XCELERATE TRAINING INSTITUTE

your learning & development partner

ELECTRICAL ENGINEERING

Switchgear, Circuit Breakers and Power Transformers – Efficient Operation and Maintenance Training Course

DURATION	LANGUAGE	FORMAT
5 days	English	Classroom / Online

Upcoming dates

Dates	Venue	Format	Fee
3 – 7 May 2027	Live online	Online (live)	€1,200
14 – 18 Jun 2027	Bahrain	Classroom	€3,600
8 – 12 Nov 2027	Live online	Online (live)	€1,200

Register or ask a question

Online: staging.x8ti.com/course/switchgear-circuit-breakers-and-power-transf…

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Switchgear, Circuit Breakers and Power Transformers – Efficient Operation and Maintenance Training Course

Introduction

This Switchgear, Circuit Breakers, and Power Transformers training course focuses on efficient operations and maintenance. Switchgear units are essential for protecting and supplying electrical power in the manufacturing sector and utility distribution systems. Poor maintenance routines can lead to system inefficiencies and decreased reliability.

Various tools are used today for maintaining low, medium, and high voltage switchgear, so it's crucial to understand which tools to use for different situations. This course aims to educate participants on the fundamentals of operating and maintaining switchgear, circuit breakers, and power transformers.

Learning Objectives

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

- Describe the basics of operating switchgear and circuit breakers.
- Select appropriate types and ratings of circuit breakers and switchgear.
- Understand the functions of switchgear components such as CTs, VTs, relays, and cable terminations.
- Describe the principles of power transformer operation.
- Recognize and apply different transformer types.
- Establish straightforward transformer protection schemes.
- Specify power transformer testing procedures.
- Rationalize switchgear asset management, including CBM and RCM processes, tripping devices, maintenance, and testing.
- Apply load and fault calculations to determine protection system objectives and operating environments.
- Explain circuit breaker control circuits, types and applications of protective relays, and the structure of control circuits.
- Administer power transformer breakdowns to minimize disruption.
- Discuss the characteristics of circuit breakers in relation to protection control circuits, including selectivity, sensitivity, and speed.
- Develop realistic maintenance strategies for switchgear and transformers.

Training Methodology

This interactive training program includes:

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

Benefits for Your Organisation

Organizations can benefit from:

- Retaining workforce by sustaining employees who might leave for full-time qualifications.
- Minimizing downtime with flexible training methods requiring less or no time away from work.
- Increasing competence by developing employees' technical skills and knowledge.
- Lowering training costs with on-site training.
- Gaining broader insights from professional instructors and peers discussing work-related problems.

Benefits for You

Participants will gain:

- In-depth course material to master the technical details of circuit breakers and switchgear.
- Practical knowledge from case studies to gain an edge in the workplace.
- Professional development and increased confidence in maintaining circuit breakers and switchgear.
- Cost-effective professional qualifications at a competitive cost.
- Interactive sessions connecting with instructors and peers to learn from real-world examples applicable to their roles.

Who Should Attend

This course is ideal for:

- Individuals wanting to study significant characteristics of circuit breakers and switchgear.
- Engineers, supervisors, and technical individuals needing a thorough understanding of switchgear and circuit breaker design, setup, inspection, testing, maintenance, and overhaul.
- Members of various industries, including electricity and utility, Ministry of Power, etc., across different geographic locations.
- Any professional interacting with switchgear, circuit breakers, or power transformers.

Course Outline

Introduction to Switchgear and Transformers

- Fundamentals of circuit breakers
- Types of breakers
- Single-line diagrams
- Active and passive network modules
- Voltage convention
- Fuse switches
- Primary & backup relaying
- Fault calculation
- System earthing
- Fuses as alternatives to circuit breakers
- Auto-reclosers and auto-reclose operation

Application of Switchgear

- History of switchgear
- Principles of current interruption
- Plain break circuit breakers
- Bulk and small oil volume circuit breakers
- Operating mechanisms
- Transfer earth circuit breakers
- Fixed and withdrawable designs
- Switchgear guidelines
- Factors affecting switchgear selection

Specification of Switchgear

- Simple and complex protection systems
- Switchgear ancillaries, measurement CTs, VTs, and relays
- Substation and switch room layouts and design
- Substation compound
- Metal-clad switchgear maintenance
- Symmetrical and asymmetrical breaking
- Make and break operations
- Cable terminations
- Indoor and outdoor operation
- Interpretation of test oscillograms

Safety Policies

- Overall safety measures and importance of personal protective equipment (PPE)
- Values of safety rules
- Principles of personal authorization
- Live training for safe operation of switchgear
- Isolation in a circuit breaker context
- Safety documentation
- Operative and safety locking and danger notices
- Work safety in a substation environment
- Safety interlocks
- Substation alarms
- Individual study tasks and presentation

Operating Contemporary Switchgear

- Principles of time and condition-based asset management
- Asset registers
- Asset management systems
- Case studies (ABB, Siemens, Schneider)

Diagnostics, Testing, and Maintenance

- Switchgear inspection methodologies
- Partial discharge measurement and survey
- Timing tests
- Mechanisms of deterioration
- Circuit breaker diagnostic techniques
- Principles of circuit breaker maintenance
- Maintaining oil circuit breakers
- Case study (circuit breaker settings, selectivity, sensitivity, speed)
- Contact maintenance and contact wipe
- Oil testing
- Maintaining vacuum circuit breakers
- Batteries – condition and monitoring
- Switchgear defects and defect control systems

Functions and Classification of Transformers

- Construction (shell type and core type)
- Insulation, windings, cooling systems, voltage levels, sizing, and breathing
- Transformer parts
- Setting up and controlling high voltage power transformers safely
- Earthing of HV transformers

Transformer Theory

- Electrical values and their role in a power transformer
- Thermal functioning, loading, paralleling, connections, and vectors

Power Transformer Protection

- Surge protection
- Protective relaying
- Thermal tools and maneuvers
- Design and specifications of auto, generator, unit, and station transformers

Oil Quality

- Oil contents: water, acidity, and dissolved gas
- Oil tests: breakdown, humidity, resistivity, interfacial tension, gravity, and power factor
- Recovery voltage measurement test

Power Transformer Electrical Tests

- AC Tests: power factor, single-phase excitation current, transformer turns ratio
- DC Tests: insulation resistance, dielectric absorption, polarization index, step voltage, hi-pot

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Registration Form

Switchgear, Circuit Breakers and Power Transformers – Efficient Operation and Maintenance Training Course

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

Duration: 5 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): .....

Position: ..... Telephone / mobile: .....

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

Company information

Company name: .....

Address: .....

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

Person responsible for training & development

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

Position: ..... Telephone / mobile: .....

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