

**GENERAL INFORMATION FOR REPAIR AND MAINTENANCE  
OF CENTRAL AIR CONDITIONING PLANT ( Direct & Chiller ).**

<b>Name of sector</b>	<b>Refrigeration &amp; Air Conditioning</b>
<b>Name of Module</b>	<b>REPAIR AND MAINTENANCE OF CENTRAL AIR CONDITIONING PLANT</b>
<b>MES Code</b>	<b>REF 701</b>
<b>Competency as per N C O Code</b>	
<b>Duration of Course</b>	<b>500 Hrs</b>
<b>Entry qualification of trainee</b>	<b>VIII Std</b>
<b>Unit size ( No of trainees)</b>	<b>20</b>
<b>Power norms</b>	<b>02KW</b>
<b>Space Norms ( Workshop and Class room )</b>	<b>60 sq.m ( Minimum size of one side to be 04 m)</b>
<b>Instructors Qualification</b>	Degree in Mechanical Engineering with one year Experience <b>OR</b> Diploma in Mechanical Engineering with two year Experience <b>OR</b> NTC/ NAC in RAC Trade with three years of Experience Craft Instructor Certificate (CIC)
<b>Desirable</b>	

**COURSE CONTENT FOR REPAIR AND MAINTENANCE OF CENTRAL AIR CONDITIONING  
PLANT  
(Direct & Chiller)**

<b>Under pinning Knowledge ( Theory)</b>	<b>Practical Competencies</b>
<ul style="list-style-type: none"> <li>Safety Precautions, study the function and working of Air Conditioning tools,</li> </ul>	<ul style="list-style-type: none"> <li>Familiarization of Air conditioning tools, Instruments &amp; Equipments.</li> </ul>

<p>Instruments &amp; Equipments.</p> <ul style="list-style-type: none"> <li>• Study the construction and working of V.C. Cycle of Central A.C.</li> <li>• Mechanical and electrical components used in central A.C and its description.</li> <li>• Ducts, filters, AHU and its details.</li> <li>• Study the current, voltage, resistance measuring.</li> <li>• Study the open circuit, short circuit and earth testing.</li> <li>• Study the different types of motors used in Central A.C.</li> <li>• Study the different types of starters, OLP, thermostat, fan, Capacitors, oscillating motors in Central A.C.</li> <li>• Study the trouble shooting in Central Air Conditioners.</li> <li>• Refrigerant, gas charging, evacuation and leak test.</li> <li>• Operation of Central Air Conditioning Plant.</li> </ul>	<ul style="list-style-type: none"> <li>• Tube cutting, bending, flaring, swaging, brazing, welding.</li> <li>• Measuring Current, voltage, resistance, temperature and pressure.</li> <li>• Check open circuit, short circuit and earth of three phase motors.</li> <li>• Identify three phase motors and open type compressors</li> <li>• Check relay, OLP, thermostat, motors, low pressure and high pressure cut out, Capacitors</li> <li>• Check the wiring circuit of Central Air Conditioner</li> <li>• Check the efficiency of Open type compressor.</li> <li>• Dismantle and Assemble Open type Compressor.</li> <li>• Identify the trouble and rectification</li> <li>• Decaling water Cooled condenser.</li> <li>• Flushing Condenser and Evaporator.</li> <li>• Leak Testing, Evacuation, Gas Charging In Central A.C</li> <li>• Servicing Central Air Conditioner</li> <li>• Check the performance of Air conditioner.</li> <li>• Operation of Central Air Conditioner</li> </ul>
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LIST OF TOOLS, INSTRUMENTS, EQUIPMENTS AND FURNITURE

1, File	5 no's
2, Hammer	5 no's
3, screw driver	5 no's
4, Combination pliers	5 no's
5, Line tester	5 no's
6, Soldering Iron	5 no's

