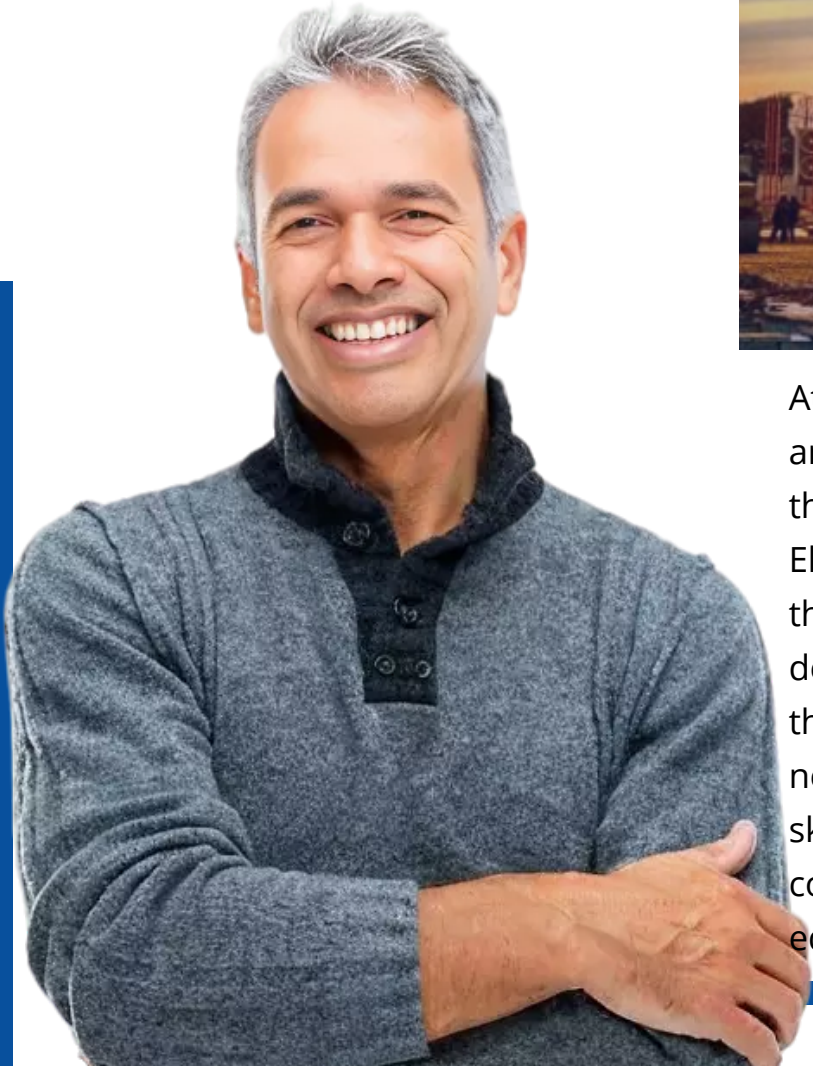




# ENGINEERS' CERTIFICATION PROGRAM

*Engineering Skills*



# ELECTRICAL LEARNING PORTAL ELP




At Electrical Learning Portal (ELP), we are dedicated to shaping the future of the electrical and MEP (Mechanical, Electrical, and Plumbing) industries through professional training and development. Our mission is to bridge the gap between the ever-evolving needs of employers and the dynamic skill set of engineers by providing comprehensive, industry-relevant education and training.


***Degree + Skills = Career Growth***

## **CONTACT US**

**Electrical Learning Portal | ELP**

 +91-8430180594, +91-7055230623

 [info@electricallearningportal.com](mailto:info@electricallearningportal.com)

 <https://electricallearningportal.com>

# POWER DISTRIBUTION SUBSTATION DESIGNING | LIVE

Welcome to the course on Power Distribution and Substation Designing using ETAP and AutoCAD. In this course, you will learn about the design and engineering of electrical substations, focusing on the preparation of practical knowledge of Substation Designing. We will cover the selection of voltage levels and the different layouts of substations, including switching devices and instrument transformers.

You will learn how to perform voltage drop calculations, select and size power transformers, and circuit breakers. We will also cover the selection and sizing of cables, surge arrestors, and earthing calculations. Additionally, you will learn about DG selection and sizing, power system protection, batteries, and power quality in electrical systems.

In this course, you will also gain an understanding of the relevant codes and standards, ensuring that you can design substations that meet safety and regulatory requirements. You will also get hands-on experience using ETAP and AutoCAD, which are powerful tools used in the electrical engineering industry.





# TOPICS

## Part 01- Power System & Substation Design Criteria

### • Introduction

*Introduction about Power Systems, Substation Types, Design Criteria, and Protection.*

*About Use of Tools details\_ MS Office, ETAP, and AutoCAD*

### **Single Line Diagram/One Line Diagram**

#### • Protection Single line diagram Up to 415V/11kV to 220kV

- o Power distribution & Study of Loads*
- o SLD From 132kV HV to LT MCC, Feeder types.*
- o CT/PT, Surge arrester, NGR selection.*
- o Ratings of Switchgear Selections.*
- o Main & Aux Protection Relay selections at HV/MV/LV.*
- o Bus bar selection/scheme.*
- o Relay/Release at LV.*
- o Basis of Busduct/Cable for LV*
- o Voltage levels at HV, MV and LV including control.*

