCD Coder & Decoder circuits.

Communications

Elements of communication system. Random signals: Random variables, autocorrelation, power spectral density Theory of Modulation and detection in analogue and digital systems. Sampling and data reconstructions; Quantization & coding. Time division and frequency division multiplexing techniques. Introduction to noise and it's effect on communication systems. Fundamentals of Information Theory, Channel Capacity Theorem.Error control coding. Telecommunication

networks, modeling and Switching technologies. Mobile Communications and Optical fiber Communications Systems, Techniques and Applications.

Signal Processing

Signal types and their representation- Time Domain, Frequency Domain. Transforms- Laplace, Fourier and Z-Transforms with applications. Linear and Non-Linear, Continuous and Discrete time Systems. System Characterization-Time and Frequency Domain. Analysis. Systems Stability Criterion.DFT and FFT. Digital Filters-FIR, IIR and Synthesis Techniques, Filter transformations and implementations. Adaptive and Multirate Systems.

Electromagnetics

Electrostatic and Magnetostatic Fields. Ampere, Poisson, Gauss, Laplace and Lorentzequations, Maxwell's equations. EM Spectrum, EM waves and their Propagation through free space. Cartesian, Cylindrical & Spherical Coordinate Systems. Wave representation. Wave Equation, Transmission Lines. Plane waves, Waveguides. Radiation and Antennas, radiation pattern, antenna gain.

Microelectronics and VLSI Design

VLSI Design flow, VLSI circuits and system representation, CMOS processing technology, MOS Transistor Theory, Short channel effects, Elements of Physical Design, Logic Design with MOSFETs, CMOS inverter, Transmission gate, Analysis of CMOS Logic Gates, VLSI Logic circuit Design, Memories and Programmable Logic circuits. PLD's, CPLD's, FPGA and their Programming Techniques.

Control Systems

Basic control system components: System Transfer functions, Block diagram description, reduction of block diagrams. Open loop and closed loop Systems, stability analysis. Signal flow graphs; transient and steady state analysis of LTI Systems and frequency response. Stability analysis techniques for LTI System: root loci, Routh-Hurwitz criterion, Bode and Nyquist plots. Control system compensators: elements of lead and lag compensation, Proportional-Integral-Derivative (PID) controllers. State variable representation and solution of state space equations of LTI control systems.