ASSISTANT SERVICE TECHNICIAN (AIR-CONDITIONER) (STAC)

Core Qualification File Syllabus

Details of Theory Syllabus

Sl. No.	CONTENT	DETAILS	Hours
1	Trade related hazards and safety precaution	1.1 Personal protection in work place. 1.2 Personal safety and prevention of accident. 1.3 Basic First Aid 1.4 Safety sign for danger, warning, caution and personal safety message 1.5 Use of fire extinguisher 1.6 Electrical safety precautions 1.7 Hazards due to leakage of refrigerant and precautionary measures. 1.8 Hazards due leakage of lubricant and water and precautionary measures. 1.9 Electrical Safety precautions 1.10 Safety precaution to be taken during the use of hand tools for Air conditioner servicing tools such as safety for Tool box, hammers, saw, screw drivers, wrenches, pliers, clamps, metal snips, files, flaring tool set, swaging tool, bending spring external type for copper tube, pipe cutter for copper tube, pinch of tool for copper tube, pipe cutter with built in reamer and space cutter for copper tube, pipe/tube bender lever type, puller 3 legged with flexible arm, torque wrench, multi meter, gas leak detector for halogen gas, electronic leak detector, Sling Psychrometer, Anemometer ,compressor tester for hermetic compressor, evacuating and charging station, two stage rotary vacuum pump etc. 1.11 Use of PPE's during servicing of Air conditioner.	6
2	Introduction	2.1 Definition of Air Conditioning. 2.2 Capacity of Air conditioner. 2.3 Classification of Air Conditioning system. 2.4 Major application area of A.C. System. 2.5 Definition of Psychometry, DBT, WBT, RH, Humidity Ratio.	9
3	Air – Conditioning System	3.1 Explanation of working principle with labeled sketch and application of following air conditioner 3.2 Explanation of working principle with labeled sketch and application of following air conditioning system	15

		• Window Air conditioner • Split Air Conditioner 3.3 Purpose and uses of - • Package type Air conditioner • Car Air Conditioner • Central Air Conditioner • Air cooler	
4	Tools and equipment for servicing air conditioner	4.1 Identification and uses of different tools and equipment required for servicing Air conditioner such as hammers, saw, screw drivers, wrenches, pliers, clamps, metal snips, files, flaring tool set, swaging tool, bending spring external type for copper tube, pipe cutter for copper tube, pinch of tool for copper tube, pipe cutter with built in reamer and space cutter for copper tube, pipe/tube bender lever type, puller 3 legged with flexible arm, torque wrench, multi meter, gas leak detector for halogen gas, electronic leak detector, Sling Psychrometer, Anemometer ,compressor tester for hermetic compressor, evacuating and charging station, two stage rotary vacuum pump etc.	9
5	Trouble Shooting	5.1 Common problems of Window Air conditioner and possible causes such as- ➢ No cooling due to compressor not started/unit running continuously. ➢ Poor Cooling due to improper setting of controls/ unit running continuously/ partially chocked filter drier. ➢ Unit running but noisy. Remedy of above problems. 5.2 Common problems of Indoor and outdoor unit of split A.C. and possible causes- ➢ No cooling due to tripping of compressor frequently ➢ Poor cooling due to frost on evaporator coil / partially chocked capillary/ gas shortage. ➢ Noisy indoor unit ➢ Water leakage in indoor unit. Remedy of the above problems.	24
6	Electrical Circuit	6.1 Concept of current, voltage, resistance, electrical power, electrical energy. 6.2 Measurement of current, voltage, resistance, electrical power, electrical energy. 6.3 Use of Volt meter, Ammeter and Multi meter. 6.4 Basic Knowledge of electrical circuit of A.C. System	9

