# PROTECTIVE RELAY & TRIP DEVICES: PRACTICAL APPLICATIONS & TROUBLESHOOTING

5-Day Training Program

## INTRODUCTION

The continuity of Electrical Power Supply is very important to the consumers specially, for industrial sector where the curtail of electrical power supply is costly.

It is important to take the necessary action to prevent the faults, and If they do occur, to minimize possible damage or possible power disruption. A protection system continuously monitors the power system to ensure maximum of electrical supply with minimum damage to life, equipment and property.

Protective relays are used in power systems to assure maximum continuity of service. They are constantly monitoring the power system to detect unwanted conditions that can cause damage to property and life. Protective relays are found throughout small and large power Systems from generation through transmission, distribution, and utilization. A good understanding of their application, operation, and maintenance is essential for the operating and maintenance personnel in order to understand how they fit into modern power systems.

## WORKSHOP OBJECTIVES

- Knowing the fault reasons in electrical networks and Its effect on the electrical quantities.
- Reviewing the Grounding System of generation, Transmission and Distribution Networks and how it affects the electrical quantities, short circuit level and protection system.
- Understanding main concepts of protection equipment and its necessity in electrical System.
- How to make relay coordination for main and back-up protection relays on the network
- How to find the cause of relay operation and verify if it is correct, false or mal operation
- How to protect the power system due to abnormal operational conditions.

## WHO SHOULD ATTEND

This course is intended for Engineers & supervisors who work in transmission, distribution, maintenance, operation, control and analysis of Electrical Networks.

## PROGRAM - DAY 1

### Introduction to power system relaying (PSP)

- Importance of Protective Relays
- Definitions.
- Requirements of PS

### Overview

- Power System Components
- Arrangement of Grounding in Power System
- Short circuit Calculations
- Transformer Connections

## DAY 2

### Fuses

Current & Voltage Transformers
Protective Relays

DTOC, IDMT, VIDMT, EIDMT Relays

- Time Current Characteristic Curves
- Choice Between DTOC & IDMT (Short & Long Lines)

Hi-Set Instantaneous Over Current Relays Combined With DTOC & IDMT

**Directional & Non-Directional overcurrent & Earthfault Relays**

## DAY 3

### Coordination of Protective Devices

- Fuse to Relay Coordination Time Intervals

- Relay to Relay Coordination Time Intervals

**Applications & Examples**

**Working on Complete Coordination System**

**Determining relays Settings**

**In-class Exercises**

## DAY 4

## Differential Relays (D.R.)

- Main Principles & Applications.
- Connections.
- Bias relay.
- Restricted earth fault relay (R.E/F.R.)
- Numerical Examples

## Impedance Relays

- Main Principles & Applications
- Connections & Characteristics.
- Coordination.

## DAY 5

## Applications & Examples On Protection of:

- Motor
- Generator
- Substation
- Transmission lines
- Distribution Network

**Discussions & Case Studies**