Maintenance of Electrical Switchgear

Course Description

Delegates will gain an overall appreciation of the applicable standards and working practices for:

Fault level calculations
Transient system models for switching transients
Modern vacuum distribution switchgear
Modern SF6 distribution switchgear
Earthing requirements
Switching requirements
Gas insulated switches at LV, HV & MV
Oil circuit breakers
Maintenance, troubleshooting and Testing of SF6, vacuum, oil and air circuit breakers-
Protection relays: types and maintenance
Current and Voltage transformers maintenance

Course Objectives

The delegate will gain detailed appreciation of:

1. To know the performance of LV , HV &MV switchgear
2. To know the principles of operation of modern SF6 and vacuum circuit breakers
3. To learn how the substations of LV , HV & MV can be earthed
4. To know how to carry out maintenance of LV , HV and MV switchgear
5. To know what are the causes of the troubleshooting of LV , HV and MV switchgear

Course Outline

- Fault level calculations
- Methods of symmetrical & asymmetrical fault calculations
- GIS apparatus and components
- Properties of SF6 gas
- Handling of SF6
- Breakdown mechanism of SF6
- Circuit breakers principles of operation
- **Arc interruption**
- Circuit breaker ratings

- Transient system models for switching transients
- Transient recovery voltages

- Rate of rise of re-striking voltages
- Breaking capacity
- Making capacity
- Capacitive switching and prospective voltages due to shopping of inductive current
- Air circuit breakers
- Air circuit breaker maintenance
- Three phase short circuit switching
- Modern SF6 switchgear
- **Maintenance of SF6 circuit breakers and switchgear**
- Important checks of sf6 switchgear **during routine maintenance**
- Testing of SF6 switchgear according to standard
- **Oil circuit breakers**
- **Maintenance of oil circuit breakers**
- Modern vacuum switchgear
- Maintenance of vacuum circuit breakers
- Important checks of vacuum circuit breakers during maintenance
- **Testing of vacuum switchgear according to standards**
- Earthing of switchgear substations
- Switching requirements for stable operation and for safety
- Electrical switching phenomena
- Comparison of different types for various switching duties
- Gas insulated switchgear
- Mechanical rated life of a switching device
- Contact travel characteristics of HV and MV circuit breakers
- Overcurrent protection
- Co-ordination Procedure
- Principles of TIME/CURRENT grading
- Standard I.D.M.T. over-current relays
- Independent (DEFINITE) time over-current relays
- Relay current setting
- Directional overcurrent protection
- Earth fault protection
- Differential protection
- Distance protection
- Current transformers
- Voltage transformers
- Maintenance of CT , VT and relays

Course Instructor

Prof. Dr.Ossama El-Sayed Gouda is the professor of electrical Power engineering and high voltage in the Dept. of electrical power and machine, Faculty of Engineering, Cairo University since 1993.He teaches several courses in Power system, High voltage, Electrical machine, Electrical measurements, Protection of electrical power system &Electrical installation He is a consultant of several Egyptian firms. He conducted more than 90 papers in the field of Electrical power system and High voltage engineering. He supervised about 35 M.SC. & Ph.D. thesis .He conducted more than 150 short courses about the Electrical Power, Machine & High voltage subjects for the field of Electrical Engineers in Egypt & abroad

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Who Can Benefit?

This course is for Electrical Engineers & Electricians