

Maintenance & Repair of Electronic Test Equipment

Name of the course : Maintenance & Repair of Electronic Test Equipment.

SECTOR : ELECTRONICS.

CODE : ELC206

Entry qualification : 8th std pass with age at least 14 years.

MES Modules on Basic Electronics -Repair and Maintenance of Power supply, Inverter and UPS

DURATION : 240 Hrs.

TERMINAL COMPETENCY:

The candidates would be able to:

- Use hand tools used for servicing the electronic test equipment.
- Operate the following electronic test equipment.
- Servicing, cleaning of switches, tighten the loose knobs, check the power cord.
- Repair the following electronic test equipment:
 1. Analog Multimeter.
 2. Digital multimeter
 3. Function Generator.
 4. Signal Generator.
 5. Oscilloscope.

CONTENENTS:

Practical Competencies	Underpinning Knowledge (Theory)
<i>Practice procedures for safety and health hazards measures</i>	<i>Electrical and personal safety, dangers and preventions</i>
(1)Analog Multimeter: <ul style="list-style-type: none"> • Precaution to be taken in handling an Analog multimeter. • Use of various hand tools. • Introduction to DC circuit, AC circuit. • Familiarisation with operation of controls of VOM. • Principle of operation of Analog multimeter. • Study of DC voltage circuit of VOM. • Study of AC voltage circuit of VOM. • Study of DC current circuit of VOM. • Study of ohms circuit of VOM. • Trouble shooting Analog multimeter. 	<ul style="list-style-type: none"> • Cleaning the dust, Cleaning the switch contacts by switch cleaning solution. • Testing the fuse. • Testing moving coil meter assembly. • Test & repair the DC voltage measurement circuit by doing measurement at the test points provided. • Test & repair the AC voltage measurement circuit by doing measurement at the test points provided. • Test & repair the DC current measurement circuit by doing measurement at the test points provided. • Test & repair the Resistance measurement circuit by doing measurement at the test points provided. • Check the battery voltage used in ohms range. • Check for proper operation of mechanical zero adjustment with the help of a screwdriver. • Repair the test leads/probes if found defective.

	<ul style="list-style-type: none"> • Replace the of battery if required. • Maintaining the test leads in proper condition. Cleaning of the switches etc. • Replacing the open Fuse with correct rating.
<p>(2)Digital Multimeter:</p> <ul style="list-style-type: none"> • Precaution to be taken in handling a Digital multimeter. • Cleaning the switch contacts with switch cleaning solution. • Testing the display (LED display, LCD display). • Check the DC voltages & waveforms at the test point of the ic commonly used in 3^{1/2} digit Digital Multimeter. • Replace the defective IC. replace the • Battery of the meter. • Maintaining the test leads in proper condition. 	<ul style="list-style-type: none"> • Cleaning the dust, Cleaning the switch contacts by switch cleaning solution. • Testing the fuse. • Testing the 7 segment LED display. Testing the LCD display module. • Check the DC voltages & waveforms at the test point of the IC commonly used in 3^{1/2} digit digital multimeter. • Troubleshoot DC voltage, AC voltage, DC current, AC current & Resistance measurement circuit by doing measurement at the test points provided. • Check the battery used in the digital multimeter. • Repair of test leads/probes if found defective. • Replacing the open Fuse with correct rating. • After repair test the digital multimeter for its performance.
<p>(3)Function Generator:</p> <ul style="list-style-type: none"> • Precaution to be taken in handling a Function Generator. • Familiarization with front panel controls, switch etc. • Cleaning the dust, Cleaning the switch contacts with switch cleaning solution. • Identify & testing a Function Generator Power supply circuit and test at the test points provided for correct output voltages. • Test the waveform generator circuit output waveforms at the test point provided with the help of a CRO. • Test the Function selector switch for its proper contacts. • Test the output amplifier circuit by doing voltage & waveform measurement at the test points provided. • Service the equipment by blowing dust, cleaning all the switches, potentiometers, output terminals etc. 	<ul style="list-style-type: none"> • Familiarization with front panel control. • Cleaning the dust, Cleaning the switch contacts by switch cleaning solution. • Testing the fuse, Power cable & ON/OFF switch. • Test & repair the Power supply circuit, waveform generator circuit amplifier circuit by doing voltage measurement at the test points provided. • Effect of DC-offset control on the waveform. • Replacing the open Fuse with correct rating.
<p>(4)Signal Generator:</p> <ul style="list-style-type: none"> • Function Generator. • Familiarization with front panel controls. • Cleaning the dust, Cleaning the switch contacts with switch cleaning solution. • Identify Different circuit blocks of Signal before trouble shooting. 	<ul style="list-style-type: none"> • Familiarization with front panel control. • Cleaning the dust, Cleaning the switch contacts with switch cleaning solution. • Testing the fuse, Power cable & ON/OFF switch. • Testing a Signal Generator's Power supply circuit, oscillator circuit & output amplifier circuit for trouble shooting. • Replacing the open Fuse with correct rating.

(5)CRO:

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| <ul style="list-style-type: none">• Precaution to be taken in handling a CRO.• Familiarization with front panel controls.• Identify different blocks in a CRO.• Study & Trouble shooting technique of CRO's Power supply circuit, vertical amplifier, horizontal amplifier & Sweep generator circuit etc.• Test the by doing voltage & waveform measurement at the test points provided.• Check for proper operation of AUTO/NORMAL, LINE, CH-1 or CH-II, EXT etc.• Check the calibration of the cro for accurate measurement by feeding the CAL signal to each channel.• Cleaning of switches, potentiometers etc.• Maintaining the test probes in proper condition. Test the probe with attenuation (X1, X10).• Time base and amplitude control• Triggering, ALT-CHOP mode | <ul style="list-style-type: none">• Familiarization with front panel controls and measurements• Cleaning the dust, Cleaning the switch contacts by switch cleaning solution.• Testing the fuse, Power cable & ON/OFF switch.• Identify & testing a CRO's Power supply Vertical amplifier circuit , horizontal amplifier & Sweep generator circuit etc.• Check by feeding the CAL signal to the channel in use for accurate measurement.• Test the circuit by doing voltage & waveform measurement at the test points provided.• Check all functions AUTO/NORMAL, LINE, CH-1 or CH-II, EXT, selection of AC-DC-GND etc.• Maintaining the test probes in proper condition.• Use of CRO probes with & without attenuation (X1, X10).• Replacing the open Fuse with correct rating.• Time base switch – its functions, operation and repair |
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TOOLS & EQUIPMENT REQUIRED:

1. Screw drivers of different types & sizes.
2. Plier.
3. Long nose plier.
4. Watch maker's screwdriver set.
5. Side cutter.
6. Brush.
7. Adjustable spanner 6".
8. Tweezer.
9. Soldering iron.
10. Analog Multimeter.
11. Digital multimeter.
12. Oscilloscope.
13. Function Generator.