Syllabus and Scheme of Examination for the Post of Junior Laboratory Assistant (Technical) - School of Civil & Environmental Engineering.

Advertisement No. IIT Mandi/Recruit./NTS/2023/02 dated 22.03.2023

Date: 09.10.2023
Time: 1:00 p.m. onwards

There will be two stage examination.

**Stage I** : Written Examination

**Stage II** : Skill/Trade Test

Stage-I : Written Examination

Stage II : Skill/Trade test will be conducted after completion of written examination.

**Stage I- Written Test**

- **Concrete Technology/ Construction Material** : Properties of concrete, cement, aggregate; importance of water quality, water cement ratio, workability; Mix design, Hot weather and cold weather concreting; Tensile test of steel; Properties and tests for bricks. Different IS codes and standards

- **Surveying** : Principles of surveying; Errors and their adjustment; Maps - scale, coordinate system; Distance and angle measurement - Levelling and trigonometric leveling Traversing and triangulation survey.

- **Geotechnical Engineering** : Three-phase system and phase relationships, index properties, 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. Different IS codes and standards

- **Water Resource Engineering** : Properties of fluids, fluid statics; Continuity, momentum, energy and corresponding equations; Potential flow, applications of momentum and energy equations; Laminar and turbulent flow; Flow measurement in channels and pipes; Basics of hydraulic machines. Open Channel flow. Different IS codes and standards

- **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. Different IS codes and standards

- **Environmental Engineering** : Drinking water standards; basic unit operations and unit processes for surface water treatment; physical, chemical and biological characteristics of wastewater (e.g., suspended and dissolved solids, BOD, COD, pathogens, dissolved oxygen, sag curve); wastewater recycling and reuse; effluent discharge standards; sludge disposal and
Section II: Skill test

1. **Building / Construction Materials Laboratory**
   - Determination of specific gravity, fineness and soundness of different cements.
   - The study of setting and hardening characteristics of different cements.
   - Determination of specific gravity, moisture content, water absorption of aggregates.
   - The study of abrasion, attrition, hardness, shape, characteristics of aggregates.
   - The study of water absorption, strength characteristics of concrete and brick samples.
   - Workability test of fresh concrete.

2. **Geotechnical Engineering**
   - Determination of Specific Gravity
   - Grain Size Analysis A. Sieve Analysis B. Hydrometer Analysis
   - Determination of Consistency Limits
   - Permeability Test A. Constant Head Method B. Falling Head Method
   - Proctor Light And Heavy Compaction Test
   - Direct Shear Test

3. **Environmental Engineering**
   - Determination of total solids in wastewater
   - Jar test for optimum coagulant dosage
   - Determination of alkalinity/acidity of water sample.
   - Determination of hardness of water sample.
   - BOD and COD of wastewater sample

4. **Transportation Engineering**
   - Softening point of bitumen sample
   - Ductility of bitumen sample
   - Viscosity of bitumen sample
   - Flash and fire point of bitumen sample
   - Penetration value of Bitumen sample

5. **Survey Engineering**
   - Chain & tape Surveying: Distance measurements
   - Measurements of area using chain and tape.
   - Levelling by auto level using height and fall method & rise and fall method.
   - Measurement of Vertical and Horizontal angles by using Theodolite.