

Course Outline

Electrical System Design Course - EHV Sub-Station Design

Basics of Electrical Engineering

- Power Generation, Transmission Distribution and Utilization
- Introduction of key Electrical Equipments used in Projects

Coordination with other Disciplines

- Mechanical Engineers
- Civil Engineers
- Protection Engineers
- Communication Engineers
- Instrument Engineers
- Site Engineers
- Procurement Department

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
- Detail Study of One and Half CB Scheme
- Detail Study of Double Main and Transfer Bus Scheme
- Introduction to Key SLD
- Development of Detail SLD
- Introduction to Equipments
- Layout development from SLD
- Inter Coordination between SLD, Plan and Section
- Structure Loading Layout
- Clearance Diagram Development
- Cable Trench Layout Development
- EKD & BOM Development

Sub-Station Design Calculations

- Rigid B/B Design

- Flexible B/B Design
- Wind Force Calculation
- Sag Tension Calculation
- Rigid SCF Calculation
- Flexible SCF Calculation
- Pinch Force Calculation
- Cantilever Strength Calculation

Cable Routing

- Cable routing Layout
- Cable Tagging

Earthing Protection Design

- Introduction of Soil Resistivity Measurement
- Introduction of IEEE-80 and Earthing Concept
- Earthing Design Calculations
- Earthing Layout Design
- Equipment Earthing Detail

DSL/SLP/Lightning Design

- Lightning Protection Requirement
- DSLP Calculation via Reznig Method
- DSLP Calculation via EGM Method
- Lightning Layout Design
- BOM Development

Illumination Design

- Introduction
- Type of Lighting fixtures
- Selection of Lighting fixtures
- Indoor Illumination Calculation
- Outdoor Illumination Calculation
- Lighting Layout Design
- Development of Lighting Schemes
- Conduit Layout Design

Control & Protection System Design

- Introduction to Control Philosophy

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- Introduction to Protection Philosophy
- PSLD Development
- Typical schematics for Line Bay
- Typical sch. for Transformer Bay
- Typical sch. For Reactor Bay
- Typical schematics for Tie Bay
- Typical Schematic for BC Bay
- Typical Schematic for TBC Bay
- Bus Bar Protection Scheme
- Bus Earth-switch Inter-Lock Logics

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
- Control Cable Schedule
- Power Cable Schedule
- Selection and Sizing of Cable Tray
- Cable Drum schedule
- Conduit Selection & Sizing

Auxiliary System Design

- 33kV LT SLD and Layout
- Development of Auxiliary Power SLD
 - MSB
 - ACDB
 - DCDB
 - MLDB
 - ELDB
- Control Room Equipment Layout
- Control Room Earthing Layout
- FFPH Equipment Layout
- FFPH Earthing Layout
- Indoor Cable Trench Layout
- Battery Sizing Calculation
- Battery Charger Design

Electrical Equipment/System Specification & Data Sheet

- Transformer
- Reactor
- Diesel Generator
- Switchgears
- Wave Trap
- Battery Charger
- Battery
- Power Cables
- Control Cables
- Illumination
- VMS system
- CRP System
- SAS System

Introduction to Emerging Technologies

- Fixed Series Compensation
- Static Var Compensation
- Shunt Compensation via STATCOM
- Fault Current Limiting Techniques
- High Voltage DC Transmission