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Course Name

# Grounding, Bonding, Lightning & Surge Protection of Utilities & Industries

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Sector Name

Electrical Engineering

Document Type

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## Grounding, Bonding, Lightning & Surge Protection of Utilities & Industries

### Course Introduction

#### Power Quality

This course provides a comprehensive illustration of the various elements of design and practical installations associated with Earthing, Bonding, Lightning, and Surge Protection employed in Electrical Systems. There are Practical Examples provided for up-to-date theory, practice, and knowledge necessary for Design, Construction, Personal Safety, Operations, Power Quality, and problem-solving and managing Electrical Facilities.

The course offers a complete coverage of grounding and bonding procedures, electrical code requirements, substation and safety grounding, sensitive electronic equipment, and lightning/surge protection. Every day, case studies used to reinforce knowledge of the grounding and bonding principles will be studied during this course. Various disciplines of engineers working in Industrial Plants who require knowledge of Earthing Systems to ensure the safety of people, electrical equipment, and buildings would highly benefit.

## Grounding, Bonding, Lightning & Surge Protection of Utilities & Industries

### Target Audience

- ✓ Power system protection engineers
- ✓ System planners
- ✓ Technical staff responsible for Smart Grid integration into power system monitoring and control

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## Grounding, Bonding, Lightning & Surge Protection of Utilities & Industries

### Learning Objectives

- ✓ Apply various Methods of Grounding Electrical Systems
- ✓ Detail the applicable National Standards
- ✓ Describe the purposes of Grounding and Bonding
- ✓ List the Types of Systems that cannot be grounded
- ✓ Describe what Systems can be operated ungrounded
- ✓ Correctly shield Sensitive Communications Cables from Noise and Interference
- ✓ Apply Practical Knowledge of Surge and Transient Protection
- ✓ Troubleshoot and Fix Grounding and Surge Problems
- ✓ Design, install, and test an effective grounding system for Electronic Equipment
- ✓ Understand Lightning and how to minimize its Impact on Industrial facilities and Electrical Utilities.
- ✓ Protect Sensitive Equipment from Lightning

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## Grounding, Bonding, Lightning & Surge Protection of Utilities & Industries

### Course Outline

#### ✓ DAY 01

##### **Module (01) Network Structures**

- ✓ Structure of Distribution Networks
- ✓ The Supply Source
- ✓ MV Power Supply
- ✓ Different MV Service Connections
- ✓ LV Networks inside the Site
- ✓ LV Switchboards Supply Modes
- ✓ LV Switchboards Backed up by Generators
- ✓ LV Switchboards backed up a UPS

##### **Module (02) Earthing System**

- ✓ The need for Earthing Systems
- ✓ Step and Touch Voltage
- ✓ Earthing System at Low Voltage
- ✓ Medium Voltage Earthing System
- ✓ Limiting Resistance Earthing

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### Course Outline

#### ✓ Day 02

##### **Module (03) Soil Investigation**

- ✓ Soil Characteristics
- ✓ Soil as a Grounding Medium
- ✓ Effect of Voltage Gradient
- ✓ Effect of Current Magnitude
- ✓ Effect of Moisture, Temperature, and Chemical
- ✓ Use of Surface Material Layer
- ✓ Soil Structure and Selection of Soil Model
- ✓ Investigation of Soil Structure
- ✓ Classification of Soils and Range of Resistivity
- ✓ Resistivity Measurements
- ✓ Interpretation of Soil Resistivity Measurements

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### Course Outline

#### ✓ Day 03

##### **Module (04) Earthing System Design**

- ✓ Simple Earthing System Design
- ✓ Earthing System Components
- ✓ Ground Rods
- ✓ Bar Wiring
- ✓ Clamping
- ✓ Welding
- ✓ Techniques for Ground System Construction
- ✓ Ground Resistivity Measurements
- ✓ Ground System Resistivity Measurements
- ✓ Bonding
- ✓ High Frequency Bonding and “Grounding”
- ✓ Sample Calculations

##### **Module (05) Grounding of Electronic Equipment**

- ✓ Electrical Power System Selection Considerations
- ✓ Equipment Selection and Installation Considerations
- ✓ Grounding Considerations
- ✓ 380 Hz to 480 Hz System
- ✓ Industrial System Noise Considerations

## ✓ Industrial System Grounding Practices

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### Course Outline

#### ✓ Day 04

##### **Module (06) Lightning Protection**

- ✓ Integral Protection System
- ✓ Construction Protection Classes
- ✓ Accessories and Equipment
- ✓ Grounding Consideration or Lightning Protection
- ✓ Separately Mounted Protection Systems
- ✓ Overhead Ground Wire Type
- ✓ Waveguide Installation and Grounding
- ✓ Lightning-Generated Transient Surge Protection
- ✓ Transient Source and Equipment Damage

##### **Module (07) Surge Protection**

- ✓ Surge Definition
- ✓ Bonding as a means of Surge Proofing
- ✓ Surges and Surge Protection
- ✓ Surge Protection of Electronic Equipment
- ✓ Achieving graded Surge Protection
- ✓ Positioning and Selection of Lightning/Surge Arrestor
- ✓ Surge Protection for Sensitive Equipment

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### Course Outline

#### ✓ Day 05

##### **Module (08) Noise Mitigation**

- ✓ Electrical Noise and Measures for Noise Reduction
- ✓ Earth Loop as a Cause of Noise
- ✓ Ways in Which Noise Can Enter a Signal Cable
- ✓ Shielded Isolation Transformer
- ✓ The Use of Insulated Ground (IG) Receptacle
- ✓ Zero Signal Reference Grid and Signal Transport
- ✓ Harmonics in Electrical Systems

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## Grounding, Bonding, Lightning & Surge Protection of Utilities & Industries

### Confirmed Sessions

FROM	TO	DURATION	FEES	LOCATION
Jan. 18, 2027	Jan. 22, 2027	5 days	4950.00 \$	Spain , Madrid
June 8, 2026	June 12, 2026	5 days	4250.00 \$	UAE , Dubai
Sept. 21, 2026	Sept. 25, 2026	5 days	4250.00 \$	UAE , Abu Dhabi
Dec. 7, 2026	Dec. 11, 2026	5 days	4250.00 \$	UAE , Dubai

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