Code: EE Electrical Engineering

Engineering Mathematics

Linear Algebra: Matrices and Determinants, Systems of Linear Equations, Eigen Values and Eigen Vectors.

Calculus: Mean Value Theorems, Theorems of Integral Calculus, Evaluation of Definite and Improper Integrals, Partial Derivatives, Maxima and Minima, Multiple Integrals, Fourier Series. Vector Identities, Directional Derivatives, Line, Surface and Volume Integrals, Stokes, Gauss and Green's Theorems.

Differential Equations: First Order Equation (Linear and Nonlinear), Higher Order Linear Differential Equations with Constant Coefficients, Method of Variation of Parameters, Cauchy's and Euler's Equations, Initial and Boundary Value Problems, Partial Differential Equations and Variable Separable Method.

Complex Variables: Analytic Functions, Cauchy's Integral Theorem and Integral Formula, Taylor's and Laurent's Series, Residue Theorem, Solution Integrals.

Transforms: Fourier Series Representation of Continuous Periodic Signals, Sampling Theorem, Fourier, Laplace and Z-Transforms.

Probability and Statistics: Probability and Sampling Theorems, Conditional Probability, Probability Density Function, Mean, Median, Mode and Standard Deviation, Random Variables, Discrete and Continuous Distributions, Exponential, Poisson, Normal and Binomial Distribution, Correlation and Regression Analysis.

Numerical Methods: Solutions of Non-Linear Algebraic Equations, Single and Multi-Step Methods for Differential Equations.

Electrical Engineering

Electric circuits and fields: Ideal voltage and current sources, Dependent sources, R, L, C elements, KCL, KVL, Node & Mesh Analysis, Star-delta transformation. Thevenin's, Nortons's, Superposition, Reciprocity & Maximum power transfer theorems, Transient response of DC & AC Networks, Sinusoidal steady state analysis, Resonance, Networks graph Theory, Two-Port Network, Balanced three phase circuits. Coulomb's law, electrical field intensity & potential due to point, line. Plane and spherical charge distribution. Gauss's Law, Ampere's Law, Biot – Savart's law, Maxwell's equations in differential & Integral form, Magnetic circuits, Self and Mutual Inductance, Dielectrics and Capacitance.

Electrical Machines: Single Phase Transformer - Equivalent Circuit, Phasor Diagram, open circuit and short circuit tests, Regulation and Efficiency; Three Phase Transformers - Connections, Parallel Operation; Auto-Transformer; Electromechanical Energy Conversion Principles; DC Machines - Types, Windings, Generator & Motor Characteristics, Armature Reaction and Commutation, Starting and Speed Control of DC Motors; AC Machines-Three Phase Induction Motors - Principles, Types, Performance, Torque Speed Characteristics, No load and blocked rotor tests, Equivalent circuit. Starting and Speed Control; Single Phase Induction Motors;

Synchronous Machines – Types, Performance, Regulation and Parallel Operation of Generators, Synchronous Motor Starting, Characteristics and Applications; Servo and Stepper Motors.

Power Systems: Basic Power Generation Concepts; Transmission Line Models and Performance; Cable Performance, Insulators; Corona and Radio Interference; Distribution Systems; Per-Unit Quantities; Bus Impedance and Admittance Matrices; Load Flow Analysis, Voltage and frequency Control; Power Factor Correction; Symmetrical Components; Fault Analysis; Principles of Over-Current, Directional, Differential and Distance Protection; Solid State Relays and Digital Protection; Circuit Breakers; System Stability Concepts, Swing Curves and Equal Area Criterion; HVDC Transmission and FACTS Concepts, Economic Load dispatch with & without Network losses.

Control Systems: Mathematical modeling and representation of systems, Feedback principle, transfer function, Block diagrams and Signal flow graphs, Transient and Steady-State analysis of linear time invariant systems, Stability analysis using Routh-Hurwitz and Nyquist criteria, Bode plots, Root loci, Lag, Lead and Lead-Lag compensators; P, PI and PID controllers; State space model, Solution of state equation, Controllability and Observability.

Electrical and Electronic Measurements: Bridges and Potentiometers; PMMC, Moving Iron, Dynamometer and Induction Type Instruments; Measurement of Voltage, Current, Power, Energy and Power Factor; Instrument Transformers; Digital Voltmeters and Multimeters; Phase, Time and Frequency Measurement; Q-Meters; Oscilloscopes; Error Analysis. Principle and applications of Mechanical & Electrical Transducers.

Analog and Digital Electronics: Characteristics of Diodes, BJT, FET; Amplifiers - Biasing, Equivalent Circuit and Frequency Response; Oscillators and Feedback Amplifiers; Operational Amplifiers - Characteristics and Applications; Simple Active Filters; VCOS and Timers; Combinational and Sequential Logic Circuits; Multiplexer; Schmitt Trigger; Multi-Vibrators; Sample and Hold Circuits; A/D and D/A Converters; 8085 Microprocessor Basics, Architecture, Programming and Interfacing.

Power Electronics and Drives: Semiconductor Power Diodes, Thyristors, Triacs, GTO’s, MOSFET’s and IGBT’s - Static Characteristics and Principles of Operation; Triggering Circuits; Phase Control Rectifiers; Bridge Converters - Fully Controlled and Half Controlled; Principles of Choppers, Buck, Boost and Buck-Boost converters. Inverters-Single Phase and Three Phase voltage and current source inverters, Sinusoidal pulse width modulation, AC voltage controller; Basic Concepts of Adjustable Speed DC and AC Drives.

******