अनुलग्नक - 'ए' /ANNEXURE -'A'

Section 'A' (1-70 questions, MCQ of one mark each) -70 Marks

खण्ड 'ए' (1-70 प्रश्न, वस्तुनिष्ठ बहुविकल्पीय प्रश्न प्रत्येक 1 अंक का)- 70 अंक

Questions related to technical knowledge of discipline as per current curriculum of Indian Universities/Institutes (Indicative syllabus has been given below) / भारतीय विश्वविद्यालयों/संस्थानों के वर्तमान पाठ्यक्रम के अनुसार तकनीकी ज्ञान से संबंधित प्रश्न (सांकेतिक पाठ्यक्रम नीचे दिया गया है)

Detailed Syllabus for Section 'A' (Technical section specific to different post) has been given in subsequent pages.

Name of the Post: Technician Fitter (Trainee) Cat. III

1. Basic arithmetic calculation, algebra, trigonometry, statistics.
2. Basic knowledge of system of units and its conversions.
3. Basic 10^{th} standard knowledge of Electricity.
4. Knowledge of properties of materials. Basic
5. Basic information related to jigs, drilling and other machining processes and principles.
6. Basic knowledge of pipe fittings, belt drive, gear train etc.
7. Knowledge of different measuring and machining tools and its principles.
8. General concepts of limits, fits and tolerances.
9. Knowledge of general safety rules at work place, use of fire extinguishers.
10. General information related to Vehicle and Internal combustion engine etc. as per the course offered by the Recognised Institutes.

Name of the Post: Technician Electrician (Trainee) Cat. III

1. **Electrical Fundametals:** Ohm's Law, Kirchoff's Law, Series & Parallel combination of Resistors, Inductors & Capacitors. Wheatstone bridge, PVC wires, Conductors & cables. Wire joints, Soldering. Heating, Lighting, magnetic & chemical effect of electric current. Joule's law. Electrolysis & its laws. Cells and Batteries - Primary & secondary cell, Lead Acid battery, Hybrid cell, Alkaline cell. Charging of battery. Care & maintenance of Battery.
2. **Magnetic Circuits:** Terminology used in magnetic circuit. Principle of elctro magnet. Capacitor & its types. Faraday's laws of Electromagnetic Induction. Fleming's rule, B-H Curve. RLC circuit- series & parallel resonance.
3. **DC generators:** Working principle, Types- Series, Shunt & Compound Generator, EMF equation, Characteristics, commutation, Efficiency, Regulation & Applications.
4. **DC Motors:** Principle, Types- Series, Shunt & Compound Motors. Characteristics curve, commutation. Applications of DC Motors. Necessity of starter, working of starters (3 point & 4 point). Speed control of DC Shunt motor (Armature & Field control). Trouble shooting - Care and maintenance.
5. **Active & Reactive Power:** Calculation for Work, Power & Energy, Power factor. Causes & effects of low power factor. Methods of improving power factor. Calculation of capacitor banks. Automatic power factor correction (APFC) panels. Three phase three wires & three phase four wires system. Three phase power.
6. **Transformers:** Working Principle, Construction. Classification of Transformers, EMF equation, rating, Loading, Losses & Efficiency Regulation, Parallel Operation, Cooling methods, Transformer oil testing. Care and maintenance, Protective devices. Tap changer - ON load OFF load. Auto transformer, Instrument Transformer - CT & PT, Welding Transformer.
7. **Measuring Instruments:** PMMC, MI Meters working principle and construction. Digital meters. Megger & Earth tester, Multimeter. Calibrations of meters. Terminology used in Illumination and calculations. Types of Lamps - Incandescent Lamp and Discharge Lampfluorescent, HPMV, HPSV Lamps, Drum Switch, Lighting calculations, Energy efficient lighting systems (CFL,LED etc), Two wattmeters method of 3 phase power measurement.
8. **Semi-conductor Devices:** Diodes, Characteristics, Zener diode, Rectifiers & filter circuits.
9. **Squirrel cage & Wound Rotor type Induction Motor:** Construction, parts, working principle, Concept of rotating magnetic field, Applications. Types of starters - DOL, Star delta, Auto transformer starter

etc. Rotor resistance type starter. Introduction to Speed control of 3 phase Induction motor. Torque - speed characteristics. Losses, efficiency, classification, working principle & uses. AC motor stator Re-winding. Single phase & Three phase winding development diagram.

10. **Synchronous Motor:** Construction, working principle, Starting Method. Effect of change of excitation on load. V-curve and Inverted V-curve. Power factor correction.
11. **Electric Drives:** DC drive, AC drive. Preventive & Break down maintenance of DC/AC machines, Voltage stabilizer, UPS, Inverter.
12. **Basics Of Wiring:** Power & control circuits wiring. Machine control cabinet/ control panel layout, assembly. Control elements -Push button switches, contactor, overload Relay etc. Concept of neutral and earth. Earthing, types, methods of reducing earth resistance, Earth tester. Star & Delta connections. Concept-Principle of plan estimation and cost-preparation of wiring layout domestic/ Industrial/ Commercial. I.E rules for muti-storeyed building. National Electrical Code, SWG, common electrical Accessories - MCB, ELCB, MCCB, RCCB etc. Comparison between different types of wirings, Installation, Testing methods - Wiring estimations & cost.
13. **Basics of Thermal Power:** Plant layout, components and working principle of thermal power plant.
14. **Non-conventional energy resources:** Working principle of wind and solar power generation.
15. **Electrical Substation:** Single Line Diagram of Substations. Electric supply system EHVAC transmission. Advantages of high voltage transmission Overhead lines: - Poles & Towers, bushings, Insulators & its types. Corona effect, Bundle conductors, Sag, Skin effect & Ferranti effect. Fault studies. 3 phase service-cable fault. Sub-station HT/LT-Function, equipment, types of distribution system. Protective relays-overcurrent, IDMT, overvoltage, differential, distance relay. Circuit breakers-lightning arrestor used in HT line. Cable - different types of cables, cable rating, derating factor. Fire fighting, Safe handling Tools & Equipments, Rescue of person who is in contact with live wire, Treat a person for electric shock/ injury.

