Electrical Equipment Installation Control Systems Commissioning Testing Start Up Of Electrical System Training

Description

Course Description

Maximum efficiency, reliability, and longevity of electrical equipment such as the various types of motors, variable-speed drives, transformers, generators, rectifiers, inverters, uninterruptible power systems, circuit breakers, fuses, power station electrical and protective systems are of great concern to many industries. These objectives can only be achieved by understanding the characteristics, selection criteria, common problems and repair techniques, preventive and predictive maintenance. This course is a MUST for anyone who is involved in the selection, applications, or maintenance of electrical equipment. It provides the latest in technology. The course covers how this equipment operates and provides guidelines and rules that must be followed for a successful operation. Their basic design, operating characteristics, specification, selection criteria, advanced fault detection techniques, critical components as well as all maintenance issues are covered in detail.

Course Objectives

This course is designed to provide a comprehensive understanding of the various types of motors, variable-speed drives, transformers, generators, rectifiers and inverters, uninterruptible power systems (UPS),circuit breakers, and fuses. Upon the successful completion of this course, participants will be able to specify select, commission and maintain this equipment for their applications.

Further, participants will haveenough knowledge to achieve reduced capital, operating and maintenance costs along with increase in efficiency.

During the duration of this course, participants will:

- Understand diagnostic testing and inspection, advanced fault detection techniques, critical components, and common failure modes.
- Study selection criteria, commissioning requirements, predictive and preventive maintenance, reliability, testing and cost.

- Discover the maintenance required to minimize their operating cost and maximize their efficiency, reliability and longevity

Course Outlines

Testing, Troubleshooting Principles and Commissioning Guide Of Electrical Equipment

1. Introduction
2. Basic principles in using a drawing and meter in Troubleshooting circuits
3. Checks for circuit continuity with disconnected supply
4. Checks for circuit continuity with live supply
5. Tests and methods
6. Testing devices
7. Testing and Commissioning Methods
8. Testing and Commissioning Procedures.
9. Maintenance of Particular Types of Electrical Equipment
10. Nomo gram for temperature correction
11. Test voltages for Commissioning and Maintenance
12. Recommended insulation values for equipment

Principles Of Maintenance

- Preventive Maintenance (PM)
- Basics
- Elements

Predictive Maintenance(PdM) (Condition-Based Maintenance) (CBM)

- The Basic Concept of Predictive Maintenance
- Benefits of Predictive Maintenance

Impact of Maintenance

- Role of maintenance organization
- Types of Maintenance
- Maintenance Improvement
- Corrective Maintenance
- Preventive Maintenance
- Reactive Maintenance
- Condition Monitoring
- Scheduled Maintenance

Condition Monitoring For Electrical Equipment

Approaches Based On Mathematical Models

- Reliability Centered Maintenance (RCM)
- Condition Based Maintenance (CBM)
- Partial Discharge

Insulation Resistance Monitoring

- Insulation resistance test (IR)
- Megger test
- Polarization index test
- Dc hi-pot test
- Measuring insulation degradation
- Insulation power factor
- On line measuring partial discharge activity for insulation

On-Line Monitoring Of Transformers

- Local Indications
- Thermography
- PDA – Partial Discharge Analysis
- Insulating Oil Properties And Tests
- Test for Dielectric Strength
- Water Content in Oil
- Acidity Test (Neutralization Number)
- Oxidation Inhibitor
- Interfacial Tension Test (IFT)
- Oil Color
- Oil Power Factor Test
- Insulating Oil Dissolved Gas Analysis (DGA)

Understanding cable thermal behavior after installation

- Optical cable Temperature Monitoring

Earthing Systems

- Introduction
- Equipment Earthing
- System Earthing
- Unearthed systems
- Solid earthing
- Resistance earthing
- Reactance earthing
- Classification Of Supply / Installation System Earthing
- Earthing Via Neutral Earthing Compensator
- Distribution transformers
- Zig Zag transformers
- Comparison of Methods (Advantages/Disadvantages) Evaluation of earthing methods

- Testing The earthing electrode Resistance

Electrical Control Devices Fundamentals Maintenance and Troubleshooting

Introduction

- General
- Control Devices, Types & Application

Relays

- Classifications
- Types & Characteristics
- Relays Applications
- Inverse Time Over Current Relays Testing and Calibration

Other Control Elements

- Diodes
- Thyristors
- Transistors

Applications of Semi-Conductors Devices

- Power Devices
- Rectification (single phase)
- Rectification (three phase)
- Controlled Rectification
- Inverters
- Thyristors in A.C. Circuits

Temperature Control Devices

- General
- Thermocouple
- Resistance Temperature Detector(RTD)
- Thermestor
- Basic Instrumentation Knowledge

Generator Fundamentals Maintenance ,Testing And Trouble Shooting

Principles of Generators

- AC Generators
- Generator excitation and voltage control
- Diesel generator sets
- Synchronising of generators
- Load sharing
- Load shedding

Preventative Maintenance

Trouble Shooting

- General Procedure
- Generator Does Not Produce Voltage
- Generator Produce Low Voltage
- Generator Produce High Voltage
- Generator Voltage Fluctuating
- Fault analysis for Generator Control Circuit

Motors, Motor Controller, Motor Starters Fundamentals, Maintenance And Troubleshooting

Fundamentals

- Types of A.C Electric Motors
- Principles of Operation of the Induction Motor
- Enclosures and Cooling
- POWER FOR INDUCTION MOTORS
- STARTING OF INDUCTION MOTORS
- Motor Operation at Reduced Voltage
- Power Factor Correction

Circuit Breaker Fundamentals, Maintenance, Service ,Testing And Troubleshooting

Fundamentals

- Air Circuit Breakers.
- Vacuum Circuit Breaker
- SF6 Circuit breaker
- Oil Circuit Breaker Ratings
- Fuses
- Trip Circuit Supervision
- Circuit-Breaker Control
- Low Voltage Molded Case Current Limiting Circuit Breakers

Transformer Fundamentals, Maintenance, Testing And Troubleshooting

Principles of Transformers

- Saturation Curve & Voltage Ratio of Transformers

- Current Ratio & Impedance of Transformers
- Transformer Construction
- Transformer losses and efficiency
- Transformer Cooling & Types
- Transformer Polarity
- Transformer Applications
- Transformer Accessories
- Maintaining Transformers

Preventative Maintenance

- Transformer Inspection
- Transformer Liquids
- Dielectric Test
- General Testing
- Other Important Tests
- Transformer Failure
- Disassembly for Inspection

UPS, Rectifiers, Inverters And Batteries Fundamentals Maintenance ,Testing And Troubleshooting

UPS Fundamentals

- Rectifications & Inverters
- Inverters
- Batteries And Battery Charging
- Battery Charging Tests
- Safety During Battery Charging
- Mixing Electrolyte