

SYLLABUS FOR WRITTEN TEST - PHASE II

Name of the Post: Technical Assistant Grade I (Junior Engineer - Civil)

SYLLABUS FOR WRITTEN TEST (Objective Type)

Duration: 90 minutes

Maximum Marks: 100 Marks

- (i) **Building Materials:** Physical and chemical properties, classification, standard tests, uses and manufacture/quarrying of materials, e.g. building stones, silicate-based materials, cement (Portland), asbestos products, timber and wood-based products, laminates, bituminous materials, paints, varnishes.
- (ii) **Concrete Technology:** Properties, Advantages and uses of concrete, cement aggregates, the importance of water quality, water cement ratio, workability, mix design storage, batching, mixing, placement, compaction, finishing and curing of concrete, quality control of concrete, hot weather and cold weather concreting, repair and maintenance of concrete structures.
- (iii) **Surveying:** Principles of surveying, measuring distance, chain surveying, working of the prismatic compass, compass traversing, bearings, local attraction, plane table surveying, theodolite traversing, adjustment of the theodolite. Levelling, Definition of terms used in levelling, contouring, curvature and refraction corrections, temporary and permanent adjustments of dumpy level, contouring methods, uses of a contour map, tachometric survey, curve setting, earthwork calculation, advanced surveying equipment. Total station applications in civil engineering. Survey work of areas for development and preparation of survey plans.
- (iv) **Soil Mechanics:** Origin of soil, phase diagram, Definitions-void ratio, porosity, degree of saturation, water content, the specific gravity of soil grains, unit weights, density index and interrelationship of different parameters, Grain size distribution curves and their uses. Index properties of soils, Atterberg's limits, ISI soil classification and plasticity chart. Permeability of soil, coefficient of permeability, determination of coefficient of permeability, Unconfined and confined aquifers, effective stress, quick sand, consolidation of soils. Principles of consolidation, degree of consolidation, pre- consolidation pressure normally consolidated soil, e-log p curve, computation of ultimate settlement. Shear strength of soils, direct shear test, Vane shear test, Triaxial test. Soil compaction, Laboratory compaction test, Maximum dry density and optimum moisture content, earth pressure theories, active and passive earth pressures, bearing capacity of soils, plate load test, and standard penetration test.

- (v) **RCC & Steel Design:** RCC beams-flexural strength, shear strength, bond strength, design of singly reinforced and double reinforced beams, cantilever beams. T-beams, lintels. One-way and two-way slabs, isolated footings. Reinforced brickworks, columns, staircases, retaining walls, and water tanks (RCC design questions may be based on both Limit State and Working Stress methods). Steel design and construction of steel columns, beams roof trusses plate
- (vi) **Estimating costing and valuation:** Estimate, glossary of technical terms, analysis of rates, methods and unit of measurement, item of works-earthwork, Brickwork (Modular & traditional bricks), RCC work, shuttering. Timber work, Painting, flooring and plastering, Boundary wall, Brick building, Water tank, septic tank. Bar bending schedule, Centre line method. Mid-section formula. Trapezoidal formula, Simpson's rule. Cost estimate of Septic tank, flexible pavements. Tube well, isolates and combined footings, Steel Truss, Piles and Piles caps. Valuation-value and cost, scrap value, salvage value, assessed value, sinking fund, depreciation and obsolescence, methods of valuation. Measurement book.

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DIRECTOR