XCELERATE TRAINING INSTITUTE

your learning & development partner

ELECTRICAL ENGINEERING

Generator Excitation Systems

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

Upcoming dates

Dates	Venue	Format	Fee
14 – 25 Jun 2027	Live online	Online (live)	**€1,800**
19 – 30 Jul 2027	Amman	Classroom	**€5,700**
20 – 31 Dec 2027	Live online	Online (live)	**€1,800**

Register or ask a question

Online: x8ti.com/course/generator-excitation-systems/

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Generator Excitation Systems

Introduction

Excitation systems play a crucial role in maintaining the stability of power systems, especially those using large generators, connected with long lines, located in sensitive voltage areas, or experiencing local fluctuations. Enhancing the reliability and availability of these systems requires skilled routine maintenance and competent troubleshooting capabilities.

Effective operation of any Generating System depends on the training of individuals performing inspection, testing, maintenance, and troubleshooting tasks. Skilled personnel following well-developed procedures can significantly reduce costs, equipment downtime, and troubleshooting complexity in the long run.

Learning Objectives

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

- Gain a thorough understanding of generator principles.
- Understand troubleshooting procedures for generating equipment.
- Choose, start, manage, maintain, test, and troubleshoot generator excitation systems.
- Apply in-depth knowledge of major generator set components.
- Demonstrate proper operating procedures for exciters and understand excitation system composition.
- Discuss excitation system performance, including dynamic and transient stability.
- Explain the hardware configuration of control electronics.
- Understand different software functions for AVR communication systems and hardware/software interfaces.
- Implement proper commissioning, operation, troubleshooting, and maintenance procedures.
- Utilize theories behind failure modes and failure analysis.
- Develop an awareness of electrical safety concerns.

Training Methodology

This collaborative 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:

- Updating technical skills and standards from previous learnings.
- Bringing workplace practices up to current standards.

- Empowering engineers and technicians with knowledge to apply in their roles, understanding current procedures and practices.
- Preparing participants for upcoming changes in relevant practices and legislation, allowing proactive implementation.
- Ensuring current work practices comply with regulatory laws.

Benefits for You

Participants will gain:

- Awareness of the importance of maintenance and safety procedures.
- An organized approach and framework for assembling and operating turbogenerator systems.
- Understanding of controls and component features of generator transformers.
- Continuous knowledge of test equipment used for electrical assessments and repairs.
- Ability to use single-line diagrams and schematics for troubleshooting.
- Recognition of standard work practices and development of plans for successful inspection and troubleshooting.

Who Should Attend

This course is suitable for:

- Electrical Technicians
- Electrical Engineers
- Electrical Supervisors
- Electrical Power Engineers
- Electrical Project Engineers
- Anyone involved in evaluating, using, maintaining, testing, or troubleshooting generator excitation systems

Course Outline

Definitions

- Generator systems (AC) and equipment
- Generator systems (DC) and equipment
- Operation, inspection, testing, control, maintenance, and troubleshooting
- Control systems

Interpretation and Use of Drawings

- Single-line electrical drawings
- Control schematics
- Wiring lists
- P&IDs
- Logic and standard symbols

Maintenance Planning

- Developing schedules and procedures
- Defining operation requirements for parts and labor
- Defining maintenance requirements for parts and labor
- Regular, preventive, predictive, and emergency maintenance

The Use of Test Equipment

- Digital voltmeter (DVM)
- Oscilloscopes
- Megger
- Frequency meter
- Temperature probes/pyrometers
- Ammeters
- Power meters
- Load banks
- Digital hydrometers
- Cable fault locators

The Technology of Generators

- Theories of AC, DC, and emergency electrical generation
- Power supplies (battery chargers, rectifiers, inverters)
- Batteries
- Generator drivers (gas/steam/water turbine, diesel/gas engine)
- Governors (control systems)
- Programmable logic controllers (PLC)
- Synchronization
- Power grid and network considerations

Generator Components and Systems

- Increasing or decreasing voltage (transformers)
- Neutral ground resistors (NGR)
- Switchgear
- Motor control centers (MCC)
- Disconnect switches
- Power monitoring
- Control relays/timers/switches
- Generator protective devices

Generator Excitations and Importance of Reactive Power

- Features and production of the Automatic Voltage Regulator (AVR)
- Digital voltage regulator for generators
- Functions and construction of governors

- Permanent magnet generators
- Over fluxing and types of excitation systems
- Self-excitation vs. brushless
- Effects of over and under excitation
- Reactive power relationship to excitation

Economical and Mechanical Impacts

- Control systems for excitation
- Impact of over and under excitation
- Significance of the capability curve and P-Q diagrams
- Interpreting the capability curve
- Capability curve software
- Generator stator thermal effects
- Generator rotor thermal effects
- Improvements in generator excitation systems

Inspection and Testing of Generators

- Methods
- Terminology
- Principles
- Special techniques
- NEC checklists

Troubleshooting of Generators

- Methods
- Terminology
- Principles
- Special techniques
- Case studies/examples
- Single-line drawings
- Group exercises

Development of a Job Plan

- Identification of troubleshooting steps
- Procedure preparation
- Documentation
- Follow-up
- Safety considerations and training

Review of Safety Requirements

- Area classifications
- NEC electrical codes
- Safety information

Identification and Restoration of System Failures

- Common mode failures
- Phase imbalance
- Contact pitting/arcing
- Electronic component failure
- Fusing
- Generator windings/bearings/brushes
- Excitation circuits
- Battery cells
- Inverters/rectifiers/battery chargers
- Bushings
- Switches
- Control circuits
- Ground faults

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Registration Form

Generator Excitation Systems

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): .....

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: .....

Email: .....

Payment

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