7, Bench vice	2 no's
8, Hack saw	5 no's
9, Pipe wrench	5 no's
10, Snip	5 no's
12, Tube cutter	5 no's
13, Tube Bender	5 no's
14, Swaging tool	5 no's
15, Pinching tool	5 no's
16, Flaring tool	5 no's
17, Gauge manifold set	2 no's
18, Compound gauge	2 no's
19, Pressure Gauge	2 no's
20, Volt meter	5 no's
21, Ammeter	2 no's
22, Multi meter	2 no's
23, Tong tester	2nos
24, Halide torch	1 no's
25, Thermometer	2 no's
26, Double end spanner set	2 no's
27, Ring spanner set	2 no's
28, Box spanner set	1 no's
30, Adjustable spanner	5 no's
31, Nitrogen Cylinder	1 no's
32, Gas cylinder	2nos
33, Vacuum pump	1 no's
34, Gas welding machine	1 no's
35, Brazing Kit	2 no's
36, Grinding machine	1 no's
37, drilling machine	1nos
38, Sling psychrometer	1no
39, Work Bench	1no
40, Central Air Conditioning plant , 10 Ton Capacity.	1 Plant.

REDESIGNED MODULES FOR THE SECTOR  
OF  
REFRIGERATION/ AIR CONDITIONING /  
VENTILATION MECHANIC  
(ELECTRICAL CONTROLS)

UNDER  
MODULAR EMPLOYABLE SKILLS (MES)

Redesigned in – 2014

*By*  
Government of India  
CENTRAL STAFF TRAINING AND RESEARCH INSTITUTE  
Directorate General of Employment & Training  
Ministry of Labour & Employment (DGET)  
EN – 81, SECTOR – V, SALT LAKE CITY,  
Kolkata – 700 091.

**Preface**

The redesigned modules of Construction sector of one modules with following details :

Module No	Module Name	Competency as NCO CODE	Space Norms	Power Norms	Unit Size	Instructors Qualification
REF101	Refrigeration / Air Conditioning / Ventilation Mechanic (Electrical Control)		60 sq.m ( Minimum size of one side to be 04 m)	02 KW	20	As per general information of each module

**GENERAL INFORMATION FOR REFRIGERATION / AIRCONDITIONING / VENTILATION MECHANIC ( ELECTRICAL CONTROLS)**

Name of sector	Refrigeration & Air Conditioning
Name of Module	Refrigeration /Air conditioning /Ventilation Mechanic (electrical Control)

<b>MES Code</b>	<b>REF 702</b>
<b>Competency as per N C O Code</b>	
<b>Duration of Course</b>	<b>500 Hrs</b>
<b>Entry qualification of trainee</b>	<b>VIII Std pass +ELE 701</b>
<b>Unit size ( No of trainees)</b>	<b>20</b>
<b>Power norms</b>	<b>02KW</b>
<b>Space Norms ( Workshop and Class room )</b>	<b>60 sq.m ( Minimum size of one side to be 04 m)</b>
<b>Instructors Qualification</b>	<b>Degree in Mechanical Engineering with one year Experience OR Diploma in Mechanical Engineering with two year Experience OR NTC/ NAC in RAC Trade with three years of Experience</b>
<b>Desirable</b>	<b>CITC</b>

