KPCL – AE & JE Electrical Syllabus

Assistant Engineer (AE – B.E. Level)

1. Basic Electrical Engineering

- Ohm's Law, Kirchhoff's Laws
- Network theorems (Thevenin, Norton, Superposition, Maximum Power Transfer)
- AC fundamentals: RMS, average values, phasor representation
- 3-phase circuits: star–delta connections, power measurement

2. Electrical Machines

- **DC Machines**: Construction, EMF equation, characteristics, losses, efficiency
- **Transformers**: EMF equation, equivalent circuit, regulation, efficiency, parallel operation
- **Synchronous Machines**: Alternator principle, regulation, parallel operation, synchronous motor characteristics
- **Induction Machines**: Slip, torque–speed characteristics, equivalent circuit, starting methods, braking

3. Power Systems

- Generation: Thermal, Hydro, Nuclear, Renewable sources
- Transmission: Line parameters, performance, corona, insulators
- Distribution systems: feeders, distributors, voltage regulation
- Fault analysis, circuit breakers, relays, earthing

4. Power Electronics

- Characteristics of diodes, SCR, MOSFET, IGBT
- Rectifiers, inverters, choppers, converters
- AC voltage controllers, speed control of DC/AC motors

5. Electrical Measurements & Instrumentation

- Measurement of voltage, current, power, energy
- CTs and PTs
- Wattmeter, energy meter, CRO
- Transducers, strain gauge, LVDT

6. Control Systems

- Open-loop and closed-loop systems
- Block diagrams and transfer functions
- Time and frequency domain analysis

- Stability (Routh, Nyquist, Bode)
- PID controllers

7. Analog & Digital Electronics

- BJT, FET, OP-AMP applications
- Logic gates, Boolean algebra, combinational and sequential circuits
- A/D and D/A converters

8. Electrical Circuits & Networks

- Mesh and nodal analysis
- Resonance
- Two-port networks
- Transient analysis (RL, RC, RLC circuits)

9. Microprocessors & Microcontrollers

- Architecture, instruction set, interfacing
- Applications in control and automation

10. Utilization of Electrical Energy

- Electric heating and welding
- Illumination systems
- Traction systems
- Energy conservation and power factor improvement

Junior Engineer (JE – Diploma Level)

1. Basic Electrical Engineering

- Ohm's and Kirchhoff's Laws
- Series, parallel circuits, AC fundamentals
- Single-phase and three-phase systems

2. Electrical Machines

- DC machines – basic operation and testing
- Transformers – single and three-phase
- Induction motors – principle, starting, speed control
- Alternators – basics and regulation

3. Power Systems

- Generation, transmission, and distribution basics
- Substations and switchgear
- Earthing, protection devices, fuses, relays, circuit breakers

4. Power Electronics

- Basic semiconductor devices (Diode, SCR, TRIAC, MOSFET)
- Rectifiers, inverters, converters, choppers – simple working

5. Electrical Measurements

- Ammeters, voltmeters, wattmeters, energy meters
- Measurement of resistance, inductance, capacitance
- CTs, PTs, megger

6. Control & Instrumentation

- Basics of control systems
- Transducers, sensors, measurement circuits

7. Transmission & Distribution

- Overhead lines, cables
- Voltage regulation, power factor
- Safety procedures and earthing

8. Electrical Estimation & Costing

- Wiring systems and layout design

- Load calculation and costing
- Domestic and industrial wiring

9. Utilization of Electrical Energy

- Electric heating, welding, and traction
- Illumination and energy saving

10. Renewable Energy & Basics of Automation

- Solar, wind, hydro energy principles
- PLC and SCADA – basic concepts