

**SYLLABUS**  
**JUNIOR LAB ASSISTANT (CIVIL ENGINEERING)**

- Basic Knowledge about computers, purchase regulations/procedures in government/academic organizations.
- Determination of forces in trusses, beams and frames; Bending moment, shear force and axial force; Properties and testing of various materials for Reinforced Concrete (RC) i.e., cement, water, fine and coarse aggregates, steel; Structural properties of RC and steel structures; Concrete mix design; Various laboratory tests of reinforced concrete for determination of compressive strength, tensile strength, stress-strain behavior, modulus of elasticity, ductility, characteristic strength, grades of concrete; Design stress-strain curve of reinforcing steel; Design and detailing of structural RC members conforming IS 456(2000); Design and detailing of structural steel members as per IS 800 (2007); In-situ tests for assessment of existing RC structures
- Origin of the soil, determination Index properties of soil, grain size analysis and soil classifications, soil permeability and Darcy's law, compaction in laboratory and field conditions, volume-change behaviour of soil, shear strength parameters of soils and its estimation, soil sampling and sub-surface investigations.
- Subgrade, Subgrade properties, aggregates, desirable properties of aggregates, gradation, bituminous materials, bitumen quality, viscosity, grades of bitumen, bituminous mixes, mix requirements, mix types, pavement, pavement layers, types, pavement evaluation.
- Continuity equation, Bernoulli's/Energy equations, Momentum equation, velocity distribution in pipes, Laminar flow and Turbulent flow through pipes, losses in pipes, losses in transitions and fittings, discharge measurements in pipes, transient flow, water hammer, surge tank, hydraulic transmission of power through pipes, uniform flow and velocity distribution in open channels, discharge measurement in open channels, hydraulic jump, impact of jets, Lysimeters, Weather stations, Rainfall-runoff in catchments.
- Concept of scale. Plotting accuracy, map sheet numbering, coordinate system and map projection. Conventional Surveying instruments and measurement methods - levels, compass, theodolites, plane table. Modern Surveying Instruments - Total Station, Global Positioning Systems, EDM, LASER based instruments. Total Station surveying - principles and methods, types of errors and corrections. DGPS surveying - principles and measurement methods, error in observations and corrections. Generation of topographic data using modern survey instruments. Remote sensing and photogrammetry basics: Digital elevation models generations.
- Molecular weight calculations, Unit conversions: Normality, Molarity, Molality etc., Principles

of Jar test analysis, pH and conductivity. Principles of oxygen demand estimation in wastewater, BOD: estimation of ultimate BOD, and COD concepts. Types of solids in wastewater, Hardness and its types, Alkalinity and its types. BIS standards for drinking water, Wastewater discharge standards. Procedure to determine the following parameters in water: Titrimetric analysis of Hardness, Alkalinity, Acidity, and Chlorides. Spectrometric analysis of Nitrates, Fluorides, and Sulphates. Jar test experiment for optimum coagulant dosage. Gravimetric analysis of various solids. Procedure to determine the following parameters in wastewater: DO using Winkler's method, BOD using 5-day incubation, COD using open reflux method, MPN and Total Coliform.

- General English, Quantitative Aptitude, Analytical Reasoning, General Knowledge/Current Affairs.