

## **EXAMINATION PATTERN AND SYLLABUS FOR THE RECRUITMENT OF JUNIOR ENGINEER (CIVIL)**

The following shall be the Scheme of Examination, components of written test and its syllabus for recruitment.

### **(A) Scheme of Examination:**

Paper – I MCQ Type	Time : 1½ hrs.*	<b>Max. marks: 100 (100 questions)</b>
Paper – II Descriptive Type	Time : 2 hrs.*	<b>Max. marks: 100</b>
<b>TOTAL MARKS</b>		<b>200 MARKS</b>

\* 15 minutes extra per hour would be given to Visually Handicapped and Cerebral Palsy candidates.

### **(B) Test Components:**

<b>Paper – I MCQ Type</b>	<b>Test Components</b>	<b>Duration 1½ hrs.</b>	
		<b>No. of Questions</b>	<b>Marks</b>
(a)	General Awareness	30	30
(b)	Reasoning	30	30
(c)	Mathematical ability	20	20
(d)	Test of Hindi Language	10	10
(e)	Test of English Language	10	10
<b>TOTAL</b>		<b>100</b>	<b>100</b>

<b>Paper – II</b>	<b>Test Components</b>	<b>Duration 2 hrs.</b>	
		<b>Marks</b>	
	Descriptive Type	100	
	<b>TOTAL</b>	<b>100</b>	

### **(C) Syllabus:**

#### **Paper - I**

- (i) **General Awareness:** Questions will be designed to test the ability of the Current Affairs of the candidate's General Awareness of the environment and its relevance to the society. The questions will be designed to test knowledge of the current events and of such matters of everyday observation as may be expected of an educated person. The test will include questions relating to India especially pertaining to History, Indian Polity & Constitution, Art & Culture, Geography, Economics, General Policy, Science, National/International Organizations/ Institutions, events etc.
- (ii) **Reasoning Ability:** The syllabus includes questions of both verbal and non-verbal types. Test may include questions on analogies, similarities, differences, space visualization, problem solving, analysis, judgment, decision making, visual memory, discrimination, observation, relationship, concepts, arithmetical reasoning, verbal and figure classification, arithmetical number series etc.
- (iii) **Mathematical Ability:** The test will cover Number System including questions on Simplification, Decimals, Fractions, L.C.M., H.C.F., Ratio & Proportion. Percentage, Average, Profit & Loss, Discount, Simple & Compound Interest, Mensuration, Time & Work, Time & Distance, Tables & Graphs etc.
- (iv) **Test of English and Hindi Language:** In addition to the testing of candidate's understanding of the English and Hindi Languages, its Vocabulary, Grammar, Sentence Structure, Synonyms, Antonyms and its correct usage etc. would also be tested.

## **For Paper– II (Civil Engineering):**

**Surveying:** Fundamental Concepts: Classification of Surveys: Chain Surveying; Compass Surveying; Leveling and Contouring; Theodolite Surveying; Tachometry; Curves; Introduction and fundamental concept of electronic measuring instrument – EDM, Total Station, GIS & GPS

**Construction materials & Practice :** Properties and uses of construction materials – Stones, Bricks, tiles Sand, Cement, Timber, Pasties, Glass, Asbestos, Paints, Distempers, Enamels and Varnishes; Preparation of Cement Mortar For various work

Classification of Buildings as per NBC, Site investigation for foundation as per NBC – Trial Pit and auger boring classification of foundations construction of spread footing and well foundation Stone and Brick masonry types and principles of construction: Doors and Windows – types fittings and fastenings types and functions of Lintels, Sunshades and Roofs, Flooring – Construction and types of material; Types of Stairs; Scaffolding; Types of Plastering Pointing painting and white / colour Wash.

