

MODULE-3

General information for **Repair and maintenance of Personal Electronic Devices**

Name of Sector	ELECTRONICS
Name of Module	Repair and maintenance of Personal Electronic Devices
MES Code	ELC703
Duration of Course	520 Hrs
Entry Qualification of Trainee	8 th Pass + 14 yrs of age
Unit size (No. Of trainees)	20
Power Norms	2.0 KW
Space Norms	60 sq.m Minimum size of one side to be 04 m.
Instructors Qualification	B.E./ B.Tech in Electronics / Electronics & Telecommunication/Electronics & Communication with one year experience in the relevant field OR Diploma in Electronics/Electronics & Telecommunication / Electronics & Communication from recognized board of technical education with two years experience in the relevant field. OR NTC/NAC in the relevant trade with three years' experience respectively in the relevant field
Desirable	Craft Instructor Certificate (CIC)

Objectives

- Testing of electrical parameters, cables and measurements
- Select the proper instrument for suitable measurement
- Identify and test passive and active electronic components
- Practice soldering and desoldering of various types of electrical and electronic components
- Trouble shoot the faults in the given power supply circuits
- Dismantle, identify and troubleshoot the LCD/LED TV for various faults
- Install DTH system
- Work with tools required for installation like drilling machine, satellite meter or QAM meter and Multi-meter
- Identify and Test necessary components to install a SET TOP BOX
- Install the SET TOP BOX and check its performance
- Check all parameters of STB like Transponder/signal strength/Audio & Video quality
- Operate and rectify faults with Remote
- Dismantle, identify and troubleshoot the given cell/smart phone
- Identify and configure the components of a typical Home theatre system
- Trouble shoot the simulated faults of the given Home theatre system
- Identify , disassemble, and assemble a computer system
- Replace various functional parts HDD, CDD, SMPS, Memory

- **Terminal Competency:** After completion of the module the participant would be able to install DTH system, assemble the parts of mini-dish and install independently at customer's premises, Guide the customers to operate the DTH systems installed in their residence, repair cell phones, install and repair the home theatre system and car stereo, replace various functional parts HDD, CDD, SMPS, Memory.

Course Contents for Module:- **Repair and maintenance of Personal Electronic Devices**

Practical Competencies	Underpinning Knowledge (Theory)
<p><u>Basics of electricity and Electrical Cables</u></p> <ul style="list-style-type: none"> • Practice procedure for electrical and personal safety measures • Identify the Live, Neutral and Earth on power Socket • Construct a test lamp and use it to mains healthiness • Use a Tester to monitor AC power. • Measure the voltage between the neutral and ground and rectify earthing • Identify and test different ac mains cables • Skin the electrical wires /cables • Measure the gauge of the wire using SWG • Make the mains cable for termination • Identify the primary and secondary cells • Measure and test the voltages of the given cells/battery using analog and digital Multi-meter • Charge and discharge the battery • Use a hydro meter to measure the specific gravity of the secondary battery 	<p>Basic terms electric charges, Potential difference, Voltage, Current, and Resistance. Basics of AC & DC. Terms such as positive cycle, negative cycle, Frequency, Time period, RMS, Peak, P-P, instantaneous values, Insulators, conductors and semiconductor. Different type of electrical cables and their specifications.</p>

<p><u>Multi-meter</u></p> <ul style="list-style-type: none"> • Cleaning the switch contacts using switch cleaning solution. • Testing the fuse. • Use the analog and digital Multi-meter to measure the DC voltage by doing measurement at the test points provided. • Use the analog and digital Multi-meter to measure AC voltage measurement by doing measurement at the test points provided. • Adjust the zero adjustment screw for proper zero setting with the help of a screw driver before using Multi-meter. • Replace the battery in the Multi-meter. • Replacing the open Fuse with correct rating 	<p>Precaution to be taken in handling an analog Multi-meter.</p> <p>Study of different controls on Analog Multimeter Principle of operation of Analog Multi-meter.</p> <p>Precaution to be taken in handling digital Multi-meter Frequently occurring problems in Analog Multi-meters and the remedial measures</p> <p>•</p> <p>Precaution to be taken in handling digital Multi-meter, Familiarization with operation controls of digital Multi-meter Principle of operation of digital Multi meter. Frequently occurring problems in digital of Multi-meters and the remedial measures</p>
<p><u>Basic Electronic Components</u></p> <ul style="list-style-type: none"> • Identify the different types of resistors. • Measure the resistor values using colour code and verify the reading by measuring in multi meter. • Identify the power rating using size • Identify different inductors and measure the values using LCR meter. • Identify the different capacitors and measure capacitance of various capacitors using LCR meter. • Dismantle and identify the 	<p>Resistor-definition, types of resistors, their construction & specific use, color-coding, power rating.</p> <p>Types of inductors, specifications and applications.</p> <p>Types of capacitors, specifications and applications</p> <p>Working principle of a Transformer, Specifications of a transformer, Step-up, Step down and isolation transformers.</p>

