

GULF INSTITUTE



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Electrical Protection

INTRODUCTION

- The Electrical Protection training seminar will look into the fundamental and critical aspects of electrical installations. Protection is applied on a component basis. Relays are associated with each significant component of the power distribution system to detect various forms of distress associated with those components. If one of those relays operates, which means that an output contact protective devices, which then isolates the defective system components. It may be convenient to think of the circuit breaker as the muscle that does the work of isolating the component, while the relay is the brain, which decides that isolation is required.

This training seminar will highlight:

- Operational Principles and Types of Electrical Protection
- Design of Different Types of Relays
- Protection Coordination and Architecture
- Protection for Feeders, Motors and Transformers
- Short Circuit Current Calculations

OBJECTIVES

At the end of this training seminar, you will learn to:

- Appreciate the practical solutions for specifying the correct type of electrical protection
- Understand comprehensive understanding of principles and selection of relays
- Develop design of protection schemes
- Learn the construction and functions of instrument transformers
- Explain types grounding system and earthing fault protection

TRAINING METHODOLOGY

- Each training course participant will receive a copy of the comprehensive training course manual. This Electrical Protection training is designed to have an interactive format to maximize delegate participation. Questions and answers are encouraged throughout and at the daily sessions. The presenter will discuss specific problems and appropriate solutions. Only minimum note-taking is encouraged to ensure maximum delegate attention during the training course.

ORGANISATIONAL IMPACT

This training seminar provides an ideal way to cater to the technical training of personnel. The benefits for the organisation can be summarised as follows:

- Technical training and up-skilling to improve and realise the full potential of a competent workforce
- Productivity increase through minimisation of project time acceptance/design and commissioning
- Identification for opportunities of improvements due to deep understanding of the presented state-of-the-art technologies
- Networking of personnel with technology leaders and other engineers and technicians with strong field experience
- Exposure of personnel to the standard international procedures
- Attitude change of workforce, as continuous follow up of new technologies, and they're up to taking could otherwise create a workforce with high resistance to change due to lack of understanding

PERSONAL IMPACT

- To understand the types and reasons of electrical faults
- To understand the various types of electrical protection devices in an LV and MV electrical system namely fuses, circuit breakers and protection relays
- To understand the operations and types of protection relays namely the micro-logic, solid-state and numerical relays
- To install and select the correct type of relays for specific functions
- Common protection relays for switchboards, feeders, motors, and transformers
- Types of short circuit currents impact and calculations

WHO SHOULD ATTEND?

- Electrical protection is a very important component in all electrical installations. It is imperative that all personnel associated with electrical installation operations and maintenance need to understand the concepts of electrical protection.

This training course is suitable to a wide range of professionals but will greatly benefit:

- Engineers and Technicians from the Electricity Supply Industry
- Technical Management Professionals and Department Leaders
- Engineering Professionals from companies manufacturing and operating power and distribution transformers
- Engineers and Technical Personnel in power utilities, petrochemical plants, service professionals of large infrastructure projects
- Maintenance and Operations Technicians

Course Outline

Types of Electrical Protection Devices and Faults

- Importance of Electrical Protection and Control Devices
- Types of Electrical Faults
- Characteristics of High Voltage Fuses for Electrical Protection
- Characteristics of Circuit Breakers for Electrical Protection
- Microprocessor Overcurrent Relays
- Time, Current, Curves and Logic Discrimination
- Hot and Cold Tripping Curves
- LV Switchboard Protection against Short Circuit

Protection Functions and Instrument Transformers

- Power System Architecture
- Protection Functions
- Selective Coordination
- Lock out and anti-pumping relays
- Sensors
- Current and Voltage Instrument Transformers
- Types of Relays
- Numerical Relays and Functions

Busbar, Transformer and Motor Protection Systems

- Busbar Protection
- Transformer Protection
- Motor Protection
- Capacitor Protection
- Overhead Line Protection
- Type of Related Faults
- Relevant Protection Functions
- Protection device coordination

Grounding Systems and Earth Fault Protection

- Overcurrent Protection for Phase and Earth Faults
- Unit Protection Schemes
- Distance Protection
- Protection of Feeders against Overload and Short Circuit
- Types of Grounding System
- Restricted Earth Fault Protection

Methods of Commissioning Relays, Short Circuit Current Calculation and Harmonics

- Commissioning of Protective Relays
- Calculation of Short Circuit Current
- Fault Topologies
- Short Circuit Current at Fault Point
- Positive, Negative and Zero Sequence Systems
- Triplen Harmonics Effects and Mitigation Techniques
- Wrap-up Session
- Q&A Session

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