

## Syllabus for Trade Test for the Post of Technician(Electrical Engineering)

- 1. Fundamentals of Electrical Engineering:** Fundamental concepts of dc and ac circuits, Circuit laws and their applications in solving problems. Concept of permeability, reluctance, mmf, coreless. Concept of phase difference, phase representation of alternating quantities. Various batteries and their care, Network theorems : Thevenin's, Norton's, Superposition and Maximum Power Transfer theorems.
- 2. Analog and Digital Electronics:** Semiconductor Diodes, Bi-polar Transistors, Transistor Biasing and Stabilization, Single-Stage and Multi-Stage Transistor Amplifiers , Field Effect Transistor (FET), Number System, Codes and Parity, Logic Gates and Families, Logic Simplification, Arithmetic circuits, Decoders, Multiplexers and De-Multiplexers, Latches and flip flops, Shift Register , Counters, Analog to Digital and Digital to Analog Converters.
- 3. Programmable Logic Controllers & Micro Controllers:** Architecture of 8086 Microprocessors and its Pin Configuration, Working of PLC, Building blocks, Instruction Set, Ladder Diagram Programming, Applications of PLCs, Micro Controller Series (MCS)-51, Over View , Instruction Set Addressing Modes, Assembly language programming, Interface, Introduction of PIC Micro controllers, Application of Micro controllers
- 4. Electrical Machines:** *Poly Phase System:* Production of rotating magnetic field in electrical machines. Characteristics of D.C. machines. Shunt series and compound types, speed control of D.C. motors. Transformer-single phase, three phase, phasor diagrams, equivalent circuits, testing, regulation, losses, efficiency, parallel operation, maintenance. *Single Phase Induction Motor:* Torque/Speed characteristics, methods of producing starting torque, capacitor, shaded pole and reluctance motors. *Three Phase Induction Motor:* Slip, torque & their various relations. Torque-slip characteristics, equivalent circuit, starting, testing, speed control, maintenance. AC Series Motor, Universal Motor: Synchronous machines: Speed/frequency relation, EMF equation, winding coefficients, synchronous impedance concept, phasor diagram, Regulation. Parallel operation, V curves, starting.
- 5. Electrical Engineering Materials :** Classification of conducting, semi conducting and insulating materials, their properties and applications. Comparison of copper and aluminum as electrical conducting material. Development of modern insulating materials. Development of dynamo grade and transformer grade silicon sheet steel materials.
- 6. Measuring Instruments & Instrumentation:** Indicating, integrating and recording instruments: deflecting, controlling and damping torques; moving coil and moving iron instruments, sources of errors extension range Watt-meters, Dynamometer type, maximum demand indicators, Energy- meters-single phase and three phase, Megger, Earth tester, Multi-meter, power factor meter. Working principle of synchroscope and phase sequence indicator, tong tester (Clamp-on meter), Instrument Transformers, LCR meters, Measurement of Temperature, Measurement of Non-electrical Quantities such as pressure, flow, level , displacement using transducers, Electronic Instruments: VTVM, CRO, Electronic multi-meter, analog multi-meter, digital meters. Measurement of inductance and capacitance and capacitance, power measurements in 3ph.Circuits.
- 7. Industrial Electronics And Control Of Drives:** Construction, working principles and V-I characteristics of SCR, DIAC, TRIAC and Quadriac, Methods of triggering a Thyristor, Commutation of Thyristors, Series and parallel operation of Thyristors, Applications of SCR, TRIACS and Quadriac, dv/dt and di/dt protection of SCR, Controlled Rectifiers, Inverters, Choppers, Dual Converters and Cyclo Convertors, Thyristor Control of AC and DC Drives, Uninterrupted power supplies.

**8. Utilization Of Electrical Energy:** Illumination, Electric Heating, Calculation of resistance heating elements (simple problems), Electric Welding, Electrolytic Processes, Electrical Circuits used in Refrigeration, Air Conditioning and Water Coolers, Electric Drives, Characteristics of different mechanical loads , Electric braking, Selection of motors for different applications, Electric Traction.

**9. Power System:** Transmission System: Selection of voltage, comparison of A.C. and D.C. Systems, comparison of 3ph. & 1ph. Systems. Electrical features of transmission line: Calculation of resistance, inductance and capacitance in A.C. transmission lines. Problems on efficiency and regulation, corona. Distribution system: Layout of H.T. and L.T. distribution system. Comparison of overhead and underground distribution system. Estimation, Generation. Conventional and Non-conventional sources of energy. Different types of power stations. Comparison, Load estimation -concept, types of power stations, comparison, Load estimation, concept of regional and national grid. Switch gear system: - Circuit breakers, Types, ratings, Comparison, Protection:-Fuses, relays, types & characteristics, comparison. Protection schemes of generators, transformers, bus bars, feeders.

**10. Installations and Maintenance Of Electrical Equipment:** Tools and Accessories, Installation of transmission and Distribution Lines, Laying of Underground Cables, Types of maintenance, maintenance schedules and its procedures, Maintenance of Transmission and Distribution System, Maintenance of Distribution Transformers, Maintenance of Grid Substations, Maintenance of Motors, Domestic Installation.

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