## **Engineering Mechanics and Strength of materials**

Forces Types of forces Parallelogram, Triangle and Polygon Law Forces, Lami's theorem; Centre of Gravity and moment of Inertia; Simple stresses and strains, Hooke's law – stress strain diagram. Working strength elastic constants, Poisson's ratio, Relationship between elastic constants, compound rods, temperature stresses, strain energy, Proof resilience, impact loading; Shear force and bending moment diagrams for simply supported, over hanging and cantilever beams. Relation between intensity of loading, Shear force and bending moment; theory of simple bending, modulus, moment of section, Moment of resistance, distribution of shear stress in rectangular, circular and I – Sections; Deflection in cantilever and simply supported beams subjected to loading columns and struts – Euler's and Rankine's formulae Slenderness ration, simple built-up columns; Analysis of dam and retaining walls; Simple plane and pin- jointed trusses, Stresses by method of joints and method of sections.

## **Hydraulics**

Properties of fluid pressure and its measurement: Types of flows, energies in fluid motion, Bernoulli's theorem and its applications- venturimeter point tube; orifice and mouthpiece; Notches and weirs; Flow through pipes, hydraulic gradient line and total energy line, laminar and turbulent flow in pipes- Reynolds number, measurement of velocity; open channels; Water turbines- Classification, centrifugal and reciprocating pumps; layout of hydroelectric power plant.

## **Quantity Surveying**

Abstract estimate, detailed estimate- centerline and long & short wall method, various items of civil Engineering work as per Indian Standards; General Specifications – earth work, brick / stone masonry in cement mortar, RCC, plastering in cement mortar, Floor finishes with ceramic tiles and marbles, white washing. Color washing; Standard schedule of rates, lead and lift preparation of bill of materials; Computation of earth Work – Mid- ordinate, mean Sectional area, Trapezoidal method, prismoidal Rule; Approximate estimate-Plinth area and cubic rate estimate.

## **Design of Structures (RCC and Steel)**

RCC structures: Design Philosophies- Principles and concepts of working stress method and limit state method, loads and permissible stresses, IS specification, analysis and design rectangular beam, slab, T – beam, column, footing and stair case.

Steel Structures: Properties of steel section loads and permissible stresses. IS specifications, Analysis and design- welded joints, beam, column, base tension member; Design of roof truss.

## **Irrigation Engineering**

Definition Duty, delta, base period, rainfall and its measurement, factors affecting runoff methods of computing maximum flood discharge; Classification of head works, component parts of a weir and barrage, factors influencing selection of site – reservoirs and dams; Classification of canals, canal lining, cross drainage works; Soil erosion, water logging, soil water plant relationship; Necessity of irrigation – advantages and disadvantages, irrigation methods.

**Environmental Engineering:**

Basics of ecosystem, water supply scheme; Sources of water; Conveyance of water – pipes, joints and laying; Testing of water, drinking water standards; Treatment of water, Distribution of water; Water supply connection to a building.

Quantity of sewage, surface drains, design of sewers running half full, limiting velocities; laying of sewers, sewage, sewer appurtenances; Collection of sewage samples, characteristics of domestic and industrial sewage-BOD, COD; Sewage treatment, septic tank & soak pit, sewage disposal – dilution and sewage farming; house drainage arrangement in buildings; solid waste-collection and disposal; Air Pollution-sources, effects and controlling methods.

**Transportation Engineering:**

Alignment of roads-plain and hilly terrain, surveys; Cross section of road structure, width of pavement, Chamber, Gradient, Super elevation, transition curves, horizontal and vertical alignment; Pavement making, traffic signs, traffic islands.

Types of soil, classification of soil-Textural IS Classification, physical properties-plasticity, cohesion, consolidation, compaction. Permeability, compressibility, soil moisture content, specific gravity, density; Bearing capacity of soil.

**Note:**

1. The question paper would be bilingual except language paper (English and Hindi) and the applicant will have the option to respond in either of the languages.
2. The questions in the written test will be of the level of degree/diploma/examination; which is prescribed as the minimum eligibility for the respective post.
3. The minimum qualifying marks for Paper – I shall be 40%. Answer script of Paper – II of a candidate would be evaluated, only if the candidate qualified in Paper – I.
4. Merit shall be drawn only for candidates on the basis of their performance in Paper- II.
5. In case of bunching/bracketing of candidates in the results of the written test, the merit list would be decided as follows:
  - (i) Aggregate marks in the qualifying examination for the post.
  - (ii) In case of failing the above date of birth will be criteria. The senior in age will be given preference.