### **Voltage Level selection**

- Voltage Classes and Considerations*
- o Extra High Voltage (EHV)*
- o High Voltage (HV)*
- o Medium Voltage (MV)*
- o Low Voltage (LV)*

### **Codes and standards**

- Purpose of Codes and Standards*
- o Overview of Key Codes and Standards*
- o Electrical Safety Standards*

## Part 02 Electrical project Engineering

### **Electrical project Engineering**

- o Review of Technical Contract documents*
- o About drawings List/Inspection & Test procedures etc.*
- o Input data for Substation design.*
- o Concepts about Basic Engineering Electrical & Calculations*
- o Concepts about Vendor Offers*
- o Concepts about Detail engineering*
- o Equipment Testing at Factory*
- o Site Installation/Testing & Commissioning.*

## Part 03 Electrical Power System & Substation Equipment's & Design Calculations.

### **Indoor Substations- 11kV to 33kV**

- o Introduction*
- o Power & Load Distribution.*
- o 11kV to 33kV Medium Voltage design*
- o VCB/VCU selection and technical details*
- o CT/PT details.*
- o Surge Arrester & Cables*
- o Protection & Control system.*

### **Outdoor Substations Up to 220kV**

- o Introduction/Site condition/Single Line diagrams.*
- o Design Criteria*
- o Technical Details-LA/CB/Isolators/CT/PT/Insulators.*
- o Busbar Scheme (Single/Double/Transfer)*
- o Civil Inputs for Outdoor Substation.*
- o Equipment's Layouts/Sections & Clearances*
- o Control and Relay panels*
- o Protection & Control system.*

## **Power, Distribution & Converter transformer**

- o Selection Criteria Power/Distribution & Converter Trafos)
- o Sizing Calculation (Load Factor, Diversity Factors)
- o Technical data sheets (Insulation/Impedance/Flux density/Losses)
- o About Transformer Drawings.

## **Current Transformers**

- o Introduction/Type
- o Protection CT classifications
- o Metering CTs
- o Design and construction considerations
- o Terminal markings
- o Specifications

## **Voltage Transformer**

- o Types
- o rating
- o Technical details

## **Substation Layouts Indoor & Outdoor**

- o Site Conditions.
- o Equipment dimensioning.
- o Equipment Layout drawings Indoor substations
- o Civil assignment drawings (Cut out/Insert plate)
- o Design Criteria- (Trench/Tunnel/overhead)
- o Transformer Civil assignment drawings.
- o Busduct layouts
- o Typical Equipment layout drawings for Outdoor (Design criteria Dimensioning, clearances etc).

## **Cable selection and size calculation**

- o HV Cable selection Criteria Up to 400kV
- o MV Cable selection Criteria Up to 33kV
- o LV Cable selection Criteria 1.1kV

- o Control & Instrument Cables Selection
- o About Derating factors.
- o MV/LV cable sizing
- o Cable specifications

## **Batteries and Battery Chargers**

- o Introduction
- o Battery Type and Selections.
- o Battery Sizing
- o Characteristics of batteries
- o Battery sizing calculations

## **Earthing calculations**

- o Introduction
- o Earthing Concepts, Types of Earthing & Soil Resistivity.
- o Earthing Selection criteria, Calculations, typical Sizing and Layouts.
- o Primary & Secondary Earthing.
- o Outdoor Earthing (step & Touch Potential)
- o Earthing Layouts Drawings
- o Lightning Protection Concepts & Design Criteria

## **Lightning Protection**

- o Introduction/Standards
- o Basic selection Criteria, Material selection etc
- o Design Calculation

## **Diesel Generators**

- o Introduction
- o Overview of the different types of diesel generators
- o Ratings and specifications of diesel generators, power output, fuel consumption, and voltage.
- o Efficiency, emission levels, and noise levels.

## Lighting Fixtures

- o Introduction
- o Important terminologies
- o Lighting fixtures calculation

## Part 04 - Substation Automation

- o Basics about SAS
- o Configuration
- o Layers in SAS
- o The interface of primary equipment and SAS.
- o IO list

## Part 05 - GIS MV and HV

- o Basics fundamental about GIS
- o Main components of GIS
- o Technical data sheet
- o GIS operation

## Part 06 - Power System study (ETAP)

### Overview & basics of Etap

- o Input data for Etap study
- o Load flow analysis
- o short circuit analysis
- o Relay coordination settings & calculations-Etap

### Contact:

+91-8430180594

[info@electricallearningportal.com](mailto:info@electricallearningportal.com)

<https://electricallearningportal.com>

## Part 07 - AutoCAD

### AutoCAD (Recorded)

- o Introduction
- o Drawing commands
- o Modifying commands
- o Editing commands
- o Dimension commands
- o Block and layer commands
- o Print commands
- o Helping commands

## Tools

- o All Classes are Live via Google Meet or Zoom
- o MS PowerPoint slides
- o Transformers, CT/PT sizing Cables, Battery sizing, etc Calculation on Excel based.
- o Single Line diagram and Basic Layouts by AutoCAD
- o Power system study (LF/SC/RC) by ETAP tool



## Benefits of the program

1. Join the professional training
2. Understand the real world
3. Be a part of the Professional Engineers' Community
4. **Program Completion Certificates**
5. **Join our engineers' WhatsApp Groups**