## **Course content for Module Refrigeration /Air conditioning /Ventilation Mechanic (electrical Control)**

<b>Under pinning Knowledge ( Theory)</b>	<b>Practical Competencies</b>
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<ul style="list-style-type: none"> <li>• Safety Precautions, study the function and working of refrigeration tools, Instruments &amp; Equipments.</li> <li>• Introduction to electric controls used in Refrigeration / Air Conditioning / Ventilation.</li> <li>• Study the electric circuit systems in Refrigerator.</li> <li>• Study the function, working, application of relays, OLP, thermostat, Door switch.</li>   <li>• Study the electrical controls used in refrigerator.</li>   <li>• No Frost Refrigerator Electrical control systems.</li>   <li>• Common faults and remedies occur in No Frost Refrigerator Electrical control systems.</li>   <li>• Testing procedure of relay, OLP, thermostat, Door switch, Defrost heater, timer, Bimetal thermo. <ul style="list-style-type: none"> <li>• Study the electric circuit systems of Bottle Cooler.</li> <li>• Study the function, working, application of relays, OLP, thermostat, capacitors used in Bottle Cooler..</li>   <li>• Study the electrical controls used in Bottle Cooler.</li>   <li>• Electrical control systems in Bottle Cooler.</li>   <li>• Common faults and remedies occur in Bottle Cooler Electrical control systems.</li>   <li>• Study the electric circuit systems of Deep Freezer.</li> <li>• Study the function, working, application of relays, OLP, thermostat, capacitors used in Bottle Cooler..</li>   <li>• Study the electrical controls used in Deep Freezer.</li>   <li>• Electrical control systems in Deep Freezer.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Familiarization of refrigeration tools, Instruments &amp; Equipments.</li>   <li>• Familiarize electrical controls used in refrigerator.</li> <li>• Identify electrical circuits used in refrigerator.</li> <li>• Trace the faults in refrigerator electrical controls.</li> <li>• Test and replace electrical controls such as relay, OLP, thermostat, Door switch.</li>   <li>• Familiarize electrical controls used in No Frost Double Door refrigerator.</li> <li>• Identify electrical circuits used in No Frost Double Door refrigerator.</li>   <li>• Trace the electrical controls faults in No Frost Double Door refrigerator.</li>   <li>• Test and replace electrical controls such as relay, OLP, thermostat, Door switch, Defrost heater, timer, Bimetal thermo.</li>   <li>• Familiarize electrical controls used in Bottle cooler.</li> <li>• Identify electrical circuits in Bottle cooler.</li> <li>• Trace the faults in Bottle cooler.</li> <li>• Test and replace electrical controls such as relay, OLP, thermostat in Bottle cooler.</li>   <li>• Familiarize electrical controls used in Deep Freezer..</li> <li>• Identify electrical circuits in Deep freezer.</li> <li>• Trace the electrical controls faults in Deep Freezer.</li> <li>• Test and replace electrical controls used in Deep Freezer.</li>   <li>• Familiarize electrical controls used in Window Air Conditioner.</li> <li>• Identify electrical circuits in Window Air Conditioner.</li> <li>• Trace the electrical controls faults in Window Air Conditioner.</li> <li>• Test and replace electrical controls used in Window Air Conditioner.</li> <li>• Familiarize electrical controls used in Split Air Conditioner.</li> <li>• Identify electrical circuits in Split Air</li> </ul>
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<ul style="list-style-type: none"> <li>• Common faults and remedies occur in Deep Freezer.</li> <li>• Electrical Controls used in Window A.C</li> <li>• Function, Construction, working of Selector switch, capacitors, OLP, Heaters, Oscillating motors, Thermostat , Relays used in Window A.C</li> <li>• Study the electrical controls used in Split Air Conditioner.</li> <li>• Faults and Remedies in Split A.C Electrical Controls.</li> <li>• Study the construction and working of electrical controls used in Split Air conditioner.</li> <li>• Package Air Conditioner Electrical Controls.</li> <li>• Central Air Conditioning Plant electrical controls such as Low pressure Cut Out, H P Cut Outs, Oil pressure cut outs, Solenoid Valve, Starters, Electronic control expansion valves, its working &amp; function.</li> </ul>	<ul style="list-style-type: none"> <li>Conditioner.</li> <li>• Trace the electrical controls faults in Split Air Conditioner.</li> <li>• Test and replace electrical controls used in Split Air Conditioner.</li> <li>• Familiarize electrical controls used in Package Air Conditioner.</li> <li>• Identify electrical circuits in Package Air Conditioner.</li> <li>• Trace the electrical controls faults in Package Air Conditioner.</li> <li>• Test and replace electrical controls used in Package Air Conditioner.</li> <li>• Familiarize electrical controls used in Central Air Conditioning Plant.</li> <li>• Identify electrical circuits in Central Air Conditioning Plant.</li> <li>• Trace the electrical controls faults in Central Air Conditioning Plant.</li> <li>• Test and replace electrical controls used in Central Air Conditioning Plant.</li> </ul>
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## LIST OF TOOLS, INSTRUMENTS, EQUIPMENTS AND FURNITURE

Sl.No	Name of Tools / Instruments / Equipment	Quantity
1,	File 200 mm	5 NOs
2,	Hammer 200 gm	5 NOs
3,	screw driver 200 mm	5 NOs
4,	Combination pliers 200 mm	5 NOs
5,	Line tester 240 v	5 NOs
6,	Soldering Iron 100 w	5 NOs
7,	Bench vice 150 mm	5 NOs



