

Syllabus for Limited Internal Competitive Examination for Promotion from Group 'C' to JTO(E).

Part A –General English & General Studies
(Objective Multiple Choice Questions)
(50 Questions of one mark each)

Standard of Paper : Standard of the paper will be such that of CBSE Xth Standard.

1. General English (25 Marks)
The question paper in General English shall be designed to test the candidate's understanding of English.
The pattern of questions shall be broadly as follows:-
 - (i) Comprehension of given passages.
 - (ii) Usages and vocabulary.
 - (iii) Grammar.

2. General Studies (25 Marks)
The paper on General Studies shall include questions on the following topics:-
 - (i) General Science.
 - (ii) Geography of India and its natural resources.
 - (iii) Current Events of National & Internal Importance.
 - (iv) General Mental Ability Test.

Questions of General Science will cover General Appreciation and understanding of Science including matters of everyday observations and experience, as may be expected of an educated person, who has not made a special study of any scientific discipline.

Questions in the Geography of India and its natural resources will relate to Physical social & Economic Geography of India.

Questions on the General Mental Ability Test will include questions on Analogies similarities, differences, space visualization, problem solving, analysis, Judgment, decision making, visual memory, discrimination, observation, relationship, concepts, arithmetical reasoning, verbal & figure classification, arithmetical number series etc.

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Part B -ELECTRICAL ENGINEERING
(Objective Multiple Choice Questions)
(100 Questions of one mark each)

- 1. BASIC ELECTRICAL ENGINEERING : (10 Marks)**
Principle of direct and alternating current and circuits, concept of frequency and wave form, instantaneous, maximum and average values, form factor for sinusoidal wave. Concept of phase and phase difference, D.C. and A.C. circuits, concept of resistance, inductance, capacitance. Power and power factor. Alternating voltage applied to resistance and inductance in series and RLC series/ parallel circuits, practical importance of power factor. Concept of three phase system, star delta connection, voltage and current relationship.
- 2. ENERGY CONSERVATION ACT & I.E.RULES: (10 Marks)**
Energy conservation Act 2001, No cost measures, Low cost and higher cost measures, Indian Electricity Act 2003, Indian Electricity Rules as amended up to date. Labeling and star rating of equipments.
- 3. ELECTRICAL MEASURING INSTRUMENTS: (10 Marks)**
Electrical properties and instruments for their measurement. Working principles and construction of measuring instruments such as Ammeters, Volt meters (moving coil and moving iron type), Watt meter, KWH meter, Frequency meter, Power factor meter. Difference between volt meter and Ammeter, Difference between watt meter and energy meter. Extension of range of A.C. & D.C. instruments. Use of multi-meter, ohm meter, megger, earth tester etc.
- 4. ELECTRICAL MACHINES AND POWER TRANSFORMER:- (10 Marks)**
Basic concept of rotating machines. Principles of generating and motoring action and relationship between terminal voltage and induced EMF. Factors determining the speed of motor. Different types of excitations. Starting and speed control. Losses, efficiency and applications. Relationship between the rotor I^2R loss and rotor slip. Causes of low power factor of motors.

Definition and application of transformers, voltage regulation, open circuit test, losses, efficiency, cooling of transformers, Parallel operation of transformers. Instrument transformers.

5. **LIGHTING :** **(10 Marks)**
Designing and Estimation of Internal Electrical Installation and Fans, Compound light, including Main boards and Sub distribution boards. Units and standards, Various types of fittings and luminaries and their applications. Modern trend in Energy efficient lighting installations.
6. **AIR-CONDITIONING:** **(10 Marks)**
Meaning of A/C, Air conditioning methods, unit of refrigeration, Co-efficient of performance. Various refrigerants such as R11, R22 & R407 used in air-conditioning, their important properties and application. Various controls, solenoid valves, thermostat, LP/HP cut out, oil safety switch. Concept of dry and wet temperature, dew points, relative humidity, absolute humidity, humidity ratio, Enthalpy. Psychometric of moist air, Psychometric chart and its uses. Description of various types of heat load, Sensible and latent heat load, sensible heat factor, by pass factor. Description of room air conditioner, package air conditioner. Measuring instruments such as pressure gauge, sling psychomotor, flow meter, Tacho-meter, anemometer etc. with their working principles.
7. **SUB STATION :** **(10 Marks)**
Different types of A.C. Switchgears, H.R.C. fuses and their application, rupturing capacity. Type of Substations, factors governing the location of substation, Space planning, determination of the rating of circuit breakers and switchgear. Different type of Bus bars system, connections, current carrying capacity Selection of capacity of Transformer and DG Set. Protection devices and safeties in Sub Station, their testing and calibrations. Power factor improvement capacitors & their selection.
8. **EARTHING AND LIGHTNING CONDUCTOR** **(10 Marks)**
Design, layout, and installation procedures for Building / Exchange earth. Lightning protection and Surge protection devices.
9. **PUMPS :** **(10 Marks)**
Various types of water lifting Pumps, their selection and application, installation procedures and specifications. Various type of starters , their selection. Maintenance aspects of pumps.
10. **FIRE DETECTION AND FIRE FIGHTING:** **(10Marks)**
Different type of fire – extinguishers, their use and applications, Various type of Fire – detectors, their selection criteria.