



SCANDINAVIAN ACADEMY
For Training and Development

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Course: Power System Protection

| Code | City | Hotel | Start | End | Price | Language - Hours |
|------|------------------|--------------------|------------|------------|--------|------------------|
| 791 | Manama (Bahrain) | Hotel Meeting Room | 2024-12-01 | 2024-12-05 | 3450 € | En - 25 |

Introduction

This Power System Protection training course covers the fundamentals of protecting a power system against hazards posed by abnormal system conditions, such as short-circuit faults. An overview of the protective devices available for application, both industrial and utility, is presented along with typical means of implementing these devices. Both electromechanical and digital relays are discussed. Fuse selection and coordination is explored in depth. Utility-specific protective devices, such as reclosers and sectionalizers, are presented, and utility-specific protection strategies, such as fuse-saving and fuse-blowing are covered. This Power System Protection training course allows the delegates to apply techniques learned in this course to realistic protection scenarios.

This training course will feature

- Philosophy of protective relaying and protection strategies
- Electromechanical relay operating principles and microprocessor implementations
- Radial system protection – time-coordinated overcurrent protection
- Instrument transformers
- Differential and distance relays, including pilot protection

What are the goals?

- Comprehend protective relaying philosophies and choose appropriate protection strategies



- Understand how electromechanical relays work and how they are emulated by microprocessors
- Design a properly coordinated overcurrent protection system for a radial distribution system
- Properly specify instrument transformers for protection applications
- Design protection schemes utilizing differential and distance relays, including pilot protection

Who is this training course for?

- Engineers and technicians new to the power industry
- Intermediate-level engineers and technicians responsible for power system protection
- Professionals involved with developing protection schemes to improve reliability
- Facility engineers and consultants who conduct protection studies
- Engineers tasked with assessing the effectiveness of protection schemes

Course Outline

Day One: Introduction, Math Review, Symmetrical Components and Sequence

Networks:

- Protection introduction
- Phasor math
- Per-unit calculations
- Symmetrical components
- Sequence networks
- Fault modeling

Day Two: Electromechanical and Digital Relays, Relay Schemes for Radial



Systems, Time-Coordinated Overcurrent Protection:

- Electromechanical relay operating principles
- Microprocessor-based relay implementation
- Instantaneous and time overcurrent relays
- Reclosers and sectionalizers
- Time-current curves
- Device coordination

Day Three: Relay Schemes for Networked Systems and Device Protection:

- Distance relays
- Distance relays with pilot protection
- Differential relays
- Differential relays for bus protection
- Differential relays for generator protection
- Differential relays for transformer protection

Day Four: Effect of Protection on Reliability:

- Reliability indices
- Fault clearing time and reclosing
- Effects of nearby faults
- Fuse saving strategy
- Fuse blowing strategy
- Intelligent protective devices

Day Five: Arc Flash Hazard and a Look to the Future:

- Shock hazard versus burn/blast hazard
- IEEE 1584 and NFPA 70E
- Personal protective equipment



- Hazard labeling
- A look to the future: communication-based overcurrent protection
- A look to the future: intelligent sectionalizing



The Scandinavian Academy for Training and Development employs modern methods in training and skills development, enhancing the efficiency of human resource development. We follow these practices:

- **Theoretical Lectures:**

- We deliver knowledge through advanced presentations such as PowerPoint and visual materials, including videos and short films.

- **Scientific Assessment:**

- We evaluate trainees skills before and after the course to ensure their progress.

- **Brainstorming and Interaction:**

- We encourage active participation through brainstorming sessions and applying concepts through role play.

- **Practical Cases:**

- We provide practical cases that align with the scientific content and the participants specific needs.

- **Examinations:**

- Tests are conducted at the end of the program to assess knowledge retention.

- **Educational Materials:**

- We provide both printed and digital scientific and practical materials to participants.

- **Attendance and Final Result Reports:**

- We prepare detailed attendance reports for participants and offer a comprehensive program evaluation.

- **Professionals and Experts:**

- The programs scientific content is prepared by the best professors and trainers in various fields.

- **Professional Completion Certificate:**

- Participants receive a professional completion certificate issued by the Scandinavian Academy for Training and Development in the Kingdom of Sweden, with the option for international authentication.

- **Program Timings:**

- Training programs are held from 10:00 AM to 2:00 PM and include coffee break sessions during lectures.