

# **Training Course for STM Linemen on O&M 33 KV / 11 KV Sub-Stations**

**Ernst & Young – Human Capital Consortium  
MP Power Sector Reforms Phase II  
HR Support to the Utilities**

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# Training Course Content for ITI Personnel on O&M

## 33 KV / 11 KV Sub-Stations

**Duration: 4 Days**

### **Module I: Maintenance of Power Transformers**

#### ***Sub Module I***

**Duration: 2 Session: 2 x 1.5 = 3 hours**

1. Hourly Maintenance
  - (i) Ambient, Winding and Oil Temperature
  - (ii) Load, Amps.
  - (iii) Transformer Hum
2. Daily Maintenance
  - (i) Oil level in transformer Conservator
  - (ii) Pressure Relief Vent
  - (iii) Dehydrating Breather
  - (iv) Radiator Line
  - (v) Heaters for Transformer Marshalling Kiosk and Panel
  - (vi) Bushings
  - (vii) Tap Position Indicator
3. Monthly Maintenance
  - (i) Resetting of Maximum Pointer Indicator of OTI & WTI
4. Quarterly Maintenance
  - (i) Monitoring of IR values and oil parameters of the transformer

#### ***Sub Module II***

**Duration: 4 Sessions: 4 x 1.5 = 6 hours**

1. Six Monthly Maintenance
  - (i) Measurement of Insulation Resistance of the Transformer
  - (ii) Measurement of dielectric breakdown voltage of transformer oil

- (iii) Silica Gel Breather
  - (iv) Radiators
  - (v) Earth Resistance
  - (vi) Alarm & Protection Circuit
  - (vii) Bus Bar Conductor
2. Yearly
- (i) Transformer oil
  - (ii) Magnetic Oil Level Gauge
  - (iii) Temperature Indicators
  - (iv) Buchholz Relay
  - (v) Relay and Alarm Circuits
  - (vi) Gasketed Joint
  - (vii) Paint Work

## **Module II: Maintenance of MOCBs & VCBs**

### ***Sub Module I***

**Duration: 2 sessions: 2 x 1.5 = 3 Hours**

- 1. Weekly
  - (i) Checking of Oil Level in Each Pole Interrupter
  - (ii) Checking of Visible Oil Leaks
- 2. Quarterly or After 20 Trappings or 9 Trippings
  - (i) Checking of Dielectric Strength of Oil
  - (ii) Breather
  - (iii) Visual Inspection of Breaker and Operating Mechanism
  - (iv) Checking of Breaker Operation and Removal of Coating on Current Carrying Part
  - (v) Checking Gas Vent Pipe
  - (vi) Checking of IR Value
  - (vii) Checking of Auxillary Switch
  - (viii) Checking / Tightening of All Electrical Terminal Connections
  - (ix) Checking AC / DC Fuse

- (x) Checking of Earth Connection
- (xi) Checking of Heater Function for Anti-Condensation

### ***Sub Module II***

**Duration: 2 sessions: 2 x 1.5 = 3.0 hours**

1. Six Monthly or After 60 Trippings of 33 KV MOCBs
  - (i) Checking of contact burning / arcing ring
  - (ii) Checking / Penetration of moving Contact
  - (iii) Checking of Extinguishing Chamber
  - (iv) Checking of Tripping/Closing Operation at Reduced Voltage
  - (v) Trips Free Operation
  - (vi) Checking of Limit Switch
  - (vii) Checking of Spring Charging Motor
  - (viii) Checking of Locking Elements in the Rod System in the Operating Mechanism
  - (ix) Cleaning and Lubrication
  - (x) Checking of Foundation Bolts and All Hardware in Breaker Mechanism
  - (xi) Checking of Earthing of MOCBs
2. Yearly on 33 KV and 11 KV VCBs
  - (i) Checking IR Values
  - (ii) Inspection of Porcelain Insulators
  - (iii) Oiling & Lubrication of Operating Mechanism
  - (iv) Overhauling of the VCB Mechanism

### **Module III: Maintenance of 33 KV and 11 KV Current Transformer and Potential Transformer**

#### ***Sub Module I***

**Duration: 1 session: 1 x 1.5 = 1.5 Hours**

1. Checking for Sparking, Oil Leakage and Cracks in the Flange.

2. Checking for Tightness of Primary Connection Clamps, Earthing and Foundation Bolts
3. Checking for Insulation Resistance Values of Windings, Tightness of Secondary Connections
4. Cleaning of Porcelain Insulator
5. Checking of load on the secondary windings
6. Checking for Sparking and Oil Leakage
7. Checking for the Tightness of Primary Clamp Connection and Secondary Terminals
8. Checking for IR Values by Removing the Earth Connection of Primary Winding
9. Cleaning the Porcelain Insulators and Checking the Load on Each Winding
10. Checking for the Secondary Fuses

#### **Module IV: Maintenance of 33 KV and 11 KV Isolators**

##### ***Sub Module I***

**Duration: 1 session: 1 x 1.5 = 1.5 Hours**

1. Monthly
  - (i) Checking for Contact Heating and Flash Over Marks
  - (ii) Lubrication of Operating Mechanism and Tightness of Foundations
2. Half Yearly
  - (i) Checking and Cleaning of Fixed and Moving Contacts
  - (ii) Lubrication of Bearing by Ordinary Grease
3. Yearly
  - (i) Checking for Moving Contact Rotation
  - (ii) Checking for the Operation of Earth Switch
  - (iii) Checking for the Tightness of Nuts-Bolts

## **Module V: Maintenance of Other Technical Items**

### ***Sub Module I***

**Duration: 2 sessions: 2 x 1.5 = 3 Hours**

1. Maintenance of Lightning Arrestor
  - (i) Daily
  - (ii) Pre-Monsoon / Post-Monsoon
2. Maintenance of Control and Relay Panels
3. Maintenance of Sub-Station Batteries
  - (i) Care and Cleanliness
  - (ii) Topping Up
  - (iii) Operation
  - (iv) Trickle Charge Current & Voltage of the Charger
4. Maintenance of Battery Charger
5. Maintenance of Station Transformer

### Training Time Table

	Period 1	Period 2		Period 3	Period 4
	9:00 AM - 10:30 AM	10:30 AM - 12:00 PM	12:00 PM - 1:00 PM	1:00 PM - 2:30 PM	2:30 PM - 4:00 PM
Day 1	Module I - Sub Module I	Module I - Sub Module I	<b>LUNCH</b>	Module I - Sub Module II	Module I - Sub Module II
Day 2	Module I - Sub Module II	Module I - Sub Module II		Module II - Sub Module I	Module II - Sub Module I
Day 3	Module II - Sub Module II	Module II - Sub Module II		Module III - Sub Module I	Module IV - Sub Module I
Day 4	Module V - Sub Module I	Module V - Sub Module I		Doubt Clearing Session	Doubt Clearing Session

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