XCELERATE TRAINING INSTITUTE

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ELECTRICAL ENGINEERING

Electrical Power System Protection and Switchgear

DURATION	LANGUAGE	FORMAT
10 days	**English**	**Classroom / Online**

Upcoming dates

Dates	Venue	Format	Fee
18 – 29 Jan 2027	Live online	Online (live)	**€1,800**
26 Jul – 6 Aug 2027	Live online	Online (live)	**€1,800**
23 Aug – 3 Sep 2027	Casablanca	Classroom	**€8,250**

Register or ask a question

Online: x8ti.com/course/electrical-power-system-protection-and-switchgear/

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Electrical Power System Protection and Switchgear

Introduction

Power systems can experience deficiencies due to inadequate insulation or other external factors. When a fault occurs, it can destabilize the system. In more complex systems, it's crucial to pinpoint the fault accurately and isolate only the affected segments, allowing the rest of the system to function normally. This course covers the prevention, detection, and correction of electrical faults efficiently. It includes practical exercises and demonstrations combined with technical concepts of electrical power system protection and switchgear.

Learning Objectives

Upon completing this course by Xcelerate Training Institute, participants will be able to:

- Identify instrument transformers for protection applications.
- Understand protective relaying perspectives and select appropriate protection plans.
- Design a synchronized overcurrent protection system for radial distribution.
- Understand the operation of electromechanical relays and their microprocessor equivalents.
- Develop protection schemes using pilot protection with differential and distance relays.

Training Methodology

This interactive training program includes:

- Lectures
- Videos
- Seminars & Presentations
- Group Discussions
- Demonstrations
- Assignments
- Case Studies & Functional Exercises Following the ‘Do-Review-Learn-Apply’ model.

Benefits for Your Organisation

Organizations can benefit from:

- Reducing unnecessary power system downtimes.
- Obtaining customized solutions to address equipment issues.
- Adopting trusted settings for trip circuit breakers and relays.
- Enhancing coordination between devices and identifying deficiencies in system protection.
- Adhering to national electric code requirements and ANSI/IEEE specifications.

Benefits for You

Participants will gain:

- Knowledge of different parts of protection systems.

- Fundamentals of electrical power security.
- Ability to set up basic relay settings independently.
- Understanding of various fault types.
- Skills to perform basic fault and design calculations.
- Ability to select appropriate protection tools for different equipment.
- Insight to justify and improve protection systems in their current plant.
- Enhanced decision-making skills for electrical power system protection.
- Improved safety policies at their site.

Who Should Attend

This course is suitable for:

- Electrical Engineers, Supervisors, or Technicians responsible for electrical protective gear.
- Engineers and technicians new to the power industry.
- Employees tasked with evaluating the effectiveness of security schemes.
- Intermediate-level engineers and technicians responsible for power system protection.
- Engineers and consultants managing security studies.
- Professionals developing protection schemes for system reliability.

Course Outline

Overview of Power Systems

- Electrical distribution system
- Basic circuit breaker design and protection introduction
- Reading single line diagrams
- Phasor math
- LV, MV, and HV equipment
- Per-unit calculations
- Symmetrical components
- Functions and types of electrical switchgear
- Sequence networks

Fundamentals of Protection in Power Systems

- Basic requirements and components
- Need for protective apparatus
- Microprocessor-based relay implementation
- Instantaneous and time overcurrent relays
- Electromechanical relay operating principles
- Device coordination

Categories of Faults and Short Circuit Currents

- Symmetrical units
- Unbalanced faults and earth faults

- Short circuit MVA calculation
- Simple distribution system development
- Equivalent diagrams for system impedance reduction
- Fault types, effects, and calculations

System Earthing and Earth Faults

- Effects of electric shock on humans
- Sensitive earth leakage protection
- Phase and earth faults
- Comparison of earthing methods
- System classification
- Protective earthing

Circuit Breakers with Built-in Protection

- Circuit breakers with integrated protection
- Conventional and electronic releases
- Fuse characteristics, ratings, and selection
- Performance under fault conditions
- Protective relay-circuit breaker combination

Relays and Auxiliary Power Apparatus

- Construction and operation of protective relays
- Communication capabilities
- Factors influencing plug setting choices
- Reasons for breakers and contractors failing to trip
- Universal microprocessor overcurrent relay
- Future of protection for distribution systems
- Necessity of consistent auxiliary power for protection systems
- Technical features of modern microprocessor relays
- Trip circuit supervision
- Capacity storage trip units

Protection Classification and Relay Coordination

- Design considerations of MV and LV networks
- Basis of selectivity
- Time-current grading
- Coordination between transformer circuits
- Importance of settings and coordination curves

Unit Security and Functions

- Recommendations and advantages of unit protection systems
- Protective relay systems
- Differential protection

- Main, unit, and backup protection
- Machine, transformer, and switchgear protection
- Feeder pilot-wire protection

Safety of Feeders and Lines

- Use of carrier signals in line protection
- Overcurrent and earth fault protection
- Unit and impedance protection of lines
- Auto-reclosing relays for transmission and distribution lines
- DMT and IDMT arrangements for large systems
- Use of auto-reclosing to reduce outage time

Protection of Machinery

- Basics of motor protection
- Introduction to generator protection
- Transient and steady-state temperature rise
- Typical protective settings for motors
- Thermal time constant
- Unbalanced supply voltages and rotor failures

The Future

- Advances in protection: microprocessor, static, and conventional
- Personal protective equipment (PPE)
- Intelligent sectionalizing
- Shock hazard versus burn/blast hazard
- Hazard labeling
- IEEE 1584 and NFPA 70E
- Communication-based overcurrent protection

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Registration Form

Electrical Power System Protection and Switchgear

Preferred dates: ..... Venue or online: .....

Duration: 10 days Language: .....

Please complete and email this form to us, or register online. We confirm your place and send the invoice within one working day.

Delegate information

Full name (Mr / Ms / Dr / Eng): .....

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Official email: ..... Personal email: .....

Company information

Company name: .....

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City / country: ..... VAT / tax number: .....

Person responsible for training & development

Full name (Mr / Ms / Dr / Eng): .....

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