8,	Hack saw 300 mm	5 NOs
9,	Pipe wrench 250 mm	5 NOs
10	Snip 200 mm	5 NOs
12,	Tube cutter 4 -12 m m	5 NOs
13,	Tube Bender	1 set
14,	Swaging tool	2 set
15,	Pinching tool	5 NOs
16,	Flaring tool	5 NOs
17,	Gauge manifold set	2 NOs
18,	Compound gauge	2 NOs
19,	Pressure Gauge	2 NOs
20,	Volt meter	5 NOs
21,	Ammeter	2 NOs
22,	Multi meter	2 NOs
23,	Tong tester	2 NOs
24,	Halide torch	1 NOs
25,	Thermometer	2 NOs
26,	Double end spanner set	2 NOs
27,	Ring spanner set	2 NOs
28,	Box spanner set	1 NOs
30,	Adjustable spanner	5 NOs
31,	Crimping Tool	2 NOs
32,	Megger	1 NOs
33,	Long Nose Plier	5 NOs
34,	Line Tester	5 NOs
35,	Brazing Kit	2 NOs
36,	Grinding machine	1 NOs
37,	drilling machine	1 NOs
38,	Refrigerator Single Door 165 L	1 NOs
39,	Refrigerator Double Door ( frost Free) 185 L	1 NOs
40,	Bottle Cooler 200 L	1 NOs
41	Deep Freezer 200 L	1 NOs
42	Window AC 1 Ton	1 NOs
43	Split AC 1.5 Ton	1 NOs
44	Electrical Controls of Package AC	1 Set
45	Electrical Controls Systems of Central AC	1 Set
46,	Steel Locker	2 NOs
47,	Work Table	2 NOs

## GENERAL INFORMATION FOR REPAIR AND MAINTENANCE OF REFRIGERATOR

<b>Name of sector</b>	<b>Refrigeration &amp; Air Conditioning</b>
<b>Name of Module</b>	<b>REPAIR AND MAINTENANCE OF REFRIGERATOR</b>
<b>MES Code</b>	<b>REF703</b>
<b>Competency as per N C O Code</b>	
<b>Duration of Course</b>	<b>500 Hrs</b>
<b>Entry qualification of trainee</b>	<b>VIII Std</b>
<b>Unit size ( No of trainees)</b>	<b>20</b>
<b>Power norms</b>	<b>02KW</b>
<b>Space Norms ( Workshop and Class room )</b>	<b>60 sq.m ( Minimum size of one side to be 04 m)</b>
<b>Instructors Qualification</b>	<p style="text-align: center;">Degree in Mechanical Engineering with one year Experience <b>OR</b> Diploma in Mechanical Engineering with two year Experience <b>OR</b> NTC/ NAC in RAC Trade with three years of Experience</p>
<b>Desirable</b>	<b>CITC</b>

## **COURSE CONTENT FOR REPAIR AND MAINTENANCE OF REFRIGERATOR**

<b>Under pinning Knowledge ( Theory)</b>	<b>Practical Competencies</b>
<ul style="list-style-type: none"> <li>• Safety Precautions, study the function and working of refrigeration tools, Instruments &amp; Equipments.</li> </ul>	<ul style="list-style-type: none"> <li>• Familiarization of refrigeration tools, Instruments &amp; Equipments.</li> </ul>

