

Civil Engineering

Paper 1

1. Building materials

Timber : different types and species of structural timber, density-moisture relationships, strength in different directions, defects, influence of defects on permissible stress , preservation , dry and wet rots , codal provisions for design , plywood.

Bricks: Types, Indian standard classification, absorption, saturation factor, strength in masonry, influence of mortar strength on masonry strength

Cement: Compositions, different types, setting times, strength.

Cement mortar: Ingredients, proportions, water demand, mortar for plastering and masonry.

Concrete: Importance of water cement ratio, strength, ingredients including admixtures, workability, testing for strength, elasticity, non destructive testing, mix design methods.

2. Construction technology and equipments.

Concept of foundations, types of foundations: Brick masonry, Types of brick bonds: Doors and windows, types and uses: Damp proofing – its effect on bricks, plaster, wood fixtures; Roofs – Types: Stairs- Planning and layout, types of stairs.

Concreting Equipment:

Weight Batcher, Mixer, vibrator, batching plant, concrete pump. Cranes, hoists, lifting equipment.

Earthwork Equipment:

Power shovel, hoe, dozer, dumper, trail waves and tractor, roller, sheep foot rollers, pumps.

3. Estimating

Units of measurements, method of calculating quantity of earth. Lead and lift, types of estimates: Specification of earth work in excavation, first class brick work, wood work in doors and windows, construction of cement concrete floor, white washing, and RCC work: Calculation of quantities of cement concrete work.

4. Hydraulics and Hydraulic Machines:

Fluid Properties, Pressure, Buoyancy, Flow kinematics, Integration of flow equations; Flow measurement; Viscosity, Hydraulic jump, pipe flow, losses in pipe flows, water hammer.

Pumps - Centrifugal pumps, Reciprocating pumps. Hydraulics Ram, Hydraulic turbines and its types.

5. Soil Mechanics:

Properties of soil, Classification and interrelationship; Compaction , methods of compaction and their choice; Permeability and Seepage, Flow nets, Compressibility and consolidations, Shearing resistance, stresses and failure; Soil testing in laboratory and in-situ; Stress path and applications; Earth pressure theories, stress distribution in soil ; soil exploration, samplers, load test, penetration test.

6. Surveying:

Classification of surveys, Scales, Accuracy, Measurement of distances – direct and indirect method; Measurement of direction, Prismatic compass, Local Attraction, Theodolites -types, Measurement of elevation – leveling; Contours; tacheometry Surveying, , plane table surveying. Definitions of curves, relation between degree of curves and its radius, types of curves, elements of circular curve.

CIVIL ENGINEERING

PAPER - 2

1. Solid Mechanics

Elastic constants, stress, plane stress, Mohr's circle of stress, strains and plane strain, Mohr's circle of strain, combined stress: Elastic theories of failure; simple bending, shear; torsion of circular and rectangular sections and simple members.

Shear force and bending moment diagrams, Direct and bending stresses, Determinate framed Structures, Deflection of beams.

2. Design of steel structures

Design of riveted and welded connections, Tension and compressive members.

3. Design of reinforced concrete and masonry structures

Limit state design for bending, shear, and axial compression and Simple column footing. Codal provisions for slabs, beams, walls and floorings. Working stress method of design of R.C. members. Merit and Demerit of limit state and working stress method of design.

4. Irrigation Engineering:

Hydrology, Hydrological cycle, precipitation and related data analyses, Unit hydrograph; Evaporation and transpiration; Floods and their management ; Streams and their gauging; Capacity of Reservoirs.

Water resources of the globe, Multipurpose uses of Water: Soil-Plant-Water relationships, irrigation systems, water demand assessment; Storages and their yields, ground water yield and well hydraulics; Water logging ; lining of canals; Sediment transport in canals, Non Overflow and overflow sections of gravity dam and their design concept, Energy dissipaters, distribution works, falls , cross drainage works, outlets; River training.

5. Environmental Engineering:

(A) Water supply Engineering:

Sources of water supply, yields; Estimation of demand; Water quality standards; Control of Water-Borne diseases; Primary and secondary treatment, detailing and maintenance of treatment units; Conveyance and distribution systems of treated water, Leakages and control; Rural water supply; Institutional and Industrial water supply.

(B) Waste Water Engineering:

Urban water disposal; Systems of sewage collection and disposal; pumping; Characteristics of sewage and its treatment, Disposal of products of sewage treatment, stream flow rejuvenation Institutional and industrial sewage management; Plumbing systems; Rural and semi-urban sanitation.

(C) Solid Waste Management:

Sources, classification, collection and disposal; Design and maintenance of landfills.

(D) Air and Noise Pollution and ecology:

Sources and effects of air pollution; Monitoring of air pollution; Noise Pollution and Standards; Ecological chain and balance, Environmental Assessment.

6. Transportation engineering.

Planning of highway systems, alignment and geometric design, horizontal and vertical curves, grade separation, materials and construction methods for different surfaces and maintenance: Principles of pavement design: Drainage.

Traffic surveys, intersection, signaling Tunneling, alignment, method of construction, drainage, lightning, and ventilation.