Power Systems Protection - Control and Stability Course

Venue Information

Venue: London UK

Place:

Start Date: 2026-03-17

End Date: 2026-03-21

Course Details

Net Fee: £4750.00

Duration: 1 Week

Category ID: EAPET

Course Code: EAPET-50

Syllabus

Course Description

This course has been designed to give plant operators, electricians, field technicians, and engineers a deeper appreciation of the role played by Power System Protection systems. Understanding power systems, along with correct management, will increase plant efficiency, improve performance, and enhance safety. The course provides a solid theoretical and practical foundation, beginning with basic concepts as a refresher before moving on to more detailed applications.

Topics include the need for protection, fault types and their effects, short circuit current calculations, system earthing, and practical exercises involving fault calculations, relay settings, and transformer magnetisation curve testing.

Course Objective

Participants attending this programme will gain a detailed appreciation of:

- Relay transducers, both current and future
- System grounding principles
- Overcurrent earth fault protection
- Coordination principles
- Transformer protection
- Generator protection
- Bus protection
- Motor protection
- Line and feeder protection
- Principles of relay application

Course Outline

Need for Protection

- Selectivity, stability, sensitivity, speed, reliability, dependability, security

Fault Types & Their Effects

- Active, incipient, passive, transient, asymmetrical
- Phase & earth faults

Simple Calculation of Short Circuit Currents

- Revision of simple formulae
- Calculation of short circuit MVA & fault currents
- Worked examples

System Earthing

- Solid, impedance, touch potentials
- Effect of electric shock
- Earth leakage protection

Protection System Components Including Fuses

- History, construction & characteristics
- Energy let-through & applications

Instrument Transformers

- Purpose & duty, clearance times, types

Tripping Batteries

- Battery types, chargers, maintenance, D.C. circuitry

Relays

- Inverse definite minimum time (IDMT) relay
- Construction principles and setting
- Calculation of settings - practical examples
- Modern numerical relays & future trends

Practical Demonstrations and Sessions

- Simple fault calculations
- Relay settings

Co-ordination by Time Grading

- Problems in applying IDMT relays

Low Voltage Networks

- Air & molded circuit breakers
- Construction and installation
- Protection tripping characteristics
- Selective co-ordination (current limiting, earth leakage protection, cascading)

Principles of Unit Protection

- Differential protection - basic principles

Feeder Protection

- Cables
- Pilot wire differential
- Overhead lines
- Distance protection (principles, characteristics, schemes)

- Buchholz relay, oil & winding temperature
- Oil testing & gas analysis

Switchgear (Busbar) Protection

- Requirements, zones, types
- Frame leakage
- Reverse blocking
- High, medium & low impedance schemes

Motor Protection

- Thermal overload, time constraints, early relays
- Starting & stalling conditions
- Unbalanced supply voltages, negative sequence currents, de-rating factors
- Phase fault protection
- Earth faults – core balance, residual stabilising resistors

Generator Protection

- Stator & rotor faults
- Overload & over-voltage
- Reverse power, unbalanced loading
- Loss of excitation and synchronism
- Typical protection schemes for industrial generators

Overhead Line Protection

- Principles of distance relays
- Tripping characteristics
- Application on power lines
- Effect of load current & arc resistance
- Power line carrier schemes

Management of Protection

- Routine & annual testing
- Investigation and performance assessment
- System upgrading