

**Training Title**

**POWER SYSTEM PROTECTION IN UTILITIES & INDUSTRIAL ELECTRICAL NETWORKS**

**Training Duration**

**5 days**

**Training Venue and Dates**

REF EE042	Power System Protection in Utilities & Industrial Electrical Networks & Protective Relaying	5	17-21 Feb 2025	\$5,500	Dubai, UAE
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In any of 5 star hotel. Exact venue will be informed later.

**Training Fees**

- \$5,500 per participant for Public Training includes Materials/Handouts, tea/coffee breaks, refreshments & Buffet Lunch

**Training Certificate**

Define Management Consultancy & Training Certificate of course completion will be issued to all attendees.

**TRAINING OVERVIEW**

Power system protection systems play a crucial role in establishing reliable electrical power systems. Poorly designed protection systems may result in major power failures. Due to the increasing importance of electricity, such power failures can have a serious impact on society and the economy.

Knowledge of power system protection systems is key when it comes to optimising the reliability level of electrical infrastructures. With the advances in protection and communication technology in recent decades plus the strong increase of renewable energy sources, the design and operation of power system protection systems has become ever more challenging.

This course presents the fundamentals of power system protection and its application. A very “hands-on” approach is used to teach the concepts. Understanding is then reinforced with real world examples. Interaction is encouraged between participants and the presenters, to underpin the learning objectives.

**TRAINING OBJECTIVES**

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Delegates will gain an overall appreciation of the applicable standards and working practices for:

- Equipment Design and selection of Electrical Equipment
- Installation
- Testing and Commissioning
- Maintenance

### WHO SHOULD ATTEND

This course is designed for technical professionals working in transmission or distribution network operator companies, consultancy organisations, in large industries or government organisations involved in design, engineering, commissioning or maintenance of protection systems. It is recommended that participants have at least a Bachelor of Engineering degree.

### TRAINING METHODOLOGY

The latest educational methods and strategies are employed. The course is designed to maximize delegate participation. From the outset the goals of each participant are discussed to ensure needs are fulfilled as far as possible. Questions and answers are encouraging throughout and at the daily wrap-up sessions. This gives participants the opportunity to discuss with other delegates and the presenter their specific problems and appropriate solutions. All delegates take away a manual of all the material presented. Only minimum note taking is encouraged to ensure maximum delegate attention during the seminars.

30% Lectures

30% Workshops and work presentation

20% Group Work & Practical Exercises

20% Videos & General Discussions

### COURSE OUTLINE

Equipment design, installation, testing and maintenance.

- Review of basics of Electrical Engineering
- Generation / Utility side equipment: Generators, switchgears, industrial & Current Transformers, Fuse, Switch and Combination units, Circuit Breakers, Contractors, Protection and metering
- And Grounding, Selection of cables, Energy savings and reduction of losses due to power quality problems. Introduction to panel design: Switch gears and Switchboards System Earthing.
- Installation: cable laying, termination and earthing.
- Testing: Type test, Routine test, Site Test (commissioning test)

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- Maintenance and failure reduction: Conditions Monitoring, Periodic Test, Visual Inspection, and Failure Reporting.

### Power System Design

- Power system design issues, system stability, protection and control
- Power system modeling: Line sequence impedances, Generator sequence impedances.
- Transformer impedances, Per unit parameters
- Power system grounding
- Performance & design of transmission lines, design of EHV transmission lines, advantages and disadvantages of HVAC and HVDC
- Selection of sizes and locations of generating stations and substations
- Designs of distribution systems, economics of distribution systems

### Power System Electrical Transients

- Transients' characterization, balanced fault analysis, Unbalanced fault analysis
- Three phase faults, asymmetric faults, Fault transients, Fault Monitoring / Recording, Effects of grounding, Grounding potential rise-safety
- Electromechanical Transients and Stability, System Stabilization

### Protection Fundamentals

- Protection philosophy, Zones of protection, Protective equipment, overcurrent protection
- Overvoltage and Under-voltage protection, Over-frequency and Under-frequency protection
- Zone distance protection, Differential protection
- Pilot relaying, Computer relaying

### Power System Protection & Control

- Principles of circuit interruption, types of circuit-breakers and switch gears
- SF6 power circuit breakers, voltage control, power system control
- Control of reactive power & power factor
- Interconnected control & frequency ties, supervisory control

### NOTE:

Pre & Post Tests will be conducted.

Case Studies, Group Exercises, Group Discussions, Last Day Review & Assessments will be carried out.

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