DETAILED SYLLABUS FOR THE POST OF JUNIOR INSTRUCTOR (ELECTRONIC MECHANIC) IN INDUSTRIAL TRAINING DEPARTMENT

CAT NO: 656/2023

MODULE – I
PASSIVE & ACTIVE COMPONENTS (10 Marks)

Resistors – Resistance – Resistivity – Temperature Coefficient – Types of Resistors – Series-parallel combinations of resistors – Color coding & Number coding of resistors – Capacitors – Capacitance – Series-parallel combinations of Capacitors – Color coding & Number coding of Capacitors – Inductors – Types of Inductors – Inductance – Series-parallel combinations of Inductors – Self Inductance – Mutual Inductance – Transformers – Working Principle – Construction – Classification – Turns Ratio – Transformer Efficiency – Transformer losses

MODULE – II
BASIC ELECTRICAL ENGINEERING (10 Marks)

Basic terms – Electric Charge – Voltage – Electric Current – Basics of AC & DC – Phase – Power – Energy – Ohm's Law – Kirchhoff's Law – DC Network Theorem – Thevenin Theorem – Norton Theorem – Superposition Theorem – Maximum Power Transfer Theorem – Electromagnetism – Types of Magnet – Laws of Magnetism – Important definitions related to Magnetism – Faraday's Law of Electromagnetic Induction AC Fundamentals – AC circuits with R, L, C, RL, RC and RLC elements - Impedance Concept – Power in AC circuits – Resonance in RLC series & parallel circuits

MODULE – III
MEASURING INSTRUMENTS (12 Marks)

Electrical Measuring Instruments – Types – Torques – Permanent Magnet Moving Coil Instrument – Moving Iron Instrument – Ammeter – Voltmeter – Extension of Ammeter Range – Extension of Voltmeter Range – Multimeter – LCR Meter – Cathode Ray Oscilloscope – Digital Storage Oscilloscope

MODULE – IV
ELECTRONIC DEVICES & CIRCUITS (15 Marks)

Semiconductor materials – PN Junction – Diode biasing –Transistors – Types – Transistor biasing – Transistor configurations – Classification of amplifiers – Feedback Amplifier Circuits – Single stage and multi stage amplifiers – Power Amplifiers – Wave shaping Circuits – Clipper – Clamper – RC Integrator – RC Differentiator – Oscillators – Requirements – Barkhausen Criteria – Types – Sinusoidal and non sinusoidal – Tuned

Collector Oscillator – Hartley Oscillator – Colpitt's Oscillator – Crystal Oscillator – RC Phase Shift Oscillator – Wein Bridge Oscillator – Multivibrators – Operational amplifiers – Differential Amplifier – Characteristics – Non-inverting Amplifier – Inverting Amplifier – Voltage Comparator – Summing Amplifier – Integrator – Differentiator – Voltage Follower – Schmitt Trigger – 555 Timer – Block diagram of 555 – Pin Diagram – Applications

MODULE – V
POWER ELECTRONIC DEVICES (12 Marks)

Construction, Symbol, Working, Characteristics, Application of the following devices – Junction Field Effect Transistor – MOSFET – SCR – TRIAC – DIAC – UJT – IGBT

MODULE – VI
POWER SUPPLY CIRCUITS (5 Marks)

Cells and Batteries – Construction – Classification – Specifications – Hydrometer – Regulated Power Supplies – Voltage Regulation – Zener Diode Voltage Regulation – Regulated power supply ICs – Rectifiers – Filters – SMPS – Inverters – UPS – Solar Power

MODULE – VII
PROTECTION DEVICES & CONTROL CIRCUITS (5 Marks)

Protection Devices – Fuses – Types – Classification – MCB – Types – Classification – RCCB – ELCB – Relay – Electrical control circuits - DC Motor – Stepper Motor

MODULE – VIII
COMMUNICATION ELECTRONICS (13 Marks)

Communication System – Radio wave Propagation – Atmospheric Layers – Propagation Mechanisms – Types of Radio wave propagation – Terms related to Radio wave Propagation – Antenna – Antenna Parameters – Types of Antenna – Analog Communication – Modulation & Demodulation – Types of Modulation – Amplitude Modulation – Principles of AM – Modulation Index – Types of AM – AM Modulation and Demodulation Circuits – Bandwidth in AM – Frequency Modulation – Principles of FM – Frequency Deviation – Modulation Index in FM – FM Modulation and Demodulation Circuits – Bandwidth in FM – Phase Modulation – Basics of PM – Phase Deviation – Modulation Index in PM –Bandwidth in PM – Pulse Modulation – Digital Communication – Pulse Code Modulation – Sampling & Quantization – Digital Modulation Techniques – Concept of Multiplexing & Demultiplexing – Optical Fiber Communication – Construction of fiber optic cables – Advantages of fiber optic cable over other media – Working Principle of fiber optic cables – Types of fiber optic cables – Properties & Losses in fiber optic cables – Optoelectronic Devices – Satellite Communication – Introduction to Satellite Communication System – Kepler's law – Definition of terms for Earth Orbiting Satellites – Types of Orbits – Classification of Orbits – Satellite Subsystems – Earth Station Subsystem – Uplink Model – Downlink Model – GPS –

DTH – Mobile Communication – Generations of Wireless Communication Systems – Concept of Cell – Frequency reuse – Concept of handoffs – GSM Architecture – Frequency band of LTe – Concepts of VoLTe

MODULE – IX
DIGITAL ELECTRONICS & MICROCONTROLLER (13 Marks)

Number System – Logic gates and truth table – Combinational logic circuits – Arithmetic circuits – Encoder – Decoder – Multiplexer – Demultiplexer – Flip flops – Sequential logic circuits – Registers – Counters – 8051 Microcontroller – Features - Internal architecture – Pin diagram - Addressing modes

MODULE – X
TRANSDUCERS & SENSORS (5 Marks)

Active and passive transducers – Thermistors – Thermocouple - Strain gauge - Inductive and capacitive transducers – LVDT – Proximity sensors

NOTE: - It may be noted that apart from the topics detailed above, questions from other topics prescribed for the educational qualification of the post may also appear in the question paper. There is no undertaking that all the topics above may be covered in the question paper.