

Civil Engineering Syllabus

STRUCTURAL ENGINEERING

Mechanics : Bending moment and shear force in statically determinate beam. Simple stress and strain relationship: Stress and strain in two dimensions, principal stresses, stress transformation, Mohr's circle Simple bending theory, flexural and shear stresses, unsymmetrical bending, shear centre. Thin walled pressure vessels, uniform torsion, buckling of column, combined direct and bending stresses.

Structural Analysis : Analysis of statically determinate trusses, arches, lack of fit and temperature effects in truss and arches beams, cables and frames, displacements in statically determinate structures and analysis of statically indeterminate structures by force / energy method. Analysis by displacement methods (slope deflection and moment distribution method influence lines for determinate and indeterminate structures. Basic concepts of matrix methods of structural analysis.

Concrete Structures : Concrete Technology – properties of concrete, limit state basics of mix design basic, Concrete Design working stress and limit state design concepts, analysis of members subjected to flexure, shear, compression and torsion. Basic elements of prestressed concrete, analysis of beam sections at transfer and service loads. Deflection of prestressed concrete beams.

Steel Structures : Limit State Analysis and design of tension and compression members, beam and beamcolumns, column bases. Connections – simple and eccentric, beam-column connections, plate girders and trusses Plastic analysis of beams and frames.

GEOTECHNICAL ENGINEERING

Soil Mechanics : Origin of soils, soil classification, three – phase system, fundamental definitions; relationship and interrelationships, permeability and seepage, effective stress principle, consolidation, compaction, shear strength.

Foundation Engineering : Sub – surface investigations – scope, drilling bore holes, sampling, penetration test plate load test. Earth pressure theories, effect of water table, layered soils. Stability of slaps – infinite slopes finite slopes. Foundation types – foundation design requirements. Shallow foundations – bearing capacity effect of shape, water table and other factors, stress distribution, settlement analysis in sands and clays. Deep foundations – pile types, dynamic and static formulae, load capacity of piles in sands and clays, negative skin friction.

WATER RESOURCES ENGINEERING

Fluid Mechanics and Hydraulics : Properties of fluids, principle of conservations of mass, momentum, energy and corresponding equations, potential flow, applications of momentum and Bernoulli's equation, laminar and turbulent flow, flow in pipes, pipe networks. Concept of boundary layer and its growth. Uniform flow, critical flow and gradually varied flow in open channels, specific energy, hydraulic jump, forces on immersed bodies, flow measurements in channels. Dimensional analysis and hydraulic modeling, Kinematics of flow, velocity triangles and specific speed of pumps and turbines.

Hydrology : Hydrologic cycle, rainfall, evaporation, infiltration, stage discharge relationships, unit hydrographs, flood estimation, reservoir capacity, reservoir and channel routing. Well hydraulics.

Irrigation : Duty, delta, estimation of evapo – transpiration. Crop water requirements. Design of : lined and unlined – canals, waterways head works, gravity & earth dams and spillways. Design of weirs on permeable foundation. Types of irrigation system, irrigation methods. Water logging and drainage, sodic soils.

ENVIRONMENTAL ENGINEERING

Water Requirements : Quality standards, basic unit processes and operations for water treatment. Drinking water standards, basic unit operations and unit processes for surface water treatment, distribution of water. Sewage and sewerage treatment, quantity and characteristics of wastewater. Primary, secondary and tertiary treatment of wastewater, sludge disposal, effluent discharge standards. Domestic wastewater treatment, quality characteristics of domestic wastewater, primary and secondary treatment Unit operations and unit processes of domestic wastewater, sludge disposal.

Air pollution : Types of pollutants their sources and impacts, air pollution meteorology, air pollution control, air quality standards and limits.

Municipal solid Wastes; Characteristics, generation, collection and transportation of solid wastes, engineered systems for solid waste management (reuse / recycle, energy recovery, treatment and disposal).

Noise pollution: Impacts of noise, permissible limits of noise pollution, measurement of noise and control of noise pollution.

TRANSPORTATION ENGINEERING

Highway Planning: Geometric design of highways, testing and specifications of paving materials, design of flexible and rigid pavements.

Traffic Engineering: Traffic characteristics, theory of traffic flow, intersection design, traffic signs and signal design, highway capacity.

SURVEYING

Importance of surveying, principles and classifications, coordinate system, measurements of distance and directions, chain survey, leveling, theodolite traversing, plane table surveying, errors and adjustments, curves.