<p>different parts of a relay.</p> <ul style="list-style-type: none"> • Identify different types of mains transformers and test them. • Identify the primary and secondary transformer windings. • Measure the primary and secondary voltage of different transformers. 	<p>Fuse – types, use of fuses and its rating.</p>
<p><u>Power supply</u></p> <ul style="list-style-type: none"> • Testing of active components • Practice soldering and de-soldering techniques • Assemble and test– half wave, full wave & bridge rectifier circuits with and without filter. • Identify the different types of fixed positive and negative regulator ICs (78/79 series) • Identify the pins • Construct a fixed voltage regulator using 78xx/79xx series ICs • Observe the output voltage of different IC regulators by varying the input voltage 	<p>Basic Electronics active components, testing of components, Working of half wave, full wave and bridge rectifier circuits. Voltage Regulator circuit. Applications of transistor – its uses MOSFET – precautions when handling. DIAC, SCR, TRIAC - application Identify the pin diagram of Voltage regulator ICs</p>
<p><u>UPS/Inverter</u></p> <ul style="list-style-type: none"> • Installation of UPS and Inverters • Maintenance of battery. • Dismantle the UPS and identify the major parts. • Testing of major components. • Testing of power modules. • Charging, discharging and testing of batteries. 	<p>Various types of batteries used in UPS and Inverters and their maintenance. Different types of inverter, UPS, Working principle, specifications, explanation with the help of block diagram.</p>
<p><u>SMPS</u></p> <ul style="list-style-type: none"> • Dismantle the given SMPS and find major sections/ ICs components. • Measure voltages at vital points 	<p>Block Diagram of Switch mode power supplies and their working principles.</p>

<ul style="list-style-type: none"> • Identify various input and output sockets / connectors of the given SMPS. • Repairing of SMPS, simulating various faults diagnosing and rectifying it. 	
<p><u>TV RECEIVER</u></p> <ul style="list-style-type: none"> • Installation of a TV receiver. • Identify the different controls of LCD/LED TV • Identify the various connector provided on LCD/LED TV and test the healthiness • Dismantle the panel of LCD/LED TV • Dismantle, identify the parts of remote control • Trace and rectify the faults of remote control • Check power supply and front panel control 	<p>Explain the working principle of color TV using block diagram. Explain the need and working principle of each block. Detailed explanation of power supply and high voltage generation section. Explanation of PTC , various voltages required for PTC. Difference between a conventional CTV with LCD & LED TVs. Principle of LCD and LED TV and function of its different section. TV Remote Control – Types, parts and functions, Working principle, operation of remote control. Different adjustments, general faults in Remote Control.</p>
<p><u>DTH System</u></p> <ul style="list-style-type: none"> • Practice procedures for safety and health hazards measures • Identify the various mini-dish components and their functions • Identify & use of different tools and equipments used in DTH installation procedure & cabling procedure • Identification of Various types of 	<p>Electrical and personal safety, dangers and preventions Basic satellite communication, Merits & Demerits of satellite communication, applications, types of satellite & its orbits, Satellite Frequency Bands.</p>

