**CERTIFICATE COURSE IN ROOM AC & HOME APPLAINCES**

* Course ID **: MSME/RACHA/001**
* Candidate Eligibility **: Pass Class 10th**
* No. of NOS (if QP) : UNDER PROCESS
* NSQF Level : **3**
* Cost Category : **1**
* Course Duration **:**
* Theory duration **: 150 Hrs.**
* Practical + OJT **: 438 Hrs.**
* **TOTAL : 588 Hrs.**

**Trainer Qualification and Work Experience:**

**Trainer Qualification: Degree in Mechanical Engineering.**

**CONTACT DETAILS OF THE BODY SUBMITTING THE QUALIFICATION FILE**

**Name and address of submitting body:**

**MSME TOOL ROOM – KOLKATA**

**(Central Tool Room & Training Centre)**

**Ministry of MSME , Govt. of India**

**Bonhooghly Industrial Area**

**Kolkata – 700108 , West Bengal**

**Ph: (033)25788769,25771068**

**Name and contact details of individual dealing with the submission**

**Name: Shri Kanakendu Das**

**Position in the organisation: Senior Manager-Trg**.

**Tel number(s): 9231897100**

**E-mail address:** **cttc@cal.vsnl.net.in** **/ cttc-msme@gov.in**

|  |  |
| --- | --- |
| **Qualification Title :** | **CERTIFICATE COURSE IN ROOM AC & HOME APPLAINCES** |
| **Qualification Code** | **MSME/RACHA/001** |
| **Nature and purpose of the :****Qualification**  | Nature of the course is trade **Certificate Course.**The purpose of the qualification are * Learners who attend this qualification are competent to work on Different Types of Room Air-conditioners, Refrigerators, Washing Machines & Microwave Ovens
* Qualified learners get employed into work.
* People upgrade their skills and knowledge already in work.
* People with vocational – professional skill access to the

higher education courses. * Qualifying learners of this qualification would be able to get opportunity in particular sector to learn new skills to deal with technological change.
 |
| **Body/bodies which will** **award the qualification**  | MSME TOOL ROOM – KOLKATA (Central Tool Room & Training Centre - Kolkata) |
| **Body which will accredit providers to offer courses** **leading to the qualification**  | MSME TOOL ROOM – KOLKATA (Central Tool Room & Training Centre – Kolkata) |
| **Body/bodies which will****carry out assessment of****learners**  | Examination Cell of MSME TOOL ROOM - KOLKATA |
| **Occupation(s) to which the qualification gives access** | Asst. Service Engineer / Service Engineer / Skilled worker in Room AC & Home Appliances sectors. |
| **Licensing requirements** | NA |
| **Level of the qualification in****the NSQF**  |  **??** |
| **Anticipated volume of** **training/learning required to complete the qualification** | **4 Months / 588 Hrs.**

|  |  |  |
| --- | --- | --- |
| Sr. No | Course Elements (Subject) | Daily Distribution |
| Basics | - Basic Mechanical, Electrical & Electronics Class | 150 Hrs. |
| Module-1Module-2Module-3Module-4Module-5Module-6 | - Air-Conditioner Technical Class- Refrigerator Technical Class- Washing Machine Technical Class- Microwave Oven Technical Class-- Soft skills development & Empathy ClassesOn Job Training in Service Centre | 96 Hrs.90 Hrs.60 Hrs.36 Hrs..12 Hrs.144 Hrs. |
|  | Total | 588 Hrs. |