<ul style="list-style-type: none"> <li>• Study the construction and working of V.C. Cycle of refrigerator.</li> <li>• Study the current, voltage, resistance measuring.</li> <li>• Study the open circuit, short circuit and earth testing.</li> <li>• Study the different types of motors used in refrigerator.</li> <li>• Study the different types of relays, OLP, thermostat, heaters, fan, timer used in refrigerator.</li> <li>• Study compressor, condenser, capillary tube, drier, and evaporator.</li> <li>• Refrigerant used in refrigerator</li> <li>• Study the trouble shooting in refrigerator.</li> <li>• Study the types of refrigerator.</li> <li>• Study the specification of refrigerator</li> <li>• Faults and remedies of refrigerator.</li> <li>• Care and maintenance of refrigerator.</li> </ul>	<ul style="list-style-type: none"> <li>• Tube cutting, bending, flaring, swaging, brazing, welding.</li> <li>• Measuring Current, voltage and resistance.</li> <li>• Check open circuit, short circuit and earth of hermetic compressor.</li> <li>• Identify starting , running, common terminal</li> <li>• Check relay, OLP, thermostat, door switch, refrigerator Bulb.</li> <li>• Check the wiring circuit of refrigerator.</li> <li>• Check the efficiency of hermetic compressor.</li> <li>• Dismantle and Assemble hermetic Compressor.</li> <li>• Identify the trouble and rectification</li> <li>• De scaling refrigerator condenser.</li> <li>• Flushing Condenser and Evaporator.</li> <li>• Leak Testing, Evacuation, Gas Charging In Refrigerator.</li> <li>• Servicing the refrigerator.</li> <li>• Check the performance of refrigerator.</li> <li>• Installation of Refrigerator.</li> </ul>
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### LIST OF TOOLS , INSTRUMENTS , EQUIPMENTS AND FURNITURE

1,	File	5 no's
2,	Hammer	5 no's
3,	screw driver	5 no's
4,	Combination pliers	5 no's
5,	Line tester	5 no's
6,	Soldering Iron	5 no's
7,	Bench vice	2 no's
8,	Hack saw	5 no's
9,	Pipe wrench	5 no's
10	Snip	5 no's
12,	Tube cutter	5 no's

13,	Tube Bender	5 no's
14,	Swaging tool	5 no's
15,	Pinching tool	5 no's
16,	Flaring tool	5 no's
17,	Gauge manifold set	2 no's
18,	Compound gauge	2 no's
19,	Pressure Gauge	2 no's
20,	Volt meter	5 no's
21,	Ammeter	2 no's
22,	Multi meter	2 no's
23,	Tong tester	2nos
24,	Halide torch	1 no's
25,	Thermometer	2 no's
26,	Double end spanner set	2 no's
27,	Ring spanner set	2 no's
28,	Box spanner set	1 no's
30,	Adjustable spanner	5 no's
31,	Nitrogen Cylinder	1 no's
32,	Gas cylinder	2nos
33,	Vacuum pump	1 no's
34,	Gas welding machine	1 no's
35,	Brazing Kit	2 no's
36,	Grinding machine	1 no's
37,	drilling machine	1nos
38,	Refrigerator Single Door	1 no's
39,	Refrigerator Double Door ( frost Free)	1 no's
40,	Steel Locker	2 no's
41,	Work Table	2 no's

## GENERAL INFORMATION FOR REPAIR AND MAINTENANCE OF AUTOMOBILE AIR CONDITIONING

<b>Name of sector</b>	<b>Refrigeration &amp; Air Conditioning</b>
<b>Name of Module</b>	<b>REPAIR AND MAINTENANCE OF AUTOMOBILE AIR CONDITIONING</b>
<b>MES Code</b>	<b>REF 704</b>
<b>Competency as per N C O Code</b>	
<b>Duration of Course</b>	<b>500 Hrs</b>
<b>Entry qualification of trainee</b>	<b>VIII Std</b>
<b>Unit size ( No of trainees)</b>	<b>20</b>
<b>Power norms</b>	<b>02 KW</b>
<b>Space Norms ( Workshop and Class room )</b>	<b>60 sq.m ( Minimum size of one side to be 04 m)</b>
<b>Instructors Qualification</b>	Degree in Mechanical Engineering with one year Experience <b>OR</b> Diploma in Mechanical Engineering with two year Experience <b>OR</b> NTC/ NAC in RAC Trade with three years of Experience Craft Instructor Certificate (CIC)
<b>Desirable</b>	

### COURSE CONTENT FOR REPAIR AND MAINTENANCE OF AUTOMOBILE AIR CONDITIONING

Under pinning Knowledge ( Theory)	Practical Competencies
<ul style="list-style-type: none"> <li>• Safety Precautions, study the function and working of Air Conditioning tools, Instruments &amp; Equipments.</li> <li>• Study the construction and working of Car A.C Cycle.</li> <li>• Study the different types of compressors</li> </ul>	<ul style="list-style-type: none"> <li>• Familiarization of Air conditioning tools, Instruments &amp; Equipments.</li> <li>• Tube cutting, bending, flaring, swaging, brazing, welding.</li> <li>• Measuring temperature and pressure in Car AC.</li> </ul>

