

€ TRAINING

Power System Protection and Reliability



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Introduction:

The Power System Protection and Reliability training program educates on safeguarding electrical power systems. Participants learn about protective relays, fault analysis, and equipment coordination for system reliability. Through theoretical and practical instruction, attendees gain proficiency in designing effective protection schemes.

Program Objectives:

At the end of this program the participants will be able to:

- Understand the types and reasons for electrical faults.
- Appreciate the practical solutions for specifying the correct type of electrical protection.
- Understand the comprehensive understanding of principles and selection of relays.
- Develop the design of protection schemes.
- Learn the construction and functions of instrument transformers.
- Explain types of grounding system and earthing fault protection.

Targeted Audience:

- Engineers and Technicians from the Electricity Supply Industry.
- Technical Management Professionals and Department Leaders.
- Engineering Professionals from companies manufacturing and operating power and distribution transformers.
- Engineers and Technical Personnel in power utilities, petrochemical plants, service professionals of large infrastructure projects.
- Maintenance and Operations Technicians.

Program Outlines:

Unit 1:

Types of Electrical Protection Devices and Faults:

- Importance of Electrical Protection and Control Devices

- Types of Electrical Faults
- Characteristics of High Voltage Fuses for Electrical Protection, and Circuit Breakers for Electrical Protection.
- Microprocessor Overcurrent Relays.
- Time, Current, Curves and Logic Discrimination.
- Hot and Cold Tripping Curves.
- LV Switchboard Protection against Short Circuit.

Unit 2:

Protection Functions and Instrument Transformers:

- Power System Architecture.
- Protection Functions.
- Selective Coordination.
- Lockout and anti-pumping relays.
- Sensors.
- Current and Voltage Instrument Transformers.
- Types of Relays and Numerical Relays and Functions.

Unit 3:

Busbar, Transformer, and Motor Protection Systems:

- Busbar Protection and Transformer Protection.
- Motor Protection and Capacitor Protection.
- Overhead Line Protection.
- Type of Related Faults.
- Relevant Protection Functions.
- Protection device coordination.

Unit 4:

Grounding Systems and Earth Fault Protection:

- Overcurrent Protection for Phase and Earth Faults.
- Unit Protection Schemes.
- Distance Protection.
- Protection of Feeders against Overload and Short Circuit.
- Types of Grounding System.
- Restricted Earth Fault Protection and Sensitive Earth Fault Protection.
- Protection against Over-voltages.

Unit 5:

Methods of Commissioning Relays, Short Circuit Current Calculation, and Harmonics:

- Commissioning of Protective Relays.
- Calculation of Short Circuit Current.
- Fault Topologies.
- Short Circuit Current at Fault Point.
- Positive, Negative and Zero Sequence Systems.
- Triple Harmonics Effects and Mitigation Techniques.