BTS
Training & Consultancy

Training Program:

Installing, Programming & Commissioning of Power System Protection Relays

Introduction:

The continuity of the electrical power supply is very important to consumers especially in the industrial sector. Protection relays are used in power systems to maximize continuity of supply and are found in both small and large power systems from generation, through transmission, distribution and utilization of the power. A good understanding of their application, operation and maintenance is critical for operating and maintenance personnel.

In this course, you will cover a thorough understanding of the capabilities of power system protection relays and how they fit into the overall distribution network. It will also cover the calculation of fault currents, selection of appropriate relays and relay coordination as well as configuring and setting of some of the commonly used types of protection relays used in industry. The strengths and weaknesses of the latest microprocessor (or numerical) relays as compared to the older electromechanical relays will be outlined. You will also gain a solid appreciation of how the modern relay communicates not only to the central SCADA system but also between them resulting in a truly multifunctional system which includes protection, control and monitoring. Finally, you will gain a solid understanding of issues of reliability and security for the modern relay

Who Should Attend?

Electrical engineers and technicians, electrical maintenance engineers, technicians and supervisors, electricians, field and service technicians, instrumentation engineers and technicians, design engineers, plant operators, project engineers, managers, engineers and technicians

Course Objectives:

By the end of this course delegates will be able to:

- Fundamentals of power system protection

- Key electrical system protection techniques including fault analysis

- How to calculate basic fault currents flowing in any part of your electrical system

- Key technologies and principles behind protective devices

- Architecture of the modern numerical or microprocessor based relay

- How to configure the various relays

- How to apply the modern relays to your distribution network

- How to assess and manage relay settings

- Typical problems and solutions with modern power system relays

- How to improve your electrical system protection against faults and other disturbances

Accreditation:

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

Course Outline

Basics of Power System Protection

- Requirements of protection in an electrical system

- Reliability, dependability and security

- Types of faults, Evaluation of short circuit currents

- Fault calculations in simple circuits

- Earth faults and role of system earthing

- Characteristics of protective relaying

- Sensitivity, selectivity, stability and speed

- Protection using fuses

- Protective relay/release and circuit breaker combination

- Instrument transformers and their application in protection systems

Relays and Their Development

- Types of protective relays (DMT and IDMT)

- Electromechanical and static relays

- Microprocessor and numerical relays

- IDMT characteristics expressed as a mathematical function

- Comparison of electromechanical/ static and numerical relays

- Key features: Flexibility/reliability/communications/SCADA interface

- Cost, Integrated protection and control

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Protection Coordination

- Time and current grading, Application of time and current grading

- Grading using IDMTL characteristics, Better grading through numerical relays

Typical Block Diagram of Numerical Protection Relay

- Typical block diagram, Hardware and software architecture

- Sampling interval, Extension of capabilities of relays in numerical design

- From individual protection relays to a complete protection management system

- Structure of the Intelligent Electronic Device (IED)

- Configuring substation automation using IEDs

Types of Numerical Protection Systems and Principles

- Functional protection relays, Equipment protection systems with multiple functions

Configuration of Numerical Relays

- Setting approach in conventional relays, Configuring numerical relays

- Configuration security through passwords

- Protection settings as a part of configuration

- Methods adopted for setting numerical relays

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Communication Aspects of Numerical Protection Devices

- Setting up a substation automation system using the communication capability of numerical relays

- Problems of compatibility between vendors, DNP3 communication standard

- The new substation standard IEC 61850, Logical grouping of functions

- Intercommunication using GOOSE, Using IEC with Unified Modelling Language (UML)