 |
| **Entry requirements and/or****recommendations** | **Passed 12thclass / ITI / Diploma in any trade.****Minimum Age: No age limit** |
| **Progression from the** **qualification**  | Qualifying trainee should obtain a MSME Approved certificate in RACHA trade issued by MSME Tool Room Kolkata. This qualification shall enable the trainee to find employment on a skilled work in the fields of repairing & servicing of Air-conditioners & Other Home Appliances Industries.Having Scope to access to other qualification at the same level and at the next higher level.After completion of course the trainee can work as a Junior Engineer / Engineer / Senior Engineer /After 2 to 3 years of experience in service centres, the person can develop his own service centre as an entrepreneur. |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Chapter**  | **Module** | **Topic** | **Description** | **Page No.**  | **Training Type** | **Days** |
| 1 | Introduction |  About  Samsung  |  Company overview, Philosophy & Product portfolio. Reporting Structure & Individual’s role  | 7 - 17  | T / AV  | Day 1  |
| 2  | Basic Terminology  | Basics of Electricals and Electronics  |  **Electrical and Electronics** :Introduction to electricity,  Electric current, emf, resistance; Power; Ohms law.  Types of circuits- series, parallel, open & closed.  Basic Components. | 18 - 24  | T  |
|  | Basics of Heat |  **Heat** : What is heat; Heat transfer-conduction, convection,  radiation; Forms of heat; Heat load. | 25 - 28  | T  |  |
| 3.1  | AC - Basics  |  |  **Psychometrics**: What is psychometric; Dry bulb, Wet bulb,  Relative humidity.  | 29 – 30  | T  | Day 2 Day 3  |
|  |  Technology  overview  |  Refrigeration & air-conditioning, Vapour compression cycle. About refrigerants, Types of refrigerant, Refrigerant regulation, R410a overview  | 31 - 38  | T / A  |  |
|  Product  overview  |  Types of air-conditioners - WAC, SAC, Ducted, Package, Chiller, DVM functioning.  | 39 - 42  | T  |
| **Test – 1 (Module 1 ~ 3.1)**  | **Day 3**  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 3.2  | AC - Basics  |  Parts  overview  |  Types of compressor and their operating principles –  Reciprocating, Rotary, Scroll, Screw.  | 43 - 47  | T / A  | Day 4  |
|  Types of heat exchangers and their functioning, Fin and tube, PFC, shell and tube, plate type; Problems in heat exchanger.  | 48 - 49  | T  |  |
|  Types of fan and blowers - propeller, centrifugal, cross flow.  | 50  | T  | Day 5  |
|  Expansion Devices - Capillary, TEV, EEV  | 51  | T  |
|  Accessories- Accumulator, Oil separator, Receiver, Mufflers, Thermostat, 4-Way reversing valve, Heat Pump Cycle  | 52 - 54  | T / A  | Day 6  |
|  Types and functioning of motors - AC / DC motors  | 55  | T  |
|  Advanced  technology  |  Overview of inverter Air-conditioner, Inverter technology and functioning.  | 56 - 57  | T  | Day 7  |
| **Test – 2 (Module 3.2)**  | **Day 7**  |
| 4  | AC – Tools & Safety  |  Tools  |  Basic tools identification - Tube cutter, Drilling machine, Flaring tool, Tube benders etc.  | 58 - 60  | T / AV / P  | Day 8 |
|  Safety & PL  |  General safety guidelines, Product Prevention - Introduction, PL case by wrong installation  | 61 - 75  | T  |  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Chapter**  | **Module** | **Topic** | **Description** | **Page No.** | **Training Type** | **Days** |
| 5  | AC – Installation  |  Installation  Process  |  Installation instruction, Correct Installation method, Place  Selection (Indoor & Outdoor) Pre Installation Requisites & Post Installation checkpoints  | 76 - 102  | T / AV  | Day 9  |
|  Pipe Preparedness  |  Pipe cutting, Flaring, Bending, Swaging, Tube brazing practice  | 103 - 104  | AV / P  | Day 10  |
|  Installation  Practice  |  Core Drilling exercise, Tube insulation, wiring and piping  layout, Vacuuming, Gas Charging Method,  Complete Installation  |
| Day 11 Day 12  |
|  Demo &  Installation  |  Remote control features and demo with Role Play  Cassette Unit Installation, Installation – Do’s & Don’ts  | 105 - 126  | T / P  | Day 13  |
| **Test – 3 (Module 4 ~ 5)**  | **Day 13**  |
| 6  | AC - Trouble Shooting |  Technical  repair  |  Compressor trouble shooting, Symptoms of failure, How to check failed Compressor, Steps to replace compressor  | 127 - 130  | T / P  | Day 14 |
|  Electrical trouble shooting, How to diagnose electrical parts failure, Checking of PCB.  | 131 - 138  | T / P  | Day 15 |
|  Symptom based troubleshooting : No Cooling Repair, No Power Repair, Noise Repair, Water leakage Repair  Disassembly & Assembly – Indoor & Outdoor Unit  | 139 - 146  | T / P  | Day 16Day 17  |
|  Star rating &  preventive  maintenance  |  Overview of Star labeling (BEE) & E-Waste Concept  | 147 - 149  | T  |
