Syllabus for the post of Junior Manager (Electrical)

Basic Electrical Engineering : Laws of electricity, Ohms law, Kirchoff's law, Faraday's law , left hand rule, Thevenin's & Norton's theorems. Maximum power transfer theorem. EMF .Network analysis Loop & Node Analysis, Voltage Source, Current source. Resistance, Inductance Capacitance, Impedance and Reactance. Magnetic circuits: MMF, Flux, Reluctance Susceptance, Electromagnetic induction, Eddy currents, basics of transformer generator and motor. Electrical measuring instruments : PMMC & MI meters. Wattmeter and Energy meter, Basics of electronics: Semiconductors, Diodes and Rectifiers

Electrical Circuits: Phasors and phasor algebra, balanced and unbalanced poly-phase circuit, Test signals, Star-Delta transformation, Network theorems, Parameters of electromagnetic circuits, resonance in R-L-C Series and Parallel circuits, Network analysis by mesh and node methods.

Electrical Engineering Materials: Conducting, Insulating materials and Magnetic materials, Properties and applications.

Electrical Instruments and Measurements: Principles of measurements: Classification, accuracy and sensitivity, damping and control forces, shunt and multiplier, Measurement of resistance: Low, medium and high. Principle and uses of DC potentiometers, AC Bridges. Indicating instruments: Multimeter, PF meters, synchroscope**.**

Electrical Machines: Classification of D.C. machines: Constructional features, e.m.f., torque, excitations, motor performance, speed, power, size considerations, speed control, efficiency.

Transformers: Induced e.m.f., equivalent circuits, regulation, different efficiencies. Three phase induction machines: Torque characteristics, Starting, equivalent Circuits. Three Phase Synchronous Machines: Generation, voltage regulation, parallel operation, synchronous motor, starting and V-curves, Single phase motors: type, starting characteristics.

Generation, Transmission and Distribution:

Generation: Thermal, Hydel and Nuclear Power Stations, Prime movers and alternators.

Transmission: Voltage levels, line conductors, electrical line parameters of short and medium lines, voltage regulation, corona. Distribution: D.C. and A.C. systems, voltage level, types of distribution feeders and distributors, voltage drop and effects, power factor improvement plant.

Substation: Different types, site selection, equipments, electrical earthing. Switchgear: Switches, isolators, circuit breakers and their types. Protection: Fault current and protective devices, fuses, relay functions, alternator, Transformer protection, thermal relays, over voltage-causes, effect and protective devices.

Electrical Estimation and Costing: Estimation of materials for industrial and residential installations. UPS and small diesel generating-set and accessories. Cost estimation of materials and selection criteria, Design and calculation of the cost of 400V/230V three phase 4 wire, 100-500 KW overhead line, Tenders**.**

Electrical Power Utilizaion: Design of lighting system. Electrical Heating: Resistance heating, Induction heating, Arc heating and Dielectric heating, types of electric welding Electrochemical process: Principles, equipment and procedure. Electrical Drives: Characteristics of various electric drives, speed control, starting and breaking, mechanical consideration, selection of motors.

Power Electronics: Power diodes and Darlington Pair. Thyristor: Principle, thyristor family, firing circuits, applications, Selenium rectifiers, uncontrolled and controlled rectification, Power MOSFETS.

Digital Electronics: Digital signals, gates, Boolean algebra, logic families, multiplexures / demultiplexure, Encoders/decoders, flip-flops, registers, counters and applications of logic gates, OPAMPS in timing circuits, A/D and D/A conversion.

Computer Programming: Concept of low level and high level languages, Block-diagram, concept of flow chart, and algorithm, Assemblers, Macros, sub-routines, co-routines, loaders, linkers, editors and compilers, programming and file handling in C and C++.