GATE Syllabus for Electrical Engineering

Engineering Mathematics

Probability and Statistics: Discrete and continuous distributions, poisson, correlation and regression analysis, sampling theorems, mean, conditional probability, median, mode and standard deviation, random variables.

Differential Equations: Cauchy's and Euler's equations, initial and boundary value problems, first order equation (linear and non-linear), partial differential equations and variable separable method, higher order linear differential equations with constant coefficients, method of variation of parameters.

Linear Algebra: Systems of linear equations, eigen values and eign vectors, matrix algebra.

Complex variables: Taylor's and Laurent series, solution integrals, residue theorem, analytic functions, Cauchy's integral theorem and integral formula.

Transform Theory: Laplace transform, Z-transform, Fourier transform.

Numerical Methods: Single and multi-step methods for differential equations, solutions of non-linear algebraic equations.

Calculus: Multiple, integrals, Vector identities, Fourier series, directional derivatives, line, stokes, surface, Gauss and Green's theorems, volume integrals, partial derivatives, maxima and minima, mean value theorems, evaluation of definite and improper integrals, theorems of integral calculus.

Electrical Engineering

Analog and Digital Electronics: Simple active filters, combinational and sequential logic circuits, VCOs and timers, multiplexer, Schmitt trigger, hold and sample circuits, multi-vibrators, D/A and A/D converters, architecture, 8-bit microprocessor basic, programming and interfacing, characteristics of diodes, FET,BJT, amplifiers-biasing, oscillators and feedback amplifiers, frequency response and equivalent circuit, operational amplifiers-characteristics and applications.

Control systems: Root loci, lead and lead-lag compensation, bode plots, leg, state space model, controllability and absorbability, principles of feedback, block diagrams, transfer function, steady-state errors, Routh and Niquist techniques.

Electrical Machines: Armature reaction and communication, three phase induction motors-principle, starting and speed control, types, performance characteristic, single phase induction motors, regulation and parallel operation of generators, synchronous

machines-performance, servo and stepper motors, regulation and parallel operation of generators, , motor starting, single phase transformer-equivalent circuit, tests, phasor diagram regulation and efficiency, parallel operation, three phase transformers-connections, windings, generator characteristics, auto-transformer, energy conversion principles, DC machines-types.

Electric Circuits and Fields: Three phase circuits, two-port networks, Gauss theorem, line, electric field and potential due to point, plane and spherical charge distributions, Thevenin's, Norton's , superposition and maximum power transfer theorem, Biot-Savart and Ampere's laws, dielectrics, inductance, capacitance, network graph, KVL, KCL, mesh and node analysis, situational steady-state analysis, transient response of A/C and D/C network, resonance, ideal current and voltage sources, basic filter concepts.

Power Electronics and Drives: Triggering circuits, bridge converters-fully controlled and half controlled, phase control rectifiers, principles of choppers and inverters, semiconductor power diodes, basis concepts of adjustable speed Ac and Dc drivers.

Electrical and Electronic Measurements: Energy and power factors, digital voltmeters and multimeters, instrument transformers, time, phase and frequency measurement, oscilloscopes, potentiometric recorders, Q-meters, error analysis, bridges and potentiometers, moving iron, PMMC, dynamometer and induction type instruments, power, current, measurement of voltage.

Power Systems: Economic operation, fault analysis, symmetrical components, principle of over-current, solid state relays and digital protection, differential and distance protection, HVDC transmission and FACTS concepts, circuit breakers, basic power generation concepts, system stability concepts, transmission line models and performance, swing curves and equal area criterion, cable performance, corona and radio interference, insulation, distribution systems, bus impedance and admittance matrices, per-unit quantities, load flow, power factor correction, voltage control.

Signal and Systems: Time-invariant and causal systems, sampling and theorem, Fourier series representation of continuous periodic signals, Laplace and Z transforms, shifting and scaling operations, representation of continuous and discrete-time signals, linear.