

PROTECTION OF ELECTRICAL POWER SYSTEMS (REF:OTSPEPS001)

Course Introduction

An electric power system should ensure the availability of electrical energy without interruption to every load connected to the system. When the electric power supply is extended to remote areas the power system would consist of several thousand kilometers of distribution lines. The high voltage transmission lines carrying bulk power could extend over several hundred kilometers. Since all these lines are generally overhead lines and are exposed, there are many chances of their breakdown due to storms, falling of external objects, damage -to the insulators, etc. These can result not only in mechanical damage but also in an electrical fault. One of the sources of trouble to continuous supply is the shunt fault or short-circuit, which produces a sudden and sometimes violent change in system operation.

Protective relays and relaying systems detect abnormal conditions like faults in electrical circuits and operate automatic switchgear to isolate faulty equipment from the system as quickly as possible. This limits the damage at the fault location and prevents the effects of the fault spreading into the system. It is the function of the protection systems.

Course Objectives

By the end of this course, trainee will be able to know the following:

- Basic principles and components of protection
- Instrument Transformers
- Basics of overcurrent protection
- Three phase protection
- Earth fault and Earth leakage protection
- Protection Discrimination
- Generator typical protection
- Transformer typical protection
- Large motors protection
- Transmission lines protection

Course Outline

Day 1

1- Basic principles and components of protection

- Introduction
- Basic ideas of relay protection
- Nature and cause of faults
- Consequences of faults
- Fault statistics
- Essential qualities of protection

2- Electromagnetic attraction relays

- Hinged armature relays
- Target and seal in unit
- Instantaneous unit
- Multi-contact relay
- Plunger or solenoid relay
- Logic relay

Day 2

3- Current transformers

- Construction
- C/T design
- Transformer polarity
- Burden
- Calculation of transformer burden
- Dangers with open circuited current transformers
- Specification of current transformers

4- Voltage transformers

- Accuracy
- Protection



Day 3

- 5- Differential protection
- Three-phase protection
- Application on power Transformers
- Applications on Generators

Day 4

6- Earth fault and earth leakage protection

- Grounding
- General
- Unrestricted earth fault protection
- Earth fault with overcurrent
- Earth leakage
- Earth leakage circuit-breakers
- Restricted earth fault protection
- Switchboard earthing

7- Protection Discrimination

Day 5

8- Transformer Protection

9- Generator Typical Protection

10- Large Motors Protection

11- Transmission line Protection

