

**INDIAN INSTITUTE OF TECHNOLOGY MADRAS, CHENNAI-600036.**

Advertisement No. IITM/R/4/2024 dated 11.03.2024

**Syllabus & Scheme of Examination**

**Post: Technical Officer**

**Stream: Electrical Engineering**

**LEVEL-1 Multiple Choice Question Test**

**(100 Marks)**

**PART – A**

**(30 Marks)**

- **Quantitative aptitude:** Number systems, simplification, decimals, fractions, LCM, HCF, ratio & proportion, percentage, log and trigonometric functions, solutions of simple equations (linear and quadratic), basic statistics – mean and standard deviation, profit & loss, discount, simple & compound interest, mensuration, time & work, time & distance, tables & graphs.
- **Logical reasoning aptitude:** Analogies, similarities, differences, space visualization, analysis, judgment, decision making, visual memory, discrimination, observation, relationship concepts, arithmetical reasoning, verbal and figure classification
- **Computer-related aptitude:** Hardware, software, operating systems, basic operations in MS Office® - Word, Excel, PowerPoint
- **Language aptitude:** Comprehension, vocabulary, basic grammar in English.
- **General awareness aptitude:** Current events, general knowledge, Indian history, Indian constitution, basic geography.

**PART – B**

**(70 Marks)**

**1. Electric circuits:** Ideal voltage and current sources, R, L, C, M elements; Network solution methods: KCL, KVL, Mesh analysis; Network Theorems: Thevenin's, Norton's, Superposition and Maximum Power Transfer theorem; sinusoidal steady-state analysis, resonance, balanced three phase circuits, star-delta transformation, power factor in ac circuits.

**2. Transformer:** Single phase transformer: equivalent circuit, phasor diagram, open circuit and short circuit tests, efficiency; Three-phase transformers: connections; Auto-transformer

**3. Electrical Machines:** DC machines: separately excited, series and shunt, motoring and generating mode of operation and their characteristics; Three-phase induction machines: principle of operation, types, performance, no-load and blocked-rotor tests, starting; Operating principle of single-phase induction motors; Synchronous machines: cylindrical and salient pole machines, starting of synchronous motors; Types of losses and efficiency calculations of electric machines.

**4. Power Systems:** Basic concepts of electrical power generation, ac and dc transmission concepts, insulators, Distribution systems, Power factor correction, Circuit breakers.

**5. Instrumentation:** Bridges and Potentiometers, Measurement of voltage, current, power, energy and power factor; Instrument transformers, voltmeters and multimeters, Phase, Time and Frequency measurement; Oscilloscopes.

**6. Analog and Digital Electronics:** Simple diode circuits: clipping, clamping, rectifiers; Amplifiers, combinatorial and sequential logic circuits, multiplexers, demultiplexers, Schmitt triggers, sample and hold circuits, A/D and D/A converters.

**7. Power Electronics:** Static V-I characteristics and firing/gating circuits for Thyristor, MOSFET; Single and three-phase configuration of uncontrolled rectifiers; SMPS, Single-phase inverter, sinusoidal pulse width modulation.

### **LEVEL – 2 Professional Competence Test**

- **The Professional Competence Test will be a Descriptive Test and/or Laboratory based Test** for testing Professional Competence on the topics mentioned under Part-B for Level-1Test.

### **LEVEL – 3 Personal Interview**

- Syllabus as mentioned for Professional Competence Test.
- The Interview/personality test shall be conducted in such a manner that the candidate's suitability for the post is tested, among other things, through academic qualifications, experience, general awareness/knowledge, communication and problem-solving skills, and overall personality, etc.

### Scheme of Examination:

| Level    | Type of Test                  | Time                           | No. of Questions – Max. Marks       | Weightage for the final result |
|----------|-------------------------------|--------------------------------|-------------------------------------|--------------------------------|
| Level -1 | Multiple Choice Question Test | Time: 120 Minutes              | 100 Objective Questions – 100 Marks | 40 %                           |
| Level-2  | Professional Competence Test  | Time: 90 minutes approximately | Descriptive / Practical Test        | 30 %                           |
| Level-3  | Personal Interview            |                                | 40 Marks                            | 30%                            |

- A minimum of 7X candidates shall be shortlisted (for X number of posts advertised) for the Level-2 Professional Competence Test based on their performance in the Level-1 Multiple Choice Question Test.
- A minimum of 3X candidates shall be called for Personal Interviews based on their performance in Level-1 and Level-2 Tests.

#### NOTE:

- a) The medium of examination will be ENGLISH
- b) The questions will generally be on the minimum qualification level.
- c) There shall be no negative marking for wrong answers.
- d) **The Level-1 Multiple Choice Question Test is tentatively scheduled to be held on 07<sup>th</sup> February 2025 at TCS iON Centres in Chennai.**