<p>used in Car A.C.</p> <ul style="list-style-type: none"> <li>• Study the Magnetic clutch working,</li> <li>• Freewheeling, thermostat, fan, heater of Car A.C.</li> <li>• Condenser, Drier, Liquid Receiver, expansion valve, evaporator, solenoid valve used in car AC</li> <li>• Electrical components and its description.</li> <li>• Study the trouble shooting in Car Air Conditioners.</li> <li>• Refrigerant used in Car A.C</li> <li>• Care and maintenance of Car AC</li> </ul>	<ul style="list-style-type: none"> <li>• Check circuit and rectify the defects.</li> <li>• Check the working of compressor</li> <li>• Check thermostat, fan, switch, heater, magnetic clutch</li> <li>• Check the wiring circuit of Car Air Conditioner</li> <li>• Check the efficiency of compressor.</li> <li>• Dismantle and Assemble Compressor.</li> <li>• Servicing air filter, condenser.</li> <li>• Flushing Condenser and Evaporator.</li> <li>• Leak Testing, Evacuation, Gas Charging in Car A.C</li> <li>• Servicing Car Air Conditioner</li> <li>• Check the performance of Air conditioner.</li> <li>• Installation of Car Air Conditioner</li> </ul>
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#### LIST OF TOOLS, INSTRUMENTS, EQUIPMENTS AND FURNITURE

1, File	5 no's
2, Hammer	5 no's
3, screw driver	5 no's
4, Combination plier	5 no's
5, Line tester	5 no's
6, Soldering Iron	5 no's
7, Bench vice	2 no's
8, Hack saw	5 no's
9, Pipe wrench	5 no's
10, Snip	5 no's
12, Tube cutter	5 no's
13, Tube Bender	5 no's
14, Swaging tool	5 no's
15, Pinching tool	5 no's
16, Flaring tool	5 no's
17, Gauge manifold set	2 no's
18, Compound gauge	2 no's
19, Pressure Gauge	2 no's
20, Volt meter	5 no's
21, Ammeter	2 no's

22, Multi meter	2 no's
23, Tong tester	2nos
24, Halide torch	1 no's
25, Thermometer	2 no's
26,Double end spanner set	2 no's
27, Ring spanner set	2 no's
28, Box spanner set	1 no's
30, Adjustable spanner	5 no's
31, Nitrogen Cylinder	1 no's
32, Gas cylinder	2nos
33,Vacuum pump	1 no's
34, Gas welding machine	1 no's
35, Brazing Kit	2 no's
36,Grinding machine	1 no's
37, drilling machine	1nos
38, Sling psychrometer	1no
39, Work Bench	1no
40,Vehicle with A.C	1 no.

## **GENERAL INFORMATION FOR REPAIR AND MAINTENANCE OF COOLERS**

<b>Name of sector</b>	<b>Refrigeration &amp; Air Conditioning</b>
<b>Name of Module</b>	<b>REPAIR AND MAINTENANCE OF COOLERS</b>
<b>MES Code</b>	REF705
<b>Competency as per N C O Code</b>	
<b>Duration of Course</b>	<b>500 Hrs</b>
<b>Entry qualification of trainee</b>	<b>VIII Std</b>
<b>Unit size ( No of trainees)</b>	<b>20</b>
<b>Power norms</b>	<b>02KW</b>
<b>Space Norms ( Workshop and Class room )</b>	60 sq.m ( Minimum size of one side to be 04 m)
<b>Instructors Qualification</b>	Degree in Mechanical Engineering with one year Experience <b>OR</b> Diploma in Mechanical Engineering with two year Experience <b>OR</b> NTC/ NAC in RAC Trade with three years of Experience
<b>Desirable</b>	CITC

