

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



CONTACT US ON:

T: +971 7 2042072 | Email: [training@maestrouae.net](mailto:training@maestrouae.net)

Website: [www.maestrouae.net](http://www.maestrouae.net)

**TRAINING TITLE**

POWER SYSTEM PROTECTION IN UTILITIES & INDUSTRIAL ELECTRICAL NETWORKS

**VENUE**

Dubai, UAE

**DURATION**

5 Days

**DATES**

24 - 28 October 2021

**PRICE**

US\$4,000 per attendee including training material/handouts, morning/afternoon coffee breaks and Lunch buffet.

**TRAINING INTRODUCTION**

**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

**TRAINING OBJECTIVES**

**By the end of this training course, participants will be able to:**

- 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

## **TRAINING AUDIENCE**

Managers, Engineers and Technicians, responsible for the design, installation and testing of electrical installations, who require to refresh their knowledge and skills.

## **TRAINING 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)
- 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 Undervoltage protection, Over frequency and Underfrequency 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
- SF<sub>6</sub> power circuit breakers, voltage control, power system control
- Control of reactive power & power factor
- Interconnected control & frequency ties, supervisory control

### **TRAINING CERTIFICATE**

**MAESTRO CONSULTANTS** Certificate of Completion for delegates who attend and complete the training course

### **METHODOLOGY**

Our courses are highly interactive, typically taking a case study approach that we have found to be an effective method of fostering discussions and transferring knowledge. Participants will learn by active participation during the program through the use of individual exercises, questionnaires, team exercises, training videos and discussions of “real life” issues in their organizations.

The material has been designed to enable delegates to apply all of the material with immediate effect back in the workplace.