WATER PURIFIER, MICROWAVE OVEN AND INVERTER SERVICING TECHNICIAN(PMIS)

Core Qualification File Syllabus

Details of Theory Syllabus

Sl. No.	CONTENT	DETAILS
1.	Occupational safety (6 Hrs)	1.1. Basic safety introduction & Personal protection 1.2. Basic injury prevention & elementary first aid 1.3. Safety sign for Danger, Warning, caution and personal safety message 1.4. Use of C type Fire extinguishers 1.5. Concept of Standard safety precautions
2	Introduction to Water purifier, Microwave Oven and Mixer Grinder Technician (22 Hrs)	1.1 Basic electrical, electronics and science about water purification process and different layers of filter present within the unit such as sediment filter, carbon block filter, TFC/TFM membrane, inline carbon filter etc. and basic 1.2 Study of Different technologies in water purification (such as reverse osmosis, de ionization etc.) 1.3 Basic principle of Microwave Oven like concept of Microwave generation, cavity Magnetron, dielectric heating etc. 1.4 Basic principle of Mixer Grinder along with concept of universal motor, electromagnet, wattage of Mixer Grinder.
3	Study of outline plan, water pipeline and assembling techniques for installation of water purifier. (14 Hrs)	1.1 Necessary criteria for installation like distance from power supply, vicinity to plumbing point, electrical works, adequate water pressure at inlet source etc. 1.2 Study of all supporting accessories for the installation of water purifier. 1.3 Study of Installation procedure by drilling holes, mounting the filter, connecting the inlet and outlet lines properly as per documentation.
4	To study on standard problems on dysfunctional water purifier (12 Hrs)	4.1 To study basic inspection of feed water valve, auto shut off valve, saddle valve, tubing, PCB module, house wiring, plumbing etc. for the reason of non functioning of water purifier. 4.2 Procedure to remove and replace the faulty module with a functional one and then reassemble the complete functional unit. 4.3 To study about periodic maintenance, correct practices and complaint lodging procedure follow in order to avoid recurring problems.
5	To study on dysfunctional mixer	5.1 Study about basic tests such as power supply inspection, volt ampere test and earthling test of power supply and

	grinder and microwave oven. (12 Hrs)	instruments 5.2 To study about every module of different units and the respective faults associated with it 5.3 Study to identify faulty components such as thermostat, relay, motor, magnetron etc. and/or PCB modules and to replace them. 5.4 To study about cleaning procedures, using different jars for different purposes and other best practices
7.	To Study common Electrical wiring and connection System (6Hrs)	7.1 To study basic electrical wiring, earthing, electrical connector, fuse, MCB etc. 7.2 Identification, Function and location of Spark plug due to loose/short contact
Total		**72 hr**

Detail of Practical Syllabus

SL NO	CONTENT (Any Eight)	DETAILS
1.	Proper use of different tools used for repairing work of Water purifier, Microwave Oven and Mixer Grinder. (10 Hrs)	Hands on practice for the use of different tools and equipments used for installation, repairing and maintenance works **like hot air gun, desoldering pump, soldering material for zero defec**t soldering , CRO, Multimeter, Electrical drill machine, TDS meter, PPM meter, Micro wave power meter, Ubiquitous meter etc. for particular repairing works of Water purifier, Microwave Oven and Mixer Grinder.
1	Installation of different parts of a water purifier system (12Hrs)	1.1. Tap/Faucet Installation. 1.2. Drain Saddle Fitting. 1.3. Install the Inlet Feed Valve. 1.4. Assemble Pre-Filter. 1.5. Assembling Storage Tank and Filter Compartment. 1.6. RO Membrane Installation. 1.7. Run the System.
2	Fault diagnosis and repairing technique of water purifier system (12 Hrs)	2.1 To detect basic electrical fault such as in proper /no earth, effective power cords, connectors or internal wiring defects, blown fuse, short/loose/open contacts 2.2 Standard procedure to change filters, resins and membranes of different types of water purifiers 2.3 To detect problems for low /no water production due to feed water valve or tank valve not being on or kinked tubing. 2.4 To identify the reasons for leaks in the filter due to loose housing, damaged or misaligned 'O' ring, cracks in the housing. 2.5 To detect worn out auto shut off valves through symptoms such as loud vibrating noise, drain water never shutting off. 2.6 To detect other problems such as clogged filter, storage tank problems, clogged flow resistor inadequate water

