

**Syllabus for the Post of**  
**"Junior Technical Officer (Civil) E1 Grade (Internal)"**

**CIVIL ENGINEERING**

**1. Surveying:**

Fundamental concepts; Classification of Surveys; Chain Surveying; Compass Surveying; Levelling and Contouring; Theodolite Surveying; Tacheometry; Curves.

**2. Construction Materials & Practice :**

Properties and uses of construction materials - Stones, Bricks, Tiles, Sand, Cement, Timber, Glass, Asbestos, Paints, Distempers, Enamels and Varnishes; Preparation of Cement mortar for various works. Classification of foundations, construction of spread footing and well foundation; Stone and Brick masonry - types and principles of construction; Doors and Windows - types, fittings and fastenings, types and functions of Lintels, Sunshades and Roofs, Flooring - Construction and types of material; Types of Stairs; Scaffolding; Types of Plastering, Pointing, Painting and White / Colour Wash.

**3. Engineering Mechanics and Strength of Materials :**

Centre of Gravity and Moment of Inertia; Simple stresses and strains, Hooke's law - stress strain diagram, working strength, elastic constants, Poisson's ratio, Relationship between elastic constants, compound rods, temperature stresses, strain energy, proof resilience, impact loading; Shear force and bending moment diagrams for simply supported, over hanging and cantilever beams, relation between intensity of loading, shear force and bending moment; Theory of simple bending, modulus of section, moment of resistance, distribution of shear stress in rectangular, circular and I-Sections; Deflection in cantilever and simply supported beams subjected to simple loading; Columns and struts - Euler's and Rankine's formulae, Slenderness ratio, simple built-up columns; Analysis of dams and retaining walls; Simple plane and pin-jointed trusses, Stresses by method of joints and method of sections.

**4. Hydraulics :**

Properties of fluids, fluid pressure and its measurement; Types of flows, energies in fluid motion, Bernoulli's theorem and its applications - venture metre, pitot tube; Orifice and mouthpiece; Notches and weirs; Flow through pipes, hydraulic gradient line and total energy line, laminar and turbulent flow in pipes - Reynolds number, measurement of velocity; open channels; Water turbines - classification, centrifugal and reciprocating pumps

**5. Quantity Surveying:**

Abstract estimate, detailed estimate - centreline and long & short wall method, various items of Civil Engineering works as per Indian Standards; General Specifications - earth work, brick / stone masonry in cement mortar, RCC, plastering in cement mortar, Floor finishes with ceramic tiles and marbles, white washing, colour washing; Standard schedule of rates, lead and lift, Computation of earth work - Midordinate, Mean Sectional area, Trepzoidal method, Prismoidal Rule;

**6. Design of Structures (RCC and Steel) :**

RCC structures: principles and concepts of working stress method and limit state method, loads and permissible stresses, IS specifications, analysis and design - rectangular beam, slab, T-beam, column, footing and stair case.

Steel Structures: Properties of steel sections, loads and permissible stresses, IS specifications, Analysis and design - welded joints, beam, column, column base, tension member; Design of roof truss.

**7. Water supply and Sanitary Engineering:**

Water supply scheme; Sources of water; Conveyance of water – pipes, joints and laying; Testing of water, drinking water standards; Treatment of water, Distribution of water, Water supply connections to building.

Quantity of sewage, surface drains, laying of sewers, sewer appurtenances, Characteristics of domestic and industrial sewage – BOD, COD; Sewage treatment, Septic tank and soak pit; House drainage arrangements in buildings, solid waste-collection and disposal.

**8. Transportation Engineering:**

Alignment of roads - plain and hilly terrain, surveys; Cross section of road structure, width of pavement, Camber, Gradient, Super elevation, Transition curves, horizontal and vertical alignment; Pavement marking, traffic signs, traffic islands

Types of soil, classification of soil - Textural, IS Classification, physical properties - plasticity, cohesion, consolidation, compaction, permeability, compressibility, soil moisture content, specific gravity, density; Bearing capacity of soil.

**9. Irrigation Engineering:**

Definitions, duty, delta, base period, rainfall and its measurement, factors affecting runoff, methods of computing maximum flood discharge; Classification of head works, component parts of a weir and barrage, factors influencing selection of site - reservoirs and dams; Classification of canals, canal lining, cross drainage works; Soil erosion, water logging, soil water plant relationship; Necessity of irrigation - advantages and disadvantages, irrigation methods.

**PART-II (General Studies)**

1. General Knowledge
2. General English
3. Quantitative Aptitude & Numerical Ability
4. Test Of Reasoning
5. Computer Basics