|  Safety Precautions, Preventive Maintenance & Cleaning of AC, Important Tips, Checkpoints, Optional Skills  | 150 - 165  | T  |
| **Test – 4 (Module 6)**  | **Day 17**  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Chapter**  | **Module** | **Topic** | **Description** | **Page No**  | **Training Type** | **Days** |
| 7  | Refrigerator Basics  | HA Range and Tools | Home Appliances Product Range, Repair and Installation Tools Kit & Safety Precautions  | 166 - 175  | T / P  | Day 18  |
| Technology Overview  | What is Refrigerator ? Advantages of Refrigerator; Types of Refrigerators, Difference between Direct Cool & Frost Free Refrigerator, What is Refrigeration? Steps of Refrigeration Cycle, Sealed System parts working process, What is refrigerant & types of refrigerants.  | 176 – 182  | T |  |
| Operating Instructions | Key Features, Correct Installation Place, Installation Process, How to use?, No Defect Found Solutions, Do's and Don'ts / Safety Precautions , Check Points  | 183- 212  | T / AV / P  | Day 19  |
| **Test – 5 (Module 7)**  | **Day 19**  |
| 8  | Direct Cool Refrigerator | Technical Education and Troubleshoot |  Parts Working and Checking process Parts Assembly & Disassembly Process  Wiring Diagram, Technical Fault | 213 – 225  | T / P  | Day 20Day 21 |
| 9  | Mechanical Frost Free Refrigerator | Technical Education andTroubleshoot  |  Parts Working and Checking process Parts Assembly & Disassembly Process  Wiring Diagram, Technical Fault | 226 – 235  | T / P  | Day 22 |
| 10  | Semi Electronics Frost Free Refrigerator | Technical Education andTroubleshoot  |  Parts Working and Checking process Parts Assembly & Disassembly Process  Wiring Diagram, Technical Fault | 236 - 240  | T / P  | Day 23Day 24 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 11  | Electronics Frost Free Refrigerator | Technical Education andTroubleshoot  |  Parts Working and Checking process Parts Assembly & Disassembly Process  Wiring Diagram, Technical Fault | 241 – 246 | T / P  | Day 25Day 26 |
| **Test – 6 (Module 8 ~ 11)**  | **Day 26**  |
| 12  | Inverter Refrigerator | Technical Education and Troubleshoot |  Demerits of Conventional Compressor Merits of Inverter Compressor Parts Working and Checking process Parts Assembly & Disassembly Process  Wiring Diagram, Technical Fault, Check Points  | 247 – 268  | T / P  | Day 27Day 28Day 29 |
| 13  | Refrigerator Sealed System  | Sealed System Repair  |  Mandatory Parts & Equipments, Symptoms, Refrigerant Discharge Process, Compressor disassembling, Nitrogen Flushing , Parts Assembling, Leakage Testing, Vacuuming, R600a Safe Gas Charging Process, Final Inspection | 269 - 276  | T / AV / P  | Day 30Day 31 |
| **Test – 7 (Module 12 ~ 13)**  | **Day 31**  |
| 14  | Washing Machine Basics  | Technology Overview  |  What is Washing Machine & its advantages.  Types of Washing machine, Difference between Semi  Automatic & Fully Automatic Washing Machine,  Washing Principle | 277- 280  | T | Day 32Day 33 |
| Operating Instructions |  Key Features, Correct Installation Place, Installation Process, How to use, No Defect Found Solutions, Do's and Don'ts / Safety Precautions , Check points  | 281 - 311  | T / AV / P  |  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Chapter**  | **Module** | **Topic** | **Description** | **Page No.**  | **Training Type** | **Days** |
| 15  | Semi Automatic Washing Machine | Technical Education and Troubleshoot |  Parts Working and Checking process Parts Assembly & Disassembly Process  Wiring Diagram, Technical Fault | 312 – 321  | T / P  | Day 34Day 35Day 36 |
| 16  | Fully Automatic Washing Machine | Technical Education and Troubleshoot |  Parts Working and Checking process Parts Assembly & Disassembly Process  Wiring Diagram, Technical Fault, Check Points  | 322 - 348  | T / P  | Day 37Day 38Day 39 |
| **Test – 8 (Module 14 ~ 16)**  | **Day 39**  |
| 17  | Microwave Oven Basics | Technology Overview  |  What is Microwave Oven, Advantages, Types of Microwave Oven, Difference between Solo, Grill and Convection Oven Working Principle | 349- 351  | T  | Day 40 |
| Operating Instructions |  Key Features, Correct Installation Place, Installation  Precautions, How to use, No Defect Found Solutions , Do's and Don'ts / Safety Precautions  | 352- 358 | T / AV / P | Day 41 |
| 18  | Convection Microwave Oven | Technical Education Troubleshoot |  Parts Working and Checking process Assembly & Disassembly, Wiring Diagram, Technical Fault | 359 – 372  | T / P  | Day 42Day 43 |
| 19  | Skills  | Optional Skills  | Skills required for Installation and Repair Engineer,How to operate Computers and software. Checkpoints – Engage with customer, Interact with colleagues, To be learn during OJT  | 373 - 382  | T  |  Day 44Day 45  |
| **Test – 9 (Module 17 ~ 19)**  | **Day 45**  |
| **FINAL THEORY TEST (2 Hr)**  | **Day 46 Day 47**  |
| **FINAL PRACTICAL TEST** |

