Training Program:

Power System Protective Relays Operation And Testing

Introduction:

Electricity is high-grade energy. Working in the electrical substations needs to be able to deal with the power & distribution transformers. All staff engineers or technicians need to understand the power transformers rules and their applications also learn the requirements of power & distribution transformer maintenance and testing and be able to understand the protection system of the transformers

This course is designed to raise the level of electrical technicians deal with the transformers to provide specific guidance to those who must implement and follow the associated procedures.

Who Should Attend?

Electrical power engineers and advanced operating staff of substations, factories, electrical distribution networks and transmission.

Methodology

This interactive Training will be highly interactive, with opportunities to advance your opinions and ideas and will include;

- Lectures
- Workshop & Work Presentation
- Case Studies and Practical Exercise
- Videos and General Discussions

Accreditation:

BTS attendance certificate will be issued to all attendees completing a minimum of 80% of the total course duration.

Course Objectives:

The delegate will gain detailed appreciation of:

- To know the different types of relays and it's principal of operation. And to Enumerate the components of protection schemes including the application of Programmable Logic Controllers, circuit breakers, current and voltage transformers
- To know how to make relay coordination for main and back-up protection relays on Ike network.
- To know how to find the cause of relay operation and verify if it is correct, false or mal operation and to Learn the proper feeder over current protection, protective relaying requirements for radial systems, relay setting criteria, load limitations and testing of over current protection schemes
- To know how to protect the power system due to up normal operational conditions. And to identify the different types of power system faults, causes & effects of power system faults, detection of faults and requirements of protective relaying system
- To know the art of advanced microprocessor based protection and to know the proper coordination of electrical protection systems, bus protection. to know the application of differential protection to transformers, winding

temperature and oil temperature devices & analysis of transformer oil for dissolved gases in relation to transformer protection

Course Outline

Fundamentals of protection practice

- Protective gear
- Reliability , Selectivity ,Zones of protection , Stability and Sensitivity
- Primary and back- up protection
- Definitions and terminology
- Relay contact systems
- Operation indicators and *Worked example on using single line diagram and reading through it.
- Identify the different types of power system faults, causes & effects of power system faults, detection of faults and requirements of protective relaying system Current and voltage distribution in a system due to fault
- Effect of system earthing on zero sequence quantities
- Circuit breakers - bulk oil, air-blast, vacuum, SF6 , Current transformers and Voltage transformers

Over current and earth fault protection

- Co-ordination procedure

- Principles of time/current grading , Grading margin
- Standard I.D.M.T. over current relay
- Combined I. D. M.T. and high set instantaneous over current relay
- Very inverse over current relay
- Time / current characteristics , Earth fault protection
- Parallel feeders , Ring mains , Directional earth fault relays
- Distance Protection and Principles of distance relays
- Relay performance
- the various types of current transformers & voltage transformers, application requirements of C.T.'s for protective relaying and accuracy classifications
- Standards of relay performance
- Relay types and their application
- Relay setting ,
- Bus-bar faults
- Protection requirements
- Differential protection using high impedance relays
- Location of current transformers
- Transformer and Transformer Feeder Protection
- Nature and effects of transformer faults
- Principles of transformer protection systems

- Generator and Generator-Transformer
- Earthing and earth faults
- Phase faults
- Inter-turn faults
- Winding protection
- Inter-turn fault protection of the stator winding
- Overload protection
- Electrical Schematic like reading, Trace Correct Drawing for each, Understanding Drawing Index and Back-up earth fault protection
- Power frequency over voltage
- Reading Settings from the Relay.
- Use of Secondary/Primary Injection Test Equipment.
- Different Types of Communication Cables used for each type of Relays.
- The proper coordination of electrical protection systems, bus protection Explain the application of differential protection to transformers, winding temperature and oil temperature devices & analysis of transformer oil for dissolved gases in relation to transformer protection
- The proper feeder over current protection, protective relaying requirements for radial systems, relay setting criteria, load limitations and testing of over current protection schemes