INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

1.	**Reference**	**Advt. No. IITR/Rect Cell/2025/2 dated 27-02-2025**
2.	**Name of Post**	**Junior Engineer (CIVIL) (Group B)**
3.	**Mode of Recruitment**	**Direct Recruitment**

Tier-I Examination (50 marks)

1. *The 2 hours Optical Response Sheet (ORS) based examination will comprise of multiple-choice questions with one correct answer.*
2. *One (1) mark will be awarded for each correct answer and minus one by three* $\left(-\frac{1}{3}\right)$ *mark for each incorrect answer.*
3. *The unanswered questions will not attract negative marks.*
4. *Question paper will have two sections namely General Section and Post Related Section.*

General Section (20 marks)

- **English Language and Comprehension:** English Grammar, Sentence Correction and Completion, Paragraph Summary, Reading Comprehension & Inferences, Verbal Analogies & Critical Reasoning
- **Mathematics & Numerical Ability:** General Mathematics - upto 10th Standard.
  Numerical Computation, Numerical Reasoning, Data Reasoning and Data Interpretation
- **General Awareness and Current Affairs:** Current Affairs, Government Schemes. Economics, Geography, Indian History, Indian Polity, Indian Constitution – upto 10th Standard
- **Logical Reasoning:** Number/Alphabet Series, Reasoning Analogies, Relations, Calendars, Cause and Effect, Clocks, Coding-Decoding, Directions, Connectives
- **Computer Proficiency:** Knowledge of MS Windows and MS Office, Internet, and email system

Post Related Section (30 Marks)

Physics, Chemistry, Mathematics and Computer Science – up to +2 standard and job-related section as provided below:

Surveying: Importance of surveying, principles and classifications, measurements of distance and directions, chain/tape surveying, compass surveying, levelling, tachometry, theodolite, ETS (Electronic Total Station), GPS (Global Positioning System), traversing, contouring, plane table surveying, curves.

Mechanics and Structural analysis: Introduction, Concept of rigid body scalar and vector quantities, Laws of force, moment, friction, Centre of gravity, simple machines, torsion, Properties of material, Bending moment and shear force in statically determinate beams. Simple stress and strain relationship. Stress and strain in two dimensions, principal stresses, stress transformation. Simple bending theory, flexural and shear stresses, unsymmetrical bending, shear Centre. Thin-walled pressure vessels, uniform torsion, buckling of column, combined and direct bending stresses. slope and deflection, Analysis of trusses

RCC Structures: Concrete technology, Ingredients of concrete, water cement ratio, workability properties of concrete, admixtures, special concretes, Non-destructive tests, basics of mix design. Concrete design-basic working stress and limit state design concepts, analysis of ultimate load capacity and design of members subjected to flexure, shear, compression and torsion by limit state methods. Basic elements of pre-stressed concrete, analysis of beam sections at transfer and service loads, one-way slab, two-way slab.

Soil Mechanics: Origin of soils, properties, soil classification, three phase system, fundamental definitions, relationship and interrelationship, flow of water through soils, permeability & seepage, effective stress principle, deformation of soils, consolidation, compaction, shear strength characteristics, plate load test, SPT, Density control, Measurement of field density by core cutter and sand replacement method, soil exploration, bearing capacity and its methods

Fluid Mechanics and Hydraulics: Properties of fluids, hydrostatic pressure, measurement of pressure, flow measurements, flow through pipes, flow through open channels, hydraulic pumps, principle of conservation of mass, momentum, energy and corresponding equations, potential flow, applications of momentum and Bernoulli's equation, laminar and turbulent flow, flow in pipes, pipe networks. Concept of boundary layer and its growth. Uniform flow, critical flow and gradually varied flow in channels,

specific energy concept, hydraulic jump forces on immersed bodies, flow measurements in channels, tanks and pipes. Dimensional analysis and hydraulic modelling Kinematics of flow.

Irrigation Engineering: Introduction, water requirement of crops, hydrological cycle, Dams, Canals, dams, canal head works and regulatory works, cross drainage works, hydraulic structures, river training works, water-logging, drainage, ground water recharge, well hydraulics.

Water supply and waste water Engineering: Introduction, quantity of water, quality of water, water treatment, conveyance of water, laying out of pipes, building water supply, water supply fixtures and installation, plumbing, sewerage system, laying and construction of sewers, sewage characteristics, Methods of disposal, sewage treatment, building drainage, air and noise pollution

Highway Engineering: History of development of highway and planning, Definitions of various terms used in highway engineering., Methods of road construction, IRC classification, Highway surveys and plans Geometric design, Different types of road materials in use, Binders, Types of pavement, CBR method, sub grade preparation, WBM, WMM, Bituminous Macadam, dense bituminous macadam, special problems in hill road.

Construction planning management: Network diagrams, PERT-CPM, cost optimization contracts, tenders, depreciation, valuation, organization, measurement books, cash book, functions of management, construction planning, quality control, inventory control, Estimation and costing definitions, methods of estimation and type of estimates.

Tier-II Examination (only for shortlisted candidates) (50 marks)

Job Oriented Test

*The **01**-hour Computer Based Test will comprise of the following:*

- Typing skill test (English) to test typing efficiency and quality
- Test Knowledge of CAD, MS Excel and PowerPoint
- About equipment and experiments for Civil Engineering and related Engineering branches