

## Post – Technical Assistant (Civil Engineering)

### SYLLABUS

#### PART – A (20 MARKS)

**General Knowledge and Current Affairs** A standard pattern similar to one used by Staff Selection Commission for Combined higher secondary level examination or banking clerical examination can be conducted. Current Affairs questions can also be included in this.

**General English:** Error recognition, Fill in the blanks with appropriate terms, Vocabulary, Grammar with special reference to Sentence Structure, Synonyms, Antonyms etc

**General Aptitude & Reasoning:** Questions on reasoning and problem solving, analysis, judgment, decision making, visual memory, relationship concepts, verbal and figure classification, arithmetical number series, non-verbal series etc.

**Mathematics:** Class 10th Syllabus of NCERT.

**Science, Computer application and Other Subjects:** Knowledge level to test supervisory skills will also be included. Class 10th Syllabus of NCERT.

#### PART – B (80 MARKS)

##### **Engineering Mechanics:**

The mechanical properties of engineering materials - elastic constants - Types of forces on structural members, different types of stresses and strains - the deformation of elastic bodies under simple stresses, the use and principles of composite sections; The effects of transverse forces such as shear force and bending moment in beams; determination of SF and BM in simple beams under different loading systems; Geometrical properties such as centroid and moment of inertia of sections. Determination of different types of stresses induced in beams.

##### **Construction Materials and Construction Practice:**

Different construction materials and their properties - different types of cement - grades of cements - tests on cement and other construction materials. Types of modern building materials such as ceramic products – glass - metals and plastics. Preparation of mortar and cement concrete. Types of foundations. Classification of stone masonry - brick masonry. Types of doors – windows - lintels - stairs. Types of floors - roofs. Different methods of pointing, plastering and termite proofing. Scaffolding - shoring - underpinning - form work. Procedure of colour washing - white washing - painting - varnishing.

##### **Soil Mechanics and Foundation Engineering:**

Development of Soil Mechanics - Soil formation - three Phase System - Index and Engineering properties. Permeability - Darcy's law. Shear strength of soil - Mohr's stress circle - Mohr-Coulomb failure theory - Shear strength test - Unconfined compression test - Optimum moisture content - Proctor's Compaction test. Soil exploration - Direct, Semi-direct and Indirect methods - Spacing and depth of test borings - Sub-Soil Sampling - Disturbed and Undisturbed samples - Seepage analysis - Head, Gradient and Potential -

Hydraulic gradient - Seepage pressure. Methods of determining bearing capacity - Types of failure in soil; Rankine's analysis - Terzaghi's analysis - Effect of water table. Settlement of foundation - Plate load test.

### **Surveying:**

Types of Theodolites - Transit and non-transit Theodolite, Vernier and Micrometer Theodolites, Measurement of vertical angle and deflection angle – Bearing of a line – Theodolite traversing. Stadia and Tangential tacheometry – Fixed hair method of tacheometry – Measurement of distance and elevation.

### **Transportation Engineering:**

Development of Roads in India - Modes of transportation - Nagpur Plan, Classifications of Highways, Types of Pavement - Flexible and Rigid Pavements - Parking - Methods of parking - Road junctions (Grade intersections and Grade separators) - Traffic signals - Types of road signs. Classifications of roads - Earthen road, Gravel road, Water Bound Macadam roads, Types of Bituminous roads - Surface dressing, Methods of construction of cement concrete roads, Rail Gauges, Requirements of an ideal rail, Types of sleepers, Rail joints, Junction and Terminal stations, Methods of interlocking - Tappets and locks system.

### **Fluid Mechanics/Hydraulics Engineering:**

Pressure of liquid at a point - Static pressure, Atmospheric pressure, Gauge pressure, Vacuum pressure and Absolute pressure – Measurement of pressure - Simple mercury barometer - Pressure measuring devices and problems - Piezometer tube - Simple U-tube manometer - Differential manometer – Micrometer. Hydrostatic pressure - Pressure on plane surfaces - Horizontal, vertical and inclined Surfaces-Total Pressure-Centre of pressure - Depth of centre of pressure. Various types of flows including Laminar and turbulent flow -Steady and unsteady flow – Uniform and Non-uniform flow - Bernoulli's theorem – Venturimeter – Orificemeter. Large orifice – Discharge formula –Types of mouthpieces - Losses of head in pipes - Types of notches and problems –Classification of weirs - Discharge over a rectangular weir and trapezoidal weir, End contractions of a weir. Rectangular and Trapezoidal channels – Discharge – Chezy's formula, Bazin's formula and Manning's formula - Methods of measurement of velocity. Flow through pipes.

### **Environmental Engineering:**

Water supply - Public water supply system and demand - types of demand - per capita demand - prediction of population. Intakes - types of intakes-description of intakes-infiltration galleries and infiltration wells in river beds - necessity of pumps - types of pumps - pipes for conveyance of water. Water treatment - sedimentation – types of sedimentation - coagulation - coagulants and their choice - types of sedimentation tanks – filtration - R.O process. Distribution system - gravity, pumping and combined system. Sanitary Engineering - estimation of storm water – minimum size and shape of sewer - materials used for sewer - joints - laying and testing - manhole - lamp hole - catch basin - street inlet - grease and oil trap -flushing tanks – drainage arrangements in buildings - sanitary fittings - sewage pumps. Sewage treatment - primary and secondary treatments - screens - skimming tanks - grit chambers - sedimentation tanks – filters - types and description of filters - activated sludge process - septic tanks - construction and working of septic tanks. methods of solid waste disposal - incineration, dumping, sanitary landfill, composting - energy from waste.