    Etc. as per the courses offered by the Recognised Institutes.

Name of the Post: Technician Welder (Trainee) Cat. II

1. First Aid. Welding in Industry. Safety precautions in Shielded metal Arc Welding and Oxy-Acetylene Welding and Cutting. Arc and Gas welding Equipments, tools and accessories. Various Welding Processes and its applications. Different process of metal joining methods: Bolting, riveting, soldering, brazing, seaming etcs. Types of welding joints and its applications. Edge preparation and fit up for different thickness. Surface Cleaning.
2. Basic electricity applicable to arc welding and related electrical terms & definitions.
   Heat and temperature and its terms related to welding, Principle of arc welding and characteristics of arc. Common gases used for welding & cutting, flame temperatures and uses. Chemistry of oxy-acetylene flame. Types of oxy-acetylene flames and uses. Oxy-Acetylene Cutting Equipment principle, parameters and application.
3. Arc welding power sources: Transformer, Motor, Generator set, Rectifier and Inverter type welding machines and its care & maintenance. Advantages and Disadvantages of AC and DC welding machines.
4. Welding positions as per EN & ASME: flat, horizontal, vertical and overhead positions. Weld slope and rotation. Welding symbols as per BIS & AWS. Arc length types & effects of arc length. Polarity: Types and applications.
5. Calcium carbide properties and uses. Acetylene gas properties and generating methods. Acetylene gas purifier, Hydraulic back pressure valve and Flash back arrestor.
6. Oxygen gas and its properities, Production of oxygen by Air liquification. Charging process of oxygen and acetylene gases. Oxygen and Dissolved acetylene gas cylinders and color coding for different gas cylinders. Gas regulators, types and uses.
7. Oxy acetylene gas welding systems (Low pressure and High pressure). Different between gas welding blow pipe (LP & HP) and gas cutting blow pipe. Gas welding techniques. Rightward and Leftward techniques. Arc blow- causes and methods of controlling. Distortion in arc & gas welding and methods employed to minimize distortion. Arc welding defects, causes and remedies.
8. Specification of pipes, various types of pipe joints, pipe welding positions, and procedure. Difference between pipe welding and plate welding. Pipe development of Elbow joint, T joint, Y joint and branch joint. Manifold system.
9. Gas welding filler rods, specifications and sizes. Gas welding fluxes - types and functions. Gas Brazing & Soldering: Principles, Types fluxes & uses. Gas welding defects, causes and remedies.
10. Electrode: types, functions of flux, coating factor, sizes of electrode

coding of electrode as per BIS, AWS, Effects of moisture pick up. Storage and baking of electrodes. Special purpose electrodes and their applications.

11. Weldability of metals, importance of pre heating, post heating and maintenance of inter pass temperature. Classification of steel. Welding of low, medium and high carbon steel and alloy steels.
12. Effects of alloying elements on steel. Stainless steel: types-weld decay and weldability. Brass- types - properties and welding methods. Copper- types- properties and welding methods. Aluminium and its alloys, properties types. Welding methods of cast iron.

    Etc. as per the courses offered by the Recognised Institutes.

Section 'B' (30 MCQ of one mark each) - 30 Marks

खण्ड 'बी' (एक-एक अंक के 30 बहुविकल्पीय प्रश्न) - 30 अंक

This section is common for all Posts, will carry 30 questions belonging to / यह अनुभाग सभी पदों के लिए समान है, जिसमें 30 प्रश्न होंगे:

I. **General Knowledge** - About India and its international relations, General Science etc/ **सामान्य ज्ञान** - भारत और उसके अंतरराष्ट्रीय संबंध, सामान्य विज्ञान आदि।

II. **General Awareness** - About Sports, Defence, Books, Prizes, About Indian democracy, etc./ **सामान्य जागरूकता** - खेल, रक्षा, पुस्तकें, पुरस्कार, भारतीय लोकतंत्र के बारे में, आदि।

III. **Reasoning, Verbal & Mental Ability** - Synonym & Antonym (Hindi/English), Grammar, Relationship etc./ **तर्क, मौखिक और मानसिक क्षमता -** पर्यायवाची और विलोम (हिंदी/अंग्रेजी), व्याकरण, संबंध इत्यादि ।

IV. **Quantitative aptitude** - Work relationship, Profit & Loss, Speed etc / **मात्रात्मक रुझान** - वर्क रिलेशनशिप, लाभ एवं हानि, गति इत्यादि।