<p>connectors, cables and wiring procedure.</p> <ul style="list-style-type: none"> • Follow the chronological order to assemble the minidisk. • Install a DTH system & track a TV channel • Site selection, installation mounting tracking for azimuth and elevation angles using SAT meter. • Identify the faults in DTH system & rectify. • Identification & use of various I/O ports of STB. • STB connection and first installation. • Identify the faults in STB & rectify. 	<p>Basic components of DTH system: PDA, LNBC, Satellite receiver terminal, dish installation aspects, Azimuth & elevation settings of dish/ DTH receiver.</p> <p>Types of cables used in DZTH system, impedance and specification</p> <p>Multi-dwelling unit design, headed amplifier, line amplifier, cascaded in/out multi-switch, tap, and splitter.</p> <p>Set top box features, block diagram of set top box, I/O ports, Cable modem termination system, software & customer premises equipments.</p>
<p><u>Cell phones</u></p> <ul style="list-style-type: none"> • Dismantle, identify the parts and assemble different types of cell phone/smart phones. • Dismantle the cell phone/smart phone replace the display • Dismantle the cell phone/smart phone remove the key pad and clean it, test for the continuity of the matrix/tracks • Test the battery and battery charger with Multi-meter. • Check track continuity and use jumpers for track problems. • Test and rectify the problems in antenna and antenna switch • Interface the cell phone/smart phone to the PC and transfer the 	<p>Introduction to various types of mobile handsets, their description, features & uses of these features. Identify the keys and their uses. Identify the components used in a cell phone.</p> <p>Use of various solders , flux and cleaning Agents</p> <p>Use of antenna and antenna switch.</p> <p>SIM and SIM related problems of GSM & CDMA PHONES.</p> <p>Use of computer for cell phone servicing – cell phone software Flashing and its need- precautions to be taken while flashing</p> <p>Knowledge of downloading of</p>

<p>data</p> <ul style="list-style-type: none"> • Connect internet on cell phone and browse popular web sites • Flash the various brands of cell phone/smart phone (at least 3) • Upgrade the OS • Format the cell phone/smart phone for virus(approach the mobile repair chop) • Identify the defective parts and rectify 	<p>add-on software, ring tones, wall papers, themes, etc. on non multimedia and multimedia handsets, window based handsets</p>
<p><u>Home theatre</u></p> <ul style="list-style-type: none"> • Identification of different parts of home theatre • Testing of speakers, woofers& tweeters • Set up of home theatre using specific devices • Identification of different parts of AV receiver • Identify the faults in AV receiver & rectify 	<p>Introduction to Home theatre, surround sound system, basic components, block diagram of home theatre & working</p>
<p><u>CAR STEREO :</u></p> <ul style="list-style-type: none"> • Testing of speakers • Identify the faults in CAR STEREO receiver & rectify 	<p>Block diagram of car stereo. Components of car stereo.</p>
<p><u>Computer Hardware,</u></p> <ul style="list-style-type: none"> • Identification of various indicators, Connectors, ports on the computer cabinet • Identify drives and their capacity. • Identify various connectors and cables inside the cabinet & Identify connections to rear side and front panel of the cabinet • Identify various parts of the system 	<p>Basic blocks of a computer, Hardware and software, I/O devices, keyboard, types of mouse, Different types of printers, HDD, DVD. Various ports in the computer.</p>

unit and motherboard

- Replace the CMOS battery
- Replace/Extend a memory module
- Test and Replace the SMPS
- Replace the given HDD on the system
- Replace the given DVD on the system
- Configuring and troubleshooting display problems

List of Tools & Equipment for module:- Repair and maintenance of Personal Electronic Devices

Sl No	Name of Tool/ Equipment	Quantity
1.	DTH System with all accessories	1 set
2.	Inverter / UPS trainer	1 No
3.	Battery charger	4 Nos.
4.	Technicians tool kit	20 Nos
5.	Digital Multi-meter	10 Nos.
6.	Analog Multi-meter	4 Nos
7.	Clip on ammeter	As Required
8.	Soldering iron	10 Nos.
9.	Desoldering pump	10 Nos.
10.	Soldering / desoldering temp controlled station	2 Nos.
11.	SMD soldering tools	4 Nos.
12.	Satellite finder (digital)	1 No
13.	Set top box	1 No
14.	Magnifying lens with illumination	1 No
15.	BGA soldering kit	1 No
16.	Computer with Flashing Unit	1 No
17.	ANTI-STATIC PAD	1 No
18.	Software compatible with different types of handsets.	As required
19.	Screw drivers assorted size and shapes (TROX) for cell phones	As required
20.	Different cell /smart phone	4 Nos each
21.	Power supply tester unit for cell phone	2 Nos
22.	Home theatre unit	1 No
23.	Tool Kit (Comprising various tools added as per requirements)	4 Nos
24.	Colour TV	1 No
25.	LNBF (Universal, dual, quad, quattero)	1 No each
26.	SMD rework station	1 No
27.	Computer system	2 nos
28.	Cell phones latest (CDMA & GSM) & smart phone	1 each