SCANDINAVIAN ACADEMY

Training and Development

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Course: Advanced Protective Relaying for Electrical Power Systems

Code	City	Hotel	Start	End	Price	Language - Hours
EE-427	Auckland (New Zealand)	Hotel Meeting Room	2027-05-03	2027-05-07	5950 €	En - 25

Program Introduction

This advanced training program focuses on the practical and technical applications of protective relaying in electrical power systems. It covers advanced fault analysis, relay coordination, protection of major power system components, digital relay applications, protection testing, and fault record analysis.

The program is designed to strengthen participants' ability to analyze protection performance, adjust relay settings, improve selectivity, and enhance the reliability and security of electrical networks.

General Objective

To enable participants to understand, apply, analyze, and improve advanced protective relaying schemes in electrical power systems, with emphasis on relay settings, fault analysis, coordination, equipment protection, testing, and system reliability.

Detailed Objectives

By the end of this program, participants will be able to:

- Analyze electrical faults and their impact on protection systems.
- Understand advanced principles of protective relay selection and application.
- Develop and review relay settings based on network characteristics.

- Apply relay coordination principles across different protection devices.
- Evaluate protection performance for transmission lines, transformers, generators, busbars, and motors.
- Understand digital and numerical relay applications in power systems.
- Conduct protection testing and interpret test results.
- Analyze event records and disturbance records.
- Identify causes of correct and incorrect relay operation.
- Recommend practical improvements to existing protection systems.

Target Audience

This program is designed for:

- Protection engineers.
- Electrical power engineers.
- Operation and maintenance engineers.
- Transmission and distribution engineers.
- Power generation engineers.
- Testing and commissioning engineers.
- Control and automation engineers.
- Advanced electrical technicians working in power system protection.

Course Outline

Day 1: Advanced Fault Analysis and Protection Principles

- Advanced overview of electrical power systems.
- Core and advanced concepts of protective relaying.
- Protection zones and system selectivity.
- Types of electrical faults in power networks.
- Short-circuit current analysis.

- Sequence components and their protection applications.
- Relationship between fault analysis and relay settings.

Day 2: Overcurrent Protection and Advanced Relay Coordination

- Principles of overcurrent protection.
- Time-current characteristics and protection curves.
- Relay pickup and time setting principles.
- Coordination between relays, circuit breakers, and fuses.
- Directional overcurrent protection.
- Coordination challenges in complex and interconnected networks.
- Impact of multiple sources and distributed generation on coordination.

Day 3: Transmission Line and Transformer Protection

- Distance protection for transmission lines.
- Distance relay zones and applications.
- Line differential protection.
- Communication-assisted protection schemes.
- Transformer differential protection.
- Transformer inrush current and harmonic restraint.
- Transformer protection challenges under special operating conditions.

Day 4: Generator, Busbar, and Motor Protection

- Generator protection principles and applications.
- Stator and rotor fault protection.
- Loss of excitation and reverse power protection.
- Busbar differential protection.
- Breaker failure protection.
- Medium and high-voltage motor protection.
- Analysis of incorrect or undesired protection operation.

Day 5: Digital Relays, Protection Testing, and Fault Record Analysis

- Digital and numerical protective relays.
- Internal relay logic and protection functions.
- Protection testing and commissioning.
- Secondary injection and functional testing.
- Event record and disturbance record analysis.
- Communication applications in protection systems.
- Practical case reviews and protection performance improvement.

The Scandinavian Academy for Training and Development adopts the latest scientific and professional methodologies in training and human resource development, aiming to enhance the efficiency of individuals and organizations. Training programs are delivered through a comprehensive approach that includes:

- Theoretical lectures supported by PowerPoint presentations and visual materials (videos and short films).
- Scientific evaluation of participants before and after the program to measure progress and knowledge acquisition.
- Brainstorming sessions and practical role-playing to simulate real-life scenarios.
- Case studies tailored to align with the training content and participants work nature.
- Assessment tests conducted at the end of the program to evaluate the achievement of training objectives.

Each participant will receive comprehensive training materials, including theoretical content, practical exercises, and supporting resources, provided in both printed and digital formats. Detailed reports, including attendance records, final results, and overall program evaluations, are also provided.

Training materials are prepared professionally by a team of experts and specialists in various fields. At the end of the program, participants are awarded a professional attendance certificate, signed and accredited by the Scandinavian Academy for Training and Development.

Program Timings:

- 9:00 AM to 2:00 PM in Arab cities.
- 10:00 AM to 3:00 PM in European and Asian cities.

The program includes:

- A daily Coffee Break provided during the sessions to ensure participants comfort.