The Syllabus and Scheme of Examination for the Post of Junior Technical Superintendent—School of Civil & Environmental Engineering.

Advertisement No. IIT Mandi/Recruit./NTS/2023/06 dated 17.05.2023

Date: 09.10.2023
Time: 09:00 a.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, Physical and Chemical properties, classification, standard tests.

- **Surveying**: Principles of surveying; Errors and their adjustment; Levelling and trigonometric leveling Traversing and triangulation survey; Total station; Horizontal and vertical curves, Handling data in GIS, application of remote sensing and geoinformatics.

- **Geotechnical Engineering**: 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.

- **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.

- **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.

- **Environmental Engineering**: Drinking water standards; physical, chemical and biological characteristics of wastewater; primary, secondary and tertiary treatment of wastewater; wastewater recycling and reuse; effluent discharge standards; sludge disposal and management; major air pollution phenomena (acid rain, photochemical smog); air pollution control technologies
(baghouses, cyclone separators, electrostatic precipitators, scrubbers, catalytic converters); air quality standards, criteria pollutants, air quality index (AQI).

- **Office work Knowledge:** Knowledge of GFR and GeM portal utility; Standard office related work and their documentation; record and book keeping; bill processing; financial and audit related knowledge, hands on experience in daily usage software like word, excel, PowerPoint, AutoCAD and other civil related technical software etc

**Part II- Skill test**

1 **Building / Construction Materials Laboratory**
- The study of water absorption, strength characteristics of concrete and brick samples.
- Assessment of compressive strength of cement and concrete;
- Flexural strength of concrete
- Workability test of fresh concrete.
- Analysis on Shake Table
- Identification of sub surface metallic objects using Ground Penetrating Radar (GPR)

2 **Geotechnical Engineering**
- Permeability Test A. Constant Head Method B. Falling Head Method
- Proctor Light And Heavy Compaction Test
- Direct Shear Test
- Unconfined Compression Test
- Universal Testing Machine
- Automatic Soil Triaxial

3 **Environmental & Water Resource Engineering**
- Determination of total solids in wastewater
- Jar test for optimum coagulant dosage
- Measurement of PM2.5 using low-volume air sampler
- Analysis of samples using Ion Chromatograph
- Pressure Plate
- Analysis of samples using UV-VIS Spectrophotometer
- Flexible wall Permeability
- Hood Infiltrometer for field permeability

4 **Transportation and Survey Engineering**
- Ductility of bitumen sample
- Viscosity of bitumen sample
- Flash and fire point of bitumen sample
- Measurement of Vertical and Horizontal angles by using Theodolite.
- Measurement and plotting the data of Area using Total Station
- Plotting the area and making maps in GIS