**Minimum pass mark (COMPETENT): 70% for each theory subject and 70% for practical;**

**Fail candidates are entitled to one more chance to clear the paper.**

**RESULTS AND CERTIFICATION:** Successful trainees will be awarded the Certificates by

**MSME TECHNOLOGY CENTRE**.

**ASSESSMENT EVIDENCE:** Assessment evidence comprises the following components document in the form of records:

* Examination - Answer sheet of assessment
* Viva –voce ; Class test
* Progress chart ; Attendance and punctuality
* Assignment of practical exercise job ; Practical Exam for each module

|  |
| --- |
|  **Evaluation Criteria for MSME Students Certification for** **CERTIFICATE COURSE IN ROOM AC & HOME APPLAINCES Course**  |
| Date Prepared: 15-Nov-15, Date Updated: 06-Jan-17 |
| **Sr. No.** |

|  |
| --- |
| **Evaluation Topic** |

 | **Method** | **Sub evaluation criteria** | **Marks** |
| 1 | Theoretical | Written test | **Final certification test** | 20 |
| **Product-Module wise test** | 10 |
| 2 | Practical | Practical test | **Product-Module wise Practical test** | 50 |
| 3 | Behavioral  | Attendance tracking | **Attendance**  | 10 |
| Instructor Observation | **Discipline**  | 5 |
|  Samsung uniforms |
|  Participation in class activities |
|  personal hygiene |
| **Communication Skills** | 5 |
|  Speaking skills |
|  Listening skills |
|  courteous communication |
|  Interaction with others  |
|   | Total | 100 |

|  |
| --- |
| **Overall Grade****1:Master- >95 ; 2:Expert- 81-95 ; 3:Senior- 71-80 ; 4: Fail<70** |
|  |
| **Grade wise Distribution of MSME Samsung Technical School Trainees, Kolkata**  |
| Date Prepared: 15-Nov-15, Date Updated: 06-Jan-17 |
| Course | Total Students | **Trainees Grade Split Up** | **Remarks** |
| **1- Master** | **2- Expert** | **3- Senior** | **4- Fail** |
| Numbers | %age | Numbers | %age | Numbers | %age | Numbers | %age |
|  |  |  |  |  |  |  |  |  |  |   |
| Total |  |  |  |  |  |  |  |  |  |  |

**Title of Component: “CERTIFICATE COURSE IN ROOM AC & HOME APPLAINCES”**

**Assessable outcomes:**

|  |
| --- |
| **Means of assessment :**Assessment comprises the following components:* Answer sheet of assessment
* Written Class Test
* Viva-voce
* Attendance and punctuality
* Practical Exam for each module
 |
| **Pass (Competent)/Fail (Not yet Competent): 70% for each Theory subject and 70% for Practical.****Fail candidates (not yet competent) are entitled to one more chance to clear the paper for Basic Module only in order to be competent.** |

|  |
| --- |
|  |