SYLLABUS FOR LAB ASSISTANT

(CIVIL ENGINEERING/RURAL ENGINEERING)

1. **Construction Materials and Management:** Desirable properties, quality control tests and behavior of various construction materials such as Structural Steel, Cement, Aggregate, Concrete, Bricks, Mortar; Timber; Bitumen, Wood and their lab and field testing procedure as per IS specifications. Concrete mix design. **Estimating, Costing and Valuation:** estimate using various methods, analysis of rates, methods and units of measurement. Valuation – Value and cost, scrap value, salvage value, assessed value, sinking fund, depreciation and obsolescence, methods of valuation.
2. **Surveying:-** Principles of surveying, measurement of distance, chain surveying, working of prismatic compass, compass traversing, bearings, local attraction, plane table surveying, theodolite traversing, adjustment of theodolite, Levelling, Definition of terms used in levelling, contouring, curvature and refraction corrections, temporary and permanent adjustments of dumpy level, methods of contouring, uses of contour map, tachometric survey, curve setting, earth work calculation, advanced surveying equipment. Remote sensing - basics, platform and sensors, visual image interpretation; Basics of Geographical information system (GIS) and Geographical positioning system (GPS).
3. **Transportation Engineering:** - Geometric design of highways, testing and specifications of paving materials, design of bituminous mixes (hot, cold, warm), test related to quality control of roads, Pavement evaluation tests, the design of flexible and rigid pavements. Traffic characteristics, the theory of traffic flow, intersection design, traffic signs and signal design, highway capacity.
4. **Soil Mechanics:** - Basic parameters of soil and tests for determination of these parameters, Grain size distribution curves and their uses. Index properties of soils, Atterberg's limits, ISI soil classification and plasticity chart. Permeability - one dimensional flow, Darcy's law; Seepage through soils. Compaction in laboratory and field conditions; One dimensional consolidation, time rate of consolidation; Mohr's circle, stress paths, effective and total shear strength parameters, characteristics of clays and sand. Sub-surface investigations - scope, drilling bore holes, sampling, plate load test, standard penetration and cone penetration tests. Various laboratory and field tests on soil samples as per IS specification.
5. **Fluid Mechanics & Hydraulics:** Fluid properties, hydrostatics, measurements of flow, Bernoulli's theorem and its application, ; Laminar and turbulent flow; flow through pipes, flow in open channels, weirs, flumes, spillways, pumps and turbines.
6. **Environmental Engineering:** - Quality standards, basic unit processes and operations for water treatment. Drinking water standards, water requirements, basic unit operations and unit processes for surface water treatment. Various test performed on water samples. Sewage and sewerage treatment, quantity and characteristics of wastewater. Primary, secondary and tertiary treatment of wastewater, effluent discharge standards. Domestic wastewater treatment, characteristics of domestic wastewater, primary and secondary treatment, Unit operations and unit processes of domestic wastewater, sludge disposal, various tests performed on waste water samples.
7. **Irrigation Engineering:** Types and methods of irrigation, Hydrology – Measurement of rainfall, run off coefficient, rain gauge, losses from precipitation. Water requirement of crops Irrigation efficiencies. Different type of canals, types of canal irrigation, loss of water in canals. Canal lining – types and advantages. Shallow and deep to wells, yield from a well. Weirs and barrages.
8. **Concrete Technology:** Properties, Advantages and uses of concrete, cement aggregates, importance of water quality, water cement ratio, workability, mix design, storage, batching, mixing, placement, compaction, finishing and curing of concrete, quality control of concrete.

SYLLABUS FOR WRITTEN TEST FOR THE POST OF LABORATORY ASSISTANT (CIVIL ENGINEERING)

9. **RCC 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 columns, staircases, IS provisions.
10. **Steel Design:** Steel design and construction of steel columns, beams, roof trusses, plate girders, IS provisions.
11. **Theory of structures:** Elasticity constants, types of beams – determinate and indeterminate, bending moment and shear force diagrams of simply supported, cantilever and over hanging beams. Moment of area and moment of inertia for rectangular & circular sections, bending moment and shear stress for tee, channel and compound sections, Torsion of circular section.
12. **CIVIL ENGINEERING DRAWING** Isometric view, Development of surface.