Training Program:

Operation, Installation, Testing & Troubleshooting Of Transformers

www.btsconsultant.com

Introduction:

This course will provide the candidates with extensive knowledge including tips, tricks and tools covering the fundamentals of power transformers and their testing. It will greatly assist you in communicating more effectively with your electrical engineering colleagues. At the end of this course, the candidates will be familiar with the importance of transformer testing and their purpose, the different kinds of transformer tests and their procedures and the practical applications of principals applied in transformer operation and maintenance.

This course aims at providing a comprehensive understanding of principles of operation, types, selection, testing and commissioning, protection, maintenance and troubleshooting of electric power and distribution transformers.

Target Audience:

Electrical Engineers, Supervisors and Foremen, Maintenance Engineers & Technicians, Maintenance Supervisors, Power Electricians, Power Engineers.

Training Objectives:

By the end of this course delegates will be able to:

- Gain the valuable know-how used by electrical engineers in operation and maintenance of power transformers
- Understand different kinds of testing of transformers and their purposes
- Understand the basis of acceptance and rejection of a test result based on standards

- Be aware of important points to be considered between the manufacturer and the requestor to avoid dispute at a later stage

Accreditation:

BTS attendance certificate will be issued to all attendees completing minimum of 80% of the total course duration.

Daily Agenda:

Principles of Operation of Transformers

- Electric currents and magnetic fields
- Ideal transformers
- The B-H curve
- The magnetic circuit
- Hysteresis and eddy current losses
- Steel core transformer
- Equivalent circuit of a steel core transformer
- Efficiency and losses
- Magnetizing currents and harmonics
- Voltage considerations
- Thermal considerations
- Major standards organizations
- Process for acceptance of American national standards

- Relevant power transformer standards documents

Kinds of Tests

Routine test

Type test

Special test

- Transformer Tests

Measurement of winding resistance

Measurement of voltage ratio and check of voltage vector relationship

Measurement of impedance voltage/short-circuit impedance (principal tapping) and load loss

Measurement of no load loss and current

Measurement of insulation resistance

Dielectric tests

Temperature rise

Test on on-load tap changers

Short-circuit test

Measurement of acoustic noise level

Measurement of the harmonics of the NLC

Measurement of power taken by fans/oil-pumps

Magnetizing current test

Magnetic balance test

- Insulating Oil

Characteristic of insulating oil

Causes of deterioration of insulating oil

Testing of insulating oil

Inhibitors

- Testing Transformers

Standards and classification of tests

Sequence of tests

Voltage ratio and proper connections

Insulation condition

Dielectric withstand

Performance characteristics

Other tests

- Maintenance and Troubleshooting

Preventative maintenance and predictive maintenance

Gas in oil analysis

Water in oil analysis

Drying techniques

Oil dielectric tests

Problem and failure investigations

Problem analysis after severe operating conditions

Where no failure is involved

- Transformer Protection

Fuses and relays

Gas relays

Differential protection

- Power Transformers
- Distribution Transformers
- Underground Distribution Transformers
- Transformer Connections
- Loading Power Transformers
- Auxiliary Equipment
- Transformer Selection and Application