

# Course Outline

## ELECTRICAL DESIGN ENGINEERING

---

### Basics of Electrical Engineering

- Single phase system and Polyphase system and their Importance.
- Power Generation, Transmission, distribution and utilization.
- Introduction of key electrical equipments used in projects.

### Coordination with Other Disciplines

- Process Engineers
- Mechanical Engineers
- Civil Engineers
- Instrument Engineers
- Communication and safety Engineers.

### Estimation of Plant Electrical Load

- Preparation of Load Schedule
- Determination of power Supply Capacity
- Standby Capacity consideration
- Rating of Generators In Relation To Their Prime
- Movers-Importance of max and min temp.
- Rating Of Motors In Relation To Their Driven Machines

### Development of Single Line Diagrams (SLD)

- Key SLD
- Detail SLD
- Lighting system SLD
- Small power SLD
- Metering and Control diagram

### Control Schematics

- Introduction
- Block Diagram
- Typical Schematics for Motor Feeder
- Typical Schematics for Power Feeder
- Typical Schematics for Transformer Feeder

# Course Outline

## ELECTRICAL DESIGN ENGINEERING

---

### Cable Routing

- Cable routing Layout
- Cable Tagging
- Installation details

### Cable Selection and Sizing

- Power and Control cable Introduction
- Cable selection
- Cable sizing for Low voltage system
- Cable sizing for High voltage system
- Voltage Drop Consideration
- Let through Energy consideration
- Earth fault Loop Impedance consideration
- Cable Schedule
- Cable interconnection Schedule
- Selection and Sizing of Cable Tray
- Cable tray schedule
- Cable Drum schedule
- Conduit Selection
- Conduit Sizing

### Selection and Sizing of Electrical Equipments

- Emergency Generator
- Transformer
- Neutral Grounding Resistor
- HV/MV Switchgears
- LV Switchgears
- HV/MV/LV Capacitor Bank
- DC Battery & Battery Charger
- AC UPS
- AC/DC Machines
- CT/PT

### Hazardous Area Classification and Selection of Equipments

- Zone /Division Classification
- Types Of Protection For Hazardous Areas
- Hazardous source List Preparation
- Certification Of Hazardous Area Equipment
- Marking Of Equipment Nameplates
- Hazardous Area Drawings / Layouts Preparation

# Course Outline

## ELECTRICAL DESIGN ENGINEERING

---

### System Studies and Calculation

- Short Circuit Analysis (Fault Calculations and Stability Studies)
- Load Flow Analysis
- Motor Starting Study
- Harmonics Study
- Relay Coordination Study

### Earthing & Lightning Protection Design

- Requirement of Earthing in Industrial Plants
- Earthing Design calculations
- Type of Earthing and Details
- Earthing Installation Details
- Earthing Layout Design
- Lightning Protection Requirement
- Lightning Protection Calculation
- Lightning Installation Details
- Lightning Layout Design

### Illumination Design

- Introduction
- Type of Lighting Fixtures
- Selection of Lighting Fixtures
- Preparation Of Fixture Schedule
- Indoor Illumination Calculation
- Outdoor Illumination Calculation
- Calculation on Software
- Lighting Layout Design
- Lighting Installation Detail
- Small Power selection
- Lighting Board Schedule

### Sub-Station design

- Introduction
- Type of Sub-Stations
- General arrangement of substation
- Equipment Layout

# Course Outline

## ELECTRICAL DESIGN ENGINEERING

---

### Electrical Equipment/System Specification

- Transformer
- Diesel Generator
- HV /MV Switchgears
- LV Switchgear
- HV/LV Capacitor Bank
- DC Battery Charger
- AC UPS
- Battery
- VFD
- Power Cables
- Control Cables
- Illumination
- Earthing and Lightening Protection
- Page Party system
- CCTV system
- Telephone System