



DEPARTMENT OF CONSTRUCTION TECHNOLOGY AND MANAGEMENT

Syllabus for M.Sc. (Engg.) and Ph.D. Entrance Exam

Unit 1

Engineering Mechanics: System of forces, free-body diagrams, equilibrium of concurrent and non-concurrent forces, Centroid and Moment of inertia of plane laminas; Friction and its applications;

Solid Mechanics: Internal forces in structural members, Bending moment and shear force in statically determinate beams; Simple stress and strain relationships; Theories of failures; simple bending theory, flexural and shear stresses, Uniform torsion, buckling of column, combined and direct bending stresses. Slope and deflection of statically determinate beams.

Structural Analysis: Analysis of trusses, arches, cables and frames; Analysis of Statically indeterminate structures by force and displacement methods; consistent deformation method, Slope deflection and moment distribution methods; Influence lines; Stiffness and flexibility methods of structural analysis.

Unit 2

Design of RC structures: Limit state design concepts; Design of beams, slabs, columns and footings. IS codal provisions for design of RC structures.

Design of Steel structures: Limit state design concepts; Design of tension and Compression members, design of beams and beam- columns, Connection details.

Design of Prestressed concrete: Analysis of beam sections at transfer and service loads, Design of sections of post-tensioned and pre- tensioned beams, Layout of cables in post-tensioned beams, Location of wires in pre-tensioned beams, Design for flexure, shear and for serviceability limit state.

Concrete Technology: Concrete - constituents, mix design, short-term and long-term properties; mineral and chemical admixtures in concrete.

Unit 3

Surveying: Principles and Classifications, Mapping Concepts, Coordinate System, Measurements of Distances and Directions, Leveling, Theodolite Traversing, Curves. Remote sensing, Total Station, Geographical information system (GIS) and Geographical positioning system (GPS).

Fluid Mechanics: Properties of fluids, Types of fluids, Hydrostatic pressure and its measurement, Pressure measuring devices, Hydrostatic forces on plane surface, Kinematics of flow, Continuity and discharge equation, Dynamics, Euler's equation, Bernoulli's theorem, Laminar and Turbulent flow in pipes, Darcy- Weisbach formula, Flow in pipes, pipe networks, Flow measurement in channels and pipes, Critical flow, Hydraulic jump, Uniform flow and gradually varied flow, Different types of flows, Reynold's and Fraud's number, Most economical section of channel, Dimensional analysis.

Geotechnical Engineering: Index properties of soils, classification of soils, Permeability of soils, Effective stress concepts, Compaction of Soils, compressibility of soils, Shear strength of soils, Lateral earth pressure, stability of earth slopes, flow nets, bearing capacity and foundation settlement, stresses in soil, Subsurface exploration.

Transportation engineering: Highway alignment and engineering surveys; Geometric design of highways - cross-sectional elements.

Quantity Surveying: Calculation of quantities of materials, Items of works involved in buildings, Road works, Rate analysis, Valuation, Depreciation.

Unit 4

Building Materials & Construction: Physical and chemical characteristic of commonly used building materials in Civil Engineering construction. Setting and laying out a building Construction details of foundation, masonry, floors, roofs, stairs, plastering, Doors and windows.

Construction Techniques & Building Services: Construction Equipment involved in Earthwork, Concreting, lifting and in transportation, Operation and Maintenance of equipment; scaffolding in construction; Services in building; Illumination, ventilation, thermal comfort in building; indoor environmental quality, sustainable water use, economic analysis of green building, principles and practices sustainable building design and construction; alternate building materials & technologies, energy conservation, waste utilization and waste management in construction sites.

Unit 5

Construction project Management: Types of construction projects; Tendering and construction contracts; Rate analysis and standard specifications; Cost estimation; Project planning and network analysis - PERT and CPM. Quality and safety in construction, ISO certifications and documentation. Benchmarking practices.