Syllabus for M. Tech CASE written test

Mechanics of materials:

Equations of equilibrium, Young's Modulus, Poisson Ratio, Generalized Hooke's law, Stress and Different states of stress, Principal stresses and maximum shear stresses, Mohr's circle. Strain and different types of strain, Plane stress and plane strain. Shear force and bending moment diagrams. Bending stress, shear stress, and torsional stress.

Structural Analysis

Concept of determinate and indeterminate structures, Determination of static and kinematic indeterminacy in beams, rigid jointed frames and trusses, Slope and Deflection of determinate structures-Moment area method, Conjugate beam method, Energy methods- Strain energy, Castigliano's theorems, Moving loads and influence line diagrams, Indeterminate structures-Force and displacement method, Method of consistent deformation, Slope deflection method, Moment distribution method, Introduction to Matrix methods of analysis

Concrete Technology

Cement and types of cements, hydration process, Aggregates: properties, tests and standards, Admixtures: properties, and effects on concrete properties, mix design Basic principles; IS method; batching of ingredients, mixing, transport, and placement, Consolidation, finishing, and curing of concrete. Fresh & Hardened properties of concrete, segregation and bleeding.

Design of Reinforced Concrete Structures

Working Stress Method and Limit State method, Types of limit states, Material Stress-strain curves – IS 456: 2000 guidelines for the design and detailing of beams (rectangular and T), columns, and slabs (one way and two way)

Design of Steel Structures

Mechanical properties of steel, cold working, and strain hardening; Philosophy, concept, and methods of design of steel structures. Bolted/Riveted Connections: Simple Connections: Lap and butt joints, Welded Connections: Design of compression members: Effective length factors and degree of restraints;