TOTAL DURATION OF THEORY CLASS	72

Detail of Practical Syllabus

SL NO	CONTENT	DETAILS	Hours
1	Identification of components of Air conditioning System.	1.1 Identification of components of Window Air conditioner compressor, condenser, evaporator, starting capacitor, running capacitor, thermostat, selector switch from actual unit. 1.2 Identification of different components of indoor unit such as evaporator, fan, swing motor, PCB and outdoor unit such as compressor, condenser, condenser fan motor, Running capacitor, Capillary tube, suction pipe and discharge pipe of Split A.C. from actual unit.	12
2	Identification and uses of tools and equipment required for Servicing A.C.	2.1 Identification and uses different tools and equipment required for servicing Air conditioner such as hammers, saw, screw drivers, wrenches, pliers, clamps, metal snips, files, flaring tool set, swaging tool, bending spring external type for copper tube, pipe cutter for copper tube, pinch of tool for copper tube, pipe cutter with built in reamer and space cutter for copper tube, pipe/tube bender lever type, puller 3 legged with flexible arm, torque wrench, multi meter, gas leak detector for halogen gas, electronic leak detector, Sling Psychrometer, Anemometer ,compressor tester for hermetic compressor, evacuating and charging station, two stage rotary vacuum pump etc.	12
3.	Trouble shooting of window A.C	3.1 Identification of problem 3.2 Testing 3.3 Proper diagnosis of problem 3.4 Solution of problem by repair/replacement of the concerned component.	12
4.	Servicing of Split A.C.	4.1 Identification of the problem 4.2 Testing if required. 4.3 Proper diagnosis of the problem 4.4 Solution of problem by repair/replacement of the concerned component.	12
5.	Copper tube	5.1 Cutting, bending and joining of copper tube 5.2 Flaring 5.3 Swaging	8

		5.4 Silver Soldering.	
6.	Leakage Testing	6.1 Testing of leakage by nitrogen gas.	8
7.	Gas charging in Air conditioner	7.1 Vacuuming 7.2 Gas Charging	8
8	Project		24
Total Practical and Project			96

Details of Project (Any two)

Sl. No.	Content	Details	Hours
1.	Project I	Disassembly and assembly of Window type Room Air-conditioner.	12
2.	Project II	Disassembly and assembly of Split type Air-conditioner.	12
3.	Project III	Identification of different components of Car A.C. form model.	12
4.	Project IV	Preparation of a report based on industrial tour to a Central Air-Conditioning Plant.	12

OUTCOMES

Outcomes to be assessed	Assessment Criteria for the outcomes
1. Apply safe working practices	1.1 Assessor will note whether the trainee is able to achieve a safe working environment in line with occupational health and safety regulations and requirements according to site policy. 1.2 Assessor can judge the trainee on his ability to recognize any unsafe situations according to site policy, and assess his report accordingly. 1.3 Assessor will ask the trainee to demonstrate use of different bandages and medicines commonly present in a first aid box. 1.4 Trainee will be asked to demonstrate basic first aid & CPR and use them under different circumstances. 1.5 Assessor will ask the trainee to demonstrate Safety sign for Danger, Warning, caution and personal safety message accurately. 1.6 Assessor will assess the report/record submitted by trainee to supervisor/ Competent of authority in the event of accident or sickness of any staff, including accident details according to site accident/injury procedures. 1.7 Trainee will be asked to identify different fire extinguishers and to use the same as per requirement in

