

Syllabus for the post of Electrical Foreman / Supervisor

General Knowledge / Current Affairs

History, geography, culture, sports, scientific research, knowledge of current events, general politics, Indian constitution, science – inventions & discoveries, economy, banking, finance, capitals, current affairs.

Electric Circuits

Single Phase A.C Series Circuits, Single Phase A.C Parallel Circuits, Three Phase Circuits, Network Reduction and Principles of Circuit Analysis, Network Theorems.

Magnetic Circuits

Concepts of flux, mmf, reluctance, Different kinds of magnetic materials, Magnetic calculations for conductors of different configurations e.g. straight, circular, solenoidal, etc., Electromagnetic induction, self, and mutual induction.

Electrical Instrumentation

Fundamentals of Measurements, Measurement of voltage and current, Measurement of Electric Power, Measurement of Electric Energy, Circuit Parameter Measurement, CRO and Other Meters

AC and DC machines

DC Generators: Working Principle, Type series, Shunt, and Compound Generator. EMF equation, characteristics, communication, efficiency, regulation, and application.

D.C. Motors: Principle, Types- Series, Shunt & Compound Motors. Characteristics curve, commutation. Applications of DC motors. The necessity of starter, Working of starters (3 points & 4 points). Speed control of DC Shunt motor (armature & Field control). Troubleshooting –Care and maintenance.

Induction Motor: Construction, parts, working principle, Concept of rotating magnetic field, Applications. Types of starters-DOL, Star delta, Autotransformer 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 Rewinding. Single-phase & Three-phase winding development diagram

Synchronous Motor: Construction, Working Principle, Starting Method. Effect of change of excitation on load. V-curve and Inverted V -curve. Power factor correction.

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 and OFF load. Autotransformer, Welding transformers, Isolation transformer, Instrument transformers: current transformers and potential transformers, Constant Voltage Transformer (CVT) and Constant Current Transformer (CCT).

Special electrical machines

Fractional Horse Power Motors: Fractional horse power (FHP) motor, Hysteresis motor, Permanent magnet motor, Reluctance motor, Switched reluctance motor.

Other Special Motors: Stepper motor and its types, Brushless DC motors, Servomotors

Electrical power generation

Thermal Power Plants: Coal, Gas/ Diesel and Nuclear-based, Large and Micro-Hydro Power Plants, Solar and Biomass based Power Plants, Wind Power Plants, Economics of Power Generation and Interconnected Power System

Transmission and Distribution of Electric Power

Basics of Transmission and Distribution, Transmission Line Parameters and Performance, Extra High Voltage Transmission, A.C Distribution System, Components of Transmission and Distribution Line

Electrical Substation

Single Line Diagram of Substations, Poles& Towers, bushings, Insulators & its types, Corona effect, Bundle conductors, Sag, Skin effect and Ferranti effect. Fault studies, 3 phase service-cable fault, Sub- Station HT/LT –Function, equipment, types of the distribution system. lightning arrester used in HT line, Cable- different types of cables, cable rating, derating factor.

Switchgear and Protection

Basics of Protection, Circuit Interruption Devices, Protection of Alternator and Transformer: Alternator Protection, Transformer Protection, Protection of Motors, Bus-bar and Transmission Line Motor, Protective relays- overcurrent, IDMT, overvoltage, differential, distance relay. Types of circuit breakers and their applications.

Fundamentals of Power Electronics

Power Electronic Devices, Thyristor Family Devices, Turn-on and Turnoff Methods of Thyristors, Phase Controlled Rectifiers, Industrial Control Circuits.

Utilization of Electrical Energy

Illumination, Electric heating, Electric welding, Electroplating, Electric drives, and motors.

Electrical Estimation and Contracting

Electrical Wiring and IE Rules: Types of wires, wiring system, Specifications of Different types of wiring materials, Accessories, wiring tools, wiring circuits, Domestic and industrial panel wiring, I.E. rules for wiring, IE Act-2003, Estimating, Costing and Contracting: Electric Installation and Safety, Estimation and Costing, Non-Industrial Installations, Industrial Installation.

Energy Conservation and Audit

Energy Conservation Basics, Energy Conservation in Electrical Machines, Energy conservation in Electrical Installation systems, Energy conservation through Cogeneration and Tariff, Energy Audit of Electrical System