		pressure, improper saddle valve mounting etc.
3	Fault diagnosis and repairing technique of Microwave oven (8 Hrs)	3.1 To detect problem of oven running but not heating due to shorted diode , HV transformer of magnetron, damaged magnetron dome, magnetron insulator breakdown, shorted HV capacitor/ wiring 3.2 To identify reason for uneven heating due to oxidized/ burned connection to magnetron filament connection, burned connector due to poor crimp or weakend connection. 3.3 To detect other problems such as defective touch panel/ keypad, defective control board, defective sensor unit, burned connector, defective triac etc.
4	Fault diagnosis and repairing technique of Mixer grinder(8 Hrs)	4.1 Locate the problem for abnormal noise during use due to loose jar coupler, overloading of jar, worn out blade shaft, worn out jar bush, worn out /broken motor coupler. 4.2 Identify and locate reasons for not running due to dysfunctional motors, overload circuit breaker tripping, no power supply etc 4.3 Identify and observe the reason for overflowing/leaking of contents from the jar such as faulty fittings of dome lid cap, dome gasket, overloading of the jar etc.
5	Preventive maintenance technique of water purifier system (8 Hrs)	5.1 Procedure to replace all the filters periodically. 5.2 Procedure to replace RO membranes periodically. 5.3 Procedure of learning methods to sanitize the water storage tanks. 5.4 Procedure to clean and sanitize the pipes periodically. 5.5 Method to check the pressure nozzle at regular intervals.
6	Preventive maintenance technique of Microwave oven (4 Hrs)	6.1 Learn the process to keep the inside clean to avoid spots and corrosion from developing. 6.2 Method to Keep the outside clean. 6.3 Put microwaveable containers with cover. 6.4 Strictly avoid metal in the microwave oven. 6.5 To check the door closes properly.
7	Preventive maintenance technique of Mixer Grinder(4 Hrs)	7.1 Method to clean the mixer grinder after every use. 7.2 Procedure to rinse the jars thoroughly in water and dry them upside down. 7.3 Procedure to remove the blades before cleaning. 7.4 Method to lock the jar properly before every use to avoid damage to the blades. 7.5 Method to increase the speed of the motor gradually and to check the ingredients are at room temperature to reduce the pressure on the motor. 7.6 Procedure to avoid spilling, by securing the lid during the grinding process.

		7.7 Method to clean the cord with a damp cloth to get rid of moisture completely.
10	Project (30 Hrs)	Three numbers each of 10 hr
Total		**96 hr.**

Details of Project (Any two)

Sl. No.	Content (Any two, each 12 Hrs)	Details
1.	Project I	Installation and assembling of different types of water purifier system (UV+UF+RO).
2.	Project II	Assembling of Mixer Grinder by using Electrical Motor of 500 watt, plastic moulded body parts, base plates, Jars set, blades set, sheet metal components and other hardware components/items
3.	Project III	Assembling of Micro wave oven by using Magnetron waveguide, Transformer, Cooling Fan , Control Panel, Door, Case etc.

