



Syllabus & Scheme of Examination for the post of **JUNIOR ENGINEER**

Stream: Electrical Engineering

Level - 1 MCQ Test

Basic concepts: Concepts of resistance, inductance, capacitance, and various factors affecting them. Concepts of current, voltage, power, energy, and their units

Measurement and measuring instruments: Measurement of power (1 phase and 3 phase, both active and re-active) and energy, 2 wattmeter method of 3 phase power measurement, Measurement of frequency and phase angle Ammeter and voltmeter (both moving oil and moving iron type), extension of range wattmeter, Multimeters, Megger, Energy meter AC Bridges Use of CRO, Signal Generator, CT, PT and their uses Earth Fault detection

Electrical Machines : (a) DC Machine – Construction, Basic Principles of DC motors and generators, their characteristics, speed control, and starting of DC Motors Method of braking motor, Losses and efficiency of DC Machines (b) 1 phase and 3 phase transformers – Construction, Principles of operation, equivalent circuit, voltage regulation, OC and SC Tests, Losses and efficiency Effect of voltage, frequency and wave form on losses Parallel operation of 1 phase /3 phase transformers Auto transformers

Generation, Transmission and Distribution – Different types of power stations, Load factor, diversity factor, demand factor, cost of generation, inter-connection of power stations Power factor improvement, various types of tariffs, types of faults, short circuit current for symmetrical faults Switchgears – rating of circuit breakers, Principles of arc extinction by oil and air, HRC Fuses, Protection against earth leakage / over current, etc Buchholtz relay, Merz-Price system of protection of generators & transformers, protection of feeders and bus bars Lightning arresters, various transmission and distribution system, comparison of conductor materials, efficiency of different system Cable – Different type of cables, cable rating and derating factor

Estimation and costing: Estimation of lighting scheme, electric installation of machines, and relevant IE rules, Earthing practices, and IE Rules.

Contracts: Understanding the stakeholders/parties involved in a construction contract; Legal Framework/Contract formation and What Constitutes a Contract - using the framework of the Indian Contract Act 1872; Various types of contracts; Rules of interpreting a contract; Commercial terms; Conditions of a contract; Significant contract clauses and risk analysis of key dispute-prone clauses, with case studies; Dispute resolutions - litigation, arbitration and alternative dispute resolution techniques.

Utilization of Electrical Energy: Illumination, Electric heating, Electric welding, Electroplating, Electric drives and motors

HVAC: Types of AC System - Air cooled / Water Cooled/ DX / Chilled Water. Types of Air Conditioning Equipment -Unitary, Split System, Package AC, Chilled Water (AHU, FCU & FAHU), and VRV System.

Solid waste management – types, effects, engineered management system. Management of e-waste.

Level – 2 Trade Test

- (1) Transformers
- (2) Switch gears
- (3) HT/LT cables
- (4) Commercial and Domestic Internal wiring
- (5) UPS and DG: Selection and kVA rating
- (6) Contracts

Scheme of Examination:

Level	Type of Test	Weightage for final result
Level-1	MCQ Test	50%
Level-2	Trade Test	50%

- The shortlisted candidates should appear for Level -1 MCQ Test and Level -2 Trade Test.
- A minimum of 5X candidates shall be shortlisted (for X number of posts advertised) for the Level-2 Trade Test, based on their performance in the Level-1 MCQ Test.
- The questions shall generally be on the minimum qualification level.

Date: 05.02.2026

—

**Sd/-
Registrar**