Syllabus for Written Exam for the post of JUNIOR ENGINEERS (CIVIL)

PART- 1 (30% WEIGHTAGE)

(i) General Intelligence & Reasoning: Analogies, similarities, differences, visualization, judgement, decision making, visual memory, discrimination, patterns, relationship concepts, arithmetical reasoning, verbal and figure classification, abstract ideas, arithmetical computations, and other analytical functions.

(ii) General Awareness**:** General awareness of the environment around us and understanding of everyday observations. Knowledge of current events and history, culture, geography, economic scene, general polity and scientific research, etc. about India and its neighbouring countries.

PART-2 (70% WEIGHTAGE)

Building Materials**:** Properties, classification, standard tests, uses and manufacture/quarrying of → building stones, aggregates, clay masonry, cement (Portland), bituminous materials, concrete, and mortar. Concrete mix design, quality control, repair and maintenance of concrete structures.

Estimating, Costing and Valuation: estimate, glossary of technical terms, analysis of rates, methods and unit of measurement, Centre line method, Mid-section formula, Trapezodial formula, Simpson's rule. Cost estimate of various structures. Valuation – Value and cost, scrap value, salvage value, assessed value, sinking fund, depreciation and obsolescence, methods of valuation.

Surveying**:** Principles of surveying, measurement of distance, working of prismatic compass, compass traversing, bearings, plane table surveying, theodolite traversing, levelling, contouring, tachometric survey, earth work calculation, advanced surveying equipment.

Soil Mechanics: Physical characterization of soil. Grain size distribution. Index properties, Atterberg's limits, and plasticity chart. Permeability of soil, effective stress and quicksand, consolidation of soils. Shear strength of soils and various test methods. Soil compaction. Earth pressure theories. Bearing capacity of soils, plate load test, standard penetration test.

Hydraulics: Fluid properties, hydrostatics, measurements of flow, Bernoulli's theorem and its application, flow through pipes, flow in open channels, weirs, flumes, spillways, pumps and turbines.

Irrigation Engineering: Glossary of terms, types and methods of irrigation, Hydrologic cycle, measurement and analysis of hydrologic fluxes, Water requirement of crops, Irrigation efficiencies. Canals – types, design, lining. Hydraulic structures, silt theories.

Transportation Engineering: Highway Engineering – cross sectional elements, geometric design, types of pavements, pavement materials – aggregates and bitumen, different tests, Design of flexible and rigid pavements. Highway drainage. Traffic Engineering – Different traffic survey, speed-flow-density and their interrelationships, intersections and interchanges, traffic signals, traffic operation, traffic signs and markings, road safety.

Environmental Engineering: Quality, source, purification, and distribution of water. Sewerage systems, circular sewer, oval sewer, sewer appurtenances, sewage treatments. Surface water drainage. Solid waste management – types, effects, engineered management system. Air pollution – pollutants, causes, effects, control. Noise pollution – cause, health effects, control.

Theory of structures**:** Theory of elasticity, determinacy and indeterminacy, bending moment and shear force diagrams of simply supported, cantilever and over hanging beams. Moment of inertia for rectangular & circular sections. Flexural and shear stresses in tee, channel and compound sections. Slope and deflection of simply supported and cantilever beams, torsion of circular section.

RCC Design: Design of RCC beams and lintels for flexural and shear demands and columns for compression demand. Design of one-way and two-way slabs, isolated footings, staircases, retaining wall, water tanks based on limit state design.

Steel Design: Steel design and construction of steel columns, beams roof trusses, and plate girders.