

**MODULE : TB15**

**PROTECTION, O & M AND CONDITION MONITORING OF TRANSFORMERS**

**COURSE DESCRIPTION:**

**Protection :**

- Recommended over current protections for delta-star and star-star transformers for different ratings.
- Differential and REF protections; stability and sensitivity tests, protection comparison.
- Rectifier protection.

**Operation and Maintenance :**

- Over loading of transformer vs reduction in insulation life.
- Transformer oil: type, definitions and acceptable values
- Drying of transformer.
- Oil filtration-modern techniques, off line and on line.
- DGA: Test, Limiting values, Case Studies.

**Condition Monitoring :**

- Winding
  - Measurement of winding resistance.
  - Measurement of winding impedance.
  - Turns Ratio Test.
  - Measurement of IR and PI.
  - Measurement of Capacitance and tan delta.
  - Recording of partial discharge.
  - Magnetic balance test.
  - Vector group test.

- Bushing
  - Visual inspection.
  - Measurement of IR.
  - Measurement of Capacitance and tan delta.
  - Recording of partial discharge.
- Insulating Oil
  - Visual inspection.
  - Oil tan delta test.
  - Oil dielectric constant test.
  - Oil resistivity test.
  - Oil breakdown Down Voltage Test.
- Summary of recommended tests and their periodicity.