Course Outline

Electrical System Design Course - EHV Sub-Station Design

Basics of Electrical Engineering

- Single phase system and Poly phase system and their importance
- Power Generation, Transmission Distribution and Utilization
- Introduction of key Electrical Equipments used in Projects

Coordination with other Disciplines

- Process Engineers (Oil & Gas)
- Mechanical Engineers (Layout)
- Civil Engineers
- Instrument Engineers
- Communication and safety Engineers

Introduction to Sub-Station

- Type of Sub-station
- Why Sub-stations are required
- Process involved in developing Sub-station

Sub-Station Design Development

- Introduction to Bus-Bar Schemes
- Introduction to Equipments
- Layout development from SLD
- Clearance Diagram Development
- Cable Trench Layout Development
- EKD & BOM Development

Sub-Station Design Calculations

- B/B Design
- Cantilever Strength Calculation
- SCF Calculation
- Sag Tension Calculation
- DSLP Calculation

Estimation of Plant Electric 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 LV & HV System
- AC UPS & DC UPS SLD
- Lighting System SLD
- Small Power SLD
- Metering and Control Diagram

Control Schematics

- Introduction
- Typical schematics for Incomer Feeder
- Typical schematics for Motor Feeder
- Typical schematics for Power Feeder

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 & Sizing

Course Outline

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Cable Routing

- Cable routing Layout
- Cable Tagging
- Installation details

Selection and Sizing of Electrical Equipments

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

Electrical Equipment/System Specification & Data Sheet

- Transformer
- Diesel Generator
- HV/MV/LV Switchgears
- 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

Earthing protection Design

- Requirement of Earthing in Industrial Plants
- Earthing Design Calculations
- Type of Earthing and Details
- Earthing Installation Details
- Earthing Layout Design

DSLP/Lightning Design

- Lightening Protection Requirement
- Lightening Protection Calculation
- Lightening Layout Design
- BOM Development

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

Control & Protection System Design

- Introduction to Protection Philosophy
- PSLD Development
- Control Cable Schedule
- Basics of Inter-Lock Logics

System Studies and Calculation (ETAP Optional)

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

Work on Generic Projects