### **COURSE CONTENT FOR REPAIR AND MAINTENANCE OF COOLER**

<b>Under pinning Knowledge ( Theory)</b>	<b>Practical Competencies</b>
<ul style="list-style-type: none"> <li>• Safety Precautions, study the function and working of refrigeration tools, Instruments &amp; Equipments.</li> <li>• Study the construction and working of V.C. Cycle of coolers.</li> <li>• Study the current, voltage, resistance measuring.</li> <li>• Study the open circuit, short circuit and earth testing.</li> </ul>	<ul style="list-style-type: none"> <li>• Familiarization of refrigeration tools, Instruments &amp; Equipments.</li> <li>• Tube cutting, bending, flaring, swaging, brazing, welding.</li> <li>• Measuring Current, voltage, resistance, temperature and pressure.</li> <li>• Check open circuit, short circuit and earth of hermetic compressor.</li> <li>• Identify starting , running, common terminal</li> </ul>



<ul style="list-style-type: none"> <li>• Study the different types of motors used in Coolers.</li> <li>• Study the compressor, condenser, capillary tube, drier, and evaporator used in coolers.</li> <li>• Study the different types of relays, OLP, thermostat, heaters, fan, timer used in Coolers.</li> <li>• Study the trouble shooting in Coolers.</li> <li>• Refrigerant used in coolers.</li> <li>• Study the trouble shooting in coolers.</li> <li>• Study the types of coolers.</li> <li>• Study the specification of coolers</li> <li>• Faults and remedies of coolers.</li> <li>• Care and maintenance of coolers</li> </ul>	<ul style="list-style-type: none"> <li>• Check relay, OLP, thermostat, door switch, refrigerator Bulb.</li> <li>• Check the wiring circuit of water, Bottle, Visi cooler and deep Freezer.</li> <li>• Check the efficiency of hermetic compressor.</li> <li>• Dismantle and Assemble hermetic Compressor.</li> <li>• Identify the trouble and rectification</li> <li>• Decaling condenser.</li> <li>• Flushing Condenser and Evaporator.</li> <li>• Leak Testing, Evacuation, Gas Charging In Coolers.</li> <li>• Servicing the water, Bottle&amp; Deep Freezer.</li> <li>• Check the performance of Coolers .</li> <li>• Installation of Coolers.</li> </ul>
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LIST OF TOOLS, INSTRUMENTS, EQUIPMENTS AND FURNITURE

1, File	5 no's
2, Hammer	5 no's
3, screw driver	5 no's
4, Combination plier	5 no's
5, Line tester	5 no's
6, Soldering Iron	5 no's
7, Bench vice	2 no's
8, Hack saw	5 no's
9, Pipe wrench	5 no's
10, Snip	5 no's
12, Tube cutter	5 no's
13, Tube Bender	5 no's
14, Swaging tool	5 no's
15, Pinching tool	5 no's
16, Flaring tool	5 no's
17, Gauge manifold set	2 no's
18, Compound gauge	2 no's
19, Pressure Gauge	2 no's
20, Volt meter	5 no's
21, Ammeter	2 no's

22, Multi meter	2 no's
23, Tong tester	2nos
24, Halide torch	1 no's
25, Thermometer	2 no's
26, Double end spanner set	2 no's
27, Ring spanner set	2 no's
28, Box spanner set	1 no's
30, Adjustable spanner	5 no's
31, Nitrogen Cylinder	1 no's
32, Gas cylinder	2nos
33, Vacuum pump	1 no's
34, Gas welding machine	1 no's
35, Brazing Kit	2 no's
36, Grinding machine	1 no's
37, drilling machine	1nos
38, Water cooler	1no
39, Bottle Cooler	1no
40, Vici Cooler	1no
41, Deep Freezer	1no

## GENERAL INFORMATION FOR REPAIR AND MAINTENANCE OF WINDOW AND SPLIT A.C

<b>Name of sector</b>	<b>Refrigeration &amp; Air Conditioning</b>
<b>Name of Module</b>	<b>REPAIR AND MAINTENANCE OF WINDOW &amp; SPLIT A.C</b>
<b>MES Code</b>	REF706
<b>Competency as per N C O Code</b>	
<b>Duration of Course</b>	<b>500 Hrs</b>
<b>Entry qualification of trainee</b>	<b>VIII Std</b>
<b>Unit size ( No of trainees)</b>	<b>20</b>
<b>Power norms</b>	<b>02 KW</b>
<b>Space Norms ( Workshop and Class room )</b>	60 sq.m ( Minimum size of one side to be 04 m)
<b>Instructors Qualification</b>	Degree in Mechanical Engineering with one year Experience <b>OR</b> Diploma in Mechanical Engineering with two year Experience <b>OR</b> NTC/ NAC in RAC Trade with three years of Experience Craft Instructor Certificate (CIC)
<b>Desirable</b>	