OUTCOMES

Assessment evidences

Outcomes to be assessed	Assessment criteria for the outcome
1. Explain knowledge for keeping safe working place.	○ Assessor will ask the student about checking of Electrical connections like proper earthling, short circuit protection. ○ Students will be asked to operate C type Fire Extinguisher. ○ Assessor will ask the student to use of proper First-aid treatment. ○ Students will be demonstrated to practical use of *proper PPE kit* as per norms. ○ Students will be demonstrated for standard safety precautions for microwave oven, inverter and water purifier. ○ Define different standard safety symbols
2. Explain fundamental electrical terms and identify basic electronics components	○ Explain Charge, Voltage, Current, Resistance, ohms law ○ Explain difference between AC and DC, understand phase, phase difference, power factor in an a.c. circuit ○ Explain inductance, capacitance, their role in circuit ○ Concept of power in A.C. and D.C. circuit ○ Calculate energy consumption of appliances ○ Explain concept of domestic wiring: Phase and neutral, Testing with a test lamp, different components like Fuses, switches, socket and plug (5A and 15 A) ○ Make Series and parallel connections, explain their uses ○ Identify basic electronics and electronic components

	(knowledge of components such as diode, transformer, LED, photo transistor, capacitor, resistor, inductor, thermistors) o Test above basic components of Electronics circuit
3. Explain working principle and application of Water purifier, Microwave Oven and Inverter.	o Assessor will ask the basic electrical, electronics and science about water purification process and different layers of filter present within the unit such as sediment filter, carbon block filter, TFC/TFM membrane, inline carbon filter etc. and basic o Demonstrate different technologies in water purification (such as reverse osmosis, de ionization etc. o Basic principle of Microwave Oven like concept of Microwave generation, cavity Magnetron, dielectric heating etc. o Basic principle of voltage stabilizer and inverter along with concept of UPS, Battery, CVT, surge suppressor, PWM circuit, DC-AC converter, rectifier, battery charging ckt etc (Only Module based function and block diagram)
4. Install a water purifier with all supporting accessories.	o Assessor will ask the students about necessary criteria for installation like distance from power supply, vicinity to plumbing point, electrical works, adequate water pressure at inlet source etc. o Demonstrate about of all supporting accessories for the installation of water purifier. o Explain the installation procedure by drilling holes, mounting the filter, connecting the inlet and outlet lines properly as per documentation.
5. Repair standard problems on dysfunctional water purifier	o Analyze the fault based on customer complaint record o Demonstrate basic inspection of feed water valve, auto shut off valve, saddle valve, tubing, PCB module, house wiring, plumbing etc. for the reason of non functioning of water purifier. o Explain the fault by inspecting every part of the unit if the fault is not identified through basic inspection o Remove and replace the faulty module with a functional one and then reassemble the complete functional unit. o Demonstrate about periodic maintenance, correct practices and complaint lodging procedure follow in order to avoid recurring problems
6. Repair dysfunctional microwave oven	o Demonstrate basic tests such as power supply inspection, volt ampere test and earthling test of power supply and instruments o Explain every module of different units through basic tests. o Demonstrate to identify faulty components such as thermostat, relay, motor etc. and/or PCB modules and to replace them at location.

7. Repair dysfunctional Inverter	7.1 Total load calculation to install a inverter 7.2 Demonstrate basic tests such as power supply inspection, volt ampere test and earthing test of power supply and instruments 7.3 Demonstrate testing of components in circuits through circuit diagram like PWM IC, **555** timer IC, LM 324 comparator, relay switch, rectifier, capacitor, diode, LED, resistor, circuit breaker, opto isolator, OPAMP 7.4 Test of components like ▪ Power Cord ▪ Battery, ▪ Inverter Circuit, ▪ Charger Module, ▪ PFC module ▪ SPS Module 7.5 Replace any component, if found defective
8. Identify and Demonstrate use of different tools and equipment used for repairing work of Water purifier, Microwave Oven and Inverter.	8.1Identify and Demonstrate use of different types of tools and equipment's like TDS meter, PPM meter, hydrometer, Battery Charger, DC regulated power supply, Micro wave power meter, digital clip on meter, analig and digital multimeter, temperature control soldering station, CRO etc.