	a mock drill 1.8 Assessor can judge the trainee on his ability to take precautionary measures in case of leakage of refrigerant. 1.9 Assessor will ask the trainee to describe the safety precaution to be taken during the use of tools and equipment required for Air conditioner servicing such as safety during use of hammers, saw, screw drivers, wrenches, pliers, clamps, metal snips, files, flaring tool set, swaging tool, bending spring external type for copper tube, pipe cutter for copper tube, pinch of tool for copper tube, pipe cutter with built in reamer and space cutter for copper tube, pipe/tube bender lever type, puller 3 legged with flexible arm, torque wrench, multi meter, gas leak detector for halogen gas, electronic leak detector, Sling Psychrometer, Anemometer ,compressor tester for hermetic compressor, evacuating and charging station, two stage rotary vacuum pump etc. 1.10 Assessor will judge the trainee on his/her ablity to use PPE's during servicing of Refrigerator.
2. Able to explain different air conditioning system describing different parameters related to Air conditioning	2.1 Assessor will ask trainee to define- 2.2 Air conditioning 2.3 Psychometry 2.4 DBT,WBT,RH & Humidity Ratio 2.5 Assessor will ask trainee to classify air conditioning system. 2.6 Assessor will ask trainee to describe major application area of Air conditioning system 2.7 Assessor will ask the trainee to explain working principle of – 2.8 Window Air conditioner 2.9 Split Air conditioner 2.10 Assessor will ask the trainee to describe the purpose and use of- 2.11 Packaged Air conditioner. 2.12 Car Air conditioner. 2.13 Central Air conditioner. 2.14 Air Cooler
3. Demonstrate the use of different tools and equipment required for servicing of Air conditioner.	3.1 Trainee will be asked to identify different tools required for servicing Air conditioner such as hammers, saw, screw drivers, wrenches, pliers, clamps, metal snips, files, flaring tool set, swaging tool, bending spring external type for copper tube, pipe cutter for copper tube, pinch of tool for copper tube, pipe cutter with built in reamer and space cutter for copper tube, pipe/tube bender lever type, puller 3 legged with flexible arm, torque wrench, multi meter, gas leak detector for

	halogen gas, electronic leak detector, Sling Psychrometer, Anemometer ,compressor tester for hermetic compressor, evacuating and charging station, two stage rotary vacuum pump etc. 3.2 Assessor will ask trainee to demonstrate the use of different servicing above tools and equipment required for Air conditioner.
4. Perform servicing of an air conditioner and troubleshooting different Air conditioning problem.	4.1 Assessor will mention few Air conditioning problem and trainee will be asked to describe possible causes and remedy of the mentioned problems. 4.2 Assessor will ask trainee to identify different components of Window A.C. such as compressor, condenser, evaporator, starting capacitor, running capacitor, thermostat, selector switch from actual unit. 4.3 Assessor will ask trainee to identify different component of indoor unit such as evaporator, fan, swing motor, PCB and outdoor unit such as compressor, condenser, condenser fan motor, Running capacitor, capillary tube, suction pipe and discharge pipe of Split A.C. 4.4 Assessor will judge trainee on his/ her ability to diagnose common problems of Window Air conditioner and possible causes such as- ➢ No cooling due to compressor not started/unit running continuously. ➢ Poor Cooling due to improper setting of controls/ unit running continuously/ partially chocked filter drier. ➢ Unit running but noisy. Remedy of above problems 4.5 Assessor will judge trainee on ability to diagnose problems common problems of Indoor and outdoor unit of split A.C. and possible causes- ➢ No cooling due to tripping of compressor frequently ➢ Poor cooling due to frost on evaporator coil / partially chocked capillary/ gas shortage. ➢ Noisy indoor unit ➢ Water leakage in indoor unit. Remedy of the above problems

	4.6 Assessor will judge trainee on flaring ability to perform cutting, bending and joining of copper tube. 4.7 Assessor will judge trainee on ability to perform flaring, swaging and silver soldering of copper tube. 4.8 Assessor judge trainee on ability to perform test for leakage of refrigerant. 4.9 Assessor will judge trainee on ability to perform Vacuuming of the Air conditioner. 4.10 Assessor will judge trainee on ability to perform drying of the Air Conditioner 411 Assessor will judge trainee on ability to perform charging of refrigerant in the Air Conditioner. 4.12 Assessor will ask trainee to explain project work with project report.
5.Demonstrate the use of electrical measuring instrument	5.1 Assessor will ask trainee to demonstrate the use Multi meter to take reading of Voltage, Current and Resistance. 5.2 Assessor will ask trainee to measure power and electrical energy from Watt meter and Energy meter respectively. 5.3 Assessor will judge trainee on ability to read basic electrical circuit for Air conditioner.