### **COURSE CONTENTS FOR REPAIR AND MAINTENANCE OF WINDOW AND SPLIT A.C**

Under pinning Knowledge ( Theory)	Practical Competencies
<ul style="list-style-type: none"> <li>• Safety Precautions, study the function and working of Air conditioning tools, Instruments &amp; Equipments.</li> </ul>	<ul style="list-style-type: none"> <li>• Familiarization of air conditioning tools, Instruments &amp; Equipments.</li> </ul>

<ul style="list-style-type: none"> <li>• Study the construction and working of V.C. Cycle of Window and Split A.C.</li> <li>• Study the current, voltage, resistance measuring.</li> <li>• Study the open circuit, short circuit and earth testing.</li> <li>• Study the compressor, condenser, capillary tube, drier, and evaporator used in window and split A.C.</li> <li>• Study the different types of motors used in Air Conditioners.</li> <li>• Study the different types of relays, OLP, thermostat, fan, Capacitors, oscillating motors in window and split A.C.</li> <li>• Study the trouble shooting in Air Conditioners.</li> <li>• Care and maintenance of air conditioner.</li> <li>• Wiring Circuit of Air conditioner.</li> <li>• Installation method of Air conditioner.</li> </ul>	<ul style="list-style-type: none"> <li>• Tube cutting, bending, flaring, swaging, brazing, welding.</li> <li>• Measuring Current, voltage, resistance, temperature and pressure.</li> <li>• Check open circuit, short circuit and earth of hermetic compressor.</li> <li>• Identify starting , running, common terminal</li> <li>• Check relay, OLP, thermostat, Capacitors Fan motors, and Oscillating motors.</li> <li>• Check the wiring circuit of window AC and Split A.C.</li> <li>• Check the efficiency of hermetic compressor.</li> <li>• Dismantle and Assemble hermetic Compressor.</li> <li>• Identify the trouble and rectification</li> <li>• Decaling condenser coil, evaporator and filter.</li> <li>• Flushing Condenser and Evaporator.</li> <li>• Leak Testing, Evacuation, Gas Charging In Window and Split A.C.</li> <li>• Servicing the window and Split A.C.</li> <li>• Check the performance of Air conditioner.</li> <li>• Installation of Window and Split A.C.</li> </ul>
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LIST OF TOOLS , INSTRUMENTS , EQUIPMENTS AND FURNITURE

1, File	5 no's
2, Hammer	5 no's
3, screw driver	5 no's
4, Combination plier	5 no's
5, Line tester	5 no's

6,Soldering Iron	5 no's
7, Bench vice	2 no's
8,Hack saw	5 no's
9, Pipe wrench	5 no's
10,Snip	5 no's
12, Tube cutter	5 no's
13, Tube Bender	5 no's
14, Swaging tool	5 no's
15, Pinching tool	5 no's
16,Flaring tool	5 no's
17,Gauge manifold set	2 no's
18, Compound gauge	2 no's
19, Pressure Gauge	2 no's
20, Volt meter	5 no's
21, Ammeter	2 no's
22, Multi meter	2 no's
23, Tong tester	2nos
24, Halide torch	1 no's
25, Thermometer	2 no's
26,Double end spanner set	2 no's
27, Ring spanner set	2 no's
28, Box spanner set	1 no's
30, Adjustable spanner	5 no's
31, Nitrogen Cylinder	1 no's
32, Gas cylinder	2nos
33,Vacuum pump	1 no's
34, Gas welding machine	1 no's
35, Brazing Kit	2 no's
36,Grinding machine	1 no's
37, drilling machine	1nos
38, Sling psychrometer	1no
39, Work Bench	1no
40,Window A.C	1no
41,Split A.C	1no

