

**MODULE : O&M 4**

**TESTING AND COMMISSIONING OF ELECTRICAL SYSTEM**

**COURSE DESCRIPTION:**

**Introduction**

Basic theory of insulation; Dielectric loss, Power factor, Dissipation factor; GST, GST-G and UST mode for testing.

**Testing Techniques**

AC test and DC test, advantages and disadvantages of each.

**Transformer Testing**

IR, AC or DC High-Pot,  $\tan \delta$ , TTR, Polarity, Voltage balance, induced potential, DGA, DC winding resistance; Acceptable values.

Oil – Definition of terms used in oil characteristics; Acceptance values for BDV,  $\tan \delta$ , Specific resistance, Neutralization value, interfacial tension, Gas content, Oil filtration techniques – Fuller’s earth, Enervac and Valcon system; DGA (Dissolved Gas Analysis), Principle, Roger’s method, Limiting value of Hydrocarbon concentrations, Case studies, Condition monitoring, Recommended test and periodicity.

**Generator /Motor Testing**

IR, PI, DC High-pot, Step voltage,  $\tan \delta$ , PF-tip up, DC winding resistance.

**Switchgear Testing**

Visual and mechanical inspection; IR and DC High-pot in Circuit Breaker open and closed position,  $\tan \delta$ , Contact resistance, Time travel analysis, Thermo graphic survey, CT & PT testing, Protective relay and functional operation.

**Cable and Accessories Testing**

IR, DC High-Pot,  $\tan \delta$ .

**Battery system Testing**

Definition of AHR rating and Volt / Cell for Lead acid and Ni-Cd Batteries; Periodic inspection procedures for Battery and Battery Chargers; Service test for given load cycle, Connection resistance test and Battery impedance test.

**Commissioning and Startup of Electrical System**

Pre Commissioning checks of Generators, Motors and Transformers; Connectivity and Phasing out; Generator dry out; Short-circuit heating, and testing of Protective Relay operation; Synchrochecks.

**Documentation and record keeping**

Typical test format for periodic maintenance testing.