PROTECTIVE RELAYS APPLICATIONS AND PRINCIPLES

COURSE OVERVIEW

The quality of Electric Power is an ever-growing concern today for both utility suppliers and consumers. For that, all system components (Generators, Transformers, Transmission Lines, Feeders, Motors, Bus bars, ..) have to be adequately protected to avoid major system disturbances, which may cause system instability or damage to equipment if faults on the system are not cleared within specified fault-clearing times. Protection of the Power System requires an understanding of system faults and their detection, as well as their reliable and safe isolation from the system. This course presents comprehensive and systematic descriptions of the concepts and principles of the application and operation of protection schemes applied to various power system elements. Many utilities need this course which studies the relay characteristics during faults and weak protection points in electrical power systems.

DATES, VENUES AND FEES

14 – 18 September 2025 - Doha

(5 Days)

Fees US$ 4500

Note: Fee is per participant + 5% VAT (if applicable).
Groups from the same company can enjoy a **discounted** price.

WHO SHOULD ATTEND?

This course is appropriate for a wide range of professionals but not limited to:

- Engineers and Technicians from Electrical Power Utilities Companies
- Electric Power Engineers, Supervisors, and Foreman involved in the Control, Operation, and Protection of Electric Power Systems

CONTACT US NOW

+971 (4) 4539841 – 42 – 43
WhatsApp: +971 52 398 7781

Millennium Solutions Training Center FZ-LLC
First Floor, Office #134, Knowledge Park, Block 2B, Dubai, UAE
Email: info@mstcme.com
Website: www.mstcme.com

ACCREDITATION

This training course is certified by CPD.

The CPD Certification Service is the leading independent CPD accreditation institution operating across industry sectors to complement the Continuing Professional Development policies of professional institutes and academic bodies. The CPD Certification Service provides support, advice, and recognised independent CPD accreditation compatible with global CPD principles. CPD is the term used to describe the learning activities professionals engage in to develop and enhance their abilities and keep skills and knowledge up to date. CPD Units are only awarded to programmes after each programme is scrutinised to ensure integrity and quality according to CPD standards and benchmarks.

COURSE CERTIFICATE

MSTC certificate will be issued to all attendees completing a minimum of 80% of the total tuition hours of the course.

CPD internationally recognized certificate will be issued for all participants who will meet the course requirements.
CPD certificates will be issued within a month of the successful completion of the course.

TRAINING METHODOLOGY

- Expert instructor lecture, input using numerous visual aids
- Supportive comprehensive course manual enabling practical application and reinforcement
- Participant discussion and involvement regarding their specific projects and challenges
- Real-world case studies and best practices

LEARNING OBJECTIVES

Upon the successful completion of this workshop, participants will be able to:

- Build foundational knowledge of protection relay systems and their operating principles
- Understand the principles, types, and applications of distance protection in transmission systems
- Develop skills in evaluating relay behavior and diagnosing protection issues
- Dive deeper into line protection strategies using distance protection schemes
- Examine complex protection schemes with a focus on busbar protection

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COURSE OUTLINE

DAY 1

Introduction to Protective Relays and Operating Principles

- Pre-test
- Overview of Power System Protection
- Purpose and Role of Protective Relays
- Classification of Protective Relays
- Fundamental Relay Operating Principles (Electromechanical, Static, Digital, and Numerical)
- Relay Characteristics and Settings
- Introduction to Current Transformers (CTs) and Voltage Transformers (VTs)
- Quiz

DAY 2

Distance Relays – Theory and Applications

- Principle of Impedance Measurement
- Types of Distance Relays (Impedance, Reactance, Mho)
- Zone Settings and Reach
- Distance Relay Characteristics in the R-X Plane
- Fault Resistance and Load Encroachment
- Comparison with Overcurrent Protection
- Case study

DAY 3

Analyzing Relay Response and Troubleshooting

- Methods for Analyzing Relay Operation (Event Reports, Oscillography, Sequence of Events)
- Relay Coordination and Selectivity
- Common Relay Malfunctions and Misoperations
- Troubleshooting Techniques for Relays
- Testing and Commissioning Fundamentals
- Case study

DAY 4

Line Protection Using Distance Relays

- Application of Distance Relays in Transmission Line Protection
- Zone Coordination for Multi-Terminal Lines
- Communication-Assisted Schemes (POTT, DCB, Permissive Overreaching)
- Fault Location Techniques
- Integration with SCADA and Control Systems
- Case study

DAY 5

Bus Protection and Integrated Protection Schemes

- Busbar Protection Principles and Challenges
- Differential Protection for Busbars
- High Impedance vs. Low Impedance Schemes
- Breaker Failure Protection and Backup Schemes
- Integration of Protection Schemes in Digital Substations
- Review of IEC 61850-based integration
- Wrap-up Q&A session
- Post test

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